SRI VENKATESWARA UNIVERSITY: TIRUPATI
S.V.U COLLEGE OF ARTS
DEPARTMENT OF ADULT & CONTINUING EDUCATION



Course
M.A. ADULT & CONTINUING EDUCATION

Choice Based Credit System (CBCS)
Academic Year 2023 – 24
Amended as per NEP-2020

About the Department

The Department of Adult and Continuing Education, Sri Venkateswara University was established in 1972. At present 3 teaching faculty, 3 Academic Consultants and 2 Supporting Staff are working in the Department. The Department has well equipped Library, Computer Lab and Seminar hall. Since its inception, the Department has been designing and implementing a variety of Teaching, Research and Extension Activities. Initially, the Department offered PG Diploma in Adult Education during 1973-78. The Department has been offering 2 PG courses i.e. M.A. Adult Education (since 1980) with an intake of 21 students & MA Rural Development & Management (since 2012) with an intake of 20 students by following choice based credit system and semester pattern. Under research, the department is offering M.Phil, PhD programmes in both Adult Education and Rural Development. The Department is undertaking individual & sponsored research projects with the financial support of UGC, NCERT, SSA, ICSSR, Planning Commission, and Ministry of Tribal Welfare. So far the Department produced 39 Ph.D's and 17 M.Phil's. Further 337 Project works as a part of MA Course were completed. Directorate of Adult Education, Govt. of India, New Delhi has empanelled the Department as external evaluating agency to evaluate Adult Education Programmes. Since 1998 to till date Adult Education programmes of different states, Jana Sikshan Sansthans & SRCs were evaluated. The Department has organized 1 International conference and 63 National seminars, published 112 books and 444 research articles in National and International Journals. The Department has initiated dissemination of research findings through publication of Journal of Adult Education & Extension and several books. Under Extension, the Department has Regional Resource Centre during 1978 to 1986; Population Education Resource Centre in 1989; Nucleus cell during 1989 to 1991; to provide resource support to adult education programmes. The major contribution of the Department in the field of Adult Education was Preparation of Primers to the adult learners, material preparation and training to the field functionaries etc. In addition to the above, the Department has adopted villages and organized Literacy promotion programmes, Awareness programmes, Health camps to develop favorable attitude among the rural community. Recognizing the potentialities of the Department, the University Grants Commission, New Delhi has granted special Assistance Programme DRS – I for the period 2009 – 14, DRS – II for the period 2015 to 2020; to work on 3 main thrust areas namely: vocational training, research, and career guidance & counseling. In the area of career guidance & counseling the department organized training programmes to the: coordinators of

career guidance and counseling cells, guidance and counseling camps for students. In addition to the above, the Department organized: Computer Courses, Tailoring, Saree Printing, Painting, Embroidery, Candle Making, Detergent Making, Vermin Compost to student & non student youth and women. Recognizing the potentialities and contributions of the Department in the field of Adult Education; The Ministry of Human Resource Development has awarded NLM, UNESCO award to the Department during the year 2006, which has brought laurels & image to the Department and the university.

Achievements bagged by the Department so far:

NLM, UNESO Award – 2006
SAP - DRS – I & DRS – II
Organized 1 International & 61 National Seminars
Published 112 Books and 444 Articles
Publication of Journal – Journal of Adult Education & Extension. ISSN No
Completed 70 Research projects and 24 Evaluation Projects
Trained more than 1000 Literacy Educators
Eradicated illiteracy in 4 Adopted Villages
Trained 300 students on computer skills
Trained 300 Women on vocational aspects

Vision

- The Department notion is to be acted as nodal center to disseminate the knowledge, conduct research at Local and higher level i.e. National bodies and organizing extension activities for needy people. As a whole the department wish to build the community with an adequate skills and sound human resources. And also, to play a vital role in the preparation of Planning in terms of Literacy and Rural Community Development Programmes, which have been introduced by State and Central Governments.

Mission

- The Department of Adult Education has confined to three domains, i.e., Teaching, Research and Extension. The teaching learning activity is to enhance the aptitude and Personality development of students. It is preparing the students towards Self-Reliance, Self-Development and Self-Employment. Eventually the students have been trained as dynamic citizens.
- As far as research is concerned the department has been conducting the qualitative and quantitative research on thrust areas. The enhancement of the literacy at the grassroot level and evaluating the National Bodies at the higher level are the main targets of the Department. The Department is also disseminating the research findings through Publications.
- In the case of extension activities, the department is preparing materials for field functionaries and conducting surveys on Welfare Schemes of State and Central Governments. The department has been conducting Health camps, Literacy camps, Vocational training programmes, awareness programmes and also conducting the celebrations on National/International important days in Rural areas to bring cognitive changes among rural people. One of the aims of the Department is adopting backward hamlets to change their environment and mind for respectable life. To strengthen the departmental Extension activities as well as the students all round development, the department wishes to exchange the MOU with RASS, NGO, Tirupati.
- The staff members are permitted to participate in Induction and Capacity Building Programmes to meet the academic demands.

Department Objectives:

- To train the students to mastery over the subjects in terms of Literacy Programmes and Rural Development aspects.
- To provide an adequate skill on research methods viz, Qualitative and Quantitative.
- To enhance the sense of Integrity on Adult Learners Problems and Rural People Issues.
- To know and prepare the students to conduct extension and outreach activities.

The Department has been following University and UGC guidelines to enhance, revision and implement the course curriculum for two Post Graduate Programmes. i.e. M.A. Adult Education and M.A. Rural Development and Management. The courses are providing theoretical and practical knowledge to the students. The traits of the course curriculum are development of Cognitive and Effective domain of students and train them as socially responsible citizens. Visit the Institutions, NGO's & Rural areas to draw factual information and do research on thrust areas. In turn the students can get employment in GO's NGO's or start their own social institution. Apart from that the course Inculcates Personal, family, Social values, Human values, Gender equality and Professional values to lead the respectable life. The course emphasis on Employability, Entrepreneurship and Skill Development. The programmes principles and outcomes are meant for students and community development.

Programme Specific Outcomes

To enable the student…

- To Know the Philosophised, Sociological and Psychological background of Adult Education and Learning. Identify the five years policy programmes and Teaching Learning methods (TLM) in Adult Education.
- To Understand the Research Techniques and methods to Identify the problems in Adult Education class management and Learners Issues. To raise the Efficiency among students in field work.
- To enhance the Level of skills to participate in grass rood Level activities and Learning aspects and also visualise the need and Importance of guidance & counselling for Adult Learners.
- To recognise the importance of human Resource in Adult Education Programmers and Identify the need of Environmental Protection and role of NGOS.

Programme Objectives:

To enable the students:

- To understand the basic principles and aspects of Life Long Learning and motivational techniques of Adult Learner.
- To know the importance of different teaching methods, Curriculum and Teaching Learning materials to organize the Literacy classes.
- To acquire training skills, Soft skills and Guidance & Counselling to conduct Literacy classes.
- To recognize the significance of monitoring, Evaluation in Lifelong learning(LLL) and Inclusive Policies for Human Resource Development.
- To conduct action research, Project work and field studies on Literacy aspects and Adult Learners Problems.

Programme Outcomes: POs

After completion of M.A. Adult Education programme the student is able to

- Acquire knowledge in relation to types of education, policies of Adult Education aspects, Adult Psychology & Learning and Evaluation of Adult Education Programmes and progress.
- Identify and Analyse the significance of Teaching Learning materials, Unique Curriculum and Vocational training for Adults to attend the Literacy classes.
- Trace and Investigate the Problems of Adult Learners in terms of Socio, Economic and Cultural aspects and provide guidance & Counselling for Adult learners.
- Design and develop materials and strategies for people participation in Community/ Mass Literacy programmes.
- Conduct Social Research by using and adopting appropriate tools to identify the problems of learners, Teacher educators and ministerial staff in connection with literacy classes.

- Recognise the Literacy importance skills and apply to social reforms and community development.
- Inculcate enthusiasm towards literacy and Lifelong Learning among learners and its knowledge to clean the surroundings and protect the environment.
- Identify the Literacy and continuing education role to enhance the individual perception towards ethics and values.
- Find out the importance of teamwork to complete the task and literacy works and sustainable development.
- Develop Communication skills which are essential to conduct and organise Adult Education programme by interact with the Adult Learners.
- Describe the Project Planning and management by following POSDCORB Principle for effective implementation of Literacy classes and LLL.
- Recognise the core principles of Life Long Learning with reference to Socio, Economic and Psychological development.

Programme Educational Objectives (PEO):

To enable the students to:

- Recognize the relationships between Philosophical, Sociological and Psychological traits and Literacy status of India.
- Apply multiple skills to organize the Literacy Programmes and its POSDCORB.
- Imbibe the Human values and professional ethics for personal and social harmony.
- Elicit information on literacy & illiteracy aspects and interpret research outcomes for Community and Nation Development.

Choice Based Credit System

SEMESTER- I

S. No	Course Code	Components of study	Title of the Course	Contact hours	No. of Credits	I.E	SEM	Total Marks
1	MAAE - 1.1	Core	ALTERNATIVE LEARNING SYSTEMS	6	4	20	80	100
2	MAAE-1.2	Core	POLICY STUDIES IN ADULT/CONTINUING EDUCATION	6	4	20	80	100
3	MAAE-1.3	Core	ADULT PSYCHOLOGY AND LEARNING	6	4	20	80	100
4	MAAE-1.4	Core	SOCIO-PHILOSOPHICAL FOUNDATONS OF ADULT EDUCATION	6	4	20	80	100
5	MAAE-1.5	CF	COMMUNICATIONMETHODSIN ADULT EDUCATION	6	4	20	80	100
6	MAAE-1.6	EF	HUMAN VALUES AND PROFESSIONAL ETHICS-I	3	2	10	40	50
7		Total		33	22	-	-	550

SEMESTER- II

S. No	Course Code	Components of study	Title of the Course	Contact hours	No. of Credits	I.E	SEM	Total Marks
1	MAAE -2.1	Core	RECENT TRENDS IN ADULT AND CONTINUING EDUCATION	6	4	20	80	100
2	MAAE -2.2	Core	CURRICULUM AND METHODS OF LITERACY TEACHING	6	4	20	80	100
3	MAAE -2.3	Core	RESEARCH METHODS IN ADULT EDUCATION	6	4	20	80	100
4	MAAE -2.4	Core	FIELD WORK & PRACTICAL ASSIGNMENTS	6	4	20	80	100
5	MAAE -2.5	CF	MANAGEMENT OF ADULT/CONTINUING EDUCATION	6	4	20	80	100
6	MAAE -2.6	EF	HUMAN VALUES AND PROFESSIONAL ETHICS-II	3	2	10	40	50
Total				33	22	-	-	550

SEMESTER- III

S. No	Course Code	Components of study	Title of the Course	Contact hours	No. of Credits	I.E	SEM	Total Marks
1	MAAE-3.1	Core	TRAINING IN ADULT AND CONTINUING EDUCATION	6	4	20	80	100
2	MAAE-3.2	Core	COMPARATIVE STUDIES IN ADULT EDUCATION	6	4	20	80	100
3	MAAE-3.3	Core	MATERIAL DEVELOPMENT FOR ADULT& CONTINUING EDUCATION	6	4	20	80	100
4	MAAE-3.4a	GE*	PEOPLES' PARTICIPATION AND DEVELOPMENT	6	4	20	80	100
	MAAE-3.4b		VOCATIONAL EDUCATION & TRAINING					
	MAAE-3.4c		GUIDANCE AND COUNSELLING IN ADULT/CONTINUING EDUCATION					
	MAAE-3.4d		INCLUSIVE EDUCATION					
Total				24	16	-	-	400
5	MAAE-4.5a	OE#	INFORMATION TECHNOLOGY FOR CONTINUING EDUCATION	6	4	20	80	100
	MAAE-4.5b		ENTREPRENEURSHIP DEVELOPMENT	6	4	20	80	100
	MAAE-4.5c		WOMEN'S EDUCATION & DEVELOPMENT	6	4	20	80	100

Note: *Among the Generic Electives the student shall choose three; # Among the Open Electives the student shall choose one.

SEMESTER- IV

S. No	Course Code	Components of study	Title of the Course	Contact hours	No. of Credits	I.E	SEM	Total Marks
1	MAAE-4.1	Core	MONITORING & EVALUATION	6	4	20	80	100
2	MAAE-4.2	Core	HUMAN RESOURCES MANAGEMENT& DEVELOPMENT	6	4	20	80	100
3	MAAE-4.3	Core	DISSERTATION / PROJECT WORK	6	4	20	80	100
4	MAAE-4.4	GE	a ENVIRONMENTAL EDUCATION b STATISTICAL METHODS FOR SOCIAL RESEARCH c DEVELOPMENT STRATEGIES & VOLUNTARISM d POPULATION EDUCATION	6	4	20	80	100
Total				24	16	-	-	400
	MAAE-4.5	OE	a ADULT EDUCATION AND EXTENSION b SKILL DEVELOPMENT INITIATIVES c CAREER GUIDANCE AND COUNSELING	6	4	20	80	100

Note: *Among the Generic Electives the student shall choose three; # Among the Open Electives the student shall choose one.

Course:101: ALTERNATIVE LEARNING SYSTEMS

UNIT I- Education - Meaning & Concept - Definition - Objectives . Functions- Status of Formal Education System - Modifications needed in the educational system - De-schooling movement, Forms of Education - Formal. Non-Formal and Informal Emergence of the Non-Formal Education.

UNIT- II: Non-Formal Education - Meaning & Concept - Definition -Objectives- Scope - Significance and varying functions of non-formal education - Typologies of – Non - formal education - Adult education - Life-long Continuing Education - Distance Education – out - of- school Education.

UNIT- III: Technology support services: Computer Aided Learning (CAL) - Computer Assisted Instruction (CAI) - Internet - World wide web - Accessing NET for learning Cable Television telecommunications, Application in Indian Context .

UNIT IV : Organization , Administration , Monitoring and Evaluation of NFE Systems in India.

REFERENCE BOOKS

1. Allemano, E Non-Formal Education, RAMS Project (Rural Assessment Manpower Surveys), Washington. D.C. Agency for International Development,1981, 237 p.
2. Ansari, N .A. Adult Edu.-iation in India; S. Chand & Company Ltd, New Delhi, 1984.
3. Camillo Bonanni. Education for Human Needs: NFE Field experiences and Designs, Indian Adult Education Asso-ciation, 1982.
4. Coombs, P.H. & Ahmed, M. Attacking Rural Poverty: How Non-Formal Education Can Help. Baltimore, M.D., The Johns Hopkins University Press. 1974,292 p.
5. Coombs, P.H , et al. New Paths to Learning for Rural Children and Youth, New York International Council for Educational Development, 1973, 133 p.
6. Dahama, O.P. and Bhatnagar O.P. (1980) : Education and Communication for Development. Oxford & IBH Publishing Co, New Delhi.
7. Faure. Edgar et al : Learning To Be The World of Education-Today and Tomorrow. UNESCO. Paris, 1972, 313 p.
8. Lengrand, Paul An Introduction to Life-long Education.
9. Mohanty, Jagannath. Adult and Non-Formal Education, Deep and Deep Publications , New Delhi. 1991.

10. Naik, J.P. Some Perspectives on Non-Formal Education. Allied Publishers Pvt. Ltd New Delhi. 1977.

Course Out comes

CO1: Remembrance of different forms of learning.

CO2: Application of different technology support services for effective learning.

CO3: Organization and administration of nonformal education programmes.

CO4: Evaluation of nonformal education programmes.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	1	2	1	2	2	2	1	3
CO2	2	2	3	1	3	2	1	2	3	2	2	3
CO3	3	2	2	3	2	2	1	1	3	2	3	3
CO4	3	2	2	2	1	1	-	2	2	3	2	3

3: High; 2: Medium; 1: Low

Course 1.2: POLICY STUDIES IN ADULT/CONTINUING EDUCATION

UNIT- I: Socio-political movements during pre-independence period for promotion of Adult Education: Library Movement (1911-1919), Co-operative movement (1918-1936) and Political movement (1937-1942); Individual efforts for Adult Education - M. Viseswaraiah, padicherla Hari Sarvothama Rao. Sanivarapu Subbarao, Prof. N.G. Ranga, Durgabai Deshmukh.

UNIT- II: Major policy trends in Adult Education during Post- Independence period: Social Education (1949). Farmers Functional Literacy Programme (1967), Non-Formal Education programme for women and youth (1975), National Adult Education programme (1978), National Literacy Mission (1988), Sakshar bharat mission. (2009)

UNIT- III: International and National organizations of Adult Education. Indian Adult Education Association; Literacy House (Lucknow); Andhra Mahila Sabha (Hyderabad); Seva Mandir (Udaipur); Bengal Social Service League; Rayalaseema Development Trust (Ananthapur), UNESCO, ASPBAE, ICAE, IAEA,

UNIT- IV: Government policy on Adult Education with particular preference to Literacy, Post literacy and Continuing Education; UGC policy on Adult/Continuing Education and Extension and Field outreach.

REFERENCE BOOKS

1. Allen Brent, Philosophical foundations for the Curriculum. George Allen & Unwin Publishers Ltd., London, 1973.

2. Bordia, A. and others (Ed.) Adult Education in India. Indian Adult Education Association, New Delhi .

3. Daswani, C.J., and S.Y. Shah (Eds) Adult Education in India, Selected papers, UNESCO, New Delhi, 2000.

4. Directorate of Adult Education. The Long March to Literacy, Government of India, New Delhi - 17.

5. Dutta, S.C. History of Adult Education in India, IAEA, New Delhi, 1986.

6. Lowe, John: The Education of Adults: A world perspective, Paris, UNESCO Press, 1975.

7. Ministry of Human Resource Development. New Policy on Education, Government of India, New Delhi, 1986.

8. Ministry of Human Resource Development. Guidelines for Project Formulation, Government of India, New Delhi, 1987

Course Outcomes:

1. Identify the socio-political movements during pre-independence period for the promotion of literacy.

2.Analyze the trends of adult education programmes during post-independence period from social education to saakshar Bharat Mission.

3.Describe the National and International organizations efforts for the promotion of literacy at various levels.

4.Ex plain the State & Central Govt policies on adult education and special reference to literacy, post-literacy and continuing education.

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	1	3	1	2	2	1	1	3
CO2	3	1	1	3	1	3	-	1	1	2	1	3
CO3	3	1	2	1	3	3	1	2	1	2	2	3
CO4	3	3	2	3	1	2	-	1	3	3	2	3

3: High; 2: Medium; 1: Low

Course:1.3: ADULT PSYCHOLOGY AND LEARNING

UNIT- I: Psychology : Meaning, nature, scope and relevance of Psychology to Adult Education.

UNIT-II: Motivation : Definition, functions, classification of motives, methods of measuring human motivation, Maslow's theory of hierarchy of needs, Achievement motivation, theory and techniques of motivating adults for learning.

UNIT- III: Adult personality: Meaning, types, factors affecting personality and aspects of personality- cognitive and affective domains.

UNIT- IV: Learning : Nature, types, characteristics of learning-ways of learning-basic concepts of learning and their significance, Laws of learning and their implications to adult learning- Theories and principles of adult learning strategies : Guided learning, Inter-learning and self- directed learning. - factors influencing adult learning/ instruction

REFERENCE BOOKS

1. Asher E.J., Tiffin, J, and Knight F.B. (1953). An Introduction to General Psychology. D.C. Health & Co., Hoston, USA.
2. Adult Learning : A Design for Action, Pergamen Press, 1978.
3. Borger, R. Seaborne, A.E.M., The Psychology of Learning, 1964.
4. Dave, R.H., Perera, D.A. and Quane, A. (Ed). Learning strategies for post-literacy and Continuing education : A cross-national perspective, Hamburg, Robert Seeman, 1985.
6. Dharm Vir. Adult Psychology & Educational Methods, International Cooperatie alliance, New Delhi, 1981.
7. Gagne, R. The Conditions of Learning, New York, 1966.
8. Gohrpade, M.B. Essenstials of Psychology, Himalaya Publishing House, Bombay.

Course Out Comes (Cos):

1: Acquire knowledge on psychological foundations and its relevance to Adult Education and Learners.

2: Learn classification of motives and motivation techniques to motivate the Adult Learner.

3: Compare the Adult Personality & Child personality based on three Domain principles.

4: Examine the Adult Learning characteristics and theories of learning, eventually he/she will apply all aspects in adult class room activity.

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	-	2	2	3	2	3
CO2	3	3	2	3	1	2	-	2	2	3	2	3
CO3	3	3	1	3	1	3	-	3	2	3	2	3
CO4	3	3	1	2	3	2	-	2	2	2	2	3

3: High; 2: Medium; 1: Low

Course:1.4: SOCIO-PHILOSOPHICAL FOUNDATONS OF ADULT EDUCATION

Unit – I : Philosophical Foundations: Principles governing the Philosophy of Education, Major Educational theories – Liberal, Behaviorist, Progressive, Humanistic, Radical and Analytical; Values of Education vis-à-vis challenges of contemporary society.

Unit - I: Philosophical Approaches: Rabindranath Tagore and Mahatma Gandhi, Conscientization approach (Ideas of Paulo Friere), Frank Leauback, Julins Narere, Socialist Pedagogy; Eminent Thinkers and their Ideas –Swami Vivekanand, B.R. Ambedkar, Dr. Zakir Hussain, M.S. Mehta.

Unit – III : Sociological foundations: Definition of Sociology, Nature of Human Society, Concept of Society, Relevance of Sociology for adult education; Social Mobility and Education – Concept of Socio-economic Inequalities, Manifestation of Inequality in the Social System, Socio-economic dimension of poverty as an aspect of Social Inequality, Social Stratification (class, caste and gender).

Unit – IV: Social Change and Movements: Social Change & Social Resistance; Dalit Movement, Women's Movement , Cooperative movement, Peasants' Movement, Literacy movements.

Reference Books

Hoyes, Nicky (1994), Foundation of Psychology: An Introduction, London: Routhedge.

Hurlock, E.A.(1984), Development Psychology: Life Span Approach, New Delhi : Tata MacGrow Hill.

Noddings, Nel(2007), Philosophy of Education ,Colorado : Westview Press.

Palmer, Joy A (2001) Fifty Modern thinker on Education: Piaget to the present day. London, Routledge flamer.

Preece, Julia (2009), Lifelong Learning and Development : A Southern Perspective, London : Continuum International Publishing Group.

Srinivas, M.N. (1956), A Note on Sanskritization and Westernization, New Delhi: University of Delhi.

Course Out Comes:

1. Create thinking capacity to survival in the present society with philosophical approach.
2. Know great eminent leaders biography, sacrifices their lives for society.
3. Aware Dalit movement, women movement, co-operative movement in society especially rural areas.
4. Examine the problems of society with reference to bonded labor, child labour, untouchability, transgender and provide awareness on human rights.

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	1	-	1	2	2	1	3
CO2	3	1	2	2	1	3	1	2	1	2	1	3
CO3	3	2	1	3	2	3	2	2	3	2	1	3
CO4	3	2	1	3	2	3	2	1	2	3	1	3

3: High; 2: Medium; 1: Low

Course1.5: COMMUNICATION METHODS IN ADULT EDUCATION

UNIT- I: Communication: Definition, process, functions, principles and their application to Adult Education, Teaching and Communication, Methods of teaching adults: Individual, group and mass methods.

UNIT- II: Communication interaction - Models of Communication, Inter- personal communication; Inter-cultural communication; Feedback and control; effects of feedback in communication, Factors influencing communication: Fidelity of communication (determinants of effect); Communication barriers and overcoming them.

UNIT-III: Communication media: Definition, Classification, nature and selection of communication media - Role of mass media in Adult Education;

UNIT-IV: Audio-visual aids: Types, selection and use of the selected aids: Chalk boards, flash cards, flannel graphs. bulletin boards, posters, pictures, maps, charts, diagrams, puppets, exhibits, folders, flip charts, photographs, banners, wall news papers, audio cassettes, video cassettes, slides, traditional media like harikathas and burrakathas, models, specimens.- Utilization in Adult Education

REFERENCE BOOKS

1. Adivi Reddy. A.. Extension Education. Bapatla, Sreelakshmi Press, 1971.
2. Bose, J. Educational Techniques in Community Development. Orient Longmans, Bombay, Madras & New Delhi.
3. Chakravarthy, S.R., Aduio-Visual Aids.in Education, New Delhi.Sagar Publications, 1977.
4. Dahama, O.P. & Bhatnagar, O.P. Education and Communications for Development, Oxford & IBH Publishing Co., New Delhi, 1989.
5. Daman Prakash A., Handbook of Communication and the Cooperative teacher, International Cooperative Alliance, New Delhi, 1975.
6. Dale Edgar, Audio-visual methods in teaching, Helt, Rinehart and Winston Inc., 1969.
7. Homes & H.elen Kember, Selected Problems in Social Education, Indian Adult Education Association, New Delhi.
8. Kuppuswamy, Communication and Social Development. Delhi, Sterling Publishers, 1976.
9. Peterson, A.D.0 (Ed.) Techniques of Teaching, VoL3, Oxford, Pergamen Press, 1965.
10. Reddy V.L.N. & Reddy M.C.R., Training Techniques for Functionaries in Adult Education, Project Officer's Training Report Banaras Hindu University. Varanasi, 1984.

11. Sohan Singh, Social Education. Concept and Method. Orient Longmans Publications: Bombay.

COURSE OUTCOMES

1. Remembering the concept and methods of communication and their application to adult Education
2. Identifying different models of communication.
3. Describing the media of communication and their utility in continuing education.
4. Realising the use of different Audio-visual aids in teaching learning process.

CO – PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	1	2	1	2	1	3
CO2	3	3	2	1	2	1	2	2	2	3	1	3
CO3	3	3	2	2	1	2	2	1	2	3	2	3
CO4	3	2	2	2	1	2	1	2	3	3	2	3

3: High; 2: Medium; 1: Low

Course1.6: HUMAN VALUES AND PROFESSIONAL ETHICS-I

Unit –I: Ethics : Definition, Nature, Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics –Ethical Values in various professions.

Unit – II: Values: Nature - Good and Bad, Ends and Means, Actual and potential values, Objective and Subjective Values; Analysis of basic moral concepts – right, ought, duty obligation, justice, responsibility and freedom, good behavior and respect for elders. Characters and conduct.

Unit –III: Individual and Society Ahimsa (Non-Violence), Satya (Truth) Brahmacharya (Celibacy) Asteya (Non possession) and Aparigraha (Non-Stealing) Purusharthas (Cardinal Virtues) Dharma (Righteousness), Artha (Wealth), Kama (fulfillment Bodily Desires) MOksha (Liberation)

Unit-IV: Crime and Theories of punishment – (a) Reformative, retributive and Deterrent (b) Views on Manu and Yajnavalkya.

Books for study:

1. Johan S Mackenjie: Amanual of ethics
2. "the Ethics of Management "by Larue Tone Hosmer, Richard D.Irwin 1nc.
3. "Management Ethics – integrity at work by josph A. Petrick and John F Quinn response Books: New Delhi.
4. "Ethics in Management" by S.A. S herlekar, Him

Course Out comes:

1. know the importance of professional ethics and to implement the ethical values in various professions.

2. understand about the Good and bad values and to analyze the basic moral concepts.

3. inculcate the students in the aspects of pursharthas .

4. Know different crimes and its impact on personal and social life and theories of punishment

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CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	2	3	--	3	1	2	2	3
CO2	3	3	2	1	2	2	--	3	1	2	2	3
CO3	3	3	1	2	1	2	--	3	1	3	1	3
CO4	3	3	2	1	1	2	--	3	1	2	1	3

3: High; 2: Medium; 1: Low

Course2.1: RECENT TRENDS IN ADULT AND CONTINUING EDUCATION

UNIT- I: Magnitude of illiteracy in India with special reference to Andhra Pradesh: Spatio - Temporal variations of literacy - Male. Female, rural, urban disparities in literacy; Need for analysing literacy data.

UNIT- II: Sakshar Bharath Mission-Objectives, strategies, Goals, Programmes, Strengths, Weakness, Opportunities and Threats (SWOT Analysis)

UNIT- III:: Extension as the Third Dimension - Adult, Continuing Education, Community colleges, Inclusive and Exclusive centres and Centre for women studies.

UNIT- IV: Scheme of Jana Sikshana Sansthans: Concept, objectives, functions, target group, organization and management, staffing and finance, monitoring, evaluation and follow-up.

REFERENCE BOOKS

1. Vashist. S. R. (Ed.) Adult Education: Issues, Problems and Prospects, Pointer Publishers, Jaipur, 1997.
2. Ministry of Human Resource Development. National Literacy Mission, Government of India, New Delhi, 1987.
3. Ministry of Human Resource Development. National Literacy Mission, Government of India, New Delhi, 1988.
4. Ministry of Human Resource Development. Scheme of 'Continuing Education for Neo-literates, NLMA, Government of India, New Delhi, 1996.
5. M.H.R.D (2000). Scheme of Jan Shikshan Sansthan (Institute of People's Education) : Guidelines for Management, Planning and Programming, Directorate of Adult Education, Dept. of Elementary Education & Literacy, Govt. of India, New Delhi.
6. National Literacy Mission. Continuing Education For Development: Appeal Approach (ATLP-CE in brief), MHRD,. Government of India, New Delhi, 1996.

Course outcomes:

1.Identify the variations of literacy growth among States and Nation with reference to gender, rural and urban.

2.Recognize the functions, activities of JSS and Saakshar Bharat Mission, to promote Life Long learning.

3. Understand the five-year plan period programmes in terms of literacy, non-formal and functional literacy.

4. Examine the significance of the extension activities as third dimension of literacy programmes at field level.

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	3	-	3	2	1	1	3
CO2	3	2	3	3	1	3	-	2	2	2	2	3
CO3	3	2	2	3	2	3	-	2	1	2	2	3
CO4	3	2	3	3	3	3	-	2	2	2	2	3

3: High; 2: Medium; 1: Low

Course 2.2: CURRICULUM AND METHODS OF LITERACY TEACHING

UNIT- I: Curriculum: Concept, Scope. Foundations of Curriculum Development- Socio - cultural and Psychological, Traditional Vs Functional literacy - Different approaches to functional literacy - Freirera's approach, Reflect approach. Laubach approach, Integrated approach.

UNIT- II: IPCL Curriculum: Concept, approach Issues relating to Selection of concept and topic; their organization and presentation - Principles relating to the development of reading and numeracy lessons - Teaching literacy through IPCL primers.

UNIT- III: Teaching of Reading, writing and numeracy to adults -Principles, approaches. Games for literacy and numeracy to adults - activity based instruction. Methods Of Teaching literacy: Analytic, synthetic, eclectic methods.

UNIT- IV: curriculum evaluation-evaluation of literacy and post-literacy materials-designing new curriculum for different target groups.

REFERENCE BOOKS

1. Allen Brent, Philosophical Foundations for the Curriculum, George Allen & Unwin Publishers Ltd., London, 1973.
2. Daniel Tanner & Laurel N. Tanner, Curriculum Development, Theory into practice (Second Edition), Macmillan Publishing Co. Inc., 866, Third Avenue, New York, 1980.
3. David, R. Evans. Games & Simulations in Literacy Training, Literacy in Development - A series of training monographs, Hutton Educational Publications Limited in Cooperation with the IIALM, Tehran, 1979.
4. Directorate of Adult Education, Hand book for developing IPCL Materials, Ministry of Human Resource Development, Govt. of India, New Delhi.
5. Gupta, N.R. Manual for Adult Literacy Teachers. Indian Adult Education Association, New Delhi.
6. Minor Gwynn, J., & John, R. Chage Jr., Curriculum Principles and Social trends, The Mac millan Co., Collier Macmillan Canada Ltd., Toranto, Ontario, 1970.

7. Mustaq Ahmed. How to write Primers for Adults, Directorate of Adult Education, New Delhi, 1979.
8. Paulo Freire. Education: The Practice of Freedom. Writers & Readers Publishers, London, 1974.
9. Pratt David. Curriculum Design and Development, Harcourt Brace Jovanovigh Inc., New York, 1980.

Course Out comes:

1. Remembering the meaning, foundations and theories of curriculum development with reference to adult learners.
2. Distinguishing different principles and approaches of curriculum development.
3. Interpreting the needs and interests of lifelong learners.
4. Executing to evaluate Adult Education programmes

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	2	--	2	3	3	2	3
CO2	3	2	3	2	1	2	--	2	1	2	1	3
CO3	3	2	1	2	1	1	--	2	2	3	2	3
CO4	3	2	2	1	1	1	--	2	2	3	1	3

3: High; 2: Medium; 1: Low

Course 2.3: RESEARCH METHODS IN ADULT EDUCATION

UNIT - I: Research - Concept, Nature and significance of research in adult education, priorities of research and adult & continuing education types of research - basic, applied, action research participatory approach in research.

UNIT- II: Research methods - Historical, experimental descriptive .and survey. Source of data primary and secondary

UNIT- III: Hypotheses - Definition, objectives & types; Sampling -Meaning, advantages and methods- random. systematic, stratified, multi-stage, cluster, purposive, quota.

UNIT- IV: Tools of Research, tools of data collection: Questionnaire – Schedule – Interview - Observation, Rating scale – steps in Report writing.

REFERENCE BOOKS

1. Babbie Earl, The Practice of Social Research, (London: Wadswarth Publishing Company, 1983)
2. Goode W.J. & Hatt P.K., Methods of Social Research, London. Me. Grand Hill Book Company. 1952.
3. Harald, S. Stone et al., Introduction to. Computer Architecture, Galgatia Publications Private Ltd., New Delhi, 1988.
4. James A. Black, Dean J. Champian, Methods and Issues in Social Research, John Willey & Sans Inc. London,1976.
5. James Martin, Computer data base organisation, Prentice hall of India Private Ltd., New Delhi. 1988.
6. Krishnaswamy. O.R. Methodology of Research in Social Sciences, Himalaya Publishing House. Delhi, 1999.
7. Kotari C.R., Research Methodology, Methods and Techniques, Wiley Eastern Ltd. New Delhi. 1985.
8. Owen Hansan, Essentials of Computer data files, Affiliated East West Press Ltd.. New Delhi, 1985.
9. William Gear. C. Introduction to Computers, Structured Programming and Applications. Galgotia Publications Private Limited, New Delhi.
10. Yaung P.V.; Scientific social surveys and research, New York, Prentice Hall. 1966.
11. D.H. Sanders. "Computer Today. Mc Graw Hil1, 3rd Edition

Course Outcomes

1. Understanding the concepts and methods of research.
2. Adopting the suitable sampling methods for research studies.
3. Developing tools for research studies.
4. Ability of research report writing.

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	2	-	2	2	2	1	3
CO2	2	2	3	2	3	1	-	2	2	2	3	3
CO3	3	2	2	2	3	2	-	2	2	2	2	3
CO4	2	2	3	2	3	2	-	2	2	2	1	3

*** 3: High; 2: Medium; 1: Low**

Course:2.4: FIELD WORK & PRACTICAL ASSIGNMENTS

(Each component carries 15 marks

1. Prepare curriculum for a specific group, keeping their level, background, status and conducting a skill development training .class for the neo-literates at the Continuing Education Centre (Curriculum. Record).
2. Prepare two lesson plans based on the educational needs of basic literacy/ continuing. education learners and teaching two units by using suitable aids & methods in the literacy/ continuing education centre (Lesson Plan Record).
3. Visits to Non-Formal education institutes/ Agencies - Correspondence Institutions / Distance Education Institutions/ Study centres of IGNOU/Dr.B.R. Ambedkar Open University for understanding those agencies (NFE Report).
4. Visits to Continuing Education Centres for observing the functioning of those centres and preparing a consolidated report (CEG Report).
5. Visits to Mandel level, Divisional level, District level/State level/MSSIDSS/ZSS/ SDAE/University Departments/State Resource Centres for Adult Education for Understanding the organization and administration of these agencies and preparing a consolidated report (Management Record).
6. Viva-voce on the above reports

(Marks for Viva 25)

(Total : 100)

Course outcomes

1.Application of knowledge and skills in project designing

2.Ability to do research work.

3.Finding solutions to the problems identified in his research work.

4.Preparing the research report.

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	2	1	2	1	1	3
CO2	3	3	2	1	2	1	2	2	2	1	1	3
CO3	3	3	3	2	2	1	1	1	2	2	2	3
CO4	3	2	2	1	2	2	2	2	2	2	1	3

3: High; 2: Medium; 1: Low

Course2.5 : MANAGEMENT OF ADULT/CONTINUING EDUCATION

UNIT- I: Management: Concept, process and importance, Basic principles of Management - Planning, Organisation, Staffing, Directing, Co – Ordinating, Reporting and Budgeting - their application to adult education.

UNIT- II: Planning and Management of Sakshar Bharath; Administrative structure of Sakshar Bharath at Central, State, District, Mandal and Village levels.

UNIT- III: Project Planning and formulation: Concept, Categories. phases of project life cycle and essentials of project planning -project formulation techniques-goal -oriented project planning, systems approach to sustainable programme.

UNIT- IV: Management Information System (MIS): Definition, Need, Structure, Reports. Meetings, Data base. Application of MIS in Monitoring the Sakshar Bharath.

REFERENCE BOOKS

1. Chowdari S., Project Management, Tata Mc Graw Hill Publishing Company. New Delhi, 1988.
2. Computer Adult Learning Information System (CALIS)- User Manual, DAE, MHRD, Govt. of India. New Delhi, 1990.
3. Indian Institute of Management : Management of Education in India, A silver jubilee publication: IIM, Calcutta, 1987.
4. Mercy Anselm . Organizational Behavior: Himalaya Publishing house, Delhi, 1985.
5. Mridula Krishna, Project planning in India, IIP A; New Delhi, 1983.
6. National Institute of Information Technology. Management information system (MIS): Guidelines for Literacy personal, DAE, MHRD, Govt. of India. New Delhi, 1990.
7. National Institute. of Information Technology. Management Information system (MIS): Instructions for usage of MIS, DAE, MHRD, Govt. of India, New Delhi, 1990.
8. Prasanna Chandra. Projects - Preparation, Appraisal & Implementation.
9. Pradeep Kumar Principles of Management, Kedarnath Ramnath and Co., Merut.
10. Rajkumari Chandra Sekhar. Aspects of Adult Education. New era publications. Madras.

Course Out Comes:

1. Know the principles of Management, Planning and Organizing capacity to conduct Adult Education Programmes.
2. Develop Social and Communication Skills to organize village, Mandal, District, State and Central level programmes.
3. Acquire project techniques for sustainable programmes.
4. Learn and enhance research skills to write project report, monitoring and evaluation of data of Adult Education Programme.

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	3	2	2	2	1	2	1	3
CO2	3	2	1	2	3	1	3	2	2	1	2	3
CO3	3	2	3	2	2	3	3	2	3	3	2	3
CO4	3	3	2	1	2	2	3	2	3	3	2	3

3: High; 2: Medium; 1: Low

Course:2.6: HUMAN VALUES AND PROFESSIONAL ETHICS-II

Unit – I: Value Education: Definition- relevance to present day concept of human values; Self introspection-Self esteem. Family values-Components, structure and responsibilities of family; Neutralization of anger – adjustability – threats of family life – status of women in family and society – caring for needy and elderly – time allotment for sharing ideas and concerns.

Unit –II: Medical ethics: Views of charka, Sushurta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to justice in health care, human cloning problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit –III: Environmental ethics: Ethical theory, Man and nature- Ecological crisis, Pest control, Pollution and waste Climate change; Energy and population, justice and environmental health.

Unit- IV: Social ethics: Organ trade, human trafficking, Human rights violation and social disparities; Feminist ethics, surrogacy/pregnancy; Ethics of media - Impact of Newspapers, Television, Movies and Internet.

Books for study

1. John S Mackenjie: A manual of ethics
2. “the Ethics of Management” by Larue Tone Hosmer, Richard D.Irwin Inc.
3. “Management Ethics – integrity at work\ by joseph A.Petick and john f. Quinn Response Books:New delhi
4. “Ethics in managemen’By S.A.Sherlkar, Himalaya Publishing House,
5. Harold H. Titus: Ethics for Today
6. Maitra.S.K. Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha.A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian system of Duties: Religious and Civil (ed)G.C.Haughton

10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha. Chowkamba Sankrit series, VolI,II and III, Varnasi, Vol I OO, 16-20,21-22 and 74-77 only.
11. Caraka Samhita :Tr.Dr.Ram Karan Sarna and Vaidya Bhagavan Dash, Chowkambha.

Course Outcomes:

1. Understand and recognize the importance of Value Education & Human Values and also try to follow the traditional values of family, women and elders in the society.

2: Examine code of ethics for medical and health care professionals. They Can sensitize the rural people on Health Issues & Problems.

3: Explain the Environmental Protection and relationship between Man and Nature, causes of pollution and impact on environmental health.

4: Recognize the need of Social ethics and fight against the anti-social activities, Organ trade, Human trafficking etc.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	3	-	3	2	3	2	3
CO2	3	3	2	2	1	3	-	3	2	3	2	3
CO3	3	3	1	2	1	3	-	3	2	3	2	3
CO4	3	3	3	2	2	3	-	3	3	3	2	3

3: High; 2: Medium; 1: Low

Course3.1: TRAINING IN ADULT AND CONTINUING EDUCATION

UNIT- I: Training: Concept, definition, objectives, types, phases of training, principles, scope, need and importance; Difference between training and education.

UNIT- II: Training Design: Steps in designing training, needs assessment, training objectives, learning unit/content, training methods, training materials and assessment.

UNIT- III: Training materials and methods: Training manuals, Training notes/folders; Supporting aids and materials, Lecture, discussion, demonstration, role play, games and simulation, brain storming, field trip, case studies, problem – solving.

UNIT- IV: Planning, organisation, monitoring and evaluation of training programmes for literacy functionaries at different levels; Training facilities available at various levels - National, State, District, Local, Innovations in training.

REFERENCE BOOKS

1.Button. J.R. Training for Community Development, Oxford University Press, London, 1962.

2. DAE, Training of Adult Education Functionaries :. A Hand-book, Ministry of Education & Social Welfare, New Delhi, 1977.

3. Department of Adult Education, Learning for Participation: An approach to training in adult education, Govt. of India, New Delhi, 1978.

4.Gartner, A., Riessman, R. The Transforming of Training: UNESCO Adult Education Abstracting Service, Series 2, No.1975.

5. John Pettit. Participatory Training, Reports Magazine, No.16, March, 1978, World Education, New York.

6. Khamborkar, K.R. Training, Teaching, Techniques, Saoji Bungalow, Akola, 1980.

7. Lynton P. Rolf and Udai Pareek. Training for Development Richard D. Irwin Inc. and Dersey Press, Homwood, Illinois.

8. PRIA. A manual for participatory training methodology in development, New Delhi.

9. National Literacy Mission Handbook on Training Methods, MHRD. Government of India, New Delhi, 2001.

Course Out Comes:

1. Identify the importance of training in Adult and Continuing Education programmes and differences between training and education.
2. Know the training methods, training materials to organize the Adult and Continuing Education programmes.
3. Follow the teaching methods like Lecture, discussion, demonstration and Role Play methods.
4. Recognize training facilities at different levels like National, State, District and Local.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	1	--	1	2	2	1	3
CO2	3	2	1	2	2	1	--	1	2	1	1	3
CO3	3	2	2	2	2	1	-	1	2	1	2	3
CO4	3	1	1	1	1	2	--	1	2	1	2	3

3: High; 2: Medium; 1: Low

Course 3.2: COMPARATIVE STUDIES IN ADULT EDUCATION

UNIT- I: Definition, aims, methodology, scope and significance of comparative study in adult education.

UNIT- II: Adult education movement in the selected countries - U.K., USA, Denmark and Vietnam with emphasis on the history of Indian Adult Education.

UNIT- III: A comparative study of current adult education programmes in the selected countries: China; Cuba, with special reference to : (a) Motivation and mobilisation (b) Training of field functionaries (c) Monitoring and Evaluation (d) Post literacy and continuing education and their relevance to Indian context.

UNIT- IV: Problems of Adult Education in developing countries with special reference to India.

REFERENCE BOOKS

1. Back Volumes of Convergence.

2. Back Volumes of Indian Journal of Adult Education.

3. Back Volumes of Adult Education and Development. German Adult Education Association. D.V.V. 4.Bereday. The Contribution of Comparative Education to Comparative Studies of Adult Education - Anthology.

5. Bhola, H.S.Campaigning for Literacy, International Council for Development. 1981.

6. Cochrane, Nancy & .J.R. Kidd. An International Legacy of Learning, Vancouver, Centre for Continuing Education, University of British Columbia. 1986.

7. Freire, Paulo. Pedagogy of the Oppressed, Middlesex. England, Penguin Books, 1972.

8. Havighurst, Robert, J. : Comparative perspective on Adult Education, Beston, Little Brown & Co., 1968.

9. Hunter, Carman, Keirn, Martha Mckee. Adult Education in China, London, Croom Helm, 1965, (Croom Helm in International Adult Education).

Course Out Comes:

1: Compare the Adult Education Programmes of different countries based on its aims and significance.

2: Compare and contrast of Adult Education movement and progress in different countries like UK, USA, Denmark etc with reference to India.

3: Find out the similarities and dissimilarities of Adult Education Programs in selected countries.

4: Identify the problems of Adult Education in terms of Planning, Organization and Budget activities in developing countries and India.

CO – PO mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**
CO1	3	3	1	2	1	2	-	2	2	3	2	3
CO2	3	3	1	2	1	2	-	2	2	3	2	3
CO3	3	2	1	2	-	2	-	2	2	3	2	3
CO4	3	3	1	2	-	2	-	2	2	3	2	3

3: High; 2: Medium; 1: Low

Course 3.3: MATERIAL DEVELOPMENT FOR ADULT& CONTINUING EDUCATION

UNIT- I: Meaning, Scope and Significance of Teaching/learning materials for continuing education programme, Development of competence based learning materials - between teaching methods and materials, approaches to material production.

UNIT- II: Identification of knowledge, skills, desired behaviours and /identifying learning objectives, analysis of objectives - performance / objectives - media selection models - instructional system design.

UNIT- III: Selection of language - spoken forms - use of technical terms, sentence structures, lesson and paragraph development, -use of photographs, illustrations.

UNIT- IV: Production of Text books, booklets, materials for learning, CD-ROM, Interactive web based materials, materials for self learning - programmed learning materials, Principles in preparation of Audio-visual materials, Evaluation of basic literacy and follow-up materials.

REFERENCE BOOKS

1. ACCU. New Guide Book for development and production of Literacy Materials, Asian Cultural Centre for UNESCO, Tokyo, 1992.

2. APPEAL. Training Materials for literacy personal (Series of volumes. 1 to 12), UNESCO, 1988.

3. Barry Lumsden, D., Teaching Effectiveness of Programmed Instructional Materials for Adult basic Education, Indian Journal of Adult Education, Vol .35, No.1, 1974.

4. DAE. Production, Selection and Purchase of Neo-literates Material for Continuing Education Centres, MHRD, Govt. of India, New Delhi.

Course Out Comes:

1. Identify the significance of learning materials in Adult Education classes.
2. Design the teaching learning activity objectives for better performance of Teacher educator in Adult Education Programmes.
3. Enhance language forms and competence and tune with the needs of the learner.
4. Develop teaching learning materials for self-learning

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	--	1	1	2	2	3
CO2	3	2	2	2	1	2	--	1	2	1	1	3
CO3	3	3	2	1	1	1	--	1	1	2	1	3
CO4	3	2	2	3	3	2	--	1	2	1	1	3

3: High; 2: Medium; 1: Low

GENERIC ELECTIVES ;3

**NOTE: Due to covid-19 pandemic situation the open elective choice was cancelled. The three core and three general elective course/papers were introduced.*

Course 3.4a: PEOPLES' PARTICIPATION AND DEVELOPMENT

UNIT- I: People's organisations: Roles, functions and need: Formation of different committees for people's involvement- education committees, health committees, water users committees, vana samrakshana samithis and other self-help groups and their role in literacy and development.

UNIT- II: Village Education Committee - nature, composition, constitution, functions and their role in Education for All and Adult Education.

UNIT- III: Panchayat Raj System: Salient features of 73rd Amendment: 11'" Schedule - scope, functions and importance. Philosophy, structure, composition and functioning of Panchayat Raj institutions in India with special reference to A.P ; Role of panchayaths in education and rural development.

UNIT- IV: Co-operative system- Concept, Principles, philosophy, purpose: main provisions, advantages and limitations; Mutually Aided co-operative Act(1995). Thrift and Credit co-operatives.

REFERENCE BOOKS

1. Bhargava B.S., PRI An Analysis of Issues problems and Recommendations. Ashoka Metha Committee, Asish Publishing House.
2. Department of Co-operation. Guidelines for Framing Bylaws of a co -operative under. the AP. Mutually Co-operative Societies Act,. 1995 (A Hand book for promoters of Co-operation), Government of A.P. & Co-operative Development Foundation, Hyderabad, 1998.
3. Haldifur, RN., Local Self-Government Institutions in India.
4. Jain, S.C.. Community Development and Panchayat Raj in India
5. Jayanth Kumar Ray, Organising Villagers for self-reliance, A study of Gomoshasthya Kendra in Bangladesh, Orient
6. Longman, 1986. Mehta, S. R, Rural Development Policies and Programmes. Sociological perspective, SAGE Publications, New Delhi, 1984.

7. Ministry of Agriculture. Integrated Rural Development and Allied Programmes A Manual. Dept. of Rural Development, Govt of India, New Delhi .

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Course Out Comes:

1. Analysing the role and functions of people committees,
2. Understanding the functions of Panchayat Raj institutions.
3. Knowledge on the role of co-operatives in rural development.
4. Ability to catalyse the performance of PRIs and co-operatives.

CO – PO mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	2	2	3	1	2	1	1	2	3	2	3
CO2	3	3	3	2	1	3	-	2	2	3	3	3
CO3	3	2	3	2	2	3	1	2	2	2	3	3
CO4	3	2	3	3	2	2	-	3	3	2	3	3

3: High; 2: Medium; 1: Low

3.4b: VOCATIONAL EDUCATION AND TRAINING

UNIT- I: Vocational Education: Concept, Meaning, need, importance; Theory and principles of vocational education; Relationship of vocational education with adult education and development.

UNIT- II: Apprenticeship: Nature of apprenticeship, Distinction, between Apprenticeable and Non-apprenticeable occupations, Apprenticeship and institutional training, Areas of Apprenticeship, training practices.

UNIT- III: Training and Educational Programmes: Training by Objective, Development of a training curriculum, training methods and resources; Issues in Rural vocational training in India, Bangladesh, Indonesia, Korea and Malesia. Training opportunities for women in Asia and the Pacific with special reference to India.

UNIT- IV: Vocational guidance and life guidance: Nature, aspects and methods of life guidance; Planning, Programming and Evaluating Vocational Education Programmes.

EFERENCE BOOKS

1. International Labour Organisation, Theory and Practice of Vocational Training in Japan. 2nd Revised Edition, APSDP, Islamabad, 1982. .
2. International labour Organisation, Planning, Programming and Evaluating Vocational Training, Report of APSDEP/ ILO/Japan Regional workshop, 11-18 August 1986, Chiba, Japan, APSDEP/Islamabad, 1986, Vi 109pp.
3. International Labour Organisation. Appropriate Technology and Training for Women in South Asia, Report of a Sub Regional Workshop, 26, Oct. - 1 Nov. 1986, Islamabad, Pakistan, APSDEP, Islamabad, 1987, Vi+57p.
4. International Labour Organisation, Apprenticeship in Asia ,,and the Pacific, Report of a Regional Seminar, 13-20 July. -981, Colombo, Sri Lanka, APSDP, Islamabad, Pakistan, 1981, 156 p.
5. Hosomi. G. Nakata, S et al. New Approach to Vocational Training Vol.1 (1985) and Vo1 11 (1986), ILO/APSDP Islamabad, Pakisthan.
6. Lucita Lazo. Work and Training opportunities for women in Asia and the pacific, International Labour Office, APSDP, Islamabad, 1984 VIII + 256 p

Course Out Comes:

1. Identify the relationships of Vocational Education and Adults development.
2. Understand the institution training importance and its practices in vocational training.
3. Identify the issues of Rural Vocational training in India and Asian Countries.
4. Provide Vocational Guidance and Counselling for Adult trainees.

CO – PO mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	2	2	2	1	1	--	1	2	1	1	3
CO2	3	2	1	1	1	2	--	2	1	1	1	3
CO3	3	2	2	1	1	1	--	1	2	1	2	3
CO4	3	2	1	2	1	1	--	1	2	2	1	3

3: High; 2: Medium; 1: Low

Course:3.4c: GUIDANCE AND COUNCELLING IN ADULT AND CONTINUING EDUCATION

UNIT- I: Meaning, Concept and functions of Guidance and Counselling; Theories and perspectives in counselling; Need and importance of Guidance and Counselling in educational process.

UNIT- II: Identification, Understanding and Analysis of Personal / Social / Educational problems of a clientele group; Major elements of a Counselling programme; Techniques in guidance and counselling.

UNIT- III: Roles and functions of guidance counsellor; Inputs required for the guidance counsellor.

UNIT- IV: Professional counselling in Continuing Education: Training in counselling and guidance; Personal guidance and counselling; Use of computers and internet in guidance and counselling; Counselling by telephone.

REFERENCE BOOKS

1. Huston, P. W. : The Guidance function in education, Appleton - Gentury Crafts, New York.
2. Lewis, E.D., The psychology of counselling, Holt, Rinehart and Winston Inc., New York.
3. Myrick Robert. Developmental guidance and counselling - A practical approach, Minneapolis' Educational Media corporation, 1993.
4. Shertzer, B. and Stone, S.C. Fundamentals of guidance, Houghton Mifflin Company, New York, 1971.
5. Traler, A.R. and North, R.D. Techniques of guidance, Harper and Row Publishers, New York, 1966.
6. UGC (1997), Guidelines for Department/Centre for Adult, Continuing Education, Extension and Field Outreach, University Grants Commission, New Delhi, 1997.
7. University of Southern California, Ways and means of strengthening information and counselling services for Adult learners, Report of the International Symposium, 1977

Course Out Comes:

1. Remembering the concept and theories and perspectives of guidance and counselling in educational process.
2. Recollecting understanding and analysis of educational problems of a clientele group.
3. Knowing the roles and functions of guidance counsellor.
4. Analysing the use of computers and internet in guidance and counselling.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	--	1	1	3	1	3
CO2	3	2	2	1	2	3	--	1	2	2	2	3
CO3	3	2	2	2	2	2	--	--	2	2	2	3
CO4	3	3	2	2	1	2	--	--	2	2	1	3

3: High; 2: Medium; 1: Low

Course 4.1: MONITORING & EVALUATION

UNIT – I: Monitoring – concept, nature, tools, elements, Monitoring system.

UNIT- II: Aims and objectives need for evaluation: Evaluation Mod0Is, types and approaches - CIPP model, advocacy model, participatory approach.

UNIT- III: Tools and techniques of evaluation - projective method, case study, self appraisal methods, observation, rating scales, check lists, questionnaire, interview schedules.

UNIT- IV: Evaluation of Instructional materials and learning outcomes: Scheme of learner evaluation - measurement of literacy, functionality and awareness.

REFERENCE BOOKS:

1. Alathur, R.S. Evaluation of Learning 'outcomes, New Delhi: Directorate of Adult Education, 1985.
2. Alford HJ. Assessment and Evaluation in Continuing Education.
3. Blalock M. Hubert, Conceptualization and Measurement in the Social Sciences, Sage Publication, New Delhi, 1982.
4. Clarence, H. Nelson. Measurement and Evaluation in the Classroom, The Macmillan Co., Callier-Macmillan Ltd., London, 1970.
5. Garrett H.E., Statistics in Psychology and Education, Valkils, Bombay.
6. Government of India, Modalities of Total Literacy Declaration and Evaluation of Learning Outcomes, New Delhi : Directorate of Adult Education, 1992.
7. Gron Lund, Nonnan, E. and Linn, Robert, L., Measurement and Evaluation in Teaching, . Macmillan Publishing Co., 1990.
8. Guilford, J.P., .Fundamental Statistics on Psychology and Education, McGraw Hill Book Co., New York, 1965.
9. Lonis J. Kamal, Testing in our schools. The Mac Milian Co., New York, 1966.
10. Lenis, J.. Kamal, Measurement and Evaluation in the schools, The Mac Milian Co., Collier. Mac Milian Ltd., London, 1970.
11. Mathus, R.S. Concurrent External Evaluation and Impact Studies, New Delhi, Directorate of Adult Education, 1989.
12. Mehrens William A. and Lehmann. Irvin, J. (1986). Measurement and Evaluation in Education and Psychology, Holt, Rinehart and Winston, Inc., New York.

Course Outcomes:

1.Identify the concept of monitoring and monitoring systems in adult education

2.Describe the different evaluation models.

3.Demonstrate the tools and techniques of evaluation.

4.Understand the importance of learner evaluation.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	2	3	-	2	3	2	3	3
CO2	3	3	3	3	3	2	-	2	2	3	3	3
CO3	3	3	3	3	3	1	-	3	3	2	3	3
CO4	3	3	3	2	2	2	-	-	3	2	3	3

3: High; 2: Medium; 1: Low

Course 4.2: HUMAN RESOURCES MANAGEMENT& DEVELOPMENT

UNIT – I: Human Resource Development: Meaning, objectives, importance and historical perspective of human resource development.

UNIT – II: Human capital and it's measurement: Views of Schultz and Weisbroad on human capital function; Adult education and human capital formulation.

UNIT – III: Cost – benefit analysis : concept, meaning, measurement and problems in measurements.

UNIT – IV: Human Resources Planning and Development: Objectives, strategies, demographical aspects, processes and policies: manpower and institutional planning and its relation to adult education.

REFERENCE BOOKS

Mehta M R : Human Resource Development Planning with Special Reference to Asia

Alexander V Alex : Human Capital Approach in Economic Development

Batra V P : The Economic and Human Resources

ILO : Employment Promotion with Special Reference to Rural Areas

George Toblas : Human Resource in india

Gerold M Mcier : Leading Issues in Economic Development

Gyan Cand : Population in Perspective

World Bank : World Development Report, 1001

Govindappa K : Adult Education Impact of National Literacy Mission

UNDP : Human Development Reports (s) 1998, 2000.

Dwidedi. R.S. : Management of Human Resource

Jayagopal. R. : Human Resource Development –Conceptual analysis and strategies

Kohli, Uddesh&Gautam, Vinayahil : Human Resource Development and Planning

Struss P. & Sayers.L. : Management Human Resources

Wykstra. R.A. : Human Capital Formation and Manpower Development.

Course Out Comes:

1. Understand the importance of human resource development and its historical background.
2. Analyze the human capital and its functions in Adult Education.
3. Explain the cost benefit process and problems of measurements.
4. Identify the need of planning in human resource development and relation to Adult Education.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	2	-	1	2	2	1	3
CO2	3	2	1	3	2	1	-	1	2	2	2	3
CO3	3	2	1	3	2	2	-	1	2	2	2	3
CO4	3	2	1	2	1	2	-	1	2	3	1	3

3: High; 2: Medium; 1: Low

Course 4.3: DISSERTATION / PROJECT WORK

Dissertation - choosing an issue / a problem of adult continuing education or a related issue: conducting a research study, analysing the data and preparing a report.(25 marks for report & 25 for viva-voce)

Course Out Comes:

1.Application of knowledge and skills in project designing

2.Ability to do research work.

3.Finding solutions to the problems identified in his research work.

4.Preparing the research report.

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	--	2	3	2	2	3
CO2	3	3	3	2	3	2	--	2	3	2	2	3
CO3	3	3	3	2	3	2	--	2	3	1	1	3
CO4	3	3	3	2	3	2	--	2	3	2	1	3

3: High; 2: Medium; 1: Low

Course 4.4a: ENVIRONMENTAL EDUCATION

UNIT – I: Environmental Education: concept, Objectives, Scope and Significance; An overview of environmental education in India; Role of literacy & Continuing Education Programmes in environmental protection and education.

UNIT – II: Environmental pollution: Air, Water, Soil, Sound, Solid Wastes; Peoples movement for environmental conservation.

UNIT – III: Environmental Laws, Ethics, Salient features of National Environment Bill (1992), Pollution Control Board.

UNIT – IV: Ecology- Definition, scope, history, kinds and types of ecology, components of environment, environment and eco factors, bio-diversity, ecological balance.

REFERENCE BOOKS

1. Bhatia.S.C.,The Environmental Concern, Centre for Adult, Continuing Education and Extensionb, University of Delhi, 1983.
2. Bhatia.S.C., Papers on Environmental Education,IUCAE, New Delhi,1984.
3. Trivedi and Raj, Management of Environmental Education and Research, Akashdeep Publishing House, New Delhi,1992.
4. Kaur. H. Environmental Chemistry Pragathi Prakasan Publishers , 240, W.K.Road , Meerut- 250001- 2008.
5 Kudesia. V.P.Environment Chemistry, Pragathi Prakasan Publishers , 240, W.K.Road , Meerut-250001- 2000.

Course Out Comes:

1.Understand the fundamental aspects of environment and need of environmental protection.

2: Interpret the environmental crisis with reference to pollutions and its impact of human life need of Environmental Conservation.

3: Know the environmental laws and role of individual and community to Control environmental pollution.

4: Explain Ecology and eco factors for Ecological Balance.

CO – PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	3	3	3	2	2	3	3
CO2	3	3	3	2	1	3	3	3	3	2	2	3
CO3	3	3	1	2	1	3	3	3	2	2	2	3
CO4	3	3	1	1	1	3	3	3	2	2	2	3

3: High; 2: Medium; 1: Low

Course 4.4d: POPULATION EDUCATION

UNIT- I: Population Education- Concept, Objectives, scope, need and importance; Population and related terminologies – population dynamics, demography; Adolescence education and Reproductive health; Integration of population education in adult education.

UNIT-II: Population growth and consequences - Problems of Health and Nutrition, Hygiene and Sanitation; Determinants of population growth; Measures to check rapid population growth – individual level, national level and international level.

UNIT-III: Role of women, NGOs, Universities, UNFPA, UNDP and WHO in promotion of population education and control.

UNIT-IV: National Population Policy- Policies influencing fertility, mortality, migration; Acts relating to Medical Termination of Pregnancy.

References

1. Ahmed, A. (1990): *Mounting Population Pressures*, Vikas Publishing House, New Delhi.
2. Bhende, A. Asha and Tara Kanitkar (2002): *Principles of Population Studies*. Himalaya Publishing House, Mumbai.
3. Bhushan, A. (2005): *Encyclopaedia of Adult Education and Literacy*, Vol. 2, Anmol Publications Pvt Ltd., New Delhi.
4. Cox, Peter R. (1970): *Demography*, Cambridge University Press, Cambridge.
5. Ghosh, B.N. (1985): *Fundamentals of Population Geography*, Sterling Publishers, New Delhi.
6. Kathuria, R.P. (1997): *Methods of Teaching Population Education*, Commonwealth Publishers, New Delhi.
7. Reddy, M.V. Lakshmi (1994): *Population Education*, Ashish Publishing House, New Delhi.
8. Pandey, J.L. & C. Seshadri (1991): *Population Education*, NCERT, New Delhi.
9. Rao, V.E. (2001): *Population Education*, APH Publishing Corporation, New Delhi.
10. Sharma, R.C. (1988): *Population, Resources, Environment and Quality of Life*, Dhanpat Rai & Sons, New Delhi.

COURSE OUTCOMES

1. Recollecting the concepts, needs and importance of population related terminologies.
2. Analysing the causes and consequences of population growth.
3. Distinguishing the roles of different agencies in promotion of population education and control.
4. Identifying the different National population policies and influences fertility, mortality and migration.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	-	1	1	1	2	3
CO2	3	2	2	2	3	2	-	1	2	2	2	3
CO3	3	3	2	2	2	2	-	2	2	2	2	3
CO4	3	3	3	2	2	3	-	2	3	2	2	3

3: High; 2: Medium; 1: Low

OPEN ELECETIVES :1

Course 5.1a: HUMAN RESOURCES DEVELOPMENT IN RURAL SECTORS

UNIT – I: Human Resource Development: Meaning, objectives, importance and historical perspective of human resource development; Dimensions of H.R.D. in Rural Development-Health, Education, Energy, Agriculture and Allied Activities; improving productivity.

UNIT – II: Human Resources Planning and Development: Objectives, Strategies, Demographic aspects, Processes and policies; Steps in HRP, Man power demand; Human capital and it's measurement - Views of Schultz and Weisbroad on human capital function; Human capital formation.

UNIT – III: Training and Development: Need for Manpower training, Classification of Training, Designing Training programmes and methods; Performance appraisal and standards, H R Competencies, Performance counseling, Effectiveness of training.

UNIT – IV: Training of developmental functionaries: Achievement motivation training, Training courses for different sectors – agriculture, cooperation, animal husbandry, health, Pancayat Raj; Training facilities available from Mandal level to state level.

Reference Books

Dipak Kumar Bhattacharyya (2006). Human Resource Management, Excel Books, New Delhi -28 (Second Edition).

Arcalion (2006). Human Resource Management, Pearson Prentice Hall, New Delhi -28 (X Edition).

APSDP (1984). Rural Vocational Training n Bangladesh, Indonesia, Korea, Malesia, The Philippines and Thailand. Report of a Sub-regional Seminar, Dhaka, Bangladesh 5-11 May, 1984.

Reddy, M C.Reddeppa (20006). Emerging Rural Occupations, Dept. of Adult & Continuing Education, S.V.University, Tirupati.

Mehta M R : Human Resource Development Planning with Special Reference to Asia

Alexander V Alex : Human Capital Approach in Economic Development

Batra V P : The Economic and Human Resources

ILO : Employment Promotion with Special Reference to Rural Areas
George Tobias : Human Resources in India
Gyan Chand : Population in Perspective
World Bank : World Development Report, 1001
Govindappa K : Adult Education Impact of National Literacy Mission

Course Out comes:

1. Analysing the importance of human resource development.
2. Knowledge on need of human resources in different dimensions of human development.
3. Application of the skills of human resource planning for rural development

4. Develop training module for different sectors like agriculture, animal husbandry and panchayat raj.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	-	-	2	2	2	2	3
CO2	3	2	1	1	1	-	-	2	3	2	2	3
CO3	3	2	2	2	1	-	-	2	2	2	1	3
CO4	3	3	2	2	2	-	-	2	2	2	2	3

3: High; 2: Medium; 1: Low

S.V.U COLLEGE OF ARTS
SRI VENKATESWARA UNIVERSITY: TIRUPATI



Course
M.A Rural Development & Management

Choice Based Credit System (CBCS)
Academic Year 2023-24 Onward

S.V.U.College of Arts
Sri Venkateswara University: Tirupati
Department of Adult Education

M.A. Course in Rural Development &Management

About the Department

The Department of Adult and Continuing Education, Sri Venkateswara University was established in 1972. At present 3 teaching faculty, 3 Academic Consultants and 2 Supporting Staff are working in the Department. The Department has well equipped Library, Computer Lab and Seminar hall. Since its inception, the Department has been designing and implementing a variety of Teaching, Research and Extension Activities. Initially, the Department offered PG Diploma in Adult Education during 1973-78. The Department has been offering 2 PG courses i.e. M.A. Adult Education (since 1980) with an intake of 21 students & MA Rural Development & Management (since 2012) with an intake of 20 students by following choice based credit system and semester pattern. Under research, the department is offering M.Phil, PhD programmes in both Adult Education and Rural Development. The Department is undertaking individual & sponsored research projects with the financial support of UGC, NCERT, SSA, ICSSR, Planning Commission, and Ministry of Tribal Welfare. So far the Department produced 39 Ph.D's and 17 M.Phil's. Further 337 Project works as a part of MA Course were completed. Directorate of Adult Education, Govt. of India, New Delhi has empanelled the Department as external evaluating agency to evaluate Adult Education Programmes. Since 1998 to till date Adult Education programmes of different states, Jana Sikshan Sansthans & SRCs were evaluated. The Department has organized 1 International conference and 63 National seminars, published 112 books and 444 research articles in National and International Journals. The Department has initiated dissemination of research findings through publication of Journal of Adult Education & Extension and several books. Under Extension, the Department has Regional Resource Centre during 1978 to 1986; Population Education Resource Centre in 1989; Nucleus cell during 1989 to 1991; to provide resource support to adult education programmes. The major contribution of the Department in the field of Adult Education was Preparation of Primers to the adult learners, material preparation and training to the field functionaries etc. In addition to the above, the Department has adopted villages and organized Literacy promotion programmes, Awareness programmes, Health camps to develop favorable attitude among the rural community. Recognizing the potentialities of the Department, the University Grants Commission, New Delhi has granted special Assistance Programme DRS – I for the period 2009 – 14, DRS – II for the period 2015 to 2020; to work on 3 main thrust areas namely: vocational training, research, and career guidance & counseling. In the area of career guidance & counseling the department organized training programmes to the: coordinators of

career guidance and counseling cells, guidance and counseling camps for students. In addition to the above, the Department organized: Computer Courses, Tailoring, Saree Printing, Painting, Embroidery, Candle Making, Detergent Making, Vermin Compost to student & non student youth and women. Recognizing the potentialities and contributions of the Department in the field of Adult Education; The Ministry of Human Resource Development has awarded NLM, UNESCO award to the Department during the year 2006, which has brought laurels & image to the Department and the university.

Achievements bagged by the Department so far:

NLM, UNESO Award – 2006
SAP - DRS – I & DRS – II
Organized 1 International & 61 National Seminars
Published 112 Books and 444 Articles
Publication of Journal – Journal of Adult Education & Extension. ISSN No
Completed 70 Research projects and 24 Evaluation Projects
Trained more than 1000 Literacy Educators
Eradicated illiteracy in 4 Adopted Villages
Trained 300 students on computer skills
Trained 300 Women on vocational aspects

Vision

The Department notion is to be acted as nodal center to disseminate the knowledge, conduct research at Local and higher level i.e. National bodies and organizing extension activities for needy people. As a whole the department wish to build the community with an adequate skills and sound human resources. And also, to play a vital role in the preparation of Planning in terms of Literacy and Rural Community Development Programmes, which have been introduced by State and Central Governments.

Mission

The Department of Adult Education has confined to three domains, i.e., Teaching, Research and Extension. The teaching learning activity is to enhance the aptitude and Personality development of students. It is preparing the students towards Self-Reliance, Self-Development and Self-Employment. Eventually the students have been trained as dynamic citizens.

As far as research is concerned the department has been conducting the qualitative and quantitative research on thrust areas. The enhancement of the literacy at the grassroot level and evaluating the National Bodies at the higher level are the main targets of the Department. The Department is also disseminating the research findings through Publications.

In the case of extension activities, the department is preparing materials for field functionaries and conducting surveys on Welfare Schemes of State and Central Governments. The department has been conducting Health camps, Literacy camps, Vocational training programmes, awareness programmes and also conducting the celebrations on National/International important days in Rural areas to bring cognitive changes among rural people. One of the aims of the Department is adopting backward hamlets to change their environment and mind for respectable life. To strengthen the departmental Extension activities as well as the students all round development, the department wishes to exchange the MOU with RASS, NGO, Tirupati.

The staff members are permitted to participate in Induction and Capacity Building Programmes to meet the academic demands.

Department Objectives:

- To train the students to mastery over the subjects in terms of Literacy Programmes and Rural Development aspects.
- To provide an adequate skill on research methods viz, Qualitative and Quantitative.
- To enhance the sense of Integrity on Adult Learners Problems and Rural People Issues.
- To know and prepare the students to conduct extension and outreach activities.

The Department has been following University and UGC guidelines to enhance, revision and implement the course curriculum for two Post Graduate Programmes. i.e. M.A. Adult Education and M.A. Rural Development and Management. The courses are providing theoretical and practical knowledge to the students. The traits of the course curriculum are development of Cognitive and Effective domain of students and train them as socially responsible citizens. Visit the Institutions, NGO's & Rural areas to draw factual information and do research on thrust areas. In turn the students can get employment in GO's NGO's or start their own social institution. Apart from that the course Inculcates Personal, family, Social values, Human values, Gender equality and Professional values to lead the respectable life. The course emphasis on Employability, Entrepreneurship and Skill Development. The programmes principles and outcomes are meant for students and community development.

Programme Specific Outcomes

To enable the student…

- To Know the Philosophised, Sociological and Psychological background of Adult Education and Learning. Identify the five years policy programmes and Teaching Learning methods (TLM) in Adult Education.
- To Understand the Research Techniques and methods to Identify the problems in Adult Education class management and Learners Issues. To raise the Efficiency among students in field work.
- To enhance the Level of skills to participate in grass rood Level activities and Learning aspects and also visualise the need and Importance of guidance & counselling for Adult Learners.

- To recognise the importance of human Resource in Adult Education Programmers and Identify the need of Environmental Protection and role of NGOS.

Programme Objectives:

To enable the students:

- To acquire knowledge on Rural aspects, Social structure and role of Rural Institutions in Rural Development.
- To Identify the significance of Literacy growth, Agriculture and Horticulture Expansion for Sustainable development of rural people.
- To inculcate the family, social and human values which are essential in personal life in particular and social life general.
- To identify the importance of Natural resource and its prominence in Rural Development.
- To examine the dire need of Rural Banking, Economic Support for agriculture and its allied sectors survival in Rural areas.
- To discover the Problems of Rural Backwardness and its impact on Rural Life style by conducting micro studies.

Programme Outcomes: POs

After completion of MA Rural Development Programme the student is able to:

- Obtain knowledge on all aspects of Rural Development in terms of Literacy, Education, Health, Housing, Sanitation, Economy, Agriculture. Rural Industries, Rural Technology and Service Sectors to encounter the problems and serve the Rural area.
- Discover and analyse the Natural and Rural Resources like Land, Water, Vegetation, Live stocks, Mines, Human resources and their share in community and Nation Development.
- Identify and investigate the causes of Rural backwardness and its impact amenities and employment in particular and people life general.
- Facilitate and develop the rural people by following human resources index and using Natural resources.

- Conduct Social Audit, Action Research, Case studies on social issues by adopting appropriate tools and methods to identify the social, economic and psychological problems of Rural people.
- Construct Social network among Agriculture, Small Scale Industry, Banking Services, Micro finance, Marketing and Service Sectors which are part and parcel of Social Development.
- Conduct awareness camps to safeguards the Soil, Water, Air by avoiding Pesticides, Chemicals in Agriculture management and provide strategies, methods to protect environment.
- Inculcate moral values, Ethics and social responsibilities and towards gender disparities, social aspects and distribution of Natural Resources for sustainable development.
- Develop team spirit to carry out Rural welfare programmes and identify the core problems on multiple aspects which are prevailing in Rural Community.
- Exchange Information and Ideas with Rural people to develop self-confidence in participation of Rural development programmes.
- Enhance competency to prepare and implement the Rural projects for common man welfare and Rural Development.
- Generate enthusiasm, curiosity and motivation towards Life Long Learning which is basic principle of Rural Development.

Programme Educational Objectives (PEO):

To enable the students to:

- Strengthen the theory and practical training to encounter the Rural problems.
- Inculcate the sense of Integrity and Empathy towards Rural aspects, Causes and Backwardness.
- Describe the Rural Technology and Governance for Implementation of welfare programmes of rural people.
- Compare the relationships between Rural growth and Nation GDP.

2020-21 academic year

Choice Based Credit System

SEMESTER-I

S.No	Course Code	Components of study	Title of the Course	Contact Hours	No. of Credits	I.E	END SEM.Exam	Total Marks
1	MARDM-1.1	Core	INTRODUCTION TO RURAL DEVELOPMENT	6	4	20	80	100
2	MARDM-1.2	Core	INDIAN RURAL SOCIAL SCENE	6	4	20	80	100
3	MARDM-1.3	Core	INDIAN ECONOMIC SCENE	6	4	20	80	100
4	MARDM-1.4	Core	EDUCATION FOR RURAL DEVELOPMENT	6	4	20	80	100
5	MARDM-1.5	CF	RURAL DEVELOPMENT INSTITUTIONS	6	4	20	80	100
6	MARDM 1.6	EF	HUMAN VALUES & PROFESSIONAL ETHICS-I	3	2	10	40	50
Total				33	22	-	--	550

SEMESTER-II

S.No	Course Code	Components of study	Title of the Course	Contact Hours	No. of Credits	I.E	END SEM.Exam	Total Marks
1	MARDM-2.1	Core	RURAL INDUSTRIALISATION	6	4	20	80	100
2	MARDM 2.2	Core	RESEARCH METHODS IN RURAL DEVELOPMENT	6	4	20	80	100
3	MARDM-2.3	Core	AGRICULTURE & RURAL BIO TECHNOLOGY	6	4	20	80	100
4	MARDM 2.4	Core	FIELD WORK& PRACTICALS	6	4	-	-	100
5	MARDM-2.5	CF	RURAL MARKETING & MANAGEMENT	6	4	20	80	100
6	MARDM 2.6	EF	HUMAN VALUES & PROFESSIONAL ETHICS-II	3	2	10	40	50
Total				33	22	-	--	550

SEMESTER-III

S. No	Course Code	Components of study	Title of the Course	Contact Hours	No. of Credits	I.E	END SEM. Exam	Total Marks
1	MARD M-3.1	Core	NATURAL RESOURCES MANAGEMENT -LAND	6	4	20	80	100
2	MARD M3.2	Core	NATURAL RESOURCES MANAGEMENT -WATER	6	4	20	80	100
3	MARD M-3.3	Core	NATURAL RESOURCES MANAGEMENT-VEGETATION	6	4	20	80	100
4	MARD M-3.4a	GE	COMMUNICATIONS FOR RURAL DEVELOPMENT	6	4	20	80	100
	MARD M3.4b		MICRO FINANCE &WOMEN EMPOWERMENT					
	MARD M-1.4c		RURAL PROJECT PLANNING & MANAGEMENT					
	MARD M-4d		ECONOMICS OF AGRICULTURE					
Total				24	16	-	-	400
5	MARD M-3.5a	OE	CAREER GUIDANCE AND COUNSELLING	6	4	20	80	100
	MARD M3.5b	OE	SKILL DEVELOPMENT INITIATIVES					
	MARD M-3.5c	Core	INFORMATION TECHNOLOGY RURAL DEVELOPMENT					

Note: *Among the Generic Electives the student shall choose three; # Among the Open Electives the student shall choose one.

SEMESTER-IV

S. No	Course Code	Components of study	Title of the Course	Contact Hours	No. of Credits	I.E	END SEM. Exam	Total Marks
1	MARDM-4.1	Core	AGRICULTURE AND RURAL DEVELOPMENT	6	4	20	80	100
2	MARDM-4.2	Core	RURAL CREDIT & MARKETING	6	4	20	80	100
3	MARDM4.3	Core	DISSERTATION/PROJECT WORK	6	4	-	-	100
4	MARDM-1.4a	GE	ENVIRONMENT & DEVELOPMENT	6	4	20	80	100
	MARDM1.4b		STATISTICAL METHODS FOR SOCIAL RESEARCH					
	MARDM-1.4c		RURAL ENTREPRENUERSHIP					
	MARDM-1.4d		VOCATIONAL EDUCATION & TRAINING					
5	MARDM-1.5a	OE	HUMAN RESOURCES DEVELOPMENT IN RURAL SECTORS	6	4	20	80	100
	MARDM-1.5b		DEVELOPMENT STRATEGIES & VOLUNTARISM					
	MARDM-1.5c		POPULATION & DEVELOPMENT					

Note: *Among the Generic Electives the student shall choose three; # Among the Open Electives the student shall choose one.

Course 1.1: INTRODUCTION TO RURAL DEVELOPMENT

UNIT-1: Rural Development: Concept, Definition Nature and Scope of Rural Development; Need for Rural Development; Historical evolution of the concept of Rural Development in the Indian Context; Causes of Rural Backwardness.

UNIT-II: Health conditions and Services in Rural Areas: Accessibility of health facilities; Health schemes - Arogya Sree, NTR Vaidya Seva; Issues in Community Health- National Health Policy of India/National Rural Health Mission; Janani Suraksha Yojana; AYUSH programme; National AIDS Control programme.

UNIT-III: Rural Housing: Status, National Housing and Habitat policy - Different Schemes of housing policy, Indira Awaas Yojana, NTR Gruha Kalpa.

UNIT-IV: Status of Rural areas: Composition of Rural Population, Rural Work Force, Problems of Unemployment and Under employment; Conditions and Problems of Agricultural Labour; Rural poverty; Levels of Living of Rural People; Integrated Rural Development.

Reference books:

Vasant Desai : A Study of Rural Economy

Jain S.C. : Rural Development

Das Kumar B : Rural Development through Decentralization

Venkata Reddy K : Rural Development in India Poverty and Development

Khanna B.S. : Rural Development in South Asia:Policies, Programmes and Organizations

Robert Chambers : Rural Development Putting the Last First

Desai A.R. : Introduction to Rural Sociology

Course Out Comes:

1: Understand and examine the basic aspects of Rural areas and Identify specific causes of Rural Backwardness.

2: Assess the Health conditions of Rural area and find out the existing health facilities and programmes in rural.

3: Develop an idea on Housing in relation to Socio, Economic and Psychological aspects and existing conditions of Rural housing.

4: Distinguish between employment, unemployment, underemployment in Rural area, assess conditions of Rural poverty, Living conditions.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	1	2	-	3	3	3	2	3
CO2	3	3	3	3	2	2	-	3	2	3	2	3
CO3	3	3	3	2	3	2	2	2	2	3	2	3
CO4	3	3	3	2	2	3	1	2	2	2	2	3

PO 1 to PO 12 denotes: **3: High; 2: Medium; 1: Low**

1. Knowledge
2. Analysis
3. Investigation
4. Development
5. Tool usage
6. Society
7. Environment
8. ethics
9. teamwork
10. communication
11. project management
12. lifelong learning

Course1.2: INDIAN RURAL SOCIAL SCENE

UNIT-I: Village Communities: Definition, Characteristics, Settlement Patterns; Individual and Society; Rural Social structure, Importance of Social Institutions: Family, Society/Community, School, Marriage, Religion.

UNIT-II: Social Capital: Introduction, Definition, India and Social Capital; Society as a Relationship-Investigation into Social Capital - Survey on Social Capital, Middle Level Institutions in Social Capital.

UNIT-III: Family: Sociological meaning and definition of family, Characteristics of family, Joint Family System in India- Characteristics, Functions, Merits and Demerit; Changing pattern in joint family.

UNIT-IV: Caste system: Meaning/definition, Characteristics, Functions of caste system in Rural India, Merit and Demerits of Caste system; Changing trends in the caste system; Future of caste system.

Reference books:

Wilbert E. Moore : Social Change

Sreenivas M. N. : Social Change in Modern India

Sreenivas M. N. : Caste in Modern India

Sreenivas M. N. & S. Seshaiahs : Dimensions of Social Change in India

Gore M.S. : Social Development

Desai A.R. : Rural Sociology

Chitambar : Rural Sociology

Maclver and Page : Society

Mehta : Sociology of Rural Development

Deb P.C. : Rural Sociology

Sharma and Malhotra : Integrated Rural Development

Hutton : Caste in India

Scarlet Epstein : South India: Yesterday, Today and Tomorrow

Hanumappa H.G. : Survival Strategies in Rural Areas

David G Mandelbaum : Society in India

Haralam Bon : Sociology and Perspectives.

Course Out Comes:

1. Understanding the social conditions in rural areas.
2. Gain in knowledge on social institutions in rural areas.
3. Analysing the social changes in different social institutions.
4. Promoting social capital for rural development

CO – Po mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	2	--	1	1	1	1	3
CO2	3	2	2	2	1	2	--	1	1	1	1	3
CO3	3	2	1	2	1	2	--	2	2	1	1	3
CO4	3	2	2	2	1	2	--	2	1	1	1	3

3: High; 2: Medium; 1: Low

Course1.3: INDIAN ECONOMIC SCENE

UNIT-I: Economic Structure of Rural India: Assets Distribution, Income Distribution; Expenditure Pattern, Agriculture and Rural Development.

UNIT-II: Agricultural Development: Introduction, Features of Indian Agriculture, Agricultural Development under the Plans; Soil Health Management, Seeds, Agricultural Credit; Risk Management, Marketing and Mechanization.

UNIT-III: Alternative Occupations in Rural Areas: Dairying, Poultry, Fishery, Horticulture, Sheep Rearing; Appropriate Technologies in Animal Husbandry Practices: Breeding, Feeding Management; Rural Non farm Sector-Need for Development-Problems and Prospects.

UNIT-IV: Assessment of Rural Energy Supply and Demand, Management of Rural Energy Systems, Non conventional Energy Sources - Biogas, Solar and Wind.

Reference books:

Venkata Reddy K : Agriculture and Rural Development (Emerging Trends and Right Approach to Development)

Datta and Sundaram : Indian Economy

Shah C. H. (Ed) : Agricultural development of India Policy and Problems

N.I.R.D. : Facets of Rural Development

Pramit Chowdary : Indian Economy

Hanumappa H.G. : Social Economic Inventory for Block Level Planning

Gunnar Myrdal : Asian Drama

Vakil C.N. : Poverty & Planning

Dandekar & Rath : Poverty in India

Sreenivas M. N. : Indian Villages

Robert Chambers : Rural Development

Course Out Comes:

1.Know the clear picture of economic structure of rural India with reference to Socio, Economic, rural economy pattern.

2. Describe the Indian Agricultural development based on five-year plan periods programne.

3. Identify the importance of alternative occupations in rural areas for livelihood.

4. Aware about the concepts and measurements of the health, education and gender equality for economic development.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	1	2	2	3	2	3
CO2	2	2	3	2	2	1	-	2	2	2	3	3
CO3	2	3	2	2	3	2	1	2	2	2	2	3
CO4	3	1	2	2	2	3	-	2	2	3	2	3

3: High; 2: Medium; 1: Low

Course1.4: EDUCATION FOR RURAL DEVELOPMENT

UNIT I- Education: Meaning & Concept - Definition – Objectives, Functions; Status of Education System in India; Forms of Education: Formal, Non-Formal and Informal Education; Relationship between Education and development.

UNIT- II: Schemes of Education – Sarva Siksha Abhiyan, Vocationalization of secondary education, Open learning systems, Sakshar Bharath programme, Scheme of Jana Sikshana Sansthans.

UNIT- III: Extension Education: Concept, Philosophy, Aims, Principles; History of Extension Activities; Developmental aspects of extension; Agricultural extension; Role of Extension Education in development;

UNIT- IV: Agricultural Education: Concept, nature, scope, types, need and significance; Agricultural education in India; Agricultural education and development; Role of Agricultural Universities and Training institutions in Rural development.

Reference books

1. Adivi Reddy. A. Extension education, Sri Lakshmi Press, Bapatla. 1971.
2. Dhahama O.P. & Bhatnagar, O.P., Education and Communication for Development, Oxford & IBH Publishng Co., New Delhi.
3. Venkata Reddy, K. Agriculture and Rural Development (Emerging Trends and Right Approach to Development), Hmalaya Publshing House Pvt., Ltd., Mumbai, 2012.
4. Ministry of Human Resource development. Sakshar Bharath, Govt. of India.
5. M.H.R.D (2000). Scheme of Jan Shikshan Sansthan (Institute of People's Education) : Guidelines for Management, Planning and Programming, Directorate of Adult Education, Dept. of Elementary Education & Literacy, Govt. of India, New Delhi.

COURSE OUTCOMES

1.Recollecting the meaning, Importance and spatial variations of literary in India.

2.Remembering the forms and status of Education in India.

3.Identifying different schemes of education.

4.Realising the needs and significance of agricultural education and extensive education.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	2	--	2	2	2	1	3
CO2	3	2	2	1	1	2	--	2	3	2	1	3
CO3	3	2	1	2	2	2	--	1	2	3	1	3
CO4	3	2	2	2	1	2	--	--	2	2	2	3

3: High; 2: Medium; 1: Low

Course1.5: RURAL DEVELOPMENT INSTITUTIONS

UNIT-I: Panchayat Raj Institutions: Evolution, Structure, Functions; 73rd Amendment; Role of PRIs in Rural Development; Cooperative Institutions: Concept and Principles of Cooperation, Types and Working of Rural Cooperatives - Credit Cooperatives, Marketing Cooperatives, Dairy Cooperatives, Sugar Cooperatives, Weavers Cooperatives.

UNIT- II: Community Based Organizations: Watershed Committees -Village Forest Committees -Water User Associations-Village Education-Committees -Mothers Committees -Role of CBOs in Sustainable Rural Development.

UNIT-III: Rural Banking and Credit: Types and sources of rural credit - Commercial Banks and Weaker sections, Commercial Banks and Rural artisans; Agriculture Finance Corporation; Agro Industries Corporation; Rural indebtedness – causes and consequences.

UNIT-IV: Training Institutions for Rural Development: NIRD&PR, NABARD, RRB, CAPART, FTCs, KVKs, Agricultural, Horticulture and Veterinary Universities.

Reference books:

N.I.R.D. : Rural Development in India Some Facets

vasant Desai : A Study of Rural Economy

Nanavati & Anjalia : The Indian Rural Problems

Sharma & Malhotra : Integrated Rural Development

Misra & Sharma : Problems and Prospects of Rural Development

Venkata Reddy K : Rural Development in India-Poverty and Development

Lakshman & Narayan : Rural Development in India

Dantwala : Indian Agriculture since Independence

Mamoria & Tripathi : Agricultural Problems in India

Pandey P.C. : Rural Development in India.

Course Out Comes:

1. Explain the importance of Panchayat Raj system in village Administration with reference to 73rd Amendment.
2. Describe need and importance of Self-Help Groups organization structure and schemes for financial assistance.
3. Identify different committees formulated in rural areas for sustainable development of self-help groups.
4. Understand the resources and financial sources from the government institutions to develop horticultural and veterinary universities.

CO- PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	2	2	2	3	2	3
CO2	3	2	2	2	3	2	2	2	1	2	2	3
CO3	3	2	2	3	2	3	3	2	2	3	2	3
CO4	3	2	3	2	2	3	2	2	3	3	2	3

3: High; 2: Medium; 1: Low

Course1.6: HUMAN VALUES & PROFESSIONAL ETHICS-I

Unit –I: Ethics : Definition, Nature, Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics –Ethical Values in various professions.

Unit – II: Values: Nature - Good and Bad, Ends and Means, Actual and potential values, Objective and Subjective Values; Analysis of basic moral concepts – right, ought, duty obligation, justice, responsibility and freedom, good behavior and respect for elders. Characters and conduct.

Unit –III: Individual and Society Ahimsa (Non-Violence), Satya (Truth) Brahmacharya (Celibacy) Asteya (Non possession) and Aparigraha (Non-Stealing) Purusharthas (Cardinal Virtues) Dharma (Righteousness), Artha (Wealth), Kama (fulfillment Bodily Desires) MOksha (Liberation)

Unit-IV: Crime and Theories of punishment – (a) Reformative, retributive and Deterrent (b) Views on Manu and Yajnavalkya.

Books for study:

1. Johan S Mackenjie: Amanual of ethics
2. "the Ethics of Management "by Larue Tone Hosmer, Richard D.Irwin 1nc.
3. "Management Ethics – integrity at work by josph A. Petrick and John F Quinn response Books: New Delhi.
4. "Ethics in Management" by S.A. S herlekar, Him

Course Out Comes:

1. know the importance of professional ethics and to implement the ethical values in various Professions.

2. understand about the Good and bad values and to analyze the basic moral concepts.

3. inculcate the students in the aspects of pursharthas .

4. Know different crimes and its impact on personal and social life and theories of punishment.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	3	-	3	2	3	2	3
CO2	3	3	2	2	1	3	-	3	2	3	2	3
CO3	3	3	1	2	1	3	-	3	2	3	2	3
CO4	3	3	3	2	2	3	-	3	3	3	2	3

3: High; 2: Medium; 1: Low

Course2.1: RURAL INDUSTRIALISATION

UNIT- I: Rural Industrialization: Concept, Need and Importance of Rural Industrialization in the context of Rural Development; Gandhian Approach to Rural Industrialization; Appropriate Technology for Rural Industries.

UNIT-II: Rural Industrial Sectors: Small Scale, Handloom, Agro-based Industries, Rural Artisans, Handicrafts and Sericulture; Marketing: Problems of Marketing, Marketing Strategy and Information System for Rural industries; Consortium Approach, Exhibitions.

UNIT-III: Industrial Promotion Organizations: District Industries Centre (DIC), National Institute for Small Industries Extension and Training (NISIET), Small Industry Development Organization (SIDO), Small Industries Service Institutions (SISI); Consultancy Organizations, Financial Organizations, Regional Rural Banks and State Finance Corporations.

UNIT-IV: Small-Scale and Micro Enterprises: Introduction, Changed Nomenclature; Definition of Micro Enterprises, National Importance of Micro and Small Enterprises (MSEs), Problems of Micro and Small Enterprises (MSEs); Khadi and Village Industries (KVIs) - Coir industry, Handlooms, Power Looms, Handcrafts.

Reference books:

Battacharya S.N. : Rural Industrialization in India

Bepion Behari : Rural Industrialization in India

Rao R.V. : Rural Industrialization in India

Bagli V : Khadi and Village Industries in the Indian Economy

Kripalani J.B. : Gandhian Thought

Vasant Desai : Organization and Management of Small Scale Industries

Sundaram J.B. : Rural Rurai Industrial Development

K.V.I.C. : Khadi and Village Industries The Gandhian Approach

Vasant Desai : Problems and Prospects of Small Scale Industries in India.

Course Out Comes:

1. Recognize the importance of Rural Industrialization and technology for Rural Development.
2. Identify the small-scale industries problems, marketing and its strategies.
3. Analyze the role of District industries centres, NISIET and SISI for providing financial support for small scale industries.
4. Identify the problems of Micro and small enterprises with regard to handlooms, power looms and handcrafts.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	1	2	1	2	1	3
CO2	3	2	2	1	2	2	2	2	2	3	1	3
CO3	3	2	1	2	2	2	1	2	3	2	3	3
CO4	3	2	3	1	2	1	1	1	2	2	3	3

3: High; 2: Medium; 1: Low

Course2.2: RESEARCH METHODS IN RURAL DEVELOPMENT

UNIT-I: Social Science Research: Need and significance, Types – Basic, Applied, Action; Methods – Historical, Experimental, Survey, Case Study; Formulation of Hypotheses.

UNIT-II: Sampling: Stratified Sampling, Multistage Sampling, Purposive Sampling, Systematic Sampling; Tools of Data Collection: Questionnaire - Schedule - Interview – Observation.

UNIT-III: Numerical Methods of Quantitative Data: Presentation – Mean, Median, Mode; Standard Deviation - Correlation - Regression - Chi-square Test; Micro Soft Office: MS Word - Excel - Power Point – SPSS.

UNIT –V: Report writing: Steps involved in writing of a report; Graphical Methods of Quantitative Data Presentation – Histogram, Pie Chart - Bar Diagrams;

Reference books

Gupta C.B. : An Introduction to Statistical Methods

Moser C.A. : Survey Research in Social Investigation

Simson and Kelkn : Basic Statistics

Babbie : Survey Research

Das Gupta : Village Studies in the Third World

Goodo & Halt : Social Research Methods

Mason and Lind : Statistical Techniques in Business and Economics

Microsoft : Manuals on Microsoft Office

SPSS : Manuals on SPSS

Course Outcomes

1. Understanding the concepts and methods of research.
2. Adopting the suitable sampling methods for research studies.
3. Developing tools for research studies.
4. Ability of research report writing.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	2	1	2	1	2	2	3
CO2	3	3	3	3	2	1	1	2	1	2	2	3
CO3	3	3	2	2	2	1	2	2	2	1	3	3
CO4	3	3	2	3	3	2	1	2	3	2	3	3

3: High; 2: Medium; 1: Low

Course2.3: AGRICULTURE & RURAL BIO TECHNOLOGY

UNIT-1: Agriculture: History and development of agriculture in India; Objectives, Socio-economical perspectives; Significance and Status of production of cereals (wheat/rice); Pulses (Arhar/gram); Oil (Sunflower/soybean);Vegetable (Potato) ; Sugars (Sugarcane).

UNIT-III: Crop residues and their application to Rural Development: Fibrous, Stoves, Straw, Husk (Hulls), Oil cakes; Sugarcane (buggies, tops, molasses, presumed), Vegetable (Tomato, potato, cabbage).

UNIT-III: Mushroom Technology: Introduction, Nutritional/medicinal importance, Cultivation of edible mushrooms; Vermi compost Technology: Significance, methodology of production, merits and demerits, impact on agriculture development.

UNIT-V: Biogas & Rural Development: Concept, Applications, Biogas Plants, and problems; Bio-pesticides - introduction, Types, Advantages, and disadvantages, Social impact; Tissue culture, Vegetative propagation, Soil-less farming.

Books reference

Fruit Preservation : S.Srivastva

Fruit and vegetables : B.Jain

Forest in India : V.P.Agrwal

A Hand Book of Social Forestry : S.S. Negi

A Text Book of Agroforestry : Gautam

Krishi Vaniki : S.S. Srivastva

Biogas : O.P.Chawla

COURSE OUTCOMES

1. Realising the history and development agriculture in India.
2. Identifying different aspects of sustainable agriculture in rural development.
3. Indicating the Importance of allied sectors of agriculture in India.
4. Recollecting the process of biogas and pesticides.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	2	1	1	2	2	2	3
CO2	3	2	1	2	2	2	2	1	3	2	2	3
CO3	3	2	1	2	3	2	2	1	2	2	1	3
CO4	3	1	1	1	2	2	2	1	2	3	2	3

3: High; 2: Medium; 1: Low

Course2.4: FIELD WORK& PRACTICALS

Every Student has to participate in the field visits to the following rural development/ Agriculture related institutes to expose himself in the field projects and programmes:

1) Prepare a Report on any one of the following issues - Health conditions and Services in Rural Areas, Rural Housing and Status of Rural Population;
2) Prepare a Report on any of the formal and Non-formal education programmes;
3) Prepare a Report on any one of the following issues - PRIs, Cooperative Societies and Rural Banks ;
4) Prepare a Report on any one of the following Agricultural Training Institutions – KVKs, FTCs and NIRDPR.
5) Prepare a Report on any one of the following Community Based Organisations - Watershed Committees -Village Forest Committees -Water User Associations-Village Education-Committees -Mothers Committees.

The project activity reports will be submitted by the students and assessed by the Internal and External Examiners. Each student has to face the Viva-Voice which will be of 25 marks**.**

(Marks for Viva 25)

(Total : 100)

Course Outcomes:

1.Application of knowledge and skills in project designing

2.Ability to do research work.

3.Finding solutions to the problems identified in his research work.

4.Preparing the research report.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	--	2	3	2	2	3
CO2	3	3	3	2	3	2	--	2	3	2	2	3
CO3	3	3	3	2	3	2	--	2	3	1	1	3
CO4	3	3	3	2	3	2	--	2	3	2	1	3

3: High; 2: Medium; 1: Low

Course2.5: RURAL MARKETING & MANAGEMENT

UNIT-1: Rural Marketing: Definition, Function, Nature and Scope; Importance of Agricultural Marketing; Classification of Rural Markets: Primary, Secondary and Tertiary Markets, Hats and Shades, Wholesale markets and Retail markets, Consumer Markets and Agricultural Input Markets in rural areas;

UNIT-II: Problems in Marketing of Agricultural Products: Transportation, Grading Storage and warehousing; Marketing information – Sources, Channels; Marketable surplus and Marketed Surplus; Factors Influencing Marketable surplus; Marketable surplus and Price. Impact of globalization on rural marketing.

UNIT-III: Marketing Costs: Methods of measures of marketing cost; Farmers' and Middlemen's share of the Prices; Price fixation and Procurement by Public Agencies.

UNIT-IV: Institutional arrangements for Rural Marketing; Regulated Markets; Cooperative Marketing System; National Council of State Agricultural Marketing Boards, Apni Mandi Scheme; Recommendations of National Commissions on Agriculture; E- marketing.

Reference Books

Venkata Reddy, K. : Agriculture and Rural Development (Emerging Trends and Right Approach to Development), Himalaya Publishing House.

Gupta A.P : Marketing of Agriculture Produce in India

Acharya S.S : Agricultural Marketing in India

NW Agarwal : Rural Marketing in India

Shamin H.M : Rural markets and development

Saxena Kailas : Inter Linked Agrarian Markets in Rural India

GOI :Reports of the National Commission on Agriculture XII

Jagdish Prasad : Various Issues of Encyclopedia of Agricultural Marketing

Bhaskar .K : Need for Linking of Regulated Markets with Cooperative marketing Societies cooperator , August,1989

Course Out Comes:

1. Know the importance of agriculture and agricultural products, food grains and knowledge about minimum support price.
2. Explain the differences of wholesale market and retail market functions.
3. Identify the reasons of market failure with regard to Liberalization and Globalization.
4. Examine the principles of Price fixation and procurement by public agencies Schemes and E- marketing.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	2	-	3	3	2	2	2	3	3
CO2	3	2	3	3	2	2	2	3	3	3	2	3
CO3	3	2	3	2	3	3	2	-	2	3	2	3
CO4	3	2	3	3	-	2	2	1	3	3	2	3

3: High; 2: Medium; 1: Low

Course2.6: HUMAN VALUES & PROFESSIONAL ETHICS-II

Unit – I: Value Education: Definition- relevance to present day concept of human values; Self introspection-Self esteem. Family values-Components, structure and responsibilities of family; Neutralization of anger – adjustability – threats of family life – status of women in family and society – caring for needy and elderly – time allotment for sharing ideas and concerns.

Unit –II: Medical ethics: Views of charka, Sushurta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to justice in health care, human cloning problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit –III: Environmental ethics: Ethical theory, Man and nature- Ecological crisis, Pest control, Pollution and waste Climate change; Energy and population, justice and environmental health.

Unit- IV: Social ethics: Organ trade, human trafficking, Human rights violation and social disparities; Feminist ethics, surrogacy/pregnancy; Ethics of media - Impact of Newspapers, Television, Movies and Internet.

Books for study:

1. John S Mackenjie: A manual of ethics
2. “the Ethics of Management” by Larue Tone Hosmer, Richard D.Irwin Inc.
3. “Management Ethics – integrity at work\ by joseph A.Petick and john f. Quinn Response Books:New delhi
4. “Ethics in managemen’By S.A.Sherlkar, Himalaya Publishing House,
5. Harold H. Titus: Ethics for Today
6. Maitra.S.K. Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha.A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian system of Duties: Religious and Civil (ed)G.C.Haughton

10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha. Chowkamba Sankrit series, VolI,II and III, Varnasi, Vol I OO, 16-20,21-22 and 74-77 only.
11. Caraka Samhita :Tr.Dr.Ram Karan Sarna and Vaidya Bhagavan Dash, Chowkambha.

Course Out Comes :

1: Understand and recognize the importance of Value Education & Human Values and also try to follow the traditional values of family, women and elders in the society.

2: Examine code of ethics for medical and health care professionals. They Can sensitize the rural people on Health Issues & Problems.

3: Explain the Environmental Protection and relationship between Man and Nature, causes of pollution and impact on environmental health.

4: Recognize the need of Social ethics and fight against the anti-social activities, Organ trade, Human trafficking etc.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	-	3	-	3	2	3	1	3
CO2	3	3	2	2	1	3	2	2	2	2	2	3
CO3	3	3	3	2	2	3	3	3	3	2	2	3
CO4	3	3	2	2	2	3	2	3	2	2	2	3

3: High; 2: Medium; 1: Low

Course3.1: NATURAL RESOURCES MANAGEMENT -LAND

UNIT-I: Land Use Pattern: Changes in Land Use Pattern, Factors Responsible for changes in Land Use Pattern; Soil Environment: Soil types, Carrying Capacity of Soils, Fertility; Organic and Bio-fertilizers: Types, Merits and Demerits; Soil Pollution: causes and management; Indigenous Knowledge Systems in Land Management.

UNIT-II: Bleeding Lands: Exploitation - Soil Erosion- Desertification - Degradation – Pollution; Effects of Modern Agricultural Practices on Land and Environment; Integrated Pest Management.

UNIT-III: Land and Soil Management Programmes: Watershed Development Programme- Scope and Objectives - Activities - Practices - Stake Holders Participation - Impact of the Programme; Indicators for Sustainable Land management.

UNIT- IV: Common Property Resources: Definition, Nature, Types, Benefits; Common property resources and Environmental protection; Declining of common property resources; Problems of CPRs - Management Strategies for Sustainable Use of CPRs.

Reference books

David Pearce : Economics of Natural Resources

Jyothi Prakash & Reddy S : Sustainable Regeneration of Degraded Lands

Roland Bunes : Two Ears of Corn

Katar Singh : Managing Common Fool Resources Principles and Case studies

Robert Chambers : Rural Development Putting - the Last First

Roy Cook : Soil Conservation, Soil Management and World Views of Conservation and Protection

IDRC and IUCN : Assessing Rural Sustainability

Pandey D. N. : Measures of Success fir Sustainable Forestry - Designing, Measuring and Communicating the Criteria & Indicators for SFM in South Asia (Mimeo)

Reddappa Reddy V : "Watershed Development Projects for Drought Prone Areas", Moving Technology, Oct-Dec 1996.

The Hindu Survey of Environment : 1993, 1994. 1995, 1996, 1997 and 1998.

Course Outcomes:

1. Analyzing the causes of soil damage
2. Adopting proper soil conservation methods.
3. Planning proper land use patterns
4. Effective uses of common property resources in rural areas.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	2	2	3	1	2	2	3
CO2	3	2	1	2	3	2	2	3	2	2	2	3
CO3	3	2	3	2	2	3	2	2	2	2	2	3
CO4	3	2	2	2	2	2	2	1	2	2	3	3

3: High; 2: Medium; 1: Low

Course3.2 : NATURAL RESOURCES MANAGEMENT -WATER

UNIT-I: Water: Quantitative and Qualitative Aspects; Water use, Demand/Challenges-Sustainability of Water Use; Surface Water and Ground water Resources; Potential and Utilization Problems in Water Management.

UNIT-II: Types and Sources of Irrigation: Major, Medium and Minor Irrigation Systems; Coverage and Ecological Implications; Tank Irrigation - Role and Importance in Drought Prone Regions- Problems in Tank irrigation Management.

UNIT- III: Water Conservation Technologies in Agriculture: Micro irrigation Systems -Drip and Sprinkler Irrigation -Comparative Economics in Relation to other Methods. Traditional Irrigation practices and their Role in the Management of Irrigation systems. **UNIT-IV:** Sustainable Water Management: Water harvesting technologies, Construction of underground reservoirs; Waste and See water recycling.

Reference books

Rao K. L : India's Water Wealth

Patrick Mc Cully : Silenced Rivers

Singh et.al : Irrigation Systems in Decay what the Farmers can do India.

Siva Mohan MVK and Christopher A Scott International food : Future Directions for Indian Irrigation Research and Policy Research Institute Policy Issues

Sprinkler Irrigation

Sivanappan : Sprinker irrigation

Narayana Murthy A : Evaluation of Drip Irrigation System in Maharashtra to the Handa of the Poor Water and Trees

N.C. Saxena and Tushaar Shah Satish and Sundar : Peoples Participation and Irrigation Management Experiences, Issues and Opinions

Norman Uphoff : Improving International Irrigation Management with Farmers' participation: Getting the Process Right

Wilcocks .W : Lectures on Ancient Systems of irrigation in Bengal and its Application to Modern Problems

Sreedhar. G : Tank Irrigation in Semi-Arid Zones.

Course Out Comes:

1. Acquire information on quantitative and qualitative aspect of water uses. Inculcate awareness about Non-drinking water and its contamination.
2. Gain knowledge about minor, major and medium irrigation system.
3. Identify the issue and provide solutions to drought prone regions problems in Tank irrigation management.
4. Develop knowledge about micro drip and sprinkler irrigation systems and water harvesting technologies, waste water and see water recycling

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	2	2	1	3	2	2	3
CO2	3	2	2	2	2	2	2	1	3	2	1	3
CO3	3	2	2	2	1	2	3	2	3	2	2	3
CO4	3	2	2	3	1	3	2	2	3	3	2	3

3: High; 2: Medium; 1: Low

Course3.3: NATURAL RESOURCES MANAGEMENT-VEGETATION

UNIT- I: Forestry: Extent - Types - Importance - Rural Development Vs Forestry Interface; Industry Vs Forestry Interface; Bleeding forests; Exploitation - Degradation - Shifting Cultivation - Factors Responsible for Bleeding of Forests.

UNIT- II: Ethno Forestry: Indigenous Knowledge Systems in Forest Management; Sustainable Forestry - Bio-Diversity- Forest Development and Management Programmes- Social Forestry - Farm Forestry-Community Forestry - Eco Tourism; Wild Life and Forestry.

UNIT- III: Joint Forest Management Programme: Scope and Objectives; Stak-holders participation-Soil Works, Silvicultural Practices – Protection, Impact of the Programme - Community Forest Management in Andhra Pradesh; Criteria and Indicators for Sustainable Forest management.

UNIT-V: Non-Timber Forest Produce: Methods of Collection - Preservation, Storage - Grading, Marring - Role of Girijan Development Corporation.

Reference books:

Vandana Shiva : Biodiversity; Social and Ecological Perspectives

Robert Chamber & Saxena : To the Hands of the poor

Cernea M M : Forest and Forest Development in India

Chanduri B and A K Maiti : Forest and forest Development in India

Henny L Gholz : Agro Forestry; Realities. Possibilities and Potentialities

Pandey D N : Ethno Forestry Local Knowledge for Sustainable Forestry and Livelihoods Security

Pandey D N : Measures of Success for Sustainable Forestry Designing. Measuring and Communicating the Criteria & Indicators for SFM in South Asia (Mimeo)

Reddapa Reddy V & : "NGO's and People's Role in Joint Forest Management

Chenna Reddy D : People's Participation and Forest Management in India:

Reddapa Reddy V : Kurukshetra, august 1998 People's Participation and forest Management in India " Few Emerging Issues". AsiaPasific Journal of Rural Development.

January, 2000

GOI :Report of the National Commission on Agriculture Forestry

Course Outcomes:

1. understand the importance of forest expansion and causes of deforestation

2. inculcate the information on forest development, social forests and management.

3. recognize the importance of soil works, silviculture practices and community forests.

4. facilitate the awareness on forest production and its collection and preservation for Livelihood

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	3	2	2	1	1	1	2	3
CO2	3	3	2	1	2	1	1	2	1	1	2	3
CO3	3	2	2	2	1	3	2	1	2	2	2	3
CO4	3	3	2	1	2	2	3	1	1	2	2	3

3: High; 2: Medium; 1: Low

GENERIC ELECTIVE (3)

**NOTE: Due to covid-19 pandemic situation the open elective choice was cancelled. The three core and three generic elective course/papers were introduced.*

Course3.4a: COMMUNICATIONS FOR RURAL DEVELOPMENT

UNIT-1: Communication: Definition, Process, Functions, Importance; Elements of Communication; Problems and Barriers in Communication; Motivation: Concept, Process and Techniques - Motives and Incentives.

UNIT-II: Communication interaction: Models of Communication- Linear, Feedback, Circular, Switch-back, Convergence; Feedback and Control; Effects of feedback in communication.

UNIT-III: Types of Communication: Verbal and Non-verbal communication, Small group and Public Communication, Dyadic Communication, Mass Communication and Interpersonal Communication.

UNIT-IV: Audio-Visual Aids: Materials and equipment, Planning, Preparation and Use of different types aids; Projectors: Films-Tape Recorder-Television-Computers-PPTs.

Reference books

Bhattacharya S.N : Community Development in Developing Countries

Rogoms : Adoption of Innovations

Paul Choudary : Methods of Social Work

Robert Chambers : Challenging the Professions

Spicer Russell E.E. : Human Problems in Technological Change

Ross N.G. : Community Organization

Beek R.C : Motivation: Theories and Principles

Mukherjee N : Participatory Rural Appraisal Methodology and Applications McConnel J W : Understanding Human Behavior.

COURSE OUTCOMES

1. Remembering the concept and elements of curriculum.
2. Distinguishing different models of communication.
3. Identifying the types of communication.
4. Recalling the planning, preparation and use of different audio-visual aids in rural sector.

CO- PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	2	--	2	1	2	1	3
CO2	3	2	2	1	2	2	--	1	2	3	2	3
CO3	3	2	2	2	1	2	--	1	1	2	1	3
CO4	3	2	2	2	1	2	--	1	2	3	2	3

3: High; 2: Medium; 1: Low

Course3.4b: MICRO FINANCE &WOMEN EMPOWERMENT

UNIT-1: Women Empowerment: Definition, Need, Strategies for Women Empowerment; Hindrances to Women Empowerment.

Unit-II: Programmes for Women's Development: MNP/ SGSY/ ICDS/ IAY/ NCW/ SCW/EDP; Human Rights with particular reference to Women – Need for legal literacy.

UNIT-III: Self-help groups and Self-help promotion: Concepts, Elements, Stages - Structure of Self-help groups - Precautions to be taken while forming the SHGs.

UNIT- IV: Savings and Credit as an Instrument of Self-help-promotion among Rural Women; Savings Operations-Credit of SHGs; Monitoring, Evaluation and Impact Assessment of Savings and Credit Programmes.

Reference books:

Yunas M : Rural Agricultural Credit Operations in Bangladesh

Fernades AP : The MYRADA Experience Alternative Management Systems For Savingand Credit of Rural Poor

Grammena Bank : Various Issues of Grameena Dialogue

lla Bhat: : A Bank of One's Own (A note from SEWA)

David Hume : Finance against Poverty

Susan Johnson and Ben Rogally : Micro Finance

Raj Sehkar D : Savings and Credit Systems of the Poor: Some NGO Experiences, NOVIB and HIVOS

James Copes she : NGO Sponsoring of Group Lending in Rural India: Theory and a Case Study

Hossain M Banks : Credit for Alleviation of Rural Poverty: The Government in Bangladesh

Mancur Olson : The Logic of Collective Action.

Course Out Comes :

1: Examine the basic components of women empowerment and hindrances.

2: Identify empowerment programmes of women, and its relation to human rights & women rights.

3: Explain the structure and functions of (SHG), Self-help group and role of SHG to enhance Social and Economic status of women.

4: Describe the importance of Savings and credit methods in women life and its role in women empowerment.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	1	2	-	2	2	3	2	3
CO2	3	3	1	2	2	2	-	3	2	2	2	3
CO3	3	3	2	3	2	2	-	2	2	3	2	3
CO4	3	3	2	2	1	2	-	2	2	2	3	3

3: High; 2: Medium; 1: Low

Course3.4c: RURAL PROJECT PLANNING & MANAGEMENT

UNIT-1: Project- Definition, Basic steps, Elements, Development of projects; Basic Steps in Project, Project Approach to Rural Development - Need and Scope of Project Management; Project Planning and Management Cycle.

UNIT-II : Project Formulation and Development: Elements of Project, Formulation Technique, Planning in Indian Context; Systems Approach to Formulation and Execution of Development Projects.

UNIT-IV: Essentials of Project Implementation: Planning, monitoring of development projects; Project management information system; Project Appraisal; PAID monitoring system for VSS and water shed- Network techniques for project management.

UNIT-V: Evaluation of Rural Development Projects/Programmes: Types of Evaluation Concurrent and Summative evaluatons.

Reference books

Bava D.S : Rural Project Planning

Price Gittinger : Economic Analysis of Agriculture Projects

Little IMD & JA Mirrless : Project Appraisal and Planning for Developing Countries

United Nations Development Organization :Industrial Guidelines for Project Evaluation

Prasanna Chanra : Projects Preparation , Appraisal and implementation

Chodhary .S : project Mangement

Mridula Krishna :Project Planning in India

Peter Smith : Agricultural Project Management Monitoring and Control of Implementation

Course Out Comes:

1. Explain the rural project planning with reference to need and scope.
2. Recognize the elements to projects and techniques of the planning for development.
3. Identify the project implementation principles as well as the project appraisal.
4. Know the evaluation of rural development programmes and its concern to human resource development.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	--	2	3	2	2	3
CO2	3	3	3	2	3	2	--	2	3	2	2	3
CO3	3	3	3	2	3	2	--	2	3	1	1	3
CO4	3	3	3	2	3	2	--	2	3	2	1	3

3: High; 2: Medium; 1: Low

Course4.1: AGRICULTURE AND RURAL DEVELOPMENT

UNIT- I: Introduction Agriculture: Nature, Role and functions of Agriculture – Interdependence between Agriculture and Industry; Agriculture and Rural Development; Need and Significance of Agriculture - Theoretical Models - Independence between Agriculture and Industry- Importance of Agriculture in Indian Economy.

UNIT-II: Status of Agriculture: Meager resources, Non-profitability of agriculture, Non-viability of farming, Distress sales, inadequate credit and Insurance, Poor marketing, Suicides of farmers, Poverty and Agriculture production, rural unemployment, Recommendations of Commissions on Farmers.

UNIT-III: Agricultural Technologies for Rural Development: Definition of Technology, New farm practices; Appropriate Technology in agriculture: Technology in Irrigation, Dry farming, Land use, Agricultural tools, Recycling of waste and Oil technology, Bio-gas technology, Micro Hydel schemes; Technologies for Animal Husbandry.

UNIT- IV: Capital Formation: Capital Formation in Agriculture and Rural Development; Stages in Agricultural and Economic Development; National Food Security - Food Subsidies-Agricultural Subsidies-Implications of New economic Policies.

Reference books

Singh I. J. : Elements of Farm Management Economics

Sharma A.V. & V.K. Sharma : Elements of Farm Management

GOI : National Five-Year Plans

Dutta and Sundaram : Indian Economy

Mellor J. W. : The Economics of Agriculture

Sen A.K. : Resources, Values and Development

Venkata Reddy, K. : Agriculture and Rural Development (Emerging Trends and Right Approach to Development), Himalaya Publishing House.

Course outcomes

1. Remembering the nature and Importance of agriculture in India.
2. Bringing out the concepts of different organic farming and organic pesticides and fertilizers.
3. Realising the status of agriculture in India.
4. Identifying the role of technologies in agriculture in India

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	1	2	3	2	1	3
CO2	3	2	1	2	2	1	2	1	2	2	1	3
CO3	3	2	2	2	1	2	2	1	2	2	1	3
CO4	3	2	2	1	2	2	1	2	2	1	1	3

3: High; 2: Medium; 1: Low

Course4.2: RURAL BANKING & CREDIT

UNIT-I: Rural Credit: Nature, Types and Sources of Agricultural Credit; Evolution of Institutional Credit; Risk & uncertainty in rural credit sources; Rural indebtedness and its Causes; Evils of Indebtedness, Remedial measures; Role of State and Rural credit..

UNIT-II: Institutional and Non-institutional Credit for Rural Development: Cooperative credit institutions - Commercial banks- Regional banks; Elements of Farm financial management - Use of balance sheet analysis and control, Evaluation of investment; Multi-Agency Approach n Rural Credit.

UNIT-III:. Rural Banking: Nationalization of Commercial Banks, Commercial Banks and Weaker Sections, Commercial Banks and Rural Artisans, Regional Rural Banks; Danthwala (Review) Committee Recommendations.

UNIT-IV: National Bank for Agriculture and Rural Development (NABARD): Roles, Functions of NABARD; Recent Policy Initiatives; Mounting Over dues, Supervised Credit System; Reserve Bank of India and Rural Credit.

Reference books:

Belshaw .H : Agricultural Credit in Economically Underdeveloped Countries

Desai SSM : Rural Banking in India

Khusro A.M : Agricultural Credit Review Committee Report

Venkata Reddy, K. : Agriculture and Rural Development (Emerging Trends and Right Approach to Development), Himalaya Publishing House.

Course Out Comes:

1. Acquire knowledge about agriculture and horticulture development.
2. Understand different types and sources of agricultural credit and provide remedies for rural indebtedness.
3. Examine the kisan credit cards and institutional and non-institutional credit system.
4. Know about National banking for Agriculture and Rural Development, Role of NABRD in Rural credit system.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	3	2	1	2	2	1	3
CO2	3	2	2	3	3	2	2	3	2	-	2	3
CO3	3	2	3	2	-	2	2	1	2	2	2	3
CO4	3	2	2	3	1	3	2	-	2	2	2	3

3: High; 2: Medium; 1: Low

Course4.3: DISSERTATION/PROJECT WORK

Each Student has to submit a project report taking any problem related rural society i.e., Land, Water, Vegetation, Micro-finance, women empowerment, rural planning and management, rural credit and banking etc., which will be evaluated by both Internal/ external examiners followed by the viva -voice.

Project report	-	75 marks
Viva-vice	-	25 marks
Total	-	100 marks

Course Outcomes

1. Application of knowledge and skills in project designing
2. Ability to do research work.
3. Finding solutions to the problems identified in his research work.
4. Preparing the research report.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	3	2	--	2	2	2	2	3
CO2	3	2	2	2	2	1	--	1	2	1	1	3
CO3	3	2	2	2	2	1	--	1	2	2	2	3
CO4	3	2	2	2	2	1	--	2	2	2	2	3

3: High; 2: Medium; 1: Low

Course4.4a: ENVIRONMENT & DEVELOPMENT

UNIT – I: Environment : Concept, Objectives, Principles, and Significance; An overview of environmental status in India; Need for environmental protection and conservation; Role of Environment in development.

UNIT – II: Environmental Crisis and Consequences: Deforestation, Global warming and Ozone depletion, Climate change; Population, environment and health implications; Natural and Man-made disasters; Environmental pollution: Air, Water, Soil, Sound, Solid Wastes.

UNIT – III: Environmental Laws and Conventions: Salient features of National Environment Bill (1992); Earth Summit, Conventions on biodiversity and climate change; Earth Summit 1992 and others for Restoration of Ecological Balance; People's Movements for Environmental Protection: Chipko, Green politics, Anti-nuclear movement.

UNIT – IV: Agencies of Environmental Protection: Government Pollution Control Board; NGOs, Educational Institutions and Mass Media.

References

1. Agrawal, K. M. Sikdar, P. K. and Deb, S.C., (2002): *A Textbook of Environment,* Macmillan India Limited, Calcutta.
2. Ehrlich P. A. H., (1977): *Eco-Science: Population Resource and Environment*, Freeman, San Francisco.
3. Hussain, Z., (1996): *Environmental Degradation and Conservation in North East India,* Omsons Publications, New Delhi.
4. Mohapatra, A.C., S.K. Barik & C.S. Rao (2000): *Man and Environment*, Star Publishing House, Shillong.
5. Odum, E. P. (1971): *Fundamental of Ecology*, W.B. Saunders and Co., Philadelphia.
6. Roa, V. K. and R.S. Reddy (1997): *Environmental Education*, Commonwealth Publishers, New Delhi.
7. Saini L. D. and R.C. Sharma (1996): *Environmental Education*, Kalyani Publishers, Gopsons Paper Ltd., New Delhi.
8. Sharma, P. D. (1994): *Environmental Biology*, Rastogi Publication, Meerut.
9. Sharma, P. D. (1997): *Ecology and Environment*, Rastogi Publication, Meerut.

Course Out Comes :

1: Understand the principles and significance of environment and need of environmental protection.

2: Interpret the environmental crisis with reference to pollutions.

3: Locate the environmental laws and examine how these laws are helpful to restoration of ecological balance.

4: Trace the role of Government and NGOs towards environmental protection

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	3	3	2	1	1	2	3
CO2	3	1	1	2	2	3	3	1	1	2	2	3
CO3	3	2	2	2	1	3	2	2	1	1	2	3
CO4	3	2	1	2	1	3	3	2	`1	1	2	3

3: High; 2: Medium; 1: Low

Course4.4c: RURAL ENTREPRENUERSHIP

UNIT- I: Entrepreneurship - Concept, Definition, Characteristics of an entrepreneur; Functions, Types of entrepreneurs; Rural entrepreneurship - Need for rural entrepreneurship, Factors affecting entrepreneurial growth; Problems of rural entrepreneurs and women entrepreneurs.

UNIT- II: Entrepreneurship Development Programme - Need, objectives and course contents, Entrepreneurial motivation, Entrepreneurial competencies, Entrepreneurial mobility and Entrepreneurial change; Training for entrepreneurship: Entrepreneurship development courses; Key problems in training for entrepreneurship.

UNIT- III: Project Management: Project Classifications, Formulation and design – Feasibility analysis, Preparation of project Report, Financial analysis, Project cost estimate and Project appraisal methods.

UNIT- IV: Project Finance: Sources of finance – Banking institutions, Role of DICS, SIDCO,SISI,SIPCOT; Incentives and subsidies; Govt., policy for small scale enterprises.

Reference books

1. Manzoor Ahmed and Philip H. Coombs (ed.). Education for Rural Development: Case studies for Planners.

2. John C. de wilde. India: Non-Formal Education in the development of small enterprise, in Manzoor Ahmed and Philip H. Coombs (ed.). Education for Rural Development: Case studies for Planners.

3. Vasanta Desai, Organisation and Management of small scale industries.

4. Nalinaksha Mutsuddi, You Too Can Become An Entrepreneur. Wheeler Publishing , 1996.

5. Vasanth Desai. Dynamics of Entrepreneurial Development and Management, Hmalayan Publishing House.

6. Khanka. Entrepreneurial Development; S.Chand & Company Ltd.

7. Satish Taneja. Entrepreneur Development; New Venture Creation.

8. N.P. Srinivasn & G.P.Gupta. Entrepreneurial Development, Sultan Chand & Sons.

Course Out comes:

1.Describe the entrepreneurship and rural entrepreneurship and explain the problems of rural entrepreneurs includes women and youth.

2.Explain key factors of entrepreneurial motivation abilities and mobility to become best entrepreneur.

3. Identify the significance of project, planning, execution and appraisal methods.

4. Assess the need of finance to start small scale industry and role of Govt, Bank and other Institution.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	3	2	1	2	2	2	2	3
CO2	2	2	3	3	1	2	2	2	2	1	2	3
CO3	3	2	3	3	3	1	1	1	2	2	3	3
CO4	2	3	2	3	3	2	1	2	2	2	2	3

3: High; 2: Medium; 1: Low

OPEN ELETIVE (1)

Course4.5a: HUMAN RESOURCES DEVELOPMENT IN RURAL SECTORS

UNIT – I: Human Resource Development: Meaning, objectives, importance and historical perspective of human resource development; Dimensions of H.R.D. in Rural Development-Health, Education, Energy, Agriculture and Allied Activities; improving productivity.

UNIT – II: Human Resources Planning and Development: Objectives, Strategies, Demographic aspects, Processes and policies; Steps in HRP, Man power demand; Human capital and it's measurement - Views of Schultz and Weisbroad on human capital function; Human capital formation.

UNIT – III: Training and Development: Need for Manpower training, Classification of Training, Designing Training programmes and methods; Performance appraisal and standards, H R Competencies, Performance counseling, Effectiveness of training.

UNIT – IV: Training of developmental functionaries: Achievement motivation training, Training courses for different sectors – agriculture, cooperation, animal husbandry, health, Pancayat Raj; Training facilities available from Mandal level to state level.

Reference Books

Dipak Kumar Bhattacharyya (2006). Human Resource Management, Excel Books, New Delhi -28 (Second Edition).

Arcalion (2006). Human Resource Management, Pearson Prentice Hall, New Delhi -28 (X Edition).

APSDP (1984). Rural Vocational Training n Bangladesh, Indonesia, Korea, Malesia, The Philippines and Thailand. Report of a Sub-regional Seminar, Dhaka, Bangladesh 5-11 May, 1984.

Reddy, M C.Reddeppa (20006). Emerging Rural Occupations, Dept. of Adult & Continuing Education, S.V.University, Tirupati.

Mehta M R : Human Resource Development Planning with Special Reference to Asia

Alexander V Alex : Human Capital Approach in Economic Development

Batra V P : The Economic and Human Resources
ILO : Employment Promotion with Special Reference to Rural Areas
George Tobias : Human Resources in India
Gyan Chand : Population in Perspective
World Bank : World Development Report, 1001
Govindappa K : Adult Education Impact of National Literacy Mission
UNDP : Human Development Report(s) 1998. 1999, 2000.

Course Outcomes:

1.Analysing the importance of human resource development.

2.Knowledge on need of human resources in different dimensions of human development.

3.Application of the skills of human resource planning for rural development

4. Develop training module for different sectors like agriculture, animal husbandry and panchayat raj.

CO – PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	2	--	2	2	2	--	3
CO2	3	2	1	1	2	2	--	1	2	1	1	3
CO3	3	2	1	1	1	2	--	1	2	2	1	3
CO4	3	1	2	1	1	2	--	1	1	2	1	3

3: High; 2: Medium; 1: Low

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF ANCIENT INDIAN HISTORY, CULTURAL ARCHEOLOGY



Course

M.A. ANCIENT INDIAN HISTORY, CULTURAL ARCHEOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

About the department:

The Department of Ancient Indian History, Culture and Archaeology [AIHC&A], Sri Venkateswara University, was established in 1993. The Department is offering two years Post-Graduation (M.A.) in AIHC & Archaeology, P.G. Diploma in Epigraphy (one year evening course) and Ph.D. Research programme encompassing all the specializations. The faculty members are specialized in the fields of Pre and Proto-History, political and cultural history, Epigraphy, Numismatics, Art, Architecture, Museology and Tourism.

Epg pathshala (e-content development an UGC/ MHRD programme under NMIECT)

In these three decades the Department has proved its ability and academic excellence and recognized as one of the best Departments. The commitment of the faculty resulted in achieving this goal. The UGC also recognized the academic activities of the Department and sanctioned E-content development project (**Epgpathshala**) for the post graduation subject **Indian Culture** by selecting Prof. P. Bhaskar Reddy as Principal Investigator, an MHRD programme under NMIECT being executed by UGC with **Rs. 1.12 Crore** during 2015-2018. The e-content for 524 Modules in four quadrants for 15 courses was successfully completed by involving subject experts at national level. The uploaded modules of the programme are in free access in ***www.epgp.inflibnet.ac.in*** and also in several digital platforms through YouTube. The content and its quality is well appreciated by the viewers.

Vision

- The P.G. courses designed as per NEP guide lines 2021 with an aim to impart knowledge and skills in Archaeology, Ancient and Medieval Indian History, Andhra History, Ancient World cultures and influences with emphasis on the study of political, social, economic, religious, cultural development and changes. The content of the courses is designed to fulfill the requirement of UPSC,APPSC, NET and SET aspirants

Mission

- The Dept. Aimed to train the students with profession and knowledge in Archaeology, Tourism, Museology, Soft skill, Laboratory methods in Archeology, Science and Technology to equip the students with the solid foundation to build upon the fundamentals, useful skills and expertise that can assist employment in Tourism Industry, Archaeology and Museums.
- Enlighten the students in several aspects from unidisciplinary approach to multidisciplinary study.
- To train in the knowledge of practical value to students and researchers about different specializations of Archaeological and Cultural History at Regional, National and Global.

Programme Specific Outcomes

- The department is specialized in teaching and research in Archaeology, Ancient and Medieval Indian History and Culture.
- The courses are designed with an aim to impart knowledge and skills in Archeology, Ancient and Medieval Indian History, Andhra history, ancient world cultures and influences with emphasis on the study of political, social, economic, religious, cultural development and changes.
- There are basic courses in core section on history which are thematic and cut across chronological divisions and regional polities.
- The ancient history courses encouraged the study on sources for the study, evolution of social structures, economy, civilizations, religious traditions, cultural developments, political processes as well as historical geography and chronology.
- Emphasis is also given to the study of Medieval history and culture with a focus on transition in Indian history from ancient to medieval and medieval to colonial period, through a reconstruction of structural continuities, regional polities, social and economic developments, as well as changes in the spheres of religion, culture and languages.
- The courses dealing with archaeological studies provide basic concepts, theoretical training in field methods including process of archaeological investigation, excavation techniques, methods of Data retrieval, Chronology and Dating Methods, Prehistory,

Proto-History, Historical Archaeology, Epigraphy, Numismatics, Art and Architecture.

- The Tourism and Museology courses can equip the students with the solid foundation to build upon the fundamentals, useful skills and expertise that can assist employment in Tourism Industry and Museum.

Programme Objectives:

- The P.G. courses are designed as per NEP guide lines 2021 with an aim to impart knowledge and skills in Archaeology, Ancient and Medieval Indian History, Andhra History, Ancient World cultures and influences with emphasis on the study of political, social, economic, religious, cultural development and changes.

Programme Outcomes:

- There are basic courses in core section on history which are thematic and cut across chronological divisions and regional polities.
- The ancient history courses encouraged the study on sources, evolution of social structures, economy, civilizations, religious traditions, cultural developments, political processes as well as historical geography and chronology.
- Emphasis is also given to the study of Medieval history and culture with a focus on transition in Indian history from ancient to medieval and medieval to colonial period, through a reconstruction of structural continuities, regional polities, social and economic developments, as well as changes in the spheres of religion, culture and languages.
- The courses dealing with archaeological studies provide basic concepts, theoretical training in field methods including process of archaeological investigation, excavation techniques, methods of Data retrieval, Chronology and Dating Methods, Prehistory, Proto-History, Historical Archaeology, Epigraphy, Numismatics, Art and Architecture.
- The Tourism ,Museology, Soft skill, Laboratory methods in Archeology, Science and Technology courses can equip the students with the solid foundation to build upon the fundamentals, useful skills and expertise that can assist employment in Tourism Industry, Archaeology and Museums.

- The Department of Ancient Indian History, Culture and Archaeology [AIHC&A], Sri Venkateswara University, was established in 1993. The Department is offering two years Post-Graduation (M.A.) in AIHC & Archaeology, P.G. Diploma in Epigraphy (one year evening course) and Ph.D. Research programme encompassing all the specializations. The faculty members are specialized in the fields of Pre and Proto-History, political and cultural history, Epigraphy, Numismatics, Art, Architecture, Museology and Tourism. .

Programme Educational Objectives (PEO's):

- The AIHC& Archeology is designed to enlighten the students in several aspects from unidesciplinary approach to multi disciplinary.
- The content of the cores are aimed to impart knowledge to the aspirants of UGCNET, APPSAC and other competitive examination.

RESTRUCTURED CURRICULUM FOR AIHC & Archaeology

(REGULAR) PROGRAMME

TO BE IMPLEMENTED WITH EFFECT FROM THE ACADEMICYEAR 2017-2018

S.V. UNIVESITY, TIRUPATI
SVU COLLEGE OF ARTS
DEPARTMENT OF ANCIENT INDIAN HISTORY CULTURE & ARCHAEOLOGY
COURSE : M.A - AIHC & Archaeology
CBCS Pattern (With effect from 2021-2022)
The Courses of Study and the Scheme of Examinations

FIRST SEMESTER

S. No.	Course Code	Components of Study	Title of the Paper	Contact hours	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	AIHC&A-101	Core-Theory	History of Ancient India upto 550 A.D.	6	4	20	80	100
2	AIHC&A-102	Core-Theory	History of India from 1206 A.D. to 1526 A.D.	6	4	20	80	100
3	AIHC&A-103	Core-Theory	History of Andhrasupto 1323 A.D.	6	4	20	80	100
4	AIHC&A-104	Core-Theory	Ancient World Civilizations.	6	4	20	80	100
5	AIHC&A-105 AIHC&A-105	Compulsory Foundation *	(A) Principles and Methods of Archaeology. (B) Advanced Archaeological Theory and Research Methodology	6	4	20	80	100
6	AIHC&	Elective	(A) Social					

	A-106	Foundation *	and Political Institutions in Ancient India (B) Indian Religious Movements.	6	4	20	80	100
			Total:	**36**	**24**	**120**	**480**	**600**
7	AIHC& A-107	Audit Course*	Human Values and Professional Ethics-I.	**0**	**0**	**100**	**-**	**-**

* All **Core** Papers are **Mandatory**
*Compulsory Foundation – Choose **One** paper
*Elective Foundation - Choose **ONE**
*Audit Course – 100 Marks (Internal) – Zero Credits under self-study
*Interested students may register for MOOC with the approval of the concerned DDC but it will considered for the award of the grade as open elective only given extra credits

SECOND SEMESTER

S. No.	Course Code	Components of Study	Title of the Paper	Contact hours	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	AIHC& A-201	Core-Theory	History of India from 550 A.D to 1206 A.D.	6	4	20	80	100
2	AIHC& A-202	Core-Theory	History of Medieval India from 1526 A.D to 1707 A.D.	6	4	20	80	100
3	AIHC& A-203	Core-Theory	History of South India from 1323 A.D. to 1724 A.D.	6	4	20	80	100
4	AIHC& A-204	Core-Theory	Pre and Proto Historic Cultures of India	6	4	20	80	100
5	AIHC& A-205 (A) AIHC& A-205	Compulsory Foundation *	(A) History of Indian Archaeology (B) Cultural Heritage	6	4	20	80	100

	(B)		Management					
6	AIHC&A-206 (A) AIHC&A-206(B)	Elective Foundation *	(A)India's Early Cultural Contacts with other Countries	6	4	20	80	100
			(B) Early History of South East Asia					
			Total:	**36**	**24**	**120**	**480**	**600**
7	AIHC&A -207	Audit Course	Human Values and Professional Ethics-II	**0**	**0**	**100**	**-**	**-**
	* All **Core** Papers are **Mandatory** *Compulsory Foundation – Choose **One** paper *Elective Foundation - Choose **ONE** *Audit Course – 100 Marks (Internal) – Zero Credits under self study *Interested students may register for MOOC with the approval of the concerned DDC but it will considered for the award of the grade as open elective only given extra credits.							

THIRD SEMESTER

S.No.	Course Code	Components of Study	Title of the Paper	Contact hours	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	AIHC&A-301	Core-Theory	History of Indian Architecture	6	4	20	80	100
2	AIHC&A-302	Core-Theory	Epigraphy	6	4	20	80	100
3	AIHC&A-303(A) AIHC&	Generic Elective * (Related to subject)	(A) History of Modern Andhra from 1724 A.D.	6	4	20	80	100

	A-303(B)		to1956 A.D. (B) Historiography and Historical Method					
	AIHC&A-303(C)		(C) Laboratory Methods in Scientific Archaeology	6	4	20	80	100
	AIHC&A-303(D)		(D) Temple Studies					
4	AIHC&A -304	Skill Oriented Course	Soft Skills in Archaeology	6	4	20	80	100
5	AIHC&A-305(A)	Open Elective * (For other Departments)	(A) Outlines of Indian History	6	4	20	80	100
	AIHC&A-305(B)		(B) Women in Indian History					
			Total:	**36**	**24**	**120**	**480**	**600**

* All **Core** Papers are **Mandatory**

***Generic Elective** – Choose **Two** papers

***Skill Oriented** course is **Mandatory**

***Open Electives** are for the Students of other Departments. Minimum **One Paper** should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.

*Interested students may register for MOOC with the approval of the concerned DDC.

FOURTH SEMESTER

S. No.	Course Code	Components of Study	Title of the Paper	Contact hours	Credits	Internal Assessment Marks	End Semester Exam	Total

							Marks	
1	AIHC&A-401	Core-Theory	History of Indian Art	6	4	20	80	100
2	AIHC&A-402	Core-Theory	Numismatics	6	4	20	80	100
3	AIHC&A-403(A)	Generic Elective* (Related to subject)	(A) Museology	6	4	20	80	100
	AIHC&A-403(B)		(B) Historical Applications in Tourism	6	4	20	80	100
	AIHC&A-403(C)		(C) Tour Guiding and Management					
	AIHC&A-403(D)		(D) Conservation of Cultural Property					
4	AIHC&A-404	Multidisciplinary Course/Project Work	History of Science and Technology in Ancient India	6	4	20	80	100
5	AIHC&A-405(A)	Open Elective * (For other Departments)	(A) Introduction to Indian Archaeology	6	4	20	80	100
	AIHC&A-405(B)		(B)History of Vijayanagara Empire					
			Total:	**36**	**24**	**120**	**480**	**600**
	* All **Core** Papers are **Mandatory** *Generic Elective – Choose **Two** papers *Multidisciplinary/ Project Work is **Mandatory**							

	*Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study. *Interested students may register for MOOC with the approval of the concerned DDC.

	I SEMESTER	
101	**HISTORY OF ANCIENT INDIA UPTO 550AD**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The objectives of the course are to impart a comprehensive knowledge and understanding of history and culture of India up to 550 CE.
- The course introduces sources for the study, early culture and civilizations, development of different religious traditions, evolution of ancient Indian polity with major political events, political geography and chronology.
- It also deals with the age of foreign incursions, structure of early Indian society and the nature of economic transformation. Focus is also placed on analysis and explanation of ancient India's cultural achievements.

UNIT- I:

Sources of Ancient Indian History - Archaeological and Literary Sources –Foreign Accounts – Purana - Itihasa Tradition – Ecological Zones of India - Indus Civilization – Its extent – Its time – Its Builders – Town Planning – Economic and Social Life – Arts, Crafts and Industries – Indus Script – Religion – End of Indus Civilization.

UNIT-II:

Vedic culture – Origin and Spread of Vedic Culture - Political Organization –Religion – Later Vedic culture, Economic and Social Life – Caste System – Religion and Philosophy – Buddhism – Buddha - Life and Doctrins of Buddha – Jainism – Mahaveera – JainaDoctrins and Philosophy.

UNIT-III:

North India in 6th Century B.C. - SodasaMahajanapadas - Rise of Magadha - Persian and Macedonian Invasions – Its Impact – Mauryan Empire – Asoka – Dharma and Missionary Activities – Mauryan Polity - Culture - Decline of the Mauryas.

UNIT-IV:

Indo-Greeks - Sakas and Kushans in India - Kushan Empire - Kanishka -Society, Economy and Religious Trends – Satavahanas in Deccan – Social and Economic conditions under the Satavahanas – Satavahana Society and Religion - Sangam Age in the South

UNIT -V :

Gupta empire - Its growth and decline - Impact of Hun invasions – Classical Age - Its facets - Gupta Polity, Society, Economy, Religion and Literature.

Suggested readings:

1. Thapar, R.- History of India, Reprint, New Delhi, 1990 Asoka and the Decline of Mauryans, 2nd Ed., New Delhi, 1973.
2. Kosambi, D.D.- An Introduction to the Study of Indian History, Bombay, 1956.
3. Rayachaudari, H.C.- Political History of Ancient India, Calcutta,1950, 5th Edition.
4. Kosambi, D.D.- The Culture and Civilization of Ancient India in Historical outline, London, 1965.
5. Thapar, R - From Lineage to State, Social formation in the Mid first Millenium B.C. in the GangaValley, Oxford University Press, 1984.
6. Thapar, R. - Ancient Indian Social History Some Interpretations, Delhi, 1978.
7. Pande, G.C. - Foundations of Indian Culture, Vol. I and II, New Delhi, 1984.
8. Ray, H.P. - Monastery and Guild, Commerce under the Satavahanas, Oxford University Press, Delhi, 1986.
9. Sarma, R.S. - Material Culture and Social formation in Ancient India, Delhi, Second Ed., 2007.
10. Basham, A.L. - The Wonder that was India, Calcutta, 1971.
11. Majumdar, R.C - History and Culture of the Indian people, relevant volumes, Comprehensive History of India, Vols. 1, 2 and 3.
12. Yazdani, G. - Early History of the Deccan, Vol. 1-2, Oxford University Press, 1960.
13. Subramanian, N. - Sangam Polity, Madras, 1966.

14. Upender Singh, The Discovery of Ancient India, 2005, Reprint -2010, Delhi.

Course Outcome:

- Students will have a familiarity with the sources, different political, social, economic, cultural and religious traditions of the Indian subcontinent upto 550 C.E.
- Student will also be well versed with different analytical approaches and models of interpretation.

102	HISTORY OF INDIA FROM 1206 AD TO 1526 AD	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- This course is designed to impart thorough knowledge on the origin and emergence of Delhi Sultanate, the political and cultural achievements of Slave, Khalji, Tughlak, Sayyad and Lodi dynasties and their legacy.
- The course create awareness among the students about their polity, policies, Administrative reforms, economic development, changing pattern of society, women's participation in politics and analyses ,women centered issues in contemporary society, religious trends, , bhakti and sufi movements, progress of Persian and indigenous languages, education, literature, development of Art, Architecture , influence and impact of Islamic traditions on Hindu culture – vis-e-vis.

UNIT- I:

Turkish invasion - Slave Dynasty - the Rule of Khiljis - Allauddin-Khilji – Mongol invasions.

UNIT-II:

Tughluq rule - Muhammad-bin-Tughluq - Firoz Shah Tughluq - Break up of the empire.

UNIT-III:

Nature of State - Evolution of Polity under the Delhi Sultanate.

UNIT-IV:

Society - Impact of Islam on Hindu society - Economic conditions, Growth of towns and cities – Impact of Urbanization -Educational system

UNIT -V :

Religious conditions - Bhakti movement - Sikkism - Sufism- Shia-Sunni sects – Literature - Persian and Indo-Islamic Architecture - Painting

Suggested readings:

1. TapanRaychaudhari., - The Cambridge Economic History of India, Oxford University Press, Delhi, Irfan Habib [ed]., 1982.
2. Percy Brown - Indian Architecture, The Islamic period, Bombay.
3. Irfan Habib - Medieval India Researches in the History of India - 1200-1750, Delhi, 1992.
4. Comprehensive History of India, Vol. V.
5. Kulke, H., - The State in India, 1000-1700 A.D. Oxford University Press, 1997.
6. Indian History Congress volumes till date, University of Delhi, New Delhi.

Course Outcome:

1. Students can familiarize in understanding the continuity with changes in all spheres of history and culture under the Delhi sultanates.
2. Students can able to assess the contribution of sultanates to Indian culture and impact of Islamic institutions on Indian culture

103	HISORY OF ANDHRAS UPTO 1323 AD	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The course aimed to impart comprehensive knowledge of the history of Ancient Andhra from earliest up to the end of Kakatiya dynasty.
- This course introduces to the students the geographical features, sources, political formation, the region under Maurya and Satavahana rule, rise of local powers, their role in political, social, economic, religious development, cultural heritage and inter dependence of the region.

UNIT- I:

Physical features – Impact on History and Culture of Andhra -Archaeological, Epigrphical and literary sources -Andhra - Andhradesa, Trilingadesa - Andhrajati. Pre-Mauryan Andhra – Andhradesa - during the Mauryas.

UNIT-II:

Satavahanas - Origin and original home - Political History -Satavahana state and its Salient Features - Social and Economic conditions – Buddhism - Brahmanical religion - Education and Literature.

UNIT-III:

Post - Satavahana period – Rule of Ikshvakus - Salankayanas – Early Pallavas – Vishnukundins - Growth of rural economy – Urbanization with reference to Nagarjunakonda - Social and Religious conditions between 3rd and 7th centuries A.D

UNIT-IV:

Chalukyas in Andhra - Eastern Chalukyas of Vengi - An overview of the Political History from 624 A.D to 1200 A.D. - Chalukya-Cholas - Early medieval society - Nature of Economy - Religious movements - Virasaivism - Srivaishnavism - Early Medieval Telugu literature.

UNIT -V :

Kakatiyas– Political History of Kakatiyas – State and Polity - Land Revenue System - Growth of rural economy - Agrarian structure - Tank irrigation- Trade Guilds - Industries – Taxation -Society - Religious trends-Kalamukhas - Suddha Saivism - Spread of Sri Vaishnavism - Education and literature.

Suggested readings:

1. Hanumantha Rao, B.S.L. - AndhrulaCharitra, Guntur, 1990.
2. Hanumantha Rao, B.S.L. - Religion in Andhra, Hyderabad, 1973.
3. Yazedani, G. - Early History of the Deccan, Oxford, 1960.
4. Gopalachari, K. - Early History of the Andhra Country, Madras, 1941.
5. Gopala Reddy, Y. - A Comprehensive History of Andhra, Hyderabad, 1990.
6. Satyanarayana, K. - A Study of the History and Culture of the Andhras Vol.1 and II New Delhi, 1975.
7. Sastri, A.M. - Early History of Deccan: problems and perspectives, Delhi, 1987.
8. Ray, H.P. - Monastery and guild, Commerce under Satavahanas, Delhi, 1986.
9. Amita Ray. - Life and Art of Early Andhradesa, Calcutta, 1983.
10. DebalaMitra - Buddhist Monuments, Calcutta, 1971.
11. Sankaranarayana, S. - Vishnukundins and their times, New Delhi, 1977.
12. Comprehensive History of Andhras, Vol. I, II, III & IV
13. Krishna Kumari, M., - The Rule of the Chalukya - Cholas, Delhi, 1980.
14. Burton stein - Peasant State and Society in Medieval South India, Delhi, 1980.
15. ParabrahmaSastri, P.V., - The Kakatiyas, Hyderabad, 1983.
16. Rajendra Prasad, B., - Art of South India, Andhra Pradesh, Delhi, 1980.
17. Venkataramanaiah, N., - EasternChalukyas of Vengi, Madras, 1950.
18. Krishna Reddy, N., - Social History of Andhra Pradesh [7th to 13th Century A.D.] Delhi, 1991.

Course Outcome:

- The study of comprehensive history of the country is incomplete without the study of regional history.
- Regional history is becoming more and more popular, for it has inherit potential of taping varied kinds of sources for understanding the divergent aspects of local heritage and culture.
- The students can develop thorough understanding on Ancient Andhra history and culture.

104	**ANCIENT WORLD CIVILIZATIONS**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The objective of this course is to look at the Ancient Egyptian, Mesopotamian, Greece, Chinese, Romans and Harappan civilizations. In the process of cultural development, as the requirements of the society increased, craft and trade activities intensified at several centers in ancient world. In due course of time a drastic change appeared in every sphere of life.
- This course will also help the students to assess the ancient societies in the light of their contribution to political, social structure, religion, literature, science and technology, trade and commerce, Art and Architecture.
- We see urban centers in several parts of the ancient world and a well-established social, economic and administrative institution which need to be studied in order to understand how they shaped the present day world.

UNIT- I:

Ancient Egyptian Civilization - Sources - Geographical Factors - The Old Kingdom - The Middle kingdom – The New Kingdom - Egyptian Society –Government - Economy -Religion - Art and Architecture.

Mesopotamian Civilization - Geographical Factors - The Sumerians and city - States - The Babylonian Empire - Science - Literature, Society

UNIT-II:

Law Codes of Hammurabi - Hittite conquest - Assyrian conquest - The Chaldean or New Babylonian empire - Persian Invasion [539 B.C.]

Ancient Greece - Historical background - Geographical influence -Development of city - states - Athenian Democracy - Wars with Persia [492 B.C.]

UNIT-III:

Greek Philosophy - Education - Literature - Science - Art and Architecture - Decline of Greece - the Age of Alexander the Great.

Ancient China - Geographical factors - Political history - The Han dynasty Polity - Economic conditions - Trade and Commerce.

UNIT-IV:

Ancient China Religion and Philosophy - Buddhism - Confucianism –Taoism - Art and Architecture.

Ancient Rome - Geography of the Italian peninsula - The age of the Kings -The Roman Republic - Conquest of Italy [366-264 B.C.] - The Punic Wars -Republic to Empire [133 to 31 B.C.]

UNIT -V :

The first Triumvirate. - Rule of Julius Caesar [49-44 B.C.] - Society - Religion - Philosophy – literature - Art and Architecture - Engineering and Technology.

Indus Civilization – Origin – extent - Urbanization its features Art and Architecture - Harappan society - Economy, Agriculture, Trade and Commerce - Religion - Script - End of Indus Civilization.

Suggested readings:

1. Wooley L and Hawker, J. - History of Mankind, UNESCO, Vols. 1-3.
2. Chester G Starr.-History of Ancient World, Oxford University Press, New York, 1974.
3. Max Savelle. - A History of World Civilization, New York, 1963.
4. Swain Edgar. - History of World Civilization, McGraw Hill Book Co., 1984.
5. Wells, HJ. - A Short History of the World, New Delhi, 1922 [2nd Ed. 2007].
6. Herman Schinider. - History of the World Civilization, London, 1931.
7. Hutchinson Ancient World History of Civilization.
8. Breastead, J.H. - A History of Egypt, New York, 1909.
9. Oppenhiem, A.L. - Ancient Mesapotamia, Chicago, 1964.
10. Delaportie, L. - Mesopotamian civilization, New York, 1925.
11. Finely, M.I. - Ancient Greeks, Penguin Books, Reprint, 1991.

12. Bury, J.B. - A History of Greece, New York, 1951.

13. Fair bank, J.K., - [Ed]., Ancient Cities of Indus.

14. Allchin, B., &. Allchin, R., - The Rise of Civilization in India and Pakistan, Revised edition, 1983.

15. Possell George [ed], Ancient Cities of Indus, New Delhi, 1979.

16. Bodo Veethoff, - Introduction to Chinese history from Ancient times to 1912, London.

17. Mommensen, T., - History of Rome, New York, 1903.

Course Outcome:

- Students gain familiarity with the rise and characteristic features of the ancient world Civilizations, its regional extent and variation.
- Students can understand the glory of the civilizations, the nature of its cities and material remains and institutions.

105	**PRINCIPLES AND METHODS OF ARCHAEOLOGY**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- This course introduces to the students the basic concept of Archaeology, the definition, aims and scope of archaeology and its development as a discipline, practical approaches in archaeology, highlighting their applications in interpreting the human past.
- The course includes theoretical training in field methods including process of archaeological investigation from the discovery of sites to their excavation and analysis excavation techniques, methods of Data retrieval, Chronology and Dating Methods, Documentation, Conservation and Preservation, and the role of archaeology in heritage management

UNIT- I:

Archaeology - Definition and Scope - Relationship with History, Anthropology and pure Sciences - Kinds of Archaeology.

UNIT-II:

History of Indian Archaeology – Foundation for Indological Studies-Sir William Jones-Establishment of Asiatic Society – James Prinsep -Alexander Cunningham - Robert Bruce Foote – John Marshall –Mortiner Wheeler.

UNIT-III:

Archaeological Explorations - Aims and Methods of Exploration – Chance finds – Maps and place names – Scientific methods of explorations – Aerial photography - Remote sensing GPS (Global Position System) - Geographic Information system – Excavation – Purposes - Methods of Excavation – Vertical and Horizontal Excavations – Burial excavations.

UNIT-IV:

Field Conservation and Preservation – Documentation and Data Analysis - Dating Methods in Archaeology - Relative and absolute methods of dating, Thermolumineiscence - Radio Carbon dating – Dendrochronology.

UNIT -V :

Marine Archaeology – Aim and scope – Objectives of Marine Archaeology – The Equipments used in Marine Archaeology – Sources for the study of Marine Archaeology – Birth of Marine Archaeology – Marine History of India with special reference to Dwaraka. Establishment of Marine Archaeology in India.

Suggested readings:

1. Wheeler, R.E.M.,- Archaeology from the Earth, Oxford, 1954.
2. Childe, V.G., - Piecing together the past, London, 1956.
3. Graham Clark., - Archaeology and Society, London, 1960.
4. Raman, K.V.,-Principles and Methods of Archaeology, Madras, 1986.
5. Srivatsava, K.M.,-New Era of Indian Archaeology, New Delhi, 1990.
6. Michael H Dey., - Fossil Man, London, 1972.
7. Butzer, K.W., - Geomorphology from the Earth, New York, 1982.
8. ShinlyGoreinstein - An Introduction to Archaeology
9. Dilip K Chakrabarthi- India: An Archaeological History, New Delhi, 2001.
10. Daniel Glyn., - The Origin and Growth of Archaeology, Penguin books, 1967.
11. Paddayya, K., -New Archaeology and its aftermath, Pune, 1990.
12. K. Rajan,- Archaeology, Principles and Methods, Manoopathippakam, Thanjavur, 2002.

Course Outcome:

- Students can develop a strong foundation on the basic understanding of the nature, fundamentals, development and value of archaeology as a discipline.
- Familiarized with basic descriptive technique and preliminary study of various categories of objects and the practical methods of doing Archaeological work.

106	HUMAN VALUES AND PROFESSIONAL ETHICS –I	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The ethos of Indian culture has been value-oriented throughout the ages.
- The rich literary heritage of India is a treasure of values and ethics to be acquired, pursued and imparted to the future generations of the present day.
- An enquiry into varying dimensions of human values may lead to furtherance of our knowledge and to ethical values suited for the modern world.

UNIT- I:

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment.Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

UNIT-II:

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom. Good behavior and respect for elders, Character and Conduct.

UNIT-III:

Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires). Moksha(Liberation).

UNIT-IV:

Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths – AryaAstangamarga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Religious

Tolerance, Gandhian Ethics.

UNIT -V :

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Suggested readings:

John S Mackenjie: A manual of ethics.

2. The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.

3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.

4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.

5. Harold H. Titus: Ethics for Today

6. Maitra, S.K: Hindu Ethics

7. William Lilly: Introduction to Ethics

8. Sinha: A Manual of Ethics

Course Outcome:

- Students can understand the need and importance of human values and professional ethics which are essential for positive human behavior and actions in our daily lives.
- They inspire the fundamental goodness of human beings and society at large.

II SEMESTER		
201	**HISTORY OF INDIA FROM 550 A.D TO 1206 A.D.**	**CREDITS -4**
Sessional Marks 20		**End semester Examinations Marks 80**

Objectives:

- This course aims at imparting comprehensive historical knowledge pertaining to the early medieval India. This age witnesses the emergence of various local and regional dynasties in North and south India and their place in history and culture are dealt in detail.
- It also covers the invasions of Arabs and foundation of Muslim rule in India
- Apart from reviewing the broad political history of this period, the broader concept of regional polity, social, economic, religious, cultural and intellectual changes and also the theoretical framework of the Segmentary State are examined from various points of view.

UNIT- I:

Pallavas of Kanchi - Chalukyas of Badami - their Polity, Society and Economy - Growth of Bhakti tradition.

UNIT-II:

Harshavardhana and his times – Polity – Religion –Economy - Society.

UNIT-III:

Rashtrakutas in the Deccan - Pratiharas and Palas in the Northern India – Rashtrakutas Polity and Society.

UNIT-IV:

The Cholas of Thanjavur – Political – Social - Economic and Religious condition

UNIT -V :

The Chalukyas of Kalyani – Political, Social, Economic and Religious conditions - Foundations of Muslim rule in India.

Suggested readings:

1. Devahuti, D., - Harsha, Political Study - Oxford University Press, 1980.
2. Basham, A.L., - The Wonder that was India, Calcutta, 1971.
3. Chopra,P.N., Ravindran, T.K., &. Subrahmanian, N., - History of South India, Vol. I, Ancient period, New Delhi, 1979.
4. Burton Stein - Peasant State and Society in Medieval South India, Delhi, 1980.
5. Noboru Karashima., - South Indian History and Society, Studies from Inscriptions, 850-1800, Delhi, 1984.
6. Majumdar R.C., - The History and Culture of the Indian people, relevant volumes; Comprehensive History of India, Vol. 1, 2 and 3.
7. Yazdani, G., - Early History of the Deccan, Vol. 1-2, Oxford University Press, 1964.
8. Sastry, K.A.N., - History of South India, The Cholas, Madras, 1975 [Reprint]
9. Basavaraja, K.R., - Administration under the Chalukyas of Kalyani
10. Subbarayulu, Y., South India the Cholas, OUP.

Course Outcome:

- Students can develop comprehensive knowledge on political, social, economic, religious and cultural history of early medieval India , regional polities and its impact
- Can also able to understandthe circumstances lead to the invasions of Arabs and foundation of Muslim rule in India

202	**HISTORY OF MEDIEVAL INDIA FROM 1526 AD TO 1707 AD**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- This course is designed to impart thorough knowledge on the Mughal conquest of India, their rule and legacy.
- The course create awareness among the students about the political achievements, policies, Administrative reforms, economic development, changing pattern of society, women's participation in politics, religious trends, bhakti and sufi movements, progress in languages, education, literature, development of Art, Architecture and Paintings.

UNIT- I:

Political situation in India at the time of Babur's invasion - Establishment of Mughal rule - Babur - Sur interlude - Sher Shah - Akbar, Jahangir - Shah Jahan - Aurangazeb - Relations with the Marathas.

UNIT-II:

Nature of Mughal State - Mughal polity - Todarmal's reforms - Mansabdari System - Society of Mughal India.

UNIT-III:

Agrarian Society - Industrial and Technological Developments - Inland and Foreign trade - Indian Mercantile trade in Indian ocean - European trade - Towns and Cities of Mughal India.

UNIT-IV:

Religious conditions - Akbar's religious policy - Growth of Sufism, Sikkism and Christianity

UNIT -V :

Art and Architecture - Mughal Decorative art - Mughal Painting - Court art.

Suggested readings:

1. Irfan Habib, - Atlas of the Mughal Empire, OUP, Delhi.
2. Japan Raychaudhari& Irfan Habib [ed], - The Cambridge Economic History of India, OUP, Delhi, 1982.
3. Tara Chand, - Society and State in the Mughal period, Delhi, 1961.
4. Percy Brown, Indian Architecture, The Islamic period.
5. Irfan Habib, Medieval India Researches in the History of India, Delhi, 1750.
6. Comprehensive History of India, Volume - V.
7. Majumdar, R.C., - The History and Culture of the Indian people, Vol. VII [The 'Mughal empire], Bombay, 1984.
8. Kulke, H., - The State in India, 1000-1700 A.D., OUP, 1997.
9. Ishwari Prasad, - A Short History of the Muslim rule in India, Allahabad, 1970.
10. Tripathi, R.P., - Rise and fall of the Mughal empire, Allahabad, 1963.
11. Muzaffar Alan Sanjay, The Mughal State Themes in Indian History [1526-1750]. Subramanyam, Oxford in Indian Readings, 1998-2000.
12. John F Richards, The Mughal Empire, the New Cambridge History of India.
13. Indian History Congress Volumes till date, University of Delhi, New Delhi.

Course Outcome:

- Students can understand thoroughly the Mughal conquest of India, their rule and legacy.
- The study help the students to assess the achievements and contribution of Mughals to Indian history and culture

203-A	**HISTORY OF SOUTH INDIA FROM 1323 AD TO 1724 AD**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- This course examines the last imperial political formation in Peninsular India and locates the history of the empires of Vijaynagara, Bahmani and contemporary pretty powers within the context of cultural, religious and ideological changes which were taking place during the late medieval period stretching from the middle of the fourteenth century till the Battle of Tallikota 1565 AD.
- The course analyses the social, economic and political changes which swept across India in the late medieval period besides the coming of Europeans and its impact.

UNIT- I:

Political conditions in south India during 14th century A.D. Resistance to the Muslim Invasions - Role of the Musunuri Chiefs - Rule of Reddi dynasties - Contributions to Andhra culture.

UNIT-II:

Origin and foundation of Vijayanagara Empire - Political History - Vijayanagara – Bahamani - Gajapati and Portuguese relations.

UNIT-III:

Nature of Vijayanagara state - Nayankara system, Social-economic Conditions - Religious conditions - Literature.

UNIT-IV:

QutubShahis of Golkonda - Mughal invasion and Annexation - Downfall of the Mughal empire - Rise of Secondary states in South India - Establishment of State of Hyderabad, 1724.

UNIT -V :

Society and Economy under the Qutbshahis - Religious trends - Advent of Europeans - Portuguese, Dutch and English - Impact on Trade and Commerce.

Suggested readings:

1. Comprehensive History of India, Vol. V.
2. History and Culture of the Indian people, Vol. VII, Bombay, 1984.
3. P.M. Josh and M. Sherwani, Medieval History of Deccan, , Hyderabad, 1973.
4. Burton Stein, Peasant state and society in medieval South India, Delhi, 1980.
5. Burton Stein, Vijayanagara,Cambridge, 1989.
6. SomasekharaSarma, M. - Forgotten Chapter of Andhra History, Waltair, 1942.
7. SomasekharaSarma, M. - History of the Reddi kingdoms, Waltair.
8. Studies in the third dynasty of Vijayanagara, Madras, 1980.
9. Hanumantha Rao, B.S.L., - AndhrulaCharitra, Delhi, 1989.
10. Kulke, H. - The State in India, 1000-1700 - OUP, 1997.
11. Sherwani, H.K. - History of the QutbShahi dynasty, New Delhi, 1974.
12. Richards, J. - Mughul Administration in Golkonda, Oxford, 1975.
13. Narayana Rao, V- Symbols of substance, Court and State in Nayaka period, OUP, 1992.
14. Satyanarayana, K. - A Study of the History and Culture of the Andhras, Vol. II, 1983.

Course Outcome:

- This course provides comprehensive knowledge on the last imperial political formation in South India and the history of Vijayanagara, Bahmani and contemporary pretty powers.
- It helps to understand with the context of polity, economy, culture, religious and ideological changes.

203-B	**PRE AND PROTO HISTORIC CULTURES OF INDIA**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The course intended to provide knowledge on the basic features of prehistoric archaeology, quaternary periods, pre-historic sites, and India's place in human evolution.
- The focus then shifts to different traits associated with Palaeolithic, Mesolithic and Neolithic are discussed.
- To give a holistic view besides the tools and techniques, different aspects of Rock Paintings, habitation features and burials practices of the early man are highlighted.
- It also tracks the development and spread of agriculture during the Neolithic, through to the rise of Harappan urbanism.
- The Early Iron Age and its cultures notably Painted Gray Ware & Northern Black Polished ware cultures associated with early historic city sites are discussed.

UNIT- I:

Definition, scope, terminology and periodisation - Quaternary Period: position of prehistory in geological chronology, climatic conditions - Prehistoric sites: type and nature of sites, landscape configuration, primary and secondary sites - Stone tool technology, typology, material and study of stone artifacts - Hominid fossils and the question of human evolution: Human evolution tree, Australopithecus, Homohabilis, Homo erectus, Neanderthal, Java man, Peking man and other major hominidae fossil evidences. India 's place in the current scheme of human evolution – Narmada skull and other discoveries .

UNIT-II:

A Historiographical perspective – from Robert Bruce Foote till the present - Palaeo-environment conditions with special reference to Potwar plateau and Kashmir , Rajasthan, Son valley, Teri sites, etc - Survey of Lower Palaeolithic cultures - Middle Palaeolithic cultures - Survey of Upper Palaeolithic cultures, - Survey of Mesolithic cultures - distribution, artefacts, technology, raw material, economy, contextual occurrence of tools, chronology, types of sites in India - Rock Art : (a) Recording system, interpretation of rock art, dating of rock art - (b) Survey of rock art in India

UNIT-III:

Protohistory: Definition, scope, terminology - Beginning of agriculture and domestication of animals and plants - distribution, artefacts, technology, raw material, economy, question of microliths, pottery, etc in association with animal domestication - Survey of Neolithic cultures - Chalcolithic cultures of North, Deccan and South.

UNIT-IV:

HarappanCivilization : Ravi , Hakra and Amri cultures Early - Harappan period, concept and evolution of terminology, characteristic features, different cultural zones during early Harappan period and distribution pattern - Late / Post Harappan period.

UNIT -V :

Iron Age Cultures : Antiquity of iron in India - Painted Grey Ware culture - Distribution pattern, relation to late Harappan culture - Survey of PGW sites in Pakistan and India - Megalithic cultures of India : Distribution pattern, different types of megaliths, survey of various regional types of megaliths including rock-cut chambers - Habitation sites.

Suggested readings:

1. Ghosh, A., - Encyclopaedia of Indian Archaeology, Vol. I and II, New Delhi.
2. Allchin, F.R., et.al., - The Rise of Civilization in India and Pakistan, Cambridge, 1996.
3. Allchin, Bidget and Raymond., - The Birth of Indian Civilization, London, 1968.
4. Agarwal, D.p., - Archaeology of India, Delhi, 1970.
5. Sankalia, H.D., - Pre-History and Proto History in India and Pakistan, Bombay, 1962.
6. Subba Rao, B., - Personality of India, Baroda, 1958.
7. Walter Fairservis, Roots of Ancient India, London, 1971.
8. Journals -Man and Environment.

9. Dhavalikar, M.K., - Indian Proto History, 1997.
10. Dhavalikar, M.K., - Historical Archaeology of India, 1999.
11. Wheeler, R.E.M., - Indus Civilization, Cambridge University Press, 1967.
12. Gregory Possehl, - Ancient Cities of the Indus, Bombay, 1979.
13. I. S. Banerjee, N.R., - The Iron Age in India, Delhi, 1965.
14. Allchin, F.R. -The Archaeology of Early Historic South Asia, Cambridge, 1995.
15. Dilip K Chakrabarthi, - India - An Archaeological History, New Delhi, 2001.
16. S. Settar, Ravi Korisettar [ed], Indian Archaeology in Retrospect Prehistory, Archaeology of South Asia, ICHR, Manohar, 2002.

Course Outcome:

- Students will develop a strong foundation and critical understanding of the pre-proto cultures of India and will be able to situate Indian materials within wider archaeological debates.

204	HISTORICAL ARCHAEOLOGY	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The course aimed to impart knowledge on studying the history and culture in conjunction with the help of written records.
- The study focuses on inscriptions, coins, monuments, royal documents, oral history and eye witnesses with their importance in writing the history from Mauryan period up to contemporary age
- The cultural sequences reflected in the ancient historical sites also dealt in detail.

UNIT- I:

Definition and scope - Brief review of archaeology of pre-Mauryan period from 6th century B.C. to 4th century B.C. and contemporary cultural assemblage including potteries of the sub-continent Technology and elements of economy – Historical Urbanization

UNIT-II:

Archaeology of post-Maurya period (2nd century B.C. to end of 3rd century A.D.). - Archaeology of the period of the Guptas and other contemporary dynasties (4th century A.D. to 6th century A.D.).

UNIT-III:

Archaeology of 7th century A.D. to 10th century A.D. in different regions - Archaeology of 11th century A.D. to 13th century A.D. in different regions.

UNIT-IV:

Archaeology of 14th century A.D. to 16th century A.D. in different regions. -Archaeology of 17th

century A.D. to 19th century A.D. in different regions.

UNIT -V :

Cultural sequence of important sites: Taxila - Kausambi - Sanchi - Sishupalgarh - Chandraketugarh - Hampi - Sannati - Nagarjunakonda - Arikamedu - Mathura - Sravasti - Brahmagiri - Nalanda

Suggested readings:

1. Allchin, The Birth of Indian Civilizations.
2. Lal, B.B., - Indian Archaeology since Independence.
3. Marshal, J, - Taxila [3 Vols.] Cambridge, 1951.
4. Dilip K Chakrabarthy, India - An Archaeological History, New Delhi, 1999.
5. Gupta, S.P., [Ed.] Mahabharata, Myth and Reality - Differing views, Delhi, 1976.
6. Sankalia, H.D., - The Ramayana in the Historical Perspective, Delhi,1982,
7. Sinha, K.K., - Excavations at Sravasti, Varanasi, 1967.
8. Ghosh, A., - The City in early historical India.
9. Ghosh, A., - Encyclopaedia of Indian Archaeology.
10. Longhurst, A.H., & Ramachandran, T.N., - Nagarjunakonda.
11. Sankalia, H.D., &Dikshit - Excavations at Brahmapuri.
12. Indian Archaeology - A Review - Volumes.
13. Ancient India - Volumes and Excavation Reports.

Course Outcome:

- The students can understand thoroughly the nature of the historical archaeology and their importance in historical and cultural studies.
- Able to interpret and writing the history with the help of written records.

205	**HUMAN VALUES AND PROFESSIONAL ETHICS –II**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The ethos of Indian culture has been value-oriented throughout the ages.
- The rich literary heritage of India is a treasure of values and ethics to be acquired, pursued and imparted to the future generations of the present day.
- An enquiry into varying dimensions of human values may lead to furtherance of our knowledge and to ethical values suited for the modern world.

UNIT- I:

Value Education- Definition - relevance to present day - Concept of Human Values - self introspection – Self-esteem - Family values-Components, structure and responsibilities of familyNeutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-II:

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT-III:

Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions.Characteristics of ethical problems in management, ethical theories, causes of unethical

behavior, ethical abuses and work ethics.

UNIT-IV:

Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, CI imate change, Energy and population, Justice and environmental health. 20 -20-

UNIT -V :

Social ethics- Organ trade. Human trafficking.Human rights violation and social disparities, Feminist ethics.Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

Suggested readings:

1. John S Mackenjie: A manual of ethics.
2. The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today.
6. Maitra, S.K: Hindu Ethics.
7. William Lilly: Introduction to Ethics.
8. Sinha: A Manual of Ethics.
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Halighton.
10. SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. Chowkarnba Sanskrit series. VolLlI and Ill, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
11. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavanDash,Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral.Issues, Judith A. Boss. May Field Publishing Company - 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. CosmoPublications.

15. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin & co Julundhar.

Course Outcome:

- Students can understand the need and importance of human values and professional ethics which are essential for positive human behavior and actions in our daily lives.
- They inspire the fundamental goodness of human beings and society at large.

III SEMESTER		
301	**EPIGRAPHY**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The course is designed to impart basic professional knowledge about the studies in inscriptions.
- The course introduces to the students the meaning, scope and relevance of Palaeography and Epigraphy in general, the antiquity of writing ,the decipherment of Indus script, Kharohshti script and Brāhmī script, their origin, features and development
- The course also intended to focus on types of inscriptions, inscription format, languages, writing materials, dating methods, and numerals.
- This course also introduces to the students the significance and reliability of some of the important Indian inscriptions.

UNIT- I:

Epigraphy as source for the reconstruction of Indian History - History of Epigraphical studies in India.

UNIT-II:

Origin and Antiquity of writing in India - The Indus script -General Features attempts at decipherment

UNIT-III:

The Brahmi script - its characteristics - History of its development - The Kharoshthi script - its characteristics - Origin - distribution and its end - Evolution of Telugu Kannada scripts.

UNIT-IV:

Types of Inscriptions and their general characteristics - Methods of Dating of inscriptions Eras - Writing materials.

UNIT -V : Detailed Study of the following Inscriptions

a) Erragudi edit of Asoka [CII; Vol. I, EI Vol. XXXII],

b) Hathigumpha inscription of Kharavela [EI. Vol. XX].

c) Nasik inscription of Pulumavi [EI. Vol. VIII].

d) Girnar rock inscription of Rudradamam [EI. Vol. VIII].

e) Nagarjunakonda inscription of Rudrapurushadatta, year 11 [EI Vol. XX.].

f) Guntupalli Pillar inscription ofSalankayanaNandivarma [EI Vol. XIII].

g) Allahabad pillar inscription of Samudragupta [CII, Vol. Ill]

h) Aihole inscription of Pulakesi II [EI Vol. VI],

i) Kalamalla inscription of RenaticholaDhananjaya [EI Vol.XXVII],

j) Ahadanakaram plates of Eastern ChalukyaVishnuvardhana [Telugu portion] [JESI-Vol.I]

k) Chebrolu inscription of Jayappanayaka [EI Vol. V],

l) Santanasagara inscription of PedakomatiVemaReddi [EI XI].

m) Gaya inscription of Krishnadevaraya [EI Vol. XXXIII].

Suggested readings:

1. Buhler, G., - Indian Palaeography.
2. Pandey, R.B., - Indian Palaeography, 1952.
3. Sircar, D.C., - Indian Epigraphy, Delhi, 1965.
4. Sivarama Murthy, C., - Indian Epigraphy and South Indian Scripts, Madras, 1952.
5. Mahalingam, T.V., - Early South Indian Palaeography, Madras, 1974.
6. Ramesh, K.V., - Indian Epigraphy.
7. Ojha, G.H., - BharatiyaPrachinaLipimala [Hindi], 2nd Ed., Ajmer, 1980.

8. Krishna Reddy, N., - SasanaParichayam [Teluguj, Tirupati, 1992.
9. Relevant volumes of Corpus Inscriptions Indicarum [CII].
10. Relevant volumes of EpigraphiaIndica [EI].
11. Richard Solomon : Indian Epigraphy – A Guide to the study of inscriptions in Sanskrit, Prakrit and the other Indo-Aryan Languages, New York, 1998.
12. Gai G.S.: Introduction to Indian Epigraphy, Mysore, 1986

Course Outcome:

- Students will be able to understand the profession knowledge on decipher and read scripts; assess the date of inscriptions with the help of paleographic features.
- Able to understand the different languages used in inscriptions, interpret the inscription in its Political. Socio-economic and Religious context.

302	HISTORY OF INDIAN ARCHITECTURE	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The course surveys the origin and evolution of architecture in India and their transformation through the ages.
- The various architectural features embedded in the ancient monuments viz, rock-cut and structures of religious and secular, their technique, style, regional variations, artistic skills, influences would be thrown open to the students to understand the heritage monuments of this country in right perspectives.

UNIT- I:

Introduction and Sources (Texts on Architecture) – Terminology – Three styles of Temple Architecture – Harappan Architecture - Mauryan Architecture.

UNIT-II:

Buddhist Architecture – Concepts and components – Buddhist cave Architecture – Early Phase – Later Phase – Buddhist Structural Architecture – Stupas of North India – Bharhut – Sanchi - Saranath –Amaravati - Nagarjunakonda – Bhattiprolu - Chaityagrihas and Viharas.

UNIT-III:

Early Hindu Cave Architecture – Gupta period-Cave Architecture in Andhradesa – Vijayawada – Mogalrajapuram – Undavalli – Bhairavakonda - Early Chalukya – Rock cut Architecture - Structural temples – Aihole, Badami and Pattadakal – Pallava – Rock-cut caves – Monolithic Rathas – Structural temples - Mahabalipuram and Kanchipuram – Rashtrakuta – Ajantha - Ellora - Greater Kailas temple.

UNIT-IV:

North Indian Structural Temple Architecture – Gupta Architecture – Sanchi, Bhumara, Nachanakutara and Deogarh – Orissan Architecture, Bhuvaneswar, Puri and Konark – Central Indian style – Khajuraho.

UNIT -V :

South Indian Architecture – Chola architecture – Tanjore, GangaikondaCholapuram - Hoyasala architecture – Belur, Halebid, Somanathpur - Kakatiya - Hanumakonda, Pillalamarri, Palampeta and Warangal -Vijayanagara - Hampi.

Suggested readings:

1. Percy Brown - Indian Architecture, Vol. I, Bombay, 1956.
2. DebalaMitra - Buddhist Monuments, Calcutta, 1971.
3. Srinivasan, K.R., - Temples of South India, New Delhi, 1971.
4. Krishnadeva - Temples of North lndia, New Delhi, 1969.
5. James Harle - Art and Architecture of India.
6. Rajendra Prasad, B.,-Art ofSouth India, Andhra Pradesh, Delhi, 1980.
7. Maichael Meister - Encyclopaedia of Indian Temple Architecture.

Course Outcome:

- Students will able to understand the evolution of architecture in India and their transformation through the ages in their religious, regional and stylistic context.
- Can gain theoretical knowledge about the basic philosophy, fundamental aspects and multifaceted nature of Architecture.

303	HISTORIOGRAPHY AND HISTORICAL METHOD	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- This course aims at developing greater understanding the meaning, scope, purpose, principles and facets of history.
- It also aims at introducing the student to the main features of research methodology
- This course is intended to familiarize the students with approaches to historical studies in the twentieth century with a focus on prominent historians and on the development of historical writing in modern India.
- It makes a critical evaluation of the impact of Orientalism on Indian historiography, the Imperialist, Nationalist, Class, Elite, Subaltern and Gender approaches and their influence on the writing and interpretation of Indian history.

UNIT- I:

Meaning, Definition of History - Scope of History- Importance of its study– Philosophy of History – Historian and his facts - Influence of Society on the Historian - History as Science or Art – Causation in History.

UNIT-II:

Research Methodology : Heuristics – Hermeneutics – Synthesis – Exposition - Objectivity – Errors in History – History and its relations with other Social Sciences.

UNIT-III:

Sources of Indian History: Ancient and Medieval -Contributions of Kautilya, Banabhatta – Kalhana – Alberuni - Alexander Cunningham - John Marshall, Robert Swell to Indian Historiography.

UNIT-IV:

Development of Western and Arab Historiography – Classical period Herodotus, Thucydides - Medieval period : Church Historiography – St. Aungustine; Arab Historiography : Ibn Khaldun – Modern Period : Hegal, Spengler and Toynbee.

UNIT -V :

Eminent Indian Historians : D.D. Kosambi, K.A.N. Sastri – Modern Indian Historiography : Historiography of the Indian Freedom Movement – Nationalist School - Cambridge School - Marxist School - Subaltern School.

Suggested readings:

1. Arthur Marwick, *The Nature of History*, London, 1970.
2. E. H. Carr : What is History, Penguin Books, 1969.
3. B. Sheik Ali : History, its theory and Method, Delhi, 1978.
4. M Block : The Historians Craft, New York, 1953.
5. R. G. Collingwood : The Idea of History, New York, 1993.
6. J.W. Thomson , History of Historical Writings[2 Vols.], New York, 1942.
7. Waleh, W.H, An Introduction to the Philosophy of History, London, 1951.
8. K. A. N. Sastry&Ramanna : Historical method with special reference to Indian History, Madras, 1966.
9. R. K. Majumdar& Srivastava A.N., Historiography, Delhi [6 ed.] 1999.
10. Aron, Raymond, Introduction to the Philosophy of History, London, 1960.
11. Butterfield, Herbert, *History and Human Relations*, London, 1951.
12. Dray, William, H., *Philosophy of History*, New York, 1960.
13. P. Gardiner, *Theories of History*, New York, 1969.
14. Lowith, Karl, *Meaning in History*, London, 1970.
15. A.L. Roose, *The Use of History*, London, 1963.

Course Outcome:

- It provides a critical overview of one of the most dynamic areas of modern historical inquiry—global history.
- The students can familiarize with historical studies, the theories and methods used in the practice of history writing.
- Students also gain foundation knowledge on Historical Methods and fundamentals of research methodology.

304-A	HISTORY OF MODERN ANDHRA FROM 1724 AD TO 1956AD	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The course aimed to impart comprehensive knowledge of the history of modern Andhra in context of regional as well with national events.
- The course introduces coming of Europeans, establishment of Asafjahi dynasty, Andhra under company and crown rule, role of Andhras in various phases of freedom movement.
- The study also intended to focus on the movement of separate Andhra state , movement for formation of Andhra Pradesh

UNIT- I:

Andhra under the Company Rule : Anglo-French rivalry and the rise of English East India Company, Acquisition of Northern Circars 1766, Nizam – British Relations – securing ceded districts – Consolidation of company rule in Andhra – Administration – Revenue - Irrigation – Agriculture development – Agrarian settlements – Thomas Munro and his reforms – Education - 1857 Mutiny and its impact.

UNIT-II:

Telangana under the Nizam'srule :Salarjung reforms – Social and Economic conditions in Telangana under the Asafjahi dynasty in 19th century.

UNIT-III:

Andhra under the Crown : Irrigation – Economy and its impact on society – Role of Missionaries - Social Reform movements – KandukuriVeereshalingam, RaghupatiVenkataratnam – Rise of

Nationalism – Press, Communications, Political Associations – Indian National Congress – Growth of Nationalist ideas – Political consciousness in Andhra.

UNIT-IV:

Nationalist Movement :Vandemataram Movement and its impact – Home Rule and Non-Brahmin Movements – Non-Cooperation Movement - Visit of Simon Commission, Civil Disobedience Movement in Andhra – Alluri Seetharamaraju – Rampa rebellion – 1922-24 - Quit India Movement

UNIT -V :

Andhra movement : Origin and Growth – Andhra Mahasabhas – Role of Nizam - Government of India Act 1935 – Congress in Power 1937-39 – Growth of left ideology – Attainment of Independence – Movement for separate Andhra - Martyrdom of PottiSriramulu – J.V.P. Report Formation of Andhra State, 1953 - Gentlemen's Agreement, Emergence of Andhra Pradesh, 1956.

Suggested readings:

1. Rao, P.R., Modern History of Andhra Pradesh, New Delhi, 1985.
2. Bipin Chandra, Modern India, New Delhi, 1986.
3. Venkatarangaiah, M., The Freedom Struggle in Andhra Pradesh Volume, Hyderabad, 1965.
4. Waheed Khan, H.W., Brief History of Andhra Pradesh, Hyderabad, 1972. Ramana Rao, A.V., Economic Development of Andhra Pradesh, [1766-1957].
5. SarojiniRegani, Highlights of the Freedom Movement in Andhra Pradesh, Hyderabad, 1968.
6. Sanjanlal, The Growth of Public Opinion, Hyderabad Academy, No. 15.
7. Gurunatham, J., The Andhra Movement, Guntur, 1913.
8. Narayana Rao, K.V., The Emergence of Andhra Pradesh, Bombay, 1973.
9. Subba Rao, G.V., The Freedom Struggle in Hyderabad State, Vol. I – IV, Hyderabad, 1956.
10. Gopal Reddy, Y., A Comprehensive History of Andhra, Hyderabad, 1994.
11. Hanumantha Rao, B.S.L., Andhrulacharitra.

Course Outcome:

- The students can understand the history of Andhra as well the history of Hyderabad state under company and crown rule.
- Assess the role of Andhras in the freedom movement
- Acquire thorough knowledge on the causes and course of the movement of separate Andhra state , movement for formation of Andhra Pradesh

304-B	SOCIAL AND POLITICAL INSTITUTIONS IN ANCIENT INDIA	CREDITS - 4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- This course introduces to the students the basic social, political ideas and institutions of ancient India.
- Social stratifications through Varna-Āśrama system, the ideal behaviour patterns of Purusharthas, family system, and position of women, educational system, and the significance of the institutions of marriage are discussed.
- Nature of polity and administration and also the idea of state in ancient India are brought to the fore through this course.
- Nature, scope and origin of state in ancient India along with the concept of Saptānga theory, kingship and its functions and the existence of democratic elements in the form of Republican states form the subject matter.
- Administrative paraphernalia and the intricacies of war and diplomacy, principles of taxation are analysed.

UNIT- I:

Sources of study - Family as social unit – Joint family – Samskaras – Purusharthas - Asramas - Varnas and the Caste system.

UNIT-II:

Institution of Marriage - The position of women – System of Education and Educational Institutions.

UNIT-III:

State in Ancient India – Saptanga Theory – Origin of Kingship – Position oand functions of the king – Council of Ministers - Military, Law and Justice – Taxation – Spy System – Inter State Relations.

UNIT-IV:

Vedic Polity - Republics in Ancient India - Local Self Government in Ancient Indian Kingdoms.

UNIT -V :

Manudharmasastra -Ardhasastra of Kautilya - Administration and polity in Ancient India.

Suggested readings:

1. Bhagawan Das: Science of Social Organisation.
2. Prabhu R.B.: Hindu Social Organisation.
3. Pandey R.B.: Hindu Samskaras.
4. Datt. N.K.: Origin and growth of Caste in Ancient India
5. Hutton : Caste in India.
6. AltekarA.S. : Position of Women in Ancient India.
7. Indira : Position of Women in Ancient India.
8. Altekar A.S.: Education in Ancient India.
9. Jayaswal K.P.: Hindu polity
10. Ghoshal U.N.: A History of Hindu Political theories.
11. Mahalingam T.V. Sounth Indian Polity
12. Dikshitar V.R.R.: Mauryan Polity
13. Altekar A.S.: State and Govt. in Ancient India.
14. Mukherjee . R.K.: Education in Ancient India.

Course Outcome:

- Students get acquainted with various developmental phases of the Indian social institutions and their significance in human life and values
- It helps to understand the concepts of Political institutions in Ancient India and their significance.

305-A	OUTLINES OF INDIAN HISTORY	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The aim of the course is to impart to the students of other departments about the basic knowledge and understanding of history and culture of India
- The course introduces sources for the study, early culture and civilizations, important phases of Indian history up to independence.

UNIT- I:

Introduction - Geographical Factors in Indian History – Sources – Periodization of Indian History.

UNIT-II:

History of North India upto 8th century A.D - Mauryas - Sungas- Kushanas - Guptas - Harsha

UNIT-III:

History of South Indian Dynasties - Satavahanas -Pallavas – Cholas - Chalukyas - Rashtrakutas - Telugu Cholas.

UNIT-IV:

Arab Conquest of Sind - Delhi Sultanates Kakatiyas- Bahmanis - Vijayanagara and Mughal Empire.

UNIT -V :

Expansion of English Power in India - 1857 Mutiny - Nature - Causes and Results - Indian National Movement - Independent India.

Suggested readings:

1. Mujumdar, Datta, and : An Advanced History of India
2. Srinivasa Chary. K.A. : An Advanced History of India

3. Pannikar, K.M : A Survey of Indian History
4. Pannikar, K.M : Geographical Factors in Indian History
5. BharatiyaVidyaBhavan Volumes : History and Culture of Indian People (Relevant
6. Mahajan, V.D. : History of India from Beginning to 1526
7. Sinha and Ray : A History of India
8. Bhasham A.L. : The Wonder that was India
9. Ram Prasad Khosla : A History of India
10. NeelakantaShastry, K.A : History of South Indian

Course Outcome:

- The non history students as an external elective course become familiar in understanding the broad phases of Indian history and culture

IV SEMESTER

401	HISTORY OF INDIAN ART	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- This Course introduces to the students the glorious tradition of Indian art from its very early phase.
- The course surveys the evolution of Art and sculpture of the Jain, Buddhist and Hindu religious contexts in India and their transformation through the years.
- The various sculptural and art features embedded in the ancient monuments particularly in the temples, stupas, viharas, major developments, would be thrown open to the students to understand the heritage monuments of this country in right perspective.

UNIT- I:

Sources – Features of Indian Art - Terminology – Beginnings of Rock Art –Indus Valley Art – Mauryan Art – Art of Sunga period.

UNIT-II:

Kushan Art – Gandhara and Mathura School of Art – Art of Amaravati and Nagarjunakonda – Gupta Art – Ajanta, Ellora – Orissan Art – Bhuvaneshwar, Puri and Konark.

UNIT-III:

BadamiChalukyan Art – Badami, Aihole, Pattadakal, and AlampurRashtrakuta Art – Ellora and Elephanta - VengiChalukyan Art –Pancharamas and Biccavolu - Hoyasala Art – Belur, Halebid and Somanathpur

UNIT-IV:

Pallava Art – Mahabalipuram and Kanchi - Chola Art – Tanjore, GangaikondaCholapuram, Tribhuvanam and Dharasuram - Kakatiya Art; Hanumakonda, Palampet, Pillalamarri and

Warangal; Vijayanagara Art – Hampi.

UNIT -V :

Indian Painting – Sources – Important texts – Technique and Tools – Ajanta Frescoes – Bagh Paintings –- Tanjore Paintings – Paintings of Sittanavasal - Paintings of Lepakshi.

Suggested readings:

1. Sarasvati, S.K., - Indian Sculpture, Delhi, 1956.
2. James Harle - Art and Architecture of India.
3. Krishnadeva - Temples of North India, New Delhi, 1969.
4. Srinivasan, K.R., - Temples of South India, New Delhi, 1971.
5. Ray C Craven - A Concise History of Indian Art, London, 1976.
6. Zimmer, H., - The Art of Indian Asia, 2 Vols., New York, 1955.
7. Benerjea, J.N., - The Development of Hindu Iconography, Delhi, 1967.
8. Gopinatha Rao, T.A., - Elements of Hindu Iconography, Varanasi, 1971.
9. Sivarama Murthy, C., - South Indian Paintings, New Delhi, 1968.
10. Brown, CJ., - Indian Painting.
11. Mehta, N.C., - Studies in Indian Painting, Bombay, 1926.
12. Lady Herrighan - Ajanta Frescoes, Oxford, 1915.
13. Niharanjan Ray - Maurya and Sunga Art.

Course Outcome:

- Students become familiar with the monuments and their sculptures, art forms, features, styles and art schools of India during the period covered in the course.

402	NUMISMATICS	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The course aimed to introduce the currency system of ancient India and acquaint the development in the coinage.
- The basic thrust of this course is to establish the relevance and significance of Numismatic studies in ancient Indian history.
- Beginning with the antiquity of coins, early Indian coinage, coins of Indo-Greeks, Śakas and Kusānas , features of Sātavāhana and Gupta coins are discussed.
- The coins of the Chola, Kakatiya, Vijayanagara dynasties and also coins of Delhi sultanates, Mughal emperors are dealt in detail.

UNIT- I:

Importance of the study of Coins - Origin and Evolution of Coinage Early Indian Coins – Punch Marked Coins - Epigraphical reference to Numismatics of the Deccan and Andhra

UNIT-II:

Coins of Foreign Invaders - Indo-Greeks - Romans and the Kushans.

UNIT-III:

Coins of the Satavahanas – Coins of the Gupta Emperors.

UNIT-IV:

Coinage of Ikshvakus – Vishnukundins - Coins of the Eastern Calukyas and the Cholas

UNIT -V :

Coinage of the Kakatiyas and Vijayanagaras – Coins of the Muslim dynasties of Delhi – Coins of the Mughal Emperors

Suggested readings:

1. Altekar, A.S., - Coinage of the Gupta empire.
2. Bhandarkar, D.R., - Lectures on Ancient Indian Numismatics.
3. Chattopadhyaya, B., - The Age of Kushanas - A Numismatic Study.
4. Chattopadhyaya, B.D., - Coins and Coinage in South India, New Delhi, 1977.
5. Gupta, P.L., - Coins, New Delhi, 1996.
6. Sarma, I.K., - Coinage of the Satavahana Empire, New Delhi, 1980.
7. Kosambi, D.D., - Indian Numismatics, Delhi, 1992.
8. The Journal of the Numismatic Society of India Volumes.
9. Numismatic Digest volumes, Indian Institute of Research in Numismatic Studies, Anjaneri, Nashik.
10. Studies in South Indian Coins volumes, New Era Publications, Madras.
11. Paula J Turner, Roman Coins branch India, 1989, London.
12. P. Srivastava, Encyclopaedia of Indian Coins – Vol. I & II, Delhi, 2012.
13. David R Sear, Roman Coins and their Values, London, 1988.
14. Durga Prasad, Silver Punch marked Coins of Ancient India [N.S. XLV, & LVII]
15. S.K. Chakravarthi, Ancient Indian Numismatics.

Course Outcome:

- Students will be able to identify and decipher the coins.
- They will also be able to understand the socio-political background that accurse through the coinage of that time; thus getting holistic picture of economic and monetary system prevalent in ancient and medieval India.

403	HISTORICAL APPLICATIONS IN TOURISM	CREDITS -4

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The aim of the course is to provide useful knowledge of the Tourism Industry in relevance to History and cultural attractions of India.
- The course can provide more in depth insight in to the specific aspects of tourism industry, fundamentals, basic concepts, socio-economic significance, tourism as industry, role of Governments at state and central in its promotion, besides special focus on Archaeological, historical, cultural and natural heritage of India as attractions of tourism .

UNIT- I:

Tourism – Definition – Nature and Scope – History of Tourism and its Developments – Motivation for travel – Types of Tourism – Domestic and International Tourism – Pilgrimage Tourism.

UNIT-II:

Socio-economic significance of Tourism – Tourism as an industry – Ancillary industries in Tourism – Tourism organization, national and International – Role of State and Centre in the promotion of Tourism

UNIT-III:

History as a tourism product – Archaeological and Historical Monuments, Sanchi – Ajanta – Ellora – Amaravati – Nagarjunakonda – Mahabalipuram and Hyderabad

UNIT-IV:

Cultural Tourism in India – Fairs and Festivals – Performing Arts – Music and Dance – Folk and Tribal Culture – Arts and Crafts – Art galleries - Museums.

UNIT -V :

Natural Resources – Vegetation – Wild life – Beaches – Hill resorts – Impacts of Tourism on physical environment –Pollution and its impact on Tourism.

Suggested readings:

. Majumdar, R.C., - Races and Culture of India, Bombay, 1980.

2. Bhatia, A.K., - Tourism Development, Principles and Practices.

3. Allchin, F.R., - Cultural Tourism in India, Its Scope and Development.

4. Basham, A.L., - The Wonder that was India, New Delhi, 1963.

5. Gupta, S.P., - Tourism Monuments of India.

6. Kaul, S.N., - Tourism in India.

7. Kramrisch, Stella, - The Art of India, London, 1954.

8. Chris Cooper and Fletcher, - Tourism; Principles and Practices.

9. Wahab, S., Tourism marketing.

10. Joan Bakewell, - The Complete Traveller.

11. James W. Morrison, - Travel Agent and Tourism.

12. Edward D. Mills, - Design for Holidays and Tourism.

13. Douglas Pierce, - Tourism Today; a Geographical Analysis.

14.Sivanagi Reddy, E., - Andhra Pradeshlo Tourism; Vanarulu – Avakasalu [Telugu], Hyderabad, 2003.

15. George Young, Tourism – Blessing or Blight.

16. Ram Acharya, - Tourism in India.

17. Mistra, K.S., - Tourism in India.

18. PranNath Seth, - Successful tourism Management.

Course Outcome:

- The students can familiarize the knowledge needed to excel in tourism activities.
- It will equip the students with the solid foundation to build upon the fundamentals, useful skills and expertise that can assist employment in Tourism Industry

404-A	**MUSEOLOGY**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- The objective of this course is to introduce students to the purpose and functioning of museums.
- The importance of museums in linking archaeology with public education is stressed.
- The prime aim of the course is to impart knowledge on the meaning and scope of museum ,its history, importance of museum and museology, types of museums, acquisition, documentation , methods and principles of exhibition, Architectural aspects, educational activities, management , conservation and preservation.

UNIT- I:

Introduction to Museology-Definitions of Museology - History of the Museum Movement in the world History and development of Museums in India. Types of Museums - their Scope and Functions.

UNIT-II:

Museum collections - Documentation and Exhibition. Collection Policies, Ethics and Procedures

Collection methods : Field exploration – Excavation – Purchase Gift and Bequests – Loans – Exchanges – Treasure trove and others.

Documentation : Registration, Accessioning, Cataloguing, Indexing,

De-Accession - Museum equipment. Methods of Display - Temporary and circulating exhibitions

UNIT-III:

Organization of Museum – Educational programmes and activities -Research based on Museum collections.

Museum Publications:[Catalogues, Guide books, Brochures, Worksheets, Pamphlets, Posters, Picture cards etc.]. Museum Management and administration. Museum security - internal and

external.

UNIT-IV:

Conservation - History of Archaeological conservation. Restoration and Preservation - Principles and guidelines of Conservation. Museum exhibits, Material classification, Organic and Inorganic – Causes of decay – Measures of Conservation

UNIT -V :

Special study of the Museums

National Museum - Delhi

Salarjung Museum - Hyderabad

Nagarjunakonda Museum - Nagarjunakonda

State Archaeology and Museums- Hyderabad.

Sri Venkateswara Museum - Tirumala Tirupati Devasthanams

Suggested readings:

1. Nigam, M.L., - Fundamentals of Museology, Hyderabad, 1966 [Rev. 1985].
2. Sivaramamurthy, C., - Directory of Museums in India.
3. Grace Morley, - Museum Today, 1967.
4. Mookerji, Ajit, - Museum Studies.
5. Markham, S.F. &Hargreves, H., - The Museums of India.
6. Smith G Bakshi, - Modern Museum.
7. UNESCO, Organisation of a Museum.
8. UNESCO, Conservation of Cultural property.
9. Plenderlith, H.J., - The Conservation of Antiquities and work of Art, London, 1957.
10. Agarwal, R.C. – Conservation.

Course Outcome:

- Students can learn the basic nature, functions of museums and their activities.
- The students were able to acquire the essential skills and knowledge needed for Museum profession.

404-B	INDIA'S EARLY CULTURAL CONTACTS WITH OTHER COUNTRIES	CREDITS -4

Sessional Marks 20 **End semester Examinations**

Marks 80

Objectives:

- This course is designed to provide a broad picture of contacts between India and South East Asia in terms of cultural, religious and economic exchanges. The Spread of Religions, influence of art and Architecture are analyzed. The Concepts of Kingship, State, Statecraft and Theories of Divine Origin will be reviewed.
- The influence of Indian culture on Central Asia, Japan, Tibet, Persia, Greece, Rome, Indo-China also discussed

UNIT- I:

Sources of study – Nature and Antiquity of Cultural contacts of Hindu Colonization in South East Asia – Hinduised States in Kambuja –Champa - Srilanka

UNIT-II:

Hindu civilization in SuvarnaBoomi – Malay peninsula – Indonesia – Java – Bornia – Sumatra and Bali – Religion – Art and Architecture

UNIT-III:

Indian Influence on the History and Culture of Burma and Siam - Influence of Indian Religion – Literature – Art and Architecture.

UNIT-IV:

Influence of Indian Culture on Central Asia – Japan and Tibet. Religion – Literature and Art.

UNIT -V :

Cultural contacts between India and China – Afghanistan – Persia – Greece and Rome – Literature and Art.

Suggested readings:

1. MajumadarR.C. : Hindu Colonies in the Far East.

2. MajumadarR.C. : Ancient Indian Colonization in South East Asia.
3. NilakantaSastray K. A.: Champa, Suvarnadvipa and Kambujadesa.
4. NilakantaSastry K. A.: South Indian influence in the Far East.
5. NilakantaSastry K. A.: The Kingdom of Srivijaya.
6. Sircar H.B.: Indian Influence on Jawa and Bali.
7. Vogel J.: Buddhist Art in India Ceylon and Jawa
8. Coedes G.: Hinduised States of South East Asia
9. RegionaldLemay : Culture of South East Asia
10. Bagchi P.C: India and China.
11. Bagchi P.C: India and Central Asia
12. Regmy : History of Nepal.
13. Ghosal U.N. : Indian Culture in Afghanistan.

Course Outcome:

- Cross regional cultural diffusion has been an important aspect of historical evolution. A strong and vibrating civilization having its impact felt upon other contemporary cultures has been a common phenomenon of history.
- Student can understood well India's early cultural contacts and its influence in South East Asia, Central Asia, Persia, Indo-China Greece and Rome

405-A	INTRODUCTION TO INDIAN ARCHAEOLOGY	CREDITS -4

Sessional Marks 20 **End semester Examinations**

Marks 80

Objectives:

This course introduces to the external elective students the basic concept of Archaeology, the definition, aims and scope of archaeology and its relevance to other sciences, pre-proto historic cultures and also importance of epigraphy and numismatic studies.

UNIT- I:

Definition - Aim - Scope and Function of Archaeology

UNIT-II:

Archaeology and its Relations with other Disciplines - Social Sciences -Natural Sciences - Physical Sciences.

UNIT-III:

Pre-Proto and Early Historic Periods.

UNIT-IV:

Indian Epigraphy - Scope, Use and Function - Origin of Writing in India - Ancient Scripts and Languages - Paleographic Formula - Writing Materials.

UNIT -V :

Indian Numismatics - Scope, Use Function - Origin of Coinage inIndia - Examination of a Coin.

Suggested readings:

1. Sankalia, H.D : Pre and Proto history of India and Pakistan
2. Sankalia, H.D : Indian Archaeology Today
3. Alchn, Bridget and Raymond : Birth of Indian Civilization
4. Childe, Gordon : What happened in History?
5. Pandey, R.B : Indian Paleography.
6. Gupta, PL : Coins
7. Glyn Daniel : 150 Years of Archaeology

8. Frank Hole and Heizer F, Robert : Introduction to Pre-historic Archaeology

Course Outcome:

- The external elective students can acquire the knowledge about the importance of archeological studies, its relevance to other sciences.
- Will become familiar to understand the importance of epigraphy and numismatics in the reconstruction of history

CENTRE FOR SOUTHEAST ASIAN & PACIFIC STUDIES

S.V.U. COLLEGE OF ATRS

SRI VENKATESWARA UNIVERSITY: TIRUPATI



RESTRUCTURED CURRICULUM FOR

M.A. SOUTHEAST ASIAN & PACIFIC STUDIES

WITH EFFECT FROM THE ACADEMIC YEAR 2023-2024

SYLLABUS

Choice Based Credit System (CBCS)

UGC-CENTRE FOR SOUTHEAST ASIAN AND PACIFIC STUDIES

SRI VENKATESWARA UNIVERSITY: : TIRUPATI

S.V.U. COLLEGE OF ARTS

About the Department

The Centre for Southeast Asian and Pacific Studies (CSEA&PS), sponsored by the University Grants Commission (UGC) under Area Studies Programme, was established in 1976 at Sri Venkateswara University, Tirupati. It is a multidisciplinary research Centre representing five disciplines: Anthropology; Economics; Geography; History; and Political Science. CSEA&PS has been promoting research on the political, economic, social and strategic aspects of the Area under study. The CSEAPS is offering **M.A. (Southeast Asian and Pacific Studies)** and **Ph.D. programmes** and **M.A. Tourism** programme.

Centre's Vision

Make the Centre, as a Premiere Area Studies Centre in India, which could offer adequate knowledge in Higher Education on foreign areas pertaining to their geography, polity, history and cultures.

Centre's Mission

- Enlighten the students in several aspects from unidisciplinary approach to multidisciplinary study.
- To train in the knowledge of practical value to students, scholars, and researchers about different important regions of the world.

- To hone the abilities of Area Studies students for deeper understanding of international issues and respond with empathetic to the global crisis.

Programme Specific Outcomes

- Students get acquaint with the meaning, significance and application of Area Studies as a distinctive approach in international affairs

- Comprehend multilateral approaches in global peace and conflict resolution processes as ways of dealing with national and international issues

- Apply both multidisciplinary and interdisciplinary research methods to deal with problems like traditional and non-traditional threats and challenges

- Preparing students on topics like regional cooperation, international relations, globalization and national security

Centre's Objectives

- To promote a comprehensive understanding of social, cultural, economic, political and strategic dimensions of the study area
- To offer vitally important inputs to the policy planners to formulate policies advancing India's economic, strategic and political interests
- To promote research with emphasis on comparative study of the issues and problems between the regions.

Programme Outcomes

- The Programme on Southeast Asian and Pacific Studies (SEAPS) will enrich the students largely related to geographical, historical, political, economic, social and strategic engagement of India with the states of Southeast Asian and South Pacific countries.

- Educate the students with interdisciplinary outlook and multidisciplinary engagement on Southeast Asian region.

- Encourage the students to focus on basic topics like, foreign relations, bilateral and trilateral, quadrilateral relations, economic ties, international treaties, conventions, regional and international organizations.

- Students will acquire analytical knowledge in regional, international relations and conflict resolution issues and predict possible outcomes

- Comprehensive understanding of Southeast Asian and Pacific region through multidisciplinary approach.

- Students will identify research topics, collect source materials, review research literature, and analyze issues by reaching substantiated conclusions.

- The teaching of various courses in SEAP studies will help the students to acquire Indian history, India's cultural and multilateral relations with neighbouring Southeast Asian region and India's status in global politics.

- Gain expertise to examine and comment on regional, national and international issues pertinent to Southeast Asia and South Pacific

- Apply contextual knowledge to assess economic, political, security, environment, legal and cultural issues of the study area

- Relate ethical principles and apply professional ethics and responsibilities in International Relations.

- Communicate effectively on different geopolitical issues with the learned community and write effective reports or articles pertaining to the Study area.

- Demonstrate knowledge and understanding on the specific Area Studies and apply basic principles which are relevant to the professional career as a member or as a leader in multidisciplinary engagements.

Programme Educational Objectives

Enable the students to :

- Identify the significance of Area Studies from the perspective of growing international relations.
- Development multidisciplinary approach while studying Area Studies with a focus on Southeast Asia and Pacific regions.
- Critically observe the impact of global changes on the Southeast Asia and Pacific countries.
- Learn and distinguish the various forms of Indian and Chinese cultural influence on Southeast Asia

S.V. UNIVERSITY, TIRUPATI

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UGC CENTRE FOR SOUTHEAST ASIAN AND PACIFIC STUDIES

M.A. History (Southeast Asian and Pacific Studies)

Programme Code : 118

CBCS Pattern (With effect from 2021-22)

The Course of Study and Scheme of Examinations

SEMESTER-I

S.No.	Compo-nents of Study	Code	Title of the Course	Credit Hrs / Week	No. of Credits	IA	Sem. End Exam	Total Marks
1.	Core	SE 101	Early Cultural History of Southeast Asia	6	4	20	80	100
2.		SE 102	Regional Geography of Southeast Asia	6	4	20	80	100
3.		SE 103	Colonization of Southeast Asia	6	4	20	80	100
4.		SE 104	Ancient Indian History up to 1206 A.D.	6	4	20	80	100
5.	Compulsory Foundation	SE 105 a	Modern European History, 1870-1991	6	4	20	80	100
		SE 105 b	History of Indian Constitution, 1773-1947	6	4	20	80	100
		SE 105 c	Indian National Movements	6	4	20	80	100
6.	Elective Foundation	SE 106 a	Medieval Indian History 1206 A.D.–1707 A.D	6	4	20	80	100
		SE 106 b	History of Asian and African Nationalism	6	4	20	80	100

	Total	**36**	**24**	**120**	**480**	**600**
7.	**Audit Course**	**0**	**0**	**100**	**---**	**--**

*** All CORE Papers are Mandatory**

- **Compulsory Foundation -- Choose one Paper**
- **Elective Foundation – Choose one paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under Self Study**
- **Interests Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**

SEMESTER-II

S.No.	Compo-nents of Study	Code	Title of the Course	Credit Hrs / Week	No. of Credits	IA	Sem End Exam	Total Marks
1.	Core	SE 201	**Contemporary Cultural History of Southeast Asia**	6	4	20	80	100
2.		SE 202	**Modern History of China, 1839-1976**	6	4	20	80	100
3.		SE 203	**Regional Geography of South Pacific & East Asia**	6	4	20	80	100
4.		SE 204	**Nationalism in Southeast Asia**	6	4	20	80	100
5.	Compulsory Foundation	SE 205 a	**Modern Indian History 1757-1965**	6	4	20	80	100
		SE 205 b	**Indian Foreign Policy**					
		SE 205 c	**International Organisations**					
6.	Elective Foundation	SE 206 a	**History of the USA from 1789 to 1990**					
		SE 206 b	**International Relations**					
	Total			**36**	**24**	**120**	**480**	**600**
7.	Audit Course			0	0	100	---	--

*** All CORE Papers are Mandatory**

- **Compulsory Foundation -- Choose one Paper**
- **Elective Foundation – Choose one paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under Self Study**
- **Interests Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**

SEMESTER-III

S.No.	Compo-nents of Study	Code	Title of the Course	Credit Hrs / Week	No. of Credits	IA	Sem End Exam	Total Marks
1.	**Core**	SE 301	**Southeast Asia and World Politics**	6	4	20	80	100
2.		SE 302	**Indochina (Cambodia, Laos & Vietnam) 1802-2000**	6	4	20	80	100
3.	**Generic Elective**	SE 303a	**Modern History of Japan 1854-1975**	6	4	20	80	100
		SE 303b	**East Asian Developments – Post Cold War**	6	4	20	80	100
		SE 303 c	**Indian Diaspora**	6	4	20	80	100
		SE 303 d	**Research Methodology**	6	4	20	80	100
4	**Skilled Oriented Course**	SE 304	**Skills and Approaches in Understanding Area Studies**	6	4	20	80	100
5	**Open Elective**	SE 305 a	**India and the World**	6	4	20	80	100
		SE 305 b	**Emerging Asia and the World**	6	4	20	80	100
	Total			**36**	**24**	**120**	**480**	**600**

*** All CORE Papers are Mandatory**

- **Generic Elective – Choose Two**
- **Skilled Oriented course is Mandatory**
- **Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study**
- **Interests Students may register for MOOC with the approval of the concerned DDC.**

SEMESTER - IV

S.No.	Compo-nents of Study	Code	Title of the Course	Credit Hrs / Week	No. of Credits	IA	Sem End Exam	Total Marks
1.	**Core**	SE 401	**Regional Cooperation in Southeast Asia**	6	4	20	80	100
2.		SE 402	**Economic Landscape of Asia-Pacific**	6	4	20	80	100
3.	**Generic Elective**	SE 403a	**Post-Cold War World order**	6	4	20	80	100
		SE 403b	**Ethnicity and Social Transformation in Contemporary Southeast Asia and Australia**	6	4	20	80	100
		SE 403c	**Developing Blue Economy**	6	4	20	80	100
		SE 403 d	**Energy, Environment and Sustainable Development**					
4	**Multidisciplinary Course/Project Work**	SE 404	**Viva + Dissertation**	6	4	20	80	100
5	**Open Elective**	SE 405 a	**India-Australia Relations**	6	4	20	80	100
		SE 405 b	**India and Asia-Pacific**	6	4	20	80	100
	Total			**36**	**24**	**120**	**480**	**600**

*** All CORE Papers are Mandatory**

- **Generic Elective – Choose Two**
- **Multidisciplinary Course / Project Work is Mandatory**

- **Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study**
- **Interests Students may register for MOOC with the approval of the concerned DDC.**

M.A. Southeast Asian and Pacific Studies (SEAPS)

CBCS Pattern (With effect from the batch 2021-22)

	I SEMESTER	
SE 101	**EARLY CULTURAL HISTORY OF SOUTHEAST ASIA**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) To learn the Indian cultural contacts with Southeast Asia
2) To know the establishment of different Indian kingdoms in Southeast Asia
3) To demonstrate thinking skills on the impact of Indian culture on Southeast Asian region

UNIT - I Sources of the study of the spread of Indian Culture -- India-Southeast Asia Maritime connections -- Trade Patterns – Immigration – Early Indian settlements

UNIT - II Funan and Chenla : Funan: Indian Origin and Political Expansion – Cult of Harihara Champa -- Origins – The Great Rulers and their Cultural contributions: Bhadravarman, Sambhuvarman -- Hindu Culture in Champa – Temples of Myson and Po Nagar Kambuja Empire : Jayavarman II and Devaraja Cult – Yasovarman and Angkorian Empire – Suryavarman II and Angkor Wat – Jayavarman VII and Angkor Thomand Bayon

UNIT - III Pagan Empire : Pagan Period – Aniruddha the Great and Shwezigon temple – Kyanzitta and Ananda temple – Mon Cultural influence on Pagan – Migrations ofChins and Karens into Upper Burma – Buddhism in Thailand

UNIT - IV Buddhist Sailendras and Srivijaya Empire : Sailendras and Borobudur and other

temples -- Sailendra – Chola Relations -- Hindu Javanese Kingdoms : Sanjaya and Mataram Dynasties – Hindu temples of Prambanan Valley – The greatness of Airlangga -- The Greatness of Kritanagara and Siva Buddhism

UNIT - V Kublai Khan's Military invasions of Southeast Asia -- Rise of Majapahit – KingJayanagara – Prime Minister Gajamada's Services to Majaphahit – Hindu Culture -- Spread of Islam

Suggested Readings

1. Bose, Phanindra Nath, ***The Hindu Colony o f Champa***, (Adayar, 1927)
2. Cady, J.F., ***Southeast Asia: Its Historical Development***, (New York, 1964).
3. Chatterji, B.R., ***Indian Cultural Influence in Cambodia***, (Calcutta, 1928).
4. Coedes, George, ***The Indianized States of Southeast Asia***, (Honolulu, 1968).
5. Hall, D.G.E., ***A History of Southeast Asia***, (New York, 1968).
6. Keyes, Charles, F., ***The Golden Peninsula***, (New York, 1977).
7. Le May, Reginald, ***The Culture of Southeast Asia: The Heritage of India***, (London, 1964).
8. Majumdar, R.C., ***Hindu Colonies in the Far East***, (Calcutta, 1973).
9. Provencher, Ronald***, Mainland Southeast Asia: An Anthropological Perspective***, (New York, 1973).

Course Outcomes:

1) Students understand the causes for the spread of Indian culture in Southeast Asia.
2) Know the different Indian dynasties of the past in Southeast Asia.
3) Students will be able to learn the impact of Indian cultural on Southeast Asian societies

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M					M		M
CO2	H	H			M							
CO3	H				H			L				L

H=High, M=Middle, L=Low

	I SEMESTER	
SE 102	**REGIONAL GEOGRAPHY OF SOUTHEAST ASIA**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Employ a full range of techniques and methods used to gain geographical knowledge on Southeast Asia.
2) To know the population trends and patterns
3) To demonstrate thinking skills by analyzing locational significance

UNIT – I Physical Make-up Distribution of Land and Water – Topography –River Systems – Climatic Regions – Vegetation Types – Soils.

UNIT – II Resource Potentialities and Economic Base : Arable Land – Preponderance of Agricultural Economy – Forest Wealth – Marine Products – Exportable Surplus Raw Materials and Minerals – Trading Prospects.

UNIT – III Populations : Trends in Population Growth – Pattern of Population – Population Density – Post-Independence Migrations.

UNIT – IV Infrastructural Development : Transport and Communications – Industrial Development – Energy Production & Consumption – Health and Education.

UNIT – V Geostrategic Base : Locational Significance – Regional Variations – Zone of Confluence and Conflict.

Suggested Readings

1. Bradshaw, Michael, ***A World Regional Geography***, (New York, 1997).
2. Cohen, B., ***Monsoon Asia***: ***A Map Geography***, (London, 1970).

3. Cole, John, ***Geography of the World's Major Regions***, (London, 1996).
4. Dobby, E.H.G., ***Southeast Asia***, (London, 1970).
5. Dutta, Ashok K., ***Southeast Asia: Realm of Contrasts***, (Boulder: Colorado, 1985).
6. Fisher, C. A., ***Southeast Asia: A Social, Economic and Political Geography***, (London, 1966).
7. Gordon East, W., Spate, O.H.K. and Fisher, Charles A., ***The Changing Map of Asia***, (Norfolk, 1971).
8. Hill, R.D., ***A Systematic Geography of Southeast Asia***, (Kuala Lumpur, 1979)
9. Salter, Christopher L., Hobbs, Joseph J., Wheeler Jr. Jesse H. and Trenton, Kostbade J, ***Essentials of World Regional Geography***, (Sydney, 1998).
10. Spencer, J.E, and William L. Thomas, ***Asia, East by South: A Cultural Geography***, (New York, 1971).

Course Outcomes:

1) Students understand geographical profile of different countries of Southeast Asia.
2) Know the trends in population movement within Southeast Asia.
3) Students will be able to assess location significance and various infrastructural developments.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H											
CO2	H											
CO3	H							L				L

H=High, M=Middle, L=Low

	I SEMESTER	
SE 103	**COLONISATION OF SOUTHEAST ASIA**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) To acquire broad knowledge of conquests of Europeans in Southeast Asia
2) To know the British administration in this region
3) Develop the analytical views of colonization in India and Southeast Asia.

UNIT – I Portuguese Conquest of Malacca: Rise and fall of Portuguese Empire in the East.

UNIT – II Colonisation of the Philippines by Spain – The Dutch takeover of East Indies

UNIT – III Colonial Conquest: Dutch takeover of East Indies - British Conquest of Malaya. Establishment of Straits Settlements – Federated Malay States and Unfedarated Malay States – British Conquest of Burma: The Three Anglo - Burmese Wars – Establishment of British Protectorate over Brunei.

UNIT – IV Colonial Policies and Administration: Dutch Culture System and Ethical Policy – Economic Policies of other Colonial Powers: British, Spanish and U.S. Administrations.

UNIT–V Developments in Thailand: The Reigns of Mongkut and Chulalongkorn – Independent

Thailand Political and Economic Transformation of Thailand upto 1945

Suggested Readings:

1. Bastian, John & J. Benda, Harry, ***A History of Modern Southeast Asia***, (Englewood

Cliffs, 1968).
2. Buss, Claude A., ***Contemporary Southeast Asia***, (New York, 1970).
3. Cady, John F., ***Southeast Asia: Its Historical Development***, (New York, 1964).
4. Christie, Clive J., ***A Modern History of Southeast Asia: Decolonization, Nationalism and Separatism***, (Singapore, 1996).
5. Hall, D.G.E., ***A History of Southeast Asia***, (London, 1976).
6. Harrison, Brian, ***Southeast Asia: A Short History***, (London, 1954).
7. Kahin, G.M., ***Nationalism and Revolution in Indonesia***, (Ithaca, 1952).
8. Kahin, G.M. (ed.), ***Governments and Politics of Southeast Asia***, (New York, 1966).
9. Purcell, Victor, ***South and Southeast Asia Since 1800***, (Cambridge, 1965).
10. Sardesai, D.R., ***Southeast Asia: Past and Present***, (New Delhi, 1997).

Course Outcomes:

1) Students will have adequate knowledge on rise and fall of Portuguese
2) Students differentiate the colonial powers that ruled Southeast Asia
3) Critically observe Thailand's Political, Economic transformation and maintaining independence

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H				M	M						
CO2	H				M	M						
CO3	H				M	M		L				L

H=High, M=Middle, L=Low

	I SEMESTER	
SE 104	**ANCIENT INDIAN HISTORY UPTO 1206 A.D.**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Students will understand the historical construction of India's ancient past
2) To identify, describe, and compare different ancient kingdoms of India
3) To Know the coming up of new kingdoms in South India

UNIT – I Meaning and importance of the study of History – Impact of Geography on Indian History – The Features of Indus Valley Civilization – Vedic Culture – Conditions prevailed in Northern India in 6th Century B.C. – Jainism and Buddhism.

UNIT – II Mauryan Empire – Chandra Gupta – Ashoka - Decline of Mauryan Empire – Post-Mauryan period in North India

UNIT – III Kushans – Kanishka – Gupta Empire – Samudra Gupta – Golden age of Guptas – Pushyabhuti Dynasty – Harsha Vardhana – Contribution to Indian Culture.

UNIT – IV Deccan and South Indian Kingdoms – Sangam Age – Satavahanas – Cholas – Chalukyas – Rastrakutas – Kakatiyas

UNIT – V Muslim Invasions – Ghazni Mohammed – Rajputs -- Ghori Mohammed – Effects of Muslim Invasions

Suggested Readings

1. Mahajan, V.D. , Ancient India, (New Delhi, 1981)
2. Majumdar, R.C., ***Ancient India***, (Calcutta, 1920)
3. Romila Thaper, ***Ancient Indian History***, (Delhi; 1978)

4. Sastri, Neelakanta, ***A History of South India*** (Madras, 1956)
5. Sastri, Neelakanta, ***History of India Vol I & II*** (Madras)
6. Yazdani, G, ***Early History of Deccan***, (Oxford, 1960).
7. Iswari Prasad, ***Medieval India***, (Allahabad, 1974).
8. Smith, V.A., ***Oxford History of India***. (Oxford, 1982).
9. ***History of India,*** Cambridge, (New Delhi, 2001).

Course Outcome:

1) Students comprehend ancient Indian History, Indus Valley Civilization, Vedic Culture and Jainism and Buddhism.
2) Know the rise of different Dynasties and contribution to Indian Culture.
3) Gain knowledge on various Muslim Invasions and affects
4)

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					M						
CO2	H					H						
CO3	H					H		L				L

H=High, M=Middle, L=Low

CF	I SEMESTER	
SE 105 (a)	MODERN EUROPEAN HISTORY, 1870 - 1991	CREDITS -4
Seasonal Marks 20		End semester Examinations Marks 80

Objectives:

1) Students will learn history of the rise of Nation states like Germany
2) Students know the formation of counter alliances in Europe
3) To know critically the reasons for the outbreak of Two World Wars

UNIT – I Franco-Prussian War – Paris Commune - The Third Republic – Bismarck and the Consolidation of German Empire.

UNIT – II Big-power Interests and Conflicts in the Balkans - Russo-Turkish War, 1877 – Treaty of San Stefano and Congress of Berlin, 1878 and their Significance.

UNIT – III Formation of Triple Alliance and Triple Entente – The Balkan Wars and their Results- Events leading to the World War I –Treaty of Versailles – Bolshevik Revolution, 1917 and its Impact on Colonial Asia.

UNIT – IV Rise of Dictatorships in Germany and Italy -- Events leading to the World War II – Reconstruction of Europe – Marshall Plan – Origin and Growth of Cold War.

UNIT –V Cold War Politics in Europe – Berlin Crisis – East Europe vs. West Europe – Role of super Powers – Collapse of the Soviet Union – End of Cold War.

Suggested Readings

1. Dayal, Rahgubir, ***A Textbook of Modern European History, 1789-1939,*** (Bombay, 1977).
2. Ferguson, Wallace K., and Bruun, Geoffrey, ***European Civilization***, (Boston, 1958).
3. Gooch, G.P., ***History of Modern Europe***, (Delhi, 1979).
4. Hammond, D.Y., ***Cold War and Detente***, (New York, 1975).
5. Joll, J., ***Europe Since 1870***, (London, 1973).
6. Ketelbey, C.D.M., ***A History of Modern Times from 1789***, (Bombay, 1976).
7. Lipson, E., ***Europe in the XIX and XX Centuries, 1815-1939***, (London, 1963).
8. Marriot, J.A.Rt., ***A History of Europe***, (New Delhi, 1979).
9. Taylor, A.J.P., ***Struggle for the Mastery in Europe, 1848-1918***, (Oxford, 1960).

Course Outcomes:

1) Differentiate volatile political situation in Europe
2) Earn broad understanding of Bismarck and consolidation of the Germany.
3) Understand global politics in the two world wars and the cold war

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M								
CO2	H											
CO3	H							L				L

H=High, M=Middle, L=Low

	I SEMESTER	
SE 105 (b)	**INDIAN NATIONAL MOVEMENT**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

CF	**I SEMESTER**	
SE 105 (c)	**HISTORY OF INDIAN CONSTITUTION, 1773-1947**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives :

1) To learn about chronology of constitutional development
2) Students know the development of Indian constitution
3) To enable the students to compare the constitutional development with other constitutions

UNIT-I Constitutional Acts under East India Company - Duel System in Bengal - Regulating Act 1773 – Pitt's India Act 1784 - Charter Acts of 1793, 1813, 1833 and 1853 - Effects of 1857 revolt on the Development of the Constitution

UNIT-II India under the Crown - Indian Councils Acts of 1861, 1892 -- Minto - Morley Reforms 1909 – Montague and Chelmsford reforms of 1919 – Salient features

UNIT-III Simon Commission's Report - Round Table conference and India's Reactions – Indian Constitutional Act of 1935 - Central and Provincial governments

UNIT-IV Provincial Autonomy - Constitutional Deadlock and August offer from Cripp's Mission -- Cabinet Mission Proposals, 1946 -- Mountbatten Plan - Indian Independence Act of 1947

UNIT-V Making of the Constitution of Indian – India's National Constitution - Union Executive - State Executive - Union Parliament - State Legislative - Union and States

– Judiciary --Amendments of the Constitution - Development of Public Services - Local Government.

Suggested Readings :

1. A.C. Banerjee ,A. C, *Constitutional History of India*, Vol. I, Mukherjee & Co, Calcutta, 1948.
2. Agarwal, R.C. , and Bhatnagar ,*Constitutional Development and National Movement of India*,
3. D.D. Basu, *Introduction to the Constitution of India*, 2015.
4. Dharma Chand Gupta, Indian National Movement and Constitutional Development, Vikas Publishing house Pvt. Ltd., Noida, 1983.
5. Manik Lal Gupta, Constitutional developments in India, Atlantic Publishers, New Delhi, 1989.
6. Sumita Singh, Constitutional Development in British India, Pragun Publications, New Delhi, 2012.
7. Kieth, A. B, Constitutional History of India, Central Book Depot, Allahabad, 1961.
8. Pylee, M. V, Constitutional Government in India, Asia Publishing, Bombay, 1967.

Course outcomes:

- Students comprehend the importance of acts in government
- Gain knowledge on the Indian Independence Act of 1935
- Know the salient features of Indian Constitution

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H											
CO2	H											
CO3	H											

H=High, M=Middle, L=Low

EF	**I SEMESTER**	
SE 106 (a)	**MEDIEVAL INDIAN HISTORY 1206 A.D.–1707 A.D**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1. Students learn about Delhi Sultanate
2. To learn about the Mughal Empire and their contributions
3. To know about the Regional powers like Marathas and Sikhs

UNIT –I Delhi Sultanate – Slave Dynasty – Khilji Dynasty – Tughlaq Dynasty – Lodi Dynasty – Downfall of Delhi Sultanate

UNIT –II Socio-cultural contribution of Delhi Sultanate -- Sufi and Bhakti Movements

UNIT –III Mughal Empire – Babur – Humayun -- Akbar – Sher Shah – Jahanghir --Shahjahan – Aurangazeb – Downfall of Mughal Empire

UNIT –IV Socio-economic conditions – Trade and Commerce – Urban life – Administration of Sher Shah -- Akbar's Religious Policy – Architecture

UNIT –V Rise of Regional powers – Marathas – Sivaji – Sikhs -- Advent of Europeans – British East India Company

Suggested Readings:

1. Majumdar, R.C., *Ancient India*, (Reprint), Calcutta, 2004)
2. Romila Thaper, *Ancient Indian History*, (Delhi; 1988)
3. Sastri, Nilakanta, *A History of South India* (Madras, 1956)

4. Sastri, Nilakanta, *History of India Vol I & II* (Madras)
5. Iswari Prasad, *Medieval India*, (Allahabad, 1974).
6. Smith, V.A., *Oxford History of India*. (Oxford, 2000).
7. Sharma, L.P., *History of Medieval India*, (New Delhi, 1997)

Course Outcomes:

- Students will gain knowledge on Major dynasties of Medieval India
- Students know the great Indian rulers of Medieval period
- Students comprehend the advent of Europeans

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H											
CO2	H											
CO3	H											

H=High, M=Middle, L=Low

	I SEMESTER	
SE 106 (b)	**HISTORY OF ASIAN AND AFRICAN NATIONALISM**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1. To know the rise of nationalism throughout the world
2. To Learn about the nationalist leaders of Asia
3. To acquire the knowledge national movements in African continent

UNIT-I Nationalism –Concept, meaning and definition – Theories of Nationalism – Colonisation – Anti-colonial struggles – Rise of Nationalism.

UNIT-II : China – 1911 revolution – Sun Yat Sen –KMT – Chiang-kai Shek – Mao Zedong Chinese Communist party – People's Republic of China.

UNIT-III : South East Asia – Dutch Colonisation of Indonesia – Nationalism struggle in Indonesia – French Colonization of Indo-China – Liberation of Indo-China states.

UNIT-IV : Colonisation of Middle East – Arab Nationalism – Nationalist struggle in Egypt.

UNIT-V : Africa – Colonisation of Africa – Anti-colonial struggle in Africa – African Nationalist Movement in South Africa.

Suggested Readings :

1. DGE, Hall, D.G. E., *History of South East Asia*, Mac Milan Education Ltd., London,1981.
2. Clyde and Beers, *The Far East: A History of Western Impacts and Eastern Responses, 1830-1975*, Waveland Pr Inc. 1991.

3. S.N. Fisher, *The Middle East*: A History, McGraw Hill, 1996.

4. R.J. Harrison Church, *West Africa*, Princeton, London, 1967.

5. Baril Davidson, *The Growth of African Civilisation East and Central Africa to the Late 19th Century.*

Course outcomes:

- Know the changing trends in Nationalist movements
- Students understand the nationalist movements in Southeast Asia
- Learn about the nationalist movements in Africa

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M					M		M
CO2		H			M		H					
CO3					H			L	M			L

H=High, M=Middle, L=Low

	II SEMESTER	
SE 201	**CONTEMPORARY CULTURAL HISTORY OF SOUTHEAST ASIA**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) To understand, analyze, and evaluate the impact of European rule on the cultures of Southeast Asia
2) To assess the cultural contributions of Indians and Chinese
3) To explain important living cultures in Southeast Asia

UNIT –I Colonialism and Spread of Christianity:

1) Christian Missionary Activities and the Spread of Christianity under the European Colonial rule in Southeast Asia: (a) Philippines (b) Burma (c) South Vietnam (d) Spice Islands (Molukkas)
2) Impact of Colonialism on Southeast Asian Cultures.

UNIT –II Overseas Indians and Chinese in Southeast Asia:

Indians:

a) Factors contributing to Indian Emigration into Southeast Asia.
b) Role of Indian Emigrants in Southeast Asia in the Struggle for Indian Freedom
c) Indian National Army – R.B. Bose – Subhash Chandra Bose

Chinese: Chinese Economic Domination and Political Ambitions – Problem of Integration into Host-communities.

UNIT –III Southeast Asian Culture Today

a) Therawada Buddhist Societies.
b) Islamic Societies.
c) Christian Societies.

d) Tribal Societies and their ways of life.

UNIT –IV Survivals of Indian Culture in Southeast Asia.

1) Balinese Hinduism

2) Cham Hindu Culture.

3) Ramayana and Mahabharata in Southeast Asia.

UNIT –V Nation Building in Southeast Asia.

1) Ethnic Conflicts in Southeast Asia.

2) Efforts at National Integration

Suggested Readings

1. Bahadur Singh, I.J., *Indians in Southeast Asia*, (New Delhi, 1981).
2. Boon, James A., *The Anthropological Romance of Bali*, (Cambridge, 1977).
3. Cady, John F., *Southeast Asia: Its Historical Development*, (New York, 1964).
4. Fisher, Charles, A., *Southeast Asia: A Social, Economic and Political Geography*, (New York, 1966).
5. Hall, D.G.E., *A History of Southeast Asia*, (New York, 1968).
6. Keyes, Charles, F., *The Golden Peninsula*, (New York, 1977).
7. Landan, K.P., *Southeast Asia: Crossroad of Religions*, (London, 1969).
8. Leber, Frank, et. al., *Ethnic Goups of Mainland Southeast Asia*, (New Haven, 1964).
9. Osborne, Milton E., *Southeast Asia*, (London, 1979).
10. Provencher, Ronald, *Mainland Southeast Asia: An Anthropological Perspective*, (New York, 1973).
11. Sandhu, K.S. & A. Mani, *Indian Communities in Southeast Asia*, (Singapore, 1993).
12. Siddique, Sharon and Nirmala Purushotam, *Singapore's Little India*, (Singapore, 1990).

Course Outcomes:

1) Students list the Christian Missionary activities in Southeast Asian countries.

2) Knows the factors of Indian Emigration, and Chinese economic contribution in Southeast Asia.
3) Comprehensive grasp over different cultures and religions in Southeast Asia

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		M					M			L
CO2	H			M	M					L		
CO3	H	H		M			H					

H=High, M=Middle, L=Low

	II SEMESTER	
SE 202	**MODERN HISTORY OF CHINA, 1839 – 1976**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Students identify significant historic events in China in 19th Century
2) Students will know the numerous politico-social changes in China after its opening
2) Students will learn critique the revolution and foreign policy of China .

UNIT –I Early Western Contacts – Opium Wars – Taiping Rebellion – Unequal Treaties – Sino-Japanese War, 1894 – Scramble for Concessions - Open Door Policy - Reform Movement: Kang Yu–Wei- Hundred Days Reform, 1898 – The Boxer Uprising - Manchu Reform Programme.

UNIT –II Sun Yat-Sen – Revolution of 1911 – The Republic – Yuan Shi-Kai – May Fourth Movement – Warlordism - Reorganisation of Kuomintang.

UNIT –III Chiang Kai-Shek - Rise of Kuomintang – Origin and Growth of Chinese Communist Party - Mao Tse-Tung - Long March – Second World War – Civil War, 1945-49 - Establishment of Peoples' Republic of China – Korean War, 1953-1954.

UNIT –IV Reconstruction and Consolidation, 1949-52 – Transition to Socialism, 1953-57 – Hundred Flowers Campaign – Great Leap Forward – Cultural Revolution, 1965-68 – Reconstruction, 968-76.

UNIT –V People's Republic of China's Relations with the USA, the USSR, India, Taiwan and

South and North Korea.

Suggested Readings

1. Ahmed. L. L., *A Comprehensive History of the Far East*, (New Delhi, 1981).
2. *Cambridge Encyclopaedia of China*, (Cambridge, 1982).
3. Chesneaux, Jean and others, *History of China,* Vol.1.2, (New Delhi, 1985).
4. Chien-nung, Li, *The Political History of China, 1840-1928*, (California, 1979).
5. Clyde, P.H., and Beers, B.F., *The Far East: A History of Western Impact and Eastern Responses 1830-1975*, (New Delhi, 1976).
6. David, M.D., *The Making of Modern China*, (Bombay, 1993).
7. Hsu, Immanual, C.Y., *The Rise of Modern China*, (London, 1985).
8. Shouyi, Bai (ed.), *An Outline History of China*, (Beijing, 1982).
9. Vinacke, Harold M., *A History of the Far East in Modern Times*, (Ludhiana, 1978).

Course Outcomes:

1) Students know Western contacts, rebellions and reforms in China
2) Advanced understanding on Sun Yat Sen, Chiang Kai-Shek and Mao Tse-Tung
3) Distinguish Reconstruction and Consolidation of China and its foreign relations

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		M									

CO2	H							M		H		
CO3	H									H		L

H=High, M=Middle, L=Low

	II SEMESTER	
SE 203	**REGIONAL GEOGRAPHY OF SOUTH PACIFIC AND EAST ASIA**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) In this course students will learn physical setting and different land forms of the region
2) Students know the natural resources and economic potentialities of South Pacific
3) In this course Students learn support arguments with infrastructure and demographic growth

UNIT –I Physical Setting

(a) South Pacific: (1) The Insularity and Island Types - Preponderance of Water Body and Pre-eminence of EEZs – Landforms, Climate, Soils and Vegetation Types in the Island Realm (2) Natural Regions of Australia.

(b) East Asia: Landforms, Soils, Vegetation and Climate.

UNIT –II Resource Base and Potentialities

(1). Australia's Abundant Mineral Wealth (2) New Zealand's modest Mineral and Forest Resources (3) Limited Terrestrial and Marine Resources of the Island Realm (4) Japan's Human Resources and Technological Development (5) Agricultural base

and Mineral Wealth of China.

UNIT –III Economic Character

(1) Australia's Export Economy (2) New Zealand's Pastoral Industry (3) Island Realm: Subsistence Farming – Economic Dependency (4) China: Intensive Capital Investment in State-owned Industrial Sector – Shift to Market Economy, (5) Japan: Imported Raw Materials and Energy vis-a-vis Leading Exporter of Manufactured goods – Regional Development Assistance.

UNIT –IV Population

(1) High Density Coastal Fringes of Australia and New Zealand – Increasing Urbanization in the Region (2) Over Population Tendencies in the Island Realm (3) Issues of Highly Populous China – Marginal Population Growth in Japan and Korea.

UNIT –I Infrastructural Development

(1) Well-developed Transport & Communication System, High Energy Production, Better Education and Health in Australia, New Zealand, Japan and South Korea (2) Improper Infrastructural Development in the South Pacific Island Realm, (3) Moderate Infrastructure and Modernization in China.

Suggested Readings:

1. Bergsmark, D.R., ***Economic Geography of Asia***, Vol. 2, (Jaipur 1996).
2. Cole, John, ***Geography of World's Major Regions***, (London, 1996).
3. Dobby, E.H.G., ***Monsoon Asia***, Vol. 5 (London, 1961).
4. Heintzelman, O.H. and R.M. Highsmith, Jr., ***World's RegionalGeography***, (New Delhi, 1965).
5. Kolb, A., ***Geography of a Cultural Region: East Asia***, (London, 1963).
6. Salter,Christopher L., Hobbs, Joseph J., Wheeler Jr. Jesse H.and Trenton,Kostbade J., ***Essentials of World Regional Geography***, (Sydney, 1998).
7. Stamp, L. Dudley, ***A Regional Geography: Asia, Australia and New Zealand***, (London, 1956).

8. Wheeler, Jr. Jesse H., Trenton Kostbade J. and Thoman, Richard S., ***Regional Geography of the World***, (New York, 1969).

Course Outcomes:

1) Students identify physical setting, landforms, climate and soils of South Pacific.
2) Comprehend on Australia, New Zealand, Japan and China
3) Recognize the economic trends in South Pacific and East Asian nations

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	M				M					M
CO2	H	M			L				M			
CO3	H		M				L				M	

H=High, M=Middle, L=Low

	II SEMESTER	
SE 204	**NATIONALISM IN SOUTHEAST ASIA**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) This course enables students to identify reasons for the rise of Nationalism in Southeast Asia
2) Student will Analyse the ways in which the Philippines and Burma got freedom
3) Students will compare the means followed in Indonesia and Malaysia independence movements

UNIT –I The Philippines: Replacement of the Spanish rule by the American Rule

Origin and Growth of Nationalist Resistance to Spanish rule – Early Filipino Nationalist Leaders: Jose Rizal, Andres Bonifacio, Emilio Aguinaldo – Spanish-American War of 1898 and American Annexation of the Philippines – The Process of Filipinisation: Organic Act, 1902, Jones Act, 1916, Tydings McDuffie Act, 1934 – Japanese Occupation of the Philippines – End of World War II and the attainment of Independence.

UNIT –II Burma : Growth of Burmese Nationalism during and after World War I – Anti-footwear Movement, 1916-17 – Movement for Dyarchy 1921-22 – Saya San Rebellion 1931 – Burma's separation from India – The Thakin Movement – AFPFL – British reoccupation and transfer of power to the Burmese.

UNIT –III Indonesia : Emergence of Indonesian Nationalist Leadership: Kartini Movement, Boedi Utomo, Sarekat Islam, – 'Volksraad' – Communist Party of Indonesia (PKI),

Indonesian Nationalist Party (PNI). Impact of the World War II on Indonesian Nationalist Movement – Post-World War II Developments: Proclamation of Indonesian Republic – Linggadjati Agreement – First Police Action – Renville Agreement – Second Police Action – New Delhi Conference on Indonesia – Hague Conference – Transfer of Power to Indonesia.

UNIT –IV Malaysia : Post-World War II Malaya – Communist bid to grab power – Establishment of UMNO, 1946 – Events leading to the Independence of Malaya – Establishment of Malaysia 1963 – Independence of Singapore, 1965.

UNIT –V Brunei :British Administration – Attainment of Independence in 1984.

Suggested Readings

1. Cady, John F., ***Southeast Asia: Its Historical Development***, (New York, 1964).
2. Christie, Clive J., ***A Modern History of Southeast Asia: Decolonization, Nationalism and Separatism***, (Singapore, 1996).
3. Hall, D.G.E., ***A History of Southeast Asia***, (London, 1976).
4. Laothamatas, Anek (ed.), ***Democratization in Southeast Asia and East Asia***, (Singapore, 1997).
5. Pluvier, J.M., ***Southeast Asia: From Colonialism to Independence***, (Kuala Lumpur, 1977).
6. Purcell, Victor, ***South and Southeast Asia Since 1800***, (Cambridge, 1965).
7. Sardesai, D.R., ***Southeast Asia: Past and Present***, (New Delhi, 1997).
8. Suryaranarayan, V., ***Singapore: Path to Independence***, (Madurai, 1977).
9. Tarling, Nicholas (ed.), ***The Cambridge History of Southeast Asia***, Vols. I & II, (Cambridge, 1992).
10. Tarling, Nicholas, ***Nations and States in Southeast Asia***, (Cambridge, 1998).
11. Tate, D.J.M., ***The Making of Modern Southeast Asia***, Vols. I & II, (Kuala Lumpur, 1977).

Course Outcomes:

1) Understand causes for the rise of nationalism and movements in different Southeast Asian countries.
2) Earn knowledge on the Japanese Occupation of Southeast Asia during the Second World War
3) Analyze the course and outcome of Nationalist movements in Southeast Asia

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		M	H	M		L				
CO2	H											
CO3	H		M			L				M		

H=High, M=Middle, L=Low

CF	II SEMESTER	
SE 205 (a)	MODERN INDIAN HISTORY 1757 – 1965	CREDITS -4
Seasonal Marks 20		End semester Examinations Marks 80

Objectives:

1) Enable students to understand historical processes and circumstances in which the British established their control over India
2) Provide opportunity for students to be familiar with the rise of Nationalism and 1857 revolt and establishment of Indian National Congress
3) This course enables students to identify the certain key features of Indian Independence and economic plans**UNIT –I** Advent of Europeans – Anglo – French conflict – Expansion and consolidation of British power in India – Governor Generals – Robert Clive – Lord Cornwallis – Permanent Settlement of Land Revenue – Lord Wellesley – Subsidiary Alliance – William Bentinck – Reforms – Lord Dalhousie – Doctrine of Lapse.

UNIT –II First War of Independence, 1857 – Causes and Failure of the revolt – Establishment of the rule of British Crown – Viceroys - Lord Ripon – Lord Curzon – Freedom Movement – Rise of Nationalism – Establishment of Indian National Congress – Partition of Bengal – Swadeshi Movement – Muslim League – Home Rule Movement– Annie Besant – Constitutional Reforms, 1909 and 1919.

UNIT –III Cultural change and Religious Reform Movement – Rise of Modern Education and Press – Social Reform Movement.

UNIT –IV Gandhian Era – Non Cooperation Movement – Civil Disobedience Movement – Round Table Conferences – Government of India Act, 1935 – Quit India Movement –

Partition of India – Indian Independence

UNIT –V Integration of Princely states – Sardar Vallabhai Patel – States Reorganisation – Indian Constitution – Declaration of Republic – Five Year Plans – Jawaharlal Nehru – Policy of Nonalignment

Suggested Readings

1. Bipan Chandra, *Modern India : A Text Book*, (New Delhi, 1986)
2. Grover B.C. and Sethi R.R., *A New Look on Modern Indian History*, (New Delhi, 1992)
3. Majumdar, R.C *History of Freedom Movement in India* (Calcutta, 1962).
4. Aggarwala, R.N., 4. *National Movement and Constitutional Development of India* (Delhi, 1984).
5. Sarkar, Summit, *Modern India, 1885-1947* (Delhi, 1983)
6. Bipan Chandra, *India's Struggle for Independence* (New Delhi, 1969)
7. Spear, Percival, *The Oxford History of Modern India*, 1974-1974, (New Delhi, 1997).
8. Kashyap, Subhasuc, *History of Freedom Movement, 1885-1947,* (New Delhi, 1990).
9. Roberts, P.E., *History of British India,* (London, 1952).

Course Outcomes:

1) Students understand Indian sub-Continent and the Europeans arrival
2) Students distinguish the causes for the rise of nationalism and various phases of Independence movement.
3) Gain adequate knowledge on Gandhian Era, Independence and post independent-India

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H						H		M			L

CO2	H						H					
CO3	H						H					

H=High, M=Middle, L=Low

CF	II SEMESTER	
SE 205 (b)	INDIAN FOREIGN POLICY	CREDITS -4
Seasonal Marks 20		End semester Examinations Marks 80

Objectives:

1) Students will learn origins of Indian foreign policy
2) Know the foreing relations between India and its neighbours
3) To know role of India in regional organisations

UNIT – I Origins of Indian Foreign Policy -- Origin and Evolution –Salient Features – Frame work – Domestic roots – Geopolitical Setting –Cultural Factors

UNIT – II India's Contribution to Philosophy of Peaceful Co-existence- Role in the Afro –Asian Decolonisation – Indonesia – Indo-China

UNIT – III India and China: The Tibetan Issue -- Sino-Indian War – Post –Mao Developments – Efforts at normalization of the relations.

UNIT – IV India and South Asian Neighbours: a) Pakistan: Kashmir Problem- Three Wars –Shimla Agreement – Hostile relations.

b) Bangladesh: Formation of Bangladesh- River –water Disputes – Border Problem – Refugee

c) Sri Lanka: Close relations- Integration issues of Tamils – India and Tamil Elam

d) Nepal: Nepal's Strategic Importance to India- Nepal between Indian and China

e) Bhutan - India Relations

UNIT – V Problems and Prospects of Regional Cooperation -- Origin an d Growth of South

Asian Association for Regional cooperation (SAARC)- SAARC and ASEAN Comparison

Suggested Readings:

1. Bandhopadhyaya, *The Making of India's Foreign Policy*, (New Delhi, 1970)
2. Damodaran, A.K., and Bajpai., *Indian Foreign Policy: The Indira Gandhi Years*, (New Delhi, 1970)
3. Jetley, Nancy (ed), *India's Foreign Policy: Challenges and Prospects*, (New Delhi,1999)
4. Khanna, V.N., *Foreign Policy of India*, (New Delhi,1977)
5. Misra. K.P., *Foreign Policy of India*, (New Delhi, 1977)
6. Nanda. B., *Indian Foreign Policy: The Nehru Years*, (New Delhi, 1976)
7. Nasenko, *Jawaharla Nehru and India's Foreign Policy*, (New Delhi,1977)
8. Prasad, Bimla, *The Origins of Indian Foreign Policy*, (Calcutta,1960)

Course Outcomes:

1) Learn the dynamics of Indian foreign policy
2) Earn broad understanding on Indian foreign relations
3) Understand India in the SAARC

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M					M		M
CO2		H						M				
CO3					H			L		L		L

H=High, M=Middle, L=Low

CF	II SEMESTER	
SE 205 (c)	INTERNATIONAL ORGANISATIONS	CREDITS -4
Seasonal Marks 20		End semester Examinations Marks 80

Objectives:

1) Students will know the history of different International Organisations
2) To know the role of International organisations in establishing peace
3) Learn the functioning of UN organisations

UNIT – I Background of International Organisations -- Need for International Understanding

UNIT – II International Law – Role and Limitation

UNIT – III League of Nations: Circumstances leading to the Establishment of the League – Hague Conference – Structure – The ILO- The Mandates – Achievements of the League – Causes for the Failure of the League.

UNIT – IV United Nations: The Genesis – UN Charter – UN Organs and its Specialised Agencies – Pacific Settlement of International disputes – Collective Security

UNIT – V : UN and Regional Security Pacts- social and Economic Cooperation –UN and Human Rights – UN and Terrorism.

Suggested Readings

1. Bennett, A, *International Organizations: Principles and Issues*, (London, 1977)

2. Bosu, Rukmi, *The United Nations : Organization*, (Delhi, 1992)

3. Goodspeed, Stephen, *Nature an d Function of International Organization*, (New York, 1954)

4. Gupta, D., *The League of Nations*, (Delhi, 1974)

5. Lurad, Evans (ed)., *The Evolution of International Organization and Administration*, (London. 1970)

6. Maurice, Wattern, *The United Nations: International Organization and Administration*, (London 1970).

7. Mehrish, B.N, *International Organization*, (Delhi, 1976)

8. Singh Sukhibir, *Structure and Function of UNO*, (Delhi, 1995)

9. United Nations, *Everyman's United Nations*, (New York, 1959)

Course Outcomes:

1) Learn about necessity of International Organisations
2) Earn broad understanding of Bismarck and consolidation of the Germany.
3) Understand global politics in the two world wars and the cold war

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H					M				L
CO2	H		M				M				L	
CO3	H			M			L			L		

H=High, M=Middle, L=Low

EF	**II SEMESTER**	
SE 206 (a)	**HISTORY OF THE USA FROM 1789 TO 1990**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**
EF	**II SEMESTER**	
SE 206 (b)	**INTERNATIONAL RELATIONS**	**CREDITS - 4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Assess the significance of elements of national power, diplomacy and balance of power in International Relations
2) To analyse the impact of the Cold War and know about Nonaligned Movement and Third world countries
3) Assess the achievements of UNO in the collective security and the rise of new economic order

UNIT-I International Relations: Meaning and Scope – Nation-**State** – Its Features – National Power: Elements of National Power - Balance of Power – **Diplomacy:** Kinds of Diplomacies.

UNIT-II Cold War: Phases of Cold War - Disintegration of Soviet Union and its impact - **Nonaligned Movement**: Origin and Growth – Role and Relevance of the Movement -

Third World: Impact of emergence of Third World – North - South Conflict and South-

South Cooperation – New International Economic order (NIEO) – Role of International Law.

UNIT-III League of Nations – Structure – Achievements of the League – Cause for the failure of the League.

UNIT -IV United Nations – Principal organs – Its specialized agencies – collective Security – UN and Regional security parts – U N and Human Rights and Terrorism – Achievements of UN: Political, social and Economic cooperation UN: Challenges and future.

UNIT-V Foreign Policies of India with the USA, Russia, and China.

Suggested Readings

1. Chander, Prakash and Arora, Prem, ***Studies in International Relations***, (New Delhi, 1989).
2. Jackson, Robert and Sorensen, George, ***Introduction to International Relations***, (Oxford, 1999).
3. Morgenthau, Hans J., **Politics Among Nations,** (Calcutta, 1969).
4. Palmer, N.D. and Perkins, H.C., ***International Relations: The World Community in Transition*****,** (Calcutta, 1969).
5. Sharma, Premlata, ***International Relations***, (Jaipur, 1996).
6. Sharma, Urmila and Sharma, S.K., ***International Relations: Theory and History***, (Delhi, 1997).
7. Srivatsava, L.N., ***International Relations***, (Delhi, 1999).
8. United Nations**,** ***Emergencies United Nations,*** (New York, 1959).
9. Bosu, Rukmi, ***The United Nations: Organization*** (Delhi 1992).
10. Gupta, DC, ***The League of Nations***, (Delhi 1974).

12. Bennelt, Le Roy A, ***International Organization: Principals and Issues***, (New Jersu, 1995).

13. Trivedi, Sonu**,** ***A Handbook of International Organization***, (New Delhi 2005).

Course Outcomes:

1) Students know the meaning, nature and scope of International Relations
2) Gain knowledge on the Cold War and New International Economic Order.
3) Acquainted with the foreign policies of various countries; and learn about League of Nations and UNO.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H			M		H			M		M
CO2	M	H			M						L	
CO3					H			L				L

H=High, M=Middle, L=Low

	III SEMESTER	
SE 301-A	**SOUTHEAST ASIA AND WORLD POLITICS**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Course Objectives

1 To know the contemporary politics of Southeast Asia

2 To enlighten on the different political regimes of Southeast Asian countries

3 To gain knowledge on the regional organisations

UNIT – I Introduction -- Nationalism, Southeast Asia and the World -- Different Political Regimes in Southeast Asia -- Early State Formations in Southeast Asia -- Indonesia - The Suharto Era – Challenges to Constitutional Democracy -- post-Suharto era -- Economic Performance in Indonesia

UNIT – II The Philippines -- Colonial Masters, National Politics -- Central Authority and Local Autonomy under the US – Post-Independence – Marcos – Arroyo -- Thailand – Uneasy Passage

UNIT – III Malaysia -- Malayan Emergency and the Development s of the Malaysian State -- Domestic developments – State-Building – Democratization in Malaysia and Singapore

UNIT – IV Myanmar – State Building in Burma – Burma in Transition – Military Rule – Opening of Democracy

UNIT – V ASEAN and the Evolving East Asian Regional Order -- The South China Sea a

Flashpoint -- China and the South China Sea -- Armed Clashes in the South China Sea

Suggested Readings:

1. D.R. Sardesai, *Southeast Asia : Past and Present*, (Westview Press, 2003)
2. Craig A. Lockard, *Southeast Asia in World History*, (Oxford University Press, 2009)
3. David Chandler, *The Emergence of Modern Southeast Asia : A New History*, (University of Hawaii Press, 2004)
4. Charles F. Keyes, *The Golden Peninsula: Culture and Adaptation in Mainland Southeast Asia* (University of Hawaii Press, 1994)
5. Elizabeth Pisani, *Indonesia : Exploring the Improbable Nation*, (Granta Books, 2014)
6. Tim Hannigan, *A Brief History of Indonesia: Sultans, Spices, and Tsunamis: The Incredible Story of Southeast Asia's Largest Nation*, (Tuttle Publishing, 2015)

Course outcomes:

- Students learn about the different political regimes in Southeast Asian nations.
- Comprehend on the contemporary political and economic conditions in Southeast Asian countries
- Analyse the reasons to address some of the questions of contemporary world politics

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H				H		L	L				
CO2	H	H			M			M		L		L
CO3	H	M			L		L			H		L

H=High, M=Middle, L=Low

	III SEMESTER	
SE 302	**INDOCHINA (CAMBODIA, LAOS AND VIETNAM),1802–2000**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Examine the influence of the Western contacts with the Indo-China region and the French occupation
2) Students asses how the French administration made ways to rise of freedom struggles
3) Evaluate the independence movements in Cambodia, Laos and Vietnam and world view on it

UNIT – I Early Western Contacts – French Conquest of Cochin-China, Establishment of Protectorates over Cambodia, Laos and Annam and Tongking.

UNIT – II French Administration – Political, Economic and Social effects –Growth of Nationalism – World War II and Japanese Occupation of Indochina – Effects Declaration of 'Independence'. Re-imposition of French rule, 1945 – Struggle for Freedom – Ho Chi Minh and Viet Minh – Democratic Republic of Vietnam – Khmer Issark and Pathet Lao movements in Cambodia and Laos– Bao Dai Experiment – Franco-ietnamese, Franco -- Cambodian and Franco -- Laotian Agreements,1948-49.

UNIT –III Cold War and its effects on Indochina – Sihanouk's crusade for Independence – Developments in Vietnam and Laos – Battle of Dien Bien Phu – Geneva Conference of 1954 – Provisions and their working – International Control Commissions.

UNIT – IV Post-Geneva Developments:

a) **Vietnam**: Internal Developments in Two Vietnams – Problems of Reconstruction in DRVN – Diem's rule in the Republic of Vietnam – Struggle for unification – National Front for the Liberation of South Vietnam – Provisional Revolutionary Government and DRVN – US involvement – Paris Agreement, 1973 – Overthrow of Thieu Regime –Unification of Vietnam.

b) **Cambodia**: Abdication of King Norodom Sihanouk – Sihanouk's rule – Struggle for Neutrality–Overthrow of Sihanouk – Lon Nol's rule, 1970-75 – Overthrow of Lon Nol.

c) **Laos**: RLG Agreement with the Pathet Lao, 1956 – Vientiane Agreement, November 1951 – Geneva Agreement 1962 – Standstill Ceasefire Agreement, 1973 -Vientiane Agreement, 1973 – Formation of PGNU, 1974 – Proclamation of LPDR, 1975.

UNIT – V Vietnam – Cambodians Conflict – Chinese Invasion on Vietnam – Cambodian problem – Collapse of Soviet Union – Integration of Indochina in to ASEAN.

Suggested Readings

1. Buttinger, Joseph, *Vietnam: A Political History*, (Andre Deutsch, 1969).
2. Cady, John F., *Southeast Asia: Its Historical Development*, (New York, 1964).
3. Dommen, J, *Conflict in Laos: The Politics of Neutralization*, (New York, 1964).
4. Hall, D.G.E., *A History of Southeast Asia*, (London, 1976).
5. Hammer, Ellen J., *The Struggle for Indochina*, (Stanford, 1956).
6. Marr, D.G., *Vietnamese Anti-Colonialism 1885-1925*, (Berkeley, 1971).

7 . Murthy, B.S.N., *Vietnam Divided*, (Bombay, 1964).

8. Reddi, V.M., *A History of the Cambodian Independence Movement, 1862-1955*, (Tirupati, 1970).

9. Sardesai, D.R., *Southeast Asia: Past and Present*, (New Delhi, 1981).

10. Tarling, Nicholas, (ed.), *The Cambridge History of Southeast Asia,* (Two Volumes) (Cambridge,1992).

Course Outcomes:

1) Students will learn early Western contacts and establishments of French protectorates over Indochina states.
2) Gain knowledge on French Administration and freedom movements in Indochina.
3) Knows global politics during Cold War and its effects on Cambodia, Laos and Vietnam national movements

CO-PO Mapping

Cour	PO1	PO2	PO	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO12
CO1	H			M			L		L			
CO2	H	M			M				M			
CO3	H											

H=High, M=Middle, L=Low

	III SEMESTER	
SE 303- (a)	**MODERN HISTORY OF JAPAN 1854 – 1975**	**CREDITS -4**
Seasonal Marks 20	**End semester Examinations Marks 80**	

Objectives:

1) Acquire broad knowledge of key periods in the history of Modern Japan
2) This course offers an opportunity to know the emergence of military victories of Japan and its role in the Two World Wars
3) Students learn to compare the pre and post world war developments of Japan

UNIT – I Early Western Contacts - The Tokugawa Shogunate - Opening of Japan - Meiji Restoration-Political, Economic, Social and Military Transformation.

UNIT – II. Japan's Expansion: Korea-Anglo-Japanese Alliance, 1902 – Russo-Japanese War, 1904 – Japan's role in the World War I - The Paris Peace Conference.

UNIT– III Political Developments during the Inter-War Period: The Washington Conference – Manchurian Crisis - Rise of Militarism - Role of Japan in the World War II.

UNIT– IV US Occupation: Political, Social and Economic Transformation – San Francisco Conference, 1951 – Post War Economic Development of Japan.

UNIT – V Japan's Relations with the Soviet Union, the USA, China, India, South and North Korea.

Suggested Readings

1. Ahmed. L. L., ***A Comprehensive History of the Far East***, (New Delhi, 1981).
2. Beasley, W.G., ***The Modern History of Japan***, (London, 1970).
3. Clyde, P.H., and Beers, B.F., ***The Far East: A History of Western Impact and Eastern Responses 1830-1975***, (New Delhi, 1976).
4. Duus, Peter, ***The Rise of Modern Japan,*** Boston, 1976).
5. Mikiso, Hane, ***Modern Japan: A Historical Survey***, (London, 1986).
6. Norman, E.H., ***Japan Emergence as Modern State***, (Delhi, 1977).
7. Pierre Lehmann, Jean, ***The Roots of Modern Japan***, (London, 1987).
8. Reischauer, Edwin O., ***Japan: Past and Present,*** (London, 1964).
9. Vinacke, Harold M., ***A History of the Far East in Modern Times***, (Ludhiana, 1978).

Course Outcomes:

1) Students acquaint knowledge on Opening of Japan and its early western contacts.
2) Knows Japan's militarization, Russo Japanese war and the First World War
3) Gain knowledge on US Occupation of Japan and Post World War-II developments and Japanese foreign relations.

CO-PO Mapping

Cour	PO1	PO2	PO	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO12
CO1	H		M							M		L
CO2	H			M					L			L
CO3	H	H			M			L				

H=High, M=Middle, L=Low

	III SEMESTER	
SE 303- (b)	**EAST ASIAN DEVELOPMENT IN THE POST COLD WAR**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Understand and discuss how Post-Cold War events are significant in East Asia
2) Identify significant historic events during the Post-Cold War in China, Japan and Koreas.
3) Acquire broad knowledge on new Economic cooperation in the region

UNIT–I End of the Cold War – Disintegration of the Soviet Union – Emergence of New World Order.

UNIT–II China: Post Cold War threat Perceptions – Diplomacy towards Southeast Asia -- China and Central Asia – Shangai Cooperation – Growing Relations with Russia -- Conflict and Cooperation with the USA – Policy towards Taiwan – China's quest for Energy.

UNIT–III Japan: Security concerns in the Post Cold War era – Japan's strengthened relations with the USA – Diplomacy towards ASEAN – Fragile relations with China – Japan's perceptions of North Korean nuclear programme – Changed Policy towards India.

UNIT–IV The Korean Peninsula: Changing security environment – The North Korea's nuclear issue – The US-North Korea conflict – China's mediation – S. Korea and N.

Korea

conflict and cooperation – South Korea and the US relations.

UNIT–V The East Asian Economic Cooperation : Development of ASEAN+3 Mechanism – The emergence of forming of East Asian Community (EAC) – Role of China and Japan in the formation of EAC – Role of India in the EAC – East Asian Economic Summit 2005 – Road towards formation of Asian Economic Community.

Suggested Readings

1) Ahmed,LL, ***A Comprehensive History of the Far East***, (New Delhi, 1981)
2) Alagappa, Muthiah(ed), ***Asian Security Practice***, (California, 1998)
3) Cronin, Richard P, ***Japan, the United States and Prospects for Asia – Pacific Security***, (Singapore, 1992).
4) Gurong, Shen and Sen Gupta, ***China Looks at the World***, (Delhi, 1999).
5) Kumar, Nagesh, ***East Asian Economic Community***, (New Delhi, 2005)
6) Nanda, Prakash, ***Rediscovering Asia : Evolution of India's Look East Policy***, (New Delhi, 2003).
7) National Institute for Defence Studies, Japan, ***East Asian Strategic Review,*** 2005, (Tokyo, 2006)
8) Rabindrasen, ***China and ASEAN : Diplomacy during and after***, (Howrah, 2002).
9) Singh, R.S.N., ***Asian Strategic and Military Perspective***, (New Delhi, 2005).
10) Taylor, Robert, ***Greater China and Japan : Prospects for an Economic Partnership in East Asia***, (London, 1996)
11) Vohra, ***India and East Asia***, (Delhi, 2002)

Course Outcomes:

1) Comprehend on the disintegration of Soviet Union and Emergence of New World Order.

2) Ability to analyze security concerns in the post Cold War and perceptions of China, Japan and North Korea.
3) Develop an understanding of ASEAN+3, EAS and Asian Economic Community.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M					M			
CO2	H			M					L			
CO3	H	H			M			M		M		

H=High, M=Middle, L=Low

	III SEMESTER	
SE 303 (c)	**INDIAN DIASPORA**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Examine the factors contributed for the migration of Indians to Southeast Asia
2) Students learn the different roles held by Indians in the US and Australia and UAE
3) Students will learn appraise the roles played by Indian Diaspora in the socio-economic development of host countries

UNIT–I Indian Emigration in Ancient India

a) Sources for Study of Migration B)Factors contributing for Migration
c) Case Study: Southeast Asian Region

UNIT–II Indian Emigration during Colonial Period

a) Factors contributing for Migration,
Socio-economic contribution to host countries, Economic and Political Status
b) Case Studies: Myanmar (Burma) Malaysia and Singapore
Fiji, Mauritius, Sri Lanka, Africa and Caribbean Islands

UNIT–III Indian Emigration during Post-Independent period

a) Factors promoting migration
Socio-economic contribution to host countries and the country of origin

(India)

b) Case Studies: USA, Europe, Australia and Gulf Countries (West Asia)

UNIT–IV Indian Communities abroad: Moves at Unity and Cooperation

a) GOPIO: Establishment and growth
b) The role of Indian Diaspora in National Reconstruction and image building in International Fora and in host countries

UNIT–V Indian Diaspora and India's Policy

a) Trends in India's policy towards Indian Diaspora
b) Pravas Bharatiya Divas (PBD) Conventions of 2003, 2004, 2005 and 2006

***Suggested Readings*:**

1. Arasarathnam, Sinnappah, ***Indians in Malaysia and Singapore***, (London, 1970)Tinker, Hugh, ***The Banyan Tree***, (New York, 1977)
2. Chakravarthi, Nalini Ranjan, ***The Indian Minority in Burma***, (Bombay, 1971).
3. Ghosh, Lipi and Ramakrishna Chatterjee, (ed.), ***Indian Diaspora in Asian and Pacific Regions: Culture, People, Interactions***, (New Delhi, 2004).
4. Gupta, Anirudha, "Overseas Indians: Patterns, Myths and Misconceptions," in ***International Conference on the Indian Diaspora***, (November 1st & 2nd, 1994, University of Hyderabad).
5. Jain, Prakash, C., "Gulf Migration and its impact," in ***International Conference on the Indian Diaspora***, (November 1st & 2nd, 1994, University of Hyderabad).
6. Mayer, Adrian, C., ***Peasants in the Pacific***, (London, 1973)
7. Motwani Jagat K. (ed.), ***Global Indian Diaspora: Yesterday, Today and Tomorrow***, (New York, 1993).
8. Nagarajan, S., ***Tamils Abroad : Non – Asian Countries***, Tamil University Pub. No. 173 (1995)

9. Saha, Panchanan, ***Emigration of Indian Labour***, (Delhi, 1970).
10. Sandhu, K.S. and Mani, A. (ed.), ***Indian Communities in Southeast Asia***, (Singapore, 1994)
11. Singh, Bahadur, I.J., ***Indians in Southeast Asia***, (New Delhi, 1984).

Course Outcomes:

1) Know the reasons of Indian migration to Southeast Asian countries.
2) Learn Indian migrant's socio-economic contribution to host nations.
3) Focus on the role of Indian Diaspora in National Reconstruction and image building in host countries.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H	H						M		M		M
CO2		M			M		L					
CO3	H			L	H			L				L

H=High, M=Middle, L=Low

	III SEMESTER	
SE 303 (d)	**RESEARCH METHODOLOGY**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives :

1) To make the student to know the importance of research in history.
2) Making use of different sources in social science research.
3) To learn about Report writing skills

Unit I – Research Design : Nature, Scope and Definition - Types of research – Descriptive – Analytical - Applied - Fundamental, Quantitative- Qualitative - Conceptual – Empirical -- Basic Research Process - Formulating the research problem - Selection of Topic -- Literature review – Collection of Material -- Primary and Secondary sources -- Reviews -- Monographs

UNIT II – Research Techniques : Observation and collection of data -- Methods of data collection -- Sampling methods -- Data processing Analytical tools - Data analysis – Observation – Interviews

Unit III – Soft Computing : Computer and its Role in Research - Web sources -- charts summarizing statistical data, network diagrams, and to retrieve data -- Use of Statistical Software SPSS

Unit IV – Methods of Data Collection and Report Writing : The Survey Method – Case

Study Method – Primary and Secondary data – Classification and Tabulation – Preparation of Tables – Preliminaries of Research Report Writing -- Significance of Report Writing, Different Steps in Report Writing, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports and inclusions.

Unit V –Research Ethics And Scholarly Publishing : Ethics-Ethical Issues, Ethical Committees (Human & Animal) - Scholarly Publishing- IMRaD Concept --- Uses in Social Sciences research -- Designing of a Research Paper - Citation and Acknowledgement - Plagiarism - Reproducibility and Accountability.

Suggested Readings

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. *An introduction to Research Methodology*, RBSA Publishers.
2. Kothari, C.R., 1990, *Research Methodology: Methods and Techniques*. New Age International.
3. Sinha, S.C. and Dhiman, A.K., 2002. *Research Methodology*, Ess Ess Publications. 2 volumes.
4. Trochim, W.M.K., 2005, *Research Methods: the concise knowledge base*, Atomic Dog Publishing.
5. Wadehra, B.L. 2000, *Law relating to Patents, Trade marks*, Copyright designs and geographical indications, Universal Law Publishing.

Course Outcomes

1) Students will be able to distinguish the difference between primary and secondary source.
2) Will be in a position to make use of various sources available for his or her research work.
3) Can write and present a research topic of his choice.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					H			M			
CO2	H					M			L			
CO3	H					M			M			

H=High, M=Middle, L=Low

	III SEMESTER	
SE 304	**SKILLS AND APPROACHES IN UNDERSTANDING AREA STUDIES**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) To learn the concept and history of Area Studies
2) To gain skills in map reading and knowledge on International organisations
3) To know critically the role of history and economics in Area Studies

UNIT-I **Introduction to Area Studies**: Concept, Nature and Scope of Area Studies; A brief history of Area Studies; Multidisciplinary Approach – Area Studies and other Disciplines; Area Studies, Regional Studies and International Relations – Area Studies in the era of Globalisation – Area, Region and Study Area : Southeast Asia and Pacific

UNIT-II **Geography and Political Studies**: Trajectories and Manifesto; Globalization and New Trends in Geography; Importance of Regional Geography; Skills of Map Reading and Map Making; Types of Maps – The theory and method of comparative Area Studies; Regional Studies from an Ideological Perspective – International Organisations and Regional Groupings

UNIT-III **Significance of History in Area Studies** : Study area -- Studying History Chronologically – Acquiring knowledge through different sources -- Regional History -- Historical Trade routes; Era of Explorations; Trade competition; Colonisation – Rise of Nationalism in Southeast Asia -- Causes and Consequences of

Conflicts and Wars -- Current Geopolitical scenario.

UNIT-IV Understanding the Cultural Domains : Ethnographic learning – Culture, Geography and Demography; Understanding the global connections -- Race, Gender, Class, Economy and Religion; Cross-cultural understandings; Language and Cultural interaction; Culture -- International Relations and Foreign Policy; Indian Cultural Imprints; Cultural Conflicts in Southeast Asia and Pacific and its effects.

UNIT-V Economic facets of Area Studies : Major economic trends in 20th century -- Economic variations in the region – Regionalism and Multilateralism – Globalisation and geoeconomic priorities -- Foreign trade, Investment and Capital Movement; Regional Trade regimes – FTAs; New International Economic Order (NIEO);Digitalization and Cyber Security; Means of Cooperation and Conflict

Suggested Readings:

1. Edith Clowes and Shelly Jarrett Bromberg, *Area Studies in the Global Age – Community, Place, Identity* (NIU Series in Slavic, East European, and Eurasian Studies), 2016.
2. Ariel I. Ahram, Patrick Köllner, and Rudra Sil, *Comparative Area Studies: Methodological 3.Rationales and Cross-Regional Applications*, (Oxford University Press, 2018).
4. Milton Osborne, *Southeast Asia: An Introductory History*, (Allen & Unwin, 2016)
5. D.R. Sardesai, *Southeast Asia : Past and Present*, (Westview Publishers, Hawaii, 2018)
6. Richard J. Evans, *In Defence of History*, (Granta, 2001).
7. Ariel I. Ahram, Patrick Kollner and Rudra Sil, *Comparative Area Studies: Methodological Rationales and Cross-Regional Applications*, (Oxford University Press, 2018).
8. Clowes and Shelly Jarrett Bromberg (eds.), *Area Studies in the Global Age: Community, Place, Identity*, Northern Illinois University Press, 2015.

Course Outcomes:

1) Develop understanding on Area Studies and other disciplines.
2) Gain knowledge on the history of certain geographical area.
3) Learn the skills of distinguishing social, economic and politics with other areas.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			H		M					M		M
CO2	H	H			M					L		
CO3			M		H			L				L

H=High, M=Middle, L=Low

	III SEMESTER	
SE 305 (a)	**INDIA AND THE WORLD**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) To identify the significant role of India in Non-Alignment and Jawaharlal Nehru
2) Students learn India's different roles in the United Nations
3) Assess the role of India and USA, Russia and in the Arab World

UNIT–I India and Non-Aligned Movement : India's Policy of Non-Alignment: Jawaharlal Nehru as messenger of Peace -- Indira Gandhi Period - India's Non-Aligned Policy after the end of Cold War.

UNIT–II India and the United Nations : India's role in the founding of the UNO -- India's Participation in the Principal organs of UNO – India and the Kashmir issue at the UNO - India and the Proposed reconstruction of the UNO.

UNIT–III India – US Relations : India and the USA – Similarities and Irritants - Indo-US Relations during the Cold War Period – Shadow of U.S.-Pakistan relations on India – Partnership in the War against Terrorism.

UNIT–IV India- Russia Relations : Cordial Relations during Nehru time – Relations during

Indira Gandhi Period – Indo-Soviet Treaty of Friendship and Cooperation and the Bangladesh crisis – India – Russia relations after the Cold War.

UNIT–V India, the Arab World: Saudi Arabia and United Arab Emirates (UAE) -- European Union

Suggested Readings

1. Bosu, Rukmi, *The United Nations: Organisation*, (Delhi, 1992).
2. Chopra, V.D., *India and the Socialist World*, (New Delhi, 1983).
3. Dixit, J.N, *My South Block Years: Memories of Foreign Policy*, (New Delhi, 1996).
4. Dixit, J.N, *Across Borders: Fifty Years of India's Foreign Policy*, (New Delhi, 1998).
5. Jha, N.K., (ed), *India's Foreign Policy in a Changing World*, (New Delhi, 2000).
6. Prasad, Bimla (ed.), *India's Foreign Policy Studies*, (New Delhi, 1979).
7. Rajan, M.S., *Nonalignment & Nonaligned Movement: Retrospect and Prospect*, (New Delhi, 1990).
8. Rasgotra, M. & Chopra, V.D., (eds.), *India's Relations with Russia & China*, (New Delhi, 1997).

Course Outcomes:

1) Develop understanding of Non-Aligned Policy under Jawaharlal Nehru and Indira Gandhi
2) Build knowledge on India's Role in the United Nations
3) Advance understanding on India's relations with the US, Russia, the Arab World and the European Union.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H						H		L			

CO2	H						M		L			
CO3	H		H				M		L			

H=High, M=Middle, L=Low

	III SEMESTER	
SE 305 (b)	**EMERGING ASIA AND THE WORLD**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Understand and discuss how economic growth led to the Asian crisis and integration
2) Compare and Assess the rising economies of India, China and Japan
3) Students will learn Appraise the significant rise of regional mechanisms and geopolitics

UNIT–I Economic and Social Progress in Asia – Economic Growth and Developing Countries – Trends of Trade among Asian Countries – Asian Economic Crisis and Recovery – Economic Integration

UNIT–II Foreign Direct Investments in Asia – China's Economic Revolution – India's Look East Policy – Dynamics of Japan's Economy

UNIT–III Maritime Security – Drug and Human Trafficking – Sea Lanes of Communication – South China Sea – India and the Indian Ocean.

UNIT–IV 21st Century and Asian Regionalism – ASEAN, SAARC and EAS – Influence of Extra Regional Powers – Growing Significance of India, China, Japan and S. Korea

UNIT–V Energy Geopolitics – The Race for Nuclear Technology/Weapons – International

Terrorism – West and Central Asian Energy and its Impact on Asian Economy and Security.

Suggested Readings:

1. Campos, Jose Edgardo, and Hilton L. Root. 1996, *The Key to the Asian Miracle: Making Shared*

Growth Credible, Washington, D.C.: Brookings Institution.

2. Dreze, Jean and Amartya Sen. 2002, *India: Development and Participation*. Oxford University

Press.

3. Shirk, Susan L. 1993, *The Political Logic of Economic Reform in China*. University of California

Press. Berkeley.

5. Katz, Richard. 1998, *Japan The System That Soured: The Rise and Fall of the Japanese Economic*

Miracle, Armonk, N.Y.: M.E. Sharpe.

6. Michael Mastanduno, "Incomplete Hegemony: the United States and Security Order in Asia," in

Alagappa, *Asian Security Order*, pp. 141-170.

7. Avery Goldstein, "Balance-of-Power Politics: Consequences for Asian Security Order," in

Alagappa, *Asian Security Order*, pp. 171-209.

8. Mitchell B. Reiss, "Prospects for Nuclear Proliferation in Asia," in Tellis & Wills (eds.), *Strategic*

Asia 2005-06, pp. 333-360.

9. Muthiah Alagappa (ed.), *The Long Shadow: Nuclear Weapons and Security in 21st Century Asia*.

Course Outcomes:

4) Develop understanding of Economic and Social Progress in Asia and also Economic crisis and Recovery of Asia
5) Comprehensive grasp over Foreign Direct Investments in Asia, Rise of China and also about India's Look East Policy.
6) Comprehend on Regionalism and regional organizations like ASEAN and SAARC.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							M	M			
CO2	H			M			M					
CO3	H				M						L	

H=High, M=Middle, L=Low

	IV SEMESTER	
SE 401	**REGIONAL COOPERATION IN SOUTHEAST ASIA**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Acquire broad knowledge of early regional organisations like ASA and MAPHILINDO
2) Students learn the circumstances led to the formation of ASEAN and its role in the Cambodian peace process
3) Identify and analyze the outcome of ASEAN Meetings and its role in ARF

UNIT–I Identification of Southeast Asia as a Region: Mountbatten and SEAC.

Early Attempts at Regional Cooperation: The Philippines Proposal of Pacific Union – SEATO (1954) – Bandung Conference (1955) – Five Power Defence Treaty – ASA (1963) MAPHILINDO (1963).

UNIT–II Formation of ASEAN

Circumstances leading to the Establishment of ASEAN - Aims & Objectives – First Decade of ASEAN – Emergence of Communism in Indochina and its Impact on ASEAN – **Cambodian Problem and ASEAN's Response** – ASEAN's opposition to Vietnam's intervention in Cambodia – Establishment of ASEAN-sponsored CGDK – Settlement of the Cambodian Problem – Paris Peace Accords of 1991.

UNIT–III Road to ASEAN-10

Admission of Brunei (1984), Vietnam's Admission (1995), Myanmar and Laos

Membership (1997) – Cambodia joins as last country (1999).

UNIT–IV ASEAN Meetings – ASEAN Foreign Ministers Meetings – ASEAN + 3 – ASEAN Summit Meetings

UNIT–V ASEAN's Economic and Security Cooperation – Establishment of ARF (1993) – Annual Meetings of ARF – AFTA.

Suggested Readings:

1. Fawcett, Louise and Hurrell, Andrew (eds.), ***Regionalism in World Politics: Regional Organization and International Order***, (Oxford University Press, New York, 1995).
2. Fifield, Russel H., ***Southeast Asia in United States Policy***, (Frederck A. Praeger, New York, 1963).
3. Ganesan, N., ***Bilateral Tensions in Post-Cold War ASEAN***, (Institute of Southeast Asian Studies (ISEAS), Singapore, 1999).
4. Mahathir Bin Mohamad, ***Regionalism, Globalism and Spheres of Influence: ASEAN and the Challenge of Change into the 21st Century***, (ISEAS, Singapore, 1989).
5. Rigg, Jonathan, ***Southeast Asia: A Region in Transition***, (Routledge, London, 1994).
6. Sueo, Sekiguchi and Makito, Noda (eds.), ***Road to ASEAN-10: Japanese Perspectives on Economic Integration***, (ISEAS, Singapore, 1999).
7. Tan, Joseph L.H. (ed.), ***AFTA in the changing international economy***, (ISEAS, Singapore, 1996).

Course Outcomes:

1) Students learn about early organizations like ASA, SEATO and MAPHILINDO.
2) Develop understanding on the evolution of ASEAN from 5 to 10 members
3) Focus on the ASEAN Summit Meetings, ARF and AFTA.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	H		H					M	M			
CO2	H			M			M					
CO3	H		M					L				

H=High, M=Middle, L=Low

	IV SEMESTER	
SE 402	**ECONOMIC LANDSCAPE OF ASIA-PACIFIC**	**CREDITS -4**

Seasonal Marks 20 **End semester Examinations Marks 80**

Objectives:

1) Students assess the locational significance of Southeast Asia and rise of Industrial economies
2) Analyze the emergence of China and its growth after the Cold War
3) Assess the role of regional economic groups and foreign direct investments

UNIT–I Regional Economic Character : Natural Resources of Asia-Pacific Region – Southeast Asia: Locational significance – Growth of agricultural economy – Rise of Industrial economies – N I Es – Singapore, Malaysia, Thailand and Indonesia.

UNIT–II Economies of East Asia : U.S.-Japan Alliance -- Rise of Japan – China: Deng Xiao Ping Economic Policies – Growth of China after the Cold War.

UNIT–III Significance of South Pacific : Australia: Active engagement in agriculture and food production – Mining – Farm economy to open market economy. New Zealand: Agriculture, Animal Husbandry – Industrial potentials.

UNIT–IV Economic Cooperation across the Asia – Pacific : Regional Economic Groups in Asia-Pacific: ASEAN, ESCAP-APEC-EAS.

UNIT–V International Economic Cooperation : Economic Reforms – Foreign Trade – FTAs – AFTA –EEZ's - Effects of Globalization.

Suggested Readings

1. L.M. Bhole: ***Financial Institutions and Markets: Structure, Growth, and Innovations,*** Tata McGraw Hill Publishing Company Limited, New Delhi, 2004.
2. Paul R. Krugman & Maurice Obstfield, ***International Economics***, Addison Wesley Longman (Singapore) Pte. Ltd., Delhi, 2000.
3. Dilip K. Das, ***Asian Economy and Finance: A Post – Crisis Perpective***, Springer Publisher, New York, 2005.
4. Jon, D. Kendall, Donghyun Park, Randolph Tan, ***East Asian Economic Issues***, World Scientific Publishers, New York, 1997.
5. Mohamed Ariff and others, ***AFTA in the Changing International Economy*****,** (ISEAS, Singapore, 1996).
6. ***Regional outlook – Southeast Asia (2001-2005)*** (ISEAS, Singapore, 2000).
7. ***The Far East and Australasia*** (Ed.) (Europa Pubilications, England, 2002).
8. World Bank, ***World Development Reports*****,** Oxford University Press, New York.
9. W. T. O. Regionalism and the World Trade Systems.

Course Outcomes:

1) Develop an understanding of the rise of industrial economies like Singapore, Malaysia, Thailand and Indonesia.
2) Comprehend of the economies of Australia and New Zealand.
3) Ability to know the Regional Economic Groups like ASEAN, ESCAP, APEC and EAS.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		M					M				H

CO2	H		M					M				
CO3	H		L					L				

H=High, M=Middle, L=Low

	IV SEMESTER	
SE 403 (a)	**POST COLD WAR WORLD ORDER**	**CREDITS -4**

Seasonal Marks 20 **End semester Examinations Marks 80**

Objectives:

1) Students will learn Evaluate the historical significance of Cold War and relevance of NAM
2) Assess the impact of globalization and role of MNCs in the world
3) Student will learn about various dimensions of North-South relations and non-state actors in International relations

UNIT–I Contemporary World Order: End of Cold War – United States as pre-eminent power – Its effects on International Relations - Relevance of Non-Aligned Movement in the Post-Cold War era.

UNIT–II Globalization and World Trade Organization – Role of Multinational Corporations (MNCs).

UNIT–III North-South Relations – Demand for New International Economic Order (NIEO) – The Present International Economic Order.

UNIT–IV Human Rights – Terrorism – Non-State Actors in International Relations.

UNIT–V Experiments in Regional and Multilateral Cooperation – Role of Regional Associations – Structure and character of OAU, OAS, EEC, ASEAN, APEC, ASSRC and EAC – Emerging Multipolar World

Suggested Readings

1. Trivedi, Sonu, *A Hand Book of International Organizations*, (New Delhi, 2005).
2. Bennett, A. LeRoy, *International Organizations: Principles and Issues*, (New Jersey, 1995).
3. McGrew, Anthony and Brook, Christopher (ed.), *Asia-Pacific in the New World Order*, (London, 1998).
4. Micheal Yahuda, *The International Politics of the Asia-Pacific, 1945-1995*, (London, 1996).

Course Outcomes:

1) Develop an understanding of the Cold War and Non-Aligned Movement.
2) Students gain knowledge on Globalization and Multi National Companies.
3) Differentiate Regional and Multilateral Cooperation and the roles of ASEAN and SAARC.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		M					M	L			
CO2	H			M							M	

CO3	H		M					M				

H=High, M=Middle, L=Low

	IV SEMESTER	
SE 403 (b)	**ETHNICITY AND SOCIAL TRANSFORMATION IN CONTEMPORARY SOUTHEAST ASIA AND AUSTRALIA**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) To study the comparative cultures and ways of Southeast Asia and Australia
2) Identify alien cultural influence on South Pacifica and study about native people
3) Compare the societies of Fiji, Australia, New Zealand and assess with today's life

UNIT–I Multi-ethnic and multi-religious background of Southeast Asian countries – Major Ethnic groups : Karen, Shan, Mon, Cham, Khmer, Vietnamese, Sundanese, Hmong -- Migration -- Mobilization – Marriage and family systems-kinship patterns- society-community.

UNIT-II Social change -- socio-cultural change-- Ethnicity -- Enculturisation -- Etiquitte Assimilation, Accommodation and Transculturation -- Religious beliefs, multiculturalism in Southeast Asian countries.

UNIT-III Economic trade and exchanges in Southeast Asian Countries -- Political systems in Southeast Asian countries -- Economic prosperity- Regional progress -- Social organisation -- Educational institutions -- Higher education and development index-science and technology -- Software industries -- Modern medical facilities – Research -- Social transformation in Southeast Asia.

UNIT-IV Status of women in Southeast Asia- Gender inequalities-women empowerment-women problems- Feministic challenges – Human trafficking

UNIT-V Aborigines in Australia : People- History- Socio-cultural back ground -- Aborigines Arts - Aborigines in White Australia – Stolen generation -- Human Rights and their violation -- Policies of Social transformation -- Social inclusion and Social change

Suggested Readings :

1. Jacques Hersh, Johannes Dragsbaek Schmidt, Niels Fold, *Social Change in South East Asia New Perspectives*, (Routledge, 1998).
2. Riaz Hassan, *Local and Global: Social Transformation in Southeast Asia*, (Leiden, 2005).
3. Dicky Sofjan, *Religion, Public Policy and Social Transformation in Southeast Asia: Managing Religious Diversity Vol. 1* (Globethics.net Focus Series Book 33, 2016).
4. Deepak Nayyar, *Asian Transformations*, (Oxford University Press, 2019).
5. Dayley, Robert & amp; Clark D. Neher, *Southeast Asia in the New International Era*. (2013).
6. John Greenway, "Australian Aborigines and the native peoples of Torres strait to (1959).
7. Huotari, Mikko & amp; Jurgen Ruland, *Introduction: Context, Concepts, and comparison in Southeast Asian Studies* (2014).
8. Clair Smith and Graeme K. Ward, *Indigenous cultures in an interconnected world*.
9. Richard Broome, "Aboriginal Australians": Black Responses to White Dominance,

1788-2001.

Course Outcomes:

1) Students understand archeology of South Pacific and settlement patterns
2) Understand the European Colonization and Socio-Economic transformation
3) Learn basic features of Australia, New Zealand and Fiji Societies and Multiculturalism.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	M					L				
CO2	H						L					
CO3	H				M			M				

H=High, M=Middle, L=Low

	IV SEMESTER	
SE 403 (c)	**DEVELOPING BLUE ECONOMY**	**CREDITS -4**
Seasonal Marks 20	**End semester Examinations Marks 80**	

Objectives:

1) Understand the core economic issues of Blue Economy and the importance of Food Security
2) Learn the prospects in the Marine industries, and inclusive growth besides international regulatory institutions
3) Gain comprehensive knowledge on Ocean Renewable Energy and exploitation of deep sea resources

UNIT–I Importance of Blue Economy-Key Economic Issues: Food Security-Demand for Protein - Rising Coastal Tourism-Surging of Seaborne Trade-Demand for Alternative Sources of Energy - Managing Coastal Urbanisation-Improving Ocean Health - Providing Marine Governance-Ocean Technologies

UNIT–II Guiding Principles of Blue Economy- Efficient Utilization of Marine Resources-

Exploiting Opportunities in Emerging Marine Industries- Inclusive and Harmonious Growth with sustainability concerns- Creating Legal and Regulatory Institutions

UNIT–III Elements of Blue Economy: Fisheries and Aquaculture- Ports and Shipping- Deep-Sea Oceanic Resources-Marine Biotechnology -Marine Services

UNIT–IV Ocean Energy: Relevance of Ocean Renewable Energy- SDGs in the context of Blue Economy- Potential, Current Status and Demand Pattern of Renewable Energy-Cost of Ocean Renewable Energy-Importance of Ocean Renewable Energy in SIDS-Importance and Status of Ocean Renewable Energy for IORA-Factors Affecting Growth of Renewable Energy

UNIT–V Technology Driven Emerging Sectors: Offshore and Deep-Sea Oceanic Resources-Deep-Sea fishing- Emerging Cruse Sector -Marine Biotechnology- Marine Derived Pharmaceuticals

Suggested Readings:

1. Charles S Colgan, "*Measurement of the Ocean and Coastal Economy: Theory and Methods*" National Ocean Economics Project, USA, 2004
2. Charles S Colgan, and Judith Kildow, "*Understanding the Ocean Economy within Regional and National Contexts",* Centre for the Blue Economy, Monterey Institute of International Studies, Monterey, CA, 2013
3. Gunter Pauli, *"The Blue Economy: 10 years, 100 innovations, 100 million jobs"*, Paradigm Publications, 2010
4. Michael Conathan, and Scott Moore, "*Developing a Blue Economy in China and the United States,"* Centre for American Progress, 2015
5. P. Stenzel, "*Resource Assessment for Osmotic Power Plants in Europe and Worldwide*", in F. Lienard, and F. Neumann, (eds.), Salinity Gradient Power in Europe: State of the Art, Sustainable Energy Week, Brussels, 2011,
6. Rui Zhao, "The *Role of the Ocean Industry in the Chinese National Economy: An Input-*

Output Analysis", Centre for the Blue Economy, Monterey Institute of International Studies, Monterey, CA, 2013,

7. UNCTAD, "*The Oceans Economy: Opportunities and Challenges for Small Island Developing States,* New York, and Geneva, 2014

Course Outcome:

1) Acquainted with the Blue Economy, Marine Governance and Ocean Technologies.
2) Gain knowledge on ports and shipping, oceanic resources and marine bio-technology.
3) Develop an understanding on Renewable Ocean Energy and its Importance.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M					M		M
CO2		H					L		M			
CO3			M		H			L				L

H=High, M=Middle, L=Low

	IV SEMESTER	
SE 403 (d)	**ENERGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) Identify significance of energy reserves and assess the energy scenario in India
2) Know the environmental pollutants and find different means of pollution controls
3) Understand and discuss how important is renewable energy and to maintain biodiversity for the sustainable development.

UNIT–I Introduction – Types of energy sources, Demand and supply – Estimates of energy reserves – Energy Resources and Investment – Overview of global / India's energy scenario.

UNIT–II Environmental effects of energy extraction, conversion and use – primary and secondary pollutants – consequence of pollution and population growth – pollution control methods and impacts.

UNIT–III Defining Environmental Security - Green technologies for addressing the problems of Water, Energy, Health, Agriculture and Biodiversity

UNIT–IV Types of Renewable Energy: solar, wind and nuclear energy – Low-cost and no-cost ways to save energy – The potential for solar energy, other renewable energy, and conservation.

UNIT–V Development of Green Energy – Biodiversity and ecosystems and their implications for sustainable development – Major environmental issues: climate change and global warming, greenhouse gas emissions – Assessment of its impact, mitigation and adaptation.

Suggested Readings:

1. Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A., 2006, Energy and the Environment, 2nd Edition, Wiley, New York.
2. Energy and the Challenge of Sustainability, World Energy assessment, UNDP, N York, 2000.
3. Hinrichs, Roger A. and Merlin Kleinbach. 2002. Energy: Its Use and the Environment, New York: Harcourt.
4. IEA, 2012, Energy Policies of IEA Countries, Australia, 2012, Review, International Energy Agency.
5. Korin, Anne and Gal Luft (Editors). 2009. Energy Security Challenges for the 21st Century: A Reference Handbook, Praeger, NY.
6. Priest, Joseph . 1991. Energy: Principles, Problems, Alternatives (New York: Addison-Wesley.
7. Smil, V. (2000) "Energy in the Twentieth Century: Resources, conversions, costs, uses and consequences," Annual Review of Energy and the Environment.
8. Tester, Jefferson W., Elisabeth M. Drake, Michael J. Driscoll, Michael W. Golay, William A. Peters. 2005. Sustainable Energy: Choosing Among Options, Cambridge, the

MIT Press.
9. E H Thorndike, Energy & Environment: A Primer for Scientists and Engineers, Addison-Wesley Publishing Company, http://maysero.ru/vumezoru.pdf
10. Environment – A Policy Analysis for India, Tata McGraw Hill, 2000.Environmental Considerations in Energy Development, Asian Development Bank, Manila (1991).

Course Outcomes:

1) Develop an understanding of the Types of energy sources in the world and India
2) Learn about environment issues and emerging green technologies.
3) Know the need of Renewable Energy, Green Energy, Bio-Diversity and eco systems.

	IV SEMESTER	
SE 404	**Project : Dissertation + Viva**	**CREDITS -4**
Sessional Marks	**End semester Examinations Marks 100**	

Objectives:

- Gain broad knowledge on the topic selection and research methods.
- Students will learn the minimum standards in the preparation of the Dissertation
- Student gain knowledge on the topic of their research and recent trends.

Course Outcomes

1. Explain the results of their project.
2. Learn in detail on the broad knowledge of their topic
3. Students leave their suggestions for the development of tourism in the country.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	H			L		H				M		
CO2	H					M				L		
CO3	H			M		M						

H=High, M=Middle, L=Low

	IV SEMESTER	
SE 405 (a)	**INDIA – AUSTRALIA RELATIONS**	**CREDITS -4**
Seasonal Marks 20	**End semester Examinations Marks 80**	

Objectives:

1) To Identify significant geographical, historical similarities, and complementarities between India and Australia.
2) Gain knowledge on the political and economic relations of India and Australia
3) Assess the security concerns and strategic cooperation between India and Australia

UNIT–I Basic Linkages of India-Australia Relations

1) Geographical Proximity as Littoral States of Indian Ocean.
2) Commonalities based on:
   (a) Geological past, (b) Mining conditions, (c) Climate, (d) Colonial legacy,
   (e) Concerns over Indian Ocean security
3) Complementarities in Economic and Trade Relationships.

UNIT–II Political Issues and Security Concerns

a) Nehru - Menzies Ideological Estrangement

b) Australia's Positive Response on the eve of Chinese aggression

c) Australia's Initiatives and India's Reluctance for Defence Cooperation

d) Australia-India Approaches to the Indian Ocean Security

UNIT–III Economic and Trade Relations

a) Economic and Technical Cooperation – Colombo Plan and after

b) Trade Imbalance

UNIT–IV Post - Cold War Initiatives

1) India's Look East Policy

2) Australia's Look West Policy

3) Joint Business Councils:

(a) Investment, (b) Scientific and Technical Cooperation, (c) Trade

UNIT–V Strategic and Security Concerns

(1) Australia's Recognition of India's Security Concerns.

(2) Australia's Reaction to India's Nuclear tests.

(3) Strategic Dialogue and Partnerships.

(4) Impact of India-U.S. Bonhomie on the India-Australia Relations.

Suggested Readings

1. Banerjee, D., *Towards an Era of Cooperation : An Indo-Australia Dialogue*, (New Delhi, 1995).
2. Department of Defence, *Australia's Strategic Policy*, (Canberra, 1997).
3. Evans, G. and Grant, B., *Australia's Foreign Relations in the World of the 1990s*, (Carton: Victoria, 1995).
4. Greenwood, G. and Norman, H., *Australia in World Affairs, 1950-55, 1956-1960,*

1961-1965, 1966-1970, (Cheshire, 1957, 1963, 1968, 1974).

5. McPherson, K. and Panandikar, V.A.P., *India- Australia: Public Policy Conference*, (New Delhi, 1996).
6. Neelamegham, S. Midgley, D. and Sen, C., *Enterprise Management: New Horizons in Indo- Australian Collaboration*, (New Delhi, 1999).
7. Senate Standing Committee on Foreign Affairs, Defence and Trade, *Australia-India Relations: Trade and Security*, (Canberra, 1990).
8. Vicziany, Marika (ed.), *Australia-India, The Economic Links: Past, Present and Future*, (Nedlands: Western Australia, 1993)
9. Watt, A., *The Evolution of Australian Foreign Policy, 1938-1965*, (London, 1967).

Course Outcomes:

1) Learn about Littoral States of Indian Ocean and Complementarities between India-Australia
2) Ability to analyze Political Issues and security concerns of both nations.
3) Comprehend on the Post Cold War initiatives, strategic and security concerns.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M			L		M		M
CO2		M	H		M		L					
CO3	H				H			L				L

H=High, M=Middle, L=Low

	IV SEMESTER	
SE 405 (b)	**INDIA AND THE ASIA –PACIFIC**	**CREDITS -4**
Seasonal Marks 20		**End semester Examinations Marks 80**

Objectives:

1) To know the changes in international order after the Cold War
2) To learn the growing relations between India and Southeast Asia
3) To enable the students to know about regional and sub-regional organizations in the region.

UNIT–I Post Cold War Asia –Pacific Economic reforms in China and India- Japan's search for new role, ASEAN and Asia –Pacific

UNIT–II India –Southeast Asia Cold War Politics –India's Look East Policy and ASEAN'S response – Emerging partnerships with ASEAN countries : Singapore, Malaysia, Indonesia, Thailand and Indochina countries and Myanmar's importance to India

UNIT–III India and South Pacific India –Australia relations- Australia's Look West policy Australia and New Zealand enhanced relations with India -- India-Fiji Relations India –Australia and ASEAN interaction

UNIT–IV India and East Asia India rediscovers China –India-China relations after the Cold War New Strategic partnership with Japan-Enhanced relations with South Korea. East Asia Summits

UNIT–V India's Cooperation with Regional and sub-Regional Organizations in the Asia-Pacific -- APEC, Pacific Islands Forum, IQR-ARC, ASEAN Regional Forum, BIMSTEC and Mekong Ganga Cooperation.

Suggested Readings

1. Chan Wahn Kim, *Economic Liberalisation and India's Foreign Policy*,(Delhi.2006)
2. Cohen , Stephen P., *Emerging Power: India*, (Oxfored,2001).1998)
3. Islam, Iyanatul and Chowdhury, Anis, *Asia-Pacific Economics*, (London, 1997).
4. Mc Grew, Anthony and Brook, Christopher(ed)., *Asia – Pacific in the New World Order*, (London1998)
5. Micheal Yahuda, *The International Politics of the Asia-Pacific, 1945-1995*, (London,1996).
6. Qurong, Shen and Gupta, Bhabani Sen (eds.) *China Looks at the World*, (Delhi,1999).
7. Sharma, R.R.(ed.), *India and Emerging Asia*,(New Delhi,2005)
8. Shukla, Vatsala, *India's Foreign Policy in the New Millennium*,(New Delhi,2005).
9. Taling, Nicholas (ed.), *The Cambridge History of Southeast Asia*, Vols, I &II, (Cambridge,1992)
10. Trivedi, Sonum *A Hand Book of International Organizations*, (New Delhi, 2005)

Course Outcomes:

- Students understand major international developments happened after the Cold War
- Gain knowledge on the Indian foreign policy changes with Southeast and East Asia
- Know about the activities of ASEAN and sub-regional organizations in the Asia-Pacific

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		M		M			M				
CO2	H			M				M				
CO3	H		L								M	

H=High, M=Middle, L=Low

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF AREA STUDIES PROGRAMME

(SOUTHEAST ASIAN & PACIFIC STUDIES)



Course

M.A. TOURISM

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

Centre for Southeast Asian & Pacific Studies

S.V. University College of Arts

Sri Venkateswara University :: Tirupati

M.A. TOURISM

About the Department

M.A. Tourism course in SVU College of Arts, S.V. University, is designed in such a way to prepare the students for managerial positions in Consultancies, Policy making, Tour operations, Travel Agencies, Small and Medium Enterprises and the students should be able to work in travel and tourism related organizations.

Vision

Make the Tourism programme an excellent professional course in nurturing and building careers for students in the emerging area.

Mission

- Train the students in capacity building skills through teaching, research and extension activities with employability.
- Empowering the students to gain knowledge of Indian culture and various types of tourist destinations particular in India and general in the world.
- To train the students in managerial and marketing the tourism products

Programme Special Outcomes

- Explain, apply and also demonstrate travel and tourism knowledge in a professional way for a successful career in the Tourism industry;
- Communicate effectively using written, oral and nonverbal techniques, including the use of technology in the gathering and presentation of information;
- Demonstrate their knowledge in launching Travel agency and usage of travel reservations and software skills.

Department Objectives

1. To foster knowledge across the recent trends in global tourism and to become efficient professionals
2. Facilitate the students to understand the interrelation of culture and tourism sites
3. Develop sensitivity towards the nature and train the students in conservation activities.

Programme Outcomes

- To equip students with a broad knowledge on the growth of tourism.
- To encourage understanding and applicability of changing trends in tourism.
- To describe the interrelationship between travel, tourism and hospitality industries.
- To develop management skills and to provide necessary Administrative, Communicative, IT, product and Resource skills to effectively handle Tourism activities.
- To acquire better and viable marketing and product innovation strategies.
- To communicate key ideas in written texts and oral presentations
- To adopt tourism practices locally and globally
- To respect Indian heritage and apply ethical principles and follow environmental responsibilities for tourism conservation.
- To develop socially, responsible business leaders in Tourism development.
- To Acquiring knowledge and develop the ability to work hard.
- To promote entrepreneurial skills among students, for promoting a better ecosystem of business.
- To recognize the need and use ability to engage in independent and life-long learning in the context of changing trends in tourism.

Programme Educational Objectives

Enable the students to:

- Acquire knowledge in changing Tourism patterns in different destinations in the world.
- Choose multiple Tourism products for career development according to their taste and skills.
- Learn the importance of Tourism sector in building national economies and offering different employment opportunities.
- Develop managerial and entrepreneurial skills to start business independently.

Programme Code : 123

CBCS Pattern (With effect from 2021-22)

The Course of Study and Scheme of Examinations

SEMESTER –I

S.No.	Compo-nents of Study	Code	Title of the Course	Credit Hrs / Week	No. of Credits	IA	Sem End Exam	Total Marks
1.	Core	T-101	**Theoretical Concepts of Tourism**	6	4	20	80	100
2.		T-102	**Tourism Principles and Practices**	6	4	20	80	100
3.		T-103	**Travel and Tourism**	6	4	20	80	100
4.		T-104	**Art, Architecture and Tourism**	6	4	20	80	100
5.	Compulsory Foundation	T-105 (a)	**Historical Perspectives of Tourism**	6	4	20	80	100
		T-105 (b)	**Socio-Economic Dimensions of Tourism**	6	4	20	80	100
		T-105 (c)	**International Tourism and UNESCO Sites in India**	6	4	20	80	100
6.	Elective Foundation	T-106 (a)	**Tourism Products in India**	6	4	20	80	100
		T-106 (b)	**Transport Management**					
	Total			**36**	**24**	**120**	**480**	**600**
7.	Audit Course			0	0	100	---	--

*** All CORE Papers are Mandatory**

- **Compulsory Foundation -- Choose one Paper**
- **Elective Foundation – Choose one paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under Self Study**

- **Interests Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**

SEMESTER –II

S.No.	Compo-nents of Study	Code	Title of the Course	Credit Hrs / Week	No. of Credits	IA	Sem End Exam	Total Marks
1.	Core	T-201	**Tourism and Geography**	6	4	20	80	100
2.		T-202	**Indian Cultural and Heritage Tourism**	6	4	20	80	100
3.		T-203	**Rural and Urban Tourism**	6	4	20	80	100
4.		T-204	**Ecotourism**	6	4	20	80	100
5.	Compulsory Foundation	T-205 a	**Health and Medical Tourism**	6	4	20	80	100
		T-205 b	**Virtual and E-tourism**	6	4	20	80	100
		T-205 c	**Airline ticketing and Information management**	6	4	20	80	100
6.	Elective Foundation	T-206 a	**Travel Agency and Tour Operations Management**	6	4	20	80	100
		T-206 b	**Tour Packages and Itinerary planning**	6	4	20	80	100
	Total			**36**	**24**	**120**	**480**	**600**
7.	Audit Course			0	0	100	---	--

*** All CORE Papers are Mandatory**

- **Compulsory Foundation -- Choose one Paper**
- **Elective Foundation – Choose one paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under Self Study**

- **Interests Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**

SEMESTER –III

S.No.	Compo-nents of Study	Code	Title of the Course	Credit Hrs / Week	No. of Credits	IA	Sem End Exam	Total Marks
1.	Core	T-301	Tourism Management	6	4	20	80	100
2.		T-302	Emerging Trends in Tourism	6	4	20	80	100
3.	Generic Elective	T-303a	Environment, Sustainable Development and Tourism	6	4	20	80	100
		T-303b	Tourism Research Methods	6	4	20	80	100
		T-303c	Tourism and Human Resource Management	6	4	20	80	100
		T-303d	Conservation and Management in Tourism	6	4	20	80	100
4	Skilled Oriented Course	T-304	Tourism Skills and Opportunities	6	4	20	80	100
5	Open Elective	T-305a	Tourism Industry in India	6	4	20	80	100
		T-305b	Adventure Tourism	6	4	20	80	100
	Total			36	24	120	480	600

*** All CORE Papers are Mandatory**

- **Generic Elective – Choose Two**
- **Skilled Oriented course is Mandatory**
- **Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study**

- **Interests Students may register for MOOC with the approval of the concerned DDC.**

SEMESTER –IV

S.No.	Compo-nents of Study	Code	Title of the Course	Credit Hrs / Week	No. of Credits	IA	Sem End Exam	Total Marks
1.	Core	T-401	**Tourism Marketing**	6	4	20	80	100
2.		T-402	**Planning and Development of Tourism**	6	4	20	80	100
3.	Generic Elective	T-403a	**Tourism Entrepreneurship**	6	4	20	80	100
		T-403b	**Tourism and Hospitality Management**	6	4	20	80	100
		T-403c	**Understanding and Event Management**	6	4	20	80	100
		T-403d	**Destination Planning and Marketing**					
4	**Multidisciplinary Course/Project Work**	T-404	**Viva + Dissertation #**	6	4	20	80	100
5	Open Elective	T-405a	**Globalization and Tourism**	6	4	20	80	100
		T-405b	**Tourism Economics**	6	4	20	80	100
	Total			**36**	**24**	**120**	**480**	**600**

*** All CORE Papers are Mandatory**

- **Generic Elective – Choose Two**

- **Multidisciplinary Course / Project Work is Mandatory**
- **Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study**
- **Interests Students may register for MOOC with the approval of the concerned DDC.**

Evaluation: The Dissertation is for 80 Marks and the Viva- Voce Exam will be for 20 Marks.

Two Internal Tests will be held for each paper in each Semester.

The Average of the Two Tests will be taken.

	I SEMESTER	
T-101	**THEORETICAL CONCEPTS OF TOURISM**	**CREDITS -4**
Sessional Marks 20		**End semester Examinations Marks 80**

Objectives:

- Students will learn the fundamentals of Tourism and its allied activities like Travel, Accommodation and Transport
- Student will also learn about the noted international travel agencies
- Develop the ability to know the functions and obligations of different Tourism organizations

UNIT- I **Tourism**: Definition, Meaning, Nature and Scope of Tourism – Tourism as an academic discipline – Interdisciplinary approaches to tourism -- Tourism Systems, Visitor, Traveller, and Excursionist – Relative differences

UNIT- II **Tourism Theories:** Leiper's Geo-Spatial Model - Mill-Morrison's Tourism Policy Model - Butler's Tourism Area Life Cycle (TALC) Model – Doxey's Index Model – Crompton's Push and Pull Theory

UNIT- III **Elements of Tourism**: Primary elements -- Transport – Different types – Types of Accommodation – Catering – Tour destinations : Natural and historical – Entertainment -- Ancillaries of Tourism

UNIT- IV **Economic impact of Tourism:** Income generator -- Employment provider, different type of jobs -- Multiplier of tourism – Infrastructure -- Foreign exchange -- Trade and commerce of handicrafts, metal, wood and textiles.

UNIT- V **Growth of Tourism** : Tourism Promotion: Central and State Governments –

Opportunities – Growth in Travellers' visits – Receipts – Subsidiary avenues

Suggested Readings

1. Bhatia A. K., *Tourism Development*, Sterling Publishers Pvt,Ltd, New Delhi, 2007
2. Bhatia A.K., *International Tourism Management,* Sterling PublishersPvt,Ltd, New Delhi,2006
3. BiswanathGhosh, *Tourism and Travel Management,* Vikas Publishing House PvtLtd., New Delhi, 1998
4. Seth, P. N., *Successful Tourism Management,* Sterling PublishersPvt,Ltd, NewDelhi,1987
5. Seth, P.N and Sushma Seth Bhat, *An Introduction to Travel and Tourism,* Sterling PublishersPvt, Ltd, New Delhi, 2006
6. Mario D'Souza (ed), *Tourism Development and Management,* MangalDeepPublications, Jaipur, 1998
7. Michael M. Coltman, *Introduction to Travel and Tourism: An International Approach,* Wiley, London, 1989
8. Punia, B.K., *Tourism Management: Problems and Prospects,* Ashish Publishing house, New Delhi, 1997
9. Vanama, P. K., *Trends in Tourism,* Prabhu Publishers, Chennai, 2005

Course Outcomes: Understand the Nature, Meaning and Scope of Tourism.

1) Students understand the different aspects in tourism.
2) Earn knowledge about national and international tourism organisations

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H						M					M
CO2	H	H			M							
CO3	H				H		M	L				L

H=High, M=Middle, L=Low

	I SEMESTER	
T-102	**TOURISM PRINCIPLES AND PRACTICES (VRB)**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Course offers to know the importance of Tourism Principles and Practices.
- Student will also learn about Tourism industry and its forms
- Gain knowledge on the Tourism policy models and Tourism Organizations

UNIT-I An overview of Tourism : Concept of Tourism: Nature - Scope - Characteristics – Typology of Tourism – Classification of Tourists - Tourism network - Interdisciplinary approaches to tourism - Emerging Areas and Practices.

UNIT-II Forms of Tourism: Inbound, Outbound, National, International- Alternative Tourism – Inclusive Tourism, Current Trends in Domestic and Global Tourism: Tourism Statistics and Analysis – Emerging areas in Tourism

UNIT-III – Tourism Practices: 5 A's – Introduction, Attraction, Accessibility, Accommodation, Amenities, Activities; Motivations and deterrents for travel -- Push and pull factors in Tourism -- National and International Tourism- Impact of Technological Advancements on tourism.

UNIT-IV Tourism Industry: Structure, Functions and Constituents - Direct, Indirect and Support Services - Basic Components of Tourism: Transport - Accommodation- Facilities & Amenities, Shopping, and Entertainment -- Horizontal and Vertical Integration in Tourism Business -- Present trends in Domestic and Global tourism – MNC's in Tourism Industry.

UNIT-V Tourism Corporations: Origin -- Institutional set up and functions of ITDC, ICPB, IATO, IRCTC, State Tourism Development Corporations -- Ministries of

Tourism and Culture, Director General of Civil Aviation, Govt. of India

Suggested Readings:

1. Page J. Stephen & Brunt Paul (2007), *Tourism- a Modern Synthesis*, Thomson London.
2. Chuck Y. Gee, James C. Makens & Dexter J. L. Choy (1989), *The Ttravel Iindustry,* VanNostrand Reinhold, New York.
3. . Goeldner, C., & Ritchie, J.R. (2011), *Tourism, Principles, Practices, Philosophies*, New Jersey: John Wiley.
4. Swain, S.K. & Mishra, J.M. (2011). *Tourism Principles and Practices*. New Delhi: OUP.
5. Jamal, T., & Robinson, M. (Eds.). (2009). *The SAGE Handbook of Tourism Studies*. United Kingdom: Sage Publications.
6. Cooper, C. (2008). *Tourism Principles and Practice*. New Delhi: Prentice Hall.
7. Ray Youell (1998), *Tourism-An Introduction*, Addison Wesley Longman, Essex.
8. Burkart A.J., Medlik S. (1974), *Tourism- Past, Present and Future*, Heinemann, London.
9. Gupta, V.K., *Tourism in India*, Gyan Publishing House, Delhi

Course Outcomes:

1) Students gain knowledge on tourism principles and practices.
2) Evaluate Tourism forms and structure.
3) Interpret the dimension of tourism organizations role.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1		M	M		H							
CO2	H	H	M				L					
CO3	H	H										H

H=High, M=Middle, L=Low

	I SEMESTER	
T-103	**TRAVEL AND TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- To gain knowledge on motivations of tourists to travel
- To know the Tourism Regulations in detailed.
- To learn the importance of transport in Tourism

UNIT I –Purpose of Tourism: Leisure and Pleasure – Relaxation: Sun, Sea and Sand -- Touring, Sightseeing and Pilgrimage - Visiting Friends and Relatives- Business and Incentive Travel -- Special Interest tours

UNIT – II Modes of Transport: Evolution and importance of Transportation- Early trade roots -- Voyages and the Discovery of Sea routes -- Role of Transportation in Tourism--Major Transport Systems: Rail, Road, Air and Water transport

UNIT – III Tourism Regulations: Inbound, Outbound and Intra-bound tourisms- Tour Regulations : Foreign Exchange Management Act -- Special Permits, Custom regulations -- Economic Regulations: Currency, Insurance and Foreign Travel Tax

UNIT – IV Passport, Visa Processing: Passport act in brief – Passport Types, Procedure, rules and regulations of eligibility -- Visa: Types of Visa, Documents for obtaining Visa, Health Check Documents – Rules and Regulations for foreign travel

UNIT – V Role of the Government: Functions of the Ministry of Tourism -- ITDC –- IRCTC- State Tourism Boards – District Tourism Boards -- Campaigns : Incredible India – Atidi Devobava.

Suggested Readings:

1. Mandal, V.K. (2008), *Travel and Transport Agency*, Cyber Tech Publication, Ansari Road, Daryaganj, New Delhi
2. Negi. J. (1998) : *Travel Agency & Tour Operation, Concept and Principles*, Kanishka Publishers, Distributors, New Delhi.
3. Agarwal, R.D. (2008), *Organization and Management*, Tate McGraw-Hill Publishing Co.,
   New Delhi.
4. Foster, D. (1985), *Travel and Tourism Management*, Macmillan Press Ltd., London.
5. Kotaler, P, (2001), *Tourism and Hospitality Management*, Pearson Education, India.
6. Kotahri, Anurage (2011), *A Textbook of Tourism Management*, Wisdom Press, New Delhi.
7. Kumar, Akshay (1997), *Tourism Management*, Commonwealth Publishers, New Delhi.

Course Outcomes:

1) Students learn the evolution of modes of transport
2) Understands the importance of travel Document
3) Comprehend the Role of Government in Tourism promotion

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H			M			M					
CO2	H			H								
CO3	H			H					L			

H=High, M=Middle, L=Low

	I SEMESTER	
T-104	**ART, ARCHITECTURE AND TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Students will learn Evolution and developments of Indian Architecture from ancient to Mughal period.
- Comprehend on the important schools of Art and Architecture evolved in India.
- This course gives an opportunity to know about different forts and palaces in India

UNIT- I **Architectural Heritage of India:** Indus valley – Salient features of Indian Architecture -- Schools of Art: Gandhara, Mathura and Amaravthi -- Relationship between Architecture and Tourism -- Role of Architecture in Tourism Industry.

UNIT- II **Buddhist Architecture**: Stupa - Chaitya – Vihara – Buddhist Sites: Sanchi, Saranath, Bodh Gaya, Ajantha, Ellora, Amaravathi and Nagarjuna Konda.

UNIT -III **Hindu Temple Architecture**: Nagara – Dravida – Vesara and Kalinga – Famous Temples -- Khajuraho – Modhera -- Mahabalipuram – Thanjavur – Hampi-
Belur- Halebidu - Puri and Cuttack

UNIT- IV **Indo-Islamic Architecture**: Qutub Minar - Fatehpur Sikri – Taj Mahal - Red Fort – Bijapur- Bidar and Gulbarga -- **Colonial Architecture**: Victoria Memorial - Fort St. George -- Gateway of India.

UNIT- V Historical monuments of touristic significance : Forts and Palaces: Jaipur – Jodpur – Udaipur – Jhansi – Bandhavgar - Raigad – Golkonda – Vellore - Ginge – Penukonda – Chandragiri – Gooty -- Palaces : Mysore Palace -- Umaid Bhavan Palace Jodhpur- Hava Mahal, Jaipur- Lake Palace Udaipur.

Suggested Readings:

1. Percy Brown, *Indian Architecture Buddhist and Hindu Architecture* - Volume I and II
2. C. V. Narayana Iyer, *Origin and History of Saivism*
3. T.V. Mahalingam, *Early Pandya Architecture*
4. K. A. N. Sastri, *A History of South India*, Oxford University Press, Chennai, 2000
5. T.V. Mahalingam*, Readings in South Indian History,* B.R, Publication, New Delhi, 2006.
6. Swamy Sadananda, *Origin and Early History of Saivism in South India*, University of Madras, Chennai, 1939.

Course outcomes:

1) Understand briefly the different art forms in India.
2) Students understand and distinguish different types of architecture.
3) Learn about most famous forts and palaces in India.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H				L			H	M			
CO2	H							L				
CO3	H							M		M		

H=High, M=Middle, L=Low

	I SEMESTER	
CF T-105 (a)	**HISTORICAL PERSPECTIVES OF TOURISM**	**CREDITS -4**
Sessional Marks 20		**End semester Examinations Marks 80**

Objectives:

- This course gives a specific understand on the development of Tourism through ages
- Comprehensive grasp over the Tourism development in the Country
- Students also learn the Tourism policies and organizations in the country.

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UNIT - I Development of Tourism Through Ages: Historical Development of Tourism -- Early and Medieval Periods -- Renaissance and its Effects on Tourism -- Birth of Mass Tourism -- Modes of Transport -- Modern Transport, Communication and Accommodation Systems

UNIT – II Tourism in India -- Trends of Tourism Development : Gender, Age and Nations -- Seasonal Trend of Tourist Arrivals, Trend of Tourists Length of Stay -- Functions of Tourism

UNIT – III Tourism Industry & Its Linkages: Meaning and Nature of Tourism Industry -- Basic Components of Tourism -- Input and Output of Tourism Industry -- Tourism Industry Network -- Direct, Indirect and Support Services: Transport- Accommodation- Facilities & Amenities

UNIT – IV Tourism Business during Liberalization & Globalization: Tourist administration -- Tourist Publicity section -- Tourist Information Centres : International and National -- Tourist Development councils -- Department of Tourism at National and

State levels -- Positive and Negative Impacts of Tourism

UNIT - V **Tourism Organizations**: Roles and Functions of United Nations World Tourism Organization (WTO), Pacific Asia Travel Association (PATA), World Tourism & Travel Council (WTTC) - International Hotel Association (IHA), Ministry of Tourism, Govt. of India, India Tourism Development Corporation (ITDC) and Andhra Pradesh Tourism Development Corporation (APTDC).

Suggested Readings:

1. Swain, S.K. & Mishra, J.M.(2012). *Tourism Principles & Practices*, Oxford University Press, New Delhi.
2. Bhatia A.K. (2002), *International Tourism Management*, Sterling Publishers, New Delhi.
3. Gee, Chuck Y., James C. Makens,, and Dexter J.L. Choy. (1997). *The Travel Industry*, Van Nostrand Reinhold, New York.
4. Youell, R.(1998). *Tourism-An Introduction*. Addison Wesley Longman, Essex.
5. Michael M. Coltman. (1989), *Introduction to Travel and Tourism- An International Approach*. Van Nostrand Reinhold, New York.
6. Roday. S, Biwal. A & Joshi. V. (2009). *Tourism Operations and Management*, Oxford University Press, New Delhi.

Course Outcomes

1) Students know historical development of tourism in India
2) Categorize important tourism linkages and destinations.
3) Gain knowledge on functions of Tourism organizations

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	L					M	M				
CO2	H						M			L		
CO3	H								M		L	

H=High, M=Middle, L=Low

	I SEMESTER	
CF T-105 (b)	**SOCIO-ECONOMIC DIMENSIONS OF TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- To know the socio-economic dimensions of Tour operations
- To comprehend on the global changes and their economic roles
- To give a specific understanding on the social progress through tourism.

UNIT – I Introduction : Meaning, definition and scope of social dimensions, community development -- Place and role of tourism -- Tourism in the national economy -- interdependence of tourism and economic development.

UNIT – II Globalisation and the world economy: Liberalisation – Opening of economies – Globalisation -- Enhanced Connectivity: Road, Rail and Air -- Tourism demand and forecasting -- Economic benefits-- cross cultural exchange, creating employment opportunity -- Conservation of historic sites and improvement of infrastructures -- TFCI

UNIT – III Importance of Economy : Economic and Social development -- Economic functions of tourism - Employment, Improvement of foreign exchange reserves -- Economic development of underdeveloped areas – Upliftment and integration of local communities

UNIT – IV Economic Impacts of Tourism: Types of economic impact: Positive Impact : Improved tax revenue and Personal income, Increased standards of living and Employment opportunities, and Negative impacts – Role of Tourism Councils: World

Travel and Tourism Council (WTTC) – Tourism Satellite Account (TSA)

UNIT – V Social Impact of Tourism : Commodification of Culture -- Demonstration effects -- Local communities – Case studies -- Defining Social sustainability – Interactions between people with different cultural backgrounds, attitudes and behaviors -- Contribution of Community events to social sustainability – Community Participation -- Ethics and social responsibility of Tourist -- Development: Community awareness and Participants contribution

Suggested Readings :

1. James Leigh, Craig Webster, Stanislav Ivanov (eds.), *Future Tourism: Political, Social and Economic Challenges*, (Rutledge, London, 2013).
2. K. Sharma, *Tourism and Economic Development*, (Sarup & Sons, New Delhi, 2004).
3. Amedeo Fossati, Giorgio Panella (eds.), *Tourism and Sustainable Economic Development*, (Springer, New York, 2000).
4. Clement Allan Tisdell, Kartik Chandra Roy, *Tourism and Development: Economic, Social, Political and Environmental Issues*, (Nova Science, 1998).
5. K.K. Sharma, *Tourism and Regional Development*, (Sarup & Sons, Delhi, 2004).
6. S.B. Agarwarl, *Tourism for Sustainable Economic Development*, (SSS Publications, Delhi, 2003).

Course Outcomes:

1) Gain knowledge on socio-economic development through tourism

2) Learn the techniques for sustainable tourism

3) Comprehend on the environmental conservation

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H					M		L			
CO2	H				M					L	M	
CO3	H											

H=High, M=Middle, L=Low

	I SEMESTER	
CF T-105 (c)	**INTERNATIONAL TOURISM AND UNESCO SITES IN INDIA**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Students will learn about trends in Global Tourism.
- Gain knowledge on the UNESCO Heritage sites
- Students know the importance of UNESCO sites in India

UNIT-I International Tourism : Meaning, Definition and Types -- Global Tourism Trends, Tourist Arrivals, Tourism Receipts and GDP shares in leading Countries -- India in International Tourism -- Factors Contributing for the growth of Global Tourism -- Motivations, Growing purchasing power and modern transport systems

UNIT- II Diversification of Tourism -- New Global Emerging Tourism Destinations -- Changing Dimensions of Tourism Products -- International Tourists -- Factors affecting Global and Regional tourist movements

UNIT-III UNESCO World Heritage Programmme -- The natural heritage features, geological and physiographical formations – Classification through several cases -- India's major International attractions – Promotion Characteristics of different States

UNIT -IV UNESCO World Heritage sites in India: Cultural, Natural, Mixed -- Agra Fort -- Ajanta Caves -- Buddhist Monuments -- Churches and Convents of Goa -- Dholavira: a Harappan City -- Elephanta Caves -- Ellora Caves -- Jaipur City -- Group of Monuments at Hampi, Mahabalipuram and Pattadakal.

UNIT -V Natural sites – Kaziranga National Park -- Keoladeo National Park -- Manas

Wildlife Sanctuary -- Nanda Devi and Valley of Flowers -- National Parks Sundarbans National Park

Suggested Readings

1. Reisinger Y*, International Tourism – Cultures and Behaviour*, Butterworth-Heinemann, 2009.Oxford, UK.
2. William F. Theobald, W.F., *Global Tourism*, Elsevier Science, London, 2013.
3. Cochrane, J., *Asian Tourism Growth and Change*, Elsevier, London, 2008.
4. UN World Tourism Organization, *Performance Indicators for Tourism Destinations in Asia and the Pacific Region*, Business & Economics 2002.
5. VellasFrançois, International Tourism: An Economic Perspectives. St. Martin's Press, 1995.
6. WTO, *International Tourism: A Global Perspective*, 1997
7. Charlotte Sullivan, *International Tourism: Planning and Development,* Willford Press, 2015.
8. Bhatia A.K, *International Tourism Management*, Sterling Publishers, New Delhi, 2019.
9. Shikha Jain, *India: UNESCO World Heritage Sites***,** Hirmer Verlag, New Delhi, 2021.

Course Outcomes:

1) Students know changing trends in International tourism and in India
2) Categorize important UNESCO tourism sites.
3) Gain knowledge on UNESCO destinations in India.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H								L			
CO2	H	M				M	H	M		M	L	
CO3	H						H					

H=High, M=Middle, L=Low

	I SEMESTER	
EFT-106(a)	**TOURISM PRODUCTS**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- To know the concept of tourism products
- To learn about wildlife destinations in India
- To comprehend on modern technical available in tourism services

UNIT – I: **Tourism Products**: Definition, Characteristics and Elements -- Tangible and Intangible -- Classifications -- Natural, Cultural, Religious, Man-made resources – Attractions, Facilities, Services and activities; Seasonality and Diversities -- Indigenous and Colonial

UNIT – II Purchasing of Tourism Products: -- Tourism Product Life Cycle – Purchasing tourism products -- Heterogeneous Products -- Unique places for variety and novelty -- Go to the service is being produced **--** Learn about the different lifestyles -- Viewing wildlife and wilderness – Outdoor visits with family and friends -- photograph in natural settings

UNIT – III : Tourism Oriented Products (TOP) : Accommodations -- Hotels and Resorts **--** Taj, ITC and Chain of Hotels; Surface Transportation – Public services, Own, Private taxis, luxury buses and boats – Trains -- Luxury coaches -- Air transport – Charter flights

UNIT – IV Tourism Intangible Products : Travel Agents, Tour Operators -- Bookings of accommodations at various sites, Shifting of luggage from one place to another – Tourism information Centres -- Entertainment and Shopping malls – Food

Beverages

UNIT – V Diversify Tourism Products : Created Tourist Destinations : Academic, Scientific and Industrial institutions -- Tourism development strategies -- Market India -- Special Interest Tourism Products (SITP) -- Developing SITP - Understanding Market - Analysing Potential -- SITP Attractions – Cultural Roots and Nature Oriented : Farm tourism, Bird watching, Dark tourism, and Adventure Tourism.

Suggested Readings

1. Bull, A. *The Economics of Travel and Tourism*, Longman: UK, 2002
2. Jagmohan Negi, *Travel Agency & Tour Operations*, New Delhi 2008
3. Bezbaruah, M.P. *Indian Tourism beyond the Millennium*, Gyan Publication, New Delhi, 1999
4. Manoj Dixit, *Tourism products*, New Royal Book Co., Lucknow, 2005
5. Norman Douglas. Ed., *Special Interest Tourism*, John Wiley & Sons, Australia, 1998
6. Robinet Jacob, *Indian Tourism Products*, Abhijeet Publications, Delhi, 2012.

Course Outcomes:

1) Students learn about the roles of major tourism products in India
2) Identify different kinds of tourism destinations
3) Students are able to learn new technologies in tourism services

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M			M				H		L	
CO2	H	H	M				M			M		
CO3	H	H			M			L				

H=High, M=Middle, L=Low

	I SEMESTER	
EF T-106 (b)	**TRANSPORT MANAGEMENT**	**CREDITS -4**
Sessional Marks 20		**End semester Examinations Marks 80**

Objective:

- Students will learn different Modes of Transport and understand transport linkages to Tourism
- To learn to start a Tourist Transport Business
- To know about the Rules and Regulations of the Indian Motor Vehicle Act

Unit – I Transport Systems: Concept of Transport- Linkages between Transport and Tourism – Characteristics of Transport -- Role of Transport in Tourism -- Various transport systems: Road, Rail, Water and Air Transport - Advantages of Motor Transport

Unit – II Transport Management: Work Patterns in Tourist Transport Business: Patience, Management, Mechanical and Technical awareness - Rules and Regulations: Economic and Infrastructural regulations -- Awareness of the destination sites – Customer care.

Unit – III Geography of transport systems : Transportation and Physical environment Transport Networks – Terminals – Urban Transport – Rural Transport — Mechanised transport systems used in different environments – Deserts -- Hilly terrains – Snow clad mountains – Under water

Unit – IV Setting up of Tourist Transport Business: Entrepreneurial Qualities - Forecasting Tourist Demand, Preparation of Business Plan -- Considerations for Setting Up of

Tourist Transport Business - Infrastructure : Vehicles, Well-equipped Office, Trained Manpower, Parking and Garage, Maintenance Facilities, Communication Facilities and Selling Network.

Unit – V Motor Vehicle Act: Motor Vehicles Act, 1988 - Registration of Vehicles- The Central Motor Vehicles Rules-Driving Licence- Tourist Transport Permits: Local and National Permits -Insurance of Motor Vehicles Rent-a-Cab Scheme- The Motor Vehicles Rules, 1993: Traffic signs, Fitness certificate -Offences Penalties and Procedure.

Suggested Readings

1. Government Motor Vehicle Act, Eastern Book Company, Lucknow, 1989
2. John Duke, Fleet Management, McGraw-Hill Co, New York,1984.
3. Kitchin.L.D., Bus Operation, Illiffee and Sons Co., London, III edition, 1992
4. Cook, R.A; Marqua, J&Yale, L.J.(2006), *Tourism: The Business of Travel*. New York: Pearson Education
5. Fontgalland, B.De.(2010).*The World Railway System*. New York: Cambridge University Press
6. Pender,L.(2001). *Travel Trade and Transport*. Coninnum, New York.

Course Outcomes:

1. Students will understand the role of Transport in Tourism
2. Gain knowledge on the importance of manpower in Transport Business
3. Comprehend the students how Transport Management is essential in Tourism.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	H								H	
CO2	H			H	M		L			M		
CO3	H	M	H	H					M		H	L

H=High, M=Middle, L=Low

	II SEMESTER	
T-201	**TOURISM AND GEOGRAPHY**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Students will learn relationship between Geography and Tourism.
- Gain knowledge on the use of map reading and other tools
- Students know the important tourism attractions in the world

UNIT-I Introduction to Tourism Geography: Meaning and Definition of Tourism Geography; Nature and Scope; Importance of Tourism Geography; Tourism a Multidisciplinary Subject – Physical Geography, Economic Geography, Cultural Geography and Historical Geography; Recent Trends in Tourism Geography

UNIT–II Factors Affecting Tourism: Physical Factors – Relief (Mountains, Rivers, Deserts, Plains and Islands), Climatic Zones; Temperate Zones and Vegetation; Important Geographical Locations of Tourism: Hill stations, Sea Beaches, Sanctuaries and National Parks, Lakes, Waterfalls and Snow fields

UNIT-III Maps and Map Reading**:** Meaning and Definition of Maps; Maps and Globes – Distinction between Maps and Globes; Types of Maps – General Maps, Thematic Maps, Tourism Maps and Topographic Maps; Latitude and Longitude, GMT, Equator, Tropic of Cancer and Tropic of Capricorn, International Date Line.

UNIT-IV Meaning and Definition of Oceanography; Growing Significance of Maritime Tourism; Case Studies – Maldives, Singapore and Caribbean Islands; Blue Economy and

Tourism.

UNIT-V Geography and Travel, Important Tourist Attractions: South Asia, Southeast Asia, East Asia, West Asia, Americas, Europe and Africa

Suggested Reading

1. Alan, A. Law, *World Geography of Travel and Tourism: A Regional Approach*, Butterworth, London, 2004.
2. Boniface, B & Chris Cooper, *World Wide Destinations: The Geography of Travel and Tourism*, 2009
3. Burton, R., *The Geography of Travel and Tourism Guide to Places of the World*, Reader's Digest, 2008.
4. Hudman, L & Richard Jackson, *Geography of Travel and Tourism,* Thomson, 2003.
5. Husain, M., *World Geography*, Rawat publications, New Delhi, 2011.
6. Stephen Williams, Tourism Geography, Routledge, London, 1998.
7. Sinha, P. C., *Tourism Geography*, Anmol Publications, New Delhi, 2000.
8. Lloyd E, Hudman, Richard, Geography of Travel and Tourism, Thomson Learning, USA, 2003

Outcomes

1) Gain knowledge on the influence of geography on Tourism.
2) Examine and learn the use of geographical tools.
3) Know the important definitions and destinations.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H						M			L		
CO2	H									M		
CO3	H		M									L

H=High, M=Middle, L=Low

	II SEMESTER	
T-202	**INDIAN CULTURAL AND HERITAGE TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Students learn the brief Indian history from Ancient to Modern times
- Understand the importance of unique Indian Heritage architecture of different religions
- Distinguish the festivals of North India and South India

UNIT- I Glimpses of Indian History- Brief Understanding of Indian History-- Cultural Heritage with special references of Ancient: Mouryas, Gupta dynasties – Medieval : Delhi Sultanate and Mughals; and Modern India : Europeans

UNIT- II Indian Culture: -Definition of culture -- General Features of Indian Culture — Components and Evolution— Structure of Indian Society -- Faiths and Practices: Unity in Diversity, Religious Tolerance-- Chief Indian Religions: Hinduism, Buddhism, Jainism, Christianity, Islam, Sikhism -- Folk & tribal culture – Scope of Cultural tourism in India : Khumba Mela and other important festivals - Religious Centers – Shrines, Pilgrimages – Centers of Yoga and Meditation – Tribal culture

UNIT – III Indian Architecture: Indian Art and Sculptures, Archaeological sites – Monuments –Ancient Temples of India – Forts - Palaces and Museums – Buddhist heritage sites of India, Islamic Art & Architecture

UNIT – IV Colonial Heritage : Colonial powers : British, French, Dutch & Portuguese -- Influence

of Colonial Powers on Indian Society and Culture : Churches -- Synagogues architecture in India – Special reference to Goa and Pondicherry - Multipurpose Projects

NIT- V **Cultural Diversities of India** : Indian Music and Dance, Musical Instruments— Languages – Dress and Indian Handicrafts: Cane Work – Pottery – Terra-cotta – Carpets – Textiles and Costumes – Kalamkari -- Brass – Silver – Stone cutting – Sculpture — Ornaments– Different Theatrical forms -- Indian Cinema -- Role in Tourism Development -- Indian Cuisines.

Suggested Readings

1. Basham, A.L. (2004)*The Wonder That Was India*. Rupa& Co. New Delhi
2. Thapar, Romila,(1990) *A History of India:* Volume 1. Penguin Book, New Delhi,
3. Basham, A.L. (1997) *A Cultural History of India*. Oxford University Press, USA.
4. Singh, Upinder, (2008) *A History Of Ancient and Early Medieval India: From The Stone Age to the12th Century*, Pearson Education India, New Delhi.
5. Chandra, B., (2009) *History of Modern India*. Orient Blackswan, New Delhi
6. Brown, P.,(2013)*Indian Architecture (Buddhist and Hindu Period*), Tobey Press, New York
7. Brown, P , (2010) *Indian Architecture (the Islamic Period),* Palmer Press, New York
8. Allchin, B., Allchin, F.R. et al. (1989) *Conservation of Indian Heritage*, Cosmo Publishers, New Delhi.
9. New Inskeep, Edward, (1991) *Tourism Planning: An Integrated and Sustainable Development Approach,*VNR, New York.
10. V.K. Semph, (2001) *Historical and Cultural Tourism in India*, Andi Publications 2008.

Course Outcomes

1 Students will be in a position to distinguish between different art forms in India.

2 Colonial Heritage of India is one of the important aspects in Indian Tourism.

3 Importance of different religions in India and tourist Places related to them.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H		L		

CO2	H							H				L
CO3	H			M				H				

H=High, M=Middle, L=Low

	II SEMESTER	
T-203	**RURAL AND URBAN TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- To understand, analyse and evaluate the importance of Rural and Urban Tourism
- Students will be able to learn the need of infrastructure and economic benefits
- Student will also learn about urban tourism concepts.

UNIT–I **Rural Tourism:** Concept, Meaning, and Definition -- Rural Tourism Resources- Village as primary resource – Showcasing rural life – Art – Culture and Heritage

UNIT- II **Benefits of Rural Tourism:** Holistic benefit on Rural Community – Society and culture: Revive and Preserve Local Tradition, Craft, Traditional festivals and Unique Practices – Economic benefits for Artisans and Local Community – Development of Infrastructure and sustainable development

UNIT -III **Rural Tourism Promotion:** Feasibility and Execution – Infrastructure - Marketing and Financial Assistance Requisites - Intervention of Professional Agencies **–** Linkages for development of Rural tourism

UNIT -IV **Case Studies**: Hodka, Gujarath – Mawynnog, Meghalaya – Pipli, Odisha – Samode, Rajastan – Naggar, Himacal Pradesh – Munsiyari, Uttarakhand-- Karaikudi, Tamil Nadu – Madhavamala, Andhra Pradesh

UNIT V **Urban Tourism:** Concept – Definition -- History and growth – City as a tourism product -- Analyzing the City's Tourism potential – Heritage, Culture, Unique Architecture, Art galleries, Emporiums and Theme Parks – Infrastructure: Express

ways, Metro networks and Smart cities.

Suggested Readings:

1. Sivasankar Reddy, P., *Rural Tourism and Promotion of Handicrafts in India*, Kanishka Publishers, New Delhi, 2012
2. Lesley Roberts, Derek Hall, *New Directions in Rural Tourism*, Rutledge, London, 2017
3. Bernard Lene & Elesabeath, Eds., *Rural Tourism : New Concept, Research and Practice*, Rutledge, London, 2018
4. Bonita M. Kolb., *Tourism Marketing for Cities and Towns*, Butterworth – Heinemann, Oxford, 2006

Course Outcomes

1. Students learn the benefits of Rural Tourism
2. Acquire knowledge on different Rural Tourism case studies
3. Gain knowledge on urban tourism sites and smart cities

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H						H				M
CO2	H			H	M		H	H	M		M	
CO3	H	M			L		L	H			M	

H=High, M=Middle, L=Low

	II SEMESTER	
T-204	**ECOTOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

1. To make the students understand the importance of Ecology and sustainability
2. Various laws pertaining to ecology will be taught
3. To make them realize how community based tourism is conducted

UNIT-I Ecotourism: Concepts and Definitions -- Evolution and Characteristics of Ecotourism -- Components of Ecosystem -- Environment -- Biomes - Major biomes of the world and biomes of India -- Biodiversity and ecological balance -- Watching most pristine form of Mother Nature

UNIT- II Ecotourism in India : Travellers to spend much time in nature -- Ecosystem more sustainable and supportive to native culture -- Preservation of wildlife and animal's natural habitat -- Activities in Ecotourism : Trekking and cycling, Nature study and Bird watching, Village homestay – Famous Ecotourism destinations in India : Munnar, Thenmala, Thodupuzha, Eravikulam National Park, Periyar National Park, Coorg, Nagarhole National Park, Bandipur National Park, Galgibaga Beach, Tyda, Maredumilli and Chilika

UNIT-III Environmental Conservation : Impact of Tourism on environment--Environmental degradation -- Environmental movements -- Environment management-- Principles and Practices -- Ecotourism as a tool for Conservation -- Ecotourism and natural resource management

UNIT-IV Tourism Legislations and Ecotourism Guidelines : Legislations and guidelines of Ecotourism at National and State level -- Major environmental acts and regulations -- Tourism bill of rights and code for environment and responsible tourism -- World Ecotourism Summit – Global Concerns - Environmental Planning - UN Initiatives on Ecology and Environment -- UNWTO – UNDP – WWF

UNIT -V Threats and obstacles to Ecotourism: Urbanisation - Transportation -- Expansion of permanent structures -- Land taken out of primary production - Trampling of vegetation and soils - Disturbance and destruction of species

Suggested Readings

1. Ratandeep Singh, *Indian Ecotourism*, 1990.
2. Jaime A, Seba, *Ecotourism and Sustainable Tourism,* 2012.
3. Anil Sharma, *Wildlife Tourism in India,* 2015.
4. Aradhana Salpekar, *Indian Tourism, Wildlife Tourism and Ecotourism,* 2009.
5. Bhatt, *Ecotourism development in India, communities, capital and conservation,* 2008.

Course outcomes

1 Students will be in a position to assess the importance of Ecology in tourism sector.

2 Sustainable development its significance will be realized.

3 Students will learn about Game parks and various ecotourism places in India

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H		M	H	
CO2	H							H		L	M	
CO3	H							H		L	L	

H=High, M=Middle, L=Low

	II SEMESTER	
CF T-205 (a)	**HEALTH AND MEDICAL TOURISM**	**CREDITS -4**
Sessional Marks 20	**End semester Examinations Marks 80**	

Objectives:

- To gain broad knowledge on the significance of Medical Tourism and Medical Tourism Destinations in India.
- Students comprehend on the various Medical Treatments available in India and strategy to attract Global medical Tourists.
- To identify and describe the Medical Tourism impact on national economy and the role of Government, Private and Voluntary organizations in tourism promotion.

UNIT – I Introduction to Health Tourism: Significance, Origin and development over ages : Ancient centres of healing - Health as a motivator to travel -- Health: Concept, Definitions and Importance of health to People, Business and Government.

UNIT -- II Medical Tourism: Genesis and growth of Medical Tourism - benefits of medical tourism, Factors responsible for growth of health and medical tourism -- Medical Tourism Business- Global medical tourism scenario, Stakeholders, countries promoting medical tourism – Health and Medical Tourism markets at global level.

UNIT – III Medical Tourism as Industry: Medical Tourism Destinations – Types and flow of Medical Tourists- Factors Influencing Choice of Medical Tourism Destinations.

UNIT – IV Medical Tourism in India: Strategy formulation to attract and retain National and Global Medical Tourists –Indian Medical Services –Traditional and Nontraditional – Pricing of Medical Services -- Centres/Destinations, Current and futuristic trends, Potentials, Issues and Challenges -- Role of Government – Private Sector – Voluntary Agencies in Promotion of Medical Tourism.

UNIT – V **Medical Tour Operations** : Tour operations and post-tour management, Health Insurance, Claiming Health Insurance -- Certification and Accreditation in medical tourism -- legal, economic and environmental issues -- National Accreditation Board for Hospitals & Healthcare (NABH) and Joint Commission International (JCI).

Suggested Readings:

1. Gupta, Ambuj & Sharma, Vinay, *Medical Tourism: On the Growth Track in India*
2. Michael D. et.al., *Medical Tourism – Health Care in The Global Economy (Trends),* American College of Physician Executive, 2007.
3. Milica Z.,et. Al., *Medical Tourism in Developing Countries*, Palgrave Macmillan, 2007.
4. *Opportunities in Medical Tourism in India*, RNCOS E-Services Pvt. Ltd, 2007
5. Raj Pruthi., *Medical Tourism in India* , Arise Publishers & Distributors, 2006.
6. Todd, Maria, *Handbook of Medical Tourism Programme Development ASSOCHM, Health Tourism : The Great Indian Advantage,*2001
7. Todd, Maria, *Medical Tourism Facilitator's Handbook,* 2007.
8. Watson, Stephanie & Stolley, Kathy S., *Medical Tourism : A Reference Hand book,* 2002.
9. Raj Pruthi (2006), Medical Tourism in India, New Delhi: Arise Pub.

Course Outcomes

1. Develop understanding of medical tourism, its development over ages as an industry
2. Learn the role of government and private sectors in promotion of Medical Tourism
3. Identify various issues related to Medical Tourism and Emerging Trends.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H		M		M
CO2	H	M			M							L
CO3	H	M	M		L			M				L

H=High, M=Middle, L=Low

	II SEMESTER	
CF T-205 (b)	**VIRTUAL AND E-TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- To study the impact of Information Technology on tourism.
- To familiarize with digital tourism business concept.
- Students will understand emerging business models in E- tourism.

UNIT-I **Introduction to E-tourism:** Historical Development – Digitalisation of Tourism and infrastructure -- New technologies -- Role of Information Technology in tourism – ICT in Travel related services -- Strategic, Tactical and operational use of IT in Tourism.

UNIT-II **Online Consumer Behaviour:** Consumer selection on Tour packages – User-Generated Content (UGC) - Online reviews and reputation management - Value of online customers — Sentiment analysis for decision-making.

UNIT-III **Social Media and E-tourism:** Social Media Campaign for Tourism – Face book, Twitter, YouTube, Whatsapp - Travel Blogs – Rising importance of Virtual Tourism : Live visits – New experiences – Visit of important sites, cultural and natural through virtual

UNIT-IV **Payment Systems in E-tourism** - Payment Gateway - Billing and Settlement Plan (BSP) - Security Issues and Certification -Future of E-tourism -- E-marketing and promotion of Tourism Products - Challenges for Conventional business models and Competitive strategies.

UNIT-V **Digital Marketing Analytics:** Tools, Technology and Data Integration -- Process for Products & Services – Online Segmentation -- Targeting-Positioning

– Inbound Vs Outbound Marketing – Uses of Search Engines in Tourism advertising

Suggested Readings:

1. Buhalis D. (2004), *Etourism: Information Technology For Strategic Tourism Management*, Prentice Hall India.
2. Poon A. (1998), *Tourism, Technology And Competitive Strategies,* Cabi.
3. Bones, C., & Hammersley, J. (2015). *Leading Digital Strategy: Driving Business Growth through Effective E-commerce*. Kogan Page Limited.
4. Chaffey, D. (2014). *Digital Business and E-Commerce Management*, (Pearson Education Limited, New Delhi).
5. HBR. (2014). *Leading Digital: Turning Technology into Business Transformation*, Harvard Business Review Press, London).
6. Rayport J.F. & Jaworski B.J. (2002), *Introduction To Ecommerce*, *McGraw- Hill*.
7. Morabito, V. (2016). *Trends and Challenges in Digital Business Innovation*, Springer Publications, London.
8. Rogers, D.L. (2016). *The Digital Transformation Playbook – Rethink Your Business for the Digital Age*, Columbia Business School Publishing, Columbia.

COURSE OUTCOMES

- Students will get familiarized with the concepts of E-Tourism.
- They will acquire proficiency in E-Commerce.
- Students would have cognizance of E-business and its strategies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	L					M	M				
CO2	H						M			L		

CO3	H								M		L	

H=High, M=Middle, L=Low

	II SEMESTER	
CF T-205 (c)	**AIRLINE TICKETING AND INFORMATION MANAGEMENT**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Examine the Air travel polices, Airfare Calculations and IATA
- Comprehend on the necessary Travel services in Air travel
- Student will also learn the use of gadgets and information technology in Tourism

UNIT - I Introduction- Increasing role of Air transport in Tourism- Information Technology to enhance air travel experience - New airline business models gaining strength - Fast expansion of air transport infrastructure - Airports: A destination for travelers -- Electronic distribution – Disintermediation – Reintermediation

UNIT - II Airport Operations: Tourism and importance of Airlines -- Significance of an airport- Structure of an airport – Airside –Terminal - Land Side (Ground side) - Functions and operations in an Airport - Ground handling - Passenger handling - Departure area - Arrival procedures - Safety and Security Issues.

UNIT – III Air Travel Policies: Passenger Care -- Passenger Capacity and Seating – Food Beverages Service – Air policies – Reservation Policies Towards Children – Disabled Passengers – Standard of Travel, Cancellation and Delays – Baggage Allowance – Weight Concept – Pet Transport Policy – Special Meals – Class of Service

UNIT -IV Tour operation and Ticket Reservations -- Guidelines for International Tariff Rules – Basic Elements of Airfare – Fare Basis – Minimum stay – Validity Dates – Horizontal and Vertical Fare Structures – Special Air Fares – Mileage System –

Round Trip Calculation – Back Haul One Day Tours – Mixed Class Travel Fare – Class Differential – Re-issuance – Refunds – Agency Commission – Machine and manual Ticketing -- Fill of Flight Coupons – Air Cargo Rules – Alterations —Stop over Indicators – Minimum Connecting Times

UNIT - V Introduction: IATA – Aims and objectives – International Aviation Organization - IATA Traffic Conference – Areas – Their Codes –International Time Calculation International Dateline – Standard Time – Local Time -- International Civil Aviation Organization (ICAO)

Suggested Readings

1. Bhatia, A. K., *Tourism Development: Principles and Practices*, Sterling Publishers Pvt. Ltd., New Delhi, 1982
2. Seth,PranNath, *Successful Tourism Management*, Sterling Publishers Pvt. Ltd., New Delhi, 1998
3. Sing, L.K., *Foreign Exchange Management and Airline Ticketing*, ISHA Books, Delhi, 2008
4. Diederiks, H. *An Introduction to Air Law,* Kluwer Law International, Netherlands, 2006
5. Pablo Mendes De Leon (Edt), *Air Transport Law and Policy in the 1990s*, MartinusNijhoff Publishers, London, 1991
6. Epstein, A Gerald, *Capital Flight and Capital Controls in Developing Countries: An Introduction*, Edward Elgar Publishing Ltd, UK, 2005
7. Bhatia, A.K., *International Tourism Management*, Sterling Publishers Private Ltd, New Delhi, 2001

Course Outcomes

1) Students know about IATA and its functions
2) Gain knowledge and use of information technology in tourism industry
3) To know about tour office management skills and tour desks.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			H	M		L				L	
CO2	H			H					L			
CO3	H		M									M

H=High, M=Middle, L=Low

	II SEMESTER	
EF T-206 (a)	**TRAVEL AGENCY AND TOUR OPERATIONS MANAGEMENT**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Students will learn the role of travel agencies in Tourism and its linkages with other agencies.
- Gain the skill of Itinerary preparation and Tour formulation process.
- Comprehend the functions of a travel agency and Rules and Regulations of the agency approval besides domestic travel operators

UNIT – I Travel Agency: History and Growth – Emergence of Thomas Cook and American Express –Types of Travel Agency and Tour Operation Wholesale and Retail Travel Agency - Setting up of a Travel Agency – Linkages with different Transport Systems

UNIT- II Functions of a Travel Agency: Tour Operations Planning – Domestic and international – Types of Tours: Independent Tour, Escorted Tour, Hosted Tour, Incentivized Tour -- Tour Wholesalers and Retailers -- Diversified Role of Tour Operators -Tour Formulation and Design Process – Group Tour Planning

UNIT- III Tour Packages: Meaning - Types and forms of Tour Packages – Tariffs – Vouchers – Hotel and Airline Exchange Order –Merits and Demerits of Package Tours – Special Tour Packages

UNIT- IV Setting up of a Travel Agency: Essential Requirements for Starting Travel Agency & Tour Operation Business - Cost Management - Procedures for Obtaining Recognition - Travel Agency Organization Structure - Sources of Revenue - Threats in Travel Agency Business.

UNIT-V Programme Preparations: Sample Tours – General and Personalized Itinerary -- Domestic and International – Preparation of common interest - Tour Itinerary and costing – Tour Regulations – Preparation models of Thomas Cook, Cox & Kings and SITA Travels

Suggested Readings

1. Bhatia A.K., The Business of Travel Agency and Tour Operations Management, Sterling Publishers, New Delhi, 2012.
2. Chand, M., *Management of Travel Agency and Tour Operation*, Anmol Publications, New Delhi, 2002.
3. Holloway, J. C., *The Business of Tourism,* Macdonald & Evans, London, 1982
4. Negi, J. M. S., *Travel Agency Operation, Concepts and Principles*, Kanishka, New Delhi, 2005.
5. Negi, J., *Tourist Guide and Tour Operation: Planning and Organization*, Kanishka, New Delhi, 2005.
6. Singh, L.K., Management of Travel Agency, Anmol Publications, New Delhi, 2009
7. Victor, T. C., *Marketing and Selling of Airline Products*, London, 2004.

Course Outcomes

1) Gain knowledge of history of travel agency, nature, and form of travel.
2) Build an understanding of functions performed by the Travel agency and tour operator.
3) Comprehend the International rules and regulations of travel agencies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		H		M						
CO2	H			M								
CO3	H				M				M			L

H=High, M=Middle, L=Low

	II SEMESTER	
EF T-206 (b)	**TOUR PACKAGES AND ITINERARY PLANNING**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

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Objectives:

- To know about the formulations of tour packages
- To gain knowledge in Itinerary Planning
- To become known with the techniques in finance management and execution of Itinerary planning

UNIT – I Tour Packages : Meaning – Types -- Components and significance of tour packages -- Destinations and tour companies -- Public and Private Tourism organizations -- Promotion of tour packages.

UNIT – II Tour Formulation – Influencing factors -- Stages in tour formulation – Primary research (destination and market) -- Brochure designing, Printing and distribution -- Product Oriented Package tour : Health tourism, Yoga, Meditation and Nature Cure –Beach holidays -- Pilgrim Tours -- Different Packages : Desert Safaris, Mountaineering, Skiing, White Water Rafting, and Scuba Diving, Golf Tours, Theme tours and Cruise

UNIT – III Defining the tour cost -- Components of tour cost – Fixed and variable costs – Direct and indirect tour costs -- Factors affecting tour costs -- Tour cost sheet – meaning and significance -- Costing procedure for independent foreign tours (FITs) group inclusive tours and conference and convention packages -- Calculation of tour pricing, pricing strategies -- Accommodation Cost-Transportation Cost – Dining

Plans

UNIT – IV **Itinerary Preparation**: Concept – Typology -- Duration, Custom made itinerary and Readymade itinerary -- Basic factors in Itinerary preparation

UNIT – V **Different Itinerary Plans** – Seasonal itinerary- Product based itinerary-All inclusive Itinerary – Do's and don'ts of itinerary preparation --Limitations and Constraints

Suggested Readings:

1. J.M.S, Negi, *Tourism and Travel -Concepts and Principles*, Gitanjali Publishing House, New Delhi, 1990.
2. P.N. Seth, *Successful Tourism Planning and Management*, Cross Section Publications, 2001
3. D.L. Foster, *The Business of Travel Agency Operations & Administration*, Mc Graw Hill, Singapore, 1990.
4. J.M.S, Negi, *Travel Agency and Tour Operation,*(Kanishka Publishing House, New Delhi, 2020)
5. Mohinder Chand, *Travel Agency Management,* (Anmol Publications, Delhi,2007).

Course Outcomes:

1. Students know the concept of tour packages and formulations
2. They gain knowledge in Itinerary Planning
3. Become familiar with the techniques and approaches for successful destinations visits.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		M	M							
CO2	H					M			M			L
CO3	H	M		L			M		M			

H=High, M=Middle, L=Low

	III SEMESTER	
T-301	**TOURISM MANAGEMENT**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Students will learn the importance of management skills in Tourism.
- To comprehend on the financial management based on the market environment.
- Students will learn the abilities of Human Resource management in Tourism industry.

UNIT-I Concept of Management – Concept, Nature, Process and Significance of Management – Nature and Levels of Management in Tourism Industry – Functions of Management –Skills and Responsibilities of a Manager – Components of Tourism – Accommodation – Accessibility – Attractions (3A's) – Management of Environment.

UNIT–II Management Skills : Interpersonal – Informational – Decision Making Roles – Planning skill – organizing skill- Leading and Controlling skills -- Managerial Skills at various Levels: Technical skill, Human skill, Conceptual skill.

UNIT-III Management of Human Capital : Recruitment: Office Management, Marketing and Operational staff – Selection - Training – Guide Services – Event Management

UNIT -IV Financial Management : Accounting - Book Keeping - Requirement of Finance for Development - Promotion and Administration - Sources of Finance - Public and Private Investments - Sectoral Investment and Foreign Investment.

UNIT – V Tourism Planning – Role of Government and Non Government organizations – Approaches and levels of Tourism Planning – Tourism Policies and Issues – Tourism and Regional Development – Indian and International Tourism Organizations.

Suggested Readings:

1. Cooper, Fletcher and others, *Tourism principles and practices,* (Pearson, 2017)
2. Robert Christie Mill, Alastair M. Morrison, *The Tourism system: An Introductory Text,* (Prentice- Hall International), 1985.
3. Philip Kotler: *Marketing Management*, 2017
4. Pran Nath Seth: *Successful Tourism Management*. Vol.,-I & II, 2006
5. Ram Acharya: *Civil Aviation and Tourist Administration in India*, 1978
6. Harold Koontz & Heinsz Weirich, *Essential of Management* , 1982
7. V.S.P. Rao, *Management Concepts*, Konark Publishers
8. R. D. Agarwal: *Organization & Management*, Tata McGraw Hill. 1982
9. L.M. Prasad: *Principles & Practice of Management* , S. Chand, New Delhi, 2019

Course outcomes

1) Demonstrate managerial skills and to manage the Tourism environment
2) Apply the marketing skills and understanding demand and supply.
3) Acquire skills of using Human Resources in Tourism Development

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		M	M	L			L				
CO2	H				M					H		
CO3	H											

H=High, M=Middle, L=Low

	III SEMESTER	
T-302	**EMERGING TRENDS IN TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- This course enables Students to learn the emerging concepts like Adventure Tourism, Eco- tourism and Theme Parks etc.
- Student will also learn the Socio, Economic and Environmental impacts of tourism.
- Students will know different kinds of Acts passed towards Tourism in the country

UNIT – I Changing Trends : Globalization – Economic viability – Infrastructure – Accessibility -- Leisure travel -- Motivations of Tourism Demand – International Tourism – Emerging Trends – Causes of variation in Tourism Trends

UNIT –II Various Types of Tourism : Adventure and Sports Tourism – Land based Adventure – Trekking, Mountaineering, Rock Climbing – Water based Adventure – Water Surfing, White Water Rafting, Para-sailing and Air based Adventure – Parachute Jumping, Gliding, Para-gliding

UNIT - III Sustainable Tourism: Concept of Eco-Tourism and Sustainable Tourism - Management – Impacts of eco-Tourism – Best Practised Eco-Tourism sites in the World – Theme Parks – MICE

UNIT- IV Tourism Impacts: Socio-Cultural Impacts of Tourism – Economic Impact and Environmental Impact and Assessment – Control Measures – Measuring Economic Costs and Benefits

UNIT –V Emerging Trends: Solo Travel – Safety and Hygiene – Digitalized Guest Experiences – Personalization – Sustainability – Shift from International to Local – Growth of contactless payments – Virtual reality tourism trends: Eco travel – Robo mania – Artificial Intelligence – Recognition Technology – Augmented reality – Healthy and organic food – Recent Changes : Covid-19 and its effects on Tourism.

Suggested Readings

1. Steve Taylor (ed) *Adventure Tourism: Meaning, Experience and Learning*, Rutledge, New York, 2013
2. RobinetJacob&P. Mahadevan, *Tourism Products of India*, Abijieet Publishers, New Delhi, 2012
3. Mountains of India: *Tourism, Adventure and Pilgrimage*, Indus Publications, New Delhi, 2000
4. Tim Gale, Jenniefer Hill (Edt), *Eco–Tourism and Environmental Sustainability: Principles and Practies*, Ashis Publications, New Delhi, 2004
5. Hall, CM & S. J. Page, *The Geography of Tourism and Recreation*, Rutledge
6. Pearce, D. G. & R. W. Butler, *Contemporary Issues in Tourism Development*, Rutledge

Outcomes

1) Students will learn about different types of Tourism.
2) Build an Understanding of socio, cultural and economic impacts of tourism.
3) To learn Tourism related laws, responsibilities and different acts related to tourism.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H	M		M						L		
CO2	H								L			

CO3	H			H			L					

H=High, M=Middle, L=Low

	III SEMESTER	
GE T-303 (a)	**ENVIRONMENT, SUSTAINABLE DEVELOPMENT AND TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

1) Enables Students to learn the importance of environment in tourism
2) Know about the different environmental declarations
3) To gain knowledge on alternative tourism

UNIT- I Tourism and Environment: Relationship between Tourism & Ecology -- Community Participation and its types -- Socio- Economic and Cultural Conditions - Evaluation of Scenic Beauty – Wild Life – Bird Sanctuaries – Species Project – Theme Park – Amusement Park – Types of Resorts

UNIT -II Eco-friendly Practices: -Basic Laws & ideas in Ecology- Biodiversity and its Conservation- Pollution- Ecological Foot Prints - Sustainable Tourism and Poverty Alleviation -- Tourism and Community Participation.

UNIT -III Analysis of Local Resources: - Approaches in Sustainable Tourism - Tourism and Poverty Alleviation - Environmental Information System (EIS) - Environmental Management System (EMS) & - Impact of Tourism Sites - Global Warming and Climate Change

UNIT- IV Climate Declarations : -Meaning – Principles - Agenda 21 for Travel and Tourism Industry - World Conference on Sustainable Tourism 1995 – Globe 90 Conference - Berlin Declarations - Bali Declarations 2005 - Cape Town Declarations 2002 and Kerala Declarations, Ecotourism- Quebec

Declaration 2002 - Kyoto Protocol 1997 - Oslo Declaration 2007.

UNIT-V **Environmental Policy and Alternative tourism**: Environmental Policy – Tourism Policy in India – Alternative Tourism: Extreme agriculture, Spa and Health tourism and Wine tourism – Potentials and Constraints - Major Eco tourism destinations of India.

Suggested Readings

1. Buckley, R., *Environmental Impacts of Eco-tourism*, CABI, London, 2004
2. Chandana, *Environmental Awareness*, Kalyani Publishers, New Delhi, 1998
3. Chaudhury, S. K., *Culture, Ecology and Sustainable Development*, Mittal, New Delhi, 2006
4. Chawala, R., *Ecology and Tourism Development*, Sumit International, New Delhi, 2006
5. Helen Briassoulis, Jan Van der Straaten, *Tourism and Environment : Regional, Economic, Cultural and Policy Issues*, Kluwer Academic Publishers, Netherlands, 2000
6. Martin Mowforth, Lan Munt, *Tourism and Sustainability Development and New Tourism in the Third World*, Routledge, 2003
7. Mowforth, M. and Munt, I. *Tourism and Sustainability. Development and New Tourism in the Third World*. Routledge, London.
8. Singh, L.K., *Ecology, Environment and Tourism*, Gayan Publishing House, New Delhi, 2008
9. Sinha, P. C., *Guidelines for Human Environmental Sustainable Development, Global Environment Law, Policy and Action Plan*, SBS Publications, New Delhi, 2006
10. Trevor, Sofield H.B., *Empowerment for Sustainable Tourism Development*, Elsevier, London, 2003.

Course Outcomes

1. Learn about the wildlife Sanctuaries

2. Gain knowledge on environment and management of Eco Systems.
3. Comprehend the Global climate policies

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H	M						H	L			
CO2	H						M				M	
CO3	H						M			L		

H=High, M=Middle, L=Low

	III SEMESTER	
T-303 (b)	**TOURISM RESEARCH METHODS**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Students will learn the Research methods in Tourism and Specific problems in Tourism
- Evaluate the difference between qualitative and quantitative methods
- Students will able to learn the skills of report writing and questionnaire design.

UNIT–I Introduction to Research: Nature, Scope and Purpose of Tourism Research – Foundations of Research – Meaning, Objectives, Motivation, Utility, Concept of Theory – Theoretical Perspectives – Tourism Management Information Systems – Conceptual and Operational Definitions – Specific Problems in Tourism Research

UNIT-II Purpose of Tourism Statistics; Role and Scope of Tourism Statistics; Measurement of Tourist Consumption, Demand and Supply and Measuring Tourism Resources. Basics Tools of Statistics: Mean, Median, Mode, Standard Deviation.

UNIT- III Quantitative Techniques: Meaning and Definition of Quantitative Methods, Types of Quantitative Research – Survey, Correlation Research, Comparative Research and Experimental Research.

UNIT-IV Qualitative Techniques: Meaning and Definition of Qualitative Research; Types of Qualitative Research – Ethnographic, Narrative, Case Study, Phenomenological and Grounded Theory Research.

UNIT-V Writing Research Proposal – Introduction, Literature Review, Objectives and

Hypotheses, Research Methods, Sampling Methods and Size, Data Analysis and Tabulation, Results and Discussions, Conclusion, References.

Suggested Readings

1. Artinah, Zainal, SallehMohdRadzietl (ed.), *Current Issues in Hospitality and Tourism Research and Innovations*, CRC Press, London, 2012
2. Bhatia, A.K., *International Tourism Management*, Sterling Publishers Private Ltd, New Delhi, 2001
3. Brent, W. Richie (ed.), *Tourism Research Methods: Integrating Theory with Practice*, CABI Publishing House, London, 2005
4. Brunt, P., *Market Research in Travel and Tourism,* Butterworth Heinemann, London, 1997
5. Engel, J. F. (ed.), *Market Segmentation: Concepts & Application,* Rinechart & Winston, New York, 1972
6. Jennings, G., *Tourism Research*, John Wiley & Sons, London, 2001
7. Michael, V. P., *Research Methodology in Management*, Himalayan Publishing House, New Delhi
8. Ritchie, J. R. B., and Goeldner (eds.), *Tourism and Hospitality Research: A Handbook for Managers and Researchers*, Wiley, London, 1994

Course Outcomes

1) To make the student understand the scope of research in tourism sector.
2) Students learn different techniques used in Research for tourism sector.
3) Gain knowledge in presentation of research findings and prepare projects.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H					H				M		
CO2	H					H						
CO3	H		L							M		

H=High, M=Middle, L=Low		
	III SEMESTER	
T-303 (c)	**TOURISM AND HUMAN RESOURCE MANAGEMENT**	**CREDITS -4**
Sessional Marks 20		**End semester Examinations Marks 80**

Objectives:

- Through the course students know the Human resources policies, functions and importance.
- Student will also learn the skills of HRM challenges and opportunities.
- Students will learn the group management and communication skills.

UNIT – I **Human Resources Management**: Introduction – Meaning, Definition, Importance of Human Resources – Functions -- Human Resource Policies: Need, type and scope and work Culture -- Understanding cross cultural differences -- Qualities of a good Personnel Manager

UNIT – II **Need for human resource Management in tourism**-- Man power recruitment Approach -- HRM – Challenges and Opportunities -- Training and development – Placement, induction and performance appraisal -- Advantages and disadvantages of choosing tour escorting as a profession -- Skills and competencies required to be a tour manager -- Challenges faced by a tour manager

UNIT – III **Roles and Duties of Tour Manager** : Pre-trip Duties / Preparation; Understanding tour client profile, Tour Escort File- Responsibilities at the Airport - Airport Check-In Procedures, Customs and Immigration; Responsibilities at the hotel-Check In, Check out, Meal requests -- On-Tour Operation; Destination Briefing, Time Schedule; Points of Interests; Routing, Distance-- Working with the Local Guide

UNIT – IV **Group management and situation handling** -- Group control and Setting

Limits, Handling difficult tourists, Communication Skills; Typical Day-to-Day Problems; Listening Skills; Conflict Resolution -- Handling emergency situations -- Tools of the trade for the tour manager

UNIT – V **Other roles and functions**: The Professional Daily Briefing; Dealing with FAQ's; Taking care of logistics: Dine Around, Shopping -- Safety of guests, Arrival preparations: Briefing instructions and feedback -- Tour Conclusion

Suggest Readings

1. Chowdhary, Nimit (2013). *Handbook for Tour Guides*. New Delhi: Matrix Publishers.
2. Mitchell, G.E. (2005). *How to Start a Tour Guiding Business*. Charleston: The GEM Group Ltd. Pond, K.L. (1993). *The Professional Guide*. New York: Van Nostrand Reinhold.

Course Outcomes

1) Learn the uses of Human resources and methods of training.
2) Comprehend knowledge on handling conflict resolutions.
3) Will gain knowledge about professional tools.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H			H		M			L			
CO2	H									M		
CO3	H				M	M						

H=High, M=Middle, L=Low

	III SEMESTER	
T-303 (d)	**CONSERVATION AND MANAGEMENT IN TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Students will understand the importance of conservation of historic sites, heritage material and natural heritage and analyse their tangible and intangible factors.
- Students know about conservation, preservation, restoration and management
- Gain knowledge in the podium of world heritage.

UNIT – I **General Principles of Conservations**: Conservation, Preservation, Restoration, Reconstruction, Reproduction and Translocation -- Analysis of Conservation material; Rules and regulations regarding antiquity and heritage; Conservation policy- Visitors Management: Infrastructure, Carrying Capacity, Information centers.

UNIT – II **Heritage Conservation**: Introduction and Types; Identification, Demarcation and Documentation of Heritage Zone; Community-based heritage conservation; Community engagement and stakeholder participation in heritage conservation. Uncovering the community participation through the case.

UNIT – III **Conservation Maintenance**: Basic conservation handlings – Tourism Eco-sites, temperature, humidity, pollution, light, bio – deterioration, proper environmental conditions, care and handling.

UNIT – IV **Preservation and Restoration Organizations:** Heritage of National importance, Conservation organizations – Indian National Trust for Art and Cultural Heritage (INTACH), International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) and Indian

Trust for Rural Heritage and Development (ITRHD)

UNIT – V **Heritage Management Plan**: Significance; Steps – Hardware component and software component; Promotion and public display of conserved site; Analysing working of Heritage management plans -- Case study of Heritage Tourism Village Raghurajpur.

Suggested Readings

1. J. J. Plenderlauth, (1971), *The Conservation of Antiques And Work of Art*, Oxford University Press, London.
2. O.P. Agarwal, (2004), *Conservation of Cultural Property of India*, National Museum, New Delhi.
3. S. S. Bishvash, (1999) Protecting the Cultural Heritage, Aryan Book Publication, New Delhi.
4. Inaugural issue of INTACH (2016) Journal of Heritage Studies, INTACH, New Delhi.
5. Heritage Management Plan, (2012), INTACH, New Delhi.
6. Shyamchainani, (2016) *Heritage Conservation Legislative and Organisational Policies of India*, INTACH.

Course Outcomes

- Students know the heritage value of the past
- Learn the skills and methods of conservation in tourism.
- Understand the role of Conservation organizations at national and international level

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H							H				
CO2	H							H			M	
CO3	H						M	H				

H=High, M=Middle, L=Low

	III SEMESTER	
SOC T-304	**TOURISM SKILLS AND OPPORTUNITIES**	**CREDITS -4**
Sessional Marks 20		**End semester Examinations Marks 80**

Objectives:

- Students will learn the skills and know the opportunities in the Tourism sector.
- To demonstrate the learned skills on Tour commentary, destination interpretation and communication.
- Students gain knowledge on the problem solving methods like crisis management, Loss of documents and Law and order issues.

UNIT-1 Definition of Tourism skills; Importance of Skills in Tourism and Hospitality; Basic Issues of Tourism Customers: Different Types of Complaints – Attitudinal, Service-related; Issues in Hotels, Travel Organizations and Airlines; Reasons for Dissatisfaction; Resolving Complaints; Need for Special Skills – Types of Skills.

UNIT -II Definition and Importance of Hard Skills; Types of Hard Skills – Accounting and Auditing -- Budgeting and Banking, Legal Awareness, Social Media Marketing, Marketing Research, Market Affiliations, Business Analysis and Sales.

UNIT –III Definition and Importance of Soft Skills; Types of Soft Skills – Communication, Language skills, Customer service skills, Team Work, Stress and Management, Networking, Organization, Multitasking, Cultural Awareness, Strategy and Innovation.

UNIT -IV Meaning and Definition of Leadership Skills; Types of Skills – Adaptability, Team-oriented, Entrepreneurial, Passionate, Listening and Negotiation Skills;

Challenges of Leadership; Important Keys to Successful Leadership.

UNIT –V Career in Tourism and Hospitality; Career Goals and Expectations; Role of Training and Training Institutions; Important Institutions in India; Career Opportunities in Hospitality and Tourism

Suggested Readings:

1. Miriam Firth, Employability and Skills Handbook for Tourism, Hospitality and Events Students, Routledge, London, 2020.
2. Anukrati Sharma (ed.), Sustainable Tourism Development: Futuristic Approaches (Advances in Hospitality and Tourism, CRC Press, London, 2019.
3. UNWTO, The Future of Work and Skills Development in Tourism – Policy Paper, 2019.
4. Saurabh Dixit, Tourism Development, ESS ESS Publications, New Delhi, 2017.
5. J K Sharma, Tourism Planning and Development : A New Perspective, Kanishka Publishers, New Delhi, 2020.

Course Outcomes

1) Students learn role and responsibilities of a tour guide.
2) Equip with communication skills, language and posture in front of tourists.
3) Learn to deal effectively at the time of emergencies

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H								M			
CO2	H			H	M				M			
CO3	H								M			M

H=High, M=Middle, L=Low

	III SEMESTER	
T-305 (a)	**TOURISM INDUSTRY IN INDIA**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- To gain knowledge on the Tourism industry in India.
- To learn about the growing hospitality, transport industries and their activities
- Students to gain knowledge on the government policies

UNIT–I Tourism Industry: Definition, Nature and Scope – Tourism as an Industry -- Economic Contribution - India's Share in World Tourist Arrivals and Receipts --Foreign Exchange Earnings - Employment - Foreign Investment -- Basic Components of Tourism -Transport- Accommodation- Facilities and Amenities -- Emerging trends in tourism industry.

UNIT–II Hospitality Industry: Essentials and Components -- Conventional and Non-conventional Hotels – Major International and Indian Hotel Chains -- Food and beverages -- Housekeeping Department: Executive Housekeeper, Asst Executive Housekeeper – Hotel Management Skills

UNIT–III Tourist Destinations : Geographical locations -- Mountains – Hill stations : Kashmir, Sri Nagar, Shimla, Manali, Kulu Valley, Nainital, Darjeeling Mt. Abu, Mahabaleswar, Ooty, Kodaikanal -- Beaches: Gopalpur, Juhu, Goa, Visakhapatnam, Chennai, Mahabalipuram, Pondichery and Kovalam

UNIT – IV Heritage Centres : Forts and Palaces: Jaipur – Jodpur – Udaipur – Jhansi –

Bandhavgar - Raigad – Golkonda – Vellore - Ginge – Penukonda – Chandragiri – Gooty -- Palaces : Mysore Palace -- Umaid Bhavan Palace Jodhpur- Hava Mahal, Jaipur- Lake Palace Udaipur.

UNIT–V **Responsible Tourism**: Role of Public and Private sectors in Tourism -- Ministry of Tourism, Government of India and State Tourism Corporations -- Sustainable Tourism development – Conservation and Ecotourism.

Suggested Readings:

1. A bhoy Das Jhangi, *Tourism industry in India*, Pacific book international publishers, 2019.
2. Robinet Jacob, Mahadevan, Sindhu Josep, *Tourism products of India*, Abhijeet Publications, 2012.
3. Media Transasia India, *Discover India*, Burda Media publication, 1988.
4. A. Satish Babu, *Tourism Development in India*, APH Publication, 2008.
6. Planning commission Report, *India 2007*.
7. P.B. Das Nageshwar Rao, *Journal of Services Research*, (September 2002).

Course Outcomes:

1) Students will know the basic features of Tourism industry.
2) Gain knowledge on the geographical locations and transport sector.
3) Students will know the public policies in strengthening the tourism sector.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H	M	H				M	M	M			
CO2	H		M	M					H	L		
CO3	H		H				H		M			M

H=High, M=Middle, L=Low

	III SEMESTER	
T-305 (b)	**ADVENTURE TOURISM**	**CREDITS -4**
Sessional Marks 20		**End semester Examinations Marks 80**

Objectives:

- Gain broad knowledge on the diversified adventure tourism in India.
- Students will learn the minimum standards to be followed in Adventure tourism in land based, water based and Aerial based activities
- Student gain knowledge on the Adventure Tourism Destinations in India and also Problems and Prospects of the sector

UNIT- I **Adventure Tourism:** Definition, Scope and Nature of adventure Tourism - Emerging trends of adventure tourism -- Popular Tourist Destinations - Land based trekking, Skiing, Mountaineering, Desert Safaris, Car Rallies. Water based rafting, kayaking, canoeing, surfing, water skiing, scuba diving and Air based parasailing, paragliding, Bungee Jumping, ballooning, hand gliding and micro lighting.

UNIT -II **Minimum requirements for Adventure Tourism:** Tools and Equipments used in land-based, water-based and air-based adventure tourism -- Popular tourist destinations in India with special reference to Jammu and Kashmir, Uttarakhand and Himachal Pradesh -- Indian Mountaineering Foundation -- Rules for mountain expeditions, cancellation of permits and bookings.

UNIT -III **Adventure Tourism Impacts:** Social, Cultural, Economic and Environmental Impacts -- Issues from the Perspective of Different Stakeholders -- Government, Local people, tourists and tourism businesses

UNIT -IV **Adventure Tourism Products and Infrastructure:** Marketing and promotional strategies -- Problems and issues relevant to the adventure travel and tourism industry - Risk Management - Future prospects of adventure tourism in India.

UNIT -V **Training organizations in Adventure Tourism:** Adventure tourism organizations and training institutes in J&K- Jawaharlal Institute of Mountaineering and Winter Sports (JIM &NIWS) - Indian Institute of skiing & mountaineering - Challenges of adventure tourism – Conservation : Litter, Waste, pollution, overbuilding, destruction of flora and fauna.

Suggested Readings:

1. Buckley.R. *Adventure Tourism Management*. Rutledge Publishers, 2010.
2. Geoff Crowther , et.al., *India - A Travel Survival Kit*. Lonely Planet Publication, 1990.
3. Gillan Wright, *Hill Stations of India*, Penguin Books, New Delhi, 1991.
4. Gupta, V.K., *Tourism in India*, Gyan Publishing House, Delhi, 2013.
5. I.C. Gupta & Sushama Kasbekar, *Tourism Products of India*, 1995.
6. Malik, S.S, *Potential of adventure Tourism in India*, Agam Kala Prakashan Publishers,2006.
7. Negi.J. *Adventure Tourism and Sports: Risks and Challenges*, Kanishka Publications, 2010.
8. Pran Nath Seth, *India - A Travellers Companion*, 1996.

Course Outcomes:

1. Explain the status and scope for adventure tourism in India.
2. Learn different types of adventure tourism
3. Evaluate the role of government and other stakeholders in adventure tourism.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H				M				M	M		
CO2	H											M
CO3	H			L			M			L		

H=High, M=Middle, L=Low

	IV SEMESTER	
T-401	**TOURISM MARKETING**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- To learn about the concepts, market management in Tourism.
- Gain broad knowledge on the various departments in Tourism marketing.
- To acquaint with the effective marketing skills for tourism industry.

UNIT-I **Marketing:** Core Concepts in Marketing – Needs, Wants, Demands, Products, Markets, Marketing Management Philosophies - Marketing for Tourism-Tourism Products- Features of Tourism Marketing and its Uniqueness- Marketing Functions-Market Research-Tourism Marketing Mix.

UNIT-II **Understanding the Market and the Consumer**: Marketing Environment-Consumer Behavior - Buyer Decision Process – Tourism Demand Forecasting - Market Segmentation – Targeting – Market Positioning – Niche Marketing.

UNIT-III **5P's of Tourism Marketing:** Product Designing – Branding and Packaging – New Product Development – Product Life Cycle – Tourist Destination Life Cycle - Price: Strategies and Approaches; Place: Channels of Distribution, Promotion: Advertising – Sales Promotion – Publicity – Personal Selling; Other P's – Competitive Differentiation – Customer Satisfaction and Relationship Marketing.

UNIT-IV **Marketing of Tourism and Related Activities:** Global Marketing, Direct Marketing, Social Media & Digital Marketing, Green Marketing, Corporate Social Responsibility, Ethics & Consumerism - Trends in Tourism Marketing – Marketing of Destinations, Airlines, Hotels, Resorts, Travel Agencies, Events and

other Tourism Sub Sectors and Products – Challenges and Strategies.

UNIT-V **Developing Marketing Skills for Tourism:** Self-Motivation-Team Building-Personality Development- Communication - Creativity & Innovation-Innovative Products in Tourism-International Perspective and Contemporary Trends.

Suggested Readings:

1. Chaudhary, M. (2010). *Tourism Marketing,* New Delhi: Oxford University Press.
2. Fyall, A., & Garrod, B. (2005). *Tourism Marketing: A Collaborative Approach* (Vol. 18). Bristol: Channel View Publications.
3. Kotler, P. (2006). *Marketing Management*. Delhi: PHI.
4. Stanton, W. J. (1999). *Fundamentals of Marketing*, New York: McGraw Hill.
5. Neelamegham, S. (1998), *Marketing in India: Cases & Readings*. New Delhi: Vikas.
6. Ramasamy, V.S., & Namakumari, S. (1990), *Marketing Management: Planning & Control* New Delhi: Macmillan.
7. E-Pathshala. (2018). Retrieved from E-Pathshala an MHRD Project Website: http://epgp.inflibnet.ac.in/ahl.php?csrno=1827 Select- P-14.

Course Outcomes

1) Students acquire knowledge on the tourism needs and demands.
2) To know different types of marketing strategies related to the tourism industry.
3) Students acquire different types of skills pertaining to tourism sector

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H				M		M			L		
CO2	H				H		M		M			
CO3	H	M				L				L		

H=High, M=Middle, L=Low

	IV SEMESTER	
T-402	**PLANNING AND DEVELOPMENT OF TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- To know the importance of concepts and planning of tourism.
- Students comprehend the linkages with government and private sectors in Tourism
- Develop analytical views on policies of national governments and international bodies.

UNIT- I **Introduction**: Concept and formulation of tourism policy -- : Understanding Tourism Planning: Conceptual meaning of Tourism Planning, Evolution of Tourism Planning, General Concepts of Planning, Levels and Types of Tourism Planning, Background Approach and planning scale.

UNIT- II Need for Tourism Planning – Role of government, public and private sectors, Role of international, multinational, state and local tourism organizations in carrying out tourism policies – Planning for Sustainable development- Forces which promote Sustainable Tourism

UNIT – III Linkage between planning and Tourism Development -- Role of Public and Private sectors in Tourism Development -- Their role in Tourism Development -- Analysis of an individual Tourism Project (Development of the Buddhist circuit)

UNIT -- IV Tourism Policy of India: National Action Plan on Tourism (1992) – Draft National Tourism Policy (1997) – Concept of National Tourism Board – Tourism in the states of India – Case study of Tourism policies of State Governments – Andhra

Pradesh, Rajasthan, Himachal Pradesh and Goa -- Tourism Policy of India 2015 -- Environment Planning

UNIT – V Agreements: Chicago Convention, Warsaw Convention, Open Sky Policy, Bermuda Convention, Euro Agreement, Schengen Agreement

Suggested Readings

1. Bhatia, A.K. (2009), *Tourism Development: Principles and Practices*, Sterling Publishers.
2. Gunn, Clare A., *Tourism Planning: Basics, Concepts, Cases,* Taylor and Francis, London, 1994
3. Hollaway J.C., *The Business of Tourism,* Financial Times Prentice Hall, New Jersey, 2006
4. Inskeep, Edward, *Tourism Planning: An Integrated and Sustainable Development Approach,* VNR, New York, 1991
5. Mill and Morrison, *The Tourism System: An Introductory Text,* Prentice-Hall, New Jersey, 1992
6. Poynter James M., *Tour Design – Marketing and Management*, Prentice Hall, New Jersey, 1993
7. Swain, K.S.,& Mishra, M.M. (2012).Tourism Principles and Practices. Delhi: Oxford University Press.

Course Outcomes

1. Learn about organized planning in the tourism industry.
2. Gain knowledge on the resolutions of state governments towards tourism in their states.
3. Know the significance of planning policies of international institutions.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	H	M		M					M	
CO2	H	M	M	H	M		M		M			M

CO3	H			H		H	H					L

H=High, M=Middle, L=Low

	IV SEMESTER	
T-403 (a)	**TOURISM ENTREPRENEURSHIP**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations**

Marks 80

Objectives:

- To gain broad knowledge on the Entrepreneurial roles in tourism.
- Students comprehend on the setting up of Enterprises in the tourism industry.
- To gain knowledge on business strategies and diversifications in tourism

UNIT-I **Entrepreneurship:** Theories & Approaches; Types of Entrepreneurs– entrepreneur and Intrapreneur - Entrepreneurial Motivation – Entrepreneurial Climate- Myths about Entrepreneurship - Role of Entrepreneurship in Economic Development – Entrepreneurial opportunities for tourism- Growth and Challenges of Entrepreneurship in Tourism Industry.

UNIT-II **Creativity and Innovation:** Process of Creativity and Roadblocks -- Innovation- Types of Innovation- Role of Creativity and Innovations in Travel and Tourism Industry - Contemporary Trends – Competencies of an Entrepreneur- Role of Technology in Tourism Entrepreneurship.

UNIT-III **Entrepreneurship in Tourism:** Opportunity Identification –Sources of Ideas- New Product Development –Writing a Business Plan - Feasibility Report –Technical Feasibility vs. Economic Viability. Setting up an Enterprise – Steps, Procedures, Licenses, Registration etc

UNIT-IV **Sources of Funding:** Sources of Finance for Tourism Enterprises, Subsidies and

Incentives- Promotion and Development of Tourism - Institutional Framework – Banks, Institutions including IFCI,ICICI,IDBI,SIDBI – Role of Government in promoting Tourism Entrepreneurship – MSME Policy, EDII, NIESBUD, NEDB.

UNIT-V **Managing Growth:** Business Integration – Diversification-Mergers and Acquisitions-Business Failure-Causes for failure-Revival of Sick Enterprises-Strategies for revival-Women Empowerment in Tourism

Suggested Readings:

1. Bedi, Kanishika, *Management & Entrepreneurship*, Oxford, New Delhi.
2. Bird B.J. *Entrepreneurial Behavior*, New York: John Wiley & Sons
3. Peter F., Drucker, *Innovation and Entrepreneurship*, 1985, Harper; NY
4. Vasant Desai, *Entrepreneurship & Small Business Management*
5. S. S Khanna, *Entrepreneurial Development*
6. C B Gupta, N P Srinivasan, *Entrepreneurial Development*
7. D N Mishra, *Entrepreneur and Entrepreneur Development & Planning in India*.
8. Lall &Sahai:Entreprenurship(Excel Books 2 edition)
9. A.K.Rai, *Entrepreneurship Development*, (Vikas Publishing)

Course Outcomes

1. Develop understanding of enterprises
2. Learn the role of entrepreneurship in Tourism industry.
3. Identify various challenges and revival techniques relevant of enterprises.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	L					M	M				
CO2	H						M			L		M
CO3	H								M		L	

H=High, M=Middle, L=Low

	IV SEMESTER	
T-403 (b)	**TOURISM AND HOSPITALITY MANAGEMENT**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Course Objectives

- To make the students understand about the importance of Hospitality in the tourism sector.
- Students will get familiar with the management techniques in the accommodation sector.
- Food services and operation of restaurants are important for the student

UNIT-I **Introduction**: Overview of Tourism Industry – Concept of Tourism –Economic Importance of Tourism - Impact of Tourism

UNIT-II **Hospitality** : Types of Accommodation – Classification –Accommodation Management – Evolution and Growth of Hotel Industry -- Hotels and their Categories - Concept of Heritage Hotels -- Classification Heritage Hotels, Dept. of Tourism Incentives

UNIT-III **Functions of the Front Office**: Structure -- Front-of-the-House Operations - Back-of-the-House Operations - The Reservation Office - Types of Reservation System - Accepting or Denying Reservation - Generating Reservation Reports - Managing Reservations - Check-in Process - Front Office Accounting - Check-out Process - The Electronic Front Office (EFO)

UNIT-IV **Housekeeping :** Layout of the Housekeeping Department and its Functions -- Management of Guest Amenities -- -Importance of Grooming -- Specifications for Men and Women – Personal Hygiene -- The Security Division

UNIT-V **Restaurant Management**: Hotel Operations – The Food and Beverage Division – Food Services : Retail, Industrial, Healthcare and Club Food – Bar and Restaurant -- Future Trends in Hospitality management -- Role of Associations in Hospitality sector.

Suggested Readings

1. Abraham Pizam (ed.), *International Encyclopaedia of Hospitality Management*, Routledge, London, 2009.
2. Andrews, *Hotel Front Office Training Manual*, Tata Mcgraw Hill, Bombay, 1980
3. Arthur & Gladwell, *Hotel Assistant Manager*, Jenkins, London, 1982
4. Bhatia, A. K., *Tourism Development: Principles and Practices*, Sterling Publications Pvt. Ltd., New Delhi, 2012
5. John C, Crotts, Dimitrios Buhalis, Roger March (ed.), *Tourism and Hospitality Management*, Routledge, New York, 2012
6. Prideaus, Gianna Moscardo (ed.), *Managing Tourism and Hospitality Services*: *Theory and International Applications*, Biddles Ltd., London, 2005
7. Seth, P. N., *Successful Tourism Management*, Sterling Publications Pvt. Ltd., New Delhi, 2000
8. Stephen Ball, Susan Horner, Kevin Nield, *Contemporary Hospitality and Tourism Management Issues in China and India*, Elsevier, London, 2007

Course Outcomes

1 Student will be in a position to distinguish between different types of accommodations in the hotel industry.

2 Will realize the importance of hospitality in the tourism sector.

3 He or she will be familiar with various types of cuisines in the hotel industry

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	M				H					

CO2	H	H	H	M			M		H	M	M	M
CO3	H	L	H				M		M		L	

H=High, M=Middle, L=Low

	IV SEMESTER	
T-403 (c)	**UNDERSTANDING AND EVENT MANAGEMENT**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Gain broad knowledge on different types of Tourism events
- Students know the importance of MICE along with Event Planning, organizing and Marketing.
- Students comprehend on the popular events organized around the world.

UNIT I **Introduction to Events**: Nature, Importance and Scope – Types of Events – Unique features and similarities – Practices in Event Management - The Dynamics of Event Management: Event Planning and organizing -- Key steps to a successful event management – Checklists for different types of Event -- Planning schedule and Action Agenda

UNIT II **MICE** -- Nature, Importance and Scope – Events in MICE -- Unique Features and Similarities – Practices in MICE Management - Economic and Social Significance of MICE -- – Events for promotion of tourism under MICE : Cultural, festivals, religious and business -- Impact of conventions on communities

UNIT III Event Operations: Registration -- Seating Arrangements -- Documentation, Press Relations -- Audio-Visual Arrangements: Films, Videos, CDs -- Video-Conferencing -- Service quality management. Managing Events - Corporate Events - Trade and Exhibitions - Events in Educational Institutions.

UNIT IV Trade Fairs: Nature, Scope and Function -- Benefits of Fairs – Unique Selling Propositions -- International Trade Fairs : World Tourism Mart (WTM), Berlin Trade Fair (BTF), TTW, FITUR, Pacific Asia Travel Association (PATA) Travel Mart.

UNIT V HR in Event Management: Interactions in Event service management -- Event service and programme quality -- Planning of Human resources in Events – Leadership and Participants Management – Managing People and Time –Site and Infrastructure Management **Logistics:** Event Networks and Supply Chain - Handling Vendors and Service Contractors - Negotiating With Vendors and Service Contractors -- Problem Solving and Crisis Management

Suggested Readings

1. Bhatia A.K. (2001), *Event Management*, *Sterling Publishers,* New Delhi.
2. Blatt, J.G. *Special Events- Best Practices in Modern Event Management*. John Wiley and Sons, New York.
3. Editorial Data Group USA (2018). *Exhibition & Conference Organizers United States: Market Sales in the United States* Kindle Edition.
4. Fenich, G.G. (2014). *Production and Logistics in Meeting, Expositions, Events and Conventions*. Edinburgh: Pearson.
5. Johnson, N. (2014). Event Planning Tips: *The Straight Scoop on How to Run a Successful Event (Event Planning, Event Planning Book, Event Planning Business*). MCJ Publishing. Kindle Edition.
6. Joe Gold Blatt (1997), *Special Events- Best Practices In Modern Event*

Management, John Wiley and Sons, New York.

7. Mittal, S. (2017). *Event Management: Ultimate Guide to Successful Meetings, Corporate Events, Conferences, Management & Marketing for Successful Events: Become an event planning pro & create a successful event series*. Alex Genadinik Publication. Kindle Edition.
8. Robinson, P., Wale, D., & Dickson, G. (2010). *Events Management*m London: CABI.
9. Shone, A & Parry, B. *Successful Event Management*, Cengage Learning.Chawala, R., *Ecology and Tourism Development*, Sumit International, New Delhi, 2006.
10. Watt. D.C.. *Event Management in Leisure and Tourism*. Pearson, UK.

Course Outcomes

1) Know the types and importance of event management.

2) Understand the managerial and operational aspects pertaining to the MICE industry.

3) Learn about customer care, marketing equipment and tools.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H	M		M					M		H	
CO2	H	H		H	H		M		H	M	M	
CO3	H	M		H	M		M		M	M		

H=High, M=Middle, L=Low

	IV SEMESTER	
T-403 (d)	**DESTINATION PLANNING AND MARKETING**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Gain broad knowledge on the concepts of Destination planning.
- Students know the importance resource analysis and Destination marketing
- Students comprehend on the Destination promotions.

UNIT-I Destination Development: Concept, Meaning, Types and Characteristics of Destination Tourism – Destination Development: Products, Lifecycle -- Destination Management Systems : Destination Zone, Planning Guidelines and Model

UNIT-II Need for Tourism Policy: Destination Planning -- Approaches to Policy Implementation - Minimization of Policy Gap -- Levels of Tourism Planning: International, National, Regional and Local -- Role of Implementing Agencies, Stakeholder-Driven Policy, Hurdles in Formulating and Implementing Tourism Policies -- Linking Tourism Policy with Planning.

UNIT-III Recourse Analysis: Destination Potentiality – Unique features - Carrying Capacity – Infrastructure Analysis -- Regional Environmental Analysis, Market Analysis and Competitor Analysis

UNIT-IV Destination Marketing: Six 'A's for Tourism Destinations -- Dynamic Wheel of Tourism Stakeholders - Destination Marketing Mix – Destination Competitiveness – Distribution Channels- Marketing Communication and Strategies- Target Marketing – Positioning strategy.

UNIT-V Destination Promotion : Destination Image Formation Process - Unstructured Image - Destination Appraisal, Tangible and Intangible Attributes of Destination - - Measurement of Destination Image -- Case Study of Incredible India and God's Own Country, Vibrant Gujarat.

Suggested Readings:

1. Morgan, N, Pritchard, A &Pride, R. (2011). *Destination Branding: Creating the Unique Proposition*, Butterworth and Heinemann,
2. Butler, R.W. (2006).*Tourism Area Life Cycle: Applications and Modifications,* Channel View Publications.
3. Tang, C.H. & Jones, E.E. (2005). *Tourism SMEs, Service Quality and Destination Competitiveness*, CABI Publishing,
4. Singh,S. Timothy, D.J. & Dowling, R.K. (2003). *Tourism in Destination Communities*, CABI Publishing,
5. Crouch, D.I. J.R. Ritchie, B. & Kossatz, H.G. (2003). *Competitive Destination: A Sustainable Tourism Perspective,* CABI Publishing,
6. Murphy, P. E.(1986).*Tourism: A Community Approach*. Methuen, New York.
7. Inskeep, E. (1991). *Tourism Planning: An Integrated and Sustainable Development Approach*. Van Nostrand Reinhold, New York.

Course Outcomes

1. Know the different tourism policies.
2. Analyse the resources in the Destination promotion tours.
3. Learn about Destination marketing.

CO-PO Mapping

Cours	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	H			M	H				M			
CO2	H	M	H		M		H	H			M	M
CO3	H			M	H	M		M		M	M	

H=High, M=Middle, L=Low

	IV SEMESTER	
T-404	**Project : Dissertation + Viva**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations**

Marks 80

Objectives:

- Gain broad knowledge on the topic selection and research methods.
- Students will learn the minimum standards in the preparation of the Dissertation
- Student gain knowledge on the topic of their research and recent trends.

Course Outcomes

1. Explain the results of their project.
2. Learn in detail on the broad knowledge of their topic
3. Students leave their suggestions for the development of tourism in the country.

CO-PO Mapping

Cours	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	H					H						
CO2	H	H		M		M	M			M		M
CO3	H	M		M		M		M	M		M	

H=High, M=Middle, L=Low

	IV SEMESTER	
T-405 (a)	**GLOBALIZATION AND TOURISM**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Objectives:

- Gain knowledge on the effects of Globalization and opportunities in Tourism.
- Students know the importance of people moments and new destinations.
- Students comprehend on the International institutions in Tourism.

UNIT-I **Globalization and Tourism** : Meaning and Definition -- Historical Development of Globalization, Challenges and Opportunities of Globalization, Significance of Tourism and Hospitality Industry.

UNIT-II **Effects of Globalization :** Global Mobility and Ease of Travel, Free flow of Information, Terrorism, Safety, and Security -- Increased Awareness of New Destinations; Impact of Globalization on Tourism – Tourism as a Force for Peace, Tourism as Cultural Homogenizer.

UNIT-III **Globalization and Hospitality Industry** : Transnational Migration, Diasporic Identities and Media Flows; The effects of Globalization on the Hospitality industry – Exposure to different cultures, Advancement of technology, Greater Opportunities for Developing Nations and Seasonal Employment.

UNIT-IV **Challenges of International Tourism** – Inter-Cultural Issues, Drug Trafficking, Human Trafficking and Non-Traditional Security Threats

UNIT-V **Global Changes**: Aviation Geography: Important Tourist Circuits:

Middle East – Far East – Asia Pacific -- Tourism in Developed Countries: USA, Japan and Germany -- Under Developed Countries – Kyrgyzstan, Mexico and Somalia

Suggested Readings

1. Fredy González Fonseca, Challenges and Opportunities in the World of Tourism From the Point of View of Ecotourism, *Higher Learning Research Communications,* December 2012 Volume 2, Number 4, https://www.researchgate.net/publication/325409129_ Globalization_in_tourism/citation/download

2. Haiyan Song, Gang Li, Zheng Cao, Tourism and Economic Globalization: An Emerging Research Agenda, *Journal of Travel Research*, October 23, 2017, https://doi.org/10.1177/0047287517734943

3. Introduction to Globalization and Tourism and Hospitality, http://lib.unipune.ac.in:8080/jspui/bitstream/123456789/3869/11/11_chapter%201.pdf

4. Iryna Mykhailivna Trunina, Olena Anatoliivna Sushchenko, Viktoriia Valeriivna Druzhynina and Olena Leonidivna, Zahorianska1Globalization impact on the world travel market development, https://www.shs-conferences.org/articles/shsconf/pdf/2020/01/shsconf_ies_2019_01029.pdf

5. Dallen J. Timothy (ed.), *Handbook of Globalization and Tourism*, (Arizona State University, 2019)

Course Outcomes

1. Know the intercultural challenges in the improvement Globalization
2. Understand the benefits of employment in the Globalization process.
3. Learn the skills to deal with different challenges like safety and security in the world

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H	M		M		H	M					M
CO2	H	H	H				H		H		M	
CO3	H	M			M				M		L	

H=High, M=Middle, L=Low

	IV SEMESTER	
T-405 (b)	**TOURISM ECONOMICS**	**CREDITS -4**

Sessional Marks 20 **End semester Examinations Marks 80**

Course Objectives

- Students will learn the principles of Demand and Supply in Tourism chain
- Student will also learn the cost benefit analysis of each tourism products.
- Students will also understand how tourism helps to develop the global economy in general and Indian economy in particular.

UNIT- I **Concept of Economics in Tourism**: Demand and Supply in Tourism -- Consumer Decision Making Process -- Determinants and indicators of Demand - Measurement of Demand - Law of Marginal Utility, Law of Demand and Supply -- Tourism product - Process of Product Development - - Tourism and economic development- Indian perspective

UNIT-II **Pricing in Tourism:** Determinants of Price - Types of Price in Tourism - Pricing a New Product - Pricing under different Market conditions - Factors influence tourism supply - Project Feasibility Study. Cost Benefits Analysis - SWOT Analysis - check list.

UNIT- III **Impact of Tourism:** Economic impacts - Social Impacts - Environmental Impacts - Multiplier Effects in Tourism, Environment Impact Assessment (EIA) - Impact on employment - Impact and Contribution of Tourism Sector in National Economy.

UNIT- IV **Public and Private Sector in Tourism**: Government Role in Tourism - Community and Tourism. Need for Public – Private Sector Co- Operation in tourism - Investment Appraisal in Public and Private Sector - Regular Role of Government in Tourism.

UNIT- V **Tourism's Contribution:** Role of Tourism in the global economy and in Indian Economy - Tourism Demand Forecasting - Sources of Finance For Tourism – TFCI - Economic Contribution, Impact and Net Benefits of Tourism.

Suggested Readings:

1. Baskota, K., *Impact of Tourism Local Employment and Income in Three Selected Destinations; Case Studies of Sauraha, Nagarkot and Bhaktapu*r. Nepal Tourism and Development Review. Vol (2) No. 1, 2012
2. Bull, A., *The Economics of Travel and Tourism*. Harlow: Longman, 1995
3. Gautam, B.P.,*Tourism and Economic Growth in Nepal*. NRB Economic Review. Vol- 23-2, 2012
4. Mankiw, N. Gregory, Macroeconomics, (3rd ed.), New York: Worth Publishers, 1997
5. Sinclair, M. & Stabler, M., *The Economics of Tourism*, (1st ed.), Routledge, 1997
6. Tribe, J., *The Economics of Recreation, Leisure and Tourism*, (4th ed.), Elsevier Ltd, 2011
7. Vanhove, N., *The Economics of Tourism Destinations*, (1st ed.), Elsevier Limited,2005
8. Williams, A.M., *Towards a Political Economy of Tourism*, In Lew, 2004
9. Hall, C.M. &Williams, A.M. (Eds.) *A Companion to Tourism,* Blackwell Publishing, 2003.

Course Outcomes

1) Students learn the concepts of demand and supply in tourism.
2) Assess the impact of tourism on environment, social and political.
3) To evaluate the role of public and private sectors and sources of finances

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	H	H				H	H	H			M	H
CO2	H	M	H	M		M			M			M

CO3	H		M	M		M		M			H	H

H=High, M=Middle, L=Low

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF CENTRE FOR WOMENS STUDIES



Course

M.A. CENTRE FOR WOMENS STUDIES

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

About the Centre

The Centre for Extension Studies of Sri Venkateswara University, Tirupati took initiative to establish the Centre for Women's Studies in Sri Venkateswara University. The Centre was established in the year 2007 on self–supporting basis with focus on Women's Development, Gender Equality and justice. In 2009, the UGC approved the Centre and sanctioned financial assistance to the Centre and thus the Centre for Women's Studies was established in S.V. University as a Regular Department. The Centre aims to sensitize the students on various women's issues and trains them in enterprise and Management of innovative technologies specifically to increase women's visibility in teaching, research & management. It also aims at enhancing their competencies, build a platform for Women's Equality and Rights, and establish Gender Justice in the Civil Society. At present the Centre is headed by one Director i/c, Prof. D. Krishnamoorthy supported by five Academic Consultants and one non-teaching Staff.

The Centre has been offering PG Programme in M.A. Women's Studies and Management (Two-year Regular Programme) since 2007 with an intake of 30 students. The Masters' Programme has 96 mandatory credits under the Choice Based Credit System. The Course is open to both boys and girls. Besides, PG programme, the Centre is also offering Research Degree leading to Ph.D.

In the beginning, the Centre also offered P. G. Diploma in Research Methodology. The Centre for Women's Studies is an Interdisciplinary and collaborate entity with sister departments in the University Viz., Dept. of Economics, Home Science, Adult Education, Population Studies, Sociology, Law and Human Rights The Centre has established linkages with several NGOs like WINS, STEPS, RISE, RASS, PASS and Universities/Colleges like Sri Padmavati Mahila Visvavidyalayam, S.P.W. College, S.V. Medical College, S.V. Agricultural University, and S.V. Veterinary University, Bharathiyar University, Bharathidasan University, University of Hyderabad and Institutes of Reputations like TISS, NIRD and NIMSME. The staff and the students of the Centre are actively involved in Teaching, Research, Projects, Workshops, Seminars, Training Programmes, Preparation of Learning material, Library and Documentation, Extension and Outreach Programmes, Clustering, Advocacy and Networking.

Vision of the Centre:

- To foster the visibility of women's issues, combine scholarship with socially relevant theories, open genuine interdisciplinary dialogues, eradicate biased gender perspectives, develop gender sensitive management systems and structures systematically.

Mission:

- To sensitize the students on various women's issues and train them in enterprise and Management of innovative technologies, to increase women's visibility in teaching, research & management by enhancing their competencies, build a platform for Women's Equality and Rights, and establish Gender Justice in the Civil Society.

Programme Specific Outcomes (PSOs):

On successful completion of M. A. Women's Studies and Management Programme, the students will be able to

PO 1: Understand the Gender roles and actively participate in the debates and discussions on feminist approach to development;

PO 2: Explain the Gender and power relations and their impact on the Family, Society and other Institutions;

PO 3: Use the range of analytical and field-based skills, leadership skills with gender perspective which will equip them with professional careers as Entrepreneurs, Social Activists and Technocrats;

PO 4: Apply their managerial skills to work independently, in groups so that they could transform themselves into job-ready candidates and achieve their career goals in an Egalitarian society.

PO 5: Utilize their knowledge to join in reputed National and International NGOs to serve the Women and Children and the downtrodden people

Programme Objectives:

This Programme is designed to educate the learner with gender concepts and perspectives.

- To Analyse the issues related to women in the context of individual, inter-personal, societal and institutional relationships;
- To explain Gender and Power relations and their impact on the Family and Society;
- To provide insight on gender disparities in education, health, income, wealth political and legal systems;
- To examine the relationship between women studies and other areas of study;
- To analyse the existing policies and programmes to achieve Gender Equality;
- To make gender analysis to undertake effective steps for achieving gender equality, gender empowerment and social justice.

Programme Out comes

PO- 1. Creative Thinking:

Development of creative thinking is a prime outcome of any P.G. Programme.

Creative thinking enables students to think Creatively, Economically and Social.

PO- 2. Multiple Thinking:

It enables students to think in Multiple dimensions such as Logically, Rationally, Scientifically, Politically and Economically.

PO- 3. Self and Long life Learning: Post Graduation course promotes Self and Long-life learning I n the broadest context of Socio, Economical changes.

PO- 4. Self-Learning: It improves the ability to engage in independent learning technics.

PO- 5. Effective Communication: Speak, Read, Write and listen clearly in person and through electronic media in English and in one Indian language and make meaning of the world by connective people, ideas, books media and technology.

PO- 6. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO- 7. Effective Citizenship: Demonstrate empathetic social concern and equity-cantered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO- 8. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO- 9. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO- 10. Self-directed and Life-Long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

Programme Educational Objectives

- Analyze the ways in which gender, race, ethnicity, class, and sexuality construct the social, cultural, and biological experience of both men and women in all societies
- Function as a Team Member and step up for social change and support womenfolk by Emulating leadership skills
- To offer courses that document women's lives, the lives of people across gender spectrums, and critically examine gender ideologies\

AppendixNo:'B'ItemNo:'B-2'

SRI VENKATESWARA UNIVERSITY: TIRUPATI

SVUCOLLEGE OFARTS

CENTRE FOR WOMEN'S STUDIES-2018-19

(M.AWomen'sStudiesandManagement)

Semester-I

S. No	Code	Titleofthe Course	Credit Hrs / Week	No. ofCredits	Core /Elective	IA	SEE	Total Marks
1.	SVUWS101	Women'sStudies-concepts,Principals&Issues	6	4	Core	20	80	100
2.	SVUWS102	HealthandNutritionalperspectivesofwomen	6	4		20	80	100
3.	SVUWS103	EntrepreneurshipManagement&Development	6	4		20	80	100
4.	SVUWS104	ComputerApplications:MS-word,MS-Excel, MS-Power-point	6	4		20	80	100
5.	SVUWS105	5a.Gender,environment,climatechange&livelihood (Opt-1) 5b.GenderSociety and Power relations5c.SocialProcessandBehavioral Issues	6	4	CF	20	80	100
6.	SVUWS106	6a. HumanValues AndEthics–I 6b. LeadershipvaluesOpt-1	6	4	EF	20	80	100
		Total	**36**	**24**		**120**	**480**	**600**

***AllCOREPapersareMandatory**

- **CompulsoryFoundation-Chooseonepaper**
- **ElectiveFoundation-Chooseonepaper.**
- **InterestedstudentsmayregisterforMOOCwiththe approvaloftheconcernedDDCbutitwillbeconsideredforthe awardofthegrade as open electiveonlygivingextracredits.**

Semester-II

S. No	Code	Titleofthe Course	Credit Hrs / Week	No. ofCredits	Core /Elective	IA	SEE	Total Marks
1.	SVUWS201	Women&Development	6	4	Core	20	80	100
2.	SVUWS202	Researchmethodology&SPSS	6	4		20	80	100
3.	SVUWS203	SalesandMarketingManagementwithfocuson Genderperceptions	6	4		20	80	100
4.	SVUWS204	SkillsDevelopmentTraining–CLanguage, DBMS,Communication&SoftSkills	6	4		20	80	100
5.	SVUWS205	5a.CapacitybuildingandleadershipTraining 5b.Gender &Media 5c.SocialWorkinitiativesforwomen's development	6	4	CF	20	80	100
6.	SVUWS206	6a.Humanvalues &ProfessionalEthics–II 6b.Familial valuesandEthics	6	4	EF	20	80	100
		Total	**36**	**24**		**120**	**480**	**600**

***AllCOREPapersareMandatory**

- **CompulsoryFoundation-Chooseonepaper**
- **ElectiveFoundation-Chooseonepaper.**
- **InterestedstudentsmayregisterforMOOCwiththe approvaloftheconcernedDDCbutitwillbeconsideredforthe awardofthegrade as open electiveonlygivingextracredits.**

Semester-III

S.No	Code	Titleofthe Course		Credit Hrs /Week	No. ofCredits	Core /Elective	IA	SEE	Total Marks
1	SVUWS301	Gender,Science&Technology		6	4	Core	20	80	100
2	SVUWS30	C++&E-Commerce		6	4		20	80	100
3	SVUWS303	Human Resource planning &DevelopmentWithfocusonGender perceptions		6	4		20	80	100
4	SVUWS304	4a	NGOManagement	6	4	Generic Elective	20	80	100
		4b	Guidance&CounselingWith GenderPerceptions.						
		4c	Feministtheories,Women's, Status&Empowerment.	6	4		20	80	100
		4d	Women's participation inAgriculture&Alliedsector s						
5	SVUWS305	5a	GenderSensitization&Traini	6	4	OpenElective	20	80	100
		5b	GenderIdentityand						
		5c	WomenandGovernance						
			TOTAL	**36**	**24**		**12**	**480**	**600**

*** AllCOREPapersareMandatory**

- **GenericElective-Choosetwo**
- **OpenElectivesarefortheStudentsofotherDepartments.MinimumOnePapershouldbeopted.Extra credits may be earned by opting for more number of open electives depending on theinterestofthestudent throughselfstudy.**
- **InterestedstudentsmayregisterforMOOCwiththe approvaloftheconcernedDDC.**

Semester-IV

S. No	Code	Titleofthe Course		Credit Hrs /We	No. ofCredits	Core /Elective	IA	SEE	Total Marks
1	SVUWS401	Documentation&ProjectWorkwith Gender perception		6	4	Core	20	80	100
2	SVUWS402	Accounting&Financial Management,Tally		6	4		20	80	100
3	SVUWS403	Participatorylearning,Extension&outreachprograms&Advocacy withf ocusonwomen		6	4		20	80	100
4	SVUWS404	4a	Legaland HumanRightsof Women	6	4	Generic Elective	20	80	100
		4b	HumanResourceManagement WithfocusonGender perceptions	6	4		20	80	100
		4c	Multimediasystems						
		4d	ReproductiveHealthandFamilyLifeEducation						
5	SVUWS405	5a	Women&Globalization	6	4	OpenElective	20	80	100
		5b	Technicalcommunication and computerethics						
		5c	Gender&MassCommunication						
			TOTAL	**36**	**24**		**12**	**480**	**600**

*** AllCOREPapersareMandatory**

- **GenericElective-Choosetwo**

OpenElectivesarefortheStudentsofotherDepartments.MinimumOnePapershouldbeopted.Extra credits may be earned by opting for more number of open electives depending on theinterestofthestudent throughselfstudy.

- **InterestedstudentsmayregisterforMOOC withtheapprovaloftheconcernedDDC.**

SRI VENKATESWARA UNIVERSITY:

TIRUPATI SVU COLLEGE OF ARTS

MA. WOMEN'S STUDIES AND MANAGEMENT-

2019-20

CO-PO Attainment in Outcome Based

Education

Semester-I

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-101(Core)	**Women'sStudies-concepts,Principles&Issues**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To sharpen students' critical awareness on how gender operates in institutional and cultural contexts and in their own lives;

2. To understand the institutions of family and marriage and their influence on the status of women;

3. To give students an opportunity to participate in social change.

UNIT– I:INTRODUCTION TOWOMEN'SSTUDIES

Definition – Meaning – Genesis – Growth – Objectives and scope of Women'sStudiesinIndia– Women'sStudies–an internationalperspective.

Status – Concept – Meaning – Definition – Types of Status – Achieved and AscribedStatus – Factors and Indicators on Status of Women. Status of Women in IndianSociety– Pre and Post-IndependencePeriods.

UNIT–II: WOMENANDSOCIAL INSTITUTIONS

Family – Meaning – Definition – Joint – Nuclear – Patriarchal Family – MatriarchalFamily. Marriage – Definition – Monogamy – Polygamy – Polyandry. Multiple rolesofwomen – Role conflict– Role change.

UNIT–III:GENDERCONCEPTS Socialization–Meaning–definition–stages–agenciesofsocialization.SocialConstructionofGender–SexandGender–Genderdiscrimination–GenderStereotyping – Gender Roles – Gender needs – Practical and Strategic- Gender Justice&Equality

UNIT–IV:ISSUESRELATEDTOGIRL CHILDANDWOMEN

Femalefeticide–Femaleinfanticide–ChildMarriage–Dowry–divorce–Widowhood–Prostitution–domesticviolence–Problemsofelderlywomen–Problemsofsinglewomen–Marginalizedanddeprived.(Groups(SC/ST,Mathammas,Devadasies, womenprisoners), SexualHarassment,Violence.

UNIT–V:

a) WomenMovementinAndhraPradeshandIndia–DalitWomen'sLiberationMovement–TelanganaMovement–AntiArrackMovement–SrikakulamMovement.

b) WomenMovementinUSA, U.K.andChina–A birdseyeView.

c) Important Women's Organizations and Associations in India – National Organizationof Women in India (Now) – AllIndia Women's Conference (AIWC) – Women'sIndia Association (WIA) – Indian Association for Women's Studies (IAWS) and A.P.MahilaSangam.

Practicals:

1. AssessmentofWomen'sstatusinruralareas.
2. Genderdiscrimination(Femalefoeticide,FoodSecurityetc.)
3. Multipleroleofwomen.
4. Problemsfacedbywomen(Single,DivorceWomen).
5. TypesofMarriages thatareexistinginSociety(Child marriage,Polygamyetc.).

6. Socialization.

References:

1. MAITHREYIRISHNA RAJ: Contribution to Women's Studies, (Bombay, SNDT,1991).
2. MAITHREYIKRISHNA RAJ: Women Studies in India – Some Perspectives(Bombay:PopularPrakasham1986).
3. Govt. of India :TowardsEquality,ReportoftheCommitteeontheStatusofwomen,(Ministryof Education and Social Welfare, December,1974).
4. Govt. of India :National Perspective Plan for women 1988-2000 A.D., (Ministry ofHumanResources Development, Department of Women and Child Development,1988).
5. Paul Chowdary :Women Welfare and Development, (New Delhi L Inter IndiaPublications1992).
6. RehnaGhadially(Ed.):Women in Indian Society, (New Delhi : Sage Publications,1988).
7. PromillaKapur:EmpoweringtheIndianWomen(MinistryofInformationandBroadcasting).Govt.ofIndia, 2001.
8. SangeethaPurushothaman : TheEmpowermentofWomeninIndia(SagePublications,New Delhi,1998).
9. SakuntalaNarasimhan:EmpoweringWomen(SagePublications,NewDelhi,1999)
10. SuzanneWilliams:TheOxfam GendertrainingManual Oxfam,U.K., 1994).

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept of women studies and its evolution over a period time;
2.	**CO2**	Understand the concept of status of women and factors influencing the status of women in India;
3.	**CO3**	**A**nalysetheinstitutions of Family and Marriage and their effect on women;
4.	**CO4**	Apply the concepts of gender to evaluate the status of women in India;
5.	**CO5**	To compare the problems of different sections of Women from womb to tomb;

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	2	3	3	3	3	-	3
CO2	2	2	3	3	3	3	3	3	-	3
CO3	3	3	3	2	3	3	3	3	-	3
CO4	3	2	3	3	3	3	3	3	-	3
CO5	3	3	3	3	2	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-102 (core)	**Health and Nutritional Perspectives of Women**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To create awareness on the importance of Health and Nutrition for women;

2. To enlighten the students about the need to improve the quality of life of women;

3. To understand the role of women in the control of population.

Unit–I:Nutrition andHealth

Concept – Definition – Nutrition and Health – Interrelationship between Health andNutrition.NutritionandhealthstatusofwomenandchildreninIndia.CommonNutritionaldisorders amongwomenand childreninIndia.

Unit–II:NutritionalandHealthProgrammes

National Nutritional programmes– Applied Nutrition Programme, SupplementaryFeeding Programme – National Health Programmes – Anaemia Censure Programme,goiterControl Programmeand Vitamin‘A’-ImmunizationPrograme.

Unit–III:NutritionandHealthEducation

NutritionEducation–Definition–Concept–Channels–
AdvantagesofBreastfeedingandcolostrum– GenderBiasin Nutritionintake..
Health Education – Concept – Definition – Objectives, IEC (Information EducationandCommunication) HealthCareservices– SubCenterLevel, PHC,CHC.

Unit-IV:Nutritionduringdifferentstages

Nutrition and Diet during infancy,child hood, Adulthood, Young women, Middleage,and Elderly. Foodgroups and balanceddiets.

Unit-V;Foodsecurity andfoodprotection,foodsafetyandhygiene

Introductiontoconceptsoffoodsecurity,foodprotectionandfoodsafety,foodquality management, importance and functions of quality control, currentchallengesto food safety

Practicals:

1. VisittoPHC,CHC,UHC,Subcenters.
2. AssessmentofNutritional andHealth statusof Women.
3. VisittoSTD ClinicandVCTC, PPTCC.

References:

1. Swaminathan.M.– *"PrinciplesofNutritionandDietetics"*(Bangalore:TheBangalore&PrintingPublishing Co.,Ltd., 1986).
2. NINPublication –*"NutritiveValueofIndianFoods"*(Hyderabad:NIN,1989).
3. ProceedingsoftheNutritionSocietyofIndiaEleventhGopalanCreation.(Hyderabad :NIN,1988).
4. Shukla,P.K.–*"NutritionalProblemsofIndia"*(NewDelhi:PrenticeHallofIndia,1982).
5. PARK,K– *"Park'sTextbookofPreventiveandSocialMedicine"*,(Jabalpur:BanarasidasPublishers, 1988).
6. ICSSR–*"HealthforAll– AnAlternativeStrategy"*(Pune:IndianInstituteofEducation,1981).
7. Reddy,P.R.andSumangalaP.(Eds.)–*"WomeninDevelopment,Vol.II"*(NewDelhi :B.R.PublishingCorporation,1999).

8. Mahadevan(Ed.)– *"HealthEducationforBetterQualityofLife"*(NewDelhi:B.R.Publications,1990).
9. GianeRechardson– *"WomenandAIDSCrisis"*NewEdition(London:UNWIN,HYMAN,1998).
10. PallackRosalindPatcheesky–*"AbortionandWomen'sChoiceQuestionsforFeminism"* (Verso, 1986).
11. WHO–HIVSERO*"PositivityandAIDSPrevention&Control,"* (NewDelhi:B.R.PublishingCorporation, 1989).
12. Govt.ofIndia– *NationalPopulationPolicy"***,**Document(NewDelhi:MinistryofHealthandFamilyWelf are,India – 2000).
13. UnitedNationals –*"IPCDReport –Cairo"*(New York:UN1994).
14. Mahadevanet.al.(Eds.)– *ReproductivehealthofHumanKind"*(NewDelhi:BRPublishingCorporation, 2000).
15. I.C.S.S.R.–*"Healthforall–anAlternative Strategy"*(Pune,IndianInstitute ofEducation,1981).
16. DasGuptaMonica&KrishnanT.N.–*"WomenandHealth"*(NewDelhi:Oxford1998).
17. KrishnaRajMaithrey(Ed.)– *"Gender,PopulationandDevelopment"*NewDelhi:Oxford1999).

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Understand the interrelationship between the nutrition and health and the health status of women and children in India;
2.	**CO2**	Analyse the impact of various nutritional programmes being implemented in India to improve the health status of women
3.	**CO3**	Get awareness on the Gender bias in nutrition intake, benefits of breastfeeding, colostrum and health care services available in India;
4.	**CO4**	Plan balanced dietneeded at different stages of the life cycle of women;
5.	**CO5**	Illustrate the ill effects of food poison and the food safety measures to be taken in different seasons for preserving food.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	3	3	3	3	2	2	-	3
CO2	2	3	2	3	2	3	3	2	-	3
CO3	3	3	2	3	3	3	3	2	-	3
CO4	3	3	2	3	3	3	3	2	-	3
CO5	3	3	2	3	3	3	3	2	2	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-103(Core)	**Entrepreneurship Management & Development**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To provide the theoretical and conceptual knowledge on Entrepreneurship;
2. To provide the knowledge about the procedures involved in the organization of new enterprises;
3. To create interest and to train students in the establishment of new organizations.

Unit – I: Entrepreneurs and Entrepreneurship – Who is Entrepreneur? Qualities of Entrepreneur, Concept and definition of Entrepreneurship–Entrepreneurial functions–origin and growth of Entrepreneurship in India

Unit–II:EstablishingNewEnterprises–ChoiceofEnterprise–MarketAssessment for SSE–Choice of Technology Financing, Preparation of the BusinessPlan.

Unit–III:BusinessPlanforEntrepreneurs–

GeneratingaBusinessidea,DevelopingaBusinessplan,MarketAnalysis,FinancialAnalysis, Realisticplanning, Marketing,Costing and Pricing, Operational Management, Record- Keeping,Saving

Unit – IV : Women and Entrepreneurship – Concept and definition of WomenEntrepreneur–Growthof womenEntrepreneurshipinIndia(RecentTrends)–

ChallengesbeforewomenentrepreneursinIndia(SWOTAnalysis)–
Entrepreneurshipdevelopment,thethrustareasforaction–
IndustrialestatesforwomenEntrepreneurs(A CasestudyofALEAP)

Unit–V:PerformanceAppraisalandGrowthStrategies–

ManagementPerformance Assessment Control–Strategiesfor Stabilization and Growth – ManagingFamilyEnterprises

Practicals:

1. CollectingCaseStudiesofWomenEntrepreneurs.
2. VisittoEnterpriserowbywomenentrepreneursandregionalentrepreneurship sup portsystem.
3. VisittoEntrepreneurial DevelopmentCell(Campus.SVUniversity)
4. PreparationofProjectProposalforaSelectedEnterprise.

References:

1. SivaKamaSundari,S."EntrepreneurshipDevelopmentforRuralWomen"(Vol.1) ,Asianand PacificforTransfer ofTechnology, New Delhi, 1995.
2. LalithaRani,D– "WomenEntrepreneurs"APHPublishingCorporation,NewDelhi,19 99.
3. SundaraPandianM."WomenEntrepreneurship:Issues andstrategies",KanishkaPublishers, Distributors, New Delhi, 1999.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept of Entrepreneurship and highlight the qualities and functions of an Entrepreneur;
2.	**CO2**	Explain the prerequisites to establish new enterprises and prepare a blue print for the same;
3.	**CO3**	Demonstrate a business idea, business plan and SWOT analysis;
4.	**CO4**	Analyze the recent trends in growth of Women Entrepreneurship and challenges being faced by women entrepreneurs in India;
5.	**CO5**	Asses the management performance and successfully implement the strategies for stabilization and growth of women enterprises in India.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	3	2	2	2	3	3	-	3
CO2	3	3	3	2	3	3	3	3	-	3
CO3	3	3	3	3	3	2	3	3	-	3
CO4	3	3	3	2	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-104 (Core)	**Computer Applications**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. 1**.** To impart the basic computer knowledge to the students;
2. To train the students to do their works such as document processing, data entry, data analysis, database Management and accessing Internet by themselves;
3. To equip students to get necessary computer knowledge to go for self-employment or get wage employment in the age of information revolution.

Unit– I :

An overview of Computer Systems : Parts of Computer–The Processor, Memory,Input/ Output devices, Storageand Software.

Types of Computers: Super Computers, MiniComputers, Work Stations, MicroComputers,Desktop Models,Laptop computers,HandledComputers.

Input Devices : The Keyboard, the Mouse, the Track ball, Scanner, Digital Camera,Keyboard,Mouse, Track Ball, Joystick, Touch Screen.

Output Devices: Monitors CRt Monitors, Flat Panel, Monitors, P.C. Projectors,SoundSystems,HardCopy,DotMatrixPrinters,InkjetPrinters,LaserPrinters,Plotters.

Unit– II :StoringInformationinacomputer:MagneticDisks– Harddisk,Floppydisk,OpticalStoragedevices–CDROM,DVD ROM,CD-Recordable, Cd-Rewritable.

Operating system: Basics, Introduction, the functions of an operating system– TheUserinterface, Runningprograms, Managingfiles, Managinghardware.
PCOperatingSystems:MS-DOS,MicroSoftWindows,UNIX/LINUX.

Unit– III : MS Office

Introduction to M.S. Office application: Starting an application–creating–opening–savingdocuments–printingan officedocuments.

M.S. Word : Introduction–entering–editing text–formatting text and pages–creating.Special word techniques– printing envelops using mail merge – object link andembeddingfeatures.

M.S. Excel : Introduction–Excel for data analysis, worksheet and its structure–dataentryediting–sorting, filteringandcopying.

M.S. PowerPoint: Introduction–building presentations–creating the presentation–creatingthetestandchartslides.Preparingcharts–customizingpresentation.Drawingslideandcreatingslideshows.

M.S. Access : Introduction–creating databases–tables and working with records–usingqueries–creatingForms– CreatingReports.

Unit–IV:**OfficeAutomation**:**Organizationofanoffice:**natureofoffice,natureofofficework,thedefinitionandneed forofficeautomation.

DocumentPreparation:

Word-processing, various office equipment that help in documentpreparation.Introductionto document storageandretrieval.

Communication System: Telephone–intercom–data Communication–LAN andWANs.

DecisionSupportSystems: Introduction– spreadsheetandGraphics.AutomationOrganization and management, how to manage innovations in the office, Benefits ofoffice automation.

Unit–V:Internet

Definition – History – Inter working – WWW – E-mail Basics – Advantages andDisadvantages – Creation of E-Mail – User IDs., Passwords and E-mail Address – MessageComponents–Mailerinnerworking–E-mailmanagement–SearchEngine –Mailinglists–News GroupComputerViruses.

Practicals:

- M.S.OfficePackage
- PowerPointPresentation
- MailMerge
- DOSCommands

References:

1. PeterNorton: “Introduction toComputers”, 4th Edition.
2. BajajK.K.:“OfficeAutomation”Macmillan.

3. “FundamentalsoftheinternetandtheWWW”:RymondGreenlawandEllenHepp, TataMc. Graw Hill.
4. SanjaySaxna,“MS Office2000foreveryone”
5. Leion andJeonM. “Computersforeveryone”
6. “Windows XP HomeEdition”
7. RaghavBahl,“ExploringMicroSoftOfficeXP”.
8. “WebTechnologies”,AchytsGodboleandAtulKahate,TMGH2003

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO’s Description
1.	CO1	Demonstrate the knowledge on overview of Computer Systems, Input Devices, Output devices and Storing Information in a computer;
2.	CO2	Demonstrate knowledge on the basics of Operating system and computer applications;
3.	CO3	Analyses the office Automation Organization and management;
4.	CO4	Use M.S. Office application to Creating Documents, PPTs, Spread sheets and Reports;
5.	CO5	Appreciate the importance of the Computer applications and Internet usage in the integrated world for Decision making for the both Genders

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	2	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	2	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-105A (Compulsory Foundation)	**Gender- Environment, Climate Change &Livelihood**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objective of the Course:

1. To create awareness on the linkages between environment and livelihood of women;
2. To impart knowledge on livelihood management in rural and tribal societies.

Unit–1:GenderandEnvironment

Natureandconceptoflivelihoodandenvironment,EnvironmentandLivelihoodRes ources, Gender Roles in Rural and Tribal Societics, Women's Access to LandandNatural Resources.

Unit-II:EnvironmentandLivelihoodsofRuralWomen

Maleandfemalefarmingsystems:differentialrole,ruralwomenlivelihoodinsubsistenceecono my,genderimpactofglobalizationandlossoflivelihoods,changingscenario ofrural economyand livelihood ofwomen.

Unit–III:EnvironmentalDegradation andLivelihoodsofTribalWomen

Environmentaldegradation;deforestation,climatechange,depletionofwaterresources, gender specific consequences of environmental degradation, development,displacement and loss of livelihood, livelihood resources, rights and entitlements,exploitation of middle men and moneylenders.

Unit-IV:RoleofWomeninSustainableEnvironmentandLivelihoodManagement

Women in Natural Resources Management, Women, Public-Private Partnership andNaturalResource Management,Women'sParticipatory ManagementAndNaturalResourcesManagement,RoleOf Women In SustainableDevelopment.

Role of government, role of NGO's, Grass Root Initiatives: Role of SHGs, MicroCreditand Micro Enterprises.

Unit–V:Climatechange–Causesandconsequences

Meaning of Global Warming and Greenhouse Effect- Contributing Factors- Responseto GreenHouse Effect-Ozone-Depletion and Its Effect on Climate Change-Result ofGlobalWarming;Climate Change ConventionofIndia towards GlobalWarmingMeasuresTaken, Consequences of Climate Change.

References

1. BaumgartnerR&HoggerR(eds),insearchofsustainablelivelihoodsystem,managingresourceandchange (2004)New Delhi, Sage publications.
2. BurraN,RandiveJ&MurthyR(eds),Micro–CreditPovertyandEmpowerment,LinkingtheTraid (2005) New Delhi, Sage publications.
3. ChandraPradanK Rural,women,issuesandoptions(2008),NewDelhi,Sonali Publication.
4. DattaS&SharmaV(eds),StateofIndia'sLivelihoodReport2010,the4pReport(2010),new Delhi, sage publication.
5. HarcourtW(ed),FeministperspectiveonsustainableDevelopment(1994)London,ZedBooks.
6. KarmakarKG(ed),LivelihoodandGender,EquityinCommunityresourceManagement(2004),New Delhi,sage publication
7. SrinivasanN.(2009),MicrofinanceinIndia;Stateofthesector2008NewDelhi.SagePublication.
8. KrishnaS(ed),Women'sLivelihoodRights,recastingcitizenshipfordevelopmentintheThirdWorld(1991London,Earthscan Publication.)

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Define the concepts of Gender, Environment, livelihood resources particularly those relevant for rural and tribal women;
2.	CO2	Understand the impact of globalization on theloss of livelihood opportunities for rural women;
3.	CO3	Analyse thecauses and consequences of environmental degradation and climate change on the livelihood levels of Tribal Women;
4.	CO4	Evaluate the role of women in ensuring sustainable development of the societies by having partnerships with government and NGOs;
5.	CO5	Define the concepts of Gender, Environment, livelihood resources particularly those relevant for rural and tribal women;

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-105B(CompulsoryFoundation)	**Gender, Society& Power Relations**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

i.To impart knowledge to the students on gender roles;

ii. To make the students to understand how gender roles are determined socially, culturally as well as in public and private domains;

Unit-1:Introduction

Genderrole:BiologicalVsCulturalDeterminism,PrivateVsPublicDichotomy,Existentialfou ndation of gender- power relations, Human Development Indicators and gender disparity.

Unit-II:Gender,FamilyandEconomy

Gender and family: Gender division of labourand Asymmetric role structure, Gender role-
Socializationandformationofidentity,socialconstructionistanddiscursiveanalysisofgender.

GenderandEconomy: SegmentedLabourMarketandLabourForceParticipation,Occupational SegregationandWageDiscrimination, GenderStereotypingInWorkPlace.

Unit-III:Genderlens: politicalandlegal systems

Gender representation in Indianpolity,GenderDimensionsinElectoralpolitics, GenderExclusion in Politics, Gender Perspective of personal Law, social Legislations and womenEmpowerment.

Unit-IV:GenderandEducation

GenderDisparityinEducation,GenderBiasinSchoolCurriculum,Andro-Centricconstructionof knowledge,Educationgoals fromgenderperspective.

Unit-V:SocialDynamicsofGender

PatriarchyandGender–power;Capitalismand Gender; Caste, Class,RaceandGender.

References

- ChristineHewardandSheilaBunwaree(eds)1999.**Gender,Education&Development:BeyondAccessto Empowerment.**London:Zed Books Ltd.
- DeborahEade(ed)2006.Development withWomen.Jaipur,RawatPublications
- GoetzAnneMarie2001.**WomenDevelopmentWorkers**. NewDelhi: SagePublications.
- LewisJane(ed).1983**Women'sWelfare.Women'srights**.London:CroomHelmLtd., 1983.
- Mahadeva.HealthEducationforBetterQualityofLife.B.R.PublicationsNewDelhi,1990.
- MartinWoodheadandDorothyFaulkner(eds)1999.**MakingSenseofSocialDevelopment.** London:Routledge.
- NarasimhanWSakuntala1999. **EmpoweringWomen**.NewDelhi,SagePublications.
- NussbaumMarthaC.1999.**WomenandHumanDevelopment**.NewDelhi:KalifforWomen.
- NussbaumMartha C.2000.**Women andHuman Development**. Chicago, Cambridge Press.
- Park,J.E.andPerk,K.1988.**TextBookofPreventiveandSocialMedicine**Jabalpur,BanarsidasPublishers.
- Tumin Melvin M. 1999. **Social Stratification: The Forms and Function of Inequality**. NewDelhi: Prentice. Hallof India.
- TSSaraswathiandBalijitKaur(eds)1993.**HumanDevelopmentandFamilyStudies inIndia:** An Agendafor ResearchandPolicy. NewDelhi:Sage Publications.
- YadavC.P.(ed)2000**.EmpowermentofWomen**.NewDelhi,Anmol Publications.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Explain the biological and cultural determinants of gender roles;
2.	**CO2**	Demonstrate the prevailing asymmetric division of labour between the two genders in the society;
3.	**CO3**	Illustrate gender disparities in political, economic, and legal systems;
4.	**CO4**	Criticallyevaluate Anglo centric nature of the education system in India which is biased towards women;
5.	**CO5**	Design policies to overcome the problems being faced by women in the patriarchal Indian society;

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	3	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-105C(CompulsoryFoundatio	SOCIALPROCESSESANDBEHAVIOURALISSU	06	4
Sessional Marks: 20	End Semester Examination Marks: 80		

Objective of the Course:

1. To impart the social and behavioral principles in the work place and in the civil society;
2. To inculcate the leadership skills among the youth.

Unit– I: SocialProcessandIssues IndianEnvironmentthechangingscenario– SocialIssuesandOrganizationalRelevance– Organizational values andwork ethics.

Unit–II:IntraPersonal Process

UnderstandHumanBehavior

Perception –Definition, Mechanisms of perception, factors influencing perception– perceptionand its implications in organizations. **Motivation**–MotivationalProcess– Maslowhierarchicaltheory.

Unit–III:InterPersonalProcess

Communication –Concept, types–Communication Model, Barriers to EffectiveCommunication–Effectivecommunication techniquesforwomen. **Unit–IV:Group andInterGroupProcess**

Buildingof rapport andmobilizationofruralpeople–interactionwithpeople– Groupformation –Groupprocess –Groupdynamics.

Unit–V:Organizational Process

Power dynamics – Male, female – Organizational – Culture with particular referenceto women

Practicals:

- PracticalsregardingMotivation
- PracticalsregardingCommunication
- Practicalsregardingleadership
- PracticalsregardingConflict
- PracticalsregardingPersonality

Reference:

- *Mullins, Laurie J; 1989 – Management and organizational Behaviour, Pitman: GnatBritain.*

- *Stephen. P Robbins, 1988; Organizational Behaviour: Concepts, Controversies andApplications.Prentice – Hall.*

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Enumerate the knowledge on social process, social issues and organizational values and ethics needed for workers;
2.	CO2	Understand the basic human behavior in terms of such useful concepts as perception and motivation;
3.	CO3	Demonstrate effective communication skills needed to
		develop social and organizational culture particularly among women;
4.	CO4	Mobilize peopleto create groups and to build rapport among members within the group and between the groups;
5.	CO5	Evaluatethe values and work ethics,personalities through Motivation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-106a (ElectiveFoundation)	**Human Values and Professional Ethics – I**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To create an awareness on social ethics and human values;
2. To instill moral and human values among the students;
3. To appreciate the rights of others.

UNIT–I

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal,MedicalandEnvironment.NeedandImportanceofProfessionalEthics-Goals- EthicalValues in variousProfessions.

UNIT–II

NatureofValues-GoodandBad,EndsandMeans,ActualandpotentialValues,Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty,obligation, justice, responsibility and freedom, Good behavior and respect for elders.

UNIT–III Ahimsa(Non-Violence),Satya(Truth),Brahmacharya(Celibacy),Asteya(Nonpossession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)- Dharma(Righteousness),Artha(Wealth),Kama(FulfillmentBodilyDesires),Moksha(Libera tion).

UNIT–IV

BhagavadGita-(a)Niskamakarma.(b)Buddhism-TheFourNobleTruths- Aryaastangamarga,(c)Jainism-mahavratasandanuvratas.ValuesEmbeddedinVariousReligions, Religious Tolerance, Gandhian Ethics.

UNIT–V

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b)Viewson manu and Yajnavalkya.

Booksforstudy:

1. JohnSMackenjie: Amanualof ethics.
2. “TheEthicsofManagement”byLarueToneHosmer,RichardD.IrwinInc.
3. “ManagementEthics-integrityatwork’byJosephA.PetrickandJohnF.Quinn,ResponseBooks: New Delhi.
4. “EthicsinManagement” byS.A.Sherlekar,HimalayaPublishingHouse.
5. Harold H. Titus: Ethics for Today
6. Maitra,S.K:Hindu Ethics
7. WilliamLilly:IntroductiontoEthics
8. Sinha:AManual ofEthics
9. Manu:ManuDharmaSastraortheInstituteofManu:ComprisingtheIndianSystem ofDuties: Religious andCivil(ed.) G.C.Haughton.
10. SusrutaSamhita:Tr.KavirajKunjanlal,KunjalalBrishagratha,ChowkambaSans kritseries,VolI,IIandIII,Varnasi, VolIOO, 16-20,21-32 and 74-77only.
11. CarakaSamhita :Tr. Dr.Ram Karan Sarma and VaidyaBhagavan Dash,ChowkambhaSanskritSeries office,VaranasiI,II,IIIVolIPP 183-191.
12. Ethics,TheoryandContemporaryIssues,BarbaraMackinnon,Wadsworth/Thom sonLearning,2001.
13. AnalyzingMoralIssues,JudithA.Boss,Mayfield PublishingCompany,1999.
14. AnIntroductiontoAppliedEthics(Ed.)JohnH.PietandAyodhyaPrasad,CosmoPu blications.
15. TextbookforIntermediatelogic,EthicsandHumanValues,boardofIntermediateE ducation&Telugu AcademicHyderabad
16. I.CSharmaEthicalPhilosophyofIndia.Nagin&coJulundhar.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define clearly the concept of Ethics, their relationship with other subjects and their importance in different professions;
2.	**CO2**	Explain different types of moral values needed for a human being;
3.	**CO3**	Apply various ethical principles preached and practiced by the great personalities of Indian Society.
4.	**CO4**	Compare and contrast the moral values advocated by different religions germinated from the Indian soil;
5.	**CO5**	Evaluate the relative efficacies of Reformative, Retributive and Deterrent methods to curb crimes in the society;

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-106b(ElectiveFoundation)	**LEADERSHIPVALUES–I**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objective of the Course:

1. Theobjectiveof thecourseis toenablestudents todevelopa theoreticalunderstandingabout concept and theories ofleadership over time.
2. The course will also make them capable of realizing the behavioural approach,situationalapproach,leadershipeffectiveness; leadershipacross cultures;
3. To provide a hands-on leadership learning experience focusing on leadershipas an outgrowth of universal values that will help as effective and ethicalleaders.

Unit-1 Leadership - concept, definition, roles and characteristics, and functions of aleader.Factorsdeterminingeffectivenessofaleader,thebasesofpowerforleadership. Power- bases of Power, power tactics; conflicts- sources, patterns, levelsandstrategies.

Unit-2 Techniquesofidentificationofleaders,typesofleadership,trainingforleadership, methods of developing leadership. Value based leadership. Leadershipacross cultures. Community based leadership – Characteristics of community leaders,types of communityleaders.

Unit-3 Group Decision making and Communication: Concept and nature of decisionmaking process; Individual versus group decision making; Nominal group techniqueandDelphitechnique;communicationeffectivenessinorganizations;Feedback,Im provingInter-personalCommunication-TransactionalAnalysisandJohariWindow.

Unit-4 Concept and theories of leadership- Behavioural approach, Situationalapproach,Leadershipeffectiveness; Leadershipacrosscultures;OrganizationalDevelopment and Stress Management: Concept and determinants of organizationalculture,creatingsustainingandchangingorganizational culture.

Unit V- Leadership for Sustainable Development - Disaster Risk Reduction andManagement - Human Rights Education - Environmental Education: Theories ofleadership and management in educational organizations - Theories of leadership andmanagement styles including emotional intelligence - Theories and models ofeducational leadership (including curriculum, professional, academic, instructionalandstudent-centered leadership)

SuggestedReadings:

- Dhama, O.P. and Bhatnagar, O.P "Extension and Communication forDevelopment",OxfordIBH, New Delhi.
- HaroldW. Boles and James A.Davenport. "Introduction to EducationalLeadership"HarperandRow Publishers, New York.
- Harold .L Nix. "Identification of leaders and their involvement in planningprocess"PHS-1998. Community Environmental Management Series, U.SDepartmentofHealth education and Welfare.
- Robbins, Stephen P. and Timothy A.Judge,"Organizational Behaviour",Prentice-Hall, New Delhi.
- Robins S.P., and Mathew, M., Organizational Theory: Structure, Design andApplication,PrenticeHall ofIndiaPvt.Ltd.
- Luthans,Fred,OrganizationalBehaviour,McGraw-Hill,NewYork.
- Sekaran, Uma, Organisational Behaviour: Text and Cases, Tata McGraw-HillPublishingCo.Ltd.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept of Leadership and thebasesofpowerforleadership;
2.	**CO2**	Explain the typesofleadership,methods of developing leadership, value based leadership, etc.
3.	**CO3**	Demonstrate the significance of Decision making and Communication inorganizations;
4.	**CO4**	Analyze the theories of Leadership and Leadershipacrosscultures;
5.	**CO5**	Asses the Leadership for Sustainable Development in different facets.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	3	3

SEMESTER-II

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS- 201 (Core)	**Women and Development**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objective of the Course:

1. To familiarize the students with Women Development from the Gender perspective;
2. To emphasize the need for collecting, incorporating and analyzing data on women development from gender perspective;
3. To educate the students on the need for gender planning and gender budgeting

Unit– I

i) ConceptsandDevelopment–Definition,meaningandscope–womenandDevelopment– Womenin Development–Genderand Development

ii) HumanDevelopmentIndex–GenderDevelopmentIndex

Unit–II

Socio Economic Development of women's Development – Education, Employment, Health,PoliticalParticipation,andMassMedia Housing.

Unit – III

Women'sDevelopmentunderFiveYearPlans–WelfarePerspective(I-V)–Development Perspective (VI – VII Plan) – Empowerment Perspective (VIII plan onwards)GenderMainstreaming

Unit– IV

Policies of Government of India for the Development of Women – National Policy for theEmpowerment of women – 2001, New Economic Policyand its impact on women – 1991,GenderBudgeting.

Unit – V: Policies and Programmes for Women's Development:

Programs of State Government: Mother and Child Tracking System (MCTS 2009), IndiraGandhiMatritvaSahyogYojana(IGMSY2010),(RGSEAG)RajivGandhiSchemeforEmpowermentofAdolescentGirls2010,Swayamsiddha2001,NationalMissionforEmpowermentofWomen(NMEW-2011),SwarnaJayantiShahariRozgar Yojana(SJRY),Indira KrantiPathakam (Velugu)Girl Child Protection Scheme,AndhraPradesh(GCPS-2015)BangarThalli-MaaintiMaha LakshmiPathakam2013

ProgramsofCentralGovernment:,ICDS,PMAY(PradhanaMantriAwaasYojanajun25th -2015),NutritionProgrammesforAdolescentGirls(NPAG)2002-03,NationalRuralLivelihood Mission (NRLM-2011), Mahatma Gandhi National RuralEmployment GuaranteeScheme(MNEREGA2005),BetiBachaoBetiPadhaoSceme2015,DWCRA1984, KishoriShakti Yojna

National Organizations: National/State Commission for Women (NCW), National Instituteof Public Cooperation and Child Development (NIPCCD), RashtriyaMahilaKosh (RMK),Role and functions of the Dept. of Women & Child Development – Central Social WelfareBoard– State SocialWelfare Board

References:

- Paul Chowdary, D. “Women Welfare and Development (A Source Book)”, Inter- India Publication,NewDelhi –1991.
- Lakshmi Devi, “Women Empowerment and Societal improvement”, Anmol Publications, Pvt. Ltd.,NewDelhi –1998.
- LakshmiDevi,“WomenandDevelopment”,AAnmolPublications,Pvt.Ltd.,NewDelhi–1998.
- Andal,N.“WomenandIndian Society”,RawatPublications, NewDelhi–2002.
- “Draft National Perspective Plan for Women, 1988-2000 AD”, Department of women and ChildDevelopment,Govt. ofIndia.
- Mahadevan, “Women and Population Dynamics (Perspectives from Asian Countries)”, SagePublications,NewDelhi–1989.
- MaithreyiKrshnaraj, “Women and Development (The Indian Experience)”, ShubhadaSaraswatPrakasam,Pune,1988.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Get familiar with the concepts of Gender Roles, Gender equality, practical and strategic needs of women;
2.	**CO2**	Explain different frameworks for Gender Analysis and Gender Mainstreaming which act as tools for women development;
3.	**CO3**	Interpret various indices developed to unearth the gender inequalities at global and national levels;
4.	**CO4**	Apply the processes and the tools to the issues related to
		women development with equality and social justice.
5.	**CO5**	Design the plans and policies to engendering the process of women development.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	2	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-202(Core)	RESEARCH METHODS & SPSS	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To provide the theoretical and conceptual knowledge to carry out the research in social sciences;
2. To impart the knowledge of Feminism research concepts, Feminist Epistemology, Feminist stand point, Research Design and Types of Research Design.
3. To provide the knowledge in applying the simple Statistical Tools for analysis of data.

Unit – I : Introduction Research with special reference to Women's Studies: Definition – Meaning – Objectives and uses of Social Science Research.definition–Meaning–ScopeandsignificanceofResearchinWomen'sStudies. Definition – Meaning and Functions of Research Design – Steps in Research Design – Problemformulation– Conceptualization–Hypothesis–TypesofResearchDesign:Exploratory,Diagnosticand Experimental

Unit– II:Sampling

Definition–meritsanddemeritsofsampling–TypesofSampling–ProbabilitySampling–RandomSampling–MultistageSampling– ClusterSampling –StratifiedSampling –SystematicSampling.

NonProbabilitysampling–PurposiveSampling–ConvenienceSampling–QuotaSampling–SnowballSampling.

Unit–III:QuantitativeandQualitativeTechniques

CharacteristicsofQuantitative andQualitativeresearchQuantitativemethods:Interview–

questionnaires(Schedule).

Quantitative Methods – Observation – Participatory research – Case Studies – Focus Group – OralHistory.OtherMethods:ActionResearch.

Techniques– Scaling(Thurstoneandlikertscales). **Unit–IV:Statistics**

MeasuresofCentralTendencies– MeasuresofDispersion –SD– SP– SimpleCorrelation.

't'Test(Students't'distribution with simplemean)chi-squaretest(2 x2,3 x3).

Unit–V:ReportWritingandPresentation Research Project Proposal – Report Writing and Presentation – Bibliography – References – Footnotesand Citation.

Practicals:

- SPSSPackageand usage.
- Preparationofvariouscharts

References:

1. Kitari C.R. : "*Research Methodology, Methods and Techniques"* (New Delhi : Wiley Eastern Ltd.,2001).
2. GoodeW.J.&HattP.K.:"*Methodsin socialResearch*",(London:Mc. Grand HillBookCo.,1952).
3. BabbieEarl :*"The Practice for Social Research"* (London : Wadsworth Publishing Co., 1983).Wilkinson T.S. &Bandarkar :*"Methodology and Techniques of Social Research"* (Bombay : HimalayaPublishingHouse,1979).
4. SarmaKVS.:*"Statistics MadeSimple"*,(NewDelhi:Prentice, HallofIndiaPvt.Ltd.,2001).Young P.V.:*"ScientificSocialSurveysand Research"*(NewYork:PrenticeHall,1966).
5. Neera Desai and Maithreyi Krishna Raj :*"Women and Society in*

India" (New Delhi : AjanthaPublications,1987).

6. SNDT Women's University Publications " *Contribution to Women's Studies Series – 4,4, Oral HistoryinWomen'sStudiesConcept, Method and Use"* (Bombay:SNDTWomen'sUniversity,1990).
7. Blalock M. Hubert :*"Conceptualization and Measurement in the Social Sciences",* (New Delhi, SagePublication,1982).
8. Kotari C.R. : "*Research Methodology, Methods and Techniques"* (New Delhi : Wiley Eastern Ltd.,1985).Guptha B.N.:*"Statistics"* (Agra :Aahithya Bhavan, 1984).
9. Dev Doss RP and Kulandavel K. – Hand Book of Methodology of Research – Oxford Press, 1985.Garett– StatisicsinPsychologyandEducation– 10th IndianReprint1986ValeitsFeferandSimsonsco.,Bombay.
10. Sharma S.R. – Statistical methods in Educational Research – Anmol Publication Pvt. Ltd., New Delhi,1994.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Describe the fundamentals of Research Methods in general and those in the field of Gender Studies in particular;
2.	**CO2**	Demonstrate the knowledge in sampling techniques needed for social science research;
3.	**CO3**	Analyse the differences between quantitative and qualitative research, schedules and Questionnaires and also different types of scaling techniques.
4.	**CO4**	Apply knowledge on measures of central tendencies, dispersion, correlation, regression and tests of significance to analyse the data collected for the research projects and will be able to interpret the results
5.	**CO5**	Prepare Research Proposals for bringing about social change and submit the same to the funding agencies for financial assistance.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	2	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-203 (Core)	**Sales & Marketing Management with focus on GenderPerception**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To provide the theoretical and conceptual knowledge on Sales & Marketing;
2. ToexplainthestrategicOrganizationalandMarketingPlanningProcess;
3. To provide the knowledge about the procedures involved in promotion of Sales & Marketing of new and existing enterprises;
4. To create interest and to train students in Sales & Marketing field.

UNIT– I Marketing:Meaning&Significance–MarketingPhilosophies–ImplementingMarketingConcept–ConceptualframeworkofMarketing,MarketingMix– Marketing Environment – Green Marketing – Organizing Marketing – Women andMarketingManagement.

UNIT– II

Marketing Planning–Marketing Research&InformationSystem–Demand andSalesForecasting– Segmentation– Targetingand Positioning

UNIT– III

Product Strategy – Product Classification – Product Mix – Product Line – Branding &Packaging – Product Life Cycle Strategies – New Product Development – InnovationDiffusion– PricingStrategy–Objectives of Pricing
– Factors Influencing the Price – Methods of Pricing Cost Based – Demand Based – Competition Based – New Product Pricing – Role played by Women in Product studyand ProductMix.

UNIT– IV SalesManagement–GoalsandFunctions–Salesmanship–SellingSkills–Buyer– SellerDyads –TheoriesofSelling–Conceptualframe workofSales–SellingProcess SalesTerritories–RoutingandSettingSalesQuotas–SalesContests,WomenandSalesManagement– Women and Sales SellingSkills inWomen.

UNIT– V

Compensating Sales Personnel – Developing and Administering Sales Personnel – MotivatingSalesPeople–SalesEvaluation–SalesAnalysis–SalesExpensesControl– Sales Audit– Women in Sales andSales and Women.

PRACTICALS

- A Studyreport onSellingSkills of Women
- Casestudyanalysis ofMarketing&Sales Management

REFERENCES

1. PhilipKotler,**"MARKETINGMANAGEMENT"**(PearsonEducation)
2. Kotler&Armstrong,**"PRINCIPLESOFMARKETING"**–PrenticeHall,India.
3. Kotler,Philip,**"MARKETINGMANAGEMENT–ANALYSISANDCONTROL"**Prentice–HallofIndia Pvt. Ltd.:NewDelhi,1986.
4. S.NeelaMegan**"MARKETINGIN INDIA"**(Vikas)
5. Still,Cundiff&Govanti,**"SALESMANAGEMENTDECISIONS,STRATEGIESANDCASE"**,Prentice –Hall ofIndia
6. DavidJobberand GeoffLancaster,**"SELLINGANDSALESMANAGEMENT"**,PearsonEdition
7. VaswarDasGupta,**"SALESMANAGEMENT–ININDIANPERSPECTIVE"**,Prentice–HallofIndia

Course Leaning Outcomes

(CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Define the concept of Sales and highlight the qualities and functions of Marketing;
2.	CO2	Explain the significance ofWomen andMarketingManagement;
3.	CO3	Demonstrate a business idea, business plan and Sales & Marketing Mix analysis;
4.	CO4	Analyze the recent trends in SellingProcess and SalesTerritories Sales of the Women enterprises products and challenges being faced by women in Marketing in India;
5.	CO5	Asses the Marketingperformance for Developing and Administering Sales Personnel

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-204 (Core)	**Skill DevelopmentTraining- C Language,DBMS, Communication&Softskills**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To provide the theoretical and conceptual knowledge of Channelsofcommunication;
2. ToexplaintheSignificance of presentationskills;
3. To provide the knowledge about C Programme basics;

Unit– I:

Communication: Meaning–Process–Barriers–principles–interpersonalcommunication–formalVs. informal Communication – Critical and Lateral Channelsofcommunication–oralcommunication:PublicSpeaking–Listeninganditsimportance – interview – Art of Conducting Good Interview and fairing in interview – writtencommunication:Essentialsofeffectivewrittencommunication,Letterwriting,memos, circulars, minutes, proposals, reports

Unit– II : Soft Skills SoftSkills: Concept&Significance–presentationskills–influencingskills–negotiatingskills–culturetraining–time management–teambuildingskills–motivationskills–leadershipskills:Definition–scope–functionsandcharacteristics of leader – Gender issues in Leadership – Methodology adopted forCapacitybuildingof women

Unit– III: 'C'Language

Introduction: History of C language – Features of C – Programme Development steps-SimpleCProgramme–Variables–Constants–Data Types–ArithmeticExpressions :Workingwithvariables–understandingdatatypesandconstants—theprintfunction– the scan ffunction.

Arthimetic,Relational&LogicalOperators,Increment&DecrementOperators,ConditionalOperators,BitwiseOperators,AssignmentOperators,ControlFlowStatements:If,If-else, nested if else

Decision making : the for statement – nested for loop – the while statement – the doWhile

Unit-IV

Arrays-Concepts,declaration,definition,accessingelements,twodimensionalarray,string-concepts, declaration, definition, stringfunctions.

Workingwithfunctions–Definingafunction–arguments–localvariables–returningfunctionresults –globalvariables.
Pointers-Concepts,declaration,definition,useof pointers,pointerstofunctions

Unit-

VDBMS :

File Processing System- Disadvantages of File Processing system- Introduction toDBMS – file system Vs. DBMS why the database is important – Advantages ofDBMS– Introduction to SQL : Data definition commands (DDL) – Data manipulationcommands(DML) – DataControl Commands (DCL)–Select Queries.

REFERENCE

S:

- Bills Scot, “THE SILLS OF COMMUNICATION”, Gower publishing companyLimited,LondonLarryL.Barker.“COMMUNICATION”,Prentice Hall ofIndia,NewDelhi
- Lesikerandpetin,“BUSNINESSCOMMUNICATION”,PrenticeHallofIndia,NewDelhi
- PiyushDharChaturvedi and MukeshChutervedi, “BUSINESS COMMUNICATION”, PearsonEducation
- BalaguruswamyC, ‘PROGRAMMINGC”
- LetUsCbyYeswanthKanethkar
- DatabaseSystemConcepts,*SixthEdition,*AviSilberschatz,HenryF.Korth,S.udarshan

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept and channels of communication;
2.	**CO2**	Explain the about presentationskills and Capacitybuildingof women;
3.	**CO3**	Demonstrate Structure C Programming;
4.	**CO4**	Analyze the Arrays-Concepts,declaration,definition andaccessingelements;
5.	**CO5**	Asses the difference between file system and DBMS.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS- 205 A (CompulsoryFoundation)	**CAPACITY BUILDING AND LEADERSHIPTRAINING**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To make the students to understand the types of leadership, qualities and skills of leadership;

2. To impart the students the necessary skills to become gender sensitized leaders and managers;

3. To appraise the students the need for attending training courses for capacity building and enhancing the leadership qualities.

UNIT-I:Leadershipqualitiesandskillsofaleader

Meaning,definition,scope and importance of leadership, Essential Characteristics an EffectiveLeader, leadership status- ascribed and achieved: need of leadership for women, and status ofwomenleadership.

UNIT-II:TYPESANDTHEORIESOFLEADERSHIP

TYPES OF LEADERSHIP AND TRAITS: Autocratic/participative, Laissez-faire,Theories ,trait,behavior, situationaland transformational.

UNIT-III:Barriers andwaysforpromotingleadership

Barriers in developing leadership: Gender difference in leadership with special reference toindia, Ways for developing leadership skills: participation-definition need and importance,typesandtools ofparticipation for promotingleadership amongwomen.

UNIT-IV:Capacitybuildingandstructure

Concept and definition, scope, need and importance of capacity buildingfor individuals andorganizations/institutions/projects,typesofcapacitybuilding:trainings,workshops,confe rences,seminars, symposiums, field visits, observation/exposure visits/crosslearning visits….etc., planning a training Programme:Training Programme: Training needsAssessment(TNA)atdifferentlevels

UNIT- V: ROLEANDSKILLSREQUIREDFORATRAINERANDTRAININGOFTRAINERS(T OT)

Role of a trainer: before, during and after training Programme, skills of trainer and guidelinesfortraining:skillsrequiredforatrainer(facilitationandcommunication);guidelinesforconducting a training, building leadership through capacity building among through capacitybuildingamongwomen :TOTProgramme onleadership, PRIand gender.

REFERENCES

Webbasedreferences:

- Capacity building Activities: A compendium – Second Edition January 2004http://www.ainc-inac.gc.ca\bc\proser\proser\fna\ccp\cpcpdme.htm
- LeadershipWikipedia
- Gender Awareness and sensitivity applications- Training Resources pack:Unnathi OrganizationforDevelopment Education;www.unnati.org

- Leading to choices: A leadership Training Handbook for women;www.learningpartnership.org

BookReferences:

- ByStydzienski,jill,ed.,WomenTransformingPolitics(1992);World-wideStrategiesforEmpowerment,Bloomington, Indiana:Indiana Universitypress
- Chambers,Report(2003):participatoryworkshops,Eathscan,india
- Hollander,E.p(1978).Leaderdynamics.newyork:Thefreepress
- Udaipareek(1996):Organizationalbehaviorprocess;newdelhi,RawatPublications

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Identify the skills, qualities and characteristics required for a successful leader;
2.	CO2	Explain various types and theories of Leadership;
3.	CO3	Analyze the barriers to become a leader and the methods of acquiring necessary skills and traits to become an efficacious leader among women;
4.	CO4	Define the concept of 'Capacity Building' and list out various means to build the capacity of a popular leader;
5.	CO5	Evaluate the roles, skills and qualities of Trainer and Trainer of Trainers to train successful leaders

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS- 205 B(CompulsoryFoundation)	**GENDERANDMEDIA**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1) To enable the students to understand the issues relating to women's participation in politics and governance;
2) To sensitize the students on gender issues in governance and media;
3) To make the students to realize the need for having responsible media to protect the self-esteem of women.

Unit1

:

Theories from cultural studies, film and gender studies, and communicationstudies:mediaandrepresentationoffemininityandmasculinity.Mediaandconstructionofgendernormsandstereotypes:FilmscreeningsanddiscussiononStereotypes:Portrayals of the rural woman, woman in paid employment, morality and the badwoman,popularcultureand interpretation ofgender.

Unit.2

:

Critical analysis of Gender in Magazines and Newspapers. Advertising and the imageofwomen. Women's magazines. Politics of paid news.

Unit3:

Internetanditssocialimpacts.Internetandwomen:empoweringoratoolfordisempowerment.

Unit4

:

Media, gender,and its intersections with casteand class. How socialnormaboutgendergetsenacted,representedandhasanimpactonidentityformationsandcommunication.

Unit5

:

Media as a socio-cultural mechanism that shapes individual and collective notions

ofidentity:essentiallywhatit means to bemaleorfemale.

References:

1. ValdiviaAngharad.1995.Feminism,Multiculturalism&theMediaGlobalDiversities.London: SagePublications.
2. CreedonPamela.1994.Women,MediaandSport:ChallengingGenderValues.Thousand Oaks: Sage
3. KosambiMeera.1994.Women'sOppressioninthePublicGaze:AnAnalysisofNewspaper Coverage,StateActionandActivistResponse.Bombay:ResearchCentreforWomen s University.
4. TannenDeborah.1994.Gender and Discourse.NewYork:OxfordUniversityPress.
5. JosephAmmu.1994.WhoseNews?:TheMediaandWomensIssues.NewDelhi:Sage.
6. PrasadKiran(ed.)2005.WomenandMedia,ChallengingFeministDiscourse.NewDelhi:TheWomen Press.
7. BhasinKamlaandBeenaAggarwal(ed.)1984.WomenandMedia:Analysis,Alternativesa ndAction. ISISInternational

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	understand the abysmally low levels of women's participation in politics;
2.	**CO2**	Explain the causes of low levels of women's participation in governance and the stalemate in passing the Women's Reservation bill in Parliament;
3.	**CO3**	Convince the need for Gender Auditing and Capacity Building in the areas of Women's participation in politics and Governance;
4.	**CO4**	Evaluate the indecent representation of women in different media;
5.	**CO5**	Create alternate media with` gender perception.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-205C(CompulsoryFoundation)	**Social Work Initiatives for Women's Development**	06	4
Sessional Marks: 20	End Semester Examination Marks: 80		

Objectives of the Course:

1) Inculcate the knowledge on the socio-economic and cultural realities of the present society;
2) To analyse the impact of current situation on marginalized women in agencies or in community.
3) Apply the knowledge gained in the classroom to real world situation through Casework - Group work - Community Development projects.

Unit– I

Social Work – Definition, objectives and functions - Values and Principles of SocialWork-Social Work PracticeinIndia.

Unit– II

Social Work Methods – Social Case work – Definition, Scope, Purpose, Components-Principles, Process and Approaches to Case work. – Social group work – Definition,Scope, Objectives, Purpose, Principles, Process of Social group work - Application towomenin need.

Unit– III

CommunityOrganization–Definition,ProcessandPrinciplesofCommunityorganization–SocialAction,Definition,Scope,Principles,socialactionforimprovement of women – Social Welfare Administration, concept, definition - socialwelfareadministration atcentre, stateandlocal levels.

Unit– IV FieldsofSocialWork–Familywelfare,childwelfare,schoolsocialwork,correctionalinstitutions,MedicalandPsychiatricsocialwork,Industrialsettings,gerontology,Communitydevelopment.

Unit– V SocialworkinitiativesforWomen–Methodsandstrategies–SocialworkinterventionstowomeninvarioussituationsandsettingsincludingIndigenous,migrant,displaced and poor women.

Practicals:

Develop knowledge of the socio-economic and cultural realities, and their impact ontheclientsystemwithspecificfocusonmarginalizedwomeninagenciesorincommunity and applying the knowledge gained in the classroom to reality situationthrough

Casework-Groupwork-CommunityDevelopment.

References:

1. SinghD.K.&Bhartiya,A.K.,SocialWork-Concepts&Methods,NewRoyalBookCompany,Lucknow.
2. EncyclopediaofSocialWorkinIndia,Ministryofwelfare,Govt.ofIndia,NewDelh i,1987.
3. FriedlanderW.A.,IntroductiontoSocialWelfare, PopularPrakashan,NewDelhi.
4. R.k.Upadhyay, SocialCasework.Rawatpublications,NewDelhi
5. SanjayBhattacharyaSocialwork:AnIntegratedApproach,DeepandDeeppublica tionsNew Delhi.
6. SiddiquiH.Y.Groupwork,TheoriesandPractices,Rawatpublications,Jaipur
7. BargerG.andSpechtH.,CommunityOrganization,ColumbiaUniversityPress,NewYork,1969.
8. GangradeK.D.,CommunityOrganizationinIndia, PopularPrakashan,Bombay1971.
9. ChaudhariD.Paul,Social WelfareAdministration, AtmaRam &Sons, Delhi

10. GoelS.L.&JainR.K.SocialWelfareAdministration:TheoryandPractice,Vol.I&I I,Deep and Deep Publications, New Delhi,1988

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept of Social Work, its objectives, principles and functions in India;
2.	**CO2**	Explainthe concepts of Social Case Work and Social Group Work as well as their principles, practices and applications to solve specific problems of women;
3.	**CO3**	Analyzethe impact of Community Organization and Social Welfare Administration in augmenting the welfare levels of
		women;
4.	**CO4**	Judge the role of Social Work Organizations in promoting the welfare of families, children and in correcting the abnormal behavior of women and children;
5.	**CO5**	Design institutions to protect the interests of different segments of women including Indigenous, migrant, displaced and poor women.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS- 206 A (ElectiveFoundation)	**Human Values and Professional Ethics-II**	06	4
Sessional Marks: 20		End Semester Examination Marks:	

Objectives of the Course:

1. To create an awareness on social ethics and human values;
2. To instill moral and human values among the students;
3. To appraise the rights and responsibilities of citizens.

UNIT –I Value Education- Definition - relevance to present day - Concept ofHumanValues-selfintrospection-Selfesteem.Familyvalues-Components,structureandresponsibilitiesoffamily-Neutralizationofanger-Adjustability- Threats of family life - Status of women in family and society - Caring for needy andelderly-Time allotmentforsharingideas andconcerns.

UNIT –II Medical ethics- Views of Charaka, Sushruta and Hippocratus on moralresponsibility of medical practitioners. Code of ethics for medical and healthcareprofessionals.Euthanasia, Ethical obligation to animals, Ethical issues in relation tohealth care professionals and patients. Social justice in health care, human cloning,problemsofabortion.Ethicalissuesingeneticengineering andEthicalissuesraisedbyn ew biological technologyor knowledge.

UNIT –III Businessethics-Ethicalstandardsofbusiness-Immoralandillegalpractices and their solutions. Characterics of ethical problems in management, ethicaltheories,causes ofunethical behavior,ethicalabuses andworkethics.

UNIT –IV Environmental ethics- Ethical theory, man and nature- Ecological crisis,Pest control, Pollution and waste, Climate change, Energy and population, Justice andenvironmentalhealth.

UNIT –V Social ethics- Organ trade, Human trafficking, Human rights violationand social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media- ImpactofNewspapers, Television, Movies andInternet.

Booksforstudy:

1. JohnSMackenjie:Amanual ofethics.
2. "TheEthicsofManagement"byLarueToneHosmer, RichardD.IrwinInc.
3. "ManagementEthics-integrityatwork'byJosephA.PetrickandJohnF.Quinn,ResponseBooks:NewDel hi.
4. "EthicsinManagement"byS.A.Sherlekar,HimalayaPublishingHouse.
5. Harold H.Titus:EthicsforToday
6. Maitra,S.K:HinduEthics
7. WilliamLilly:IntroductiontoEthics
8. Sinha: AManualofEthics
9. Manu:ManavaDharmaSastra ortheInstituteofManu:ComprisingtheIndianSystemofDuties:Religiousan dCivil(ed.) G.C.Haughton.
10. SusrutaSamhita:Tr.KavirajKunjanlal,KunjalalBrishagratha,ChowkambaSanskritseries,VolI,IIandIII,Varnasi, VolIOO,16-20,21-32 and74-77only.
11. CarakaSamhita:Tr.Dr.RamKaranSarmaandVaidyaBhagavanDash,ChowkambhaSanskritSeriesoffice, VaranasiI, II, III VolIPP183-191.
12. Ethics,TheoryandContemporaryIssues.,BarbaraMackinnon,Wadsworth/Thomson Learning,2001.
13. AnalyzingMoralIssues,JudithA.Boss,MayfieldPublishingCompany,1999.
14. AnIntroductiontoAppliedEthics(Ed.)JohnH.PietandAyodhyaPrasad,CosmoPublications.
15. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Education-Telugu Akademi, Hyderabad.
16. I.CSharmaEthicalPhilosophyofIndia.Nagin&coJulundhar

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Understand the significance of value education, the need for bestowing care for the needy and elderly persons in general and women in particular;
2.	CO2	Illustrate ethics needed for health care workers and medical professionals in the context of emerging advanced biotechnology and genetic engineering;
3.	CO3	Distinguish between ethical and unethical practices in business and apply the knowledge to maintain ethical standards in business.
4.	CO4	Judge the human responsibility towards protecting the environment, climate change, and to control pollution to maintain environmental sustainability;
5.	CO5	Create awareness in the society on social ethics, feminist ethics, ethics for responsible citizens and media for the benefit of the society as a whole.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS- 206 B (ElectiveFoundation)	**FAMILIALVALUESANDETHICS**	06	4
Sessional Marks: 20		End Semester Examination Marks:	

Objective of the Course:

1. Theobjectiveof thecourseis toenablestudents tounderstandthefamilyvalues.
2. The course will also make them capable of realizing the familystructures andfamilydynamics;
3. To enable the students to understand the structure of families and children.

UNIT-1

Defining familyvaluesandethics,promotingfamilyvalues,theimportanceoffamilyin Indian culture. Common characteristics, Family Rituals, Family Traditions, FamilyRoutines,FamilyFunctions,FamilyStructuresandFamilyDynamics,Fa milyConflicts ,FamilyViolence;Diversityoffamilies:Nuclearfamily,Jointfamily,Extendedfa mily,Workin gParents,Singleparents,Youngerparents,Fosterfamilies

UNIT-2

Family Life Cycle and Development Stages: Eight development Stages in Family lifecycle- Stage 1: Married couple—Stage 2: Child bearing families—Stage 3: Familieswithpreschoolchildren—Stage4:Familieswithschoolagedchildren-- Stage5:Families with Teenagers—Stage 6: Families with young adults—Stage 7: Middle-agedparentsintheemptynest-- Stage8:Ageingfamilymembers;Familydevelopmental tasks: Characteristics & Importance; Concept of Family health, FamilyWell-beingandFamilyEnrichment

UNIT-3

Definition,TypesofMarriage,Workingparents,DivisionoflaborinFamilies,Factorsthatinflu ence FamilyDynamics,MaritalDynamics,SocializationofChildren

UNIT-4

FeministandGenderPerspectiveonFamilies,ImpactofUrbanization/Modernizationon marriagestabilityand Parenting

UNIT-5

Parent Child Relationship, Family Stress, Sibling Rivalry, Child Rearing Practices,Issues and Concerns of Children and Families in Rural and Urban Areas, Children infamiliesexperiencingdomesticviolence.

References

1. Rao,ShankarC.N.(2007). IndianSociety,NewDelhi:SSChand&CompanyLtd
2. Lewis, David &Ravichandran, N. (2008). NGOs and Social Welfare: New Delhi:RawatPublications.
3. Iman, R. Pittin& Omelet, H. (1985). Women and the Family, Nigeria: Codersia BookSeries 4. Roy, Kalpana.(2000). Women and Child Development, New Delhi:CommonWealth Publications.
4. McCurdy Karen & Jones, Elizabeth. (2000). Supporting Families: Lessons from theField,USA: SagePublications.
5. Barik, S. (2011). Domestic Violence in India, Delhi: Adhyayan Publishers &Distributers
6. Gomango, S. P. (2005). Consequences of Child Maltreatment, New Delhi: AuthorsPress
7. Tiwari, Satish. (2000). Health and Family Welfare, Delhi: Anmol Publications Pvt.Ltd.
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9. Patel, Tulsi. (2005). The Family in India: Structure and Practice, Delhi:SagePublications

10. Ahuja,Ram,CrimeAgainstWomen,Jeypore:RawatPublications.
11. Charana, Karuna, Socialization Education and Women; Expositions inGenderidentity,New Delhi.
12. Chawala,Janet,ChildBearingandCulture,NewDelhi: ISI,1994.
13. GaryA. Becker, Treatiseon Family1991, HawardUniversityPress.
14. JyotiMitra(ed)(1996)WomenandSociety:EqualityandEmpowerment,New- Delhi,KanishkaPublishers, Distributors
15. Karkar,Sudhir,IntimateRelations,ExploringIndiansexuality,NewDelhiPenguinBooks, 1989.
16. Quoroshe,M.A., MuslimLaw ofMarriage:DivorceofMaintenance.
17. Parasher,WomenofFamilyLaw Reformin India.
18. R.M.Maclver&CharlesH.Page(1950)SocietyAnIntroductoryAnalysis,NewDelhi,Mac millanIndiaLtd.
19. Satri,Madhu,StatusofHinduWomen.
20. Sarkar,Latika,WomenandLaw:ContemporaryProblems.
21. Satni,S.P.,TowardsGenderJustice.
22. Mitra,Ashok,ImplicationsoftheDecliningSexRatioinIndia'sPopulation,Bombay,Allie d Publishers, 1979.
23. UshaS.Kanhere(1987)WomenandSocialization(AStudyofTheirStatus&RoleINLower CastesofAhmedabad),New Delhi, Mittal Publication.
24. National Perspective Plan for Women: Department of Women andChildDevelopment,Government ofIndia.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept of familyvaluesandethics;
2.	**CO2**	Explain the Family Life Cycle and Development Stages;
3.	**CO3**	Demonstrate the Factorsthatinfluence Familyand MaritalDynamics,SocializationofChildren;
4.	**CO4**	Analyze the impactofUrbanization/Modernizationon marriagestabilityand Parenting;
5.	**CO5**	Asses the Parent Child Relationship, Family Stress, Sibling Rivalry, etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	3	3	3	3	3	3	-	3
CO2	2	2	3	3	3	3	3	3	-	3
CO3	2	2	3	3	3	3	3	3	-	3
CO4	3	3	3	3	2	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

SEMESTER-
III

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-301 (Core)	GENDERSCIENCE&TECHNOLOGY	06	4
Sessional Marks: 20		End Semester Examination Marks:	

Objectives of the Course:

1. To inculcate 'Scientific Temper' among the students;

2. To understand how science and technology would assist women for their development;

3. To evaluate whether the science and technology would lessen or increase the work burden of women in their day to day life.

Unit–I: GenderandDevelopmentinScienceTechnologyandManagement

- DefinitionofGender,FocusonGender,GenderAnalysis
- MainstreamGenderinScience andTechnology
- GenderManagementSystem -Objectives-GMSStructures-GMSMechanisms
- MainstreamingGenderdevelopmentpolicies

Unit–II: EnvironmentandSustainableDevelopment:TheGenderDimension

- Women'sLocalandIndigenousKnowledgeSystems-Agriculture,BiodiversityandFood Security
- Education,CareersandDecision-Making

- Scienceforwomen:supportingwomen'sdevelopmentandlivelihoodactivitiesthr ough Science &Technology

Unit–III:ApproachesforapplyingGenderin ScienceandTechnology

- Capacitydevelopmentfor technologychoice
- Capacitydevelopmentfor promotingwomen ininnovation systems
- Approachesforaction:interconnectionsandempowermentthrougha genderPersp ective

Unit–IV:RuralWomenandTechnologyDevelopment

- Women in Technologyroles
- WomeninMicrofinance
- Impactof TechnologyonWomen andViceVersa
- TransferTechnologyforDevelopmentofWomen
- Self-HelpGroupWomenBeneficiariesandAdoptionofScience&Technology

Unit–V:TechnologySupportSystems

Financing–InformationSystems–OrganizingatEnterpriseLevel–WomenandInformationTechnologySystems.

Practicals:

- Reporton CaseStudies onWomen and Technology

References:

- Jain,S.C.,"womenandTechnology"–RawatPublications,JaipurBeghs,1985.
- Poonacha, Veena, Coverage of Women in the Print Media: Content Analysis of theSundayObserver, Research Centre for Women's Studies, SNDT Women's University,Bombay,1988.
- Singh, InduPrakash, Indian Women: The Power Trapped, Galaxy Pub, New Delhi,1991.
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- Elizabeth McGregor and FabiolaBazi (2001)Gender Mainstreaming in Science andTechnologyAReferenceManualforGovernmentsandOtherStakeholdersJune2001.
- Rege, Sharmila (ed), Sociology of Gender: The Challenge of Feminist SociologicalKnowledge,Sage,NewDelhi, 2003.
- Mohanty,Manoranjan,(eds),Class,Caste,Gender,Sage,NewDelhi,2004
- Malini Bhattacharya (Ed)., Women and Globalization, Tulika Books in Association ofSchoolof Women'sStudies, Jadapur University,New Delhi, 2005

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Define the basic concepts of Gender, Science, Technology and Management and discuss how science and technology can be mainstreamed in the development process of women;
2.	CO2	Explain how environment and science education would support the livelihood system of women and ensure food security and sustainable development;
3.	CO3	Analyze how capacity building can be used to mainstream women in innovation system at national and grassroots levels;
4.	CO4	Evaluate how rural self-help group women incorporate science and technology to become successful entrepreneurs;
5.	CO5	Design and develop a model project that would incorporate the appropriate technology in the industrial or business activity

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	2	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-302(Core)	C++&E- COMMERCE	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To provide the theoretical and conceptual knowledge of e-business;
2. ToexplaintheSocial, Legal, Privacy and Ethical issues;
3. To provide the knowledge about C++ Programme, C++ Programming basics;
4. To create interest and to train students in OOPS Concepts.

Unit-1

Introduction:ConceptofE-Commerce–Features–Drivingforces-Benefitsandlimitations–Applications of E-commerce – B2B and B2C models of E-commerce –E-Commercevs. E-Business-Regulatoryframework-Futureof E-commerce.

Unit-2

Issues in E-Commerce: Social issues - Legal issues – Privacy issues - Ethical issues – IPR issue. E-Commerce Applications: Advertising – Supply chain management – Marketing research – Financial services – Publishing – Entertainment - Retailing – Tradingstocks.(Theoryonly)

Unit-3:IntroductiontoC++

Introduction: Whatisobject-orientedprogramming?WhydoweneedobjectorientedProgrammingcharacteristicsofobject-

orientedlanguages,StructureProgrammingvsobjectorientedProgramming,Differencebetw eenC&C++,Structure of C++ Programme, C++ Programming basics, Variables, Constants, Datatypes,Header files, Manipulators.

Unit-4

ControlFlowStatements:If,If-else,nestedifelse-Decisionmaking:theforstatement – the while statement – the do While- Switch Statements – go to statements-breakstatements.

Functions:

Returning values from functions, Reference arguments, Overloaded function.Defaultarguments.Returningbyreference, Recursion,Enumerated Data Types.

UNIT-5

OOPS Concepts: (Encapsulation, Abstraction, Polymorphism, Classes, Inheritance,objects)constructors&Destructors-Overloading-recursion,functionparameterpassing,Types ofInheritance.

REFERENCEBOOKS:

1. ImplementingTally:Nadhani&Nadhani,BPB
2. BusinessDataprocessingSystem:P.Mohan,Himalaya
3. BusinessDataProcessingAndAccountingSystem:V.Srinivas, Kalyani
4. ManualsSuppliedalongwithrespectivepackages.
5. OOPS:Balaguruswamy
6. LetUsC++:YeswanthKanithkar

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept of E-Commerce,Features, B2B and B2C models;
2.	**CO2**	Explain the Social, Legal, Privacy and Ethical issues of E-Commerce;
3.	**CO3**	Demonstrate StructureProgrammingvsobject-orientedProgramming;
4.	**CO4**	Analyze the Decisionmaking and Iterative statements;
5.	**CO5**	Asses the OOPS Concepts.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credit
SVUWS-303(Core	**HUMAN RESOURCE PLANNING&**	0	4
Sessional Marks: 20		End Semester Examination	

Objectives of the Course:

1. To provide the conceptual and theoretical knowledge on Human Resources;
2. To train the students in the Management of Human Resources;
3. To ascertain the role of women in Human Resource Management and performance appraisal.

Unit–I:Basicsof HumanResource Planning

Introduction to HRP System – The Emerging Context – Process and Functions ofHumanResourcePlanning– MethodsandTechniques:DemandManagement–Methods and Techniques: Supply management – Contemporary Trends in ManagingDemand and Supply

Unit–II:ApproachestoAnalyzingJob&KeyHumanResourcePractices

JobAnalysis–ChangingNatureofRoles–
JobEvaluation:ConceptsandMethods– CompetencyApproaches toJobAnalysis
Recruitment –Gender Sensitivity in Recruitment – Selection–
Orientation – CareerandSuccession Planning–
PerformanceAppraisal

Unit– III:HRD :CONCEPT AND DESIGNINGSYSTEM The Process and System of HRD, Status and Role of Women in HRDCareer and Career System, Designing the training and development programsGenderSensitivityin Development Function.

Unit–IV:HRDSYSTEMSAND PROFESSION

RewardSystem Self-Renewal SystemProfessionaliz ation of HRD HRDStrategiesandExperiences

Unit–V:ROLEAND RESPONSIBILITIESOFHRD MANAGERS Role of HRD Manager -case studies of women managersMakingHRDFacilitator HRDInterventions TradeUnions rolein HRD

PRACTICALS:

1) CaseStudies(Nationaland International)
2) ReportsofCaseStudyAnalysis

REFERENCES:

1. DavidA.DecenzoandStephenP.Robbins:PERSONNEL/HRM
2. MNRudraBasavaRaj,DYNAMICPERSONNELADMINISTRATION,HimalayaP ubli shingHouse
3. GaryDesslerHUMANRESOURCEMANAGEMENTPrenticeHall IndiaPvt.Lmt.

4. BiswajeetPattanayak:HUMANRESOURCEMANAGEMENT,(PrenticeHallofIndia)
5. RobertL.Mathis,et.al:HUMANRESOURCEMANAGEMENT,(ThomsonLearning)
6. BiswajeetPattanayak:HUMANRESOURCEMANAGEMENT,(PrenticeHallofIndia)
7. DavidA.DecenzoandStephenP.Robbins:PERSONNEL/HUMANRESOURCEM ANA GEMENT (PrenticeHall ofIndia)
8. SrinivasRKandula:STRATEGICHUMANRESOURCEMAN AGEMENT, (PrencticeHall)
9. T.V.Rao,"AlternativeApproachesandStrategiesofHumanResourceDevelo pment"– Rawat Publications, Jaipur,1988
MadanMohanVarma,"HumanResourceDevelopme nt"– GitanjaliPublishingHouse,1988
10.Garden,McBeath, Organization And Man power planning (BusinessBooks)
11.ThornesH.Pattern:MANPOWERPLANNINGANDDEVELOPMENTOFHUMA NRE SOURCES,(John Wiley)

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Demonstrate the emerging issues in Human Resources management with focus on women;
2.	CO2	Explain the process of planning human resources, recruitment and training with particular emphasis on women;
3.	CO3	Apply the techniques of Competence mapping and Performance Appraisal with Gender sensitivity to improve the work culture among the employees;
4.	CO4	Analyze different methods employed for the development of
		human resources particularly those of women;
5.	CO5	Enumerate the success stories of women entrepreneurs and managers

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course	No of Hours Per week	No of Credits
SVUWS- 304A(GenericElective)	NGOMANAGEMENT	06	4
Sessional Marks: 20		End Semester Examination	

Objective of the Course:

1.To analyse the theoretical basis of Development of Women and Women Empowerment;

2. To appraise the recommendations of various Committees and Commissions appointed for development of women;

3. To evaluate the contribution of plethora of women specific development programmes on the development of women and women empowerment in the country.

Unit– I:VoluntarismandSocial Action

Voluntarism Vs. Activism – Voluntary Agencies – Definition – Objectives, Ideologyof NGOs. – Evolution and functions of NGOs – Complementary role of contractbetween NGOs. With Government, Role of NGOs.In Development, National andInternational. **Unit–II:Formation & Registrationof NGO**

FactorsinfluencingtheformationofNGOs.– PreparationofMemorandumofAssociation and bye-laws – Registration of NGOs under Societies Registration Act.,TrustAct– Enrolmentofmembersandsustenance,growthofNGOs.,capacitybuildin g.

Unit-III:ProjectFormulation&FundingAgencies

Problem identification & Assessment- Formulation of Projects- Steps & Methods- Sources of funds and methods of mobilization – donor agencies – Problems in raisingfunds – important provisions of Foreign Contribution Regulation Act– Financialmanagementandaccountabilityin

NGOs.– NGOs. forWomen Empowerment. **Unit-IV:ManagementofProject&FundingAgencies:**

CAPART- Central Social Welfare Board- State Social Welfare Board- Other CenralandStateGovernmentDepartment.InternationalDonoragencies:DFID-NOVIB- Action Aid- OXFARM, UNIFEM, Programmes on Women's Responsibility- CaseStudyof oneorTwoOrganizations-Activities in Women Development

Unit–V:MonitoringandEvaluation

Concept,Objectivesandneedformonitoringandevaluation– monitoringandevaluation of specific of NGO – Steps in monitoring and evaluation, role of donoragencies and otherstakeholders– problemsin monitoringand evaluation.

Practicals:

1. Visit toNGOs.(RASS,PASSetc.).
2. VisittoVoluntaryOrganizations(RISE(Mathammas)Srikalahasti).
3. BuildinguprapportandMobilizationofruralpeopleInteractionwithpeople,Government and NGOs.
4. ReportonCommunityDevelopmentProgramme

References:

1. ReiderDate2003,organizations&Development-StrategiesStruchers&Process,SagePublications,NewDelhi
2. B.K.Prasad-2004,NGOS&Development,AnmolPublicationsPrivateLimited-NewDelhi,2004
3. ICSSR,Foreignfunding,NGOsinIndia4. Johnfarrinton,et.al.,NGOandtheStateinAsia,London:Routledge,1993
5. Lawani,B.T.NGOsinDevelopment,Jaipur;RawatPublication,1999
6. atarSingh,RuralDevelopment:Principles,PoliciesandManagement,sagePublications,NewDelhi,1999
7. Vijay Padaki Ed.Development Intervention & ProgrammeEvaluation,New Delhi:sagePublications,NewDelhi, 1999

8. MachaelNortonandMurrayCulshaw,GettingStartedinfundraising,sagePublications,NewDelhi,2000
9. ohnG.Sommer,EmpoweringtheOppressed:GrassrootsAdvocacyMovementsinIndia,SagePublications,NewDelhi, 2001.
10. .L.Dantwala,HarshSethi,PravinVisaria(Eds.),SocialChangethroughVoluntaryAction,SagePublications,NewDelhi, 1998.
11. VoluntaryActionNetworkIndia,Non-GovernmentalOrganisationGuidelinesforGoodPolicyandPractice, NewDelhi:Vani, 1995.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Explain the theoretical contributions made by such great economists like Garry Becker, Amartya Kumar Sen and Mohammad Yunus towards women development and women empowerment;
2.	**CO2**	Critically analyse changing perspectives of women development from welfare to Inclusive development of women through the Five Year Plans;
3.	**CO3**	Comparethesocio-economic determinants of women development and women empowerment;
4.	**CO4**	Apply the National Policy on Women and the New LPG policies to assess the development of women in India;
5.	**CO5**	Evaluate the efficacy of general and women specific development programmes being implemented in India by the Central and State governments.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per	No of
SVUWS-304B(GenericElective)	GUIDANCE AND COUNSELLING WITH FOCUS WITHGENDER PERCEPTION	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To provide the students with sound technical knowledge on guidance;

2. To develop the capacity of the students to tackle the problems that they may encounter during the course of their professional career.

3. To incorporate gender perspectives in guidance and counselling.

Unit–I :Guidance

i) Meaning,Scope,Purpose,functionsandroleofguidance,principlesunderlyingguidance, Historical Development of Guidance

ii) Typesofservicesina guidanceprogramme:

a) AppraisalService– Observation,interview,autobiography.Cumulativerecord,testdata,socio-metrictechniques.

b)InformationalService-purpose,types,principlesandmaterialinvolved,CareerPlanningand PlacementService.

Unit– II :Counselling

i) Meaning, Scope, Purpose, functions and role of Counselling, principles underlyingCounselling, Types ofCounselling, HistoricalDevelopment ofCounselling.

ii) ExpectationsandgoalsofCounselling,rolesandfunctionsofCounselor,characteristicsofcounselorandcounselee,qualitiesofagoodcounselor,factorsfacilitatingcounselingrelationships.

Unit– III :CounsellingTheories

i) Trait-factor,Client-centered,Eclecticcounseling,BehaviouralCounselling,Rationalemotive,Reciprocal inhibition, existentialism.
ii) Roleofnon-verbal communicationin counseling.

Unit– IV:Group Guidanceandcounseling

(i) Concept, Characteristics, individual Vs Group Techniques; Similarities andDifferences;Advantagesand limitations.
ii) Generalprinciplesofevaluationofguidanceandcounselingprogramme,Majorapproaches,concept of accountability.
iii) Guidanceandcounselingtowomen&adolescentgirls.

Unit–V: ReportPresentationofaCaseStudyonGuidanceand Counselling.

PRACTICALS:

1. Visitto ChildGuidanceCounselling Clinic- SVRRHospital-TPT
2. VisittoPPTTC(HIV/AIDS)Counsellingcentre–MaternityHospital–TPT
3. Visitto FamilyCounselling Centre-CSWB–TPT
4. Visitto FamilyCounselling Centre–NGO(PASS) – TPT
5. VisitGuidanceCounsellingCentre-TPT
6. ReportonactivitiesofGuidanceand Counselling

References:

1. NarayanaRao,"CounsellingandGuidance"–2nd Edition,TataMc.Graw-HillPublishingLtd.,NewDelhi, 2000.

2. Masch.“PrinciplesofGuidanceand counseling”–SarupandSons,NewDelhi,2000.
3. SitaramJayaswal.“GuidanceandCounselling–Aneclecticapproach”–PrakashKendra,Lucknow,1990.
4. Kukhopadhya,“GuidanceandCounselling”–(AMannual),HimalayaPublishingHouseLtd.,NewDelhi, 1989.
5. SwadeshMohan,“CareerDevelopmentinIndia”-VikasPublishingHousePvt. Ltd.,NewDelhi,1998.
6. Adams,James,F.“ProblemsinCounselling”–TheMacmillanCo.,NewYork,1970.
7. Hansen,James, C. “CounsellingProcessand Procedure”–MacmillanCo.,NewYork,1978.
8. JohnsonDorothy,E.andMaryVestermark,J.“BarriersandHazardsinCounselling”–HoughtonMifflinCo., Boston, 1970.
9. Kaur,Surajit, “Fundamentals ofCounselling”–SterlingPublishers,NewDelhi,1971.
10. Kochhar,K.“EducationalandVocationalGuidanceinSecondarySchools”,SterlingPublishers,NewDelhi, 1976.
11. krumbeltz,JohnDandCarlE.Tharasen,“CounsellingMethods”–Holt,Rinehart,Winston,NewYork,1976.
12. Pepinsky,HaroldB.andPaulineNicholsPepinsky,“Counselling,TheoryandPractices”–TheRonaldPressCo., NewYork, 1954.
13. Shertzer,B.andStones,C.“FundamentalsofGuidance”–HoughtonMifflinCo.,Boston,1976.
14. Shertzer,B.andStones,C.“FundamentalsofCounselling” –HoughtonMifflinCo.,Boston,1976.
15. Waters,Jane,“Techniquesof Counselling”– McGrawHill BookCo.,NewYork,1965.
16. Brammer,L.M.andShatram,E.L.“TherapeuticPsychology”NewDelhi,Prentice–HallofIndia,1968.
17. Fuster,“CounsellinginIndia”,NewYork:TheMacmillan and Co.,1964.
18. Goldman, L.“UsingTestsin Counselling”,NewYork, AppletonCentryCrafts,1971.
19. Jones,A.J.and Steward,N.B.“PrinciplesofGuidance”Tata – McGrawHill,Bombay,1970.
20. Kemp,Gratoon,C.“FoundationsofGroup Counselling”,McGrawHillBookCo.,NewYork,1970.
21. Krumboltz,JohnD.TharesenCarl,E.“BehaviouralCounselling”–Holt,RinehartandWinstonInc.,NewYork, 1966.

22. Miler,F.W.“GuidancePrinciplesandServices”CharlesOhio,F.merrilPublishing Co.,Columbus,1968.
23. Miller,Carol,H.“FoundationsofGuidance”– Harper and RowPublishers,NewYork,1971.
24. Ohlsen,Merie,M “GroupCounselling”– HoldRinchartandWinstoninc.,NewYork,1970.
25. Parricha,Prem,“GuidanceandCounsellinginIndianHigherEducation”NCERT,New Delhi,1976.
26. Tolber,“CounsellingforCareer Development”–Houghton MifflinCo.,Boston,1973.

Journals:

1. BritishJournalofGuidance.
2. CounsellingPsychologist.
3. IndianJournalofClinicalPsychology.
4. JournalofCounsellingPsychology.
5. PersonnelandGuidance.
6. TheSchoolCounsellor.
7. JournalofCommunityGuidanceandResearch.

S.No.	Course Number:	CO's Description
1.	CO1	Define the concept of Guidance, its types, functions and role;
2.	CO2	Explain the meaning, scope, types and functions of Counselling;
3.	CO3	Illustrate various theories of counselling theories and the role of non-verbal communications in providing counselling;
4.	CO4	Compare the Individual and Group Techniques of counselling and reiterate the need for counselling women and adolescence girls;
5.	CO5	Prepare a model project proposal taking a critical case study for guidance and counselling.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3-	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS- 304C (GenericElective)	**FEMINISTTHEORIES,THOUGHTANDWOMEN'SSTATUS**	06	4
Sessional Marks: 20	End Semester Examination Marks: 80		

Objectives of the Course:

1. To define the concept of Feminism and its evolution over the period of time;

2. To gain knowledge on theories of feminism and their application to the real world situation;

3. To understand various streams of Feminism evolved over the period of time;

UNIT-1 HistoricalOverviewof FeministTheories

Concepts and Definition of Feminism, Types of Feminism, Phase of Feminism, FirstWave, Second Wave and Third Wave Feminism, Historical Development ofLiberalFeministThought,Rationality-PoliticalPhilosophy-FeminstthoughtsofMaryWollstone,Craft, HarrietTaylor, J.S.Mill and BettyFriedan.

UNIT–II Statusof Womenin India

Position and status of Women in Indian society. Sex Ratio: Definition – Sex ratio inIndia, Factors responsible for adverse sex ratio in India, Consequences of adverse sexratio,measures toachievethe balancebetween thesexes.

Unit-III EducationalStatusofwomen

Recenttrendsinwomen'sEducation,GenderInequalityinEducation,VocationalTraining,AdultLiteracy,AndNon-FormalEducation,WomeninScienceandInformationTechnology.

Unit-IV EconomicStatusofwomen

Role Of Women In Economic Development, Female Labour Force India, DecliningTrend In Female Work Participation Rates- Causes, Measures To Improve Work-ParticipationRates.

Unit-V Womenin varioussectors

WomeninManagement&Administration,Politics,Judiciary,Governance,andBankingSecto r

RecommendedReadings:

- QuillAhmad,MohammedanLaw(Allahabad:CentralLawAgency,1992
- GoordassBenerjee.TheHinduLawofMarriageandStridhana.(Delhi:MittalPublication,1984)
- Yadav.C.P: EncyclopediaofWomen'sproblems andtheirremedies
- SharmaKanta:Women'sroleinthefamily
- M.K.Roy:Violenceagainst Women
- Kumar Raj: WomenandMarriage.
- Sushma&Srivastava:WomenandFamilyWelfare
- ChandrakavateM.S.,"TheSHGmodelofmicrofinance:Asalientmovementtowardsempoweringruralwomen",Southern Economist,Vol.44, No. 17,January2006, p. 31-32.
- GladisMaryJohn(2008)"WomenEmpowermentThroughSelfHelpGroups"SouthernEconomist March 1 2008
- GovernmentofAndhraPradesh(2009-2010),'Socio-economicSurveyReport',Hyderabad.
- K.G.Karmakar,"Ruralcreditandselfhelpgroups-MicrofinanceneedsandconceptsinIndia",New Delhi, Sage PublicationIndia Pvt. Ltd., 2003, p.231.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Trace waves of Feminism originated in different parts of the world in a historical perspective;
2.	CO2	Gain knowledge on the important theories of Feminism including that of Marx;
3.	CO3	Explain the theories of Radical Feminism and their impact on the Feminist movement in the world;
4.	CO4	Evaluate the relevance of 'Psycho analytic' and 'Existentialist Feminism' to the real world conditions;
5.	CO5	Combine several Post–modern concepts of Feminism such as Eco Feminism, Dalit Feminism etc., with Modern Feminism discussed in the Telugu literature.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	3	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-304D(GenericElective)	**Women'sParticipation in Agricultureand AlliedSector**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To provide the theoretical and conceptual knowledge on Status and Role ofWomeninAgriculture;
2. ToexplaintheWomenfarmercollectives;
3. To provide the knowledge about the statistics of WomenintheAgriculturalLabourForce;
4. To create interest to know about womenlandrights.

Unit– I

DefinitionofFarmer,StatusofWomeninAgriculture,theRoleofWomeninAgricultureandallied fields–cattlemanagement,Milking,FodderCollection,Poultryfarming.

Unit-II

Womenfarmercollectives,cooperatives,Entitlementsandsupporttowomeninfarming,participation offarmwomen in agricultural operations.

Unit– III

WomenintheAgriculturalLabourForce,EconomicallyActivePopulationinAgriculture,TimeSpentinAgriculturalActivities,Women'sContributionToAgriculturalProduction.

Unit-IV

womenlandrights,needforlegalprovision, land purchase &landlease,land audit

Unit-V

PoliciesandProgrammesforWomeninAgriculture-NationalHealthPolicy,1982
ii)Technology Policy Statement, 1983, (iii) National Policy on Education, 1986, (iv)National Water Policy, 1987 (v) National Forest Policy, 1988, (vi) New IndustrialPolicy, 1991, (vii) National

Nutrition Policy, 1993 (viii) National Housing Policy,1994,(ix)NationalPopulationPolicy,2000,(x)NationalAgriculturePolicy,2000.

References:

- Addati, L. and N. Cassirer. 2008. Equal sharing of responsibilities between womenand men, including care giving in the context of HIV/AIDS. Paper prepared for theExpert Group meeting on the equal sharing of responsibilities between women andmen, including care giving in the context of HIV/AIDS, organized by the UnitedNationsDivision forthe Advancement ofWomen,Geneva.
- Anríquez, G. 2010. Demystifying the Agricultural Feminization Myth and the GenderBurden.BackgroundpaperpreparedforTheState ofFoodandAgriculture 2011.
- Deere, C.D., 1982. The Division of Labor by Sex in Agriculture: A Peruvian CaseStudy.EconomicDevelopment andCultural Change, 30(4):795-811.
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- Doss, C. 2010. If Women Hold up Half the Sky, How Much of the World's Food dothey Produce?BackgroundpaperpreparedfortheStateofFoodand Agriculture2010.
- Eaton, C. and Shepherd, A. W. 2001. Contract Farming: Partnership for Growths,FAOAgriculturalServicesBulletin145, FoodandAgriculturalOrganization,Rome.
- FAO/GSO/MoP. 2010. National Gender Profile of Agricultural Households, 2010.Report based on the 2008 Cambodia Socio-Economic Survey. Food and AgricultureOrganization of the United Nations, Rome and General Statistics Office and MinistryofPlanning, Phnom Penh.
- FAO/MAF. 2010. National Gender Profile of Agricultural Households, 2010. ReportbasedontheLaoExpenditureandConsumptionSurveys,NationalAgricult uralCensus and the National Population Census. Food and Agriculture Organization of theUnitedNations, Romeand Ministryof AgricultureandForestry, Vientiane.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept of Agriculture in India and participation of women in Agriculture;
2.	**CO2**	Explain the significance ofWomenfarmercollectives;
3.	**CO3**	Demonstrate about WomenintheAgriculturalLabourForce;
4.	**CO4**	Analyze the recent trends in womenlandrights,needforlegalprovision;
5.	**CO5**	Asses the PoliciesandProgrammesforWomeninAgriculture.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS- 305A (OpenElective)	**GENDERSENSITIZATION&TRAINING**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To create Gender sensitivity among the students in every part of life of a human being;

2. To impart knowledge on different methods of training to inculcate gender sensitivity among the students;

3. To assess the relative roles of government, NGOs and Self-help groups in evolving a Gender Sensitive Society.

UNIT–I:ConceptualFrameWorkof Training

Basic concepts: Training, Education Teaching: Concept and Scope of Training; KeyFacets and levels of Training; steps in Training Design: Origin, Need, ProgrammeObjectives, Preparation of Action Plan, and Consideration in Designing a Programme.

UNIT– II: Training Methods andTechniques

Determinants of the choice of Training Methods, Lecture Methods, Case Study, RolePlayManagementGames,Assignments,PanelDiscussionandBrainStorming,Demonstrationsand Fields Trips.

UNIT–III: Gender ComponentsofTrainingStrategy

Objectives of different Training Approaches: Training in Sensitization or AwarenessRaising, Skill Transfer in Gender Analysis and Diagnosis, Translation of Skill intoPlanningPractice,TraininginMotivationalFactors;DefiningtheTargetGroup,Operationalization Training within an institution, Concept of Training, EvaluationProcedures. **UNIT-IV: Practicum– Areasof GenderSensitization**

SocialConstructionofGender,GenderRoles,Socialization,identityformation,GenderIdentity:Feminityand Masculinity.

UNIT–V:LivelihoodManagement

Role of Government, Role of NGO's, Grass – Root Initiatives: Role of SHGs, MicroCredit and Micro Enterprises, Patriarchy and Oppression, Social Institution: A Genderlens,violenceagainst women, GenderEquality.

ClassRoomActivity

- Developing training module for gender sensitization training programmes on variedthemes.

RecommendedReadingListforWSC-106:

- *Gender AnalysisFramework*:http://socialtransitions.kdid.org/sites/socialtransitions/files/resource/files/bk-gender-analysis-frameworks-010199-en.pdf
- MurthyRanjaniK.2001.*BuildingWomen`sCapacities*.NewDelhi:SagePublications.
- GrambsJean.1976.*TeachingAboutWomenintheSocialStudies:Concepts,MethodsandMaterials*.*Virginia:* National Council forthe Social Studies.
- *ParticipatoryPlanningforchange*:http://www.dfggmoi.gov.kh/documents/Learning-Theme-01/1-Handout/Module4-SA-Tools/Module4-8-SA-Tool-En/M4-1-Participatory-Planning-6-Handout-En.pdf
- http://hcfp.gov.in/downloads/manuals/Training_Manual_on_Gender_Sensitization.pdf
- http://ncw.nic.in/pdfreports/gender%20sensitization%20of%20police%20officers.pdf
- http://timesfoundation.indiatimes.com/articleshow/1254836.cms

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Have conceptual clarity on Education, Training and Teaching and will be able to design a good training programme for gender sensitization;
2.	CO2	Assess relative merits of different methods of training and select one or combination of different types of training methods;
3.	CO3	Analyze basic methodologies for planning gender sensitive programs and projects to the target groups;
4.	CO4	Identify the areas where Gender sensitivity is required and impart the same to the target groups.
5.	CO5	Evaluate the role of Government, NGOs, SHGs and Microfinance institutions in the management of livelihood resources for women and in evolving a Gender sensitive Society.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS- 305 B (OpenElective)	**GENDERIDENTITYANDLEADERSHIP**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectiveness of the Course

1.To develop a clear and precise understanding of Gender identity;

2. To analyze different perspectives of Gender and Gender Identity;

3. To suggest measures to unearth the Gender Identity and to promote leadership qualities among women.

UNIT –I

Meaning and Definition of Gender – Identity, Freedom and Empowerment:SometheoreticalreflectionsanalyzingstructuresofPatriarchy withrelationtogender,familyand socialchange.

UNIT– II

DifferentPerspectivesonGender–MasculinitiesandFemininitiesandWork –ExaminingtheintersectionofGenderandWork–SexandGenderintheNewMillennium.

UNIT– III

Caste,Class,Gender andEthnicityasdistinct Categoriesandtheirinterconnections.

UNIT– IV EmergenceofWomenLeadership–StylesofLeadership–CasesinLeadershipTeamLeadership–Strategic Leadership– CultureandLeadership.

UNIT– V

PsychodynamicApproachand LeadershipEthics–Net1+Work.

References:

- BinaAgarwal (1994) ***A Field of One's Own: Gender and Land Rights in South Asia***,Cambridge UniversityPress.
- BinaAgarwal,JaneHumphriesandIngridRobeyns(ed)(2006)***Capabilities,Freedomand Equality: AmartyaSen's Work from a Gender Perspective***, New Delhi,OxfordUniversityPress.
- DorothyP.Moore&E.HollyButtner(1997)***WomenEntrepreneurs:MovingBeyondtheGlass Ceiling***, New Delhi, SagePublication.
- GaryN.Pwell(ed)(1999)***HandbookofGender&Work***,NewDelhi,SagePublications.
- Mats Alvesson& Yvonne Due Billing (1997) ***UnderstandingGender andOrganization***,New Delhi, SagePublications.
- MeenaKelkar&DeeptiGangavane(ed)(2003)***FeminisminSearchofanIdentity: TheIndian Context***, New Delhi, Rawat Publications.
- MarthsFetherolfLoutfi(ed)(2002)***Women,GenderandWork:WhatisEqualityandHowdo wegetthere?***, Jaipur andNew Delhi,Rawat Publications.
- PeterG.Northouse(2007)Leadership:TheoryandPractice,SagePublications,NewDelhi.
- SuzanneStaggenborg(1998)Gender,FamilyandSocialMovements,NewDelhi,PineForgePress.
- TapanBiswal(2006)HumanRights,GenderandEnvironment,NewDelhi,VivaBooksPrivateLimited.
- W.GlennRowe(2007) CaseinLeadership,Sage Publications,NewDelhi.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept of 'Gender Identity' and distinguish clearly between 'Freedom and Empowerment';
2.	**CO2**	Explain the Interaction between the Gender and Work in the new Millennium;
3.	**CO3**	Relate Gender Identity with Caste, Class and Ethnicity in a society;
4.	**CO4**	Compare different categories of leadership like Team Leadership, Strategic leadership;
5.	**CO5**	Evaluate the effectiveness of Psychodynamic Approach in building women leadership.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-305C (openelective)	WOMEN ANDGOVERNANCE	06	4
Sessional Marks: 20		End Semester Examination Marks:	

Objectiveness of the Course:

1. Toimpart knowledge to the students on the need for and current status of women's participation in politics and administration;

2. To identify the factors responsible for abysmally low levels of representation of women in political and governance domains;

3. To enumerate the interventional measures initiated in India to augment women's representation in politics and governance;

4.To suggest remedial measures to improve the participation of women in political and governance institutions at national, state and local levels.

Unit-I: Conceptsand natureofWomen'spoliticalparticipation

- Definition, meaning,scope andnatureof politicalparticipation ofwomenReasonsforlowpolitical participation of women
- Impedimentsandproblems facedbywomenforpoliticalparticipation.
- RoleofwomeninGovernmentinstitutionsandtheircontributioninthedevelop men tofnation

Unit-II: Componentsofpoliticalparticipationofwomen

- Womenasvoters:Typesofvoters,votersturnoutandelections
- WomenasCandidates:Types,contestantsintheelectionsWomenandPolitica lPart ies:National and Regional parties
- Women'sapproachintopdecisionmakingbodiesofthePoliticalpartiesManifestos ,ElectionCampaigns, Procedureand Nominations

Unit-III: Interventions forWomen'spoliticalparticipations

- 73rd and 74th amendmentstotheConstitutionofIndiaandtheirrepresentationinlocal bodies.
- Women'sreservationBillforupperbodies-currentscenario,debate,Affirmativeaction
- StrategiesbyIndianGovernment andNGO's for women's sharein politics

Unit-IV: GovernancethroughDemocraticDecentralization

- Women'sshareinPolitics– Evolutionarychangesduringpre-independenceperiod
- Women'smovementforpoliticalparticipation
- Struggleandagitationsbywomenleaderssince1930inIndia
- Post-independenceperiod-ConstitutionalRights,PoliticalRightsofwomenandpoliticalpower

Unit-V:WomenandGovernancein theIndiancontext

- Womeninlocalgovernment-PanchayatRajandUrbangovernanceWomeninStateAssemblies
- Womenin Parliament
- Problemsandremedial measuresfortheireffectiveparticipationin governance
- Majorissues,problemsandremedialmeasuresforwomen'seffectiveparticipationingovernance

RecommendedReadings:

1) **SanjayPrakashSharma,***PanchayatiRaj,*VistaInternationalPublishing,NewDelhi,2006.
2) **S.P.Sharma,***RuralDevelopmentandPanchayatiRaj*,VistaInternationalPublishing,NewDelhi, 2006.
3) **DrL.M.Singvi**,*DemocracyandtheRuleoflaw,*OceanBooksPvt.Ltd.,NewDelhi2002.
4) **LaxmiDevi**,*Women in Politics Management and*

*Decision*Making,AnmolpublishingPvt.Ltd. New Delhi, 1998.

5) **S.N Ambedkar**,*Women Empowerment and PanchayatiRaj,*ABD Publishers,Jaipur2005.

6) **KumarRaj**,WomeninPolitics,AnmolPublishersPvt.Ltd.,New Delhi, 2000.

KumarRaj,*Womenandleadership*,AnmolPublishersPvt.Ltd

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Define the concept of 'Political Participation' and identify the reasons or the impediments for the low levels of participation of women in politics.
2.	CO2	Explain different components of political participation by women;
3.	CO3	Analyze interventions made by the government through 73rd and 74Amendments to the Indian Constitution and the current stalemate in the Women's Reservation Bill in the Indian Parliament;
4.	CO4	Summarize the entire struggles and agitations by women since 1930 to gain political power at various levels;
5.	CO5	Evaluate the current low level of women's share in Parliament and State Assemblies and suggest measures to improve the situation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	2	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

SEMESTER-IV

Course Code	Course Title	No of Hours Per week	No of Credit
SVUWS-401 (Core	**DOCUMENTATION & PROJECT WORK**	0	4
Sessional Marks: 20		End Semester Examination Marks:	

Objectives of the Course:

1. To expose students to work with the society.
2. To make them to apply knowledge acquired in class room in practical situations.
3. To make them to understand with the avenues available and to equip them with necessary skills to be suitable to the demands of the competitive job market.

Action Plan:

Duration : 30 Days for Data Collection

Time : During the winter vacation after completion of III semester

Examinations.

Area of study : Depending upon the topic selected.

Preparation of Time Plan:

1. Data collection and analysis

2. Preparation of Dissertation during the IV Semester
3. Submission of Dissertation immediately after the IV Semester examinations
4. Viva-Voce Examination.

Evaluation Process

S. No	Particulars	Assessment	Marks
1	Seminar	Internal	20
2	Dissertation	Report evaluation	50
3	Viva-voce Examination	Dept. Committee with external member	30
			Total -100

Course Leaning Outcomes (CLOs)

S.No.	Course	CO's Description

	Number:	
1.	**CO1**	Have a thorough understanding of the theoretical and empirical literature on the topic chosen for the project
2.	**CO2**	Design an interview schedule/Questionnaire for collecting data from the sample or census units
3.	**CO3**	Collect necessary data, edit, analyse and interpret the results of the study
4.	**CO4**	Draft a research report based on the findings of the study and they get it ready for presentation
5.	**CO5**	Defend successfully any query raised by the examiners or give clarifications on the doubts raised by the examiners

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	2	3	3	3	3	3	-	3
CO5	3	3	2	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-402 (Core)	ACCOUNTING AND FINANCIAL MANAGEMENT &TALLY	06	4
Sessional Marks: 20		End Semester Examination Marks:	

Objectives of the course

- Totrainthestudentsinmaintenanceof Accounts.
- ToorientandteachthemAccountsandFinancialManagement.

UNIT– I

Introduction – Meaning – Principles – Concepts – Conventions – Functions of Accounting –Double Entry System – Classification of Accounts – Ledger Postings – Subsidiary Books –TrailBalance– ThreeColumnCashBook,ImportanceofAccountingandFinanceManagement for Women Entrepreneurs

UNIT– II

Bank Reconciliation Statement – Preparation of Final Accounts – Trading, Profit and LossAccountand Balance SheetAdjustments

UNIT– III

FinancialManagement–Introduction–ScopeofFinance–FunctionsofFinance–Objectives of

Financial Management – Organization of Finance Function – Role of FinancialManager – Operating and Financial Leverages – EBTI – EPS Analysis – Computation ofleverages – BudgetingandBudgetcontrol–Women inFinance Management

UNIT– IV

ManagementofWorkingCapital–Concepts–NeedforWorkingCapital– OperatingCycle –FinancingofWorkingCapitalNeeds–EstimationofWorkingCapitalRequirements–

InvestmentAppraisal–New,Types,MethodsandLimitations.

UNIT– V

FeaturesandImportanceofTally–ComponentsofGatewayofTally–CreationofaCompany – Creating, Displaying and altering Singleor MultipleLedgers– Groups andAccountingVouchers–DisplayofFinancialStatements–InventoryMasters– Configuration

– Creating, Displaying and Altering Single or Multiple Stock Groups – Stock Categories –Unit of Measure– Stock Godowns- Stock ItemsandInventory Vouchers- Display ofInventory Reports – maintenance of Out standings – Calculating Interests – Maintenance ofBudges VAT: Concept and Classification – Configuration – Creation of Ledgers – VoucherEntries for Single and Multiple Ledgers – VAT rates – VAT on Imports and Exports – VATComputations and Reports – TDS: Configuration – Creation of Ledgers and Vouchers forDeductions,Payments,DepositsandAdvances–TDSReports– TCS:Configuration–Creation of Ledgers and Vouchers for Collections, Receipts, and Advances – TCS Reports –ST: Configuration – Creation of Ledgers and Vouchers for Service Providers, Service Usersand Advances – ST Reports – FBT – Configuration – Creation of Ledgers and Vouchers –FBT Reports, Women andComputerAccountsskills

REFERENCES

1. JainandNarang,“INTRODUCTIONTOACCOUNTANCY”,KalyaniPublications
2. R.L.Gupta,“ADVANCEDACCOUNTANCY”,KalyaniPublications

3.NandhaniA.K.andNandhaniK.K,“IMPLEMENTINGTALLY7.2”,BPBPublications,New Delhi

4. KiranKumar,K,“TALLY6.3”,LasyaPublishers,Hyderabad

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO’s Description
1.	**CO1**	Define the Concepts, Conventions, Functions of Accounting andDouble Entry System;
2.	**CO2**	Explain the Bank Reconciliation Statement, Preparation of Final Accounts;
3.	**CO3**	Demonstrate FinancialManager’s role, Operating and Financial Leverages;
4.	**CO4**	Analyse the EstimationofWorkingCapitalRequirements;
5.	**CO5**	Asses the importanceofTally, componentsofGatewayofTally.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	2	2	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	2	3	3	3	3	3	-	2
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits

SVUWS-403	**Participatory learning, Extension and**	06	4
	programmes &Advocacy,with focus		
Sessional Marks: 20		End Semester Examination Marks:	

Objectives of the Course:

1. To understand the changing concept of extension, objectives and functions of Extension; a

2. To expose the students to outreach programmes to interact with the community;

3. To impart the techniques of planning, implementation, monitoring and assessment of extension activities.

Unit–I: ChangingConceptofExtension

Extensionwork – Meaning– Scopeneedsand methods.
Changing concept of Extension – Philosophy – Objectives – Principles functions.Extensioneducationcomponentsanddimensions– Characteristicsof ExtensionWork
:Buildinguprapport–Mobilizationofruralpeople–Interactionwithpeople,Government and NGOs.– Extension and Communication– Motivation and skilldevelopment specific to extension work – professional- Women and Extension forCommunityDevelopment.

Unit–II:SupportStructuresandtheirFunctions

Panchayats, DRDA, CAPART, NIRD, Extension as a third dimension of

UniversityEducation–
Areaspecificproblems.

UNIT – III: Participatory Extension: Introduction to concepts and approaches– importance,keyfeatures,principles andprocessofparticipatoryapproaches–different participatory approaches (RRA, PRA, PLA, AEA, PALM, PAR, PAME,ESRE, FPR)and successful models.

Unit-IV:

Participatorytoolsandtechniques–Space-relatedMethods: Villagemap(Social& resource)–Time related methods: Time line, trend analysis, seasonal diagram – Dailyactivities schedule,dream map.

UNIT– V:

Preparation of participatory action plans– concept and action plan preparation – participatory technology development and dissemination – participatory planning andmanagement - phases and steps in planning and implementation – process monitoring,participatoryevalustion.

References:

1. Albroosht,H.Et.al.(1989): RuralDevelopmentSeries: AgriculturalExtensionVol.1& IIBasic Concepts and Methods,WlleyEasternLimited, New Delhi.
2. Chaubey,B.K.(1979):AHandBookofEducationExtension,JyotiPrakashan,Allahabad.
3. Dahama,O.P.andBhatnagar,O.P.(1987):EducationandCommunicationforDevelopmen t,Oxford andIBH PublishingCo., Pvt.Ltd.,New Delhi.
4. ExtensionEducationinCommunityDevelopment(1961): MinistryofFoodandAgricultur e,GovernmentofIndia, New Delhi.
5. Pankajam,G.(2000): Extension– ThirdDimensionofEducation,GyanPublishingHouse,NewDelhi.
6. Ray,G.L.(1999): ExtensionCommunicationandManagement,NayaPrakash,Calcutta.
7. Reddy,A.(1997)ExtensionEducation,SreeLakshmiPress,Bapatla.

8. Waghmare,S.K.(1989): ExploringofExtensionExcellence,MultiTech.PublishingCompany.
9. BirthaMikkelsen:MethodsofDevelopmentworkandResearch(NewDelhi,Sage,1995).
10. Adhikary,"ParticipatoryPlanningandProjectManagementInExtensionScience",
11. AgrotechPublicationAcademy
12. MukharjeeN."ParticipatoryLearningandAction",ConceptPublishingCompany,NewDelhi.
13. MukharjeeAmitava,"ParticipatoryRuralAppraisal– MethodsandApplicationsinRuralPlanning", ConceptPublishingCompany,NewDelhi.
14. MukharjeeNeela"ParticipatoryLearningandActionWith100FieldMethods",ConceptPublishingCompany, NewDelhi.
15. MukharjeeNeela"ParticipatoryRuralAppraisalAndQuestioneeaireSurvey",ConceptPublishingCompany,NewDelhi.
16. SinghBK,"PRA/PALANDPARTICIPATORYTRAINING"AdhyayanPublication&Distribution.

SomeshKumar,"MethodsforCommunityParticipation"VistaarPublications

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Understand the evolving concept of extension, principles and functions of extension work.
2.	CO2	Learn the procedures to approach the supporting agencies such as DRDA, CAPART, NIRD to pursue the third dimension of university education, Extension;
3.	CO3	Apply the principles of Participatory Extension in rural areas and to the needy people;
4.	CO4	Demonstrate different tools and techniques of Participatory Extension to achieve desired results;
5.	CO5	Evaluate the success of the extension activities for generating sustainable outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	3	3	3	2	3	-	3
CO2	2	2	3	3	3	3	2	3	-	3
CO3	3	2	3	3	3	3	2	3	-	3
CO4	2	2	3	3	3	3	2	3	-	3
CO5	2	2	3	3	3	3	2	3	3	3

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Course Code	Course Title	No of Hours Per week	No of Credit
SVUWS-404 A (GenericElective)	LEGALANDHUMANRIGHTS OFWOM	06	4
Sessional Marks: 20		End Semester Examination Marks:	

Objectives of the course:

1. To enable the students to understand the constitutional and legal provisions;
2. To sensitize the society about legal rights of women and to encourage women's effective participation in the society;
3. To provide knowledge on various agencies and mechanism involved in the protection of women and girl children.

Unit–I: ConstitutionalRightsofWomen

FundamentalRights,FundamentaldutiesandDirectivePrinciplesofStatePolicy.

Unit– II: Womenand MaritalRights

i. Birds eye view of laws related to marital rights of a women with regard totheirindividualreligious,Hindus,Muslims,ChristiansandParsi– Marriage,Divorce,Maintenance,Adoption, Guardianship and Property.

ii. FamilyCourts Act 1986.

Unit–III:SalientFeaturesandProvisionsrelatedtowomenin CriminalLaws

IPCandCRPC–Dowry Prohibitionact.1961– Immoraltrafficpreventionact(amendment) 1986 – Indecent representation of women (prohibition) act 1986 – MTP1971 & Pre-natal diagnostic techniques

(Prevention and regulation or misuse) act –Commission of Sati (Prevention) act 1987 – Gender issues in crimes – DomesticViolenceBill–2002– SexualHarassmentandrelatedissues--SurrogateMotherhood –legalperspectives.

Unit–IV:Laws relatedtoWomen's Workingconditions

Minimum Wage act 1984– Equal remuneration Act 1976– Maternity benefit act1961Factories act 1948– JuvenileJusticeact.

Unit–V:WomenandHumanRightsandtheEnforcement Machinery

Definitionandenforcementofhumanrightforwomen andchildren–UNConvention –CEDAW–NationalandStateCommissionforWomen–MaithriSangam– LokAdalats

References:

1. QuilAhmad,"Mohammedanlaw"–(Allahabad:CentralLawAgency,1992).
2. GoroodassBenerjee,"TheHinduLawofMarriageandStridhana"– Delhi:MittalPublications,1984.
3. VepaP.Sarathi,"LawofEvidence"–Lucknow:EasternBookCompany,1989.
4. K. Sharma, "Divorce Law in India" – New Delhi : Deep and Deep Publications,1990.
5. DwarakanathMitter, "The Position of Women in Hindu Law" – New Delhi : InterIndiaPublications,1984.R.N.Saxena,"TheCodeofCriminalProcedure"– Allahabad:CentralLaw Agency, 1990.
6. Rakesh& Singh, " Law of Sexual Offences" – Allahabad : The Law Book Company(P)Ltd.,1994.
7. M. Krishnan Nair. "Family Law Vol.1" – Tiruvananthapuram : The Law AcademyofLegalLaws, 1993.
8. ArchanaParashan, "Women and Family Law Reform in India" – New Delhi : SagePublishers, 1991.
9. DilipChand Manoja,"The Family Laws ofIslam"– New Delhi

:InternationalIslamicPublishers, 1993.

10. Mukhopadhayay and Maheswari, “The Employees Provident Fund acts” – NewDelhi:AlliedSchemesBookCorporation,1991.
11. ParasDiwan, “Dowry and Protection to Married Women” – New Delhi : Deep &Deep Publications, 1987. Multiple Action Research Group, “Our Laws (Vol.1 to10)” –NewDelhi:Dept.ofWomenStatusofwomeninIndia.
12. KiranDevendra,“ChangingStatusofWomeninIndia”– NewDelhi:VikasPublishing House,1994.
13. NirojSinha,“WomenandViolence” –NewDelhi:VikasPublishingHouse, 1989.14.

InduaPrakash Singh, “Women Law and Social change in India” – New Delhi :Radiant Publishers, 1989. Sinha B.S., “ Law and Social Change in India” – NewDelhi,Deep& DeepPublications,1983.

15. SushmaSood,“ViolenceAgainstWomen”–Jaipur:ArihantPublishers,1990.
16. VimalaVeenaRagavan,“RapeandVictimsofRape”– NewDelhi:NorthernBookCentre, 1987.
17. Srivastava,“WomenandLaw– NewDelhi:LecturalPublications,1954.TheIndecentRepresentationofWomen(P rohibition)Act,1986.
18. M.T.P.Act.,1971.
19. Pre-natalDiagnosticTechniques(PreventionandRegulationofMisuse)Act,1984.

Course Leaning Outcomes

(CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Remember and recollect the Constitutional Provisions for protection
2.	**CO2**	Have an understanding of plethora of labour laws to ensure the
3.	**CO3**	Analyze various Family Laws including the Domestic Violence
4.	**CO4**	Assess the effectiveness of Criminal laws enacted including the
5.	**CO5**	Evaluate the performance of several law enforcing agencies, NGOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

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Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-404 B GenericElective	HUMAN RESOURCE MANAGEMENT WITH FOCUS ON GENDER	06	4
Sessional Marks: 20		End Semester Examination Marks:	

Objectives of the Course:

1. To provide the conceptual and theoretical knowledge on Human Resources;
2. To train the students in the Management of Human Resources;
3. To ascertain the role of women in Human Resource Management and performance appraisal.

UNIT–I: HumanResourceManagement:Context,ConceptandBoundaries

i. TheChangingSocialContextandEmergingIssues.

ii. TheConceptandFunctionsofHumanResource Management iii. StructuringHumanResourceManagement

iv. SpecialFocuson Women

UNIT–II: GettingHumanResource

(a) JobAnalysisandJobDesign

(b) Human ResourcePlanning

(c) AttractingtheTalent:Recruitment–Selection–Outsourcing. (d) HumanResourceand Women

UNIT–III: PerformanceManagementandPotentialAssessment

(a) CompetencyMappingwithSpecialStudyofWomen

(b) PerformancePlanningandReview,Gender sensitivityinPerformanceManagement. (c) PotentialAppraisal – AssessmentCentresandCareerandSuccessionPlanning.

(d) HumanResourceMeasurementand Audit.

UNIT–IV :HumanResourceDevelopment

(a) HumanResourceDevelopmentSystem–Training

(b)

MentoringandPerformanceCoachin

g. (c) BuildingRolesandTeams

(d) HRDand Women

UNIT–V: Womenin HumanResourceManagement

(a)Status&Role(b)Challengesbeforewomeninbringingaboutchange(c)T opWomenin Human ResourceManagement– Success Stories

REFERENCES:

1. DavidA.Decenzo andStephenP.Robbins:**PERSONNEL /HRM**
2. MNRudraBasavaRaj,DYNAMICPERSONNELADMINISTRATION, HimalayaPu blishingHouse
3. GaryDesslerHUMANRESOURCEMANAGEMENTPrenticeHallIndiaPvt.Lmt.
4. BiswajeetPattanayak:**HUMANRESOURCEMANAGEMENT**,(Pren ticeHallofIn dia)
5. RobertL.Mathis,et.al**:HUMANRESOURCEMANAGEMENT**,(ThomsonLearni ng)
6. BiswajeetPattanayak:**HUMANRESOURCEMANAGEMENT**,(Pren ticeHallofIn dia)
7. David A. Decenzo and Stephen P.Robbins: **PERSONNEL / HUMAN RESOURCEMANAGEMENT**(Prentice Hall ofIndia)
8. SrinivasRKandula:**STRATEGICHUMANRESOURCEMANAGEMENT,** (PrencticeHall)

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Demonstrate the emerging issues in Human Resources management with focus on women
2.	**CO2**	Explain the process of planning human resources, recruitment and training with particular emphasis on women;
3.	**CO3**	Apply the techniques of competence mapping and Performance Appraisal with Gender sensitivity to improve the work culture among the employees;
4.	**CO4**	Analyze different methods employed for the development of human resources particularly those of women;
5.	**CO5**	Enumerate the success stories of women entrepreneurs and managers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	3	3	-	3
CO4	3	3	3	3	3	3	3	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

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Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-404 C GenericElective	MULTIMEDIASYSTEMS	06	4
Sessional Marks: 20		End Semester Examination Marks:	

Objectives of the Course:

1. To expose the students to multimedia system to create interactive presentations materials.;

2. To apply the computer knowledge gained in the course to multimedia systems;

3. To improve the self-employment or wage employment opportunities for the students in multimedia systems.

UNIT-I

Introduction to Multimedia: media and Data Streams: Medium Main Properties ofMultimediaSystem-Multimedia-TraditionaldatastreamsCharacteristics- DatastreamsCharacteristics for continuous Media – Information Units-Sound/Audio: BasicConcepts-Computer ImageProcessing.

UNIT-II

Video and Animation: Basic Concepts-Television-Computer based Animation- DataCompression:StorageSpace-CodingRequirements-Source,EntropyandHybridcoding- someBasic CompressionTechniques-JPEGH.261-MPEG_DVI.

UNIT-III

Optical storage media: Basic Technology-Video Disks and other WORMs CompactDiskReadOnlyMemory-CD-ROMExtendedArchitecture-FurtherCD- ROMTechnologies-ComputerTechnology:CommunicationArchitecture- MultimediaWorkstation.

UNIT-IV

MultimediaOperatingSystems:RealTime-Resourcemanagement-ProcessManagement- FileSystems-AdditionalOperatingSystemissues-systemArchitecture.

UNIT-V

Multimedia Communication Systems: Application Subsystem – TransportSubsystem- Quality subsystem Quality of service and Resource Management-Database Systems:Multimedia Database ManagementSystem-Characteristics of MDBMS-DataAnalysis

REFERENCEBOOKS:

1. TayVaughan,MultimediaMakingitwork,TataMcGraw-Hill,Edition,2001
2. Jeffcoate,MultimediainpracticeTechnologyandApplication,PrenticeHall,1995John F. KoeelBuford,Multimediasystems,AddisonWesley,1994.
3. FredHalsall,Multimediacommunications,PearsonEdition2001.
4. PrabhatKAndleighandKiranThatkar,MultimediasystemsDesign,PHI2005.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Describe the Multimedia system, its properties and major components;
2.	**CO2**	Explain the video Animation and systems of data compression using Entropy and Hybrid coding;
3.	**CO3**	Analyze different methods of data storage, communication architecture and multimedia workstation;
4.	**CO4**	Compare Real Time Resource Management with other methods of data management;
5.	**CO5**	Demonstrate the practical applications of Multimedia animation system in the real world and secure a professional career.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	2	3	-	3
CO2	3	3	3	3	3	3	2	3	-	3
CO3	3	3	3	3	3	3	2	3	-	3
CO4	3	3	3	3	3	3	2	3	-	3
CO5	3	3	3	3	3	3	2	3	-	3

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Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-404 D GenericElective	**REPRODUCTIVEHEALTH &FAMILYLIFEEDUCATION**	06	4
Sessional Marks: 20		End Semester Examination Marks:	

Objectives of the Course:

1. To acquire knowledge on physiological processes of one's own life;

2. To create an awareness regarding proper age of marriage, reproduction and the consequences early adolescent pregnancies;

3. To create awareness on communicable and sexually transmitted diseases.

UNIT– I ReproductiveHealthStatus

Introduction–
DefinitionandImportanceofReproductiveHealth,ReproductiveHealthProbl
ems,
Antenatal- Natal- Postnatal care, Infant Mortality Rate- Maternal Mortality Rate – Maternal Morbidity Rate, Immunization ,Family Welfare and fertility behaviours, Importanceof Family Planning and fertility preference, Family Planning and Contraceptive Methods,ReproductiveRights.

UNIT-II ReproductiveHealthandCommunicableDiseases

SexuallyTransmittedDiseases/ReproductiveTrackInfection,HumanImmuneVirus

/AcquiredImmuneDeficiencySyndrome,Modes ofTransmission,

UNIT-III ReproductiveHealthCareServices,Policies&Programmes

PHCs-
CHCsandSubcentrelevel,Integratedchilddevelopmentscheme(ICDS),Ayushmati scheme, Infant and young child feeding project (IYCF), RH Policies and Reports(MDGGoals, NFHS IIIand NFHSIV)

Unit IV **Familylifeeducation**

ConceptofFamilyLife,FamilyLifeEducation-
ConceptandMeaning,ImportanceofFamily Life Education,Operational Principles of FLE, Individuals and Families in SocietalContexts, Internal Dynamics of Families, Human Growth & Development Across the LifeSpan,FamilyResourceManagement

Unit V **Family LawandPublicPolicy**

Family and the law , Family and social services , Family and education , Family and theeconomy , Family and religion , Policy and the family, Career Opportunities in Family LifeEducation

References

- FacilitySurveyofPublicHealthInstitutionsinAndhraPradesh,IndianInstituteofHealthandFamilyWelfare, VengalraoNagar,Hyderabad –2008,
- Radika.R. and Jejjebhoy.S.J, Women's Reproductive Health in India, Rawat Publications,JaipurandNewDelhi,2000.
- Panthaki, D., (1998) Education in Human Sexuality: A source book for educators, FamilyPlanningAssociationof India,Mumbai.
- WomenWorldDevelopmentseriesWomenandHealth,Zedbookslimited,London ,1995.
- WHO School Health Education to Prevent AIDS and Sexually Transmitted Diseases, aresourcepackageforcurriculumplanners,1994.
- Srinivasan. K., Reproductive Health, India towards population and Development goals,OxfordUniversityPress,NewDelhi, 1997.

- National guidelines on Infant and Young Child Feeding, Ministry of Women And ChildDevelopmentFoodandNutritionBoard,Govtof IndiaSecondEdition,2006.
- SaseendranPallikadavath,Women'sReproductiveHealth,SocioculturalContext andAIDS Knowledge in Northern India, Journal of Health ManagementVol.: 7,No.: 1,April,12005
- Susan S. Hally, Nutrition in Reproductive Health, The Journal of Midwifery & Women'sHealth,Volume43,Issue6, pages459–470,Dec1998.
- Watsa, M.C., Meeting the Health needs of young people, Journal of Family Welfare. 10: 3-10,1990.
- PopulationFoundationofIndia,TrainingModuleReproductiveandChildHealth, TrainingandResource DevelopmentCentre,NewDelhi,1998.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	**CO1**	Define the concept of ReproductiveHealth of women;
2.	**CO2**	Explain the significance ofReproductiveHealthandCommunicableDiseases;
3.	**CO3**	Demonstrate about ReproductiveHealthCareServices,Policies&Programmes;
4.	**CO4**	Analyze the FamilyLifeEducation and Dynamics of Families;
5.	**CO5**	Asses the Family and the law, Career Opportunities in Family LifeEducation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	3	3	3	3	2	3	2	3
CO2	2	2	3	3	3	3	2	3	3	3
CO3	2	2	3	3	3	3	2	3	-	3
CO4	2	3	3	3	3	3	2	3	-	3
CO5	3	3	3	3	3	3	2	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-405 A OpenElective	WOMENANDGLOBALIZATION	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To create awareness among the students on the ongoing process of globalization;

2. To analyze the impact of globalization on feminization of labour force, low wages and Income gender inequalities;

3. To evaluate the policies and programmes being implemented as a part of globalization on promoting status of women and gender equality

UNIT– I

Globalizationinhistorical context–TheorizingGenderArrangements.

UNIT– II

Globalizationand changing pattern of employment in the Third World – GlobalizationofPoverty–FeminizationofPoverty.

UNIT– III

Economic Policies and Patterns of Globalization – Growth as development, humandevelopment and gender inequalities;Macro–economythrough the Genderlens.

UNIT– IV

GenderImplicationsofEconomicliberalizationpoliciesandpatternsofglobalization– Genderandpatternsofworkintheageofglobalization,Tradeliberalization,workingconditionandw agegaps –Impact of genderinequalitiesonpatternsofglobalization.

UNIT– V Challenges to liberalization and globalization; towards gender equitable economicpolicies in the world economy; Challenging the gender biases of macroeconomic policies – Gender budgets – challenging gender biases of international trade – challenging gender biasesof international trade – challenging the gender biases of the international system of economicgovernance,Gender, Stateand Citizenship– Challenges.

References:

1. Alexander&C.T.Mohanty(eds)***FeministGenealogies,ColonialLegacies,Democrati cFulines***,Routledge,1999.
2. Amin,S.***Capitalism intheageofGlobalization***,NewDelhi,Madhyam,1999.
3. Burbach,Nunezetal.***GlobalizationanditsDiscontents***,London,Pluto,1997.
4. ChossudovskyM.***TheGlobalizationofPoverty***.Goa,Madhyam,2001.
5. GhoshJ. ***GenderConcerninMacroEconomicPolicy***,EPW30thApril,WS– 2.
6. HeikkiPatomaki(2001)***DemocratizingGlobalization:TheLeverageoftheTobinTax***, NewDelhi,ZedBooksLtd.
7. Dr. HalimaSadiaRizi& Ms. PoojaKhurana(2007)***Globalization,Income Inequalityand HumanDevelopment***,NewDelhi,Global BooksOrganization.
8. ILO(2004),NiluferCagatayandKorkukErturk,***GenderandGlobalization:AMacroeco nomicPerspective***(WorkingPg.No.19),Geneva.
9. SyedNawabHaiderNaqvi(2002)***DevelopmentEconomics– NatureandSignificance***,NewDelhi,Sage Publications.
10. SamirDasgupta&RayKiely(ed)(2006)***GlobalizationandAfter***,NewDelhi,SagePublicatio ns.
11. Rao,N.Rump,L&R.Sudarshan,(ed),***SiteofChange***,NewDelhi,UNDP,1996.
12. Vol.3,Dude,L&RPalriwala(eds),***Structure&StrategiesWomen,Work&FamilyinAsi a***,NewDelhi,Sage,1989.
13. Vol.4Krishnaraj,M&K.Chanana(eds)***GenderandtheHouseholdDomain***,NewDelhi, Sage,1989.
14. Uberoi,P(ed)***StateSexuality&Social Reform***,NewDelhi,Sage,1996.
15. Vikalp,VolVII/No,3,4,5,1999/2000,Plumbai, VAK.

16.EPWIssueJune30–July 6,2001, March 24–30, 2001,June24–30,2000,Jan15–21, 2000,Oct. 30–Nov5, 1999, June17–23,2000,July29–Aug. 4,2000.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Understand the concept and components of globalization;
2.	CO2	Analyze the impact of globalization on changing patterns of employment and poverty.
3.	CO3	Judge the effects of globalization on women from macroeconomic perspective;
4.	CO4	Assess the tenors of globalization on feminization of labour
		force, working conditions and wage rates;
5.	CO5	Evaluate the challenges that women are facing during the era of globalization.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	3	2	3	2	3
CO2	3	3	3	3	3	3	2	3	3	3
CO3	2	2	3	3	3	3	2	3	-	3
CO4	2	2	3	3	3	3	2	3	-	3
CO5	3	3	3	3	3	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-405 B (OpenElective)	**TECHNICALCOMMUNICATIONANDCOMPUTER ETHICS**	06	4
Sessional Marks: 20	End Semester Examination Marks: 80		

Objectives of the Course:

1. To provide the theoretical and conceptual knowledge of Englishcommunication;
2. ToexplaintheSignificance of technicalwriting;
3. To provide the knowledge about Computer Ethics;

UNITI

Phonetics and Spoken English, The Phonemes, The Syllable, Prosodic Features. Thesounds of English – Voweis and Consonants, Word Accent, Features of ConnectedSpeech,Pronunciation,spelling,SuggestionsforimprovementofIndianEnglish. Effective Speaking – Oral Presentations.Listening Comprehension. ReadingComprehension.

UNITII IntroductiontoTechnicalWriting– ObjectiveoftechnicalwritingAudienceRecognitionandInvolvement,PreparationofResume, TechniquesforwritingeffectiveE-mail.WritingUserManuals,WritingTechnicalReportsandSummaries.

UNITIII

Introduction to Computer Ethics – Policy vacuum, Moral and Legal issues,ComputerEthicsProfessionalEthics– Characteristicsofprofessions,ConflictingResponsibilities, Code of Ethics and Professional conduct. Philosophical Ethics–EthicalRelativism, Utilitarianism,Rights individual andSocial PolicyEthics.

UNITIV

Ethics Online – Hacking and Hacker Ethics computer crime Netiquetie. Privacy – Computers and Privacy issue. Proposals for better Privacy Protection property RightsinComputerSoftware– CurrentLegalProtection.SoftwarePiracy,TheMoralquestion.

UNITV Accountability–BuyingandSellingSoftware–Accountabilityissues,SocialChange, Democratic values in the Internet, Freedom of Speech, Future issues. TheRights and Responsibilities of Engineers – Professional Responsibilities, Ethics andRightsEthics in Research and Experimentation.

ReferencesBooks:

1. KrishnaMohan,andMeenakshiRaman,EffectiveEnglishCommunciation,TataMcGray Hill, 2000.

2. MartinM.W.andSchinzungerR.EthicsinEngineering3rdEditionTataMc-Gray-Hill, 1996.

3. DivisionofHumanitiesandSocialSciences,AnnaUniversity,EnglishforEngineerandTec hnologists, Vols, 1and 2ndedition,OrientLongman, 2002.
4. NHTEthicsandSecurityManagementonthe Web,Prentice–Hall of India2003.

5. RutherfordA.J.BasicCommunicationSkillsforTechnology2ndeditionPearsonEducation Asia, 2001.

6. jayanthiDakshinaMurthy,ContemporaryEnglishGrammar,BookPalave,Delhi,1998.

7. HornyA.SParnwellE.C,AnEnglishReader'sDictionary,OxfordUniversityPress,2001.

8. RogetM.RandRogerJ.LRoget'sThesaurusofSynonyms&Antonyms,W.RGoyalPublishersandDistributors, Delhi, 2004.

9. NurnbergM,andRosenblumM,HowtoBulidaBetterVocabulary,WarnerBooks,1989.

PaulV.Anderwon,TechicalCommunication,Thomson,5th edition,2004

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Define the importance of Spoken English;
2.	CO2	Explain the about Technical Writing, Audience, Recognition;
3.	CO3	Demonstrate the Computer Ethics;
4.	CO4	Analyze the Computers and Privacy issues and Legal Protection;
5.	CO5	Asses the Accountabilityissues,SocialChange, Democratic values in the Internet, etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	-	3
CO2	3	3	3	3	3	3	3	2	-	3
CO3	3	3	3	3	3	3	3	2	-	3
CO4	2	2	3	3	3	3	3	2	-	3
CO5	3	3	3	3	3	3	3	3	-	3

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Course Code	Course Title	No of Hours Per week	No of Credits
SVUWS-405 C Open Elective	**Gender and Mass Communications**	06	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives of the Course:

1. To impart the knowledge to the students on the inalienable aspects of human life viz,, Human Rights and their evolution over the period of time;

2. To enhance the awareness on the international initiatives in ensuring the Human Rights of the people across the globe;

3. To make the students to understand the Constitutional Guarantees and protective measures on Human Rights and their enforcement agencies in India.

UNIT– I Women,MediaandSociety–genderinequalityanditssources,familiesontelevision, Women and Social Life, Women and Literature – Women representationand participation in literature and arts – Women and media culture – Women inadvertisements– Women in film and music industry – Mediated images of womenandtheirgenderstatus in contemporarysociety–Gender construction andmedia.

UNIT– II Feministcommunicationtheories– Structuralismandfeministcommunicationtheories– Thestructuralistparadigm– Mutedgrouptheory–Standpointtheory– Poststructuralismandfeministcommunicationtheories– Thepoststructuralistparadigm– Performanceand Positingtheory– Transgender and Cyborgtheories.

UNIT– III

Communication and Women's Empowerment – National Policy for Empowerment ofWomen – Social and Economic Empowerment of Women – Gender Budget – Role ofNGO'sfor Women's Development.

UNIT– IV

Portrayalofwomeninprintandelectronicmedia–Feministwritings–
Representationofwomeninmedia–
ObscenityPornography,IndecentRepresentationof Women (Prohibition) Act
– Women's Sexuality in films. Women in Indian Soap Operas – Women as Viewers – Themes – Characters – Portrayal of women in Television Soap Operas – Soap OperasandSocial Change.

UNIT– V

Development&Communication–ActiveResearch–
FeministCommunicationMethodologyStructuralismandMethodology–
Conversationanalysis–Criticaldiscourseanalysis–
Poststructuralismandmethodology– Poststructuralismdiscourseanalysis and transversediscourseanalysis.

References:

1. Allen.D,Rush.R.,andKaufmanS.J(eds)(1996)***WomenTransformingCommunication, GlobalIntersections***.CA:SagePublications, NewDelhi.
2. AmmuJoseph,KalpanaSharma(eds)(1994)***WhoseNews?TheMediaandWomen'sIssue s***,SagePublications,NewDelhi.
3. AmmuJoseph,KalpanaSharma(eds)(2006)***WhoseNews?TheMediaandWomen'sIssue s***,SagePublications,NewDelhi.
4. CharlotteeKrolokkeandAnneScotSorensen(2005),***GenderCommunication:Theoriesa ndAnalyses***,SagePublications.

5. Donna Allen, Susan J. Kaufman, Ramona, R. Rush (ed). ***Womentransformi***
6. KarenBoyle(2002)***MediaandViolence***.London:SagePublications.
7. Kiran Prasad (ed.) (2005). ***Women and Media: Challenging Feminist Discourse***.NewDelhi:TheWomenPress.
8. KiranPrasad(ed.)(2006)***Women,GlobalizationandMassMedia:InternationalFacetsof Emancipation***. NewDelhi:TheWomenPress.
9. KatharineSarikakisandLeslieReganShade(2008)(eds),***MindingtheGap:FeministI nter ventionsinInternationalCommunication***,USA:RowmanandLittle field.
10. KiranPrasad(ed)(2004)***CommunicationandEmpowermentofWomen:StrategiesandPolicyInsightsfromI ndia***vol.1&2.NewDelhi:TheWomenPress.
11. Marian Meyers. Engendering Blame: News Coverage of Violence against Women.London:SagePublications.
12. PamelaCreedon.WomeninMassCommunications.
13. Patricia M Buzzanell. Rethinking Organizational and Managerial CommunicationformFeministPerspectives.
14. SubhashJoshandKiranPrasad(eds)(2008).FeministDevelopmentCommunication: Empowering Women in the Information Age. New Delhi: TheWomen Press.
15. VidyaDehejia, Representing Body: Gender Issues in Indian Art, Kali for Women,NewDelhi,1997.

Course Leaning Outcomes (CLOs)

S.No.	Course Number:	CO's Description
1.	CO1	Understand the concept of Human Rights and their evolution across the globe;
2.	CO2	Describe the outcomes of various international declarations, covenants on Human Rights, Women and Child Rights;
3.	CO3	Analyze theConstitutional, legal and judicial provisions and the role of Human Rights Commissions in the enforcement and protection of Human Rights;
4.	CO4	Critically analyze various types of violations of Human Rights in the country focusing on women and children;
5.	CO5	Evaluate the functioning of different government and non-governmental agencies in the enforcement of human rights of women and children.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	2	3	-	3
CO2	3	3	3	3	3	3	3	3	-	3
CO3	3	3	3	3	3	3	2	3	-	3
CO4	3	3	3	3	3	3	2	3	-	3
CO5	3	3	3	3	3	3	2	3	-	3

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF ECONOMETRICS



Course

M.A. ECONOMETRICS

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

About the Department

- The Department of Econometrics was started as an interdisciplinary course in 1976 and the department attained the status of an independent full-fledged department in March 1985. There is increasing application of quantitative techniques to various branches of economics in recent times. The use of quantitative tools in economics makes the traditional economic theory more precise and abstract. Hence, a comprehensive course with economics as the core subject and subjects like mathematics, computers as the supporting subjects, which strengthen the quantitative base of the economic theory, is necessary for the present day student.

Vision

- The vision is to promote the publication of high-quality research works in the fields of Economic Theory, Econometrics, and Quantitative Economics more generally. Publications may range from more or less extensive accounts of the state of the art in a field to which the authors have made significant contributions, to shorter monographs representing important advances on more specific issues. In addition to the usual promotion by the Publisher in their advertising and displays at conferences, it also arranges for members of the Econometric Society to receive monographs at a special discount.
- In the same way as for papers submitted to Econometrics. Our experience shows that this procedure generates quite valuable services to the authors. Referee reports are usually very professional, and contain detailed and specific suggestions on how to improve the manuscript. Such services, which are not normally offered by private publishing companies, are among the features that distinguish the Monograph Series of the Society from others.

Mission

- The department mission is to The Master of Arts programme in Econometrics has been designed with the objective to develop in-depth knowledge of students in frontier areas of economic theory and quantitative methods, so that they are able to use the knowledge to study real world economic problems.
- The course has a strong focus on theoretical and quantitative skills and train students in the collection and analysis of the data using their software skills. The programme offers specialized optional courses,

which allow student to pursue their studies in their area of interest. The students are required to submit report and present their findings of field-study. Besides, to hone the student's writing and analytical skills they are required to submit a term paper on current economic problem. Thus, the Masters in Econometrics programme seek to: Supportive environment for all students.

Choice Based Credit System (CBCS):

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed.

Students of this course would be expected to :

- To provide the basic knowledge of decision making, production of products, different market structure and pricing structure of the firms.
- To analyze the concepts and measurement of National Income, factors determining national income and problems in Estimation of National Income.
- To learn basic mathematical methods those are essential for learning and working with economic theories and models.
- To promote the analytical skills of the practical knowledge of calculating descriptive statistics.
- To learn Statistical Methods describing the dynamics of economic systems such as production function analysis and solve econometric analysis of underlying data use with knowledge advanced econometric tools and techniques can solve easily.

- To aware the analytical skills that can be used to solve complex analytical tasks based on a non-trivial statistical analysis of the underlying data and to solve the tasks of formulating and estimating economic models using statistical methods.
- The student will be enriched with several aspects pertaining to Human values and performing of Professional Ethics in day today life.
- Gain the knowledge of Decision about the statistical significance of individual explanatory variable and also over all models. Impacts for the violation of one of the important assumptions for application of OLS regression.
- To know the knowledge of Different types of data, and analyse relationship of economic variables using simple and multiple regression models which are covered in basic Econometrics.
- To learn Mathematical calculation of static optimization, Application of Lagrange's method and also student can evaluate Differential Equations and with Economic Applications.
- Gain knowledge on Web based Information Retrieval Systems
- To aware the Insurance is one of the main and important fields of the economy. The main aim of the insurance is to protect people from risks and from dangers.

Department Objectives:

The Department is having the following objectives:

- Exposure of students to practical and theory and to provide them systematic tools of qualitative and quantitative data analysis to acquire this knowledge and skill.
- To update the syllabus essential for appearing in NET, SLET, RRB, Bank and other competitive exams of UPSC and APPSC.
- To make aware the students to know the Econometric Techniques, to study by relative methods and research areas.
- To develop trained and Practical knowledgeable for educational and Research Institutions and NGO's.
- To develop self employable ability and to apply knowledge for several Companies like Data analyst, Business Managers and other Researchers; it will also provide employment to other dependents.

Program Specific Outcomes:

- The students will acquire additional specialisation through optional courses.
- They will be able to use common software for analysis of economic data.
- Besides, students will be able to execute in-depth analysis of economic issues based on their understanding of economic theory, which will not only widen their opportunities for employment, but also help them to pursue their doctoral studies.

Program Objectives:

The basic objectives of our M.A Econometrics degree program. The department's research mission is to develop an environment conducive to promoting high-quality applied research. Applied research is work that informs policy at the global, national or local level, or that is useful in the conduct of business, or the administration of government or non-profit activities.

- to provide our students with appropriate analytical skills to lay the groundwork for lifelong learning;
- to enable our students to become policy-literate and thus be more informed as citizens;
- to encourage the use of experiential learning, including cooperative education, as a means to introduce students to the world of work, reinforce classroom teaching, and assist in the development and advancement of career goals;
- to prepare our students for successful careers as applied economists; and
- Prepare students to develop own thinking /opinion regarding current national or international policies and issues
- Create awareness to become a rational and an enlightened citizen so that they can take the responsibility to spread the governments' initiatives/schemes to the rural areas for the upliftment of the poor or vulnerable section of the society for inclusive growth
- Motivating the learners to conduct investigations of multifaceted problems by applying research-based knowledge and different types of research methods including conducting of user studies and case studies in libraries, analysis and interpretation of data and synthesis of the information to get right solutions to the problems
- Inspiring the learners to learn ICT skills, Retrieval of various Electronic Resources

Programme Outcomes:

- The Master of Arts programme in Econometrics has been designed with the objective to develop in-depth knowledge of students in frontier areas of economic theory and quantitative methods, so that they are able to use the knowledge to study real world economic problems.
- The students will acquire additional specialisation through optional courses.
- They will be able to use common software for analysis of economic data.
- Besides, students will be able to execute in-depth analysis of economic issues based on their understanding of economic theory, which will not only widen their opportunities for employment, but also help them to pursue their doctoral studies.
- Understanding the basic assumptions in various econometric analysis, economic theories and enhance capabilities of developing ideas based on them Prepare and motivate students for research studies in Econometrics models especially by developing questionnaire, collecting primary data through field surveys.
- Provide knowledge of a wide range of econometric techniques using excel or other statistical software.
- To gained and evaluate Econometric Methods such as OLS, LPM, Logistic regression analyses and conclude using SPSS Package and Students will be able to write programme for Simple statistical analyse and interpret through R-programming.
- Motivate students to extract or utilize different websites for secondary data collection, generating concepts for various facets of econometrics studies and gather latest information provided by various Universities, UGC, ICSSR and other websites.
- Motivate students in preparing for various competitive examinations, NET, SLET, Indian Economic Service etc., by developing or gaining value addition day by day by giving assignments, by following a routine or developing discipline / concentration etc.
- The Department assesses the knowledge and competence levels of the students at the time of their entry into the post graduate programme so that the instruction could be geared to their needs and capabilities, and necessary remedial measures are adopted for the benefit of the slow learners.
- The student should acquired the knowledge with facts and figures related to various aspects in day- to-day life.
- When you graduate with a Master of Arts (Econometrics) you will have learned how to work at a high level of academic achievement

Program Educational Objectives

- To gained and evaluate Econometric Methods such as OLS, LPM, Logistic regression analyses and conclude using SPSS Package and Students will be able to write programme for Simple statistical analyse and interpret through R-programming.
- To aware and how to reduce global poverty and improve people's living conditions and standards; structure of financial system and economic development.
- To aware the knowledge and practical implementation of relevant economic theory in understanding and addressing an environmental or natural resource issue.
- To aware of Life Table and its Relation with Survival Function, Deterministic Survivorship group, Recursion formulas, Assumptions for traditional ages, Analytical Laws of Mortality and to explore Life Insurance models; Level benefit insurance, Endowment insurance, deferred insurance and varying benefit insurance.

RESTRUCTURED CURRICULUM FOR M.A ECONOMETRICS (REGULAR) PROGRAMME

TO BE IMPLEMENTED WITH EFFECT FROM THE ACADEMICYEAR 2021-2022

Semester – I

S. No	Code	TitleoftheCourse	CreditHrs /Week	No. ofCredits	Core /Elective	IA	SEE	TotalMarks
1	EMT 101	MicroeconomicTheoryI	6	4	Core	20	80	100
2	EMT 102	MacroeconomicTheoryI	6	4	Core	20	80	100
3	EMT 103	MathematicalMethods	6	4	Core	20	80	100
4	EMT 104	PracticalI	6	4	Core	20	80	100
5.	EMT 105(a)	StatisticalMethods	6	4	CF	20	80	100
6.	EMT 105(b)	Introduction to Econometrics	6	4	CF	20	80	100
7.	EMT 105 (c)	Agricultural Economics	6	4	CF	20	80	100
8.	EMT 106 (a)	Entrepreneurship and Skill Development	6	4	EF	20	80	100
9	EMT 106 (b)	Environmental Economics	6	4	EF	20	80	100
10.	EMT 107	HumanValuesandProfessionalEthics–I	6	4	EF	20	80	100
		Total	36	24		120	480	600

***AllCOREPapersareMandatory**

- **CompulsoryFoundation -Chooseonepaper**
- **ElectiveFoundation -Chooseonepaper.**
- **Interestedstudentsmay**

registerforMOOCwiththeapprovaloftheconcernedDDCbutitwillbeconsideredfor theaward ofthe grade asopenelectiveonlygiving extra credits.

Semester–II

S. No	Code	Titleof theCourse	CreditHrs /Week	No. ofCredits	Core /Elective	IA	SEE	Total Marks
1	EMT 201	Microeconomic Theory II	6	4	Core	20	80	100
2	EMT 202	Macroeconomic Theory II	6	4	Core	20	80	100
3	EMT 203	Basic Econometrics	6	4	Core	20	80	100
4	EMT 204	Practical II	6	4	Core	20	80	100
5.	EMT 205(a)	Mathematical Economics	6	4	CF	20	80	100
6.	EMT205 (b)	Actuarial Statistics	6	4	CF	20	80	100
7.	EMT205 (c)	Women and Economic Development	6	4	CF	20	80	100
8.	EMT206 (a)	Public Finance	6	4	EF	20	80	100
9.	EMT206(b)	Industrial Economics	6	4	EF	20	80	100
6.	EMT 207	Human Values and Professional Ethics II	6	4	EF	20	80	100
		Total	36	24		120	480	600

***AllCOREPapersareMandatory**

- **CompulsoryFoundation –Chooseonepaper**
- **ElectiveFoundation-Chooseonepaper.**

- **Interested students may register for MOOC with the approval of the concerned DDC, but it will be considered for the award of the grade as open elective only giving extra credits.**

Semester–III

S. No	Code	Titleofthe Course	CreditHrs /Week	No. ofCredits	Core /Elective	IA	SEE	TotalMarks
1	EMT 301	Advanced Econometrics	6	4	Core	20	80	100
2	EMT 302	Computer Applications and Data Analysis	6	4	Core	20	80	100
3	EMT 303(a)	Practical III	6	4	Core	20	80	100
4	EMT 303(b)	Applied econometrics	**6** 6	**4** 4	Generic Elective	**20** 20	**80** 80	**100** 100
5	EMT 303(c)	Economics of Development and Planning	6	4		20	80	100
6	EMT 303(d)	Financial Institutions and Markets						
7	**EMT304**	Personality development	**6**	**4**	**Skill Oriented**	**20**	**80**	**100**
8	**EMT305(a)**	Indian Economy	6	**4**	Open Elective	**20**	**80**	**100**
9	**EMT305(b)**	Economics of Insurance	**6**	4	Open Elective	**20**	**80**	**100**
		Total	**36**	**24**		**120**	**480**	**600**

* **AllCOREPapersareMandatory**

- **GenericElective-Choosetwo**
- **Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may beearnedbyoptingformore numberofopenelectivesdependingontheinterestofthestudentthroughself study.**
- **InterestedstudentsmayregisterforMOOCwiththeapprovaloftheconcernedDDC.**

Semester–IV

S. No	Code	TitleoftheCourse	CreditHrs /Week	No. ofCredits	Core /Elective	IA	SEE	TotalMarks
1	EMT 401	TimeSeriesEconometrics	6	4	Core	20	80	100
2	EMT 402	OptimizationTechniquesin Economics	6	4	Core	20	80	100
3	EMT 403(a)	PracticalIV	6	4	Generic	20	80	100
4	EMT403(b)	InternationalTradeand Finance	6	4	Generic	20	80	100
5	EMT403(c)	IndianEconomy	6	4	Generic	20	80	100
6	EMT403(d)	Project	6	4	Generic	20	80	100
7	EMT 404	Freedom Movement In India, 1857 - 1947	6	4	Multidisciplinary	20	80	100
8	EMT 405(a)	OptimizationTechniquesin Economics	6	4	Open Elective	20	80	100
9	EMT 405(b	Data Base for the Indian Economy	6	4	Open Elective	20	80	100
		Total	36	24		120	480	600

* **AllCOREPapersareMandatory**

- **GenericElective-Choosetwo**
- **Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may beearnedbyoptingformore numberofopenelectivesdependingontheinterestofthestudentthroughself study.**
- **InterestedstudentsmayregisterforMOOCwiththeapprovaloftheconcernedDDC.**

Note:1.Theminimumcreditspersemesterwillbe24and totalminimumcreditsforallthesemesterswillbe96.

2.The internal students shall take atleast one open elective in a semester from the open electives offered byother Departments in the Unversity or other Universities in the state or country either personally orthrough MOOCS.

Evaluation:a)ThedistributionofmarksforPracticalPaperisasfollows:

PracticalExamination -60marks

Viva-Voce -15marks

Seminars -15marks

Record -10mark.

b)Twomidtestswillbeconductedforeachtheorypaperineachsemester.Theaverageofthetwowillbetaken for20marks.

Syllabus

EMT101	**MICROECONOMIC THEORY-I**		**4Credits**
Course Objectives: The objective of this course is to provide the basic knowledge of decision making, production of products, different market structure and pricing structure of the firms with the study of the subject in a Master's programme.			
Course Out comes: At the end of the course, the student will be able to			
CO1	The microeconomic theory is to analyze how individual decision-makers, both consumers and producers, behave in a variety of economic environments.		
CO2	The common goal in all of these issues is to identify the incentives of the various participating agents and the trade-offs that they face.		
CO3	Microeconomics is a branch of economics that studies the behavior of individuals and firms in making decisions regarding the allocation of scarce resources and the interactions among these individuals and firms.		
CO4	Microeconomics shows conditions under which free markets lead to desirable allocations.		
CO5	The fundamental concepts of supply and demand, rational choice, efficiency, opportunity costs, incentives, production, profits, competition, monopoly, externalities, and public goods will help you to understand the world around you.		

Mappingofcourseoutcomeswiththeprogramoutcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	1	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1:Theory of Individual Decision Making

Theory of Demand - Consumer equilibrium under Indifference Curve Analysis – Applications of Indifference Curves - Slutsky Theorem – Revealed Preference Hypothesis - Choice under Uncertainty- Recent Developments in the Theory of Market Demand.

Unit 2: Theory of Production and Cost

Concepts of Production Function – Homogeneous Production Function - Least Cost Combinations of Factors – Cobb-Douglas and CES Production Functions – Frontier Production Function - Properties - Laws of Returns to Scale - Theory of Cost – Traditional and Modern theories of Cost.

Unit 3:Traditional Market Structures

Perfect Competition - Equilibrium, Short Run and Long Run considerations, Efficiency and Welfare – Monopoly – Price and output determination - Price Discrimination - Welfare and Output.

Unit 4: Modern Theories of Market

Monopolistic competition – Collusive and Non- Collusive Oligopoly: Cournot, Bertrand Stackelberg models - Nash equilibrium - Kinked Demand curve and Price Leadership models.

Unit 5: Limit Pricing and Managerial Theories of Firm

Bain's Limit Pricing: Recent developments – Sylos-Labini and Franco Modigliani Models - Baumol's Sales Maximisation: Static single product model with and without advertisements – Marris' model of Managerial Enterprise.

TEXT AND REFERENCE BOOKS:

1) J.M. Henderson and R.E. Quandt (2003) Micro-economic Theory: A Mathematical Approach, Tata McGraw Hill publishing company Ltd.
2) Hal R.Varian (1995), Intermediate Micro-econometrics: A Modern Approach, East West Press.
3) A. Deaton and J. Muellbauer (1987) Economics and Consumer Behaviour, Cambridge University Press.
4) A. Koutsoyiannis, (1979), Modern Micro-economics, London: Macmillan.

EMT102	MACROECONOMIC THEORY-I		4Credits

Course Objectives:

The objective of this course is to provide the basic knowledge of the study of the aggregate economy. The primary goals of macroeconomics are to achieve stable economic growth and maximize the standard of living. The basic concepts in macroeconomics and the concepts of National Income, measurement of National Income and factors determining national income and problems in Estimation of National Income. The theory of Employment, consumption Function, investment Multiplier and Accelerator, IS-LM model with Government sector, Monetary and Fiscal Policies and effect of IS and LM curves; Kinds of investment and determinations of investment; the monetary policy and fiscal policy are tools used by the government to control economic performance and reach macroeconomic goals.

Course Out comes: At the end of the course, the student will be able to

CO1	Define and explain the process of calculating national income, identify its components, demonstrate circular flow of income, analyse the various income identities with government and international trade, define the concept of green accounting.
CO2	Understand Say's law of market, classical theory of employment and Keynes objection to the classical theory, demonstrate the principle of effective demand and income determination.
CO3	Explain the meaning of consumption function, relationship between APC and MPC, consumption and income, concept of multiplier and analyse the theories of absolute and relative income hypotheses.
CO4	Understand the relationship between investment and savings, demonstrate investment multiplier, and understand the meaning of MEC and MEI. CO5. Illustrate the meaning of interest, analyse the various theories of interest

CO5	The goals are supported by objectives such as minimizing unemployment, increasing productivity, controlling inflation, and more. The macro economy of a country is affected by many forces, and as such, economic indicators are invaluable to assessing different aspects of performance.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Macro-Economics

Micro and Macroeconomics - Basic Concepts in Macroeconomics – Stocks and Flows - Statics, Comparative statistics and Dynamics – Micro Foundations of Macroeconomics -– Circular flow of National income.

Unit 2: National Income

Definition – Concepts of National Income – Measurement of National Income – Factors determining National income – National Income and Social Accounting - Methods of Estimation – Problems in Estimation of National Income – National Income and Economic Welfare.

Unit 3: Classical and Keynesian Economics

Classical Theory of Employment – Critique of Classical Theory – Basic Keynesian Model – Consumption Function – Investment Multiplier – Accelerator – Interaction between Multiplier and Accelerator - Integration of Monetary theory and Value theory – Don Patinkin theory – The Real Balance Effect – Pigou Effect.

Unit 4: Neo-Classical and Keynesian Synthesis

The IS-LM model – Extension of IS & LM model with government sector – Relative effectiveness of Monetary and Fiscal Policies –Shifts in IS and LM curves.

Unit 5: Savings &Investment

Kinds of investment – Determinations of investment - Investment demand and Output growth – Marginal Efficiency of Capital – Tobin's 'Q' Theory – Lags in Investment demand.

TEXT AND REFERENCE BOOKS:

1) Edward Shapiro, Macroeconomic Analysis, Galgotia Publications, New Delhi.
2) Keynes, J.M. 1936, General theory of Employment, Interest and Money.
3) Gardener Ackley, 1978, Macro-economic Theory - Theory and policy, Macmillan, New Delhi.

EMT103	MATHEMATICAL METHODS		4Credits

Course Objectives: The course is designed to build the mathematical foundations of the students by equipping them with basic mathematical methods that are essential for learning and working with economic theories and models.This course also introduces the Mathematical tools such as Basic Algebra, Sets operations, functions which is more important in economic functional relations, differential equations and Matrices and Determinants.

CO1	Formulate mathematical models describing the dynamics of economic systems.Demonstrate the role of quantitative techniques in the field of business/industry, illustrate different types of equations, solve equations and system of equations, understand the concept of sets, illustrate and apply basic set operations.
CO2	Explain the rules for calculating derivatives, uses and application in calculating inter-relationship among total, marginal and average cost and revenue, calculate maxima, minima, elasticity, decide the optimal level of production for a firm.
CO3	Demonstrate the rules for calculating integration, describe the importance and application of integration in consumers' and producers' surpluses, total revenue and cost.
CO4	Illustrate matrix operation, minors, cofactors, use cofactor method to find inverse of a matrix, use Cramer's rule to solve systems of equations.
CO5	Students will get to learn applications of mathematical tools to economy.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-

CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Basic Concepts and Set Theory

Exponents – Polynomials – Factorization of Equations — Sets - Meaning, Definition, Types of sets, set operations – Ordered Sets – Linear Point Sets - Cartesian product – Relation – Functions.

Unit 2: Functions and Limits

Functions - Type of Functions – Increasing and Decreasing – Implicit and Explicit – Constant, Linear, Quadratic, Logarithmic and Exponential functions – Graphical Representations of Functions – **Economic Applications of Functions - Limits:** Concepts of a Limit of a Function –Theorems on Limits of Functions – Evaluations of Limits in Simple Cases – Limits and Continuity of Functions.

Unit 3: Differential Calculus and Economic Applications (One Variable)

Differential Calculus: Meaning – Process of Differentiation – Rules of Differentiation – Differentiation of Logarithmic and Exponential Functions – Higher Order Derivatives – Maximum and Minimum Points – Points of Inflection - **Economic Applications:** Marginal concepts, Price and cross Elasticity of demand – Relationship among Total, Marginal, Average concepts – Optimizing Economic functions.

Unit 4: Integration and Economic Applications

Concept of an Indefinite Integral – Standard Integral Formula – Rules of Integration – Methods of integration – Concept of a Definite Integral – Area under a Curve – Fundamental theorem of Calculus – Properties of Definite Integral – Area between Curves; **Economic Applications:** Total Functions from Marginal Function – Consumer's and Producer's Surplus.

Unit 5: Matrices and Determinants

Matrices: Concept of a Matrix – Types of Matrices – Matrix Operations – **Determinants:** Properties of Determinants – Minors and Co-Factors – Evaluation of Determinants of Second and Third Order - Inverse of a Matrix – Solutions of Simultaneous Linear Equations involving two or three Variables by Matrix Inverse Method and Cramer's Rule – Characteristic roots and equations – Concept of a Quadratic form – Rank of a Matrix – Concept of g-inverse and c- inverse.

TEXT AND REFERENCE BOOKS:

1) Allen, RGD : Mathematical Analysis for Economists
2) Mehta, BC and Madanani GMK: Mathematics for Economists, Sultan Chand and Sons, Delhi
3) Taro Yamane: Mathematics for Economists (An Elementary Survey), Prentice Hall of India Private Ltd, New Delhi
4) Alpha C. Chang: Fundamental Methods for Mathematical Economics
5) Barry Bressler: A Unified introduction of Mathematical Economics.
6) Dowing, Edward T: Introduction to Mathematical Economics, (2/ed.), Schaum's Outlines, Mc. Graw Hill, 1980
7) Bose, D : An Introduction to Mathematical Economics, Himalaya Publishing Company, Delhi.

MAPPING

EMT104	PRACTICAL-I		4Credits

Course Objectives: The main objective of this study programme is thus to promote the analytical skills of the practical knowledge of calculating descriptive statistics. These knowledge scan be used to solve complex analytical tasks based on statistical analysis of the underlying socio-economic data.To solve the tasks of formulating and estimating economic models using statistical methods such as Correlation and Regression.This course an underlying of practical knowledge of Probability, and Testing of Hypothesis.

CO1	Able to find Mean, Median, Mode, Range, Quartile Deviation and Standard Deviation and Coefficient of Variation.
CO2	Able to apply Binomial, Poisson, Normal and Log-Normal Distribution Correlation and Regression Analysis
CO3	Able to test small sample tests based on t, F and Chi-square distributions
CO4	Able to find Inverse of a Matrix, System of Simultaneous Linear Equations and Cramer's Rule method.
CO5	Student can identify the relationship between the economic variables and test their significance which is key factor for economic analysis and policy making or business decisions.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Functions and Limits

Functions - Type of Functions – Increasing and Decreasing – Implicit and Explicit – Constant, Linear, Quadratic, Logarithmic and Exponential functions – Graphical Representations of Functions – **Economic Applications of Functions - Limits:** Concepts of a Limit of a Function –Theorems on Limits of Functions – Evaluations of Limits in Simple Cases – Limits and Continuity of Functions.

Unit 2: Differential Calculus and Economic Applications (One Variable)

Differential Calculus: Meaning – Process of Differentiation – Rules of Differentiation – Differentiation of Logarithmic and Exponential Functions – Higher Order Derivatives – Maximum and Minimum Points – Points of Inflection - **Economic Applications:** Marginal concepts, Price and cross Elasticity of demand – Relationship among Total, Marginal, Average concepts – Optimizing Economic functions.

Unit 3: Estimation and Testing of Hypothesis:

Estimation: Introduction – Point and Interval Estimation - Estimators and their Properties: Consistency, Unbiasedness, Efficiency and Sufficiency - Method of estimation – Method of Least Squares and Method of Maximum Likelihood. **Tests of Hypothesis:** Statistical Hypothesis – Critical Region – Best Critical region – The Most Powerful Test - Types of errors - Large sample tests for means and proportions - Small sample tests based on t, F and Chi-square distributions.

Unit 4: Sampling Theory:

Need for sampling – Census Vs. Sampling - Types of sampling – Simple random sampling – Stratified random sampling – Systematic sampling – Two Stage sampling.

Unit 5: Correlation and Regression:

Simple Correlation – Computation – Properties - Rank Correlation - Regression Lines - Numerical problems – Concept of Partial and Multiple Correlations.

TEXT AND REFERENCE BOOKS:

1) Allen, RGD : Mathematical Analysis for Economists
2) Mehta, BC and Madanani GMK: Mathematics for Economists, Sultan Chand and Sons, Delhi
3) Taro Yamane: Mathematics for Economists (An Elementary Survey), Prentice Hall of India Private Ltd, New Delhi

4) Alexander M.Mood, Franklin A. Graybill and Duance C. Boes: Introduction to the Theory of Statistics. Third Edition. McGraw-hill Statistics Series, 1988.
5) S.P. Gupta: Introduction to Statistical Methods.
6) S.P. Gupta: Elements of Statistics.

MAPPING

EMT105(a)	STATISTICAL METHODS		4Credits

Course Objectives: The main objective of this study programme is thus to cultivate the analytical skills that can be used to solve complex analytical tasks based on a non-trivial statistical analysis of the underlying data.To solve the tasks of formulating and estimating economic models using statistical methods.This course an underlying of descriptive statistics, Probability, Sampling methods, Correlation and Regression Analysis and Testing of Hypothesis.

CO1	Able to find Mean, Median, Mode, Range, Quartile Deviation and Standard Deviation and Coefficient of Variation.
CO2	Able to apply Binomial, Poisson, Normal and Log-Normal Distribution Correlation and Regression Analysis.
CO3	Able to test small sample tests based on t, F and Chi-square distributions
CO4	formulate Statistical Methods describing the dynamics of economic systems such as production function analysis and solve econometric analysis of underlying data use with knowledge advanced econometric tools and techniques can solve easily.
CO5	Student can identify the relationship between the economic variables and test their significance which is key factor for economic analysis and policy making or business decisions.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Basics:

Measures of Central Tendency – Measures of Dispersion – Coefficient of Variation, Skewness and Kurtosis – Numerical problems.

Unit 2: Probability and Distributions:

Probability: Concept of Probability – Axioms of Probability – Addition and Multiplication theorems – Bayes's Theorem - **Distributions:** Random Variables – Distribution Function – Probability Density Function - Mathematical Expectation – Binomial, Poisson, Normal and Lognormal distributions – Mean and Variance - Chief characteristics of Normal Distribution.

Unit 3: Estimation and Testing of Hypothesis:

Estimation: Introduction – Point and Interval Estimation - Estimators and their Properties: Consistency, Unbiasedness, Efficiency and Sufficiency - Method of estimation – Method of Least Squares and Method of Maximum Likelihood. **Tests of Hypothesis:** Statistical Hypothesis – Critical Region – Best Critical region – The Most Powerful Test - Types of errors - Large sample tests for means and proportions - Small sample tests based on t, F and Chi-square distributions.

Unit 4: Sampling Theory:

Need for sampling – Census Vs. Sampling - Types of sampling – Simple random sampling – Stratified random sampling – Systematic sampling – Two Stage sampling.

Unit 5: Correlation and Regression:

Simple Correlation – Computation – Properties - Rank Correlation - Regression Lines - Numerical problems – Concept of Partial and Multiple Correlations.

References

1) S.C. Gupta and V.K. Kapoor: Elements of Mathematical Statistics.
2) Wonnacott&Wonnacott: Introduction to Statistical Methods.
3) Alexander M.Mood, Franklin A. Graybill and Duance C. Boes: Introduction to the Theory of Statistics. Third Edition. McGraw-hill Statistics Series, 1988.
4) S.P. Gupta: Introduction to Statistical Methods.
5) S.P. Gupta: Elements of Statistics.

EMT 105(b)	INTRODUCTION TO ECONOMETRICS		4Credits

Course Objectives: The objective of the course is to provide knowledge on Econometric applications of Economic theory.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	students will have adequate competency in the frontier areas of economic theory and methods
CO2	Use basic econometric estimation techniques such as Ordinary Least Squares to estimate bivariate and multivariate regression models.
CO3	Decision about the statistical significance of individual explanatory variable and also over all model.
CO4	Impacts for the violation of one of the important assumptions for application of OLS regression.
CO5	Students will acquire additional specialization topics are estimation of system of equations, estimation of panel data models, generalized method of moments, discrete response models, censored regression models and estimation of average treatment effects.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Nature of Econometrics and Economic Data

Definition of Econometrics – Steps in Empirical Economic Analysis - Econometric Model – The Role of Measurement in Economics – The Structure of Economic Data: Cross-Sectional data, Time Series data, Pooled Cross Section data, Panel Data.

Unit 2: Simple Regression Model

Two Variable Linear Regression Model: Assumptions, Estimation of Parameters, Tests of Significance and Properties of Estimators – Functional forms of Regression models – Log-linear models, Semi log-models and Reciprocal models – Choice of Functional Form.

Unit 3: The General Linear Model

Review of Assumptions, Estimation and Properties of Estimators: Un-biasness, BLUEs and Tests of significance of estimates – Analysis of Variance - **Dummay variables -** Nature of Dummy variables – Use of Dummy Variables – Errors in Variables and its consequences.

Unit 4: Auto-regressive and Distributed Lag Models

Introduction – Types of Lag schemes - Koyck's lag model, Almon's Lag scheme, Partial Adjustment and Expectations models - Causality in Economics – The Granger Causality Test.

Unit 5: Simultaneous Equation Models

Specification – Simultaneous Bias – Inconsistency of OLS Estimators - The concept of Identification, Rank and Order conditions for Identification – Indirect Least Squares - Two stage Least Squares (without proof), Problems.

Text and reference books:

1. Johnston,J: Econometric Methods, McGraw-Hill Book Co., New York.
2. Maddala, G.S: Econometrics, McGraw-Hill Book Co., New York, 3rd Rd.
3. Gujarathi, D.N: Basic Econometrics, Fourth Edition, Tata McGraw-Hill, New Delhi.
4. Tintner,G: Econometrics, John Wiley & Sons, New York.
5. Wooldridge, Jeffery M: Econometrics, Cengage Learning India Pvt. Ltd, New Delhi.

EMT 105 (c)	AGRICULTURAL ECONOMICS		4Credits

Course Objectives: To import knowledge on role of agriculture sector in Economic development and structural changes and contribution of Agriculture sector to the country economy. Understanding the need for improvement in Agricultural Productivity – various programmes adopted by the Government for the improvement of Agricultural productivity

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Understanding scope of Agriculture Economics – Role of Agriculture in Economic Development- changes and contribution of Agriculture sector and Role of Women in Agricultural Development
CO2	Understanding the development of Agriculture Sector Post independence period – trends in area production and productivity and India's position in World Agriculture.
CO3	Agriculture Sector Post independence period – trends in area production and productivity and India's position in World Agriculture.
CO4	Understanding the disbursement of institutional finance to primary sector, credit management and risk management.
CO5	Other agencies – reasons for indebtedness in Agricultural Households.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit –I: Agriculture and Economic Development

Definition, Nature and Scope of Agricultural Economics – Role of Agriculture sector in Economic Development – Structural changes and Contribution of Agriculture Sector — Modernisation of Agricultural Production Systems – Global Hunger Index – Achieving Zero Hunger – Re-orientation of Agricultural Development- Sustainable Agriculture- Role of Women in Agricultural Development.

Unit –II: Agriculture Sector in India

Development of Agriculture sector during Post-Independence Period –Green Revolution - Trends in Growth of Gross Cropped Area and Gross Irrigated Area – Decreasing Size of Average Land Holdings – Area, Production and Yields of Principal Crops- Targets and Achievements during Five Year Plans – India's Position in World Agriculture.

Unit –III. Investments in Agriculture Sector in India

Factors Determining Gross Capital Formation in Agriculture Sector – Trends during Five Year Plans – Share of Public and Private Sectors – Budgetary expenditure on Agriculture sector – Inflow of FDI into Agriculture sector- Sources and Trends in flow of Credit to Agriculture – Kisan Credit Cards – Credit for Rain fed Areas – Indebtedness of Agricultural Households .

Unit – IV: Government Initiatives and Development of Agriculture

Need for Improvement in Agricultural Productivity- Government Initiatives – National Food Security Mission (NFSM)- National Mission for Sustainable Agriculture (NMSA) and Agricultural Extension and Technology – National Crop Insurance Programme – PradhanMantriFasalBimaYojana-RashtriyaKrishiVikasYojana – Rain fed Area Development Programme.

Unit- V: Agricultural Marketing and Trade in India

Determinants of Marketable and Marketed Surplus – Structure of Agricultural Markets – Primary and Secondary Wholesale Markets- Terminal Markets – Retail Markets – Fairs – Nature of Markets – Group Marketing- Cooperative Marketing – Direct Marketing – Warehousing in Rural areas – Physical and Financial Performance of GrameenBhandaranYojana – Role of AGMARK and AGMARKNET- Exports and Imports of Agricultural Commodities

References:

1. Bilgrami, S.A.R. (1996) Agricultural Economics, Himalaya Publishing House, New Delhi
2. FAO (2002) World Agriculture Towards 2015/30: Summary Report, Rome
3. FAO (2015) The State of Agricultural Commodity Markets : Trade and Food Security, Rome.
4. FAO (2015) The State of Food Insecurity in the World., Rome
5. Global AgriSystem Private Limited: Evaluation and Impact Assessment for the Central Sector
6. Scheme of GrameenBhandaranYojna, Submitted by Global AgriSystemPrivate Limited to Directorate of Marketing and Inspection, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.
7. Government of India (2012) Twelfth Five Year Plan (2012–2017) Economic Sectors,Volume II Agriculture, Planning Commission, New Delhi, Published by Sage Publications.
8. Government of India (2015) Annual Report-2014, Ministry of Agriculture and Cooperation, New Delhi
9. Government of India (2015) Agricultural Statistics at a Glance 2014, Ministry of Agriculture
10. Department of Agriculture & Cooperation Directorate of Economics &Statistics, New Delhi, Oxford.
11. Government of India (2015) Pocket Book of Agricultural Statistics-2015.

EMT 106 (a)	ENTREPRENEURSHIP AND SKILL DEVELOPMENT		4Credits

Course Objectives: To make students develop and can systematically apply an entrepreneurial way of thinkingTo import knowledge on organisations for Skill Development.Development of communication skills and skill development.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Entrepreneurship and skill development course outcome study of concepts, functions and types of entrepreneurship.
CO2	To familiar the student with the basic concepts function and type of entrepreneurs.
CO3	Women entrepreneurship and economic development. Role of national and state level organizations in the development of entrepreneurship.
CO4	Provide orientation on identification and to assess the feasibility of the project.
CO5	To make students develop and can systematically apply an entrepreneurial way of thinking.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit I: Entrepreneurship

Concepts of Entrepreneurship - Functions and Types of Entrepreneurs - Motivation and Competency –Entrepreneurship - Women Entrepreneurship and Economic Development.

Unit Ii: OrganizationsFor Entrepreneurship Development

Programmes for the Development of Entrepreneurship - National and State Level Organizations - Entrepreneurship Development Institute of India (EDII) - National Institute for Entrepreneurship and Small Business Development (NIESBUD) - National Science and Technology Entrepreneurship Development Board (NSTEDB) - National Institute of Small Industry Extension and Training (NISIET).

Unit Iii:Identification And Preparation Of Project Report

Identification of Project – Objectives of Project – Methods and Contents of Project Report – Formulation and Appraisal of Project Report.

Unit Iv: Development Of Skills

Need for the Development of Skills –Communication Skills – Verbal and Non-Verbal Communication – Barriers to Communication – Individual Interaction Skills – Basic Interaction Skills - Leadership Skills - Working Individually and as a Team - Personality Development – Intra and Inter-personal Communication Skills.

Unit V: Organizations For Skill Development

Skill Development Mission – PM's National Council on Skill Development – National Skill Development Coordination Board – National Skill Development Corporation – SIKSHAM-National Skill Foundation of India(NSFI) – Skill Development Initiative (SDI) - KaushalVikasYojana (KVY) – AP State Skill Development Board.

References:

1. Kent G. A, 1982, Encyclopedia of Entrepreneurship, Prentice Hall, USA
2. Markcassion, 2000, Enterprise and Leadership, Edward Elgar., UK
3. Michael and et al, 1998, Educating Entrepreneurs for Wealth creation, Aghgate Publisher, Hampshire, U.K.
4. Patel V.G., 1987, Entrepreneurial Development Programmes in India and its relevance to Developing Countries, WorId Bank.
5. Samuddin, 1990, Entrepreneurial Development in India, Mittal Publications,New Delhi.
6. Steneson et al, 1986, Importance of Entrepreneurship and Eco-nomic Development.
7. Rajiv K Misra, Personality Development, Rupa& Co.
8. Govt. of India (2012) XI Plan Document.
9. Govt. of India (2014) Economic Summary.
10. M.GangadharRao. et al, 1993, Industrial Economy Part-I,Kanishka Publishing House, New Delhi.
11. Katar Singh, 1994, Rural Development Principles, Policies and Management, Sage Publication India, New Delhi.
12. Development Commissioner: Annual Reports, Small Scale Industries, New Delhi.
13. UDAl PAREEK and T. VenkateswaraRao, Developing Entre-preneurship - A Hand Book Learning Systems, New Delhi.
14. Deshpande, M.U., Entrepreneurship of Small Scale Industries, Deep and Deep Publications, New Delhi.
15. D.L. Narayana, 1972, Entrepreneurship and Economic Development, Madurai University Press, Madurai.

EMT 106(b)	ENVIRONMENTAL ECONOMICS		4Credits

Course Objectives: The main objective of environmental economics is to maintain a balance between economic development and environmental quality. In order to achieve it, environmental economists have to explore the various socio-economic possibilities to reduce pollution and uplift the standard of living of the people.Environmental economics is a distinct branch of economics that acknowledges the value of both the environment and economic activity and makes choices based on those values. The goal is to balance the economic activity and the environmental impacts by taking into account all the costs and benefits.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Realize the importance and influence of environment on the economy including the quality of manpower. Arouse their feelings to make cleaner environment so as to achieve harmonious development.
CO2	Understand that environmental problem is not the problem of a single country or region but a global problem/issue. Hence, policy formulation may be for all countries.
CO3	Demonstrate the scientific management of waste materials; realize the role and importance of individuals to keep the environment clean.
CO4	Understand the causes and victims of environmental pollution like poverty, population explosion, and over-use of resources, careless or unscientific dump/management of wastes.
CO5	Suggest appropriate measures to correct environmental degradation, aware of those ingredients such as healthy climate, quality of human beings, domestic and other natural habitats and biodiversity levels, productivity and productions, sustainability, etcare all influenced by environment.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1

												2
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Nature and Scope of Environmental Economics

Nature and Scope of Environmental Economics – Economic Growth and Environmental degradation – Environmental Kuznets Curve - Limits to Economic Growth - Sustainable Development – Environmental Quality and Economic Development.

Unit 2: Environmental Degradation and Resource Depletion

Natural Resources – Renewable and Non-renewable Resources – Approaches to the use of Natural Resources – Theories of Natural Resources - Depletion of Natural Resources – Tragedy of Commons – Causes of Environmental Degradation.

Unit 3: Sources and Effects of Pollution

Sources and Types of Pollution – Soil, Air, Water Pollution - Industrialization and Environmental Pollution – Urban Solid-waste and other sources of Pollution – Aqua Culture, Coastal and Marine Pollution - Economic Effects of Pollution.

Unit 4: Environmental Principles and Policies

Environmental Regulation and Control of Pollution – Polluter Pays Principle - Hedonic Pricing Principle – Pigovian Analysis of taxes and Subsidies - Pollution Permits – Environmental Institutions - Environmental Policy – Objectives – National Environmental Policy of 2006 - Pollution Control Policies in India.

Unit 5: Environmental Laws and Management Strategies

Environmental Laws and Regulations – The Air Act, The Water Act, The Environmental Protection Act, The Wildlife Protection Act in India - Environment Management Strategies – Development of Clean Production

Technologies - Forest Conservation, Management and Conservation of Common Property Resources and Environmental Education – Social Forestry – Community Participation.

TEXT AND REFERENCE BOOKS:

1) Bhattacharya, R.N. (Ed), 2001, Environmental Economics; An Indian Perspective, Oxford University press, New Delhi.
2) Sankar,U. (Ed), 2001, Environmental Economics, Oxford University press, New Delhi.
3) Baumol, W.J. and W.E. Oates, 1998, the theory of Environmental policy, (2nd Edition), Cambridge University press, Cambridge.
4) Anil Kumar, 1990 Environmental Protection and Industrial Development, Ashish Publishing House, New Delhi;
5) Mussen, A.M. 1999, Principles of Environmental Economics, Rutledge, London
6) Kolstad, C.D., 1999, Environmental Economics, Oxford University press, Baltimore.
7) Sengupta, R.P.2001, Ecology and Economics: An approach to sustainable development, Oxford University press, New Delhi.

EMT 107: HUMAN VALUES AND PROFESSIONAL ETHICS – I

Human values are the virtues that guide us to take into account the human element when we interact with other human beings. It is with those human values that one becomes truly able to put into practice his/her ethical values, such as justice, integrity, and refusal of violence and ban to kill – even in a crisis situation.To create an awareness on Management Ethics and Human Values.To inspire Moral and Social Values and Loyalty.To appreciate the rights of others. The prime objective of the Professional Ethics is to develop ability to deal effectively with moral complexity in students.To understand the moral values that ought to guide the Engineering profession, (b) To resolve the moral issues in the profession, and (c) To justify the moral judgment concerning the profession.

Course Objectives

This is a course on human values and professional ethics. The main objectives of the course is nature of ethics, relation to Religion, Politics, Business, Legal, Medical and Environment; Nature of Values- Good and Bad, analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom; the Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires). Moksha(Liberation); **t**he Four Noble Truths and Gandhian Ethics; and lastly **c**rime and Theories of punishments are reformative, retributive and Deterrent.

REFERENCES:

1) John S Mackenjie: A manual of ethics.
2) The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
3) "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
4) "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5) Harold H. Titus: Ethics for Today
6) Maitra, S.K: Hindu Ethics
7) William Lilly: Introduction to Ethics
8) Sinha: A Manual of Ethics
9) Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties:

Religious and Civil (ed.) G.C.Halighton.
10) SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. Chowkarnba Sanskrit series. VolLlI and Ill, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
11) CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
12) Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
13) Analyzing Moral.Issues, Judith A. Boss. May Field Publishing Company - 1999.
14) An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications
15) Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.
16) I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar

Learning Outcomes

After successfully completing the course the graduate is able to:

Honesty, open disclosure and sincerity are all characteristics of ethical behavior. Many organizations include a commitment to ethical behavior in their code of conduct. The professionals can adopt a personal code of conduct and make the same commitment on an individual basis. Professional ethics are accepted standards of personal and business behavior, values and guiding principles. The codes of professional ethics are established by professional organizations to help to guide members in performing their job functions according to sound and consistent ethical principles. The principles are beneficence, non-malfeasance, autonomy, justice; truth-telling and promise-keeping.

EMT201	MICRO ECONOMIC THERORY II		4Credits

Course Objectives: The microeconomic theory is to analyze how individual decision-makers, both consumers and producers, behave in a variety of economic environments. The factor prices are land, labour, capital and organization, determination of factor prices, pricing of factors; Ricardian theory of Rent, wage determination under perfect competition, classical theory of interest, theories of Profit; static and dynamic equilibrium, Walrasian System of General Equilibrium, Existence and Stability of General Equilibrium, externalities and Allocative Efficiency; Adam Smith, Bentham, Pigou, Kaldor-Hicks Compensation Criteria.The Fundamental concepts of supply and demand, rational choice, efficiency, opportunity costs, incentives, production, profits, competition, monopoly, externalities, and public goods will help you to understand the world around you.

CO1	Demonstrate the meaning and function of money, high powered money, monetary and paper system, illustrate various version of quantity theory of money.
CO2	Identify types of banks, explain the meaning and function of commercial banks, illustrate how banks create credit, and suggest the instruments to control credit.
CO3	Analyze different phases of trade cycle, demonstrate various trade cycle theories, understand the impact of cyclical fluctuation on the growth of business, and lay policies to control trade cycle.
CO4	Illustrate the meaning of inflation, deflation, stagflation and reflation, identify different kinds of inflation, causes and effects of inflation on different sectors of the economy, describe different measures to control inflation.
CO5	Criteria of Social Welfare – Adam Smith, Bentham, Pigou, and Cardinal school – Pareto Optimality in Consumption, Production and Distribution – Kaldor-Hicks Compensation Criteria- Bergson Social Welfare Function - Social Choice Theory, Coase and Sen.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1

												2
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Factor Markets

Factor Pricing: Marginal Productivity Theory of determination of Factor prices - Factor shares and the 'Adding up' problem - Euler's theorem - Pricing of factors under Imperfect Competition.

Unit 2: Functional Distribution

Theories of Rent: Concept of Rent – Ricardian theory of Rent – Quasi Rent, Theories of Wages: Wage determination under Perfect competition, Monopsony and Collective bargaining Bilateral Monopoly), Theories of Interest: Classical theory of interest – Loanable fund theory – Keynes liquidity preference theory of interest, Theories of Profit: Profit as dynamic surplus – innovations and profits – risk uncertainty and profits

Unit 3:Economics of Information

Basic Concepts of Economics of Information - Economic Value of information - Role of information in Economic theory – Information, a measure of risk - Bayes' Rule - Classical Paradoxes - Choice under Risk - Risk Allocation in Exchange Economies Model - Monopolist Insurer - Perfect Competition - Adverse Selection - Monopolistic Screening, Competition and Market Breakdown - Public Intervention - Brief introduction to Game theoretic approach to information use.

Unit 4: General Equilibrium

Meaning of Partial and General Equilibrium – Static and Dynamic Equilibrium – Stable and Unstable Equilibrium –Walrasian System of General Equilibrium - Existence and Stability of General Equilibrium - Externalities and Allocative Efficiency.

Unit 5: Welfare Economics

Welfare Economics – Criteria of Social Welfare – Adam Smith, Bentham, Pigou, and Cardinal school – Pareto Optimality in Consumption, Production and Distribution – Kaldor-Hicks Compensation Criteria- Bergson Social Welfare Function - Social Choice Theory, Coase and Sen.

Text and reference books:

1. J.M. Henderson and R.E. Quandt (2003) Microeconomic Theory: A Mathematical Approach, Tata McGraw Hill publishing company Ltd.
2. Hal R.Varian(1995), Intermediate Micro econometrics: A Modern Approach, East West Press.
3. A. Deaton and J. Muellbauer(1987) Economics and Consumer Behaviour, Cambridge University Press.
4. A. Koutsoyiannis, (1979), Modern Microeconomics, London: Macmillan.
5. Macho-Stadler, I and D. PerezCastrillo (1997): "An Introduction to the Economics of Information", Oxford University Press.
6. J. Hirshleifer and J. Riley (1992): "The Analytics of Uncertainty and Information", Cambridge University Press
7. J.-J. Laffont (1989): "The Economics of Uncertainty and Information", MIT Press
8. L. Phlips (1988): "The Economics of Imperfect Information", Cambridge University Press
9. T. Van Zandt (2006): "Introduction to the Economics of Uncertainty and Information"
10. K. Binmore (2011): "Rational Decisions", Princeton University Press
11. M. Osborne: "An Introduction to Game Theory", Oxford University Press.

EMT202	MACRO ECONOMIC THERORY II		4Credits

Course Objectives: Macroeconomics refers to the study of the overall performance of the economy. While microeconomics studies how individual people make decisions, macroeconomics deals with the overall aggregate effect of microeconomics. Macroeconomics is crucial for the government to understand and predict the long-term consequences of their decisions. The overarching goals of macroeconomics are to maximize the standard of living and achieve stable economic growth. The goals are supported by objectives such as minimizing unemployment, increasing productivity, controlling inflation, and more. The objectives are Full employment. Price stability. A high, but sustainable, rate of economic growth. Keeping the balance of payments in equilibrium.

CO1	The overarching goals of macroeconomics are to maximize the standard of living and achieve stable economic growth
CO2	The goals are supported by objectives such as minimizing unemployment, increasing productivity, controlling inflation, and more.
CO3	The macro economy of a country is affected by many forces, and as such, economic indicators are invaluable to assessing different aspects of performance.
CO4	Meaning and Types of Inflation – Demand-Pull inflation – Cost-Push Inflation – The Phillips curve – The Inflation – Unemployment trade-off.
CO5	Objectives of Macroeconomic policies – Objectives of Monetary policy.New-classical and Real Business cycles Theorem – Post-Keynesians - Implications for Stabilization Policies.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-

CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Demand for and Supply of Money

The Classical View- Neo-classical view-Quantity Theory of Money – Keynes and the Demand for Money - Post Keynesian theories of demand for money - Baumol , James Tobin and Friedman – Concept of Money Supply – Components of Money Supply – RBI approach to Money supply – High Power Money and Money Multiplier – Determinants of Supply of Money.

Unit – 2: Macro Theories of Distribution

Functional Versus Personal Distribution of Income - MicroversusMacro-theories of Distribution **-** Marxian, Ricardian, Kelecki Theories of Distribution **-** Alternate theories of distribution – Kaldor.

Unit 3: Trade Cycles

Meaning and Types of Trade Cycles – Different theories of Trade Cycles – Samuelson`s Model of Trade Cycle – Hicks' Theory Cycle – Kaldor`s Model of Trade Cycle – Control of Business Cycle – Monetary and Fiscal Policies.

Unit 4: Theories of Inflation

Meaning and Types of Inflation – Demand-Pull inflation – Cost-Push Inflation – The Phillips curve – The Inflation – Unemployment trade-off - The Monetarists Accelerationists' Hypothesis – Rational Expectations Hypothesis – New-classical and Real Business cycles Theorem – Post-Keynesians - Implications for Stabilization Policies.

Unit 5: Macroeconomic policies

Objectives of Macroeconomic policies – Objectives of Monetary policy – The policy of Activists arguments – The policy of Non-activists arguments - Fiscal policy – objectives and tools - Automatic stabilizers – Problems of using of Fiscal policies – Effectiveness of Monetary and Fiscal policies –The concept of Open Economy macroeconomics.

Text and reference books:

1. Ackley, G. Macroeconomic theory, Macmillan
2. Edward Shapiro, Macroeconomic Analysis, 5th edition, New-Delhi Galgotia publications.
3. Branson, W.B., Macro Economic Theory and Policy.
4. Gupta, S.B., 1983, Monetary Economics, Chand and Co.
5. Hicks, J.R., Mr. Keynes and the Classicals; A suggested Interpretation, Econometrics,
6. Laidler, D.E.W., Demand for money.
7. Friedman, M. (ed), The quantity theory of money – A Restatement of studies in the quantity theory of money.
8. Patinkin, Don., Money, Interest and Prices.
9. Rosalind Levacic and Alexander Rebthann, 1982, Macroeconomics; The English Language Book Society and Macmillan.
10. Rongar L. Miller and Robert Pulsinelli, Macroeconomics.

EMT203	BASIC ECONOMETRICS		4Credits

Course Objectives: This course is designed to define Econometrics, Steps in Empirical Economic Analysis, Different types of data involved in econometric Analysis.The courses involved Simple and Multiple Linear regression model and Functional forms of Non-Linear Regression models.Basic concept of Auto regressive distributed lag model (ARDL) developed which will be helpful for future research work with time series data.

CO1	Adequate competency in the frontier areas of economic theory and methods.
CO2	Formulation and estimation of a multiple regression model.
CO3	Decision about the statistical significance of individual explanatory variable and also over all models
CO4	Impacts for the violation of one of the important assumptions for application of OLS regression.
CO5	Estimation of system of equations, estimation of panel data models, generalized method of moments, discrete response models, censored regression models and estimation of average treatment effects.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Nature of Econometrics and Economic Data

Definition of Econometrics – Steps in Empirical Economic Analysis - Econometric Model – The Role of Measurement in Economics – The Structure of Economic Data: Cross-Sectional data, Time Series data, Pooled Cross Section data, Panel Data.

Unit 2: Simple Regression Model

Two Variable Linear Regression Model: Assumptions, Estimation of Parameters, Tests of Significance and Properties of Estimators – Functional forms of Regression models – Log-linear models, Semi log- models and Reciprocal models – Choice of Functional Form.

Unit 3: The General Linear Model

Review of Assumptions, Estimation and Properties of Estimators: Un-biasness, BLUEs and Tests of significance of estimates – Analysis of Variance - **Dummay variables -** Nature of Dummy variables – Use of Dummy Variables – Errors in Variables and its consequences.

Unit 4: Auto-regressive and Distributed Lag Models

Introduction – Types of Lag schemes - Koyck's lag model, Almon's Lag scheme, Partial Adjustment and Expectations models - Causality in Economics – The Granger Causality Test.

Unit 5: Simultaneous Equation Models

Specification – Simultaneous Bias – Inconsistency of OLS Estimators - The concept of Identification, Rank and Order conditions for Identification – Indirect Least Squares - Two stage Least Squares (without proof), Problems.

Text and reference books:

1) Johnston,J: Econometric Methods, McGraw-Hill Book Co., New York.
2) Maddala, G.S: Econometrics, McGraw-Hill Book Co., New York, 3rd Rd.
3) Gujarathi, D.N: Basic Econometrics, Fourth Edition, Tata McGraw-Hill, New Delhi.
4) Tintner,G: Econometrics, John Wiley & Sons, New York.
5) Wooldridge, Jeffery M: Econometrics, Cengage Learning India Pvt. Ltd, New Delhi.

EMT204	PRACTICAL-II		4Credits

Course Objectives: The course designed about Practical knowledge of mathematical concepts specially related to Input-output analysis and Linear Programming which are most important in economic decisions.This course covered Practical knowledge of OLS Method.The course involved practical approach of Multiple Linear Regression Model.Identify, Inconsistency of OLS Estimators.This course is extension of practical practices of Basic Econometrics and Mathematical Economics what we mentioned in the courses of EMT 203 and EMT 205.

CO1	Students can Identify Inter industrial relationships using Input-output analysis,
CO2	analyse maximization of profits and minimization of costs can evaluate using Linear Programming,
CO3	Analyse relationship of economic variables using simple and multiple regression models which are covered in basic Econometrics
CO4	Able to estimate and interpret linear regression models and be able to distinguish between economic and statistical importance
CO5	They should be able to critique reported regression results in applied academic papers and interpret the results for someone who is not trained as an economist.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Input-Output Analysis

Assumptions - Technological Co-efficient Matrix – Closed and open Model – Solution of Open Model – Hawkins-Simon Conditions – Dynamic Input-Output Model – Production Function Approach to Input Output Model.

Unit 2: Linear Programming

Basic Concepts – Formulation of LPP – Basic and Feasible Solutions – Graphical Solution - Simplex Method – Duality in Linear Programming – Elements of Data envelop Analysis and its Applications.

Unit 3: The General Linear Model

Review of Assumptions, Estimation and Properties of Estimators: Un-biasness, BLUEs and Tests of significance of estimates – Analysis of Variance - **Dummay variables -** Nature of Dummy variables – Use of Dummy Variables – Errors in Variables and its consequences.

Unit 4: Auto-regressive and Distributed Lag Models

Introduction – Types of Lag schemes - Koyck's lag model, Almon's Lag scheme, Partial Adjustment and Expectations models - Causality in Economics – The Granger Causality Test.

Unit 5: Simultaneous Equation Models

Specification – Simultaneous Bias – Inconsistency of OLS Estimators - The concept of Identification, Rank and Order conditions for Identification – Indirect Least Squares - Two stage Least Squares (without proof), Problems.

Text and reference books:

1) Johnston,J: Econometric Methods, McGraw-Hill Book Co., New York.
2) Maddala, G.S: Econometrics, McGraw-Hill Book Co., New York, 3rd Rd.
3) Gujarathi, D.N: Basic Econometrics, Fourth Edition, Tata McGraw-Hill, New Delhi.
4) Allen, RGD: Mathematical Analysis for Economists.
5) Mehta, BC and Madanani GMK: Mathematics for Economists, Sultan Chand and Sons, Delhi.
6) Taro Yamane: Mathematics for Economists (An Elementary Survey), Prentice Hall of India Private Ltd, New Delhi.

EMT205(a)	MATHEMATICAL ECONOMICS		4Credits

Course Objectives: This course also introduces the Mathematical tools such as Differential Calculus and Economic Applications (Two or More Variables), Differential Equations and Economic Applications.This course explores Input-output analysis and Linear programming which is most important in the area of Inter industrial dependency and maximization of the profits and minimization of the cost of the firms.

CO1	Students can deal Mathematical calculation of static optimization, Application of Lagrange's method and also student can evaluate Differential Equations and with Economic Applications.
CO2	Able to estimate and interpret Inter industrial relationships using Input-output analysis, also analyse maximization of profits and minimization of costs of the firms using Linear Programming method
CO3	Economic Applications of Differential Equations – Dynamic Multiplier – Harrod-Domar Model.
CO4	Homogeneous Linear Difference Equations with Constant Coefficients – Particular Solution of Non-homogeneous Linear Equations – Linear First Order and Second Order Difference Equations with constant coefficients – Cobweb Model –Market model with Stocks
CO5	Formulation of LPP – Basic and Feasible Solutions – Graphical Solution - Simplex Method – Duality in Linear Programming – Elements of Data envelop Analysis and its Applications.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2

CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Differential Calculus and Economic Applications (Two or More Variables)

Differential Calculus: Functions of two or more variables and Partial Derivatives – Rules of Partial Differentiation – Second-Order Partial Derivatives – Optimization of Multivariable Functions – Constrained Optimization with Lagrange Multipliers – Significance of Lagrange Multiplier – Differentials – Total and Partial Differentials – Homogeneous Functions – Euler's Theorem – Partial Elasticities; **Economic Applications:** Maximization of Utility – Minimization of Cost – Maximization of Cost, Profit – Elasticity of Substitution

Unit 2:Differential Equations and Economic Applications

Definitions and Concepts – Linear Differential Equations of the First and Second Order with constant coefficient – Non-linear Differential equations of First-Order and First Degree – Variable Separable Case, Differential Equations with homogeneous equations - Economic Applications of Differential Equations – Dynamic Multiplier – Harrod-Domar Model.

Unit 3: Difference Equations and Economic Applications

Definitions and Concepts – Homogeneous Linear Difference Equations with Constant Coefficients – Particular Solution of Non-homogeneous Linear Equations – Linear First Order and Second Order Difference Equations with constant coefficients – Cobweb Model –Market model with Stocks – Dynamic Multiplier – Multiplier Acceleration Model : HarrodDomar Model – Multiplier's Accelerator Interaction Model of Samuelson.

Unit 4: Input-Output Analysis

Assumptions - Technological Co-efficient Matrix – Closed and open Model – Solution of Open Model – Hawkins-Simon Conditions – Dynamic Input-Output Model – Production Function Approach to Input Output Model.

Unit 5: Linear Programming

Basic Concepts – Formulation of LPP – Basic and Feasible Solutions – Graphical Solution - Simplex Method – Duality in Linear Programming – Elements of Data envelop Analysis and its Applications.

Text and reference books

1) Allen, RGD: Mathematical Analysis for Economists.
2) Mehta, BC and Madanani GMK: Mathematics for Economists, Sultan Chand and Sons, Delhi.
3) Taro Yamane: Mathematics for Economists (An Elementary Survey), Prentice Hall of India Private Ltd, New Delhi.
4) Alpha C. Chang: Fundamental Methods for Mathematical Economics.
5) Barry Bressler: A Unified introduction of Mathematical Economics
6) Dowing, Edward T: Introduction to Mathematical Economics, (2/ed.), Schaum's Outlines, McGraw Hill, 1980.
7) Bose, D: An Introduction to Mathematical Economics, Himalaya Publishing Company, Delhi.

EMT 205(b)	ACTUARIAL STATISTICS		4Credits

Course Objectives: The objective of the course is to provide knowledge on Actuarial Statistics. Actuarial analysis is an essential task performed by insurance companies to analyze data and estimate the probability of an insurance claim being filed for a given event. This work allows insurance companies to predict with areas on able degree of accuracy the amount of claims they will pay out, which helps them determine what premiums they must charge to remain profitable.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	To learn and gain the knowledge about the impact of economic and social conditions in the financial sector.
CO2	To create awareness about the financial terminology and calculations in the policy designing
CO3	To skill development and honed by successful actuaries include an excellent business communications in sense with knowledge of finance, accounting, and economics.
CO4	Actuaries often required keen analytical and problem solving skills using mathematics and statistics.
CO5	Actuaries can ability to work with reliability and relevance by using the analytical and scientific reports generated by the researchers

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

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Unit -1 Theory of Interest rates, Rate of Interest, Nominal rate of interest. Accumulation factors. Force of interest, present values, Stoodley formula for the force of interest, Present value of cash flows, Valuing cash flows - Basic Annuities Certain, Present values and accumulation, Concepts of different annuities, Continuously payable annuities, Varying annuities.

Unit- 2 Utility Theory, Insurance and Utility Theory, Models for individual claims and their sums, Approximations for the distribution of the sum - Application to Insurance - Survival function, time until death for a person age X, Accurate future Life time, Force of Mortality.

Unit-3 Life Table and its Relation with Survival Function – Examples - The Deterministic Survivorship group, Recursion formulas, Assumptions for traditional ages, Analytical Laws of Mortality, Select and Ultimate tables.

Unit – 4 Life Insurance: Insurance payable at the moment of death and at the end of the year of death – Level benefit insurance, Endowment insurance, Deferred insurance and Varying benefit insurance. Life Annuities. Single payment, Continuous Life annuities, Discrete life Annuities - life annuities with monthly payments, Complete annuities – Immediate and Apportionable annuities – due.

Unit 5: Multiple life functions, Joint life and Last Survivor status, Insurance and Annuity benefits through multiple life function, Evolution for Special Mortality laws - Multiple decrement models, associated single decrement tables, Central of multiple decrement, Central force assumptions for multiple decrements. Uniform distribution assumption for multiple decrements.

Text and reference books:

1) Bowes, N.L., Gerber, H.U., Hickman, J.C, Jones, D.A., and nesbitt, C., J .(1986). Actuarial Mathematics. Society of Actuaries, Lthaca, lllins, U/S.A. 2nded(1997) C.H.1,2,3,4,5,9&10.
2) McCutchheon, J.J. and Scott, W.F., An introduction to Mathematics of finance.
3) Spurgeoin,E.T .(1972). Life Contingencies. Cambridge University Press.
4) Nall, A (1977), Life Contingencies. Heinemann.

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EMT 205(c)	WOMEN AND ECONOMIC DEVELOPMENT		4Credits

Course Objectives: To make the students to understand the role of Women in India's Economic Development To assess the status of women in India in terms of such key indicators as literacy rates, education, work participation rates, income, wealth and political power.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Understand and explain the key concepts like fertility rates, work participation rates and the role of women in economic development of the country.
CO2	Explain the vast gender gaps existing in India in literacy, life expectancy, health care and income levels between men and women.
CO3	Illustrate the flaw in the existing gender division of labor and the reasons for the low levels of work participation rates among women in India
CO4	Analyze the status of women in politics and administration and the role of various institutional agencies in the development of women
CO5	Critically evaluate impact of various poverty alleviation and development programmes implemented in ameliorating the conditions of women in India.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

UNIT- I: Women and Economic Developmentin India

Women Population in India - Rural and Urban Women Population – Fertility Rates – Women Labour Force and Work Force Participation Rates – Role of Women in Economic Development.

UNIT – II: Women and Human Development

Human Development – Gender Gap – Gender Inequality Index - Gender Development Index – Gender Empowerment – Measures – Women and Literacy, Life Expectancy –Access to Health Care – Income Inequalities.

UNIT – III: Women and Labour Markets

Gender division of labour –Participation rates in rural and urban employment markets in India - Factors affecting women entry into labour markets in Agriculture, Industry and Service sectors - Women in Organized and Unorganized Sectors

UNIT – IV: Governance for Women Development

Role and functions of Ministry of Women and Child Development - Social Welfare Boards: National and State level Commissions of Women. Women's Development Corporation. National Institute of Entrepreneurship and Small Business Development (NIESBUD) – NABARD -Small Industries Development Bank of India (SIDBI).

UNIT – V: Welfare Programmes and Women Development

Role of Non-Government Organizations in Women's welfare - Kasturba Gandhi BalikaVidyalayas (KGBV) – National Programme for Adolescent Girls (NPAG) – National Mission for Empowerment of Women – STEP – Micro Credit Groups – SWADHAR – DHANALAKSHMI – RashtriyaMahilaKhosh (RMK) – Indira Gandhi MatrutvaSahayogYojana – MGENREGA – Hostels for Working Women – KishoriBalikaPathakam – Indira KranthiPatham – JananiSurakshaYojana - BangaruTalliProgramme – Jana DhanYojana – SuknyaSamrudhiYojana.

Reference:

1. Boserup, E (1970), Women's Role in Economic Development, George Allen andUnwin, London.
2. Desai, N and Raj, M.K. (Eds)(1970), Women and Society in India, Research Centre forWomen Studies, SNDT University, Bombay.
3. Krishnaraj, M, Sudharshan, R.M. and Shariff, A (1999), Gender, Population andDevelopment, Oxford University Press, New Delhi.
4. Seth, M (2000), Women and Development: The Indian Experience, Sage Publications, New Delhi.
5. Wazir, R (2000), The Gender Gap in Basic Education: NGOs as Change Agents, Sage Publications, New Delhi.
6. Ramachandrudu, G. (1991), Demographic Methods, AU Press, Visakhapatnam.
7. Various issues of Economic Survey, Government of India.
8. Annual Reports of Ministry of Women and Child Development, Government of India.
9. Annual Reports of Ministry of Rural Development, Government of India.
10. Survey on Employment and Unemployment 2012-13, Ministry of Labour, Government of India.

EMT 206(a)	PUBLIC FINANCE		4Credits

Course Objectives: The objectives of public finance are achieved by managing and drafting policies pertaining to key areas such as taxation, management of public revenue and expenditure, raising and servicing public debt, fiscal administration at various levels.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Understand the sources of finance both public and private, demonstrate the role of government to correct market failures and possible advantage of public financing
CO2	Attain the advantages and knowledge of public investments and other government expenditures. Understand the causes of growing public expenditures for various programmes and policies within and outside the country.
CO3	Understand the possible burden, benefits and distribution of various types of taxes among various classes of people, know the general trend and impact on general welfare and arouse them to suggest good and bad tax system.
CO4	Understand the needs of public borrowing from all possible sources to meet necessary public investment/expenditures. Also be alerted to find sources for repayment
CO5	Deliver effectively the preparation of budget and how they are passed in the house. Understand the changes in size and flexibility of state and central budget along with the role played by Finance Commission.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5												

Unit 1: Scope and Structure of Public Finance

Nature, Scope and Importance of Public Finance - Public Finance and relationship with other Sciences - Distinction between Public and Private Finance - Principles of Public Finance-Principle of Opportunity Cost in Public Finance - Theory of Public Goods and Merit Goods - Role of Public Finance in Developing Economies and Underdeveloped Countries.

Unit 2: Public Expenditure

Introduction - Difference between Public and Private Expenditure - Reasons for growth of Public Expenditure - Classification and Canons of Public Expenditure - Effects of Public Expenditure - Wagner's Law of Increasing State Activities - Peacock and Wiseman Hypothesis - Controls and Accountability of Public expenditure in India

Unit 3: Public Revenue and Taxation

Sources of Public Revenue - Classification of Public Revenue - Principle of Public Revenue - Effects and significance of Public Revenue - Characteristics of Good Tax system in India - Canon of Taxation - Classification of Taxation - Benefit (Modern) theories of Taxation - Ability to Pay Theory - Taxable Capacity - Value Added Taxation**(VAT)**and GST Principle and Issues – Indian Tax Structure – Incidence and Effects of Taxation.

Unit 4: Public Debt

Classification of Public Debt - Causes of Public Debt - Objectives of Public Debt - Effects of Public Debt - Burden of Public Debt - Public debt Management - Public Debt in India.

Unit 5:Budget and Federal Fiscal Systems

Introduction –Definitions of Primary deficit, Revenue deficit, Budgetary deficit and Fiscal deficit - Budget classification - Zero Base Budgeting - Fiscal Deficit and Budgetary Deficit in India – FRBM -Centre-State Financial relations in India –Functions of Finance Commission - Recommendations of 13^{th}and14^{th} Finance Commissions.

Text and reference books:

1. B.P.Tyagi, Public Finance, Jai Prakash& Company, Meerut, 2008.
2. Bhargava .R.N, the Theory and Practice of Union Finance in India, Chaitanya Publishers, Allahabad, 1998.
3. Dalton.H, Principle of Public Finance, Allied Publishers, Bombay, 1992.
4. Dwevedi.P.N, Reading in Indian Public Finance, Chanakya Publications, New Delhi, 2006.
5. Lakadawala.D.T, Union State Financial Relations, Lalwani Publishers House, Mumbai, 1986.
6. Mathew.T, Tax Policy, Some Aspects of Theory and Policy, Chanakya Publications, New Delhi, 2001.
7. Mundle.Sudipto.(ed), Public Finance, Policy Issues for India, OxfordUniversity, Press, 1999.
8. Musgave.R.A, The Theory of Public Finance- A Study of Public Finance, McGraw hill company, Tokyo, 1999.
9. R.K.Lekhi, Public Finance, Kalyani Publishers, New Delhi, 2007.

EMT 206(b)	INDUSTRIAL ECONOMICS		4Credits

Course Objectives: To make students understand the theory of firm and forms of Industrial organization. To familiarise students with industrial location importance and theories of industrial location To make students understand the native and investment decision. To help students to understand industrial management and role of Science and Technology in Industrial Development.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Understanding industrialization and economic development strategies of industrialization in developing countries.
CO2	Study the theory of the firm – optimum firm – factors determine optimum firm
CO3	Understanding factor influencing Industrial location and theories of Industrial location Study the nature and types of investment decisions.
CO4	Profile for project, project evaluation and cost benefit analysis
CO5	Understanding Industrial Management, role of Science and Technology in Industrial Development and Industrial Policies

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Industry and Economic Development

Industrialization and Economic Development-Factors Promoting Industrialization-Strategies of Industrialization in Developing Countries.

Unit 2: Firm and Forms of Industrial Organization

The Theory of the Firm – Objectives – Size-Growth of the Firm-Optimum Firm-Factors Determining Optimum Firm - Forms of Industrial Organization.

Unit 3: Theories of Industrial Location

Factor Influencing Industrial Location–Theories of Industrial Location: Alfred Weber, Sargeant Florence, August Losch, Walter Isard–Melvin Greenhut.

Unit 4: Investment Decisions

Nature and Types of Investment Decisions–Time Preparation–Profile of Project–Project Evaluation/Appraisal–Cost-Benefit Analysis-Different Rates of Return Methods - Pay Back Method - Accounting Rate of Return Method - Net Present Value Method and Internal Rate of Return Method-Break-Even Analysis.

Unit 5: Industrial Management

Industrial Productivity–Rationalization–Automation–Industrial Efficiency–Role of Science and Technology in Industrial Development-Industrial Policies of 1956 and 1991.

References:

1. Ahulwalia I.J., Industrial Growth in India-Stagnation Since the Mid Sixties, Oxford University, New Delhi, 1985.
2. Barthwal R.R., Industrial Economics, Wiley Eastern Ltd., New Delhi, 1985.
3. Cherunilam, F., Industrial Economics: Indian Perspective (3rd Edition), Himalaya Publishing House, Mumbai, 1994.
4. Dasgupt P.S., Marglin and A. Sen, Guideline for Project Evaluation , UNIDO Publications, New York, 1972.
5. Desai B., Industrial Economy in India (3rd Edition), Himalaya Publishing House, Mumbai, 1999.

6. Divine P.J. and R.M. Jones (et.al), An Introduction to Industrial Economics, George Allen and Unwine Ltd, London, 1976.3
7. Fog B., Industrial Pricing Policies, North Holland, Amsterdam, 1959.
8. GangadharaRao M., HeggadeOdeyar D. and Yadapadithya., Industrial Economy: Trends, Problems and prospects, Part-II, Kanishka Publishing House, New Delhi, 1993.
9. Hay D. and D.J. Morris., Industrial Economics: Theory and Evidence, Oxford University Press, New Delhi, 1993.
10. Jalan B., India's Economic Policy, Viking, New Delhi, 1996.
11. KuchhalS.C., Industrial Economy of India, Chaitanya Publishing House,Allahabad (Latest Edition).
12. Patel S.J., Technological Transformation in the Third World, AldershotAvebury, 1993.
13. Sivayya K.V. and Das V.B.S., Indian Industrial Economy, S.Chand& Company Ltd., Ram Nagar, New Delhi (Latest Edition).
14. Sandesara J.C., Industrial Policy and Planning 1947-1991: Tendencies, Interpretations and Issues, Sage Publication, New Delhi, 1999.
15. Smith D.M., Industrial Location: An Economic Geographic Analysis, John Wiley & Sons, New York, 197

EMT 207: HUMAN VALUES AND PROFESSIONAL ETHICS – II

Human values are the virtues that guide us to take into account the human element when we interact with other human beings. ... It is with those human values that one becomes truly able to put into practice his/her ethical values, such as justice, integrity, and refusal of violence and ban to kill – even in a crisis situation. To create awareness on Management Ethics and Human Values. To inspire Moral and Social Values and Loyalty. To appreciate the rights of others. The prime objective of the Professional Ethics is to develop ability to deal effectively with moral complexity in students.To understand the moral values that ought to guide the Engineering profession, (b) To resolve the moral issues in the profession, and (c) To justify the moral judgment concerning the profession.

Course Objectives

This course explores of the Human values and professional ethics for economics. The main objectives of the course is the value Education, concept of human values, self-introspection, self-esteem, family valuesand responsibilities of family, threats of family life - status of women in familyandsociety; The medical ethics, responsibility of medicalpractitioners. ethical issues; business ethics immoral and illegal practices, ethical abuses and work ethics; **e**nvironmental ethics, ecological crisis; social ethics and ethics of media.

Unit-I: Value Education- Definition - relevance to present day - Concept of Human Values - self introspection – Self-esteem - Family values-Components, structure and responsibilities of family- Neutralization of anger - Adjustability - Threats of family life - Status of women in familyandsociety - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

Unit-II: Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medicalpractitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit-III: Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions.Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit-IV: Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollutionand waste, CI imate change, Energy and population, Justice and env iron mental health.

Unit-V: Social ethics- Organ trade.Humantrafficking.Human rights violation and social disparities, Feminist ethics.Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

References:

1. John S Mackenjie: A manual of ethics.
2. The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Halighton.
6. SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. Chowkarnba Sanskrit series. VolLlI and Ill, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
7. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
8. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
9. Analyzing Moral.Issues, Judith A. Boss. May Field Publishing Company - 1999.
10. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications
11. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education-Telugu ~ Akademi, Hyderabad.
12. I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar

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Learning Outcomes

After successfully completing the Human values and professional ethics the graduate is able to:

The value Education, concept of human values, self-introspection, self-esteem, family valuesand responsibilities of family, threats of family life - status of women in familyandsociety; The medical ethics, responsibility of medicalpractitioners. ethical issues; business ethics immoral and illegal practices, ethical abuses and work ethics; **e**nvironmental ethics, ecological crisis; and social ethics, ethics of media. Honesty, open disclosure and sincerity are all characteristics of ethical behaviour. Many organizations include a commitment to ethical behaviour in their code of conduct. Professionals can adopt a personal code of conduct and make the same commitment on an individual basis. Professional ethics are accepted standards of personal and business behaviour, values and guiding principles. Codes of professional ethics are established by professional organizations to help to guide members in performing their job functions according to sound and consistent ethical principles. The principles are beneficence, non-malfeasance, autonomy, justice; truth-telling and promise-keeping.

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EMT 301	ADVANCED ECONOMETRICS		4Credits

Course Objectives: The objective of this course to provide students with a knowledge of the core techniques of econometric analysis which forms the basis for the understanding and critical assessment of published work in empirical econometrics.

To develop the analytical skills required to demonstrate theoretical asymptotic properties of different econometric estimation and testing procedures under weakened modelling assumptions..

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Concepts of Heteroscedasticity &Multicollinearity Possible reasons behind the presence of Heteroscedasticity&Multicollinearity. Skill to judge the reliability of estimation in case of violation of basic assumptions for the application of ordinary linear regression method.
CO2	Concepts of Autocorrlation reasons behind the presence of Heteroscedasticity&Multicollinearity. Describe the variance/covariance matrix for the regression errors under the assumption that the errors are correlated
CO3	Apply modern econometric methods covering time series analysis, financial econometrics, microeconometrics, macroeconometrics and structural econometric modelling;
CO4	Interpret and critically evaluate applied economics research literature; demonstrate programming skills and numerical methods; and
CO5	Apply methods learned to address policy and business decision questions.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-

CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Multicollinearity and Heteroscadasticity

Multicollinearity: Source and Consequences, Tests for Multicollinearity and solutions for Multicollinearity. Heteroscadasticity**:** Sources and Consequences, Tests for Heteroscadasticity, Generalized Least Squares Method of Estimation.

Unit 2: Autocorrelation

Sources of Autocorrelation - first order Autoregressive scheme - Consequences of Autocorrelation - Tests for Autocorrelation – Durbin-Watson test - Methods of estimation of Autocorrelation coefficient -Estimation from d- statistic and Cochran-Orcutt iterative method.

Unit 3: Qualitative and Limited Dependent Variables Models

Binary Choice Models: Linear Probability Model, Probit Model and Logit Models – Censored and Truncated regression models.

Unit 4: Simultaneous Equation Models: Estimation Methods

Two stage Least Squares, Limited Information Maximum Likelihood, K-class Estimators, Three Stage Least Squares and Full Information Maximum Likelihood Methods – Numerical Problems.

Unit 5: Panel Data Regression Models and Time Series Econometrics

Panel Data – Estimation of Panel Data Regression Models - Fixed and Random Effects – Estimation – Introduction to Time Series Econometrics - Stationary and Non-Stationary Stochastic Process – Integrated Stochastic Process – Unit roots – Co-integration – Test for co-integration, Co-integration and error correction mechanism.

Text and reference books:

1. Maddala, G.S: Econometrics, McGraw-Hill Book Co., New York, 3rd Rd.
2. Johnston,J: Econometric Methods, McGraw-Hill Book Co., New York.

3. Gujarathi, D.N: Basic Econometrics, Fourth Edition, New Delhi.
4. Maddala, G.S: Limited-Dependent and Qualitative Variables in Econometrics, Cambridge University Press.

EMT 302	COMPUTER APPLICATIONS AND DATA ANALYSIS		4Credits

Course Objectives: The objective of the course is to provide knowledge on Econometric tools and their applications on Economic theory and practice using statistical packages like STATA, SPSS, R, e-views etc.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Students will get basic knowledge of computers i.e., block diagram, evolution of computer, input/output devices, storing information in computer etc.
CO2	At the end of this course student will gain Examine spreadsheet concepts and explore the Microsoft Office Excel environment. Import and export data.
CO3	Work with pivot tables and charts. Create and edit charts. Learn to use functions and formulas. Perform analysis tasks using Data analysis pack
CO4	Student gained and evaluate Econometric Methods such as OLS, LPM, Logistic regression analyses and conclude using SPSS Package
CO5	Finally, student will be able to write programme for Simple statistical analyse and interpret through R-programming.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-

CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Computer Fundamentals

Definition - Components of a computer-block diagram – Evolution of computer – Generations – input/output devices – storing information in computer – types of computers – Hardware and Software – Compilers and Assemblers – Low level and high-level languages – Operating systems and the graphic user interface – Microsoft Windows operating system.

Unit 2: MS-WORD

Creating, opening and saving files - editing and formatting text - spell and grammar check – auto correct-hyphenation – creating of tables and columns - mail merge - equation editor – concept of a macro - print preview.

Unit 3: MS-EXCEL

Work sheet – entering data – creation of worksheets and workbooks – opening and saving workbooks - editing and formatting - sorting, filtering and pivot tables - Creating graphs and charts - mathematical and statistical functions -Data analysis pack in Excel - Descriptive statistics, tests of hypothesis, ANOVA, Correlation and Regression, Random Number Generation.

Unit 4:Data Handling Using SPSS

Opening Excel files in SPSS - Variables, labels and values, Analysis tools - Descriptive statistics - Selection of variables in multiple linear regression - Stepwise, forward and backward procedures - Factor analysis and Discriminant analysis (Stress on procedures and syntax only).

Unit 5: Data Analysis using R

R environment – Workspace, Getting help, Packages and Built-in data - Assigning values, performing vectorized arithmetic - Creating objects, vectors, lists, matrices, arrays and data frames - Conditional selection, sorting and indexing data frames, implicit looping - Importing data - Branching and looping statements - plotting data – Bar plots, Pie charts, Histogram, Box plots - Summary statistics - Generating samples from discrete and continuous distributions - Simple correlation and regression - Testing hypothesis of mean and variance, Analysis of variance.

Text and reference books:

1. Shelly and Hunt, Computers and Common Sense, Prentice Hall of India, New Delhi.
2. Rajaraman V, Fundamentals of Computers, Prentice Hall of India, New Delhi.
3. Peter Dalgaard (2008): Introductory Statistics with R, 2nd Edition, Springer, New York. (Chapters 1, 2, 3,4,5,6 and 7).
4. Peter Norton's Introduction to computers, Tata McGraw Hill Publishing Co., New York.
5. Foster,J.J.(2001), Data Analyzing using SPSS For Windows 8.0 – 10.0, A Beginner's Guide.
6. M. Crawley, Basic Statistics: An Introduction using R.
7. B.S. Everitt& T. Hothorn, A Handbook of Statistical Analyses Using R (2nd Ed.).
8. J. Maindonald& J. Braun, Data Analysis and Graphics Using R: An Example-based. Approach.
9. P. Murrell, R Graphics (2nd Ed.).

EMT 303(a): PRACTCAL-III	ADVANCED ECONOMETRICS, AND COMPUTER APPLICATIONS AND DATA ANALYSIS		4Credits

Course Objectives: The objective of this course is to provide knowledge of data analysis through the domains of MS-Excel, SPSS and R-programming. In today's business world, data analysis plays a role in making decisions more scientific and helping businesses operate more effectively.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Student will gain Examine spreadsheet. Work with pivot tables and charts. Create and edit charts. Learn to use functions and formulas.
CO2	Perform analysis tasks using Data analysis pack using MS-Excel.
CO3	Student gained and evaluate Econometric Methods such as OLS, LPM, Logistic regression analyse and conclude using SPSS Package
CO4	Student will able to test of Multicollinearity, Heteroscedasticity and Autocorrelation.
CO5	Student will be able to write programme for Simple statistical analyse and interpret through R-programming.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-

CO5	3	2	1	-	1	2	-	1	1	2	-	1

Concepts are covered in this Practical Approach follows;

- **MS-Excel;**Pivot tables, Charts-Histogram, Bar, Pie, Scatter diagrams, Data Analysis Pack-Descriptive Statistics, Correlation Matrix, Simple and Multiple Regression analysis and Testing of Hypothesis.
- **SPSS;**Descriptive Statistics, Correlation Matrix, Simple and Multiple Regression analysis and Testing of Hypothesis.

  Using SPSS Testing of Multicollinearity, Heteroscedasticity and Autocorrelation, LPM and Logistic regression models

  R-programme;Descriptive Statistics, Correlation Matrix, Simple and Multiple Regression analysis and Testing of Hypothesis, LPM and Logistic Regression Models.

EMT 303(b)	APPLIED ECONOMETRICS		4Credits

Course Objectives: The objective of this course is to provide the basic knowledge of an advanced theoretical understanding of consumer behaviour and decision-making. To develop a theoretical understanding of strategic behaviour of economic agents.

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CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Student will be able to develop a sound understanding of the core microeconomic concepts that economists use to understand the process of decision-making by an economic agent(s).
CO2	The student should be able to apply mathematical tools and techniques to study behaviour of economic agents.
CO3	Students will be able to identify strategic behaviour of economic agents and formulate them in a game theoretic framework.
CO4	Student can explore Macro econometric models; Klein-Goldberger Model for USA, Agarwal, K. Krishna Murthy and N.V. A. Narasimhan Models.
CO5	To gain knowledge in Applications of Single and Simultaneous Equation Models for macroeconomic variables.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-

CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Demand Analysis

Demand functions – Restrictions to be satisfied by Demand functions - Single Equation models, Engel Functions and Curves, Specification of Functional forms and Estimation – Linear Expenditure System - Review of Empirical Studies.

Unit 2: Consumption Function

Theories of Consumption Function – Alternative specifications – Absolute Income Hypothesis, Relative Income Hypothesis, Life Cycle Hypothesis, Permanent Income Hypothesis – Problems of Estimating the Consumption Function – Review of some empirical studies.

Unit 3: Production Functions

Single Equation Estimation of production functions - Cobb-Douglas, CES, Translog – Specifications and Estimation issues – Review of Empirical studies – Functional forms and Estimation of Cost Functions - Estimation of Factor demand Equations - Empirical Studies.

Unit 4: Macro Econometric Models

Nature ofSimultaneous Macro Econometric Models – Klein-Goldberger Model for USA - Brookings Model – Macro Econometric models for India – Agarwal, K. Krishna Murthy and N.V. A. Narasimhan Models.

Unit 5: Other Applications of Single and Simultaneous Equation Models

Models of Money Demand and Supply – Estimation of Demand for Money Function – Application in Industrial Organization, Labour Economics and Health Systems – Review of Empirical Studies.

Text and reference books:

1. Intriligator, M. D. (1978) Econometric Models, Techniques and Applications, North-Holland.

2. ICSSR Survey of Economics – Vol.7 (Econometrics) Allied Publishers
3. Deaton A. and John Muellbauer, Economics and Consumer Behaviour –Cambridge University Press, 1987
4. Killingsworth Mark R.- Labour Supply, Cambridge University Press 1985
5. MeghnadJ.Desai 1973 – Macro-economic models for India: A Survey – Sankhyaseries-B 85 – PP 169-205

EMT 303(c)	ECONOMICS OF DEVELOPMENT AND PLANNING		4Credits

Course Objectives: The paper provides fundamental foundation of basic growth and development issues, approaches and models. The paper attempts to discuss the structure and change in variables. It helps understand the overall static and dynamic perspectives of the economy in a purely theoretical perspective.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	The economic development plan provides a comprehensive overview of the economy, sets policy direction for economic growth, and identifies strategies, programs, and projects to improve the economy.
CO2	The aim of economic development is to improve the material standards of living by raising the absolute level of per capita incomes. Raising per capita incomes is also a stated objective of policy of the governments of all developing countries.
CO3	One of the most important functions of economic planning is to achieve consistency among different economic objectives. Some desirable goals are likely to conflict with others.
CO4	One of the most important functions of economic planning is to achieve consistency among different economic objectives.
CO5	Five basic stages are traditional society, preconditions for take-off, take-off, drive to maturity, and age of high mass consumption), there exists no clear definition for the stages of economic development.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2

CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Concepts and Measurement of Economic Growth and Development

Economics of Development and Growth - Problems and Causes of Underdevelopment and Development - Factors of Economic Growth - Obstacles to Economic Development - Vicious Circle of Poverty - Characteristics of Modern Economic Growth - Measures of Economic Growth and Economic Development, HDI and PQLI.

Unit 2: Theories of Growth and Development

Classical, Karl Marx and Schumpeter - Joan Robinson Golden Age model, Harrod-Domar model, Rostow Stages of Growth - Lewis theory of Surplus Labour - Rodan's Big Push theory - Nurkse Balanced Growth theory - Hirschman's Unbalanced theory – Ranis - Fei Model – Dependency Theory of Development.

Unit 3: Domestic Factors in Economic Development

Capital Formation and Economic Development- Role of Agriculture and Industry in Economic Development – Population Growth and Economic Development - Human Capital Formation and Man Power Planning – Entrepreneurship in Economic Development – Role of Technology in Economic Development.

Unit 4: Trade and Development

Role of Foreign Trade in Economic Development – Trade as an Engine of Economic Growth - Two Gap Model – Objectives and Role of Monetary and Fiscal Policies in Economic Development - Commercial Policy and Economic Development - Price Policy and Economic Development.

Unit 5: Planning Techniques and Planning in India

Capital-Output Ratio - The Choice of Techniques and Appropriate Technology - Investment Criteria – Elements of Cost-Benefit Analysis - Poverty, Unemployment and Economic Inequalities in India – Role of Public Sector in India - Role of Foreign Aid and Foreign Capital in India.

Text and reference books:

1. Kindleberger.C.P, Economic Development, McGraw Hill Company, New York, 1988.
2. Lewis.W.A, The Theory of Economic Growth, George Allen and Unwin, London, 1998.
3. Michel.P.Todero& Stephen C.Smith, Economic Development, Pearson Education (Singapore) Limited, New Delhi, 1998.
4. S.K.Misra and V.K. Puri, Economics of Development and Planning, Himalaya Publishing House, New Delhi, 2006.
5. Solow.R.M, Growth Theory: An Exposition, Oxford University Press, New York, 2000.

EMT 303(d)	FINANICIAL INSTITUTIONS AND MARKETS		4Credits

Course Objectives: To introduce students to the world of financial services to enrich student's understanding of the fundamental concepts and working of financial service institutions. Further, to equip students with the knowledge and skills necessary to become employable in the financial service industry.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Explain the broad features of Indian financial institutions with its apex banks' objectives and purview. Also understand the instruments to control credit in the country.
CO2	Effectively narrate the kinds and components of money with its regulatory system, be aware of the functions, objectives and limitations of commercial banks.
CO3	Identify the existence and development of non-banking financial institutions, know the important role of Mutual funds, LIC, investment companies etc., utilize and effectively participate in the development process.
CO4	Understand the conditions of financial markets and its impact in the economy
CO5	Demonstrate the role and significance of foreign exchange rate and its markets with its impact on various sectors in the economy.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Financial System

Evolution of Financial System – Structure of Financial System – Functions of Financial System – Financial System and Economic Development.

Unit 2: Money Market

Features of Money Market – Instruments of Money Market: Call Money Market – Treasury Bills Market – Commercial Bills – Market for Commercial Papers – Certificate of Deposits – Discount and Finance House of India (DFHI) – Securities Trading Corporation of India (STCI) – Deficiencies and Recent Developments in Indian Money Market.

Unit 3: Capital Market

Industrial Securities Market: Primary and Secondary Markets – Government Securities Market and Long Market – Objectives, Functions and performance of Securities and Exchange Board of India (SEBI) – Over the Counter Exchange of India (OCTCEI) – Functions of Stock Exchanges – Bombay Stock Exchange (BSE) – National Stock Exchange (NSE) – Reforms in Capital Market.

Unit 4: Banking and Financial Institutions

Banking: Central Banking: Objectives and Functions - Commercial Banks, Functions and Growth - Process of Credit Creation – Growth and Control of Non-banking Financial Institutions - Functions and Performance of Industrial Finance Corporation of India (IFCI) – Industrial Development Bank of India (IDBI) – Industrial Credit and Investment Corporation of India (ICICI) – Small Industrial Development Bank of India (SIDBI) – State Financial Corporations (SFCs) – Mutual Funds.

Unit 5: Investment Institutions and Foreign Capital

Functions and Performance of Life Insurance Corporation (LIC) – General Insurance Corporation (GIC) and Unit Trust of India (UTI) – Forms of Foreign Capital – International Financial Instruments – Trends in Foreign Capital Inflows to India – Advantages and Disadvantages of Foreign Capital.

Text and reference books:

1. M.Y. Khan, Indian Financial System, Tata McGraw Hill, New Delhi.
2. L.M.Bhole, Financial Institutions and Markets, Tata McGraw Hill, New Delhi.
3. V.A.Avadhani, Indian Capital Market, Himalaya Publishing House, Bombay.
4. H.R.Machiraju, International Financial Markets and India, Wheeler Publishing Company, New Delhi.

5. Vasant Desai, Indian Financial System, Himalaya Publications, Bombay.
6. Peter.S. Rose, Money and Capital Market: Financial Institutions and Instruments, Tata McGraw Hill, London.
7. S.C.Kucchal, Corporation Finance, Chaitanya Publishing, Allahabad.
8. S.L.N.Sinha, Capital Market in India, Vora& Co, Bombay.
9. Hendrik.S. Houthakker, The Economics of Financial Markets, Oxford University Press, New Delhi.

Econometrics (R) III Semester

EMT 304	PERSONALITY DEVELOPMENT AND SOFT SKILLS		4Credits

Course Objectives: Develop effective presentation skills. Conduct effective business correspondence and prepare business reports which produce results. Become self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Soft skills provide students with a strong conceptual and practical framework to build Develop and manage teams.
CO2	They play an important role in the development of the Students' overall personality, thereby enhancing their career prospects
CO3	This paper provides strong practical orientation to the students and helps them in building andimproving their skills in communication, the effective use of English, business correspondence, presentations, team building, leadership, time management, group discussions, interviews, and inter-personal skills.
CO4	This paper also helps students in career visioning and planning, effective resume writing and dealing with placement consultants and headhunters and also to create interesting, and interactive manner,
CO5	Which gives ample scope for the students to interact with each other and face a wide variety of issues, topics, and situations that they are likely to come across as entry-level.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2

CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit – I Foundations of personality development: Concept of Personality – Dynamics - Trait theory of personality: Personality Determinants: Physical, social, educational, family, intellectual and emotional determinants; Causes for sick personality and healthy Personality. (Theory only)

Unit-II Self-awareness skills: self-awareness and management- Communicating: Sending inter personal messages – Listening and reading non-verbal messages - Providing feedback. (Theory only)

Unit- III Motivating: Goal setting – Coaching, Counseling and Mentoring – Empowering people through delegation - Leading: Politicking – Persuading - Applying leadership styles – Managing Change. (Theory only)

Unit- IV Teaming: Working with teams – Running meetings – Valuing diversity: Problem solving: Ethical decision making - Creative problem solving – Resolving conflicts – Negotiation. (Theory only)

Unit- V Self-esteem: Characteristics – Causes of low self-esteem – Steps to build Positive self-esteem; Attitude: Steps in building positive attitude; Interpersonal skills; Steps in developing a positive Personality. (Theory only)

Reference books:

1. Elizabeth B.Hurlock, Personality Development, Tata McGraw Hill, New Delhi-2009.
2. Stephen P.Robbins and Philip L Hunsaker, Training in interpersonal skills, person Education, New Delhi.

3. Shiv Khera, You can wing, Macmillan Publications, New Delhi.
4. Robert M. Sherfield. Rhonda J.Montgomery, PatricaG.Moody, Developing soft Skills, Person education, New Delhi, 2009
5. Biswajit Das IpseetaSatpathy, Business Communication & Personality Development, Excel Publication, New Delhi.

EMT 305(a)	INDIAN ECONOMY		4Credits

Course Objectives: The objective of this course is to provide the basic knowledge of Indian economyStructure of the Indian Economy, Agricultural Sector, Industrial Sector, Tertiary and Foreign Sectors and Planning and Development of the Indian economy that is with the study of the subject in a Master's programme.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Students will develop ideas of the basic characteristics of Indian economy, its potential on natural resources.Understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development.
CO2	Understand agriculture as the foundation of economic growth and development, analyse the progress and changing nature of agricultural sector and its contribution to the economy as a whole. Students will obtain information regarding various agricultural issues in India and remedies for it
CO3	Students will aware about recent economic affairs such as demonetization, universal basic income, cashless economy, skill and training development schemes, make in India etc
CO4	Students will get benefit about various economic issues at local, national and global level.
CO5	Grasp the importance of planning undertaken by the government of India, have knowledge on the various objectives, failures and achievements as the foundation of the ongoing planning and economic reforms taken by the government.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-

CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Structure of the Indian Economy

Indian Economy on the Eve of Independence- Basic Characteristics of the Indian Economy as Developing Economy- Major issues of Development in Indian Economy- Growth and Structural Changes in the Indian Economy- Population-Poverty –Measurement of Poverty, Anti PovertyProgrammes - Inequality- Natural Resources-Infrastructure- Human Development in India-Prices, Price Policy and Economic Growth- Balanced Regional Development-Unemployment in India.

Unit 2: Agricultural Sector

Role Agriculture in Indian Economy- Share of Agriculture - Interrelationship between Agriculture and Industry –Land Tenure System - Farm Size and Productivity -Institutional and Technological Aspects- New Agricultural Policy-Food Security in India-Rural Credit- Agricultural Marketing- Regional Disparities in Indian Agriculture- Irrigation and other Agricultural Inputs.

Unit 3: Industrial Sector

Industrial Structure and Economic Growth- Large and MSMEs - Industrial Labour Problems and Labour Policy -Industrial Sickness Causes and Remedial Measures- Economic Reforms and Industrial Growth-Pattern of Industrialization-Public and Private Industrial Finance in India- Unorganized Sector and Informalisation of the Indian Economy.

Unit 4: Tertiary and Foreign Sectors

Service Sector - Role, Growth and Structure of Service Sector in India –Growth, Composition and Direction of India's Foreign Trade – Trade Policy and its Reforms in India – India's Balance of Payments - WTO and Indian Economy.

Unit 5: Planning and Development

Objectives and Strategy of Planning- Public Sector and Indian Planning- Re-Organization of Planning Commission (NITI Aayog) - Privatization and Globalization and its impact on India-Government Subsides in India - Problems of Capital Formation- Foreign Capital, Foreign aid and Economic Development in India.

Text and reference books:

1. Ghosh. Alak, Indian Economy –Its Nature and Problems, A New Look Indian Economics, Calcutta, The World Press Private Limited, 1989.
2. Jalan.B, The Indian Economy Problems and Prospects, Viking Publications, New Delhi, 2006.
3. RuddarDatt and Sundaram. K.P.M, S.Chand and Company, New Delhi, 2008.
4. S.K.Misra and V.K. Puri, Indian Economy, Himalaya Publishing House, New Delhi, 2006.
5. Sen R.K and B.Chatterjee, Indian Economy-Agenda for 21st Century, Deep and Deep Publications, New Delhi, 2001.
6. Uma Kapila, Indian Economy Since Independence, Agricola Publications Academy, New Delhi, 1998.

EMT 305(b)	ECONOMICS OF INSURANCE		4Credits

Course Objectives: The objective of this course is to provide the basic knowledge of Economics of Insurance, Element of Risk and Risk Management, Life and Health Insurance, Risk and Insurance, General and Other Types of Insurance and Regulation of Insurance are explained.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Demonstrate knowledge of insurance contracts and provisions, and the features of property-liability insurance, life and health insurance, and employee benefit plans.
CO2	Demonstrate knowledge of the operation and management of insurance entities, and the economic implications of organizational design and structure.
CO3	Develop skills to facilitate insurance product cost and pricing, marketing, and distribution.
CO4	Develop practical skills through professional development seminars, internships, and/or a practicums in insurance and risk management.
CO5	Examine the role of public policy including social insurance in personal financial planning and risk management.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Element of Risk and Risk Management

Fundamental of Risk and Uncertainty – Classification of Risk – Risk Pooling and Risk Transfer - Concept of Risk Management – Essentials and Elements of Risk Management – Risk Assessment and Risk Control.

Unit 2: Risk and Insurance

Definition of Insurance – Role and Functions of Insurance – General and Specific Principles of Insurance Contract – Insurance and Economic Development – Insurance as Financial Intermediaries and Investment Institutions – Classification of Insurance - The Concept of Re-insurance.

Unit 3: Life and Health Insurance

Fundamental Principles of Life and Health Insurances – Functions of Life and Health Insurances – Plans of Life and Health Insurance – The Process of Underwriting Life and Health Insurance- Group Insurance

Unit 4: General and Other Types of Insurance

Definition of General Insurance – Marine, Motor Vehicular, Fire and other types of Insurances –Physical and Moral Hazards in General Insurance – The General Insurance Corporation (GIC Re) and General Insurance Companies, NOUN – Growth of General Insurance business in India.

Unit 5:Regulation of Insurance

Organization and Growth of LIC - Monopoly of LIC - Need for Insurance Regulation in India - Functions and Duties of Insurance Regulation and Development Authority (IRDA) of India — Entry of Private and Foreign Insurance Companies – Implications – Prospects of Insurance Companies.

Text and reference books:

1. Misra, M. N. and V. K. Puri, (2008), Insurance Principles and Practice, New Delhi: S. Chand.
2. Periasamy, P. (2007), Principles and Practice of Insurance, Mumbai: Himalaya Publishing House.
3. Palande, P. S., Shah, R. S. andLunawal, M. L. (1983), Insurance in India, Changing Policies and Emerging Opportunities, New Delhi: Response Books, A Division of Sage Publications.
4. Bhole, L. M. (1990), The Indian Financial System, New Delhi: Tata McGraw Hill.
5. Black, K. Jr. and H. D. (2000), Life and Health Insurance, New Jersey: Prentice Hall.
6. Bailey, R. (1999), Underwriting and Life and Insurance, Atlanta: LOMA.
7. Bickelhaupt. D. L. (1992), General Insurance, Burr Bridge: Irwin Inc.

8. Hedad, G. L. AND HornI.I. (1991), Essentials of Risk Management, Vol. I Insurance Institute of America.

EMT 401	TIME SERIES ECONOMETRICS		4Credits

Course Objectives: The objective of the course is to provide knowledge on Econometric applications of Economic theory, especially time series econometrics.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Students will acquire additional specialization through the Time series Econometrics Analysis.
CO2	Skill to judge the reliability of estimation in case of Stationarity and Non-Stationarity test, Co-integration test.
CO3	Forecasting with a single-equation linear regression model, and Forecasting with a multi-equation econometric model
CO4	Student can evaluate Univariate Time Series Models like MA, AR, ARMA and ARIMA models.
CO5	Student will be able to calculate VAR model which most important in macro-economic models.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Basic concepts

Introduction – Stationary Stochastic Process – Non-stationary Stochastic Process; Unit root Stochastic Process, Integrated Stochastic Process, tests of Stationarity.

Unit 2: Co-integration

Integrated Variables, Unit root tests - Dickey-Fuller tests; Co-integration and error correction mechanism – Engle–Granger, Johansen and Juselius Co-integration tests – ARDL Co-integration Tests.

Unit 3: Forecasting

Nature and uses of Forecasts – Forecasting with a single-equation linear regression model -Forecasting with a multi-equation econometric model - Evaluation of the forecasting power of a model – Conditional and Unconditional Forecasting – Single and Double exponential smoothing – Box-Jenkins Model.

Unit 4: Linear Time Series Models

Univariate Time Series Models - Moving Average Models - Auto Regressive Models - Mixed Auto Regressive Moving Average Models – ARIMA models.

Unit 5: Vector Auto-regressions and Models for Volatility

Estimation and Forecasting with VAR, VAR and Causality, Some problems with VAR Modeling, Measuring Volatility - The ARCH (p) models – ARCH tests – GARCH (p, q) model – Asymmetric GARCH models.

Text and reference books:

1. Gujarathi, D.N, Basic Econometrics, Fourth Edition, Tata McGraw Hill, New Delhi, 2004.
2. Koutsoyiannis, A, Theory of Econometrics, The Macmillan Press Ltd., Hong Kong, Second Edition, 1983.
3. Robert S.Pindyck and Daniel L. Rubinfeld, Econometric Models and Economic Forecasts, McGraw Hill Book Company, 1988
4. Francis Diebold, Elements of Forecasting, South Western College Publishing, 1998.
5. Newbold and Bos, Introductory Business and Economic forecasting (second edition), South Western College Publishing, 1994.

6. William H. Green, Econometric Analysis, Pearson's Education, fifth Edition, 2003.
7. Hamilton, J.D, Time Series Analysis, Princeton, N.J., Princeton University Press, 1994.

Learning Objectives

After successfully completing the course Time Series Econometrics the graduate is able to:

At the end of the course the students will acquire additional specialization through the Time series Econometrics Analysis. Skill to judge the reliability of estimation in case of Stationarity and Non-Stationarity test, Co-integration test. Students will be able to execute in-depth analysis of VECM model and Granger Causality test. Student can perform the Forecasting with a single-equation linear regression model, and Forecasting with a multi-equation econometric model. Student can evaluate Univariate Time Series Models like MA, AR, ARMA and ARIMA models. Finally, student will be able to calculate VAR model which most important in macro-economic models.

EMT 402	OPTIMIZATION IN ECONOMICS		4Credits

Course Objectives: The objective of the course is to provide knowledge on Optimization in Economic. Optimization techniques are very crucial activities in managerial decision-making process. Expressing relationships through equations is very useful in economics as it allows the usage of powerful differential technique, in order to determine the optimal solution of the problem.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Knowledge of several models will enhance the applicability of the knowledge to actual data solving and getting appropriate conclusions.
CO2	Be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
CO3	This course will sharpen the quantitative skills of a student and help them understand applications of Operations research in varied fields like manufacturing, Finance, purchasing and procurement, assigning and allocation of resources for optimum result.
CO4	Be able to design new simple models, like: CPM, PERT to improve decision –making and develop critical thinking and objective analysis of decision problems.
CO5	Students will be able to identify and develop operational research models from verbal description of real system.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-

CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Transportation Problem

Nature and Matrix form of TP – Transportation Table – Types of Transportation Problem – Balanced Transportation Problem, Unbalanced Transportation Problem – Methods to solve Transportation Problem - The Initial Basic Feasible solution: North-West Corner Rule and Vogel's Approximation method – Moving towards optimality, the Transportation Algorithm.

Unit 2: Assignment Problem: Assignment problem, Transportation problemand Linear Programming – Types of Assignment problem – Properties of Optimal Solution – Solving the Assignment Problem by Hungarian Algorithm – The Auction Algorithm for Assignment Problem – Branch and Bond Techniques for Assignment Problem.

Unit 3 : Game Theory: Basic concepts -Two–person Zero Sum Games - The Maximum Minimax Principle – Games without Saddle Points – Mixed Strategies – Graphical solution of 2 x n and m x 2 Games – Dominance property – The Modified Dominance Property – Reducing the Game Problem as a Linear Programming Problem.

Unit 4 : Inventory Management

Introduction - Inventory control - Techniques of Inventory control with known demand - Economic Lot Size Problems –The fundamental Problem of Economic Order Quantity (EOQ), The Problem of EOQ with Uniform Demand, and The Problem of EOQ with Finite Rate of Replenishment - Problem of EOQ with Shortage.

Unit 5: Simulation

Introduction – Elements of a Simulation Model – Event – Types of Simulation – Generation of Random Phenomena – Monte Carlo Technique – Generation of Uniform (0,1) Random Observations – Simulation languages.

Text and reference books:

1. KantiSwarup, P.K.Gupta and Man Mohan: Operations Research, Sultan Chand and sons, New Delhi.
2. Panneerselvam, R: Operations Research, Eastern Economy Edition, Prentice Hall of India, New Delhi, 2007.
3. Srinivasan, G., Operations Research _Principles and Applications, Second Edition, Prentice Hall of India, New Delhi, 2012.
4. Richard, Brown and Govindaswamy, N., Schaum's Outlines Series Operations Research, Second Edition, 2012.
5. Gupta, P.M. and D.S.Hira: Operations Research, Sultan Chand and Sons, New Delhi.

6 Harven, Wagner: Operations Research.

7 Starr and Miller: Inventory Control.

EMT 403(a): PRACTICAL-IV	TIME SERIES ECONOMETRICS AND OPTIMIZATION IN ECONOMICS		4Credits

Course Objectives: The course has a strong focus on Practical skills and train students in the collection and analysis of the data using their software skills Especially, EViews for Time series analysis.The entire Practical course divided into two parts first part can made Time series analysis through EViews software and second part will be covered Optimization technique in Economics.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Able to get application knowledge of tatistical packages like SPSS, E-Views to apply economic data.
CO2	At the end of this course student will gain practical knowledge of Time Series Analysis by using EViews.
CO3	Student gained and evaluate Stationarity test by using ADF Test.
CO4	fter complete this course student will able to test of Spurious Regression, Co-integration test and Granger Causality test.
CO5	Finally, student will be able to made feasible solution in optimization.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-

CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Concepts are covered in this Practical Approach follows;

- Unit root test [ADF-Augmented Dicky-Fuller test].
- Spurious Regression.
- Co-integration Test.
- Vector Error Correction Mechanism [VECM].
- Granger Causality test.
- VAR Model.
- ARMA and ARIMA Model.
- Optimization-Transportation problem; Balanced Transportation Problem, Unbalanced Transportation Problem North-West Corner Rule.
- Assignment problem; Hungarian Algorithm Branch and Bond Techniques for Assignment Problem.

MT 403(b)	INTERNATIONAL TRADE AND FINANCE		4Credits

Course Objectives: The course has a strong focus on International trade and the accompanying financial transactions are generally conducted for the purpose of providing a nation with commodities it lacks in exchange for those that it produces in abundance; such transactions, functioning with other economic policies, tend to improve a nation's standard of living.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Identify the basic difference between inter-regional and international trade, understand how international trade has helped countries to acquire goods at cheaper cost and explain it through the various international trade theories.
CO2	Show the benefits of international trade in a way how nations with strong international trade have become prosperous and have the power to control world economy and how global trade can be one of the major contributors of reducing poverty.
CO3	Explain how restrictions to international trade would limit a nation in the services and goods produced within its territories and at the same time explain that a rise in international trade is essential for the growth of globalization.
CO4	Show the importance of maintaining equilibrium in the balance of payments and suggests suitable measures to correct disequilibrium as well.
CO5	Be aware of the changes in the composition as well as direction of foreign trade after international trade and know the causes and effects of deficits in the balance of payments, measures adopted to correct the deficits and identify the need for having trade reforms.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2

CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Old and New Theories of International Trade

Comparative advantage in Ricardian, Haberler and Heckscher–Ohlin Theories – Factor Price Equalization Theorem - Intra Industry Trade – Neo-Chamberlin and Neo-Heckscher-Ohlin Theorems - Product Cycle and Technology Gap and Strategic Trade theories.

Unit 2: Free Trade and Protection

Free Trade vs. Protection – Theory of Tariffs –The Political Economy of Non-tariff Barriers - Terms of Trade – Secular Deterioration (Singer-Prebisch) Thesis -Immiserizing Growth- The Concept of Customs Union - Regional Trade Agreements - EU and SAARC.

Unit -3: Balance of Payments and adjustment Mechanism

Balance of Payments Accounts –Adjustment of Deficit in Balance of Payments – Traditional Elasticity and Absorption Approaches - Theories of policy mix - BOP adjustments with capital mobility – Foreign Trade Multiplier.

Unit 4: Theories of Exchange rate determination

Exchange rate under free market – Spot and Forward Rates -Exchange rate adjustments under capital mobility - Floating Rates and their implications for developing countries - Currency Boards - Import and Exchange Controls and Multiple Exchange Rates.

Unit 5: **Global Institutions**

The Bretton Woods System - IMF and World Bank – Collapse of Bretton Woods System – New International Monetary Order – WTO – Issues at the recent WTO ministerial Conferences-Multinational Corporations - Implications for Developing countries.

Text and reference books:

1) Paul Krugman& Maurice Obstfeld (6th ed.) International Economics, (Chapters 2-11) Addison Wesley, 2003.
2) Caves, R. and Jones, R. World trade and payments (chapters 4, 6, and 7). Boston: Little, Brown and Company, 1977.
3) Sodersten, B. and Reed, G. International economics (chapters 1-11, 13-16, 19, 20, 22-24, 26 & 27). Macmillan Company, 1994.
4) Pilbeam, K. International finance (chapters 4-15). Macmillan, 1994.
5) Turnovsky, S. J. Macroeconomic analysis and stabilization policy (chapters 9-12). Cambridge University Press, 1977.
6) Dixit, A. and Norman, V. The theory of international trade. Cambridge University Press, 1980.
7) Grossman, G. M. and Rogoff, K., eds. Handbook of international economics. Vol III. Elsevier, 1995.
8) Kierzkwoski, H., ed. Protection and competition in international trade. New York: Blackwell, 1987.
9) Bhagwati, J, ArvindPanagariya, & T.N. Srinivasan: Lectures on International Trade, 2nd ed. MIT Press 2001.
10) Grossman, G. M. and Rogoff, K., eds. Handbook of international economics. Vol III. Elsevier, 1995.

EMT 403(c)	INDIAN ECONOMY		4Credits

Course Objectives: The objective of this course is to provide the basic knowledge of Indian economyStructure of the Indian Economy, Agricultural Sector, Industrial Sector, Tertiary and Foreign Sectors and Planning and Development of the Indian economy that is with the study of the subject in a Master's programme.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Students will develop ideas of the basic characteristics of Indian economy, its potential on natural resources.Understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development.
CO2	Understand agriculture as the foundation of economic growth and development, analyse the progress and changing nature of agricultural sector and its contribution to the economy as a whole. Students will obtain information regarding various agricultural issues in India and remedies for it
CO3	Students will aware about recent economic affairs such as demonetization, universal basic income, cashless economy, skill and training development schemes, make in India etc
CO4	Students will get benefit about various economic issues at local, national and global level.
CO5	Grasp the importance of planning undertaken by the government of India, have knowledge on the various objectives, failures and achievements as the foundation of the ongoing planning and economic reforms taken by the government.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-

CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Structure of the Indian Economy

Indian Economy on the Eve of Independence- Basic Characteristics of the Indian Economy as Developing Economy- Major issues of Development in Indian Economy- Growth and Structural Changes in the Indian Economy- Population-Poverty –Measurement of Poverty, Anti PovertyProgrammes - Inequality- Natural Resources-Infrastructure- Human Development in India-Prices, Price Policy and Economic Growth- Balanced Regional Development-Unemployment in India.

Unit 2: Agricultural Sector

Role Agriculture in Indian Economy- Share of Agriculture - Interrelationship between Agriculture and Industry –Land Tenure System - Farm Size and Productivity -Institutional and Technological Aspects- New Agricultural Policy-Food Security in India-Rural Credit- Agricultural Marketing- Regional Disparities in Indian Agriculture- Irrigation and other Agricultural Inputs.

Unit 3: Industrial Sector

Industrial Structure and Economic Growth- Large and MSMEs - Industrial Labour Problems and Labour Policy -Industrial Sickness Causes and Remedial Measures- Economic Reforms and Industrial Growth-Pattern of Industrialization-Public and Private Industrial Finance in India- Unorganized Sector and Informalisation of the Indian Economy.

Unit 4: Tertiary and Foreign Sectors

Service Sector - Role, Growth and Structure of Service Sector in India –Growth, Composition and Direction of India's Foreign Trade – Trade Policy and its Reforms in India – India's Balance of Payments - WTO and Indian Economy.

Unit 5: Planning and Development

Objectives and Strategy of Planning- Public Sector and Indian Planning- Re-Organization of Planning Commission (NITI Aayog) - Privatization and Globalization and its impact on India-Government Subsides in India - Problems of Capital Formation- Foreign Capital, Foreign aid and Economic Development in India.

Text and reference books:

7. Ghosh. Alak, Indian Economy –Its Nature and Problems, A New Look Indian Economics, Calcutta, The World Press Private Limited, 1989.
8. Jalan.B, The Indian Economy Problems and Prospects, Viking Publications, New Delhi, 2006.
9. RuddarDatt and Sundaram. K.P.M, S.Chand and Company, New Delhi, 2008.
10. S.K.Misra and V.K. Puri, Indian Economy, Himalaya Publishing House, New Delhi, 2006.
11. Sen R.K and B.Chatterjee, Indian Economy-Agenda for 21st Century, Deep and Deep Publications, New Delhi, 2001.
12. Uma Kapila, Indian Economy Since Independence, Agricola Publications Academy, New Delhi, 1998.

EMT 403(d):PROJECT

A project objective describes the desired results of a project, which often includes a tangible item. An objective is specific and measurable, and must meet time, budget, and quality constraints. ... A project may have one objective, many parallel objectives, or several objectives that must be achieved sequentially.

Project objectives are what you plan to achieve by the end of your project. This might include deliverables and assets, or more intangible objectives like increasing productivity or motivation. Your project objectives should be attainable, time-bound, specific goals you can measure at the end of your project.

Goals and objectives are statements that describe what the project will accomplish, or the business value the project will achieve. Goals are high level statements that provide overall context for what the project is trying to achieve, and should align to business goals. In brief, project management objectives are the successful development of the project's procedures of initiation, planning, execution, regulation and closure as well as the guidance of the project team's operations towards achieving all the agreed upon goals within the set scope, time, quality and budget standards.

Learning Outcomes

The use effectively oral, written and visual communication. identify, analyze, and solve problems creatively through sustained critical investigation. integrate information from multiple sources. Demonstrate an awareness and application of appropriate personal, societal, and professional ethical standards.The value of any project cannot be measured without defining success. It requires focus on outcomes. Outcomes are the events, occurrences, or changes in conditions, behavior, or attitudes that indicate progress toward a project's goals. Outcomes are specific, measurable, and meaningful.Good outcome statements are specific, measurable, and realistic.” Think carefully about what you can realistically accomplish given the groups you want to reach and the scope of your resources. Develop outcomes as follows: Outcomes should describe what you want to happen after your activity is completed.

EMT 404	FREEDOM MOVEMENT IN INDIA, 1857-1947		4Credits

Course Objectives: The Indian national movement was undoubtedly one of the biggest mass movements modern Society has ever seen, It was a movement which galvanized millions of People of all classes and ideologies into political action and brought to its knees a mighty colonial empire. Consequently, along with the British, French, Russian, Chine, Cuban and Vietnam revolutions, it is of great relevance to those wishing to alter the existing political and social structure

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	This paper helped to **strengthen Indian nationalism**, as it led to a sense of patriotism among people across India..
CO2	Supporters of the Indian Independence Movement began to argue that India's role in World War.
CO3	The revolt of 1857 was an unprecedented event in the history of British rule in India.
CO4	It united, though in a limited way, many sections of Indian society for a common cause
CO5	Though the revolt failed to achieve the desired goal, it sowed the seeds of Indian nationalism.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit I Nationalism : Its meaning and different interpretations – Factors leading to growth of Nationalism- Emergence of Indian National Congress- Moderates and Militant Nationalists- Swadeshi and Home Rule Movements

Unit II Emergence of Gandhiji : Non- Violence and Satyagraha- Rowlat and Khilafat issues- Non- cooperation Movement- Swarajists - Civil disobedience Movement- Ministries at Provincial level and Second World War

Unit III Revolutionary Nationalists: Bhagath Singh- Growth of Capitalist class and its role – Growth of left Ideology and peasant and Working class movement.KisanMahasabha

Unit IV Growth of Communal Ideology and politics: Factors leading to Communalism- Formation of Muslim League and Hindu Mahasabha- National issues, Role of Congress and Muslim League, Cripps proposals and Quit India Movement, Cabinet Mission, the Partition and attainment of Independence

Unit V Freedom Struggle in Princely states: Socio, Political and Administrative conditions- Origin of Nationalism- Impact of Freedom Struggle of British India over Native States, Haripura Resolution, 1938- Growth of Popular Movements- Lapse of Paramountacy- Join India Movement- Vallabhai Patel and Integration.

Suggested Readings

1. Anil Seal, Emergence of Indian Nationalism

2. Bipan Chandra, Communalism in Modern India, Vikas, Delhi, 1987

3. Bipan Chandra, Nationalism in Modern India, Orient Longman, Delhi, 1981

4. Bipan Chandra, (ed), India's Struggle for Independence, 1857-1947

5. Brass, Paul, Plitics in India since Independence, Delhi, 1994

6. Brown, Judith, Gandhi's rise to Power in Indian Politics, 1915-22, OUP, 1972

7. Desai, A.R., Peasant Struggle in India, OUP, Delhi, 1979

8. Desai, A.R., Social Backgroud of Indian Nationalism, Mumbai, 1986

9. Guha, Ranajit, Elementary Aspects of Peasant Insurgency in Colonial India, OUP,Delhi, 1983

10. Jones, K., Social and Religious Reform Movement in Modern India, New Cambridge History, 1989

11. Low, D.A.(ed), Congress and the Raj : Facts of the Indian Struggle 1917-1947, Delhi, 1977

12. Ravinder Kumar, Social History of Modern India, OUP, Delhi, 1985

13. Sarkar, Sumit., Modern India, 1885-1947, Macmillan, 1985

14. Stokes, Eric, Peasant and Raj : Studies in Agrarian Society and Peasant Rebellion in Colonial India, Delhi,
Vikas, 1978

15. Ganshyam Shah, Social movements in India, A review of Literature, Sage, Delhi, 2004

EMT 405(a)	OPTIMIZATION IN ECONOMICS		4Credits

Course Objectives: The objective of the course is to provide knowledge on Optimization in Economic. Optimization techniques are very crucial activities in managerial decision-making process. Expressing relationships through equations is very useful in economics as it allows the usage of powerful differential technique, in order to determine the optimal solution of the problem.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Knowledge of several models will enhance the applicability of the knowledge to actual data solving and getting appropriate conclusions.
CO2	Be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
CO3	This course will sharpen the quantitative skills of a student and help them understand applications of Operations research in varied fields like manufacturing, Finance, purchasing and procurement, assigning and allocation of resources for optimum result.
CO4	Be able to design new simple models, like: CPM, PERT to improve decision –making and develop critical thinking and objective analysis of decision problems.
CO5	Students will be able to identify and develop operational research models from verbal description of real system.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2

CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Transportation Problem

Nature and Matrix form of TP – Transportation Table – Types of Transportation Problem – Balanced Transportation Problem, Unbalanced Transportation Problem – Methods to solve Transportation Problem - The Initial Basic Feasible solution: North-West Corner Rule and Vogel's Approximation method – Moving towards optimality, the Transportation Algorithm.

Unit 2: Assignment Problem: Assignment problem, Transportation problemand Linear Programming – Types of Assignment problem – Properties of Optimal Solution – Solving the Assignment Problem by Hungarian Algorithm – The Auction Algorithm for Assignment Problem – Branch and Bond Techniques for Assignment Problem.

Unit 3 : Game Theory: Basic concepts -Two–person Zero Sum Games - The Maximum Minimax Principle – Games without Saddle Points – Mixed Strategies – Graphical solution of 2 x n and m x 2 Games – Dominance property – The Modified Dominance Property – Reducing the Game Problem as a Linear Programming Problem.

Unit 4 : Inventory Management

Introduction - Inventory control - Techniques of Inventory control with known demand - Economic Lot Size Problems –The fundamental Problem of Economic Order Quantity (EOQ), The Problem of EOQ with Uniform Demand, and The Problem of EOQ with Finite Rate of Replenishment - Problem of EOQ with Shortage.

Unit 5: Simulation

Introduction – Elements of a Simulation Model – Event – Types of Simulation – Generation of Random Phenomena – Monte Carlo Technique – Generation of Uniform (0,1) Random Observations – Simulation languages.

Text and reference books:

1. KantiSwarup, P.K.Gupta and Man Mohan: Operations Research, Sultan Chand and sons, New Delhi.
2. Panneerselvam, R: Operations Research, Eastern Economy Edition, Prentice Hall of India, New Delhi, 2007.
3. Srinivasan, G., Operations Research _Principles and Applications, Second Edition, Prentice Hall of India, New Delhi, 2012.
4. Richard, Brown and Govindaswamy, N., Schaum's Outlines Series Operations Research, Second Edition, 2012.
5. Gupta, P.M. and D.S.Hira: Operations Research, Sultan Chand and Sons, New Delhi.
6 Harven, Wagner: Operations Research.
7 Starr and Miller: Inventory Control.

EMT 405(b)	DATA BASE FOR THE INDIAN ECONOMY		4Credits

Course Objectives: The main objective of this course is data warehouse of the Department of Statistics and Information Management (DSIM), under the Reserve Bank of India. The entire statistics have been presented in seven subject areas - Real Sector, Corporate Sector, Financial Sector, Financial Market, External Sector, Public Finance, Socio-Economic Indicators.

CourseOutcomes: Attheendofthecourse, thestudentwillbeableto

CO1	Develop ideas of the basic characteristics of Indian economy, its potential on natural resources
CO2	Understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development.
CO3	Students can able to describe the knowledge or skills students should acquire by the end of a particular assignment, class, course, or program, and help students understand why that knowledge and those skills will be useful to them
CO4	Creating new knowledge (Cognitive) Developing feelings and emotions (Affective) Enhancing physical and manual skills (Psychomotor).
CO5	Students can also be scaffolded so that they continue to push student learning to new levels in any of these three categories.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-
CO5	3	2	1	-	1	2	-	1	1	2	-	1

Unit 1: Census – Demographic Indicators – Definitions – schedules – Dissemination – Database – Tpes – Other data sets from Census – Economic census – Education census – Agricultural census – Major Results of Recent Census Data in India.

Unit 2: National Income Accounting – Base year – Methods of Estimation – Types of Reporting – Balance of Payments (BOP) and National Income) (NI) – State Domestic Product – District Domestic Product - District Census Handbooks.

Unit 3: NSSO – Large and Small samples – NSSO Rounds on Consumption Expenditure, Employment and Unemployment Status in India – Major Findings of Recent NSS reports on Poverty,Inequality and Unemployment – Annual Survey of Industries (ASI) – Coverage – Definition of Terms – price and wage statistics Major Findings of Recent reports – Socio-economic statistics – National Family Health Survey (NFHS) – Health and Morbidity Data.

Unit 4: RBI – Balance sheet approach – Financial and Banking statistics – Money supply Indicators and Statistics on Money Supply in India – Foreign Exchange Reserves – Exchange rate – Stock Market Statistics – Non-banking Financial Institutions data.

Unit 5: Govt. and International data – Ministry of Commerce Data on Exports and Imports – Data in Annual Economic Surveys from the Ministry of Finance - Data from World bank, IMF, ILO, WTO, UNCTAD, UN and other international agencies – Specific data bases such as World Value Surveys – Penn World Tables - Gallop Poll.

Books for Reference:

1. Websites and reports of respective ministries and organizations, like Directorate of Census Operations, CSO, NSSO, GOI, SEBI, RBI.
2. Reports of Statistics Departments in State Governments.
3. Reports of UN Organisations.
4. Annual Economic Surveys, Minstry of Finance, Government of India.
5. http://www.commerce.nic.in/eidb/iecnttopn.asp

Model Paper

M.A DEGREE EXAMINATION

First Semester

Branch: ECONOMETRICS

Paper 101 – MICROECONOMIC THEORY – I

(UNDER CBCS Revised Syllabus from 2021-22)

Time: 3 Hours Max. Marks: 80

Section-A

Answer any FIVE questions

Each question carries 4 marks(5X4=20)

1. Explain the properties of Indifference curves.
2. Explain the statement 'Choice Reveals Preference'.
3. State any four properties of the Cobb-Douglas Production Function.
4. Explain the relatinship between average cost and marginal cost in the Modern Theory of Cost.
5. State the characteristics of perfect competition.
6. State the conditions for Price discrimination.
7. Explain the Cournot's model of Duopoly.
8. Explain the reason for kink in the Demand Curve of an Oligopolist firm.
9. What are the weaknesses of the Bain's theory of Limit Pricing?
10. State the assumptions of Marris' model of Managerial Enterprise.

PART –B

Answer ALL the questions

Each question carries 12 marks

11. (a) Discuss consumer's equilibrium under Indifference Curve analysis.

Or

(b) Explain how the price effect can be decomposed into substitution and income effects.

12. (a) Explain the relationship among various cost components in the traditional theory of cost.

Or

(b) Discuss the properties of CES Production Function.

13. (a) Discuss the price and output determination of a firm under perfect competition.

Or

(b) Explain the short – run and long run equilibrium of the firm under Monopoly.

14. (a) Critically examine Chamberlin's model of Monopolistic Competition.

Or

(b) Explain the Price Leadership model of the Dominant firm.

15. (a) Discuss Baumol's theory of Sales Maximisation.

Or

(b) Elucidate the Franco Modigliani model of Limit Pricing.

MODEL QUESTION PAPER

M.A DEGREE EXAMINTION

FIRST SEMESTER

BRANCH: ECONOMETRICS

Paper-102: MACROECONOMIC THEORY-I

(Under CBCS Revised Syllabus from 2021-22)

Time: 3 Hours Max. Marks: 80

Section-A

Answer any FIVE questions

Each question carries 4 marks

(5X4=20)

1. Expliain the basic concepts in Macroeconomics.
2. Write a note on Comparative Statics and Dynamics.
3. List out the problems in the measurement of National Income.
4. Is national income an adequate measure of welfare?
5. Explain the concept of Investment Multiplier.
6. Write a note on the consumption function.
7. Explain the concepts of Classical Range and Keynesian Range.
8. Explain the efects of shifts in Savings and Investments on the IS curve.
9. What are the determinants of investment?
10. Write a short note on Tobin's Q theory.

Section- B

Answer ALL the questions

Each question carries 12 marks

(5X12=60)

11. (a) Explain the Circular Flow of National Income in an economy.

Or

(b) Examine the Micro Foundations of Macroeconomics.

12. (a) Discuss the methods of estimation of National Income.

Or

(b) Explain different concepts of National Income and their usefulness.

13. (a) Critically examine the Classical Theory of Employment

Or

(b) Discuss the practical implications of the basic Keynesian model.

14. (a) Discuss the IS-LM model with government sector.

Or

(b) Elucidate the relative effectiveness of Monetary and Fiscal Policies.

15. (a) Explain the determinants of Marginal Efficiency of Capital

Or

(b) Distinguish between Autonomous and Induced investments and discuss the lags in investment demand.

Model Paper

M.A DEGREE EXAMINTION

FIRST SEMESTER

BRANCH: ECONOMETRICS

Paper-103: MATHEMATICAL METHODS

(Under CBCS Revised Syllabus from 2021-22)

Time: 3 Hours Max. Marks: 80

Section-A

Answer any FIVE questions

Each question carries 4 marks

(5X4=20)

1. What is an exponent? State the properties of exponents.
2. Distinguish between a Relation and a Function with an example.
3. What is an Algebraic Function? Explain different types of algebraic functions with examples.
4. State any two theorems of Limit.
5. Define the derivative of a function and write down the Product and Quotient Rules of differentiation.
6. Given the demand function, Q_d= 100- 2P, find the point elasticity of demand at P= 25.
7. Discuss the properties of definite integral.
8. Given the marginal cost curve MC = $3-2x-x^2$, find the total cost curve.
9. Explain the concepts of Upper Triangular Matrix and Lower Triangular Matrix.
10. Explain the concepts of g-inverse and c-inverse.

Section- B

Answer ALL the questions

Each question carries 12 marks

(5X12=60)

4^3x 27^2

11. (a) Simplify: ----------

9^3x 4^2

Or

(b) Define a Set and discuss different types of Sets.

PTO

12. (a) Explain the conepts of Logarithmic and Exponential fucntions and their applications in economics.

Or

(b) Find the limits of the following functions:

(x^2+1)

i) Y = ----------

$as\ x \to \infty$ (x^2-1)

$(x^2- 4)$

ii) Y = ----------

$as\ x \to 2$ (x- 2)

13. (a) State the conditions for maxima and minima of the function y = f(x) and find them for the function y = $3x^2$-x+1.

Or

(b) The total revenue and total cost functions of a firm are R = 20Q-Q^2 and C = Q^2+8Q+12 respectively. Find the profit maximizing levels of output and the maximum profits.

.

14. (a) Distinguish between the concepts of 'Definite and Indefinite Integrals' and find the integral of the following function:

$$\int_0^1 x(\mathrm{x}+6)dx$$

Or

(b) Define the concepts of Consumers' Surplus and Producers' Surplus. If the demand function is $p = 25-3x-3x^2$, find the consumers' surplus when the quantity demanded, $x_0 = 2$.

15. (a) Define the concept of Determinant of a Matrix and discuss the properties detrminants with illustrations.

Or

(b) Solve the following system of equations by Cramer's Rule:

$$2x-4y+3z=3$$

$$4x-6y+5z=2$$

$$-2x+y-z=1$$

Model Paper

M.A DEGREE EXAMINATION 2021-22

First Semester

Branch: ECONOMETICS

DEPARTMENT OF ECONOMETRICS

1ST SEMESTER –PRACTICAL EXAMINATION

PAPER CODE: EMT-104

TIME: 3 HOURS **Maximum: 80 Marks**

Answer any **four**questions, All Questions Carry equal Marks (4*20=80 Marks)

1.Calculate Mean, Median and Mode for the following data.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of Students	6	16	35	55	45	31	8

2.Following are the Marks obtained by two students A and B in 10 papers in an examination.

Who will get the prize, if the consistency of performance is the criterion for awarding the prize?

Student/sets	1	2	3	4	5	6	7	8	9	10
Marks obtained by A	42	82	80	47	51	70	68	53	62	65
Marks obtained by B	41	69	53	64	66	58	71	49	54	45

3. The distribution of typing mistakes committed by a typist

Mistake for Page	0	1	2	3	4	5
No. of Mistakes	142	156	69	27	5	1

(i) Fit a Poisson distribution (ii) To find expected frequencies

(iii) Test for goodness of fit.(X^2table value is 9.488)

4. The scores for nine students in Physics and Chemistry are as follows:

Physics	35	23	47	17	10	43	9	6	28

Chemistry	30	33	45	23	8	49	12	4	31

Compute the Spearman rank correlation.

5. Fit two Regression Lines for the following data, Y on X and X on Y

X	46	31	29	32	51	24	16	23	28
Y	34	42	57	40	54	50	28	47	38

6. Use Cramer's Rule to solve $3x+5y-7z=13$,

$4x+y-12z=6$,

$2x+9y-3z=20$.

Model Paper

M.A DEGREE EXAMINTIONFIRST SEMESTER

BRANCH: ECONOMETRICS

Paper-105(a): STATISTICAL METHODS

(Under CBCS Revised Syllabus from 2021-22)

Time: 3 Hours Max. Marks: 80

Section-A

Answer any FIVE questions

Each question carries 4 marks(5X4=20)

1. Define Arithmetic Mean and discuss its properties.
2. Define Skewness and discuss different methods of measuring Skewness.
3. Define Probability and discuss any three concepts associated with Probability.
4. Expalin the concepts of Distribution Function and Probability Density Function.
5. Distinguish between Point Estimation and Interval Estimation with an example.
6. Explain the concept of Type – I Error and Type – II Error.

7. Explain the concept of Probability Sampling with an example.
8. What are the advantages of Stratified Sampling over the Simple Random Sampling?
9. State various uses of Correlation and Regression analysis in economics.
10. Distinguish between Partial and Multiple Correlations.

Section- B

Answer ALL the questions

Each question carries 12 marks

(5X12=60)

11. (a) Compute Mean, Median and Mode for the following data:

Class Interval	40-50	50-50	60-70	70-80	80-90	90-100
Frequency	35	24	21	18	6	3

Or

(b) Compute the Coefficeint of Variation for the following data:

Class Interval	5-10	11-15	16-20	21-25	26-30	31-35
Frequency	3	4	7	3	2	1

PTO

12. (a) Derive the Mean and Variance of the Binomial Distribution.

Or

(b) Fit Poisson distribution for the following data:

x-value	0	1	2	3	4
Frequency-f	123	59	14	3	1

13. (a) Discuss the desirable properties of a Good Estimator.

Or

(b) Out of a sample of 120 persons in a village, 76 were administered a new drug for preventing influenza and out of them, 24 were attacked by influenza. Out of those who were not adminstered the new drug, 12 persons were not affected by influenza. Prepare

(a) The 2x2 table showing actual and expected frequencies.

(b) Use Chi-square test for finding out whether the new drug is effective or not.

(The table Chi-square value at 5% level of significance for one degree of freedom is 3.84)

14. (a) Define Sampling and discuss the relative merits and demerits of Sample and Census methods of data collection.

Or

(b) (b) Distinguish between Random and Non-random sampling and discuss different types of Random Sampling.

15. (a) Compute the Correlation Coefficient for the following data and interpret your result:

Class Interval	3	5	6	7	9	10	11	12	13	15
Frequency	4	5	7	8	9	11	12	13	14	16

Or

(b) (b) What are Regression Lines? Explain the method of deriving two regression lines of Y on X and X on Y.

MODEL PAPER

M.A. DEGREE EXAMINATION

SECOND SEMESTER

Branch: Econometrics

PAPER: 105(b) – INTRODUCTION TO ECONOMETRICS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max. Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. Discuss the role of measurement in Economics.
2. Explain the method of Pooling of Cross Section and Time Series Data.
3. State the properties of OLS Estimators.
4. State the assumptions of the two variable linear model.
5. Derive the mean and variance of OLS estimator in general linear model.
6. What is Error in Variables linear model? What are its consequences?
7. What is a distributed lag model? Explain different lag schemes in lagged variable linear models.
8. Explain the method of Koyck's lag scheme.
9. Show that the OLS estimators are inconsistent in simultaneous equation models.
10. State the Rank and Order conditions for Identification.

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. Explain the interrelationship among economics, mathematics and statistics in econometric approach.

(OR)

What are the basic principles of Econometric model building?

12. Formulate the classical linear regression model and discuss the properties of least squares estimators of a linear regression model.

(OR)

Explain the different Functional Forms of regression models

13. Show that the OLS estimators are BLUEs.

(OR)

What is multiple correlation coefficient? What are its uses and explain the difference between R^2 and adjusted R^2?

PTO

14. Explain Almon's method of estimation of parameters in lagged variables

(OR)

Explain the Partial Adjustment and Cagan's Adaptive Expectations models in distributed

lag models

15. Explain the method of Indirect Least Squares.

(OR)

Explain the model specification, assumptions and procedure of 2SLS method of estimation without proof.

Model Paper

M. A. DEGREE EXAMINATION – 2021-22

FOURTH SEMESTER

Branch: Econometrics

Paper: EMT 105(c) – AGRICULTURAL ECONOMICS ECONOMICS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. What is Nature and Scope of Agricultural Economics.
2. Explain the concerpt of Sustainable Development.
3. Distinguish between Renewable and non-renewable resources.
4. Explain the concept of 'Tragedy of Commons'.
5. What are the different sources of Air pollution?
6. what is Kisan Credit Cards.
7. Explain the National Food Security Mission (NFSM).
8. What is National Crop Insurance Programme?
9. State the Exports and Imports of Agricultural Commodities
10. What is Physical and Financial Performance of GrameenBhandaranYojana?

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. Discuss the Role of Women in Agricultural Development.

Or

Elucidate the Modernisation of Agricultural Production Systems

12. Discuss the Development of Agriculture sector during Post-Independence Period

Or

Explain the Targets and Achievements during Five Year Plans

13. What are theFactors Determining Gross Capital Formation in Agriculture Sector explain.

Or

Explain methods of managing urban solid waste in India.

14. Explain the Sources and Trends in flow of Credit to Agriculture?

Or

Discuss the objectivesof National Crop Insurance Programme.

15 Examine the National Mission for Sustainable Agriculture (NMSA) and Agricultural Extension and Technology

Or

Examine thePrimary and Secondary Wholesale Markets

Model Paper

M.A DEGREE EXAMINATION – 2021-2022

Branch: ECONOMETRICS

EMT 107, Human Values and Professional Ethics-I

Model Paper

M.A DEGREE EXAMINATION

Second Semester

Branch: ECONOMETRICS

EMT 201 – MICROECONOMIC THEORY – II

(UNDER CBCS Revised Syllabus from 2021-22)

Time: 3 hours Marks: 80

Section-A

Answer any FIVE questions

Each question carries 4 marks(5X4=20)

13. Distinguish between the Value of Marginal Product (VMP) and Marginal Revenue Product.
14. Explain the concept of 'Monopolistic Exploitation' of a Factor.
15. What is 'Quasi Rent'?

16. Explain the concept of 'Liquidity Trap'.
17. State the meaning of risk and distinguish it from uncertainity.
18. What is 'Zero Sum' game?
19. Explain the concepts of stable and unstable equilibrium.
20. What are externalities?
21. Distinguish between Pareto Optimality and Pareto improvement.
22. State the concept of Kaldor-Hicks' Compensation Criterion.

Section –B

Answer ALL the questions

Each question carries 12 marks

5x12=60

23. Critically examine Marginal Productivity Theory of Distribution

Or

State and prove Euler's Theorem and explain its significance.

24. Discuss the Ricardian Theory of Rent.

Or

Evaluate the Loanable Funds theory of interest.

13. Elucidate the role of information in economic theory.

Or

Explain the short – run and long run equilibrium of the firm under Monopoly.

15. Critically examine Chamberlin's model of Monopolistic Competition.

Or

Explain the Price Leadership model of the Dominant firm.

15. Discuss Baumol's theory of Sales Maximisation.

Or

Elucidate the Franco Modigliani model of Limit Pricing.

Model Paper

M.A DEGREE EXAMINATION Second Semester

Branch: ECONOMETRICS

EMT 202: MACROECONOMIC THEORY II

(UNDER CBCS Revised Syllabus from 2021-22

Time: 3 Hrs Marks: 80

Section-A

Answer any FIVE questions

Each question carries 4 marks(5X4=20)

1. State and explain Fisher's Quantity theory of money.
2. What are the components of money supply according to RBI in India?
3. Distinguish between Fucntional and Personal distribtuion of Income.
4. Explain the Ricardian concept of Stationary State'.
5. Briefly explain different phases of Trade Cycle.
6. What are the lags in monetary policy?
7. Distinguish between 'Demand Pull and Cost Push Inflations".
8. State the implications of Rational Expectation Hypothesis.
9. What are the objectives of the Monetary Policy?
10. What are the uses of Automatic Stabilizers?

Section –B

Answer ALL the questions

Each question carries 12 marks 5x12=60

11. Discuss Tobin's Portfolio Approach to demand for money.

Or

What is 'High Powered' Money? Explain the process of Money Multiplier in an economy.

12. ElucidiateKelecki Theory of Distribution.

Or

Give an account of Kaldor's theory of Distribution.

13. Examine Hicks' Thoery of Trade Cycle.

Or

Explain the methods of controlling Trade Cycles in a free market economy.

14. Discuss the 'Trade – off' between Inflation and unemployment in the short run.

Or

Critcally examine the 'Real Business Cycle Theorem' profounded by the New Classical School.

15. What are the instruments of Monetary policy? Explain their role in stabilisation of the economy.

Or

Expalin the relative effectiveness of Fiscal and monetary policies in promoting economic growth in an economy.

MODEL PAPER

M.A. DEGREE EXAMINATION

SECOND SEMESTER

Branch: Econometrics

PAPER: 203 – BASIC ECONOMETRICS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max. Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. Discuss the role of measurement in Economics.
2. Explain the method of Pooling of Cross Section and Time Series Data.
3. State the properties of OLS Estimators.
4. State the assumptions of the two variable linear model.
5. Derive the mean and variance of OLS estimator in general linear model.
6. What is Error in Variables linear model? What are its consequences?
7. What is a distributed lag model? Explain different lag schemes in lagged variable linear models.
8. Explain the method of Koyck's lag scheme.
9. Show that the OLS estimators are inconsistent in simultaneous equation models.

10. State the Rank and Order conditions for Identification.

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. Explain the interrelationship among economics, mathematics and statistics in econometric approach.

(OR)

What are the basic principles of Econometric model building?

12. Formulate the classical linear regression model and discuss the properties of least squares estimators of a linear regression model.

(OR)

Explain the different Functional Forms of regression models

PTO

13. Show that the OLS estimators are BLUEs.

(OR)

What is multiple correlation coefficient? What are its uses and explain the difference between R^2 and adjusted R^2?

14. Explain Almon's method of estimation of parameters in lagged variables

(OR)

Explain the Partial Adjustment and Cagan's Adaptive Expectations models in distributed lag models

15. Explain the method of Indirect Least Squares.

(OR)

Explain the model specification, assumptions and procedure of 2SLS method of estimation without proof.

MODEL PAPER

M.A. DEGREE EXAMINATION

SECOND SEMESTER

Branch: Econometrics

PAPER: 204 – practical II

(Revised Regulations CBSC from 2021-22)

Answer any THREE Questions. All Questions carry equal marks

[3x20=60]

1. The following data we get to all the Indian Agriculture production, area and a yield index numbers from 2000-01 to 2014-15 are furnished below.

ear	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	201 14
regate nption(Y)	107.1	113.7	118.7	122.2	121.8	127.5	129.6	138.5	142.4	145.5	145.9	150.6	148.2	144.4	14
osable me (X)	105.6	109.1	112.1	113.8	114.6	116.1	117.7	119.7	121.2	122.4	123.4	123.7	122.4	121.8	12

Calculate the following objectives based on the above data

(i). estimate the parameters and fit the two-variable linear model.

$$Y_t = \alpha + \beta X_t + u_t$$

(ii). to predict the value of 'Y' when 'X=130.5.

(iii). to determine the R^2

2. The following data relates to the corn production with the inputs of fertilizers and insecticides used.

Production (Y)	40	44	46	48	52	58	60	68	74	80
Fertilizers (X_1)	6	10	12	14	16	18	22	24	26	32
Insecticides (X_2)	4	4	5	7	9	12	14	20	21	24

(i). Estimate the parameters and fit the three variable linear model

(ii). Test the significance of individual parameters

(iii) Calculate the Analysis of variance (ANOVA).

3. From the following matrix find out the final output goals of each industry, assuming that consumer output targets are USD $ 80 millions in Steel, USD $ 30 millions in Coal and USD $ 50 millions in Railway transport industry. The technological coefficient matrix and final consumer requirements of theCoal (A), Steel (B), and Railway transport (C) are;

	Coal	**Steel**	**Railway's**	**Final consumer requirements**
Coal (A)		0.3	0.2	0.2	Rs. 80 million
Steel (B)	0.2	0.1	0.5	Rs. 30 million
Railway's (C)		0.2	0.4	0.2	Rs. 50 million
Labour		0.3	0.3	0.1	

(i). Determine the gross levels of output of three industries and

(ii). To find what will be the total labour requirements.

4. Solve the following LPP using the Simplex method.

$$Maximize \qquad Z = 12x_1 + 16x_2$$

$$Subject\ to \qquad 10x_1 + 20x_2 \leq 120$$

$$8x_1 + 8x_2 \leq 80$$

$$x_1 \text{ and } x_2 \geq 0$$

5. The following problems solved byUsing Lagrange multiplier method.

(i). Maximization: what combination of (output) mixed should be profit maximizing produced when its total profit function is $\pi = 80x - 2x^2 - xy + 3y^2 + 100y$, and maximum output capacity is $x + y = 12$, and also estimate the effect of profit when its output capacity extended by one unit.

(ii). Minimization: what combination of goods x and y should produced to the minimum cost when joint cost function $C = 6x^2 + 10y^2 - xy + 30$, and firm as a production quota is $x + y = 34$. Estimate the effect on cost if the production quota is reduced by one unit.

MODEL PAPER

M.A. DEGREE EXAMINATION

Second Semester

Branch: Econometrics

PAPER: 205(a) – MATHEMATICAL ECONOMICS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max. Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. Explain the rules of partial differentiation.
2. Discuss the concept of partial elasticities.
3. Distinguish between first order and second order differential equations.
4. What is partial integration
5. Explain the concept of Non-homogeneous linear equation.
6. State the importance of Dynamic Multiplier.
7. Discuss the features of Technological Coefficient of Matrix.
8. State the assumptions of Dynamic Input Model.
9. How do you formulate Linear Programming Problem?
10. Explain the importance of Linear Programming Technique.

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. Explain constrained optimization with Lagrange multipliers with an example.

OR

Maximise the utility function $U= 6xy-x^2$, subject to the budget constraint $4x+2y=30$.

12. Explain the general formula for solution of first order differential equation with an example.

OR

Find the solution Y(t) of the following differential equation, given that Y(0)= -2

$$\frac{dy}{dt} - \frac{ty^2}{\sqrt{1+t^2}}$$

13. Explain the procedure for solving non homogeneous difference equations and solve the following system.

$\frac{1}{t} = 4^{1}/_{t-1^{-9}}$ and $Y_0 = 5$.

OR

Describe the Multiplier – Accelerator interaction model of Samuelson.

PTO

14. Given an econometrician's explanation for Input – Output technique and appraise the assumptions of input – output model.

OR

Given the matrix

$$X=\begin{bmatrix}50 & 30 & 40\\ 20 & 60 & 25\\ 10 & 15 & 24\end{bmatrix} \text{ and } F=\begin{bmatrix}50\\ 40\\ 60\end{bmatrix}$$

Where X represent the intersectoral flow of goods and F represent the final demand vector, time the total requirement table by inviting Leontief Matrix.

15. Explain the graphical solution of linear programming problem given below:

Maximize $Z= 20x+10y$

Subject to $4x+3y \leq 48$

$3x+5y \leq 60$

$x \leq 9$

$x,y \geq 0$

OR

Using the Simplex method solve the following:

Maximize $Z= 6x_1+4x_2$

Subject to $-2x_1+x_2 \leq 2$

$x_1- x_2 \leq 2$

$3x_1+2x_2 \leq 9$

$x_1, x_2 \geq 0$

Model Paper

M.A DEGREE EXAMINTION

SECOND SEMESTER

BRANCH: ECONOMETRICS

Paper-205(b): ACTUARIAL STATISTICS

(Under CBCS Revised Syllabus from 2021-22)

Time: 3 Hours Max. Marks: 80

Section-A

Answer any FIVE questions

Each question carries 4 marks

(5X4=20)

1. What is Life Insurance
2. Explain the Theory of Interest rates
3. State any four Assumptions for traditional ages.
4. What is Special Mortality laws.
5. Define theUtility Theory

6. Explain the Endowment insurance
7. What are the causes of Endowment insurance
8. Explain the Analytical Laws of Mortality
9. What isEndowment insurance
10. Write a short note on Level benefit insurance

Section- B

Answer ALL the questions

Each question carries 12 marks

(5X12=60)

11. (a) Explain the Survival function, time until death for a person age X, Accurate future Life time,Force of Mortality

Or

(b) Elucidate the Assumptions for traditional ages, Analytical Laws of Mortality, Select and Ultimate tables.

12. (a) Critically examine the Central of multiple decrements, Central force assumptions for multiple decrements.

Or

(b) Explain the Multiple life functions, Joint life and Last Survivor status, Insurance

13. (a) critically Analyse the Insurance and Utility Theory

Or

(b) Discuss the 'Evolution for Special Mortality laws

14. (a) Define Present values and accumulation, Concepts of different annuities,

Or

(b) Explain the Models for individual claims and their sums.

15. (a) Critically examine the Evolution for Special Mortality laws - Multiple decrement models

Or

(b) Discuss the major Concepts of different annuities, Continuously payable annuities, Varying annuities.

Model Paper

M.A DEGREE EXAMINTION- 2021-22

SECOND SEMESTER

BRANCH: ECONOMETRICS

Paper-205(c):WOMEN AND ECONOMIC DEVELOPMENT

(Under CBCS Revised Syllabus from 2021-22)

Time: 3 Hours Max. Marks: 80

Section-A

Answer any FIVE questions

Each question carries 4 marks

(5X4=20)

1. What is Fertility Rates
2. Explain the Micro Credit Groups
3. Explain about Women and Literacy,.
4. What is Special Mortality laws.
5. Describe the Income Inequalities.

6. Explain the Gender division of labour
7. Explain Kasturba Gandhi BalikaVidyalayas (KGBV)
8. Explain the National Programme for Adolescent Girls (NPAG)
9. What isRashtriyaMahilaKhosh (RMK)
10. Write a short note on Indira Gandhi MatrutvaSahayogYojana

Section- B

Answer ALL the questions

Each question carries 12 marks(5X12=60)

11. (a)explain the Factors affecting women entry into labour markets

Or

(b) Elucidate the Role of Women in Economic Development.

12. (a) Critically examine the Role of Non-Government Organizations in Women's

welfare.

Or

(b) Explain the National Institute of Entrepreneurship and Small Business Development (NIESBUD)

13. (a) critically Analyse the KishoriBalikaPathakam – Indira KranthiPatham – JananiSurakshaYojana - BangaruTalliProgramme

Or

(b) Discuss the Role and functions of Ministry of Women and Child Development

14. (a)critically examine the Women Development

Or

(b) Explain the Welfare Programmes

15. (a) Critically examine the Factors affecting women entry in Agriculture, Industry and Service sectors

Or

(b) Discuss the NABARD -Small Industries Development Bank of India (SIDBI).

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Model Paper

M.A DEGREE EXAMINTION-

SECOND SEMESTER

BRANCH: ECONOMETRICS

Paper-206(A): PUBLIC FINANCE

(Under CBCS Revised Syllabus from 2021-22)

Time: 3 Hours Max. Marks: 80

Section-A

Answer any FIVE questions

Each question carries 4 marks (5x4=20)

16. Distinguish between Private Finance and Public Finance.
17. Explain the concepts of Public Goods and Merit Goods.
18. State any four Cannons of public expenditure.
19. List out the effects of public expenditure.
20. Define Tax and discuss any three cannons of tax.
21. Explain the concept of Taxable capacity.
22. What are the causes of public debt?
23. Do you agree with the statement that internal debt is not a burden?
24. Distinguish between Primary deficit and Revenue deficit.

25. Write a short note on FRBM.

Section- B

Answer ALL the questions

Each question carries 12 marks (5X12=60)

26. (a) Discuss the nature, scope and importance of Public Finance.

Or

(b) Elucidate the principles of Public Finance.

27. (a) Critically examine the Wagner's Law of Increasing State Activities.

Or

(b) Explain the need for controls on and accoutability of Public expenditure in India.

PTO

28. (a) Analyse the characteristics of good tax system. Are they found in the Indian tax system?

Or

(b) Discuss the 'Ability to Pay' Theory of Taxation.

29. (a) Define Public Debt and discuss different types of classification of Public Debt.

Or

(b) Explain the principles governing the management of Public Debt.

30. (a) Critically examine the present system of Centre-State financial relations in India.

Or

(c) Discuss the major recommendations of 14th Finance Commission in India.

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MODEL QUESTION PAPER

M.A. DEGREE EXAMINATION

SECOND SEMESTER

Branch : ECONOMETRICS

EMT 206(b) :INDUSTRIAL ECONOMICS

(Revised syllabus CBCSw.e.f.2021-2022)

Time:3 Hours Max. Marks :80

SECTION –A

Answer any **FIVE** of the following. Each question carries**4** Marks.

(Short notes) **(5X4=20)**

1. What is the Strategies of Industrialization in Developing Countries?
2. What is the difference between the Firmand Industrie
3. How many Types of Investment.
4. What is Cost-Benefit Analysis
5. What is Pay Back Method
6. What is the meaning of Break-Even Analysis? .
7. What is the Net Present Value Method
8. Importance of Accounting Rate of Return Method .
9. What is the Project Evaluationexplain .
10. What is the Role of Science and Technology in Industrial Development

SECTION –B

Answer any **ALL** question. Eachquestion carries**10** Marks. **5X10=50**

11. a) Write a note on Development-Factors to Promoting Industrialization-Strategies of Industrialization in Developing Countries.

OR

b) What is Industrialization and Economic Development explain.

12. a)Examine the main objectives of the Firm-Optimum Firm-Factors

OR

b)Explain theAlfred WeberTheories of Industrial Location .

13. a) what is the difference between Pay Back Method and Accounting Rate of Return Method

OR

b) Explain Alfred Weber, Sargeant Florence, August Losch, Walter Isard–Melvin Greenhut theory's.

14. a) Explain the - Net Present Value Method and Internal Rate of Return Method.

OR

b) Explain the Cost-Benefit Analysis-Different Rates of Return Methods

15. a) Write a note on Role of Science and Technology in Industrial Development-Industrial Policies of 1956 and 1991.

OR

b) Examine the Importance ofBreak-Even Analysis.

Model Paper

M.A DEGREE EXAMINATION – 2021-2022

Second Semester

Branch: ECONOMETICS

EMT 207, Human Values and Professional Ethics-I

(UNDER CBCS Revised Syllabus from 2021-22

Time : 3 Hrs Marks: 70

Section-A

Answer any FIVE questions. Each question carries 4 marks (5X4=20)

Section – B

Answer ALL the questions

Each question carries 12 marks 5 x 12m = 60 Marks

Five questions with internal choice

MODEL PAPER

M.A. DEGREE EXAMINATION

THIRD SEMESTER

Branch: Econometrics

PAPER: EMT 301 – ADVANCED ECONOMETRICS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max. Marks:80

PART- A

Answer any FIVE questions (Marks: 5 x 4 = 20 Marks)

1. Explain any one of the tests for detecting the Multicollinearity.

2. Explain the Bartlett Test for detecting the Heteroscadasticity.

3. Explain Cochran-Orcutt two-stage method.

4. Discuss the sources and consequences of Auto-Correlated disturbances.

5. Explain the Linear Probability Model.

6. Discuss the Censored Regression Model.

7. Write a note on K-Class estimators.

8. Discuss the LIML method of estimation.

9. What is meant by a fixed effects model (FEM)? Explain.

10. What is meant by an error components model (ECM)? Explain.

PART- B

Answer ALL questions (Marks: 5 x 12= 60 Marks)

11. Explain the concept of Multicollinearity. How does the presence of Multicollinearity affect prediction of the dependent variable?

(OR)

What is Heteroscadasticity? What are its consequences? Discuss a procedure for estimating the parameters of the model in the presence of Heteroscadasticity.

12. Explain Durbin-Watson test for testing the positive and negative Autocorrelation of first order.

(OR)

Explain the procedure for estimation of parameters of the model in the presence of Auto-correlation.

13. Explain the method of Probit Model in Limited Dependent Variables.

(OR)

Explain the Logit Method of Estimation.

14. Discuss the method of Two Stage Least Squares (2SLS).

(OR)

Explain the method of Full Information Maximum Likelihood (FIML).

15. When is panel data regression model inappropriate? Give an example.

(OR)

What is meant by an integrated time series? Explain.

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Model Paper

M. A. DEGREE EXAMINATION

THIRD SEMESTER

Branch: Econometrics

EMT 302 – COMPUTER APPLICATIONS AND DATA ANALYSIS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. Explain the characteristics of a computer.

2. Distinguish between Hardware and Software.

3. Describe the concept of 'macro' in MS Word.

4. Explain the importance of Spell and Grammar check in MS Word.

5. How do you create Worksheets and label them in MS Excel?

6. Distinguish between Absolute cell referencing and Relative cell referencing.

7. Describe the procedure for opening Excel files in SPSS.

8. Explain the Descriptive Statistics for data analysis in SPSS.

9. Explain the method of sorting and indexing data frames using R- software.

10. How do you draw Bar chart using R-software?

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks

11. Describe the input-output devices of a computer and show them in a Block-diagram.

Or

What is an Operating System? Explain its features.

12. Discuss the procedure for creation of a Table, inserting columns and rows and editing them in MS Word.

Or

Describe the procedure for inserting Microsoft Equation in MS Word and explain the uses of equation editor in MS Word.

13. Explain the procedure for creating a scatter diagram and editing it in MS Excel by using Hypothetical statistical data.

Or

Discuss the steps involved in the estimation of descriptive statistics by using statistical functions in MS Excel. PTO

14. Explain the procedure for estimating a linear regression equation for statistical data using SPSS.

Or

Discuss the procedure for estimating the Chi-square test statistic using SPSS.

15. Explain the procedure of generating samples from discrete and continuous distributions using R-software.

Or

Using R-software, compute the mean, variance and ANOVA table with an example of your own.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

BRANCH IV (B) - ECONOMETRICS

Semester-303(a): PRACTICAL EXAMINATION

COMPUTER APPLICATIONS AND DATA ANALYSIS

Time: 3 Hours **Max. Marks: 80**

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Answer any Four Questions. All Questions Carry Equal Marks [4x20 = 80]

1. The following data refers to the distribution of body length of 120 fish observed in a lake.

Class	8-10	10 - 12	12 - 14	14 -16	16 - 18	18 - 20
Frequency	4	24	41	31	16	4

Prepare i) Histogram, ii) Frequency Polygon iii) Ogives

2. The following data refers to the intake of various dietary components consumed by 20 experimental subjects. Calculate all possible correlations among them using Excel Data Analysis and interpret the findings.

SNO	PRO	FAT	CHO	CAL	IRON	VITA
1	54.0	37.0	518.0	360	21	2321
2	58.0	34.0	524.0	363	22	2481
3	61.0	36.0	534.0	388	23	2436
4	54.0	42.0	526.0	372	26	2151
5	56.0	39.0	521.0	381	24	2122
6	57.0	41.0	542.0	379	23	2238
7	58.0	42.0	524.0	386	24	2408

8	52.0	43.0	512.0	381	28	2326
9	59.0	46.0	544.0	372	21	2129
10	53.0	45.0	538.0	389	20	2189
11	58.0	39.0	526.0	376	18	2326
12	52.0	48.0	556.0	388	17	2289
13	61.0	42.0	551.0	361	16	2186
14	58.0	47.0	548.0	373	22	2381
15	51.0	46.0	532.0	389	19	2286
16	42.0	41.0	489.0	348	21	2132
17	49.0	40.0	512.0	347	23	2412
18	51.0	42.0	551.0	386	26	2638
19	59.0	46.0	552.0	346	25	2132
20	42.0	41.0	489.0	389	20	2189

3. Fit the Multiple Linear Regressions for the following data using R-Programme and comment on results.

Y	40	44	46	48	52	58	60	68	74	80
X1	6	10	12	14	16	18	22	24	26	32
X2	4	4	5	7	9	12	14	20	21	24

4. The weights of a calf taken at weekly intervals are given below. Plot the scatter diagram and fit a Straight Line using the method of least squares. Display the Straight Line Equation and r^2 Value on chart. What is the average rate of growth per week?

Age (X)	1	2	3	4	5	6	7	8	9	10
Weight(Y) (in Kgs)	52.5	58.7	65.0	70.2	75.4	81.1	87.2	95.5	102.2	108.4

5. The below table gives Y is Dependent variable and X_1, X_2, X_3, X_4, X_5 are independent variables. Our model is $Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \varepsilon$

Y	**X1**	**X2**	**X3**	**X4**	**X5**
60323	830	234289	2356	1590	107608
61122	885	259426	2325	1456	108632
60171	882	258054	3682	1616	109773
61187	895	284599	3351	1650	110929
63221	962	328975	2099	3099	112075
63639	981	346999	1932	3594	113270
64989	990	365385	1870	3547	115094
63761	1000	363112	3578	3350	116219
66019	1012	397469	2904	3048	117388
67857	1046	419180	2822	2857	118734
68169	1084	442769	2936	2798	120445
66513	1108	444546	4681	2637	121950
68655	1126	482704	3813	2552	123366

69564	1142	502601	3931	2514	125368
69331	1157	518173	4806	2572	127852
70551	1169	554894	4007	2827	130081

Detect Multicollinearity using VIF test. If there Multicollinearityproblem exist what solution you are suggest [using SPSS].

6. Create an Excel worksheet with the following data

SNO	TC	TR	HDL	VLD	LDL
1	187.1	210.1	33.6	42	111.5
2	194.2	211.4	30.8	42.3	121.2
3	203.6	215.4	31	43	129.6
4	200	228.1	32.4	45.6	122
5	201	211.4	32	42.3	126.7
6	187.2	194.1	32.4	38.8	116
7	209.1	218.8	29.1	43.8	136.2
8	167.4	239.1	29.8	47.8	89.7
9	171.1	222	30.4	44.4	96.3
10	210.2	225.1	30	45	135.2
11	220.1	200.1	31	40	149.1
12	216.4	194.9	31.9	38.9	145.6
13	259.4	209.1	30.8	41.8	186.8

14	209	231	30	46.2	132.8
15	200	221	30	44.2	125.8

Using this data find the Descriptive Statistics using Data Analysis in Excel. Comment on results

Model Paper

M. A. DEGREE EXAMINATION

THIRD SEMESTER

Branch: Econometrics

Paper: EMT 303(b): APPLIED ECONOMETRICS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. Distinguish between Cross Section and Time series data.
2. What is an Engel function? How do you derive it from the Household's utility function?
3. Explain the concept of Absolute Income Hypothesis.
4. State briefly the problems involved in estimating the Consumption Function.
5. List out different methods of estimating Cobb-Douglas Production Function.
6. What is Elasticity of Cost? What are its uses?
7. Discuss the nature of Simultaneous Equations Model.
8. State the essence of the Agarwal's Macro-econometric Model for India.
9. Explain the uses of Simultaneous Equations in Health System.
10. Construct a Simultaneous Equations Model relating to Labour economics.

PART- B

Answer ALL questions. Each question carries 10 Marks

(Marks: 5 x 12 = 60 Marks)

11. Examine the restrictions to be satisfied by Demand Function such as $x_j = x_j (p_1, p_2, I), j = 1, 2.$

Or

Describe the nature of different Engel forms utilized by researchers to analyse family budget studies with special reference to some of the empirical studies.

12. Elucidate various functional forms used in the estimation of Consumption Function.

Or

Review the empirical studies on Consumption Function in India.

13. Enumerate the problems of estimating Aggregate Production Function.

Or

Explain the properties of CES Production Function and its applications in Industrial sector.

14. Examine the trends in Macro-econometric model building and illustrate the problems involved in macro-econometric model building.

Or

Make a comparison of K. Krishna Murthy's Macro-econometric Model with that of N. V. A. Narasimham.

15. Examine the applications of Simultaneous Equations in the models of Demand for and Supply of Money.

Or

Describe the application of Simultaneous equations in Industrial Organizations.

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Model Paper

M.A DEGREE EXAMINATION

Third Semester

Branch: ECONOMETRICS

EMT 303(c): ECONOMICS OF DEVELOPMENT AND PLANNING

(UNDER CBCS Revised Syllabus from 2021-22)

Time : 3 Hrs Marks: 80

Section-A

Answer any FIVE questions. Each question carries 4 marks(5X4=20)

1. Distinguish between Growth and Development.
2. Explain the concept of Vicious Circle of Poverty.
3. Explain the Marxian concept of Industrial Reserve Army.

4. State the meaning of the concept of Directly Productive Activity.
5. Explain the concept of Demographic Dividend.
6. State the need for Manpower planning.
7. State the benefits of international trade.
8. State the need for export promotion measures in a developing economy.
9. What is Choice of Technique?
10. State the importance of Cost-benefit analysis in project planning.

Section –B

Answer ALL the questions

Each question carries 12 marks 5x12=60

11. Discuss the obstacles to economic development.

OR

Elucidate the need for introduction of HDI and PQLI as measures of economic development.

12. Critically examine the Marxian Theory of economic growth.

OR

Make an assessement of Lewis' model of unlimited supplies of labour.

13. Discuss the need for industrialization to promote economic growth in a developing economy.

OR

Elucidate the role of Technology in promoting economic development.

14. 'Trade is an Engine of Economic Growth'- Robertson.Elucidate.

OR

Discuss the objectives and intstruments of Fiscal policy.

15. Explain the need for the introduction of 'appropriate technology' in a labour abundant country like India.

OR

Examine the role of foreign capital in developing countries.

M. A. DEGREE EXAMINATION

THIRD SEMESTER

Branch: Econometrics

Paper: EMT: 303(d)- FINANCIAL INSTITUTIONS AND MARKETS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks(Marks: 5 x 4 = 20 Marks)

1. Write a note on evolution of financial system.
2. State the structure of financial system.
3. What is the feature of Money market?
4. Give an account of discount and finance houses in India.
5. Explain briefly the functions of stock exchange.
6. Mention the features of primary Market.
7. What are the uses of mutual funds?
8. What are the functions of Industrial Finance Corporation of India (IFCI)?
9. Explain the advantages of foreign capital.
10. State briefly the Role of UTI in mobilizing financial resources.

PART- B

Answer ALL questions. Each question carries 12 Marks (Marks: 5 x 12 = 60 Marks)

11.Discuss the role of financial system in economic development.

Or

Explain the functions of financial system.

12. Elucidate the recent developments in Indian money market and their limitations.

Or

Explain the instruments of money market and their limitations.

13. Explain the reforms introduced by the Govt.to improve the performance of capital market.

Or

State the objectives and functions of and Securities and Exchange Board India (SEBI).

14.Discus the functions and achievement of I.C.I.C.I

Or

Explain the role of Industrial Development Bank of India in Industrial Development.

15. Mention the functions and problems of Life Insurance Corporation.

Or

Discuss the advantages and disadvantages of foreign capital.

MODEL QUESTION PAPER

M.A.DEGREE EXAMINATION

THIRD SEMESTER

Branch : ECONOMETRICS

EMT 304 :PERSONALITY DEVELOPMENT AND SOFT SKILLS

(Revised syllabus CBCSw.e.f. 2021-2022)

Time:3 Hours Max. Marks :80

SECTION –A

Answer any **FIVE** of the following. Each question carries**4** Marks.

(Short notes) **(5X4=20)**

1. What is the Concept of Personality.
2. What are the Causes for sick personality and healthy Personality
3. Explain Self-awareness skills.
4. What is Goal setting explain
5. What is the meaning of diversity Problem
6. Explain Ethical decision making.
7. What are the Causes of low self-esteem.
8. What is the meaning of positive attitude
9. Importance ofEthical decision making.
10. Explain the Interpersonal skills.

SECTION –B

Answer any **ALL** question. Eachquestion carries**12** Marks. **5X12=60**

11. a) Write a note on Physical, social, educational, family, intellectual and emotional determinants.

OR

b)Briefly explain the Foundations of personality development.

12. a)examine the Causes for sick personality and healthy Personality

OR

b)Explain the self-awareness and management skill.

13. a) What are the reasons for the Valuing diversity: Problem

OR

b) briefly examinethe positive attitude and negative attitude.

14. a) Explain the Steps in developing a positive Personality.

OR

b) Write an essay onEthical decision making

15. a) write a note on Counseling and Mentoring – Empowering

OR

b)Importance ofEthical decision making and interpersonal skills

Model Paper

M. A. DEGREE EXAMINATION

THIRD SEMESTER

Branch: Econometrics

Paper: EMT 305(a): INDIAN ECONOMY

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. State the major structural changes in Indian economy since its independence.

2. What are the basic characteristics of a developing economy?

3. Write a short note on new agricultural policy.

4. Explain the concept of food security.

5. Write a short note on the source of industrial finance in India.

6. What are the major problems of industrial labour in India.

7. Write a short note on GATT.

8. Describe broad structure of India's foreign trade in recent years.

9. What are the major objectives of planning in India?

10. What are the problems of capital formation in India?

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. What do you mean by anti-poverty Programmes? Briefly describe about anti-Poverty programmesimplemented in India after 1970s.

Or

Critically examine the Indian economic development during five-year plans.

12. Explain inter relationship between agriculture and industry.

Or

Examine the controversy in India between the farm size and productivity.

13. What are the causes of industrial Sickness in India? Suggest some remedial measures.

Or

Evaluate the importance of Micro, Small and Medium Scale Enterprises (MSMEs) in the Indian economy.

14. Examine methods of correcting disequilibrium in India's BOP.

Or

Evaluate the impact of WTO on agriculture in India.

15. Explain the concepts of Privatization and Globalization and their impact on India.

Or

Discuss the role of foreign capital and foreign aid in India's Economic development.

Model Paper

M. A. DEGREE EXAMINATION

THIRD SEMESTER

Branch: Econometrics

Paper: EMT 305(b): ECONOMICS OF INSURANCE

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. Define the concept of Risk and distinguish it from the Concept of Uncertainty.

2. What is Risk Pooling?

3. Define Insurance.

4. Explain the concept of Reinsurance.

5. State the functions life insurance.

6. Give a brief account of any two life insurance products available in India.

7. Mention various types of General Insurance.

8. Explain the concept of Utmost Good faith.

9. Give a brief account on LIC of India.

10. What is IRDA? State its functions briefly.

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. Explain the concept of Risk Management and examine the essentials of Risk Management.

Or

Explain the concepts of Risk Assessment and Risk Control. Examine different methods of effective Risk Management.

12. Is Insurance a contract? If so, discuss General and Specific Principles of Insurance Contract.

Or

Elucidate the relationship between Insurance and Economic Development.

13. Critically examine various life insurance products being marketed in India.

Or

What are the functions of Health Insurance? State the relevance of various Health Insurance policies in the Indian Context.

14. Enumerate the problems faced in the marketing of General Insurance policies in India.

Or

Examine the principles of Physical and Moral Hazards in General Insurance with special reference to India.

15. Do you think that there was a need for the entry of private and foreign insurance companies in Insurance business in India? Justify your answer.

Or

Critically examine the functioning of Insurance Regulatory and Development Authority in India.

MODEL PAPER

M.A. DEGREE EXAMINATION

FOURTH SEMESTER

Branch: Econometrics

PAPER: EMT 401 – TIME SERIES ECONOMETRICS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max. Marks:80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. Explain the concept of stationary stochastic process.
2. Explain the concept of unit root stochastic process.
3. Discuss the concept of Co-integration.
4. Explain the Johansen test for Co-integration.
5. Explain the nature and uses of forecast.
6. Explain the concept of Unconditional Forecasting.
7. State the properties of Moving Average models.
8. State the properties of Auto Regressive models.
9. Explain the ARCH model.
10. What is a VAR model? How do you measure the volatility in VAR models?

PART- B

Answer ALL questions. Each question carries 60 Marks

(Marks: 5 x 12 = 60 Marks)

11. Explain Trend stationary and Difference stationary stochastic processes with an example.

(OR)

Explain any two tests for stationarity of the stochastic process.

12. Describe the Engle-Granger and Augmented Engle-Granger tests used in testing for Co-integration in the econometric estimation of regression equation.

(OR)

Explain the ARDL Co-integrating test.

13. Explain the procedure for 'Forecasting' with serially correlated errors.

(OR)

Explain Conditional forecasting.

14. State the properties of ARMA process in econometric analysis.

(OR)

State the properties of homogeneous non-stationary Processes of order‘d’.

15. Describe the DF and ADF tests used in testing for unit roots in the econometric estimation of regression equation.

(OR)

Explain the VAR and GARCH models in econometric analysis.

Model Paper

M. A. DEGR

EE EXAMINATION

FOURTH SEMESTER

Branch: Econometrics

Paper EMT 402 – OPTIMIZATION IN ECONOMICS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. Explain the mathematical formulation of the Transportation Problem with an example.
2. Distinguish between Balanced and Unbalanced Transportation Problem.
3. What is a Game Theory? List out the assumptions made in the theory of Games.
4. Explain the Maxi-min principle used in Game theory.
5. Define Inventory. What are the advantages and disadvantages of having inventories?
6. Explain the different costs that are involved in inventory problems.

7. Explain the concepts of Network: (i) Activities and (ii) Nodes.
8. Explain the rules for constructing the Networks.
9. Explain the concept of Simulation.
10. Explain the Event-type Simulation with the help of an illustration.

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. Explain how the initial basic feasible solution to the Transportation Problem is determined using Vogel's approximation method.

Or

Determine an initial basic feasible solution to the following Transportation Problem using North West Corner Rule:

	D1	D2	D3	D4	Availability
O1	6	4	1	5	14
O2	8	9	2	7	16
O3	4	3	6	2	5
Requirement	6	10	15	4	35

12. Define Saddle point and value of the Game. Determine the value of the game whose pay-off is given by:

	Player B	
Player A	-5	2
	-7	-4

Or

Explain the Dominance property and use the dominance property to solve the game theory whose pay off matrix is given by:

		Player B	
		I	II
	I	9	2
Player A	II	8	6
	III	6	4

13. Explain the fundamental problem of EOQ.

Or

Explain the problem of EOQ with finite rate of replenishment.

14. What is a Network? Explain the constraints in Network.

Or

Explain the Critical Path Method (CPM).

15. Explain the different methods to generate Uniform (0, 1) Random observations.

Or

Explain the procedure involved in the generation of a sequence of random observations from any specified probability distribution.

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SRI VENKATESWARA UNIVERSITY: TIRUPATI

BRANCH IV (B) - ECONOMETRICS (2021-22)

Semester-IV: 403(a)-PRACTICAL EXAMINATION

Time: 3 Hours **Max. Marks: 80**

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Answer any Four Questions. All Questions carry equal marks [4x20=80]

6. The following time series data relates to capital, revenue receipts and expenditure of the union Govt. of India data and also GDP at market prices time series data have the base year 2011-12 (in crores of rupees) during the period from 1988-89 to 2014-15.

Year	GDP Base year (2011-12)	Total Receipts	Total Expenditure	Year	GDP Base year (2011-12)	Total Receipts	Total Expenditure
1988-89	2063458	73469	79111	2002-03	4319293	411365	413248
1989-90	2186180	82316	92908	2003-04	4662417	475146	471203
1990-91	2307151	93951	105298	2004-05	5028361	506382	498252
1991-92	2331534	104559	111414	2005-06	5495238	526626	505738
1992-93	2459357	110306	122618	2006-07	6004315	578869	583387

1993-94	2576196	130893	141853	2007-08	6592818	739842	712671
1994-95	2747743	159778	160739	2008-09	6849344	840122	883956
1995-96	2955870	168468	178275	2009-10	7430151	1025874	1024487
1996-97	3179025	187823	201007	2010-11	8192480	1190899	1197328
1997-98	3307769	232963	232053	2011-12	8736329	1320355	1304365
1998-99	3512335	279549	279340	2012-13	9213017	1461384	1410372
1999-00	3809588	297189	298053	2013-14	9801370	1578618	1559447
2000-01	3961020	324414	325592	2014-15	10536984	1663673	1663673
2001-02	4156862	363806	362310				

Check the given time series data is a stationary series or not by using **Augmented Dickey-Fuller** test (unit root test) by using Eviews.

7. The following quarterly time series data shows USA people **Personal Disposable Income (PDI),** and **Personal Consumption Expenditure (PCE)** in terms of billions of dollars 1987, during the 1970-I to 1981-iv.

Year	Q	PDI	PCE	Year	Q	PDI	PCE	Year	Q	PDI	PCE

1970	I	1990.60	1800.50	1974	I	2334.70	2050.80	1978	I	2587.30	2347.10
	II	2020.10	1807.50		II	2304.50	2059.00		II	2631.90	2394.00
	III	2045.30	1824.70		III	2315.00	2065.50		III	2653.20	2404.50
	iv	2045.20	1821.20		iv	2313.70	2039.90		iv	2680.90	2421.60
1971	I	2073.90	1849.90	1975	I	2282.50	2051.80	1979	I	2699.20	2437.90
	II	2098.00	1863.50		II	2390.30	2086.90		II	2697.60	2435.40
	III	2106.60	1876.90		III	2354.40	2114.40		III	2715.30	2454.70
	iv	2121.10	1904.60		iv	2389.40	2137.00		iv	2728.10	2465.40
1972	I	2129.70	1929.30	1976	I	2424.50	2179.30	1980	I	2742.90	2464.60
	II	2149.10	1963.30		II	2434.90	2194.70		II	2692.00	2414.20
	III	2193.90	1989.10		III	2444.70	2213.00		III	2722.50	2440.30
	iv	2272.00	2032.10		iv	2459.50	2242.00		iv	2777.00	2469.20
1973	I	2300.70	2063.90	1977	I	2463.00	2271.30	1981	I	2783.70	2475.50
	II	2315.20	2062.00		II	2490.30	2280.80		II	2776.70	2476.10
	III	2337.90	2073.70		III	2541.00	2302.60		III	2814.10	2487.40
	iv	2382.70	2067.40		iv	2556.20	2331.60		iv	2808.80	2468.60

Find the following objectivesby using Eviews

I. Calculate stationarity test by using ADF

II. If the data has non-stationary series then find out whether the functional relationship between PDI and PCE has spurious regression (Non-sense regression) or not.

8. The following quarterly time series data shows USA people ***Personal Disposable Income (PDI),Personal Consumption Expenditure (PCE)***and***Gross Domestic Product (GDP)*** in terms of billions of dollars 1987, during the 1970-I to 1981-iv.

Year	Q	GDP	PDI	PCE	Year	Q	GDP	PDI	PCE	Year	Q	GDP	PDI	PCE
1970	I	2872.8	1990.6	1800.5	1974	I	3259.4	2334.7	2050.8	1978	I	3591.8	2587.3	2347.1
	II	2860.3	2020.1	1807.5		II	3267.6	2304.5	2059		II	3707	2631.9	2394
	III	2896.6	2045.3	1824.7		III	3239.1	2315	2065.5		III	3735.6	2653.2	2404.5
	iv	2873.7	2045.2	1821.2		iv	3226.4	2313.7	2039.9		iv	3779.6	2680.9	2421.6
1971	I	2942.9	2073.9	1849.9	1975	I	3154	2282.5	2051.8	1979	I	3780.8	2699.2	2437.9
	II	2947.4	2098	1863.5		II	3190.4	2390.3	2086.9		II	3784.3	2697.6	2435.4
	III	2966	2106.6	1876.9		III	3249.9	2354.4	2114.4		III	3807.5	2715.3	2454.7
	iv	2980.8	2121.1	1904.6		iv	3292.5	2389.4	2137		iv	3814.6	2728.1	2465.4
1972	I	3037.3	2129.7	1929.3	1976	I	3356.7	2424.5	2179.3	1980	I	3830.8	2742.9	2464.6
	II	3089.	2149.	1963.		II	3369.	2434.	2194.		II	3732.	2692	2414.

		7	1	3			2	9	7			6		2
	III	3125.8	2193.9	1989.1		III		2444.7			III	3733.5	2722.5	2440.3
							3381		2213					
	iv	3175.5	2272	2032.1		iv	3416.3	2459.5	2242		iv	3808.5	2777	2469.2
1973	I	3253.3	2300.7	2063.9	1977	I	3466.4	2463	2271.3	1981	I	3860.5	2783.7	2475.5
	II	3267.6	2315.2	2062		II	3525	2490.3	2280.8		II	3844.4	2776.7	2476.1
	III	3264.3	2337.9	2073.7		III	3574.4	2541	2302.6		III	3864.5	2814.1	2487.4
	iv	3289.1	2382.7	2067.4		iv	3567.2	2556.2	2331.6		iv	3803.1	2808.8	2468.6

Using the above time series data, examine **Johansen Cointegration** test to study the co-integration between PCE,PDI and GDP by using Eviews.

9. Consider the problem of assigning four sales persons to four different sales regions as shown in below table such that the total sales are maximized.

	Sales Region-I	**Sales Region-II**	**Sales Region-III**	**Sales Region-IV**
Salesman-I	10	22	2	14
Salesman-II	16	18	22	10
Salesman-III	24	20	12	18

Salesman-IV	16	14	24	20

The cell entries represent annual sales figures in lakhs of rupees. Find the optimal allocation of the sales persons to different regions by using Hungarian Method.

Model Paper

M. A. DEGREE EXAMINATION

FOURTH SEMESTER

Branch: Econometrics

Paper: EMT 403(b): INTERNATIONAL TRADE AND FINANCE

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

16. Define the concept of Comparative Advantage and explain how comparative advantage is proved in the Ricardian Theory of Comparative Advantage.
17. Explain the Concept of intra-industry Trade. How do you measure it?
18. Explain the concept of Immiserizing Growth.
19. Distinguish between the concepts of Trade Creation and Trade Diversion.
20. State the Marshall – Lerner Condition for Devaluation.
21. What do you mean by Policy Mix?
22. What is Spot rate of Exchange? How is it different from the Forward Rate of Exchange?
23. What do you understand by Multiple Exchange Rates?
24. Write a Short note on Bretton Woods Twins.
25. What is Multilateralism?

PART- B

Answer ALL questions. Each question carries 60 Marks

(Marks: 5 x 12 = 60 Marks)

11. Critically examine the Heckscher-Ohlin Theory of International Trade.

Or

Explain Neo-Chamberlin Model of International Trade.

12. Discuss the relative merits and demerits of Free Trade.

Or

Analyse the effects of Tariff with partial and general equilibrium approaches.

13. Explain the Absorption Approach to Devaluation.

Or

Explain how adjustment in balance of payments takes place under fixed exchange rates.

14. Discuss the exchange rate adjustments with free mobility of capital.

Or

Discuss the relative merits and demerits of Fixed and Flexible Exchange Rates.

15. Critically examine the role of IMF in ensuring adequate international liquidity under Bretton Woods' system.

Or

Assess the role of World Trade Organization in liberalizing international trade since 1995.

Model Paper

M. A. DEGREE EXAMINATION

FOURTH SEMESTER

Branch: Econometrics

Paper: EMT 403(c): INDIAN ECONOMY

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. State the major structural changes in Indian economy since its independence.

2. What are the basic characteristics of a developing economy?

3. Write a short note on new agricultural policy.

4. Explain the concept of food security.

5. Write a short note on the source of industrial finance in India.

6. What are the major problems of industrial labour in India.

7. Write a short note on GATT.

8. Describe broad structure of India's foreign trade in recent years.

9. What are the major objectives of planning in India?

10. What are the problems of capital formation in India?

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. What do you mean by anti-poverty Programmes? Briefly describe about anti-Poverty programmesimplemented in India after 1970s.

Or

Critically examine the Indian economic development during five-year plans.

12. Explain inter relationship between agriculture and industry.

Or

Examine the controversy in India between the farm size and productivity.

13. What are the causes of industrial Sickness in India? Suggest some remedial measures.

Or

Evaluate the importance of Micro, Small and Medium Scale Enterprises (MSMEs) in the Indian economy.

14. Examine methods of correcting disequilibrium in India's BOP.

Or

Evaluate the impact of WTO on agriculture in India.

15. Explain the concepts of Privatization and Globalization and their impact on India.

Or

Discuss the role of foreign capital and foreign aid in India's Economic development.

MODEL QUESTION PAPER

M.A.DEGREE EXAMINATION,-2021-22

FOURTH SEMESTER

Branch IV : ECONOMETRICS

EMT 404 :FREEDOM MOVEMENT IN INDIA, 1857 - 1947

(Revised syllabus CBCSw.e.f.2021-2022)

Time:3 Hours Max. Marks :70

SECTION –A

Answer any **FIVE** of the following. Each question carries**4** Marks.

(Short notes) **(5X4=20)**

1. Factors for the growth of Nationalism.
2. Militant Nationalists.
3. Rowlatt Act.
4. Swaraj Party.
5. Growth of capitalist class in India.
6. Significance of KisanMahasabha.
7. Importance of Muslim League.
8. Significance of Cripps proposals.
9. Importance of growth of popular movements.
10. Lapse of paramountacy.

SECTION –B

Answer any **ALL** question. Eachquestion carries**10** Marks. **5X10=50**

11. a)Write a note on Nationalism, its meaning and different interpretations.

OR

b)What was Home Rule Movement in India? Discuss.

12. a)Write about non - violance and satyagraha and their significance during freedom movement in India?

OR

b)Explain the powers and functions of Ministries at provincial government in India.

13. a) Describe critically on the role played by revolutionary Nationalist Bhagath Singh durinBrish rule in Indi.

OR

b)Give a critical account of Peasant Movements between 1921 -1942 in India.

14. a) What are the reasons for the growth of communalism between 1937 -1947 in India.

OR

b)Write a detailed note on cabinet Mission in India.

15. a) Explain the political conditions in Princely States in India.

OR

b)Write an essay on Join India Movement and its significance

Model Paper

M. A. DEGREE EXAMINATION

FOURTH SEMESTER

Branch: Econometrics

Paper EMT 405(a) – OPTIMIZATION IN ECONOMICS

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. Explain the mathematical formulation of the Transportation Problem with an example.
2. Distinguish between Balanced and Unbalanced Transportation Problem.
3. What is a Game Theory? List out the assumptions made in the theory of Games.
4. Explain the Maxi-min principle used in Game theory.
5. Define Inventory. What are the advantages and disadvantages of having inventories?
6. Explain the different costs that are involved in inventory problems.
7. Explain the concepts of Network: (i) Activities and (ii) Nodes.
8. Explain the rules for constructing the Networks.
9. Explain the concept of Simulation.
10. Explain the Event-type Simulation with the help of an illustration.

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. Explain how the initial basic feasible solution to the Transportation Problem is determined using Vogel's approximation method.

Or

Determine an initial basic feasible solution to the following Transportation Problem using North West Corner Rule:

	D1	D2	D3	D4	Availability
	O1	6	4	1	5	14
	O2	8	9	2	7	16
	O3	4	3	6	2	5
Requirement	6	10	15	4	35	

12. Define Saddle point and value of the Game. Determine the value of the game whose pay-off is given by:

		Player B	
		-5	2
Player A			
		-7	-4

Or

Explain the Dominance property and use the dominance property to solve the game theory whose pay off matrix is given by:

		Player B	
		I	II
	I	9	2
Player A	II	8	6

III 6 4

13. Explain the fundamental problem of EOQ.

Or

Explain the problem of EOQ with finite rate of replenishment.

14. What is a Network? Explain the constraints in Network.

Or

Explain the Critical Path Method (CPM).

15. Explain the different methods to generate Uniform (0, 1) Random observations.

Or

Explain the procedure involved in the generation of a sequence of random observations from any specified probability distribution.

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Model Paper

M. A. DEGREE EXAMINATION

FOURTH SEMESTER

Branch: Econometrics

Paper: EMT: 405(b)- DATA BASE FOR INDIAN ECONOMY

(Revised Regulations CBSC from 2021-22)

Time: 3 Hours Max: Marks: 80

PART- A

Answer any FIVE questions. Each question carries 4 Marks

(Marks: 5 x 4 = 20 Marks)

1. State the major structural changes in Indian economy since its independence.

2. What are the basic characteristics of a developing economy?

3. Write a short note on new agricultural policy.

4. Explain the concept of food security.

5. Write a short note on the source of industrial finance in India.

6. What are the major problems of industrial labour in India.

7. Write a short note on GATT.

8. Describe broad structure of India's foreign trade in recent years.

9. What are the major objectives of planning in India?

10. What are the problems of capital formation in India?

PART- B

Answer ALL questions. Each question carries 12 Marks

(Marks: 5 x 12 = 60 Marks)

11. What do you mean by anti-poverty Programmes? Briefly describe about anti-Poverty programmes implemented in India after 1970s.

Or

Critically examine the Indian economic development during five-year plans.

12. Explain inter relationship between agriculture and industry.

Or

Examine the controversy in India between the farm size and productivity.

13. What are the causes of industrial Sickness in India? Suggest some remedial measures.

Or

Evaluate the importance of Micro, Small and Medium Scale Enterprises (MSMEs) in the Indian economy.

14. Examine methods of correcting disequilibrium in India's BOP.

Or

Evaluate the impact of WTO on agriculture in India.

15. Explain the concepts of Privatization and Globalization and their impact on India.

Or

Discuss the role of foreign capital and foreign aid in India's Economic development.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF ECONOMICS



Course

M.A. ECONOMICS

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

DEPARTMENT OF ECONOMICS

SRI VENKATESWARA UNIVERSITY :; TIRUPATI

About the Department:

The Department of Economics, established in 1954, is one of the premiere departments of Sri Venketeswara University. The department was instrumental for the establishment of the interdisciplinary departments like Commerce, Political Science, Population Studies, Adult Education and Econometrics in the university. The Department, founded by Prof. E.K. Warrior, a product of Oxford University, U. K., was further nurtured and developed by Prof. D.L. Narayana, the former President of IEA. The department made pioneering contributions to the teaching and research in several areas of Economics in general and in the areas of Labour Economics, Agricultural Economics and Public Finance in particular. The department has been admitted to the UGC Special Assistance Programme (SAP) right from 1975, for three successive phases. The Department of Economics is also the first one toget UGC SAP in the entire South India. Having successfully completed UGC-SAP (DRS:Phase - I) from 2009-14, the Department has been admitted to DRS:Phase-II for the period 2016-22.

With committed, competent and experienced faculty members, the Department has, to its credit. a commendable record of teaching, research and training programmes. Over 315 Pb.D and 70 M. Phil scholars have been trained since the inception of the Department. During 2021-22, 35 Ph.Ds were in the pipeline. The Department trains 180 Post-Graduate students in Economics every year. (Vide Table -1 & 2). Apart from teaching and research guidance, the Department has a creditable record of completing research projects funded by different agencies. About IJS major research projects, funded by UGC/ICSSR/Planning Commission/State Government have been completed and a good number of projects are in progress. [It is gratifying to note that some of the students trained in the Department are well placed in Government, Private and academic institutions all over the country.

The Department of Economics has been a pioneer in the organisation of Conferences, Seminars, Workshops, Refresher Courses, etc., and during the 1.,,(8 years the Department has organized one International and nine national level seminars. The notable among them were, "The 6' International Seminar of Regional Network on Poverty Eradication" organized in collaboration with Universiti of Malaysia, Kelantan,

Malaysia during 13-15th November 2015 and the 99th Annual Conference of the Indian Economic Association during 27-29 December 2016. Besides, the Department has been instrumental in the formation of A.P. Economic Association, Tirupati Chapter of the Indian Institute of Public Administration and Rayalaseema Economic Association. The Department also organized seven Refresher courses in Research Methodology and Summer Institutes for the benefit of the in-service teachers and research scholars under the auspices of the Academic Staff College of the University.

Vision:

To promote the department as an institute for Advanced studies in Economics, Applied Economics / School of Economics.

Mission:

To undertake qualitative teaching, ethics based research and capacitate extension – programme to facilitate research and training in-frontier areas of Economics in tune with the changing man power requirement of the economy.

Programme specific outcomes (pso's) of pg programme:

PSO-1.	To understand the basic principles of Economics.
	To understand the distribution of income and wealth of the country.
	To understand the trade relations among the countries
PSO-2.	To analyse the economic doctrines of India.
	To understand the various economic policies of the country.
	To understand the efficiency and equity implications of Markets interference including government policy.

Programme outcomes of pg programmes:

PO- 1.	**Creative Thinking:**
	• Development of creative thinking is a prime outcome of any P.G. Programme.
	• Creative thinking enables students to think methodically with Economic and Social background.
PO- 2.	**Multiple Thinking:** it enables students to think in Multiple dimensions such as Logically, Rationally, Scientifically, Politically and Economically.
PO- 3.	**Self and Long life Learning:** Post Graduation course promotes Self and Long-life learning in the broad context of Socio, Economical changes.
PO- 4.	**Self-Learning:** It improves the ability to engage in independent learning technics.
PO- 5.	**Effective Communication:** Speak, Read, Write and listen clearly in person and through electronic media in English and in one Indian language and make meaning of the world by connective people, ideas, books media and technology.
PO- 6.	**Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO- 7.	**Effective Citizenship:** Demonstrate empathetic social concern and equity-cantered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO- 8.	**Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO- 9.	**Environment and Sustainability:** Understand the issues of economics in the context of environmental and sustainable development.
PO- 10.	**Self-directed and Life-Long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

DEPARTMENT OF ECONOMICS

SVU COLLEGE OF ARTS :: TIRUPATI

Paper Titles of Revised Syllabus with effect from 2021-2022

Sl. No.	Components of Study	Title of the Course		Credit Hrs/ Week	No. of Credits	Internal Marks	Sem End Exam Marks	Total	Page No.
First Semester									
1.	Core	101	Micro-Economic Analysis – I	06	04	20	80	100	01
2.		102	Macro-Economic Analysis - I	06	04	20	80	100	03
3.		103	Public Economics	06	04	20	80	100	05
4.		104	Mathematical Methods in Economics	06	04	20	80	100	07
5.	Compulsory Foundation (opt ONE)	105(a)	* Fundamentals of Computer	06	04	20	80	100	09
		105(b)	Urban Economics						11
		105(c)	Welfare Economics						13
6.	Elective Foundation (opt ONE)	106(a)	Economics of Environment	06	04	20	80	100	15
		106(b)	Demography						17
TOTAL				**36**	**24**	**120**	**480**	**600**	
7.	Audit Course	107	Human Values and Professional	00	00	100	--	--	19

			Ethics -I						
Second Semester									
1.	Core	201	Micro-Economic Analysis – II	06	04	20	80	100	23
2.		202	Macro-Economic Analysis - II	06	04	20	80	100	25
3.		203	Federal Finance	06	04	20	80	100	27
4.		204	Statistical Methods in Economics	06	04	20	80	100	29
5.	Compulsory Foundation (opt ONE)	205(a)	International Trade: Theory and Policy	06	04	20	80	100	31
		205(b)	Economics of Infrastructure						33
		205(c)	Introduction to Information						35

			Technology						
6.	Elective Foundation (opt ONE)	206(a)	Basic Econometrics	06	04	20	80	100	37
		206(b)	Economics of Tourism						39
TOTAL				**36**	**24**	**120**	**480**	**600**	
7.	Audit Course	207	HumanValues and Professional Ethics -II	00	00	100	--	--	41
Third Semester									
1.	Core	301	Economics of Growth	06	04	20	80	100	4

			and Development						5
2.		302	Indian Economy	06	04	20	80	100	47
3. & 4.	Generic Elective (Opt **TWO**)	303 (a)	International Finance	06	04	20	80	100	49
		303 (b)	Production Economics and Farm Management	06	04	20	80	100	51
		303 (c)	Industrial Economics						53
		303 (d)	Women and Economic Development						55
5.	Skill Oriented Course (Compulsory)	304	Communication and Soft Skills	06	04	20	80	100	57
6.	Open Elective (opt **One**)	305 (a)	Andhra Pradesh Economy	06	04	20	80	100	59
		305 (b)	Agricultural Economics						61
TOTAL				**36**	**24**	**120**	**480**	**600**	

Fourth Semester									
1.	Core	401	Rural Development	06	04	20	80	100	65
2.		402	Financial Institutions and Markets	06	04	20	80	100	67
3. & 4.	Generic Elective (Opt **TWO** Papers)	403 (a)	India's Economic Reforms	06	04	20	80	100	69
		403 (b)	Entrepreneurship and Skill Development	06	04	20	80	100	71
		403 (c)	Labour Economics						73
		403 (d)	Economics of Insurance						75
5.	Skill Oriented Course (Compulsory)	404	Human Resource and Sustainable Development	06	04	20	80	100	77
	Open Elective (opt **One**)	405 (a)	Human Resource Development	06	04	20	80	100	79
6.		405	Planning in						8

		(b)	India and Indian Economy						1
TOTAL				**36**	**24**	**120**	**480**	**600**	

Note: * Theory – 60, Internal Assessment – 20 and Practicals -20 paper 105(a) - First Sem

SEMESTER – I		
Paper – 101	Micro Economics Analysis – I	Credits –04
Sessional / Internal Marks : 20	End Semester Exam Marks : 80	
Objectives:		

i. To identify and explain economics concepts and theories related to the behaviour of economic agents, markets, industry and firm structures, legal institutions, social norms and government policies.

ii. To integrate theoretical knowledge with quantitative and qualitative evidence in order to explain past economic events and to formulate predictions on future ones.

iii. To evaluate the consequences of economic activities and institutions for individual and social welfare.

iv. To identify the basic feature of alternative representation of human behaviour in economics.

Syllabus : ECO 101: MICRO ECONOMICS - I

Unit 1: Demand Analysis

Demand Analysis : Marshalian, Hicksian, Slutsky and Samuelson's Revealed Preference Approaches – Pragmatic Approach – Linear Expenditure System – Constant Elasticity of Demand Function – Von Neumann – Morgenstern Utility Index.

Unit 2: Theory of Production and Cost

Production Function : Cobb – Douglas Production Function – CES Production Function – Law of Variable Proportions – Returns to Scale – Isoquants-Iso – Cost Curves – Equilibrium of the Firm: Choice of Optimum Combination of Inputs – Elasticity of Substitution.

Unit3: Cost of Production, Revenue and Equilibrium of the Firm

Cost of Production: Traditional and Modern Approaches – Short run and - Long run Cost Curves – Concept of Revenue – Revenue Curves under Different Market Conditions – Equilibrium of the Firm and Industry.

Unit 4: Price And Output Determination under Perfect Competition, Monopoly and monopolistic competition. Perfect Competition: Price and Output Determination - Market Period-Short run and Long-run Analysis – Monopoly: Short run and Long run Equilibrium – Price Discrimination – Monopolistic Competition: Equilibrium of the Firm and the Group – Product Differentiation and Selling Cost – Chamberlin Concept of Excess Capacity.

Unit5: Price and Output Determination: Duopoly and Oligopoly

Duopoly: The Models of Cournot, Bertrand and Stackelberg – Oligopoly: Chamberlin Model and Kinked Demand Curve Model – Collusive Oligopoly: Cartels and Price Leadership.

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2. Archibald G.C. (Ed), 1971, Theory of the Firm, Penguin, Harmonds worth.
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4. Borch, K.H., 1968, The Economics of Uncertainty, Princeton University Press, Princeton.
5. Koutsoyiannis, A., 1979, Modern Micro Economics, Second Edition, Macmillan Press, London.
6. Watson, Donald S., 1967, Price theory and its uses, Scientific Book Agency, Calcutta.
7. Da Costa, G.C., 1980, Production, Prices and Distribution, Tata Mc Graw Hill, New Delhi.
8. Diamond and Roths Child (Ed), 1978, Uncertainty in Economics, Academic Press, New York.
9. Hirchleifer, J. and Glazer, 1977, Price Theory and Applications, Prentice Hall of India, New Delhi.
10. John Von Neumann and Oskar Morgenstern, 1947, Theory of Games and Economic Behaviour,

Second Edition, Princeton University Press, Princeton.

11. Kalman, J. Cohen and Richard M. Cyert 1976, Theory of the Firm: Resource Allocation in a Market
Economy, Second Edition, Prentice Hall of India, New Delhi.
12. Kreps David, M., 1990, A course in Micro Economic Theory, Princeton University, Princeton.

Course Outcomes:	
CO1.	Students will be able to evaluate the consequences of economics activities for individual and social welfare.
CO2.	Able to understand various Methodologies of studying Economics.
CO3.	Able to understand and analyse utility analysis and apply the same in his life.
CO4.	Make the students to understand about the demand and its responses and how it will be measured.
CO5.	Able to understand about the consumer behaviour.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		3	1							2	3	1
CO2		1		3						2	3	
CO3		2	1	3						2	3	
CO4	2	3	2	2	1	1			2	2	1	3
CO5	2	3		2				2		2	1	3

SEMESTER – I		
Paper – 102	**Macro Economics Analysis – I**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i. To know macroeconomic concepts and theories by explaining them using appropriate terminology.

ii. To understand macroeconomic models by describing relationship among macroeconomic variables.

iii. To tract down economic data and data sources.

iv. To interpret existing knowledge by explaining what macroeconomic principles are used in economic analyses.

v. To argue based on acquired knowledge in terms of attitudes.

Syllabus : ECO 101: MICRO ECONOMICS - 1

Unit 1: Nature and Scope of Macro Economics

Nature of Macro Economics – Scope and Importance of Macro Economics – Limitations of Macro Economics –Macro Statics – Macro Dynamics and Comparative statics – Micro Foundation of Macro Economics.

Unit 2: National Income

Meaning of National Income – Concepts of National Income; Gross National Product, Net National Product, NMP at Market Price, NNP at Factor cost, NDP at Factor cost, Personal income, Disposal Income, Real Income and Per Capita Income – Methods of measuring National Income and Difficulties in the Measurement of National Income – Circular flow of income and expenditure: In two sector, three sector closed economy and four sector open economy.

Unit 3: Classical and Keynesian Macroeconomics

Classical Theory of Employment – Critique of Classical Theory – Basic Keynesian Models – Consumption Function – Investment Multiplier – Types of

Investment – Marginal Efficiency of Capital and Investment – Accelerator – Interaction between Multiplier and Accelerator.

Unit 4: Consumption Function; Alternative Hypotheses

Consumption Function – Theories of Consumption Function – Alternative Hypotheses – Absolute Income Hypothesis, Relative Income Hypothesis, Life Cycle Hypothesis, Permanent Income Hypothesis.

Unit 5: Neo Classical And Keynesian Synthesis

The Goods market and Money market - Goods market equilibrium: the derivation of IS curve –Shift in IS curve – Money Market Equilibrium: The derivation of LM curve – Shift in LM curve – Interaction of IS-LM curve: The simultaneous equilibrium of goods market and Money market – The Elasticity of LM curve – The effectiveness of Monetary and Fiscal Policies.

References

1. Gardner Ackley, 1978, Macro-economics: Theory and Policy, Macmillan, New York.
2. Dornbush, R and Stanley, F., 1997, Macro-economics, McGraw Hill Inc., New York.
3. Glabe, F.R., Macro-economics: Theory and Policy.
4. Keynes, J.M., 1936, General theory of employment interest and money.
5. Edward Shapiro, Macro-economic analysis, Galgotia publications, New Delhi.
6. Branson, W.A. 1989, Macro-economic theory and policy, Harper and Row, New York.
7. Jhingan, M.L., 2005, Macro-economic Theory, Vrinda Publications, New Delhi.
8. Ahuja, H.L., 2006, Macro-economics, S. Chand and Company, New Delhi.
9. Vaigh, M.C., 2005, Macro-economics, Vikas Publications.
10. Seth, M.L. 2006, Macro-economic theory, Lakshmi Narai Agarwal Publications, Agra.

Course Outcomes:	
CO1.	Able to understand different concepts of National Income and methods to measure national income.
CO2.	Able to acquire the knowledge about the classical and Keynes theories of employment.
CO3.	Able to understand Keynes theory of consumption function and working of multiplier and acceleration principle.
CO4.	To understand the function of money, different theories of money.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1	2		3	2				2		3	3	
CO2		3		2	2		2		1		2	1
CO3	1	2	2	3					1	2	3	
CO4	2	2	3	2		1				2	3	

SEMESTER – I		
Paper – 103	**PUBLIC FINANCE**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . Students can able to define, understand scope and various theories of public finance.

ii. They can be able to study reasons for growth of public expenditure and effect of public expenditure.

iii. Students main objective is to understand various sources of public revenue and taxable capacity of the people.

iv. Students can be able to know the tax structure of the government and various modern reforms in taxation.

v. They can understand the various classical, modern view on public debt, objectives, principles of debt management.

Syllabus: ECO 103: PUBLIC FINANCE

Unit 1: Public Finance And Public Authority

Economic Systems – Need for Government Intervention – Major Fiscal Functions of the Government – Definition and Scope of Public Finance – Public and Private Finance – Positive and Normative approaches to Public Finance – Maximum Social Advantage and Optimum Allocation of Resources.

Unit 2: Public Expenditure

Wagner's Law of Increasing State Activities – Peacock and Wiseman Hypothesis – Rostow's Theory – Reasons for Growth of Public Expenditure in Modern times – Determinants and Classification of Public Expenditure –

Growth of Public Expenditure – Effects of Public Expenditure – Regulation of Public Expenditure in India.

Unit 3: Public Revenue

Sources of Public revenue – Tax Revenue and Non-tax Revenue – Characteristics of Good Tax System – Benefit Theory and Ability to Pay theory – Taxable Capacity – Factors Determining Taxable Capacity, Measurement of Taxable Capacity and Taxable Capacity in India.

Unit 4: Incidence Of Taxation

Incidence of Taxation – Classical Approach – The Concentration, Diffusion and Modern Theories of Incidence and Musgrave's Concept of Incidence – Study of Indian Tax Structure – Direct and Indirect Taxes – Review of Tax Proposals of Raja. J. Chellaiah Committee – Reforms in Taxation.

Unit 5: Public Debt

Classical and Modern Views on Public Debt – Classification of Public Debt – Debt Burden Controversy – Classical Keynesian and Modern Views – Objectives and Principles of Public debt Management – Methods of Public Debt Redemption – Public Debt and Economic Development in India.

References

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2. Bhargava R.N. 1971, the theory and practice of union finance in India, Chaitanya Publications, Allahabad.
3. Chellaiah R.J., 1971, Fiscal Policy in underdeveloped Countries with special reference to India, George Allen and Unwin, London
4. Mathew, T, 1981, Tax Policy, some aspects of Theory and Policy, Chanakya Publications, New Delhi.
5. Dwivedi P., (Ed) Readings in Indian Public Finance, Chanakya Publications, New Delhi.
6. Tripathy R.M., Fiscal Policy and Economic Development, Sterling Publications, New Delhi.

7. Musgrave Richard A and Peacock Allen, T, 1976, Classics in theory of Public Finance, Macmillan, London.
8. Sudipto Mundle (Ed), 1997, Public finance, Policy issues for India, Oxford University Press.
9. Raja, J. Challaiah, 1996, Essays in Fiscal and Financial sectors reforms in India, Oxford University Press.
10. Raghabendra Jha, 1998, Modern Public Economics, Routledge, London.
11. Government of India, Economic Survey (various reports).
12. Government of India, 1992, Report of the Tax Reforms Committee, Part I & II, New Delhi.
13. RBI Monthly Bulletins.

Course Outcomes:

CO1. Students come to know about the Role of Government in Public-Revenue, Public-Expenditure, Public Debt and Public Administration.

CO2. They come to know the Modern taxable capacity effects of taxation under different market conditions.

CO3. Students come to know about the Role of Public Debt in a developing country like India.

Mapping of Course Outcomes with Programme Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS1	PS2
CO1	2	2	3	2		1		1	1	2	3	2
CO2	1		3	2					2	1	1	3
CO3	1	3	2	2	1		1	2		2	1	3

SEMESTER – I		
Paper – 104	**MATHEMATICAL METHODS IN ECONOMICS**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . The objective of this course is to help the students develop precise understanding of mathematical reasoning; the majority of the course will be devoted to teaching the concepts of functions, matrices and Input, Output analysis and incorporating these concepts into economic theory. At the end of the course students will be able to solve rather complex economics problems using a fairly high level mathematics.

Syllabus : ECO 104: MATHEMATICAL METHODS IN ECONOMICS

Unit-I: Sets and Operations on Sets

Sets and Operations on Sets - Concepts of Cartesian Product Relation and function - Types of Functions - Polynomial Function. Homogenous Function – Logarithmic and Exponential Functions – Limit and Continuity of Function - Standard Limits - Evaluation of Limits in Simple Cases - Demand and Supply Functions and Determination of Equilibrium Price and Quantity.

Unit-II: Differentiation of Functions of One or Two Variables

Concept of Derivative–Rules of Differentiation, Power Rule, Product Sum, Difference-Quotient, Chain, Logarithmic and Exponential Rules–Higher Order Derivatives–Rules of Differentiation of Multi - variable Function - Interpretation of Partial Derivatives- Higher Order and Cross Partial derivatives–Interpretation of Revenue, Cost, Demand and Supply Functions and Elasticities.

Unit-III: Maximum and Minimum Functions and Integration

Conditions for Maxima and Minima of Functions of One or Two Variables - Simple examples from Economics, Maximization of Output,

Revenue and Profit-Minimization of Cost under Perfect Competition and Monopoly Concepts of integration – Definite and Indefinite Integrals – Simple Rules of Integration – Application of Integration to Consumer's Surplus and Producer's Surplus.

Unit-IV: Matrices and Determinant

Concept of Matrix – Types of Matrix – Concept of Vector and its Properties – Addition and Multiplication of Matrices – Determinants and Their Properties - Inverse and Rank of a Matrix Solution of Two and Three Simultaneous Equations through Cramer's Rule.

Unit-V: Linear Programming and Input-Output Analysis

Linear Programming–Formulation of a Linear Programming Problems – Solution of Linear Programming through Graphical Method – Formulation of a Dual Programme and its Interpretation – Input-Output Analysis – Assumptions – Formulation of Model - Finding Solution – Closed and Input-output Models.

References:

1. Allen, R.G.D., 1974, Mathematical Analysis for Economists, Macmillion and ELBS, London.
2. Baumol, W.J., 1984, Economic Theory and operations Analysis, Printice Hall, Eaglewood Cliffs, New Jersey.
3. Chiang, A.C., 1986, Fundamental Methods of Mathematical Economics, McGraw Hill, New York.
4. Mathur, P.N. and Bharadwaj, R, (Eds), Economic Analysis in Input-output research, input-output
5. Research Association of India, Pune.
6. Monga, G.S., 1972, Mathematics and Statistics for Economists, Vikas Publishing for Economists, Prentice Hall of India, New Delhi.
7. Yamane, Taro, 1975, Mathematics for Economists, Prentice Hall of India, New Delhi.
8. Vygodsky, G.S., 1971, Mathematical Hand book (Higher Mathematics) Meir Publishers, Moscow.

Course Outcomes:	
CO1.	Understanding different types of functions and standard limit. By using demand and supply function determination of equilibrium price and quantity.

CO2.	Study of different rules of differentiation application of different rule of differentiation in economics.
CO3.	Understanding the concepts of maxima and minima functions and application of these functions in economics for selection of optimum return. Study different concepts of integration and application of integration to consumer's and producer's surplus.
CO4.	Understanding concepts of matrices and determinants and their relationship. Solving minor and higher order matrices with the help of determinants.
CO5.	Impact knowledge of linear programming techniques and application of linear programming for decision making understanding the concepts structure and work with input-output models.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1	2	2	2	3					2	3	3	2
CO2		3	3	2					2	2	3	1
CO3	2		3	1						3	3	
CO4		3		3		1			2	3	3	
CO5			3	3						3	3	

SEMESTER – I		
Paper – 105	**FUNDAMENTALS OF COMPUTERS**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To make the students to familiarize with fundamentals of computers that are used in day to day life;

Ii To create interest in the students in the use of simple office tools such as MS Word and MS Power Points so as enable him to present their research papers/talks to the audience more effectively;

iii To equip the economics students with the simple tools for data analysis such as MS Excel and MS Access;

Syllabus : ECO 105: FUNDAMENTALS OF COMPUTERS

Unit 1: Computer Fundamentals

Definition – Components of a Computer – Block Diagram–Evolution of Computer Generations– Input–Output Devices–Hardware and Software – Compilers and Assemblers –Low level and High level Languages – Operating Systems and the User Interface – Microsoft Operating Systems.

Unit 2: MS Word

Creating, Opening and Saving Files–Editing and Formatting Text–Spell and Grammar Check– Creation of Tables and Columns – Mail-merge – Word Art – Concept of Macro – Print Preview and Operations.

Unit 3: MS Excel

Work Sheet – Creating a Data File in MS Excel – Calculations in Excel Sheet – Creating Graphs and Charts with Excel–Data Analysis Pack–Statistical Functions – Printing Operations.

Unit 4: Power Point

Components of MS Power Point – Parts of a Power Point Screen - Creating a New Presentation – Opening – Saving – Closing a Presentation.

Unit 5: MS Access

The Concept of Database Management System - Creating New Database Files – Fields – Records – Files - Viewing forms, Query and Reports.

PRACTICALS : Time: 3 hrs Max Marks:20

1. Each candidate has to perform two practicals
2. Practical record is to be maintained
3. Practical examination is based on practical record, demonstration and Viva-Voce.

References:

1. Sinha, P.K., 1992, Computer Fundamentals, BPB Publications, New Delhi.
2. Raja Raman, V., 1999, Fundamentals of Computers, Prentice Hall of India, New Delhi.
3. Tom Sheldon, Windows 95 Made Easy, Tata Mc Graw Hill Publishing Co., New Delhi.
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5. Russel A. Shultz, Learn Microsoft Office 97, BPB Publications, New Delhi..
6. Peter Norton, Introduction to Computers, Tata Mc Graw- Hill Publishing Co., New Delhi.
7. Ravichandran, D., 2001, Introduction to Computers and Communication, Tata Mc Graw Hill Publishing Company Limited, New Delhi.
8. Sanjay Sexena, 2000, A First Course in Computers, Vikas Publishing House, New Delhi.
9. Shelly and Hunt Computers and Common Sense, Prentice Hall of India, New Delhi.

Course Outcomes:

CO1.	Know the basic information regarding computers such as hardware, software, Operating Systems as well as basic computer languages;
CO2.	Open a MS Word document to type, format, edit, save and print the documents;
CO3.	Apply their knowledge in MS Excel to create file, enter the data, edit the data, analyse the data and to draw conclusions therefrom;
CO4.	Design an attractive Power point presentation (PPT) to deliver the speech or lecture in an appealing way to the audience;
CO5.	Create a data base file, enter a sufficiently large data set, analyse the data and able to generate useful reports through queries.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1			3	2					2	3	3	
CO2		2		3	1				1		3	
CO3	1	1	3	2		1				3	3	
CO4	1	2	2	2	3					3	3	1
CO5												

SEMESTER – I		
Paper – 106	**Human Values and Professional Ethics – I**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . The student's major objective is to study the Nature of Ethics and its relation to Religion, Political, Business, Legal, Medical and Environmental issues.

ii. The second objective is to know the basic moral concepts – rights, duties, responsibilities and freedom to build good character and conduct.

iii. The third objective is to follow Non-violence, truth, Non-possession, Non-stealing, cardinal virtues rightcomness, wealth and liberation etc.

iv. The fourth one is to learn the values embedded in various religions, religional tolerance and Gandhian ethics.

v. The last objective is to study crime and various theories i.e reformation and retribution etc.

Syllabus : ECO 106: Human Values and Professional Ethics – I

UNIT-I: Definition and Nature of Ethics-Its relation to Religion ,Politics, Business, Legal , Medical And Environment ,Need And Implementation Ethics-Goals-Ethical Values in Various Professions.

UNIT-II: Nature Of Values-Good and Bad, Ends and Means, Actual and Potential Values, Objectives and Subjective Values ,Analysis Of Basic Moral Concepts-rights, Ought, Duty, Obligation, Justice. Responsibility and Freedom. Good Behavior and Respect for Elders, Character and Conduct.

UNIT-III: Ahimsa (Non-Violence), Satya (Truth),Brahmacharya (Celibacy),Asteya (Non-possession) and APARIGRAHA (Non-stealing).Purusharthas (Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama(Fulfillment bodily desires).Moksha (Liberation)

UNIT-IV: Bhagavad Gita-(a) Niskama karma.(b).Buddhism-The four noble truths-Arya Astanga marga, (c) Jainisam- mahavratas and anuvratas. Values embedded in various religions, Religious tolerance, Gandhian ethics.

UNIT-V: Crime and Theories or punishment-(a) Reformative, Retributive and Deterrent ,(b) Views on manu and Yajnavalkya.

References:

1. R.Subramanian ,Professional Ethics, Oxford University Press.
2. Joha S Mackenjie:A Manual Of Ethics.
3. The Ethics of Management by Larue Tone Hosmer.Richard D.Irwin Lnc.
4. Management Ethics Integrity at Work by Joseph A.Petrick and John F.Quinn.Respons Books;New Delhi.
5. "Ethics in Management" By S.A.Sherlekar, Himalaya Publication House.
6. Harold H.Titus ; Ethics For Today.
7. Maitra,S.K;Hindu Ethics.
8. William Lilly;Introducation Ethics.
9. Sinha: A Manual of Ethics.
10. Manu:Manava Dharma Sastra or the Institute of Manu:Comparising the Indian System of Duties :Religious and civil (ed.) G.C.Halighton.
11. Susrpta samhita: Tr.Kaviraj Kunjanlal , Kunjalal Brishagratha .Chowkarnaba Sanskrit series. Vol LII and III , Varanasi , Vol I 00, 16'20,21-32 and 74-77 only.
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13. Ethics, Theory and contemporary issues.Barbara mackinnon wadsworth / Thomsaon learning, 2001.
14. Analyzing moral.issues,Judith A.Boss.May Field Publishing Company-1999.
15. An introduction to applied ethics(ed.)John H.Piet and Ayodhya Prasad.cosmo publications.
16. Text book for intermediate first year ethics and human values. Board of intermediate education-Telugu-academy, Hyderabad.
17. I.C.Sharma ethics philosophy of india. Nagin & co julundhar.

Course Outcomes:	
CO1.	Students mould themselves into systematic citizens.
CO2.	Student improves their Human Values and Ethics.
CO3.	Students learn the Moral Values, Self Control etc.
CO4.	Students develop their character and conduct.
CO5.	Students learn the importance of physical and mental health.
CO6.	Students come to know the adverse effects of usage of Alcoholic and other Narcotic drugs.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		3		2	2	2	3	3	1		3	
CO2		2		1	2	2	3	3	1		3	
CO3				2	2	2	2	3	3		3	
CO4				3	2	2	2	3	1		3	1
CO5	1			2	2	2	2	3			2	1
CO6	2		2		2	3	3		1		3	

SEMESTER – II		
Paper – 201	**MICRO ECONOMIC ANALYSIS – II**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i. To identify and explain economic concepts and theories related to the behaviour of economic agents, markets, industry and firm structures, legal institutions, social norms, and government policies.

ii. To integrate theoretical knowledge with quantitative and qualitative evidence in order to explain past economic events and to formulate predictions on future one.

iii. To evaluate the consequences of economics activities and institutions for individual and social welfare.

iv. To identify the basic features of alternative representations of human behaviour in economics.

Syllabus : ECO 201: MICRO ECONOMIC ANALYSIS – II

Unit 1: Modern Theories of the Firm

Baumol's Sales Revenue Maximization Model–Marris' Model of the Managerial Enterprise–Williamson's Model of Managerial Discretion–Bain's Limit Pricing Theory –Recent Developments in the Theory of Limit Pricing: The Models of Sylos-Labini–Franco Modigliani and Bhagawati.

Unit 2: Theories of Distribution

Theories of Distribution:- Ricardo, Karl Marx, Neo-Classical Theory(Marginal Productivity Theory) Kaldor-Factor Pricing in Perfect and Imperfect Competitive Markets–Adding up Problem and Euler's Theorem.

Unit 3: General Equilibrium

Meaning of Equilibrium–Static and Dynamic Equilibrium–Stable and Unstable Equilibrium – Partial and General Equilibrium – General Equilibrium of Exchange and Consumption–General Equilibrium of Production and Exchange–General Equilibrium and Relative Prices.

Unit 4: Welfare Economics

Pigovian Welfare Economics–Pareto-Optimal Conditions–Kaldor - Hicks Compensation Principle – Social Welfare Function – The Theory of Second Best.

Unit 5: Advanced Topics in Modern Micro Economics

Game Theory–Two Person Constant and Zero Sum Game–Linear Programming Graphical Solution - Input–Output Analysis–Static and Dynamic Models.

References

1. Koutsoyiannis, A., 1979, Modern Micro Economics, (2nd Edition), Macmillan Press, London.
2. Archibald, G.C. (Ed), 1971, Theory of the Firm, Penguin, Harmonds Worth.
3. Mishan, E.J. 1969, Welfare Economics: An Assessment, Noeth Holland, Amsterdam.
4. Green, H. and V.Waish, 1975, Classical and Neo Classical Theories of General Equilibrium, Oxford University Press, London.
5. Quirk. J. and R.Saposnik, 1968, Introduction to General Equilibrium Theory and Welfare Economics, McGraw Hill, New York.
6. Weintrub, E.R., 1974, General Equilibrium Theory, Macmillan, London.
7. Broadway, R.W. and N.Bruce, 1984, Welfare Economics, Basil Blackwell, London.
8. Pigou, A.C., 1920, Economics of Welfare, Macmillan and Co. London.
9. Little I.M.D., 1975, A Critique of Welfare Economics, (2nd Edition), Oxford University Press, Oxford.
10. Ahuja, L., 2000, Advanced Economic Theory: Micro Economic Analysis, S.Chand and Company, New Delhi.

Course Outcomes:
CO1. Make the students to have complete knowledge regarding theory of firm and

	pricing theories.
CO2.	Able to acquire knowledge regarding different types of cost and revenue, and about the interest and profits.
CO3.	Ability to understand and working of different kinds of factor and market equilibriums.
CO4.	To make students understand how the welfare and optimality in social welfare theories.
CO5.	To make the students in understanding of quantitative tools in microeconomics.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		3		2		2				3	3	
CO2			3	2		2			1	3		3
CO3		2		3						2	3	1
CO4	1		2					2		3	3	2
CO5		3		2						3	3	

SEMESTER – II		
Paper – 202	**MACRO ECONOMIC ANALYSIS – II**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i. To identify the determinants of various macroeconomic aggregates such as output, unemployment, inflation, productivity and the major challenges associated with the measurement of these aggregates.

ii. To discuss the linkage between financial markets and the real economy, and how these linkages influence the impact of economic policies over differing time horizons.

iii. To describe the main macroeconomic theories of short term fluctuations and long term growth in the economy.

iv. To critically evaluate the consequence of basic macroeconomic policy options under differing economic conditions within a business cycle.

Syllabus : ECO 201: MACRO ECONOMIC ANALYSIS – II

Unit 1: Demand for Money

The Classical View–Quantity Theory of Money–Keynes' Theory of Demand for Money–Post Keynesian Theories of Demand for Money: Tobin, Friedman and Baumol–Integration of Monetary Theory and Value Theory: Keynes and Don Patinkin.

Unit 2: Supply of Money

Concept of Money Supply–Components of Money Supply–RBI Approach to Money Supply–High Power Money and Money Multiplier–Changes in the Supply of Money.

Unit 3: Business Cycles

Types of Trade Cycles–Different Theories of Trade Cycles: Samuelson–Hicks and Kaldor–Control of Business Cycles: Monetary and Fiscal Policies.

Unit 4: Theories of Inflation

Types of Inflation: Demand–Pull Inflation–Cost-Push Inflation-The Phillips Curve–The Inflation and Unemployment Trade off–The Monetarists Accelerationists' Hypothesis– Rational Expectations Hypothesis.

Unit 5: Macroeconomics Policies

Objectives of Macro-Economic Policies–Objectives and Tools of Monetary Policy–Evaluating Monetary Policy: The Policy of Activists and Non-Activists Arguments–Fiscal Policy: Objectives and Tools–Automatic Stabilizers–Problems in the Implementation of Fiscal Policies–Relative Effectiveness of Monetary and Fiscal Policies.

References

1. Ackley, G., Macro-Economic Theory, Macmillan.
2. Branson, W.B., Macro-Economic Theory and Policy.
3. Branson, W.H. and Litvack, J.M.P., 1981, Macro Economics, Harper and Row.
4. Edward Shapiro, Macro economic Analysis, 5th Edition, New Delhi, Galgotia Publications.
5. Friedman, M.(ed). The Quantity Theory of Money – A Restatement of Studies in the Quantity Theory of Money.
6. Gupta, S.B., 1983, Monetary Economics, Chand and Co.
7. Hicks, J.R., Mr.Keynes and the Classicals: A Suggested Interpretation, Econometric, April, 1937.
8. Hicks, J.R., Critical Essays in Monetary Theory.
9. Johnson, H.G., Essays in Monetary Economics.
10. Lila J.Truett and Dale B.Truett, Macroeconomics, Times Mirror/ Mosby College Publishing St. Louis.
11. Rosalind Levacic and Alexander Rebthann, 1982, Macroeconomics : The English Language Book Society and Macmillan.
12. Rogar L.Miller and Robert Pulsinelli, Macroeconomics.

Course Outcomes:
CO1. Acquire knowledge and understand the classical and Keynes theories and functions of money and demand for and supply of money.

CO2.	Able to acquire the knowledge about government's intervention in money supply.
CO3.	Able to understand meaning and definitions of trade cycle its phases, consequences and controlling measures.
CO4.	Acquire knowledge regarding macroeconomic concept of inflation, deflations and how it can be controlled.
CO5.	Able to know the particular solutions to the economic functions like Monetary and Fiscal policies.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2		3						3	3	2
CO2			2	2					2	2	3	1
CO3	2	2		3					1	3	3	1
CO4			3			2			1	2	3	
CO5		1	2	2						2	2	2

SEMESTER – II		
Paper – 203	**FEDERAL FINANCE**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . The first objective is study the role of state in economic performance, objectives and role of fiscal policy.

ii. The second one is to study the principles of Multi-unit finance and problem of Federal Finance.

iii. Third objective is to know a comparative analysis with the Indian scenario and various functions of finance commission and recommendations.

iv. The fourth one is to analyse the theories of Government budgetary ie. classical and modern view on Government budget in India.

v. The last objective is to study the significance of local finance, sources of local revenue and expenditure of local bodies.

Syllabus : 203: FEDERAL FINANCE

Unit 1: Fiscal Policy

Role of State in Economic Performance: Classical and Modern Views-Objectives of Fiscal Policy –Role of Fiscal Policy in Developed and Developing Economies– Balanced and Unbalanced Budget Multipliers–Built-in Stabilisers-Long–Term Fiscal Policy in India.

Unit 2: The Theory of Federal Finance

Principles of Multi-Unit Finance and Problems of Federal Finance-Theory of Fiscal Federalism-Vertical and Horizontal Imbalances-Theory of Grants-Conditional and Unconditional Grants – Matching Vs. Non-Matching Grants–Income and Substitution Effects of Grants–Grants and Subsidies– Allocative and Equity Effects.

Unit 3: Federal Fiscal Systems

Federal Fiscal Relations in Australia, Canada and USA – A Comparative Analysis with the Indian Scenario. Functions of Finance Commission-Recommendations and Approaches of the Thirteenth and Fourteenth Finance Commissions-Reforms of Federal Finance.

Unit 4: Government Budget

Theory of Government Budgeting: Classical and Modern Views-Budget Classification: Functional and Economic Classification-Programme and Performance Budgeting-Zero-Based Budgeting-Budget Reforms – Fiscal Crisis in India – Reforms to Control Revenue Deficit-Fiscal Deficit and Budgetary Deficit in India.

Unit 5: Local Finance

Significance of Local Finance–Revenue and Expenditure of Local Bodies-Financial Strengthening of Urban and Rural Local Bodies through Devolution of Funds from Central and State Governments.

References

1. Musgrave R.A.and Musgrave P.B., 1976, Public Finance in Theory and Practice, McGraw Hill, Tokyo.
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3. Chellaiah Raja, J., 1971, Fiscal Policy in Under Developed Countries with Special Reference to India, George Allen and Unwin, London.
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15. Phillips A and O.E. Williamson (Eds), 1967 Prices, Issues in Theory. Practice and Public Policy, University of Pennsylvania Press, Philadelphia.
16. Economic Surveys, Government of India, New Delhi.

Course Outcomes:
CO1. Students know about the fiscal and monitory role in the financial activities of the government.
CO2. They learn the importance of the various finance commissions of the government.
CO3. Students know the various fiscal Monitory tools to control the fluctuation in the economic system.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1	2	2		3		1			2		1	2
CO2			2	3		2	1			3		3
CO3			3			2				2		3

SEMESTER – II		
Paper – 204	**STATISTICAL METHODS IN ECONOMICS**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives::		

i . To develop the students to deal with numerical and quantitative issue in Economics.

ii. To enable the use of statistical graphical and algebraic techniques wherever relevant.

iii. To have proper understanding of statistical applications in economics.

Syllabus : 205: STATISTICAL METHODS IN ECONOMICS

Unit-I: Correlation and Regression

Meaning - Assumptions and Limitations of Simple Correlation, Karl Pearson Coefficient of Correlation and Spearman's Rank Correlation-Coefficient– Simple Regression – Lines of Regression and Properties of Regression Coefficient.

Unit-II: Probability and Theoretical Distributions

Concept of Probability – Various Types of Events: Classical and Empirical Definitions of Probability – Laws of Addition and Multiplication of Probability (statements only) – Conditional Probability – Theoretical Distributions – Binomial – Poisson and Normal Distributions.

Unit-III: Sampling Theory

Basic Concept of Sampling-Random and Non-Random Sampling–Simple Random – Stratified Random – Systematic and P.P.S. Sampling Techniques.

Unit-IV: Hypothesis Testing

Formulation of Statistical Hypotheses – Null and Alternative – Goodness of Fit – Confidence Intervals and Level of Significance – Hypothesis Testing based on t, X^2 (Chi-Square) and F-tests.

Unit-V: Index Numbers and Time Series

Concept of Index Numbers–Uses and Construction of Index Numbers–Simple and Weighted Index Numbers – Laspeyer's, Paasche's and Fisher's Methods - Tests for Ideal Index – Time Series Analysis – Components of Time Series – Determination of Trend – Least Square Method.

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4. Guptha, C.B., 1981, Statistical Methods, Vikas Publishing House, New Delhi.
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Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	Understanding concepts of different types of correlation and Regression. By using correlation to identify the strength and direction of relationship between variables and using regression to predict how much a dependant variable changes based on adjustment to an independent variable.

CO2.	Understanding the concepts of probability, various types of Events, Definitions, Laws and its applications.
CO3.	Understanding the concepts of sampling –various types of sampling and its application in the field of research and daily life.
CO4	Understanding the concepts of statistical hypothesis null and alternative – goodness of fit; goodness fit and hypothesis testing based on t, x^2 and f Tests.
CO5	Understanding various components of Time Series fitting different time series models –predicting future values of time series. Understanding various methods of indexes and apply them to solve practical problems.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2	2	3						3	3	
CO2	2	2		2						2	3	
CO3	2	2	1	3						2	3	
CO4	1	2	2	3		2				2	3	
CO5		3		2						3	3	1

SEMESTER – II		
Paper – 205 (a)	**International Trade: Theory and Policy**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To apply the concepts, tools and techniques of microeconomics to understand the issues in international economics;

ii. To expose the students to the pure, modern and alternative theories of international trade which form the basis for the current wave of globalization;

iii. To understand the emerging trends in the proliferation of Regional Free Organizations and their effect on the Multilateralism being advocated by WTO

SYLLABUS : 204: INTERNATIONAL TRADE: THEORY AND POLICY

Unit-I: Theories of International Trade

The Pure Theory of International Trade –Theories of Absolute Advantage and Comparative Advantage – Empirical Testing of Theories – Heckscher – Ohlin Theory of Trade – Leontief Paradox – Factor Price Equalization Theorem.

Unit-II: Imperfect Competition and International Trade Intra – Industry Trade – Neo-Heckscher – Ohlin Model – Neo–Chamberlin Model –Kravis and Linder Theory of Trade–Role of Dynamic factors in Trade (Alternative Theories of Trade) Vent for Surplus – Availability, Changes in Tastes, Technology.

Unit-III: Terms of Trade and Gains from Trade

Concepts of Terms of Trade – Terms of Trade and Economic Growth–Model of Economic Growth and International Trade–Singer–Prebisch Theory and Terms of Trade–Rybenzynski Theorem – Immiserizing Growth.

Unit-IV: Theory of Trade Policy

Free Trade Vs. Protectionism –Trade Restrictions – The Theory of Tariffs – The Stopler-Samuelson Theorem - Tariffs and Income Distribution – Tariffs - The Terms of Trade and Domestic Prices – Political Economy of Non-Tariff Barriers – Effects of Quotas – FERA and FEMA – Import Substitution Vs. Export Promotion.

Unit-V: International Economic Integration

Forms of Economic Co-operation – Free-Trade Area – Customs Union – Common Market – Economic Unions – European Union – SAARC – ASEAN – International Monetary Fund – Regionalism – Multilateralism – World Trade Organization – Recent Issues at WTO Ministerial Conferences - Gains and Problems of Developing Countries from WTO.

References:

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2. Bhagwathi, J.N. and Panagaria., Lectures on International Trade.
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4. Haberler, G., Theory of International Trade.
5. Johnson, H.G., New Trade Strategy for the World Economy.
6. Kindelberger, C.P., International Economics.
7. Lipsey, R.G., Theory of Customs Union.
8. Meade, J.E., Balance of Payments.
9. Michaely, Theory of Commercial Policy.
10. Sodersten B.O. and Reed, G. International Economics.
11. Salvactore, D., International Economics.
12. W.T.O., Regionalism and the World Trade Systems.

Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	Explain the gains from international trade according to the Classical and Modern theories of international trade;
CO2.	Apply the knowledge on imperfect competition to determine the current structure of international trade;
CO3.	Evaluate the relevance of free international trade to suit the special conditions of the developing countries;
CO4.	Analyse the impact of restrictive trade policies on the terms of trade, income distribution and welfare levels of the countries;
CO5.	Assess, compare and contrast the emerging trends in the growth of RTOs (Regionalism) and the policies of IMF and WTO on Multilateralism.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2		3	2						2	3
CO2			2		3	1	1			2	2	3
CO3		1		3	2	1	1		1	2		3
CO4			1	3	1	1	1		1	2	3	
CO5		2	2	2	1	1		1	1	3	1	3

SEMESTER – II		
Paper – 206	**HUMAN VALUES AND PROFESSIONAL ETHICS - II**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . Students can learn value of education, structure and responsibilities of family, status of women in family and society.

ii. To analyse the medical ethics, moral responsibility of medical practitioners and Social Justice in health care.

iii. To know the environmental ethics, ecological crisis, self-control, pollution, climate change and environmental health.

To study the business ethics, characteristic of ethical problem in business.

iv. The fith objective is to study the social ethics such as social disparities, Human trafficking, ethics of media i.e impact of Newspaper, Television etc.

Syllabus : 206: HUMAN VALUES AND PROFESSIONAL ETHICS - II

UNIT-I: Value Education –Definition-Relevance to present day-Concept of Human Values-self introduction-self-esteem-family values-Components , Structure and responsibilities of family-Neutralization of anger-Adjustability-Threats of family life –Status of women in family and society –Caring for need elderly –Time allotment for sharing ideas and concerns.

UNIT-II: Medical ethics-Views if charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia ,ethical obligation to animals, ethical issues

in relation to health care professional patients. Social justice in health care , human cloning , problems of abortion .Ethical issues ingenetic engineering and ethics issues raised by new biological technology of knowledge.

UNIT-III: Business ethics – Ethical standards of business-immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories causes of unethical behavior , ethical abuses and work ethics.

UNIT-IV: Environmental Ethics- Ethical Theory , man And Nature- Ecological Crisis , Pest Control , Pollution and Waste , Climate Change, Energy and Population, Justice and Environmental Health.

UNIT-V: Social ethics – Organ trade. Human trafficking, Human rights violation and social disparities, Feminist ethics. Surrogacy / pregnancy, Ethics of media-Impact of newspapers, Television , Movies and Internet.

References:

1. Joha S Mackenjie:A Manual Of Ethics.
2. The Ethics of Management by Larue Tone Hosmer.Richard D.Irwin Lnc.
3. Management Ethics Integrity at Work by Joseph A.Petrick and John F.Quinn.Respons Books;New Delhi.
4. “Ethics in Management” By S.A.Sherlekar, Himalaya Publication House.
5. Harold H.Titus ; Ethics For Today.
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15. Text book for intermediate first year ethics and human values. Board of intermediate education-Telugu-academy, Hyderabad.
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Course Outcomes:												
After successful completion of this course, the students will be able to												
CO1.	Students can be able to improve their efficiency and capabilities and get the employment opportunities.											
CO2.	They will improve their skills and talents in various fields.											
CO3.	Students will strive to achieve the self-driven and work ethics in jobs in various sectors.											
Mapping of Course Outcomes with Programme Outcome												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1	2	1	2		1	2	2	2	2	3	3	
CO2	1	1	2	1	1	2	2	2	1	2	3	
CO3	1		2		2	2	2	3	1	2	1	1

SEMESTER – III		
Paper–301	**ECONOMICS OF GROWTH AND DEVELOPMENT**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To familiarize the students with the key concepts such as economic growth, economic development, Human Development, Inclusive Development and Sustainable Development;

ii. To make the students to understand the basic determinants of economic growth, economic development and other related processes;

iii. To expose the students to the Classical and Modern theories of economic growth especially those relevant to the conditions of the developing countries.

Syllabus : ECO 301: ECONOMICS OF GROWTH AND DEVELOPMENT

Unit-I: Economics of Growth and Development

Concepts of Economic Growth, Development and Under development – Measurement of Economic Growth and Development – Traditional, Welfare and Modern Approaches –Characteristics of Developing Economies.

Unit-II: Factors in Economic Development

Population and Economic Development – Optimum Theory of Population – The Theory of Demographic Transition – Role of Capital in Economic Development – Capital -Output Ratio - Technology in Economic Development - Choice of Techniques and Appropriate Technology.

Unit-III: Theories of Growth

Adam Smith, Ricardo, Karl Marx and Schumpeter – Joan Robinson's Golden Age Model-Harrod-Domar Models, Solow and Meade's Models.

Unit-IV: Strategies of Economic Development

Rostow's Stages Theory – Lewis Surplus Labour Theory – Rodan's Big Push Theory – Nurkse's Balanced Growth Theory – Hirschman's Unbalanced Theory – Leibenstein's Critical Minimum Effort Theory – Nelson's Low Level Equilibrium Trap.

Unit-V: Theories of Dualism

Dualism and Dualistic Economy – Dualistic Theories - Boeke Theory of Sociological Dualism – Higgins Theory of Technological Dualism - Fei and Rani's Dualistic Model.

References:

1. Adelman, I, 1961, Theories of Economic Growth and Development, Stanford University Press, Stanford.
2. Kindleberger, C.P, 1977, Economic Development, McGraw Hill, New York.
3. Higgins, B, 1959, Economic Development, W.W.Norton, London.
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10. Ghatak, S. 1986, An Introduction to Development Economics, Allen and Unwin, London.
11. Behrman.S and T.N. Sreenivasan, 1995, Hand book of Development Economics, vol.3 Elsevier Amsterdam.

Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	Distinguish between economic growth and economic development and the evolution of the measurement of Development over the period of time;
CO2.	Identify the determinants of Economic Development and the choice of techniques to be opted to achieve economic development in developing countries;
CO3.	Analyse the factors that could promote economic growth in a country according to Classical and Neo-Classical economists;
CO4.	Evaluate the suitability of different Strategies of Economic development to achieve economic development in developing countries;
CO5.	Assess how the sociological and technological dualisms have retarded the growth process in developing countries.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2		2						2	3	1
CO2	1			3			1		1	2	2	
CO3	1	2		2	1					2	3	
CO4		2	1	3					1	2	2	1
CO5	1		2	1				1		1	2	1

SEMESTER – III		
Paper – 302	**INDIAN ECONOMY**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To explain and apply key development economic growth theories, economic development theories.

ii. To analyse and describe the features of less developed economics.

iii. To analyse and describe significant policy options available to government and international organization to address economics development challenges.

iv. To develop analytical and critical thinking sills and use them to judge the appropriateness of economic development policy options.

v. To identify and appraise economic development policy failures, and suggest adjustments or alternatives.

Syllabus : ECO 302: INDIAN ECONOMY

Unit-I: Basic Structure of Indian Economy

Characteristics of Indian Economy – Structure of National Income - Human Resources – Occupational Structure – Economic Sectors and Contribution to Employment Generation and GDP – Recent Trends in Poverty and Unemployment.

Unit-II: Agricultural Sector

Role of Agriculture in Economic Development – Green Revolution – Concept of Food Security – Farm Size and Productivity – Irrigation and Agricultural Development – Livestock Resources – Need for Credit for Indian Farmers – Performance of Indian Agriculture in Five Year Plans.

Unit-III: Industrial Sector

Role of Industrial sector in Economic Development–Industrial Policy–1991 – Role of Public and Private Sectors – Micro, Small Medium Enterprises (MSMEs) - Growth of Large Scale Industries and Economic Development - Disinvestment Programe – Liberalization, Privatization and Globalization (LPG) and Industrial Development.

Unit-IV: Service Sector

Service Sector in Indian Economy–Performance of Trade – Tourism–Shipping and Port Services–Telecom and Related Services–IT and IT-enabled Services– R & D Services– Construction Services – Social Services – Performance of Service Sector during Five Year Plans.

Unit-V: Economic Reforms

Rationale of Internal and External Reforms – Globalization of Indian Economy - W.T.O. and Impact on the Different Sectors of Indian Economy – Need for and Issues in Good Governance – Issues in Competition and Safety Nets in Indian Economy.

References:

1. Ahluwalia, I.J. and I.M.D. Little (Eds,), 1999, India's Economic Reforms and Development (Essays in Honour of Manmohan Singh), Oxford University Press, New Delhi.
2. Bardhan, P.K. (9th Edition), 1999, The Political Economy of Development in India. Oxford University Press, New Delhi.
3. Bawa, R.S. and P.S. Raikhy (Ed.), 1997, Structural Changes in Indian Economy, Guru Nanak Dev University Press, Amritsar.
4. Brahmananda, P.R. and V.R. Panchmukhi (Eds.), 2001, Development Experience in the
   Indian Economy: Inter-State Perspectives. Bookwell, Delhi.
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9. Jain, A.K., 1986, Economic Planning in India, Ashish Publishing House, New Delhi.
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11. Jalan, B., 1996, India's Economic Policy Preparing for the Twenty First Century, Viking,
New Delhi.
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16. Sen, R.K. and B.Chatterjee, 2001, Indian Economy: Agenda for 21st Century (Essays in Honour of Prof. P.R.Brahmananda), Deep & Deep Publications, New Delhi.

Course Outcomes:
upon successful completion of this course, students should have
CO1. Engage in critical thinking through the comparative assessment of competing Economics development models and policy frameworks.
CO2. Able to articulate pragmatic, principles-based policies to enhance economic well-being and promote social justice.
CO3. Able to understand about demography and its recent trends including population policy.
CO4. Able to understand regarding the current structure of Indian economy likes National Income, Poverty and Unemployment etc.
CO5. Analyse new economic policies (privatization, liberalization and globalization) in India.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1	1	2		2		2			1	2		3
CO2	1	2	1	2		1	1		1		1	3
CO3	1		3	1			1		1	2	1	3
CO4		2	1	2		1			2	2	1	3
CO5		2	1	2			1	1		2		3

SEMESTER – III		
Paper – 303	**ECONOMICS OF ENVIRONMENT**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To familiarize the students with nature and scope of Environmental Economics;

ii. To create awareness on Non-renewable and renewable resources and the need for effective utilization of resources;

iii. To analyse the causes, effects of environmental pollution and strategies for effective management of environmental resources to ensure sustainable development.

Syllabus : ECO 303: ECONOMICS OF ENVIRONMENT

Unit-I: Nature and Scope of Environmental Economics

Environmental Economics – Nature and Scope of Environmental Economics- Economic Growth and Environmental Degradation-Environmental Kuznets Curve - Limits to Growth-Sustainable Development - Environmental Quality and Economic Development.

Unit-II: Environmental Degradation and Resource Depletion

Natural Resources – Renewable and Non-renewable Resources - Approaches to Natural Resources – Theories of Natural Resources–Depletion of Resources – Tragedy of Commons - Causes for Environmental Degradation.

Unit-III: Sources and Effects of Pollution

Sources and Types of Pollution: Air, Water, Noise and Solid Waste Pollution – Industrial Pollution – Marine Pollution – Thermal Pollution – Nuclear Pollution – Urban Pollution – Effects of Environmental Pollution on Health, Economic and Social Aspects.

Unit-IV: Environmental Policy and Principles

Objectives of Environmental Policy – National Environment Policy, 2006 – Policy Measures to Control Environment Pollution – Polluter-Pays-Principle– Pigovian Analysis of Externalities – Taxes and Subsidies – Pollution Permits – Hedonic Pricing Principle.

Unit-V: Environmental Laws and Management Strategies

Environmental Laws and Regulations – Air Act, Water Act, Environment Protection Act and Wildlife Protection Act in India – Global Environmental Policies – International Conferences on Environment-Environmental Strategies: Development of Clean Production Technologies, Forest Conservation, Conservation and Management of Common Property Resources and Environmental Education – Social Forestry–Community Participation.

References:

1. Baumol, W.J. and W.E. Oates (1987), "Theory of Environment Policy" – Cambridge University Press, Cambridge.
2. Dales. J.H.(1968), Pollution, Property and Prices:- Toronto University Press, Toronto.
3. David Pearce. W.D(1998), "Economics and Environment–Essays on Ecological Economics and Sustainable Development"-Edward Elgar Publishers Ltd. UK.
4. Karpagam, M.(2006), "Environmental Economics"-Sterling Publishers Private Ltd, New Delhi.
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6. Rabindra N. Battacharya (2001), "Environmental Economics–An Indian Perspective"-Oxford University Press, New Delhi. \
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11. World Commission on Environment and Development (1987) "Our Common Future"- Oxford University Press, Oxford.
12. World Bank (1992), "World Development Report".

Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	Define Environmental Economics and explain the relationship between per capita income and environmental quality in terms of Kuznets curve;
CO2.	Discuss the theories of Natural Resources and causes of depletion of natural resources;
CO3.	Analyse the causes and consequences of environmental pollution;
CO4.	Evaluate the relative desirability of different principles and policies suggested by the economists to mitigate the ill-effects of environmental pollution.;
CO5.	Assess the effectiveness of different International and National Laws and Acts in controlling the environmental pollution.

Mapping of Course Outcomes with Programme Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS1	PS2
CO1	1	1		2					2	1	3	
CO2		2		2					2	2	2	1
CO3		2	1	2					2	2	2	1
CO4	1	1	2	1					2	1	2	1
CO5		1	2	2					2	2	2	2

SEMESTER – III		
Paper– 304(a)	INTERNATIONAL FINANCE	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To make the students to understand the key issues of deficit, causes deficit and methods of adjustment in balance of payments;

ii. To inculcate the knowledge on the concept of foreign exchange, determination of foreign exchange rates and causes of fluctuations in foreign exchange rates;

Syllabus : ECO 304(a): INTERNATIONAL FINANCE

Unit-I: Balance of Payments

Balance of Payments – Measurements of Balance of Payments – Measuring Deficit or Surplus in Balance of Payments - Causes of Deficit in Balance of Payments.

Unit-II: Adjustment Mechanisms in Balance of Payments

Automatic Price Adjustment under Gold Standard – Classical Theory of Balance of Payments – The Elasticity Approach – The General Theory of Balance of Payments - The Monetary approach of Balance of Payments and Foreign Trade Multiplier.

Unit-III: Foreign Exchange Market

Meaning and Determination of Foreign Exchange Rate – The Mint Parity Theory – The Purchasing Power Parity Theory – The Balance of Payments Theory – Causes of Changes in the Exchange Rate-Exchange Rate Adjustment Policies**:** Fixed Exchange Rate – Flexible Exchange Rate–Adjustable Peg System – Crawling Peg System – Multiple Exchange Rate System – Spot and Forward Exchange Equilibrium.

Unit-IV: International Capital Movements

Types of International Capital Movements–International Development Agencies; International Finance Corporation (IFC) - International Development Association (IDA) - The Multinational Investment Guarantee Agency (MIGA) - Euro-Dollar Market – The International Debt Management and Developing Countries.

Unit-V: The International Monetary Problem

The International Liquidity Problem – Establishment of IMF – Role of IMF – India and IMF – SDRs –The World Bank – Breakdown of Bretton woods System – Present Monetary System.

References

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9. Fleming, M.J., Domestic Financial Policies under Fixed and under Gloating Exchange Rates, IMF, Staff Papers, Nov, 1962.
10. Bilson, J., The Monetary Approach to the Exchange Rates-Some Empirical Evidence, IMF, Staff Papers, March, 1978, PP.48-75.

Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	Define various concepts and accounts associated with the Balance of payments;
CO2.	Describe various automatic and policy induced adjustment methods available to bring about equilibrium in the balance of payments;
CO3.	Explain various terms associated with the foreign exchange rates and analyse the relative merits and demerits of the systems of Fixed and Flexible Exchange rates systems;
CO4.	Analyse the trends in the international capital movements and the functioning of different international financial institutions;
CO5.	Critically evaluate the working of the International Monetary System and the functioning of World Bank and IMF.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2	2	2						2	3	
CO2		2	2	1	1	1				1	2	
CO3	1	2	1	2						2	3	
CO4	1	2	1	2						1	2	
CO5	1	2	2	1						2	1	2

SEMESTER – III		
Paper– 304(b)	**AGRICULTURAL ECONOMICS**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To import knowledge on role of agriculture sector in Economic development and structural changes and contribution of Agriculture sector to the country economy.

ii. Provide orientation to the students regarding Development of Agriculture sector during post-independence period, Targets and achievement during five year plans and India's position in World Agriculture.

iii. Expose the students to the factors determine Growth Capital formation in Agricultural Sector and inflow of credit to Agricultural Sector.

iv. To import knowledge on Government initiation and development of Agriculture.

v. Enhancing expertise in improving the performance of the marketing institutions and layers in marketing of Agricultural commodities.

Syllabus : ECO 304(b): AGRICULTURAL ECONOMICS

Unit –I: Agriculture and Economic Development

Definition, Nature and Scope of Agricultural Economics – Role of Agriculture sector in Economic Development – Structural changes and Contribution of Agriculture Sector — Modernisation of Agricultural Production Systems – Global Hunger Index – Achieving Zero Hunger – Re-orientation of Agricultural Development- Sustainable Agriculture- Role of Women in Agricultural Development.

Unit –II: Agriculture Sector in India

Development of Agriculture sector during Post-Independence Period –Green Revolution - Trends in Growth of Gross Cropped Area and Gross Irrigated Area – Decreasing Size of Average Land Holdings – Area, Production and Yields of Principal

Crops- Targets and Achievements during Five Year Plans – India's Position in World Agriculture.

Unit –III. Investments in Agriculture Sector in India

Factors Determining Gross Capital Formation in Agriculture Sector – Trends during Five Year Plans – Share of Public and Private Sectors – Budgetary expenditure on Agriculture sector – Inflow of FDI into Agriculture sector- Sources and Trends in flow of Credit to Agriculture – Kisan Credit Cards – Credit for Rain fed Areas – Indebtedness of Agricultural Households .

Unit – IV: Government Initiatives and Development of Agriculture

Need for Improvement in Agricultural Productivity- Government Initiatives – National Food Security Mission (NFSM)- National Mission for Sustainable Agriculture (NMSA) and Agricultural Extension and Technology – National Crop Insurance Programme – Pradhan Mantri Fasal Bima Yojana- Rashtriya Krishi Vikas Yojana – Rain fed Area Development Programme.

Unit- V: Agricultural Marketing and Trade in India

Determinants of Marketable and Marketed Surplus – Structure of Agricultural Markets – Primary and Secondary Wholesale Markets- Terminal Markets – Retail Markets – Fairs – Nature of Markets – Group Marketing- Cooperative Marketing – Direct Marketing – Warehousing in Rural areas – Physical and Financial Performance of Grameen Bhandaran Yojana – Role of AGMARK and AGMARKNET- Exports and Imports of Agricultural Commodities

References:

1. Bilgrami, S.A.R. (1996) Agricultural Economics, Himalaya Publishing House, New Delhi
2. FAO (2002) World Agriculture Towards 2015/30: Summary Report, Rome
3. FAO (2015) The State of Agricultural Commodity Markets: Trade and Food Security, Rome.
4. FAO (2015) The State of Food Insecurity in the World, Rome
5. Global AgriSystem Private Limited: Evaluation and Impact Assessment for the Central Sector
6. Scheme of Grameen Bhandaran Yojna, Submitted by Global AgriSystem Private Limited to Directorate of Marketing and Inspection, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.

7. Government of India (2012) Twelfth Five Year Plan (2012–2017) Economic Sectors,Volume II Agriculture, Planning Commission, New Delhi, Published by Sage Publications.

8. Government of India (2015) Annual Report-2014, Ministry of Agriculture and Cooperation, New Delhi

9. Government of India (2015) Agricultural Statistics at a Glance 2014, Ministry of Agriculture

10. Department of Agriculture & Cooperation Directorate of Economics & Statistics, New Delhi, Oxford.

11. Government of India (2015) Pocket Book of Agricultural Statistics-2015.

Course Outcomes:

After successful completion of this course, the students will be able to

CO1.	Understanding scope of Agriculture Economics – Role of Agriculture in Economic Development- changes and contribution of Agriculture sector and Role of Women in Agricultural Development.
CO2.	Understanding the development of Agriculture Sector Post independence period – trends in area production and productivity and India's position in World Agriculture.
CO3.	Understanding the disbursement of institutional finance to primary sector, credit management and risk management. Other agencies – reasons for indebtedness in Agricultural Households.
CO4.	Understanding the need for improvement in Agricultural Productivity – various programmes adopted by the Government for the improvement of Agricultural productivity.
CO5.	Understanding the role, mechanism and value of commodity future markets for price risk management and price discovery in Indian Commodity Markets.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2	2	1			1			2	1	3
CO2	1	2	2	2			1			2	1	3
CO3	1		2	1					2	1	1	3
CO4			3	1			1		1	2	1	3
CO5	1	1	2	2					1	2	1	3

SEMESTER – III		
Paper– 304(c)	DEMOGRAPHY	Credits -04
Sessional / Internal Marks : 20	End Semester Exam Marks : 80	
Objectives:		

i . The first objective to know the Nature and scope of Demography theories of population such as Adem Smith J.S. Mill Mattur, Max and Keynes.

ii. To study the composition and distribution of population in India and Urban-Rural population growth.

iii. To analyse the Facility, Mortality, Nasality, and Migration in India.

iv. The fourth objective is to learn determinants of quality of population in India and to know the structural changes in population.

v. The last objective is to study the Government inittatives and population policies in India.

Syllabus : ECO 304(c) – DEMOGRAPHY

Unit-I: Nature and Scope of Demography

Definition, Nature and Scope of Demography – Demographic Thoughts – Demographic Analysis – Direct and Indirect methods of data collection – Theories of Population – Adam Smith, J.S. Mill, Malthus, Marx, Meade and Keynes – Optimum Population.

Unit –II: Composition and Distribution of Population in India

Decennial growth of Population and Stages of Demographic Transition in India- Crude Birth Rate and Death Rates – Migration, industrialization and Urbanization as determinants of population growth – sex and age-wise distribution of population – Rural and Urban population growth – Religion and Caste-wise growth of Population – Trends in population density.

Unit-III: Fertility, Mortality and Migration in India

Size of the family- Urban and Rural differentials- Social, cultural and psychological factors affecting fertility – Achievements in Total Fertility Rates - Causes and Indicators of Mortality – Relation between age, sex, marital status, education and migration in India.

Unit – IV: Quality of Population in India

Determinants of Quality of Population in India – Structural changes in Population – Demographic dividend - Trends in Life Expectancy at Birth and Gender differentials – Trends in Achieving Literacy Rates- Gender dimension of Literacy rates – Trends in Workforce and Labour force Participation Rates- Sectoral Employment of workers – Formal and Informal Sectors - Need for Skill Development.

Unit-V: Government Initiatives and Population Policies in India

Need for Population Control and Stabilization – Strategies to achieve Population stabilization – Role and progress of Family Planning Programme – Two-child Policy — Highlights of National Population Policy- 2000 – Janani Suraksha Yojana -2005 – Role of Accredited Social Health Activists (ASHA) – SANTUSHTI AND PRERANA Strategies – Rashtriya Kishore Swasthya Karyakram -2014- Population Projections-2016 and 2026.

References:

1. Agarwala, S.N. (1972) India's Population Problem, Tata McGraw Hill , Bombay
2. Alok Ranjan Chaurasia and Ravendra Singh (2012) 40 Years of Planned Family Planning Efforts in India
3. Bogue ,J Donald , D.J. (1971) Principle of Demography, John Wiley , New York
4. Bose ,A. (1996) India's Basic Demographic statistics, B.R. Publishing corporation, New Delhi
5. Edward G. Stockwell and Associates (1976) The Methods and Materials of Demography, Academic Press, New York

6. FICCI and Ernst and Young (2012) Knowledge paper on Skill Development in India –Learner First Government of India (2009) Compendium of Selected Indicators of Indian Economy, Vol.II- Key Economic Indicators (Demography), Ministry of Statistics and Programme Implementation, New Delhi.
7. Government of India (2014) Report on Education, Skill Development and Labour force, (2013-14) –Vol. III, Ministry of Labour and Employment, Chadigarh.
8. Government of India (2014) Five Years (2009-14)-Achievements and New Initiates, Ministry of Health and Family Welfare, New Delhi .

Course Outcomes:
After successful completion of this course, the students will be able to
CO1. Students can be able to study the evaluation of population policy in India.
CO2. Students get the awareness on women employment family planning child health and women health.
CO3. Students can be able to create awareness our population control which leads to the rapid economic growth and development of the country.

Mapping of Course Outcomes with Programme Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS1	PS2
CO1		2	2	3						2	3	
CO2	1	2						1	1			3
CO3		2	2	3		1			1	2	1	3

SEMESTER – III

Paper– 304(d)	**HUMAN RESOURCE DEVELOPMENT**	**Credits -04**
Sessional / Internal Marks : 20		**End Semester Exam Marks : 80**
Objectives:		

i . To study the nature and scope of HRD in developed and developing countries.

ii. To analyse the role of education in HRD and Economics Development.

iii. To know the Health and Economic development.

iv. The fourth objective is to know the nutritional status in India, Nutritinal status and to prevent Malnutrition in India.

Syllabus : ECO 304(d): HUMAN RESOURCE DEVELOPMENT

Unit-I: Nature and Scope of HRD

Nature and Scope of Human Resource Development – Factors influencing HRD – HRD in Developed and Developing Countries - Human Resource Development in India – HRD and Development Strategy.

Unit-II: Education and HRD

Role of Education in Human Resource Development – Education as Consumption and Investment – HRD and Economic Development.

Unit-III: Health and Human Resource Development

Health and Economic Development – Measurement of Health Status –Trends in Mortality and Morbidity - Population Growth and Health Status – Growth of Corporate Health in India.

Unit-IV: Nutritional Status, and Human Resource Development

Nutritional Status in India – Measurement of Nutritional Status – Nutritional Development - Food Security - Programmes to Prevent Malnutrition in India.

Unit-V: HRD and Human Values:

HRD and Human Values – Human Development and Pre and Post Gandhian Thought – Right to Work and Public Participation.

References:

1. Baru, R.V., 1998, Private Health Care in India – Social Characteristics and Trends, Sage Publications, New Delhi.
2. Becker, G.S., 1974, Human Capital (2nd Edition), National Bureau of Economic Research,
   New York.
3. Behrman J.R., 1990, Human Resource Led Development? Review of Issues and Evidence,
   ILO-ARTEP, New Delhi.
4. Berman, P. and Khan, M.E., 1993, Paying for India's Health Care, Sage publications,
   New Delhi.
5. Blaug, M. and Layard, P.R.G, Causes of Graduate Unemployment in India.
6. Carrin, Guy, 1984, Economic Evaluation of Health Care in Developing Countries: Theory
   and Applications, London.
7. Chandra Sekhar, S., Sanjeeva Reddy, P.C. and Ram Gopal, 1989, Towards 2000 A.D. – Indian Health Economy and Policy, Chugh Publications, New Delhi.
8. Cooper, M.H. and A.J. CCulyer (Eds.), 1973, Health Economics Middle Six, Penguin Books.
9. Govt. of India, 1983, National Health Policy, New Delhi.
10. Harbison, Fredrick and Myers, Charles, A.,2002, Education, Manpower and Economic Growth: Strategies of Human Resource Development, McGraw Hill.
11. ICSSR, 1981, Health for All by 2000 A.D., New Delhi.
12. Krishna Kumar, T. and Rao, K.K., 1987, Financing of Health Services in India. Perspectives and Issues, University of Hyderabad, Hyderabad.
13. Nalla Gounden, A.M., 1978, Education, Employment and Earnings, University of
    Madra, Madras.

14. Padmanabhan, C.B., 1984, Financial Management in Education, Select Books, New Delhi.
15. Premi, M.K., 1972, Educational planning in India, Sterling Publishers, New Delhi.
16. Schultz, T.W., 1971, Investment in Human Capital, Free press, New York.
17. Tilak, J.B.G., 1994, Education for Development in Asia, Sage Publications, New Delhi.
18. UNIDO-Human Development Reports from 1990 to 2005.
19. Woodhall, M., 1992, Cost Benefit Analysis in Educational Planning, UNESCO, Paris.
20. World Bank, The World Development report, 1993 – Investing in Health, Oxford University Press, New York.

Course Outcomes:
After successful completion of this course, the students will be able to
CO1. Students can be able to improve their efficiency and capabilities and get the employment opportunities.
CO2. They will improve their skills and talents in various HRD areas.
CO3. Students will achieve the self-employment and other jobs in various sectors.

Mapping of Course Outcomes with Programme Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS1	PS2
CO1		2		2						2	2	1
CO2	1	2	1	2			1			2	2	2
CO3	1		2	1			1			2	2	3

SEMESTER – III		
Paper– 305(a)	**URBAN ECONOMICS**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To make the students to understand the emerging trends in urbanization at global and national levels;

ii. To create awareness among the students on the teething problems of urbanization and the challenged posed by the urbanization;

iii. To develop creativity among the students to find solutions to the problems of environmental pollution, paucity of economic and social infrastructure in urban areas.

Syllabus : ECO 305(a): URBAN ECONOMICS

Unit-I: Urbanisation : A Global View

Definition, Nature and Scope Urban Economics – Sources of Urban Growth – Natural Increase – Net Migration – Urban Reclassification –Industrialisation - International Migration - Push and Pull Factors for Urban Growth – Trends in Growth of Urban Population in the world – The Challenges for Urban Growth – Social Equity – Environmental Sustainability – Governance – Sustainable Urban Development.

Unit –II: Urbanisation in India

Census Definition of Urban areas – Classification of Urban areas – Growth and Characteristics of of Urban Population – Size and Growth of Major Urban Agglomerations – Urban Poverty and Inequaality – Slums, Pollution and sanitation.

Unit –III: Urbanisation and Labour Market

Pull and Push Factors for Urbanisation in India – High Wages – Improved Infrastructure – Employment Opportunities – Educational facilities – Growth of formal and Informal economic activities – Labour Force Participation and Distribution of Workers – Street Children and Street Vendors.

Unit-IV: Urbanisation and Environmental Challenges

Rate of Urban Population Growth – Over Population – Problem of Urban Transportation – Pollutants to air and water – Solid Wastes and Noise Pollution

– Burden of Diseases – Need for Improvement in Quality of Living and Environment.

Unit-V: Urban Development and Government Policy

Urban Poverty Alleviation Approaches – SJSRY – Employment through Skills, Training and Placement – National Urban Livelihood Mission (NULM)- Basic Services to Poor (BSUP)- National Policy on Street Vendors -2009- Housing and Slum Development Strategies- Integrated Housing and Slum Development Programme – JNNURM-2005 – JNNURM and Role of National Building Organisation – Inflow of FDI and Construction Sector – Rajiv Awas Yojana – Sab Keliye Awas – Basti Sudhar – Rajiv Rinn Yojana – Need Reforms in Government Policy .

References:

1. G.F. Bussars: Repid Problems of Urbanisation in India.
2. Asok Owtra John: An Approach to Urban studies in India
3. John D. Herbert and Alfrad P.Vn; Urban Planning in the Developing Countries.
4. UN HABITAT : Cities and Climate Change Initiatives, News Letters
5. UN HABITAT (2003) The Challenges of Slums, Earthscan Publications, London
6. United Nations (2014) World Urban Pospects – Revision 2014,Department of Economic Social Affairs, Population Division , New York.
7. United Nations Human Settlemtent Programme (2013) Planning and Design for Sustainable Urban Mobility. Global Report on Human Settlements -2013.

Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	To define the concept of urbanization and describe the factors responsible for the growth of urbanization
CO2.	Explain the classification and characteristics of urban areas in India and the associated insurmountable problems such poverty, slums, lack of sanitation and pollution;
CO3.	Analyse the urban labour market and the problems of urban street children and street vendors;
CO4.	Assess the impact of urbanization on air and water pollution and the problems in the management of urban waste;
CO5.	Critically evaluate different policies and programmes being implemented by the governments for the development of urban areas in India.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1	1	2		2					2	2	2	1
CO2	1		1	3			1		1	2	1	3
CO3			1	3			1		1	2	1	2
CO4		2	2	1			1		2	2	1	2
CO5	1		1	2			1		2	2		3

SEMESTER – III		
Paper– 305(b)	ECONOMICS OF INFRASTRUCTURE	Credits -04
Sessional / Internal Marks : 20	End Semester Exam Marks : 80	
Objectives:		

i . To provide students with a thorough grounding in the key conepts of infrastructure economics.

ii. To illustrate how these concepts and standard economic tools can be used to analyse infrastructure related theory and policy issues.

iii. To be able to apply this knowledge to the analysis of specific infrastructure economic issues in India.

Syllabus : ECO 305(b): ECONOMICS OF INFRASTRUCTURE

Unit 1: Infrastructure and Economic Development

Meaning and Definition of Infrastructure–Types of Infrastructure–Economic and Social Infrastructure–Approaches to Infrastructure–Traditional and Modern Approaches – Infrastructure and Economic Development.

Unit 2: Infrastructure and Public Utilities

Infrastructure as a Public Good–Special Characteristics of Public Utilities–Performance of Education, Health and Housing in India-Marginal Cost Pricing in Public Utilities–Cost Subsidization– Free Prices, Equity and Efficiency.

Unit 3: Economics of Transportation and Communications

Sources and Importance of Transportation and Location of Economic Activities– Performance of Railways in India–Importance of Communications–New Telecom Policy-1999 – Telephone Regulatory Authority of India (TRAI) Telecommunications in Rural India.

Unit 4: Economics of Energy

Energy Needs of India–Importance of Energy in Economic Development– Factors Determining the Demand for Energy–Sources of Energy-Renewable and Non-Renewable Sources–Trends in the Production and Consumption of Commercial Energy– Energy Crisis – Measures to Tackle the Energy Problem in India.

Unit 5: Electricity, Gas and Water Supply

Sources of Electricity–Thermal–Hydel–Nuclear–Growing Importance of Wind and Solar Energy–Production and Consumption of Natural Gas–Rural Drinking Water– Measures to improve Electricity, Gas and Water Supply.

References:

1. Crow, M.A. and R.D.Kleindorfer, 1979, Public Utility Economics, Macmillan, London.
2. Nelson, J.R., 1964, Marginal Cost Pricing in Practice, Prentice Hall, England-Cliffs.
3. Philips, A and O.F. Williamson (Eds), 1967, Prices: Issues in Theory, Practice and Public Policy, University of Pennsylvania Press, Philadelphia.
4. Kneafsey, J.T., 1975, Transportation Economic Analysis, Lexington Books, Toronto.
5. Aronofsky, J.A and M.Shakum, Eds, 1978, Energy Policy, North Holland, Amsterdam.
6. Macrakis, MS.Ed., 1974, Energy Demand Consevation and Institution Problems,
   Macmillan, London.
7. Nordhavs, W.P., Ed., 1974, International studies of the demand for energy, North
   Holland, Amsterdam.
8. Pachauri, R.K., Ed., 1989, Energy Policy for India, Macmillan Co. of India, Delhi.
9. Turvey, R and D. Anderson, 1977, Electricity Economics, John Hopkins, Baltimore.

Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	Understanding concepts and models related to infrastructure.
CO2.	Understanding basic economic theories and models required for infrastructure sector development.
CO3.	Students will exhibit the ability to integrate technical, economic, social and regulatory frameworks for infrastructure sector planning and resource management.
CO4.	Understanding energy needs of India factors determining demand for Energy – Trends in the production and consumption of energy.
CO5.	Study sources of Electricity-Growing importance of Renewable Energy-Measures to improve Electricity, Gas and water supply.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2		3					1	2	2	1
CO2		2		3	1			1	1	2		3
CO3		1	1	3					1	2	1	2
CO4		2		3						2		3
CO5	1			3				1	2	2	1	3

SEMESTER – III		
Paper – 305(c)	ECONOMICS OF INSURANCE	Credits -04
Sessional / Internal Marks : 20	End Semester Exam Marks : 80	
Objectives:		

i . To make the students to understand the basic concepts related to risk and insurance;

ii. To create awareness among the students about the importance of insurance in the lives of individuals as well as in the economic development of a country;

iii. To impart knowledge among the students about the role played by the LIC and the GICs in securing the lives of the people;

iv. To induce students to undertake insurance business as insurance agents or development officers.

Syllabus : ECO 305(c): ECONOMICS OF INSURANCE

Unit-I: Introduction

Economic Security, Exposure to Losses - Definition of Insurance - Risk pooling and Risk Transfer, Social Vs. Private Insurance - Life Vs. Non- Life Insurance - Classification of Life, Health and General Insurance Policies

Unit-II: Risk and Risk Management

Fundamentals of Uncertainty and Risk, Classification of Risk - Concepts of Risk Management - Essentials of Risk Management, Elements of Risk Management - Risk Assessment - Risk Control - Risk Financing - Concepts of Re-insurance - Types of Re-insurance - Re-insurance Markets

Unit- III: Insurance and Economic Development

Risk Management and Insurance in Economic Development- Insurance Institutions as Financial Intermediaries, Insurance Institutions as Investment Institutions - Regulations governing Investments of Insurance Institutions in India

Unit-IV: Types of Insurance

Life and Health Insurance - Fundamentals of Life and Health Insurance - Functions of Life and Health Insurance - Plans of Life Insurance - Selection of Risks - Underwriting of Life and Health Insurance - Group Insurance - General Insurance - Definition of General Insurance - Types of General Insurance - Fundamentals of the Following Concepts - Common Law Equity Proposal - Indemnity, Insurable interest, Contribution, Subrogation - Utmost good faith, Physical and Moral Hazards - Marketing of General Insurance.

Unit-V: Insurance for Retirement Needs and Regulations

Retirement Planning Strategies - Investment for Retirement - Pension Plans - Pension Plans in India - Regulation of Insurance - Insurance Regulation in India - Insurance Regulation and Development Authority (IRDA).

References:

1. Bhole, L.M., 1990, The Indian Financial System, Tata McGraw Hill, New Delhi.
2. Black, K.Jr and H.D. Skipper, 2000, Life and Health Insurance, Prentice Hall, N.J.
3. Bailey, R., 1999, Underwriting in life and insurance, LOMA, Atlanta.
4. Bickelhaupt, D.L., 1992, General Insurance, lrwin.lnc.Burr Bridge.
5. Finsinger, J and M.V. Pauly (Eds), 1986, McGraw Hill's life Insurance, The American College, Blyn Mawr Pa.
6. Hedad, G.L., and S. Horn II, 1991, Essentials of Risk Management, VoL 1 , Insurance Institute of America.
7. Skipper, J.H.D. (Ed) 1988, International risk and insurance: An environmental managerial approach, Irwin McGraw Hill, Boston.
8. Taehimo, K.B. and D.A. Linic, 1993, Planning for Retirement needs, The American Collge, Bryn, Mawn pa.
9. Palande, P.S., Shah, R.S and Lunawal, M.L., 1983, Insurance in India, Changing policies and emerging opportunities, Response Books, A division of Sage Publications India.

Course Outcomes:
After successful completion of this course, the students will be able to
CO1. Define the Concepts of Risk, Risk pooling, Risk Transfer, Risk taking and Risk aversion and the fundamental principles of Insurance business.
CO2. Apply knowledge gained on the Management of Risk and Insurance Business;
CO3. Assess the relationship between Insurance and Economic Development of a country;
CO4. Analyse different types of insurance business and principles governing Insurance business;
CO5. Critically evaluate progress of insurance business during the era of LPG and the performance of IRDA in India.

Mapping of Course Outcomes with Programme Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS1	PS2
CO1			2	3						2	3	
CO2	1	2		3						2	2	1
CO3	1			3					1	2	1	3
CO4	1			3						2	3	
CO5			2	1					1	2	1	3

SEMESTER – IV		
Paper – 401	**RURAL DEVELOPMENT**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To understand the basic elements of Rural Development.

ii. To know the people's participatory approach target group approach and integrated approach of Rural Development.-

iii. To analyse the trends of poverty and unemployment in Rural Economy.

iv. To interpret the Community Development Programme.

v. To judge the role of NGO's in Rural Development.

vi. To understand the functions and implementation of project management.

Syllabus : ECO 401: RURAL DEVELOPMENT

Unit-I: Approaches To Rural Development

Rural Development – Basic Elements of Rural Development – Approaches to Rural Development: Marxian and Gandhian Approaches – People's Participatory Approach – Target Group Approach – Integrated Approach.

Unit-II: Issues of Rural Development

Size and Structure of Rural Economy – Poverty – Rural Unemployment Scenario – Role of Agricultural Sector and Non-Farm Sector – Food Security– Rural Industrialization – Rural Migration.

Unit-III: Rural Development Programmes

Community Development Programme (CDP) – Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) – Swarna Jayanthi Gram Swarozgor Yojana (SGSY) - Rural Housing Schemes-Provision of Urban Amenities in Rural Areas (PURA).

Unit-IV: Institutional Support to Rural Development

Panchayat Raj and Rural Development – Role of N.G.Os in Rural Development – Financing of Rural Development–NABARD – Commercial Banks – Regional Rural Banks and Cooperatives.

Unit-V: Project Management and Rural Development

Functions of Project Management – Project Implementation – Planning for Implementation Project Control–Integration and Coordination – People's Participation–Project Monitoring and Evaluation.

References:

1. Bhaduri, A and Arisur Rahman, M.A., 1982, Studies in Rural Participation, Oxford and IBH Publishing Company, New Delhi.
2. Hunter Guy, Bunting, A.H. and Bottrall, Anthony, 1978, Policy and Practice in Rural Development, The English Language Book Society, London.
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6. Katar Singh, 1986, Rural Development Principles, Policies and Management, Sage Publications, New Delhi.
7. Desai, Vasant, 1988, Rural Development: Rural Development Through the Plans, Himalaya Publishing House, Bombay.
8. Chambers Robert, 1985, Rural Development: Putting the Last First, Longman, London.
9. K.Venkata Reddy, Agriculture and Rural Development, Himalaya Publishing House, Bombay.
10. Norman, T.Uphoff, 1982, Rural Development and Local Organization, Macmillan
    India Ltd., Delhi.
11. Bhattacharya, S.N., 1980, Rural Industrialization in India, Publishing Corporation, Delhi.
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13. Mishra, S.N. and Kushal Sharma, 1983, Problems and Prospects of Rural Development in India, Uppal Publishing House, New Delhi.
14. Chambers, 1983, Rural Development, Longman, New Delhi.

Course Outcomes:

After successful completion of this course, the students will be able to

CO1. Acquire knowledge about rural development.

CO2. Understand about the rural issues like credit, marking and food problem in India.

CO3. Students will be able to understand about the severity of poverty and unemployment problems in India.

CO4. Students will comprehensively understand, interpret compare and contrast, explain the need of planning and know the changes through planning that go to evaluation of Rural Development.

Mapping of Course Outcomes with Programme Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS1	PS2
CO1	1	2	1	2	1	1	1	1	1	2	1	2
CO2		2	1	2					2	1	1	2
CO3	1	2	1		2	2	1		1	1	1	2
CO4		1	2	1		1			2	2	1	3

SEMESTER – IV		
Paper – 402	FINANCIAL INSTITUTIONS AND MARKETS	Credits -04
Sessional / Internal Marks : 20	End Semester Exam Marks : 80	
Objectives:		

i . To study the Nature and role of Financial System in Economic Development and structure of Financial system.

ii. To study the structure, composition and instruments of money market.

iii. To analyse the structure and composition of capital market.

iv. To create awareness on money and capital markets in India, recent development and defects of Indian capital market.

v. To learn the objective and various functions of RBI, Commercial Banks and other non-banking financial companies in India.

Syllabus : ECO 402: FINANCIAL INSTITUTIONS AND MARKETS

Unit 1: Nature and Role of Financial System

Meaning, Definition and Structure of Financial System – Functions of Financial Systems – Promotional Role of Financial System in Developing Countries.

Unit 2: Structure, Composition and Instruments of Money Market

Definition of Money Market – Composition of Money Market: Call Money Market – Discount Market (Commercial Bill Market) – Acceptance Market – Treasury Bill Market – Instruments of Money Market – Commercial Papers – Certificate of Deposit–Repo and Reverse -Repo Transactions.

Unit 3: Structure and Composition of Capital Market

Definition of Capital Market – New Issues Market–Functions of New Issues Market – Players in the New Issues Market–Recent Trends in New Issues

Market–Secondary Market – Functions of Stock Exchanges–Issue and Listing of Securities – Method of Trading in a Stock Exchange.

Unit 4: Money and Capital Markets in India

Structure, Objectives and Features of Money Market in India – Discount and Finance House of India (DFHI) - Recent Developments and Deficiencies in Indian Money Market - SEBI: Objectives, Functions and Performance – Securities Trading Corporation of India (STCI) – Features of NSE and BSE – Over the Counter Exchange of India (OTCEI) – Recent Developments and Defects of Indian Capital Market.

Unit 5: Financial Institutions in India

Objectives and Development Functions of Reserve Bank of India – 3Commercial Banks – Non-Banking Finance Companies – Development and Investment Institutions in India – IFCI, IFBI, UTI, LIC and GIC–Recent Reforms in Indian Capital Market.

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15. M.Y. Khan and P.K. Jain, Financial Management, Tata McGraw Hill, New Delhi.
16. R.B.I. Bulletins, Reserve Bank of India, Mumbai.

Course Outcomes:

After successful completion of this course, the students will be able to

CO1. Students can be able to know the functioning of the financial system in India and role of the banking and Non-banking financial institutions.

CO2. Students can be able to know the role and functions of Reserve Bank of India and commercial banks in economic development of the country.

CO3. They learn the merits and demerits of share markets.

CO4. They acquire skills for using the various tools in the financial markets.

Mapping of Course Outcomes with Programme Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS1	PS2
CO1		2	1	2	1				1	2	2	1
CO2		1		3	1				1	2	1	2
CO3		2		2	1				1	2	1	3
CO4	1	2	1	1	1				1	1	1	3

SEMESTER – IV		
Paper – 403	**INDUSTRIAL ECONOMICS**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . Familiarise the students with basic concepts of Industriliztion and Economic Development.

ii. To make students understand the theory of firm and forms of Industrial organization.

iii. To familiarise students with industrial location importance and theories of industrial location.

iv. To make students understand the native and investment decision.

v. To help students to understand industrial management and role of Science and Technology in Industrial Development.

Syllabus : ECO 403: INDUSTRIAL ECONOMICS

Unit 1: Industry and Economic Development

Industrialization and Economic Development - Factors Promoting Industrialization - Strategies of Industrialization in Developing Countries.

Unit 2: Firm and Forms of Industrial Organization

The Theory of the Firm – Objectives – Size - Growth of the Firm - Optimum Firm -Factors Determining Optimum Firm - Forms of Industrial Organization.

Unit 3: Theories of Industrial Location

Factor Influencing Industrial Location –Theories of Industrial Location: Alfred Weber, Sargeant Florence, August Losch, Walter Isard – Melvin Greenhut.

Unit 4: Investment Decisions

Nature and Types of Investment Decisions – Time Preparation–Profile of Project –Project Evaluation/Appraisal – Cost-Benefit Analysis - Different Rates of Return Methods - Pay Back Method - Accounting Rate of Return Method - Net Present Value Method and Internal Rate of Return Method - Break-Even Analysis.

Unit 5: Industrial Management

Industrial Productivity – Rationalization – Automation – Industrial Efficiency – Role of Science and Technology in Industrial Development-Industrial Policies of 1956 and 1991.

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15. Smith D.M., Industrial Location: An Economic Geographic Analysis, John Wiley & Sons, New York, 1971.
16. Stephen Martin., Industrial Economics Analysis & Public Policy, Macmillan Publishing Company.

Course Outcomes:
After successful completion of this course, the students will be able to
CO1. Understanding industrialization and economic development strategies of industrialization in developing countries.
CO2. Study the theory of the firm – optimum firm – factors determine optimum firm.
CO3. Understanding factor influencing Industrial location and theories of Industrial location.
CO4. Study the nature and types of investment decisions. Profile for project, project evaluation and cost benefit analysis.
CO5. Understanding Industrial Management, role of Science and Technology in Industrial Development and Industrial Policies.

Mapping of Course Outcomes with Programme Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS1	PS2
CO1		2	2	1					1	2	2	1
CO2		2		2						2	3	
CO3			2	1						2	2	1
CO4		2	1	2					1	2	2	1
CO5		1	2	1						2	1	3

SEMESTER – IV		
Paper– 404(a)	INDIA'S ECONOMIC REFORMS	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To make the students to understand the need for and the rationale behind the Economic reforms initiated in India from 1991 onwards;

ii. To appraise the students on reforms initiated in the banking and financial sector, agricultural sector, industrial sector, foreign trade sector as a part of LPG;

iii. To evaluate the impact of economic reforms on the performance of different sectors of the economy in general and on poverty, unemployment and inequality in India.

Syllabus : ECO 404(a): INDIA'S ECONOMIC REFORMS

Unit 1: Economic Reforms -1991

Economic Reforms–Need for Economic Reforms in India–Reforms of 1991–Apprisal of Economic Reforms in the Market Economy–Future Directions of Economic Reforms

Unit 2: Reforms In Banking Sector

Economics of Liberalization and Privatization–Banking and Financial Sector Reforms in India–Liberalizing Interest Rates–Narasimham Committee Report on the Financial System– Non-Banking Financial Companies : RBI Directions–Disinvestment in Public Sector Units.

Unit 3: Reforms In Agricultural Sector

Structural Reforms–Macroeconomic Stability–Fiscal Policy and Economic Reforms in India–Economic Reforms in Agricultural and Rural Development.

Unit 4: Industrial Reforms

Industrial Reforms–Impact of Reforms on Poverty and Employment-New Economic Policy and Sustainable Development–Strengthening Social Sectors and Safety nets.

Unit 5: Reforms in Trade

Globalization of Indian Economy–Trade Reforms–Impact on Trade–Foreign Direct Investment–Multinationals– WTO–Problem of Foreign Debt.

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3. Mahesh V., Joshi, 1997, Economic Reforms in India, a Critical Evaluation A.P.H. Publishing Corporation, New Delhi.
4. Raj Kapila and Uma Kapila, 1996, Understanding India's Economic Reforms, Academic Foundation. Delhi, Six Volumes.
5. Om Prakash, 1996, Economics of Liberalization, RBSA Publishers, Jaipur.
6. Ruddar Datt and KPM Sundaram, Indian Economy. S. Chand and Company,
   New Delhi.
7. Raj Kapila and Uma Kapila, 1998, Banking and Financial Sector reforms in India, Academic Foundation (6 Volumes).
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10. I.G. Patel, 1996, Economic reform and Global Change, Macmillan.
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Course Outcomes:

After successful completion of this course, the students will be able to

CO1.	Understand the rationale behind the introduction of the economic reforms in the form of Liberalization, Privatization and Globalization (LPG);
CO2.	Explain the details of reforms introduced in the financial sector on the recommendations of the Two Reports of the Narasimham Committee;
CO3.	Illustrate how the economic reforms introduced in the Agricultural sector enabled to bring about self-sufficiency in food grains production and food security in the country;
CO4.	Analyse the nature and contents of industrial reforms and their effects on sustainable development and social safety nets to the vulnerable sections of the population;
CO5.	Critically evaluate impact of reforms introduced in the external sector on the growth of India's foreign trade, Foreign Direct Investment and foreign debt.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2	1	2					1	2		3
CO2	1	1	2	1					1	2	1	2
CO3		2	1	2					1	2	1	3
CO4		2	1	2			1			2	1	3
CO5	1	2	1	2			1			1	1	2

SEMESTER – IV		
Paper– 404(b)	ANDHRA PRADESH ECONOMY	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To make the students to understand the structure, major problems and prospects of development in Andhra Pradesh;

ii. To appraise the current levels and prospects for the development of agriculture, industrial and services sectors in Andhra Pradesh;

iii. To evaluate the how the planning process and the budget operations in Andhra Pradesh have impacted the lives of the people in Andhra Pradesh.

Syllabus : ECO 404(b): ANDHRA PRADESH ECONOMY

Unit 1:Structure of Andhra Pradesh Economy

State GDP – Per Capita Income – Human Development Index – Income and Employment Pattern in Andhra Pradesh – Magnitude of Poverty – Demographic Features – Social, Political and Economic Empowerment of Women.

Unit 2: Role of Agriculture Sector

Importance of Agriculture –Production and Productivity of Agriculture – Change in Cropping pattern – Sources of Agricultural Finance – Land Reforms in Andhra Pradesh – Recommendations of Koneru Ranga Rao Committee.

Unit 3: Industrial Sector Growth and Structure of Industries – Large Industries and Micro, Small and Medium Enterprises – Weaknesses and Problems of Industries – Sources of Industrial Finance – Role of Cooperatives in Andhra Pradesh.

Unit 4: Role of Service Sector

Service Sector in Andhra Pradesh – Importance, Composition and Growth with Special reference to Transport, Electricity, Communication, Tourism and Information.

Unit 5: Planning in Andhra Pradesh

Five Year Plans of Andhra Pradesh – Aims, Objectives, Targets and Achievements – Sources of State Revenue – Trends in Public Expenditure and Public Debt of Andhra Pradesh.

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2. V.H.Rao, A.P. at Fifty, CDR and Communications, Himayat Nagar, Hyderabad.
3. C.H. Hanumantha Rao and Mahendra Dev, A.P. Development, Economic Reforms and Challenges ahed, CESS, Begumpet, Hyderabad.
4. Y.V. Krishna Rao and S.Subramanyam, Development of A.P. 1956-2001 – A Study of Regional disparities, NER Research Central, Vishalandhra Publishers, Hyderabad.
5. Statistical Abstract of A.P.
6. Socio-Economic Survey of A.P., Govt. of A.P.
7. Govt. of A.P. Human Development Report, A.P. CESS, Begumpet, Hyderabad.
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9. National Council of Applied Economics Research, New Delhi, Survey of Backward district of A.P.
10. Laxmana Rao, V. Economic Growth of A.P.
11. Andhra Pradesh state Archives, two decades of Development (1956-1976)
12. Selected Socio Economic Indicators – 2007, Directorate of Economics and Statistics Government of A.P. Hyderabad.
13. An outline of Agricultural situation in A.P 2006-07 (DES A.P, Hyd.)
14. Socio – Economics Survey 2007-08 Government of A.P (Planning Department)
15. S.Mahendra, Dev, Inclusive Growth of Andhra Pradesh.

Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	Understand the structure of the economy of Andhra Pradesh and the problems of poverty, Unemployment and Human Development with focus on women Empowerment;
CO2.	Explain the status, problems and prospects of Agricultural Development in Andhra Pradesh;
CO3.	Demonstrate the growth, structure and problems of industrial development in Andhra Pradesh;
CO4.	Analyse the enormous opportunities available for the growth of services sector in Andhra Pradesh;
CO5.	Critically evaluate impact of budgetary operations in Andhra Pradesh, focusing on targets and achievements of economic growth during the Five Year Plan Periods.

	Mapping of Course Outcomes with Programme Outcome											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2		2		1			1		1	2
CO2		1		2					1	2	1	2
CO3	1			2					1		1	2
CO4	1		2	2						2	1	2
CO5			2	1		1			1	2	1	2

SEMESTER – IV		
Paper–404(c)	ENTREPRENEURSHIP AND SKILL DEVELOPMENT	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . Entrepreneurship and skill development course outcome study of concepts, functions and types of entrepreneurship. Women entrepreneurship and economic development. Role of national and state level organizations in the development of entrepreneurship. Objectives, methods and content of project report. Development of communication skills and skill development.

Syllabus : ECO 404(c): ENTREPRENEURSHIP AND SKILL DEVELOPMENT

Unit I: Entrepreneurship

Concepts of Entrepreneurship - Functions and Types of Entrepreneurs - Motivation and Competency – Entrepreneurship - Women Entrepreneurship and Economic Development.

Unit II: Organizations for Entrepreneurship Development

Programmes for the Development of Entrepreneurship - National and State Level Organizations - Entrepreneurship Development Institute of India (EDII) - National Institute for Entrepreneurship and Small Business Development (NIESBUD) - National Science and Technology Entrepreneurship Development Board (NSTEDB) - National Institute of Small Industry Extension and Training (NISIET).

Unit III: Identification and Preparation of Project Report

Identification of Project – Objectives of Project – Methods and Contents of Project Report – Formulation and Appraisal of Project Report.

Unit IV: Development of Skills

Need for the Development of Skills – Communication Skills – Verbal and Non-Verbal Communication – Barriers to Communication – Individual Interaction Skills – Basic Interaction Skills - Leadership Skills - Working Individually and as a Team - Personality Development – Intra and Inter-personal Communication Skills.

Unit V: Organizations for Skill Development

Skill Development Mission – PM's National Council on Skill Development – National Skill Development Coordination Board – National Skill Development Corporation – SIKSHAM- National Skill Foundation of India(NSFI) – Skill Development Initiative (SDI) - Kaushal Vikas Yojana (KVY) – AP State Skill Development Board.

References:

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2. Markcassion, 2000, Enterprise and Leadership, Edward Elgar., UK
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Course Outcomes:												
After successful completion of this course, the students will be able to												
CO1.	To familiar the student with the basic concepts function and type of entrepreneurs.											
CO2.	To import knowledge on programs for the Development of Entrepreneurship.											
CO3.	Provide orientation on identification and to assess the feasibility of the project.											
CO4.	To make students develop and can systematically apply an entrepreneurial way of thinking.											
CO5.	To import knowledge on organisations for Skill Development.											
Mapping of Course Outcomes with Programme Outcome												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1	1	1		2						1	2	
CO2		2		2		1				2		2
CO3			1	3						2	3	
CO4		1		3		1				1	2	
CO5		1	3			1				2		3

SEMESTER – IV		
Paper– 404(d)	LABOUR ECONOMICS	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To identify the characteristic of Labour

ii. To describe the Industrial Disputes

iii. To understand the factors affecting real wages

iv. To write down the Social Security

v. To understand the Trade Union.

Syllabus : ECO 404(d): LABOUR ECONOMICS

Unit 1: Labour Markets

Nature and Characteristics of Labour Markets in India-Types of Labour Markets- Concept and Types of Labour–Composition of Labour in Different Sectors-Lewis Surplus Model-Demand for Labour in the Long Run–Labour Supply Analysis.

Unit 2: Wage Determination

Wage Theories of Ricardo, J.S. Mill and Karl Marx-Marginal Productivity Theory of Wages-Bargaining Theory of Wages-Principles of Wage Determination-Wage Determination in Various Sectors - Organized-Unorganized and Informal Sectors.

Unit 3: The Wage Policy in India

National Wage Policy and Economic Development-Concepts of Minimum, Fair and Living Wages-Minimum Wages Act-1948-Role of Wage Boards in Wage Fixation-Profit Sharing Schemes and Payment of Bonus.

Unit 4: Employment

Concept and Types of Unemployment in India–Various programmes to solve the problem of unemployment during plan Era – Philip's curve – relationship between employment and unemployment.

Unit 5: State and Labour

Features of Industrial Labour–Trade Union Movement-its Defects and Measures to Strengthen the Movement in India–Social Security and Welfare Measures in India–Second National Commission on Labour.

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2. Dasgupta, A.K., 1976, A Theory of Wage Policy, Oxford University Press.
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20. The Indian Economic Association, 84th Conference Volume.

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Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	Evaluate and interpret the labour market policies of governments, unions and other actors in the labour market.
CO2.	Identify the actions of economic actors within the labour market, and identify various outcome of the labour market, that are driven by economic incentives.
CO3.	Critically analyse labour market quantitative research.
CO4.	Synthesise information on different actors and outcome across the various labour market topics.
CO5.	Analyse labour market issues through the application of economic data and theories.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		1		2						2	2	1
CO2			2	2						2	2	
CO3	1	1		2							2	1
CO4		2		2						2		3
CO5	1		2	2						2		3

SEMESTER – IV		
Paper–405 (a)	WOMEN AND ECONOMIC DEVELOPMENT	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To make the students to understand the role of Women in India's Economic Development;

ii. To assess the status of women in India in terms of such key indicators as literacy rates, education, work participation rates, income, wealth and political power;

iii. To evaluate the impact of various development and welfare programmes implemented in India on women development and women empowerment.

Syllabus : ECO 405 (a): WOMEN AND ECONOMIC DEVELOPMENT

UNIT - I: Women and Economic Development in India

Women Population in India - Rural and Urban Women Population – Fertility Rates – Women Labour Force and Work Force Participation Rates – Role of Women in Economic Development.

UNIT – II: Women and Human Development

Human Development – Gender Gap – Gender Inequality Index - Gender Development Index – Gender Empowerment – Measures – Women and Literacy, Life Expectancy –Access to Health Care – Income Inequalities.

UNIT – III: Women and Labour Markets

Gender division of labour – Participation rates in rural and urban employment markets in India - Factors affecting women entry into labour markets in Agriculture, Industry and Service sectors - Women in Organized and Unorganized Sectors

UNIT – IV: Governance for Women Development

Role and functions of Ministry of Women and Child Development - Social Welfare Boards: National and State level Commissions of Women. Women's Development Corporation. National Institute of Entrepreneurship and Small Business Development (NIESBUD) – NABARD - Small Industries Development Bank of India (SIDBI).

UNIT – V: Welfare Programmes and Women Development

Role of Non-Government Organizations in Women's welfare - Kasturba Gandhi Balika Vidyalayas (KGBV) – National Programme for Adolescent Girls (NPAG) – National Mission for Empowerment of Women – STEP – Micro Credit Groups – SWADHAR – DHANALAKSHMI – Rashtriya Mahila Khosh (RMK) – Indira Gandhi Matrutva Sahayog Yojana – MGENREGA – Hostels for Working Women – Kishori Balika Pathakam – Indira Kranthi Patham – Janani Suraksha Yojana - Bangaru Talli Programme – Jana Dhan Yojana – Suknya Samrudhi Yojana.

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5. Wazir, R (2000), The Gender Gap in Basic Education: NGOs as Change Agents, Sage Publications, New Delhi.
6. Ramachandrudu, G. (1991), Demographic Methods, AU Press, Visakhapatnam.
7. Various issues of Economic Survey, Government of India.
8. Annual Reports of Ministry of Women and Child Development, Government of India.
9. Annual Reports of Ministry of Rural Development, Government of India.
10. Survey on Employment and Unemployment 2012-13, Ministry of Labour,

Government of India.

Course Outcomes:	
After successful completion of this course, the students will be able to	
CO1.	Understand and explain the key concepts like fertility rates, work participation rates and the role of women in economic development of the country;
CO2.	Explain the vast gender gaps existing in India in literacy, life expectancy, health care and income levels between men and women;
CO3.	Illustrate the flaw in the existing gender division of labour and the reasons for the low levels of work participation rates among women in India;
CO4.	Analyse the status of women in politics and administration and the role of various institutional agencies in the development of women;
CO5.	Critically evaluate impact of various poverty alleviation and development programmes implemented in ameliorating the conditions of women in India.

Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2		2						2	2	
CO2	1		2								2	
CO3			2	2		2				2	2	
CO4	1	2		2		1				2		3
CO5										1		3

SEMESTER – IV		
Paper–405 (b)	**ECONOMICS OF TOURISM**	**Credits -04**
Sessional / Internal Marks : 20	**End Semester Exam Marks : 80**	
Objectives:		

i. Economics of tourism course content study of the definition, nature and scope of tourism. Elements of tourism. Role of travel agents and tour operators in the promotion of tourism. Economic impacts of tourism. Income and employment generation. Tourism policy in India. Domestic and international tourism. Contribution of tourism to GDP. Incentives for hotels and tour operators. Role of publicity in the promotion of tourism.

Syllabus : ECO 405 (b): ECONOMICS OF TOURISM

Unit I: Nature, Scope And Composition Of Tourism: Meaning And Definition Of Tourist and Tourism- Historical Perspective of Tourism in India- Types and Forms of Tourism in India –Individual, Group and Mass Tourism – Domestic, National and International Tourism – Inbound and Outbound Tourism - Composition of Tourism Industry –Accommodation, Hospitality and Catering – Transportation – Travel Agents and Tour Operators – Emerging Forms of Tourism

Unit II: Economic Dimensions of Tourism: Interaction Between Economic Development and Tourism- Tourism: a Consumption Industry – Economic Impacts of Tourism – Multiplier effect- Income and Employment Generation – Impact on Balance of Payments – Regional Development – Impact of Tourism on Environment - Sustainable Tourism – Pro-Poor Tourism (STEP) – Tourism and Women Empowerment.

Unit III: Development of Tourism In India: Domestic And International Tourism In India – Mode and Purpose of Tourism –Tourism Policies in India – Tourism Policy-2015-20 – Incredible India – New Schemes – Swadeshi Darshan – National Mission on Pilgrimage Rejuvenation and Spiritual Augmentation (PRASAD) –Swachh Bharat Mission – Swachh Paryatan - Fiscal Incentives to

Tourism and Inflows of FDI – e-Tourism – Publicity and Marketing of Tourism – International Cooperation.

Unit IV: Economics of Tourism: Schemes And Programmes For The Development Of Tourism – Trends in Contribution of Tourism to GDP - Tourism Products and Mega-destinations in India – Trends in Domestic and Foreign Tourist Arrivals – Source countries for Foreign Tourist Arrivals – Tourism Receipts – Trends in Foreign Exchange Earnings – Share of India – Future Potential of Tourism Industry.

Unit V: Sub-Segments of Tourism Industry in India: Allied Components Of Tourism – Types of Accommodation – Hotels and Restaurants – Major Players – Classification of Hotels – Incentives for the Hotels – Tour Operators – Major Players – Guides and Travel Trade Service Providers – Travel Agents – FDI and Development of Hotels – Transportation and Tourist arrivals – Air, Rail and Road Transportation – Package Tours – India Convention Promotion Bureau (ICPB) – Publicity and Market Development for Promotion of Travel and Accommodation.

References:

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2. Bhatia, A.K. (2002) Tourism Development: Principles and Practices, Sterling Publishers Pvt. Ltd. New Delhi
3. Dain Bolwell and Wolfgang Weinz (2008) Reducing Poverty through Tourism, Working Paper-266, ILO, Geneva
4. The Federation of Hotel & Restaurant Associations of India (FHRAI) (2015) The India Hotel
5. Gill, Pushpinder (2005) Perspectives on Indian Tourism, Anmol Publications, New Delhi.
6. Gill, Pushpinder (2005) Tourism: Economic and Social Development, Anmol Publications, New Delhi
8. ILO (2013) Tool Kit on Poverty Reduction through Tourism, Geneva.
9. Jaganmohan Negi (2004) International Tourism and Travel: Concepts and Principles, S.Chand & co. New Delhi.

10. Kaul , R.N. (1985) Dynamics of Tourism : A Triology _ Vol.I : The Phenomenon, Vol.II- : Accommodation, and Vol. III- Transportation and Marketing.
11. Khan, M.A. (2005) Introduction to Tourism, Anmol Publications, New Delhi
12. Kumari Purnima (2014) A Text Book of Hospitality, Tourism and Aviation, Anmol Publications, New Delhi.
13. KPMG (2014): Incredible India: Travel and Tourism Sector: Potential, Opportunities and Enabling Framework for Sustainable Growth, India.
14. Malra Ram (2013) Tourism Principles, Practices, Concepts and Philosophies, Anmol Publications, New Delhi
15. Mathur Akhil (2012) Tourism, Hotel and Hospitality Industry Development, Anmol Publications, New Delhi.
16. Mathur Akhil (2012) Tourism Marketing Management, Anmol Publications, New Delhi.
17. Narasaiah, M.L. (2013) Globalisation and Sustainable Development, Discovery Publications, New Delhi.

Course Outcomes:
After successful completion of this course, the students will be able to
CO1. To make students to understand the nature, scope and composition of Tourism.
CO2. To import knowledge on economic Dimensions of Tourism and impart of Tourism on different sectors.
CO3. Provide orientation to the students regarding development of tourism in India and Tourism Policies.
CO4. To import knowledge on schemes and programmes for the development of Tourism in the country.
CO5. Expose the students to sub-sequent of Tourism Industry in India.
Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1			2		1				1	2	2	1
CO2											2	1
CO3	2		1	2	1				1	1		3
CO4			2	1		1				1	1	3
CO5		1	2	3					1	1		3

SEMESTER – IV		
Paper– 405 (c)	**TRIBAL ECONOMY**	**Credits -04**
Sessional / Internal Marks: 20	**End Semester Exam Marks : 80**	
Objectives:		

i . To study the characteristics of Tribal People and growth of tribal population in Andhra Pradesh and India.

ii. To create awareness on Socio-economic conditions of Tribes, status of tribals in the society.

iii. To analyse the development of tribal women in India.

iv. To know the government policies on Tribals such as shifting cultivation, deforestation and distribution of forest land in India etc..

Syllabus : ECO 405 (c): TRIBAL ECONOMY

Unit – 1: Characteristics of Tribal Population

Definition of Scheduled Tribes – Primitive Tribes – Characteristics of Tribal Population – Different Tribal Groups in India – Growth of Tribal Population in India.

Unit – 2: Socio-Economic conditions of Tribes

Need for Tribal Development – Socio –Economic Conditions of Tribal – Tribal Health, Food and Nutrition – Tribal Culture – Status of Tribal Women Development.

Unit – 3: Development of Tribal Woman in India

Approaches for Tribal Development in India – Pre-Independence period and post – Independence period – Integrated Tribal Development Agency in India – Tribal Development Plans – Community Development Plans – Approach and Tribal Development.

Unit – 4: Government Policy and Tribal

Educational Development of Tribals – Economic status – Shifting Cultivation - Deforestation and Tribals – Legal Status and Distribution of Forest Lands – Social Intervention Policy – Political status in India.

Unit – 5: Status of Tribals in Andhra Pradesh

Tribal Economy in Andhra Pradesh – Literacy level – Asset Holding - Distribution of Schedule Population in Andhra Pradesh Districts – Growth of Scheduled Tribes Population - Predominate tribes in Andhra Pradesh – Tribal welfare in Andhra Pradesh.

References

1. Padma Sri. S.S. Shashi, Tribal Culture Customs and Affinities, Anmol Publications Pvt. Ltd, New Delhi – 1955.
2. S.N. Chaudhary, Tribal Development Since Independence, Concept Publishing Company, New Delhi, 2009.
3. Suresh Sharma, Tribal identity and the Modern World, Sage Publications, New Delhi, 1994.
4. M.Ramesh Singh, Tribal Development in 21st Century – An Experience from Manipur, Mittal Publications, New Delhi 2006
5. Ajit K. Singh, Gaya Pandy, Prabhath K. Singh, Forest and Tribal In India, Classical Publishing Company, New Delhi, 1998.
6. Govinda Chandra Rath, Jean Dreze, Tribal Development in India, Sage Publications, New Delhi 2006.
7. Pariyaram M. Chacko, K.S. Singh, Tribal Communities and Social Change, Sage Publications, New Delhi 2005.
8. P. Sudhakara Reddy, Displaced Populations and Socio – Cultural Changes, Common Wealth Publications, New Delhi, 1995.

Course Outcomes:
After successful completion of this course, the students will be able to
CO1. Students can be able to know the socio-economic conditions of the Tribal people.
CO2. They learn the tribal business and economic strategies.
CO3. They get the employment opportunities in the tribal area and to improve the social, economic, political condition of the tribal people.
Mapping of Course Outcomes with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PS1**	**PS2**
CO1		2		2		1	2			2		3
CO2	1			2		1	1			2	1	3
CO3		2		2		1	1			2		3

M.A. ECONOMICS

SEMESTER – I

PAPER – ECO- 101: Micro Economics Analysis - I

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Define demand and mention its influencing factors?
2. What is "Substitution Effect"?
3. What is Average Variable Cost?
4. Explain the relationship between marginal cost and average cost curves?
5. What are Isoquant Curves?
6. Explain the choice of optimum combination of inputs?
7. Explain the concept of Elasticity of Substitution?
8. Discuss average revenue under perfect competition?
9. Discuss the features of perfect competition?
10. Explain Chamberlin's concept of 'Excess Capacity?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Discuss Marshal's Theory of Demand?

(a).

OR

Discuss Samuelson's Revealed Preference Theory?

(b).

12 Critically examine Crbb-Douglas production function?

(a).

OR

Critically examine the Law of Variable proportions?

(b).

13 Explain Average Revenue under perfect competition and Monopoly Markets?

(a).

OR

Illustrate 'Price Discrimination' with suitable examples?

(b).

14 Analyse price and concept determination under monopolistic completion.

(a).

OR

Which market is ideal from social welfare point of view?

(b).

15 Explain the Cournot's model of duoply?

(a).

OR

Describe the concept of Kinked Demand Curve.

(b).

SEMESTER – I

PAPER – ECO- 102: Macro Economics Analysis -I

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Nature and Scope of Macro Economics
2. Macro Statics
3. Gross National Product
4. Types of Investments
5. Marginal Efficiency of Capital
6. Consumption Function
7. Absolute Income Hypothesis
8. The Derivation of LM Curve
9. Accelerator
10. Relative Income Hypothesis

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Explain the micro foundation of macro economics

OR

(b). Explain the concepts of National Income and methods of measuring National Income

12 (a). Discuss about circular flow of Income and expenditure in two and three sector economy ?

OR

Explain the classical theory of employment

(b).

13 Explain Keynesian Theory of Employment

(a).

OR

Diagrammatically discuss about marginal efficiency of investment

(b).

14 Explain the theory of Multiplier

(a).

OR

Discuss about life cycle and permanent income hypothesis

(b).

15 Discuss the interaction between multiplier and accelerator

(a).

OR

Explain the Shifts in IS and LM curves

(b).

M.A. ECONOMICS

SEMESTER – I

PAPER – ECO- 103: Public Economics

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Nature and Scope of Public Finance.
2. Public Finance and Private Finance.
3. Wagner's law of increasing state activities.
4. Important heads of public expenditure.
5. Tax Revenue and Non-Tax Revenue.
6. What is incidence of taxation.
7. Principals of public debt management.
8. Objective of public debt.
9. What is fiscal deficit.
10. Recommendation of Rsja.J. Challain Committee.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Discuss the principles of Maximum Social Advantage?

(a).

OR

Briefly analyse the reasons for growth of public expenditure in India.

(b).

12 Describe the Peacock and Wiseman Hypothesis?

(a).

OR

(b). Explain the effect of increasing public expenditure on production, distribution and economic growth.

13 Write the characteristic of Goods Tax System?

(a).

OR

Ability to pay theory – Explain?

(b).

14 What are the merits and demerits of Direct and Indirect Taxes?

(a).

OR

Analyse the Musgrave's Concept of Incidence.

(b).

15 Public debt burden – Discuss?

(a).

OR

Discuss about the various methods of Public Debt Redemptions?

(b).

M.A. ECONOMICS

SEMESTER – I

PAPER – ECO- 104: Mathematical Methods of Economics

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Define function – Give examples of function.

2. Find $\lim_{x \to 2} \frac{x^2-4}{\quad}$

3. Find the derivate of $y=x^2+3x+2$.

4. Find AC and MC if $TC= Q^3-3Q^2+15Q+27$.

5. Find the maximum and minimum values of $y = 2x^2-x^3$.

6. Evaluate $\int_3^2 (2x^2+5x+1)dx$.

7. State the properties of determinants.

8. Evaluate $\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 5 \\ 1 & 5 & 12 \end{vmatrix}$

9. Explain basic assumptions of linear programming.

10. State the assumptions of Input-Output analysis.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Find the limit of the functions

(a). i). $\lim_{x \to 3} \frac{x^2-x-6}{x-3}$ ii). $\lim_{x \to 1} \frac{x^3-3x+2}{x^3+x^2-5x+3}$

OR

i). Prove the associative Law for the union of sets.

(b). ii). State Logarithmic and exponential function.

12 Differentiate the following :

(a). i). $y = \frac{x-1}{3x+2}$ ii). $Y = x^2e^x$ iii). $Y = x^3 \log x$

OR

Find the second order partial derivative of $Z = x^2y^3 - 4xy^2+3x^2y+y^3-5x4$.

(b).

13 Find the maximum and minimum values of the function $y =8x^5 - 15x^4 +10x^2$.

(a).

OR

Given $Pd = \frac{8}{x+1} - 2$; $Ps = \frac{x+3}{2}$. Determine.

(b).

14 Solve the gen system of equations by Cramer's rule.

(a). $x - 2y + 3z = 6$

$2x + 3y + 7z = 29$

$3x - 5y - 2z = 13$

OR

(b).

15 Solve the following liner programming problem graphically.

(a). Maximise $Z = 2x+Zy$ subject to

a) $x+4y \leq 24$, $3x+y \leq 21$, $x+y \leq y$ and b) x and $y \geq 0$

OR

Explain the basic features of Input Output analysis and examine its usefulness.

(b).

M.A. ECONOMICS

SEMESTER – I

PAPER – ECO- 105 (a): Fundamentals of Computer

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Explain Block Diagram of Computer.
2. What is the difference between RAM and ROM?
3. Explain the components of File in MS-Word?
4. State the options for ending a word documents.
5. Explain the procedure to enter the time series data in an excel sheet.
6. How do you create pie chart in an excel sheet?
7. State the advantages of Power Point Presentation.
8. State the options available for slide show.
9. How do you retrieve the data from excel sheet to SPSS data sheet?
10. What are the search Engines?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Explain the different types of computers.

(a).

OR

Explain in detail about various input devices in computer.

(b).

12 Explain creating, editing and printing a word document.

(a).

OR

Explain the procedure for mail merge in MS-Word.

(b).

13 Discuss the architecture of an Excel Sheet and its advantages.

(a).

OR

Explain the procedure involved in getting descriptive statistics through Excel.

(b).

14 What are the essential components of a good power point presentation.

(a).

OR

Discuss the procedure involved in creating a good power point presentation.

(b).

15 Explain the procedure involved in creating and E-Mail and sending it.

(a).

OR

Elucidate the advantages and disadvantage of email.

(b).

M.A. ECONOMICS

SEMESTER – I

PAPER – ECO- 105 (b): Urban Economics

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. What are the Classifications of Urban Areas?
2. Explain Nature and Scope of Urban Economics.
3. Write note on Problem of Urban Transportation.
4. Write about Street Children and Street Vendors.
5. Explain Urban Poverty and Inequality.
6. Briefly write on Solid Wastes and Noise Pollution.
7. Role of National Building Organisation.
8. Sustainable Urban Development.
9. What are the need for Improvement in Quality of Living and Environment?
10. Explain the Burden of Diseases.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Describe about Growth and Characteristics of Urban Population.

OR

(b). Explain the Growth of Formal and Informal Economic Activities.

12 (a). Write about pull and push Factors for Urbanization in India.

OR

what are the Challenges for Urban Growth?

(b).

13 Urban Poverty Alleviation Programmes.

(a).

OR

JNNURM and role of National Building Organisation.

(b).

14 What are the Growth of Formal and Informal Economic Activities?

(a).

OR

Integrated Housing and Slum Development Programme.

(b).

15 Explain the Size and Growth of major Urban Agglomerations.

(a).

OR

Describe about SJSRY.

(b).

M.A. ECONOMICS

SEMESTER – I

PAPER – ECO- 105 (c): Welfare Economics

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Define the concepts of welfare and wellbeing.
2. Explain the concept of 'Rationality' with an example.
3. State the reasons for divergence between private costs and the social costs.
4. Explain the concept of externalities in consumption with an example.
5. List out the conditions for majority rule.
6. What is the need for interpersonal comparisons in welfare economics?
7. Briefly state the contributions of Barone to Welfare Economics.
8. Write a short note on Bergson's social welfare function.
9. State the criticisms leveled against the classical assumption of rational behavior.
10. Write a short note on Cognitive economics.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Discuss the nature, scope and limitations of welfare economics as a breach of study.

OR

(b). Illustrate the similarities and differences between "Positive Economics and Normative Economics" with examples.

12 (a). Explain the importance and limitations of Pigovian welfare economics.

OR

(b). Discuss the First Fundamental Theorem of Welfare Economics.

13 (a). Elucidate the optimality conditions of Pareto for the maximization of Social Welfare

OR

(b). Examine the contributions of Arrow-Debreu to Welfare Economics.

14 (a). State Scitovsky double criterion. How is it an improvement over Kaldor-Hicks' Compensation criterion?

OR

(b). Critically examine Samuelson's Utility Possibility Frontier.

15 (a). Discuss W. Kahneman and Tversky's Prospect theory on Optimal Decisions.

OR

(b). Elucidate Richad Thaler and Sunstein's Nudge theory.

M.A. ECONOMICS

SEMESTER – I

PAPER – ECO- 106 (a): Economics of Environment

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Nature and Scope of Environmental Economics
2. Sustainable Development
3. Natural Resources
4. Renewable and Non-Renewable Resources
5. Types of Pollution
6. Industrial Pollution
7. Air and Water Pollution
8. Urban Pollution
9. Pigouvian Analysis of Externalities
10. Environmental Education

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Discuss about Economic growth and Environmental Degradation

OR

(b). Explain about Environmental Kuznets Curve

12 (a). Explain the relation between environmental quality and economic growth

OR

Briefly explain the causes of environmental degradation

(b).

13 Discuss about the objectives of environmental policy

(a).

OR

Describe the National Environmental Policy 2006

(b).

14 Explain the Environmental Protection Act

(a).

OR

Explain the global environmental Policies

(b).

15 Discuss about the environmental conferences on environment

(a).

OR

Describe about the Conservation and management of Common Property Resources

(b).

M.A. ECONOMICS

SEMESTER –I

PAPER – ECO- 106 (b): Demography

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks (5 x 4 = 20)

1. Briefly explain the direct and indirect methods of data collection.
2. Briefly write about demographic thoughts.
3. What are the trends of population in India.
4. Explain the caste wise growth of population in India.
5. Briefly analyse the mortality rate between rural and urban areas in India.
6. Explain the role of education in rural development of India.
7. Explain the structural changes in population?
8. Explain the need for skill development in India.
9. Bring out the main elementary of population policy 2000?
10. Briefly write about the Janani suraksha Yojana scheme in India.

SECTION – B

Answer all Questions. Each question carries equal marks (5 x 12 = 60)

11 Explain the nature and scope of demography

(a).

OR

Describe the Adam Smith population theory.

(b).

12 Explain the theory of demographic transition in India..

(a).

OR

What are the causes for growth of population in India

(b).

13 Explain the size of family between rural and urban areas?.

(a).

OR

What are the causes and indicators of mortality in India

(b).

14 Explain the determination of quality of population in India..

(a).

OR

Describe the employment level in formal and informal sector in India.

(b).

15 What are the Measures to control of population explain.

(a).

OR

Explain the role and progress of family planning programmes in India

(b).

SEMESTER – I

M.A. ECONOMICS

PAPER – ECO- 107 : Human Values and Professional Ethics-I

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Define the nature and scope of Ethics?
2. Explain Ethics and its relation to Religion and Environment?
3. Examine Actual and Potential Values?
4. Responsibility and Freedom?
5. Aparigraha and Asteya.
6. Niskama karma.
7. Religious tolerance.
8. Gandhian Ethics.
9. Explain crime and punishment?
10. Views on Manu.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 What are the Needs and Implementation of Ethics?.

(a).

OR

Explain the Goals and Ethical Values in Various Professions?

(b).

12 Examine the Basic moral conceps/

(a).

OR

(b). Explain the Nature of Values, Good and Bad, End and Means, Character and Conduct?

13 What are the purusharthas? Explain it?

(a).

OR

Explain the Ahimsa, Satya, Bramhacharya?

(b).

14 Examine the Buddism Four Noble truths?

(a).

OR

Briefly explain the Jainism?

(b).

15 Explain the Crime and theories of Punishment?

(a).

OR

Examine the reformative and retributive?

(b).

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 201: Micro Economics Analysis - II

(Revised Syllabus with effect from 2021-2022)

Time:3Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 (5 x 4 = 20) marks

1. Explain the concept of Limit Pricing?
2. Expound Sylos-Labine models of Limit Pricing?
3. Discuss the concept of Eulers Thereon?
4. What is Marginal Physical Product?
5. Illustrate Ricardo's Theory of Distribution?
6. Critically examine Karl Mark's theory of distribution?
7. Explain 'General Equilibrium'?
8. Explain the concepts of Social Welfare Function?
9. Distinguish between Static and Dynamic Equilibrium?
10. Decribe the 'Zero Seem Game'?

SECTION – B

Answer all Questions. Each question carries equal marks (5 x 12 = 60)

11 Discuss Baumol's Revenue Maximisation Model of the Firm?

(a).

OR

Elucidate Maris' model of the managerial enterprise?

(b).

12 Elucidate Williamson's model of managerial discretion?

(a).

OR

Expound the Neo-Classical theory of distribution?

(b).

13 Discuss exchange and consumption under general equilibrium?

(a).

OR

Describe production and exchange under general equilibrium

(b).

14 Discuss the Pigovian Principles of Welfare Economics?

(a).

OR

Illustrate Pareto Optimal Conditions?

(b).

15 Explain linear programming with graphic examples?

(a).

OR

Examine the significance of input-output analysis?

(b).

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 202: Macro Economics Analysis - II

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Nature and Scope of Environmental Economics
2. Sustainable Development
3. Natural Resources
4. Renewable and Non-Renewable Resources
5. Types of Pollution
6. Industrial Pollution
7. Air and Water Pollution
8. Urban Pollution
9. Pigouvian Analysis of Externalities
10. Environmental Education

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Discuss about Economic growth and Environmental Degradation

OR

(b). Explain about Environmental Kuznets Curve

12 (a). Explain the relation between environmental quality and economic growth

OR

Briefly explain the causes of environmental degradation

(b).

13 Discuss about the objectives of environmental policy

(a).

OR

Describe the National Environmental Policy 2006

(b).

14 Explain the Environmental Protection Act

(a).

OR

Explain the global environmental Policies

(b).

15 Discuss about the environmental conferences on environment

(a).

OR

Describe about the Conservation and management of Common Property Resources

(b).

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 203: Federal Finance

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Objectives of Fiscal Policy?
2. What are the main causes for Low Deficit Finance in India?
3. Matching Vs. Non-Matching Grants.
4. Balanced and Unbalanced Budget?
5. What are the various problems of Federal Finance?
6. Principles of Multi-Unit Finance?
7. The Reforms of federal finance in India?
8. Fiscal federalism?
9. Zero based Budgeting
10. Significance of Local Finance

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Explain the Role of Fiscal Policy in India

(a).

OR

What are the functions and performance of finance commission?

(b).

12 Describe about Grants and Subsides

(a).

OR

Fiscal crisis in India-Discuses?

(b).

13 Discuss about Balanced and Unbalanced Budget Growth?

(a).

OR

What is classical and modern views on Fiscal policy?

(b).

14 Briefly write on budget classification?

(a).

OR

Explain the Revenue and Expenditure of local bodies?

(b).

15 What are the functions of 14th Finance Commission in India?

(a).

OR

Explain the reforms of federal finance in India?

(b).

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 204: Statistical Methods in Economics

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 (5 x 4 = 20) marks

1. State different types of correlation.
2. Distinguish between Correlation and Regression.
3. Define probability. Explain the conditional probability.
4. State the properties of Normal Distribution.
5. Explain the advantages of sampling over the census method.
6. Why stratified random sampling method is better than the simple random sampling?
7. Discuss the test for the consistency of Index Numbers.
8. Review the components of time series.
9. Explain the large sample tests and small sample tests.
10. Explain the terms null hypothesis, level of significance.

SECTION – B

Answer all Questions. Each question carries equal marks (5 x 12 = 60)

11 (a). What do you mean by correlation? What is its significance? Does the existence of correlation always signify causal relationship between the two variables.

OR

(b). For the given data, calculate two regression equations:

	Advertisement Cost (In Rs.)	Sales (In Rs.)
	X	Y
Mean	20	120
S.D	5	25

The correlation coefficient h=0.08.

12 (a). A back contain 12 blue balls, 7 green balls and 4 red balls. Find the probability of drawing:

i). One blue ball ii). Three Green Balls and iii). Three balls one each color.

OR

Explain a normal distribution and state the properties of normal distribution.

(b).

13 Explain the terms random sample, stratified sample and purposive sample. Explain the

(a). importance of normal theory in Economics.

OR

Distinguish between Random and Non-Random Sampling designs.

(b).

14 Fit a straight line trend to the following data and hence estimate the production for the

(a). year 2024.

Year	2017	2018	2019	2020	2021
Production (in tons)	80	90	92	83	94

OR

Fishers Index number is an Ideal Index number – Justify.

(b).

15 What is student t-distribution? How is it used a test of significance.

(a).

OR

A die is thrown 180 times with the following results.

(b).

Number turned up	1	2	3	4	5	6
Frequency	25	35	40	22	32	26

TSest the hypothesis that the die is unbiased (use χ^2 – test)

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 205 (a) : International Trade : Theory and Policy

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. **(5 x 4 = 20)**

Each Question carries 4 marks

1. Explain the Concept of "Absolute Advantage" with a simple numerical example.
2. Distinguish between gains from exchange and gains from specialization.
3. State Linder's Preference Similarity theory of international trade.
4. Give an account of Kravis' Availability theory.
5. Distinguish between Gross Barter and Net Barter Terms of Trade.
6. What is Immiserizing Growth?
7. How do you measure the deadweight cost of protection?
8. Write a short note on FEMA.
9. Distinguish between Trade Creation and Trade Diversion with numerical example.
10. What are the major provisions of India's New Patent Act of 2005?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Analyse the gains from international trade according to Ricardo's Comparative Advantage.

OR

(b). State and prove Factor Price Equalization Theorem.

12 (a). How did Felvey incorporate the intra-industry trade within the framework of Heckscher-Ohlin Theorem?

OR

(b). "Comparative Advantage is not a permanent one; it can change over the lifecycle of a product". Elucidate the statement.

13 (a). Critically examine the Secular Deterioration thesis.

OR

(b). Discuss the Hicksian theory of Terms of Trade and Economic Growth due to technical progress.

14 (a). Illustrate the effects of Tariff using partial equilibrium approach.

OR

(b). State and prove Stolpher –Samuelson theorem.

15 (a). Analyse the different stages of economic integration with examples.

OR

(b). Evaluate the functioning of WTO with special reference to the developing countries.

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 205 (b): Economics of Infrastructure

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. What is infrastructure meaning and Definition?
2. What do you mean by non-conventional sources of energy?
3. New Telecom Policy 1999?
4. What is morbidity?
5. What are the sources of Energy?
6. What is the cost subsidization?
7. Which type of performance of Health?
8. Consumption of Natural Gas?
9. Explain the performance of railway's
10. What are the infrastructure public Utilities?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Explain the two categories into which infrastructure are divided. How are both interdependent?

OR

(b). Write few lines about power distribution supply in national capital of India?

12 Why infrastructure is called the support system on which depends the efficient

(a). working of a modern industrial economy?

OR

Write the difference between commercial and non-commercial sources of energy?

(b).

13 What are the challenges faced by power and Tele communication sectors in India?

(a).

OR

What do you mean by the term 'AYUSH'?

(b).

14 How has women's health become a matter of great concern?

(a).

OR

What is the state of rural infrastructure in India?

(b).

15 What are the indicators of health status of a country?

(a).

OR

How can we increase the effectiveness of health care programmes?

(b).

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 205 (c) : Introduction of Information Technology

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Distinguish between LAN and WAN.
2. State the importance of https in internet browsing.
3. State the uses of e-mail.
4. Write short note on binary files.
5. State the need for compressing files video files.
6. Write short note on web –TV.
7. What is data mining?
8. Explain the concept of CAM.
9. What are the harmful effects of Electromagnetic Radiation?
10. What do you mean by Phishing?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Discuss the evolution of internet during the last 20 years in terms of quantity and quality.

OR

(b). What is internet? What are its features? How is a website designed?

12 (a). What is electronic mail? How is it used for group communications? What are its merits and demerits?

OR

(b). Discuss the methods of uploading and downloading attachments with email.

13 (a). What is content development? How is it uploaded and shared with the stakeholders?

OR

(b). Elucidate the methods of reducing the size of video files without compromising their quality.

14 (a). "Information technology is a tool for effective management". Substantiate the statement.

OR

(b). Analyse the growing importance of online trading and e-commerce in recent years.

15 (a). Write an essay on the growing menace of viruses as a threat to information technology.

OR

(b). Discuss the need for ethical values in the use of online resources.

Model Question Paper

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO 206(A): BASIC ECONOMETRICS

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Define Econometrics. How is it different from Mathematical Economics?
2. What is Time Series Data? Give examples.
3. State the Assumptions of Classical Simple Linear Regression Model.
4. Explain the meaning and significance of R^2.
5. State the assumptions of General Linear Regression model.
6. What are the limitations of Regression Analysis with Dummy variables?
7. Outline the consequences of the problem of Multicollinearity on the OLS estimators.
8. Briefly explain the White Test for Heteroskedasticity.
9. What is Simultaneous Equation bias?
10. Explain the method of Indirect Least Squares.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Discuss the nature, scope and limitations of Econometrics

OR

(b). Distinguish between Time Series data and Cross section data and discuss the relative merits and demerits.

12 Explain the method of estimation of simple linear regression model through

(a). OLS method.

OR

(b). Discuss different functional forms used in regression analysis and their applications in economics.

13 (a). Discuss the properties of OLS estimators of a General Linear Model and prove that they are BLUE.

OR

(b). Explain the method of fitting Regression equation with dummy variables.

14 (a). What is Heteroskedasticity? What are its consequences? How do you overcome them?

OR

(b). Explain the Durbin-Watson test to detect the auto-correlation.

15 (a). What is Simultaneous bias? What are its consequences?

OR

(b). Explain the order and Rank conditions for the identification of equations.

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 206 (b) : Economics or Tourism

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks

1. What are they differentiation of Tourist and Tourism?
2. Explain the Travel agents and Tour Operators
3. Define impact of Balance of Payments
4. Explain the Tourism and Women Empowerment
5. What are the Tourism Policies in India?
6. Meaning of E-Tourism?
7. What are they international cooperation in tourism sector?
8. what is the FDI and Development of Hotels
9. What is the Multiplier effect?
10. Meaning of Sustainable Tourism?

SECTION – B

Answer all Questions. Each question carries equal marks

11 (a). Explain the different categories into Schemes and Programmes for the Development of Tourism sector in India?

OR

(b). Analyse the Trends in Exchange Earnings for Tourism in International levels?

12 (a). Explain the historical perspective of tourism in India?

OR

(b). Determine the Share of India's future potential of Tourism Industry?

13 (a). Explain the interaction between economic development and tourism sector in India?

OR

(b). What economic dimensions of Tourism consumption industry income and employment generation level in India?

14 (a). Describe the publicity and Market Development for Promotion of Travel and Accomn

OR

(b). Explain the Sub-segment of Allied components of Tourism industry in India?

15 (a). Discussed Central Government Scheme of National Mission on Pilgrimage Rejuvenat

OR

(b). How can great domestic and International tourism development in India?

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 206 (b) : Economics or Tourism

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. What are they differentiation of Tourist and Tourism?
2. Explain the Travel agents and Tour Operators
3. Define impact of Balance of Payments
4. Explain the Tourism and Women Empowerment
5. What are the Tourism Policies in India?
6. Meaning of E-Tourism?
7. What are they international cooperation in tourism sector?
8. what is the FDI and Development of Hotels
9. What is the Multiplier effect?
10. Meaning of Sustainable Tourism?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Explain the different categories into Schemes and Programmes for the Development of Tourism sector in India?

OR

(b). Analyse the Trends in Exchange Earnings for Tourism in International levels?

12 (a). Explain the historical perspective of tourism in India?

OR

(b). Determine the Share of India's future potential of Tourism Industry?

13 (a). Explain the interaction between economic development and tourism sector in India?

OR

(b). What economic dimensions of Tourism consumption industry income and employment generation level in India?

14 (a). Describe the publicity and Market Development for Promotion of Travel and Accommodation in Tourism Sector?

OR

(b). Explain the Sub-segment of Allied components of Tourism industry in India?

15 (a). Discussed Central Government Scheme of National Mission on Pilgrimage Rejuvenation and Spiritual Augmentation (PRASAD)?

OR

(b). How can great domestic and International tourism development in India?

M.A. ECONOMICS

SEMESTER – II

PAPER – ECO- 207 : Human Values and Professional Ethics-II

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. What is value education?
2. Explain structure and responsibilities of family?
3. Human Cloning.
4. Euthanasia.
5. Business ethics.
6. Medical ethics.
7. Environmental Ethics.
8. Social ethics.
9. Human Trafficking.
10. Surrogacy / Pregnancy?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Explain the family values in value education?

(a).

OR

Examine the status of women in family and society?

(b).

12 (a). Briefly explain the views of charaka and sushruta on moral responsibility of medical practitioners?

OR

(b). Ethical issues in relation to health care professional patients?

13 (a). Examine the ethical standards of business immoral and illegal practices and their solutions?

OR

(b). Explain the characteristics of ethical problems in management?

14 (a). Examine the environmental ethical theory?

OR

(b). How to control ecological cisis?

15 (a). Explain the organtrade and Human trafficking in society?

OR

(b). What is the media – Impact of Newspapers, Televison?

M.A. ECONOMICS

SEMESTER – III

PAPER – ECO- 301 : Economics of Growth and Development

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Define Economic Growth and distinguish it from Economic Development.
2. Briefly explain the problems in the use of Percapita income as a measure of welfare.
3. Explain the concepts of Positive Checks and preventive Checks.
4. Define the capital – output ratio and state its determinants.
5. What are the assumptions of Adam Smith's model of growth?
6. Write a short note on 'Stationary State'.
7. What are the pre-conditions for take-off?
8. Explain the concept of 'Vicious Circle of Poverty'.
9. What is Dualism?
10. Write a short-note on Sociological Dualism.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Discuss the evolution of measures of Economic Development.

OR

(b). What is Physical Quality of Life Index? How is it constructed? What are its limitations?

12 (a). Analyse the Optimum theory of Population

OR

Elucidate the Theory of Demographic Transition.

(b).

13 (a). Explain the Theory of Maximum Investible Surplus proposed by Amartya Kumar Sen

OR

Discuss the Golden Age model of Mrs. Joan Robinson.

(b).

14 (a). Elucidate Balanced Growth Theory proposed by Rosentein Rodan and Ragnar Nurkse to break the Vicious Circle of Poverty operating in underdeveloped countries.

OR

Critically Examine Lewis Model of Economic Growth with Unlimited Supplies of labour.

(b).

15 (a). Discuss Higgins' theory of Technological Dualism.

OR

Discuss dualistic process of economic development in underdeveloped countries according to Fei and Ranis model

(b).

M.A. ECONOMICS

SEMESTER – III

PAPER – ECO- 302 : Indian Economy

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Structure of National Income
2. Recent Trends in Poverty
3. Occupational Structure
4. Green Revolution
5. Concept of Food Security
6. Livestock Resources
7. 1991 Industry Policy
8. Disinvestment Programme
9. IT and IT enabled Services
10. MSMES (Micro , Small ,Medium Enterprises)

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Explain the Basic Characteristics of Indian Economy

OR

(b). Explain Causes for Unemployment in India ? What are the steps taken by the government to overcome unemployment problem in India ?

12 Discuss the role of agriculture in Economic Development

(a).

OR

Is Farm size influence agricultural Productivity ?Explain ?

(b).

13 Explain the Performance of Indian agriculture in Five Year Plans

(a).

OR

Describe the role of Industrial Sector in Economic Development

(b).

14 Explain the role of Service Sector in Indian Economy

(a).

OR

Describe the R & D and Construction Services in India

(b).

15 Explain the globalization of Indian Economy

(a).

OR

Discuss W.T.O and impact on the different sectors of Indian Economy

(b).

M.A. ECONOMICS

SEMESTER – III

PAPER – ECO- 303 (a) : International Finance

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Meaning and Definition of Industrialization.
2. The Patterns of Industrialization
3. Transport Cost and Market Density
4. Public Sector Companies
5. Agglomerative and Deglomerative Factors
6. Co-efficient of Localization
7. Factors affecting Industrial Productivity
8. The Review of Industrial Resolution 1956
9. Briefly Explain the Cost Benefit Analysis
10. Write about the Break-Even-Analysis

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Examine the Factors Promoting Industrialization in Developing Countries.

OR

(b). Briefly analyse the Factors Influencing the Size of the Optimum Firm.

12 Briefly Explain Different Forms of Industrial Organization in India.

(a).

OR

Discuss the Essential Characteristics of Corporate Sector and find out the

(b). Advantages and Disadvantages of the Corporate Sector.

13 Critically examine weber's theory of industrial location

(a).

OR

Briefly explain the Walter ISARD location theory

(b).

14 Examine the importance of industrial production and productivity

(a).

OR

Briefly explain the objectives of new industrial policy on 1991.

(b).

15 What are the different rates of return methods and pay back methods?

(a).

OR

Explain the role and progress of family planning programmes in India

(b).

M.A. ECONOMICS

SEMESTER – III

PAPER – ECO- 303 (b) : Production Economics and Farm Management

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Explain the Nature and Scope of Modern Agriculture?
2. Write about production Function?
3. What is the role of Agriculture?
4. What are the types of Planning?
5. Write note on Dairying and Fisheries?
6. Explain about Green Revolution in India?
7. Explain the Horticulture and Floriculture?
8. Problems of rural industrialization?
9. Explain about Rural infrastructure?
10. Animal husbandry.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Characteristic of Indian Agriculture?

(a).

OR

Comments on the trends in production and productivity in Agriculture.

(b).

12 What is the importance of Allied Activities in Development of Rural Economics?

(a).

OR

Describe about interdependence between Agriculture and Industry?

(b).

13 Write about production Functions?

(a).

OR

Explain the Risk and Uncertainty in Agriculture?

(b).

14 Suggest some measures to increase the agricultural productivity.

(a).

OR

What is the main causes for small size of land holdings?

(b).

15 Write a detailed note on programming techniques discussing their infinity in

(a). planning?

OR

Explain the Development of Agro-based industries in India.

(b).

M.A. ECONOMICS

SEMESTER – III

PAPER – ECO- 303 (c) : Industrial Economics

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Meaning and Definition of Industrialization.
2. The Patterns of Industrialization.
3. Transport Cost and Market Density.
4. Public Sector Companies.
5. Agglomerative and Deglomerative Factors.
6. Co-efficient of Localization.
7. Factors affecting Industrial Productivity.
8. The Review of Industrial Resolution 1956.
9. Briefly Explain the Cost Benefit Analysis.
10. Write about the Break-Even-Analysis.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Examine the Factors Promoting Industrialization in Developing Countries

OR

(b). Briefly analyse the Factors Influencing the Size of the Optimum Firm

12 (a). Briefly Explain Different Forms of Industrial Organization in India

OR

12 (b). Discuss the Essential Characteristics of Corporate Sector and find out the Advantages and Disadvantages of the Corporate Sector.

13 (a). Critically examine weber's theory of industrial location.

OR

13 (b). Briefly explain the Walter ISARD location theory.

14 (a). Examine the importance of industrial production and productivity.

OR

14 (b). Briefly explain the objectives of new industrial policy on 1991.

15 (a). What are the different rates of return methods and pay back methods?

OR

15 (b). Explain the role and progress of family planning programmes in India.

M.A. ECONOMICS

SEMESTER – III

PAPER – ECO- 303 (d) : Women and Economic Development

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Examine the trends in women Population in India?
2. Accident for the declining work force participation in India?
3. How do you calculate Human Development Index?
4. Define Gender Gap?
5. What is Gender Development Index?
6. How educated women in is useful to a family?
7. Account for lower ownership of land by women in agriculture?
8. Discuss the Functioning of Social Welfare Boards?
9. Examine the working of Micro Credit Groups?
10. Estimate the importance of Jana Dhan Yojana Scheme?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Discuss the role of women in economic development?

(a).

OR

Elucidate the reasons for under human development in India?

(b).

12 Critically examine the women Empowerment measures taken in India?

(a).

OR

Which measures can be taken to improve health care access?

(b).

13 Growing income in equalities disturb equilibrium of the economy's comment.

(a).

OR

Account for the factors which affect women entry into labour markets?

(b).

14 Critically examine the working of National Commission of Women?

(a).

OR

How NABARD is Contrifreeling to women development in India? Explain?

(b).

15 Discuss the role of Non- Government Organisations in empowerment of women?

(a).

OR

Discuss the importance of MGENREGA scheme in increasing employment of women?

(b).

M.A. ECONOMICS

SEMESTER – III

PAPER – ECO- 304 : Communication and Soft Skills

Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 100**

Answer all Questions. Each question carries equal marks **(5 x 20 = 100)**

1 (a). Differentiate intra and inter personal skills. Attempt an essay on its importance and salient features.

OR

(b). Attempt an essay defining soft skills and its importance in a globalized world.

2 (a). Explain the Time Management Matrix and its significance in maintaining a work life balance.

OR

(b). Explain stress management and its importance .

3 (a). Attempt a essay on Group Discussion

OR

(b). Attempt an essay on clarity in Presentation Skills

4 (a). You are the General Manager of TCS. Write a memo to your subordinate Mr. Ravi for his negligence in completing the project within the time frame.

OR

(b). Write an essay on “Corruption hinders the nation’s development”.

5 (a). What is Etiquette? How important is it in today's corporate world?

OR

(b). In an interview, a HR asks the question ‘Given a chance, what would you change in your life?’ As an active listener, analyse the content and intent of the question

M.A. ECONOMICS

SEMESTER – III

PAPER – ECO- 305 (a) : Andhra Pradesh Economy

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. What are the components of Human Development Index?
2. Write a short note on the changing demographic features of Andhra Pradesh.
3. What are the main objectives of the land reforms policy in Andhra Pradesh?
4. Briefly explain the trends in the cropping pattern in Andhra Pradesh.
5. What are the specific problems of tiny and small scale sectors in Andhra Pradesh?
6. Compare the availability of institutional and non-institutional sources of rural credit in Andhra Pradesh.
7. State the importance of Services sector in Andhra Pradesh.
8. Identify the important religious tourism places in Andhra Prades
9. What were the objectives of Twelfth Five year Plan in the Andhra Pradesh
10. Outline the changing role of administered prices in Andhra Pradesh.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Bring out the factors that contribute to the growth of income and employment in Andhra Pradesh.

OR

(b). Critically evaluate the measures taken in Andhra Pradesh towards the Empowerment of Women.

12 Bring out the factors that contribute to the growth of Agricultural productivity in

(a). Andhra Pradesh.

OR

(b). Critically evaluate the recommendations of the Koneru Ranga Rao Committee on Land Reforms in Andhra Pradesh.

13 (a). Analyse the role of large scale industries in the development of Andhra Pradesh.

OR

(b). What are the major sources of industrial finance in Andhra Pradesh?

14 (a). Analyse the role of APSRTC in the provision of public transport to the people of Andhra Pradesh.

OR

(b). Do you think that Power Sector in Andhra Pradesh has been sufficiently developed in relation to the demand? Justify your answer.

15 (a). Critically evaluate the targets and achievements of various Five Year Plans in Andhra Pradesh.

OR

(b). Analyse the major sources Tax revenue to the Government of Andhra Pradesh.

M.A. ECONOMICS

SEMESTER – III

PAPER – ECO- 305 (b) : Agricultural Economics

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. What are the causes for low productivity in agriculture?
2. Write about Kisan Credit Cards.
3. Explain about Global Hunder Index.
4. Write a short note on modernisation of Agriculture.
5. Write briefly short notes on Achieving Zero hunger.
6. Briefly outline the scope of Agricultural Economics.
7. Write about National Crop Insurance Programme.
8. Write notes on Re orientation of Agricultural Development.
9. National Food Security Mission (NFSM).
10. Explain the price policy in India.

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Explain the role of women in Agricultural Development.

OR

(b). Write notes on Rainfed Area Development Programme.

12 What are the Causes for small size of land holdings in India?

(a).

OR

Explain the Rural Indebtedness.

(b).

13 Describe the share of public and private sector.

(a).

OR

What are the physical and Financial Performance of Grameen Bhandaran Yojana..

(b).

14 Explain about National Mission for Sustainable Agriculture.

(a).

OR

Write about structure of Agricultural Markets.

(b).

15 Explain the role of AGMARK and AGMARKNET.

(a).

OR

Write about Exports and Imports of Agricultural Commodities.

(b).

M.A. ECONOMICS

SEMESTER – IV

PAPER – ECO- 401 : Rural Development

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Discuss the Gandhian Approach to rural development?
2. Discuss the peoples participatory Approach to rural development.
3. Explain the target group Approach to rural Development.
4. Analyse the importance of food securities in India?
5. Account for rural migration in India?
6. Discuss the importance of community development programme?
7. Examine the importance of Swarna Jayanthi Gram Swarozor Yozana?
8. Explain the PURA model for development of rural area?
9. Explain the role of Commercial Banks in rural development?
10. Examine the role of RRBs in rural development

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Discuss the basic elements of rural development?

(a).

OR

Critically examine the Markelan Approach to rural development?

(b).

12 Critically examine the Structure of rural development?

(a).

OR

Account for the rural unemployment in India?

(b).

13 Examine the role of agriculture in rural development?

(a).

OR

Explore various opportunities for rural industrialisation?

(b).

14 Examine the functioning of MGNREGS in increasing employment in rural India?

(a).

OR

Discuss the role of NGOs in rural development?

(b).

15 Examine the Greentown's of project Management?

(a).

OR

How do you monitor and evaluate a rural development programmes?

(b).

M.A. ECONOMICS

SEMESTER – IV

PAPER – ECO- 402 : Financial Institutions and Markets

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Function of Financial System in India.
2. Call- Money Market?
3. Commercial Paper?
4. Repo and reverse Repo Transactions.
5. Secondary Market?
6. New Issue Market?
7. Objectives and Feature of Money Market in India.
8. Bombay Stock Exchange.
9. Differences in Indian Money Market.
10. Industrial Finance Corporation of India (IFCI).

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Briefly analyse the Structure of Financial System in India.

OR

(b). Discuss the promotional role of financial system in developing country like India?

12 Describe the Commercial Bill Market and Treasury Bill Market?

(a).

OR

Explain the Function of Stock Exchange?

(b).

13 Discuss the various methods of Trading in Stock Exchange.

(a).

OR

Analyse the objectives, functions and performance of SEBI.

(b).

14 Discuss the various function if IDBI and also assess its performance?

(a).

OR

Discount and finance House of India – Explain?

(b).

15 Briefly analyse the objective and development functions of Reserve Bank of India?

(a).

OR

Recent Reforms in Indian Capital Market ? Discuss.

(b).

M.A. ECONOMICS

SEMESTER – IV

PAPER – ECO- 403 (a) : India's Economic Reforms

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. What was the immediate cause for the introduction of LPG in India in 1991?
2. What was the need for Devaluation of Indian rupee in 1991?
3. Write a short note on Bank mergers in India in recent years.
4. What are the reasons for the growth of NPAs in the Banking sector?
5. State the need for implementation of Minimum Support Price for major Agricultural products.
6. Identify the major risks in Agricultural sector.
7. What justification do you have to merging of Micro and Small industries with Medium industries?
8. Write a short note on the Corporate Social Responsibility (CSR).
9. What was Multi-Fiber Arrangement? When was it removed?
10. What is debt sustainability?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Make an assessment of India's Economic Reforms since 1991 focusing on its successes and failures.

OR

(b). Elucidate the major reforms undertaken in India on taxation.

12 (a). What are the major arguments in support of the privatization of commercial banks in India?

OR

12 (b). Analyse the growth and structure of Non-financial Companies in India and their effect on the implementation of monetary policy.

13 (a). Critically examine the major reform measures initiated in Indian Agriculture since 1991.

OR

13 (b). Assess the impact of economic reforms in India since 1991 on Macroeconomic stability.

14 (a). Analyse the impact of economic reforms on the eradication of poverty in India.

OR

14 (b). What is Sustainable Development? What measures are taken towards ensuring Sustainable Development in India in recent years?

15 (a). Make an assessment of the impact of Liberalized Trade Policies on the growth of India's foreign trade.

OR

15 (b). Critically examine the functioning of the MNCs in India.

M.A. ECONOMICS

SEMESTER – IV

PAPER – ECO- 403 (b) : Entrepreneurship and Skill Development

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. What are the functions of Entrepreneurs?
2. Write about women Entrepreneurs?
3. What are the different types of Entrepreneurs?
4. Write about the concept of Entrepreneurship?
5. Verbal and Non-Verbal communication?
6. Communication Skills?
7. Entrepreneurship Development Institute of India (EDII)?
8. Leadership Skills?
9. Barrier to communication skills?
10. Motivation?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Explain the nature and characteristics of Entrepreneurs?

OR

(b). Explain the role of entrepreneur in Economic Development?

12 National Institute for Entrepreneurship and small Business Development?

(a).

OR

Describe the problems of women entrepreneur?

(b).

13 Explain the concept of project report?

(a).

OR

National Science and technology Entrepreneurship Development Board (NSTEDB)?

(b).

14 Explain National Skill Development Corporation?

(a).

R

Explain the formulation and Appraisal of Project Report?

(b).

15 National Institute of Small Industry Extension and Training (NISIET)?

(a).

OR

Write about AP State Skill Development Board?

(b).

M.A. ECONOMICS

SEMESTER – IV

PAPER – ECO- 403 (c) : Labour Economics

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Types of Labour Markets
2. Concepts and Types of Labour
3. Labour Supply Analysis
4. Ricardo Wage Theory
5. Bargaining theory of Wages
6. Concept of Minimum and Fair Wages
7. Types of Unemployment
8. Minimum Wages Act -1948
9. Features of Industrial Labour
10. Phillips Curve

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Explain the natural Characteristics of Labour migration in India

OR

(b). Describe the composition of labour in different sectors

12 (a). Discuss the Lewis Surplus Theory

OR

Explain the demand for labour

(b).

13 Discuss about Principles of Wage Determination

(a).

OR

Explain the marginal productivity theory of Wages

(b).

14 Discuss about national wage policy and economic development

(a).

OR

Explain the role of wage boards in wage fixation

(b).

15 Describe the various programmes to solve the problem of unemployment

(a).

OR

Explain the Social Security and welfare measures in India

(b).

M.A. ECONOMICS

SEMESTER – IV

PAPER – ECO- 403 (d) : Economics of Insurance

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Definition of Insurance?
2. What is the Risk Financing?
3. Define Re-Insurance Markets?
4. Concept of Re-Insurance?
5. What is the risk Management?
6. Meaning of Social Insurance?
7. Determine Private Insurance sector?
8. What is the Group Insurance
9. Define Institutional Financial intermediaries?
10. Explain the Retirement Pension Plans?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Discuss the Risk Pooling and Risk Transfer of Insurance sector?

(a).

OR

What is the economic Security, Expose sure to Losses in Insurance Sector in India?

(b).

12 Analyse the types Insurance and Economic Development in India?

(a).

OR

Determine the Life Vs Non- Life Insurance?

(b).

13 Explain the interaction between economic development and tourism sector in India?

(a).

OR

Classification of Risk and Explain the Essential of Risk management, Element of

(b). Risk Management of Insurance Sector?

14 Describe the insurance and economic development of institutions as Investment in

(a). Insurance governing in India?

OR

Explain the Health and General Insurance Policies?

(b).

15 Discussed Common Law Equity Proposal, Indemnity, Insurable interest,

(a). Contribution, Subrogation levels?

OR

What is the retirement planning strategies and Insurance Regulation and

(b). development Authority (IRDA) in India? Explain

M.A. ECONOMICS

SEMESTER – IV

PAPER – ECO- 404 : Human Resource and Sustainable Development

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any Five Questions. Each Question carries 4 marks **(5 x 4 = 20)**

1. What is the concept of Economic Growth?
2. What is the theory of Demographic Transition?
3. What is the technology in Development?
4. Capital Output Ratio?
5. Trends in Mortality?
6. What is the development Strategy?
7. What type of performance of factor influencing?
8. What type of resources in HRD?
9. Explain the morbidity in health sector?
10. What are factors in sustainable development?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 (a). Explain the measurement of Economic growth and development in developing countries?

OR

(b). Write few traditional, welfare and modern approaches in HRSD?

12 (a). Explain social and economic factor determine by the population and economic development?

OR

12 (b). Write the difference between HRD and Economic Development?

13 (a). What are the challenges in human resource development in India?

OR

13 (b). Discuses the Health and Economic development in developed and developing Countries?

14 (a). Describe the growth of corporate health in India? Explain

OR

14 (b). Explain the nature and scope of population and HRD Development Strategy in India?

15 (a). What type of the indicators of education as consumption and investment levels in India?

OR

15 (b). Disuses the technology and techniques of decentralisation and appropriate technology?

M.A. ECONOMICS

SEMESTER – IV

PAPER – ECO- 405 (a) : Human Resource Development

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Scope of Human Resource Development?
2. Strategies of Human Resource Development?
3. Role of Education in Human Resource Development?
4. Growth of Corporate Health in India?
5. Mortality and Morbidity?
6. Nutritional Status in India?
7. Food Security in India?
8. HRD and Human Values?
9. Nature of HRD?
10. What are the parameter of HRD?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Is Education and Consumption & Investment - Explain?

(a).

OR

Explain the Pre-Post Gandhian Thought of HRD?

(b).

12 Write note on measurement of Nutritional Status in India?

(a).

OR

How to relation between HRD and Economic Development – Explain?

(b).

13 Analyse the various functions of HRD.

(a).

OR

Explain the measurement of Health Status in India.

(b).

14 Describe the various programms to prevent Mal-nutrition in India?

(a).

OR

Discuss the various trends in Mortality and Morbidity?

(b).

15 Discuss the HRD in Developed and Developing Countries?

(a).

OR

Explain the Human Resource Developing in India?

(b).

M.A. ECONOMICS

SEMESTER – IV

PAPER – ECO- 405 (b) : Planning in India and Indian Economy

(Revised Syllabus with effect from 2021-2022)

Time: 3 Hours **Max. Marks = 80**

SECTION – A

Answer any FiveQuestions. Each Question carries 4 marks **(5 x 4 = 20)**

1. Explain the importance of Agriculture and Economic Development?
2. Write a note on planning under capitalism?
3. What is the need of Industrialization in Developing Nations?
4. Explain the Planning in a Mixed Economy?
5. What are the meaning and Need for Shadow Prices?
6. Write a note on planning commission?
7. Write a note on Need for Investment criteria in India?
8. What is the determination of Shadow Prices?
9. What is the Need and Stages of Project Evolution?
10. What are the function of Wold Trade organisation?

SECTION – B

Answer all Questions. Each question carries equal marks **(5 x 12 = 60)**

11 Explain the Regional Planning Policy in India?

(a).

OR

Describe the limitations and uses of Cost-benefit Analysis?

(b).

12 What area the advantages and disadvantages of private foreign investment?

(a).

OR

Write about different types of planning in India?

(b).

13 Role of monetary policy and its limitation in India? Explain?.

(a).

OR

Explain about Foreign trade and Economic Development?

(b).

14 Explain the main role of fiscal policy in India?

(a).

OR

Explain the need and stages of project evaluation?

(b).

15 Describe Foreign Aid and Importance of Foreign Capital?

(a).

OR

Describe the importance and components of Foreign Capital?

(b).

SRI VENKATESWARA UNIVERSITY

DEPARTMENT OF EDUCATION

TIRUPATI – 517 502

TWO YEAR DEGREE OF MASTER OF EDUCATION-REGULAR PROGRAMME

(As per the Action Plan of NEP 2020)

CBCS-SEMESTER SYSTEM

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Head; Dept. of Education &
Chairman BOS in Education (Comb),Dept.of Education
S.V.University, Tirupati

About the Department:

- The department of education was established in the year 1971. M.Ed. course was started during the academic year 1971-72 with an intake of 10 students. M.Ed. is a two years course with effect from the academic year 2015 onwards with intake of 50 students. Dissertation is an essential component of the course as per the norms of the national council for teacher education (NCTE). The department, since inception, has been working in tune with the mission of the university to promote teaching research and extension.

- Research guidance was provided for Ph.D. candidates since the inception of the department that is from 1971-72. Four research associates worked in the department and at present two research fellows are working in the department.

- The department, since inception, has been working in tune with the mission of the university to promote, teaching, research & extension. Number of major and minor research projects have been completed. Up to now 121 Ph.D. AND MORE THAN 70 M.Phil. were awarded. Number of seminars, workshops, in service training programmes were conducted. Some of the faculty members visited foreign countries. Guidance and counselling services were conducted.

Vision:

To create Teachers for elementary, secondary and higher education holistically to train the future generations of the Country.

Mission:

The department creates environment to train the teachers in leadership roles as caring teachers, professional experts. Training teachers in communication skills to communicate clearly and effectively, to solve problems, use effective education tools to meet the global standards.



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Program Specific Outcomes:

- Impact quality education to students for future teachers.
- Develop a high degree of expertise in all tools of teaching techniques.

Program Outcomes:

- **Creative Thinking:** Development of creative thinking is a prime outcome of any P.G. Programme. Creative thinking enables students to think Creatively, Economically and Socially.
- **Multiple Intelligence :** It enables students to think in Multiple dimensions of intelligence such as Logically, Rationally, Scientifically, Politically and Economically.
- **Investigation :** It enables the students to apply the knowledge on research and other methods of data collection, analysis and interperpretation on research and formulate valid conclusions and suggestions
- **Self-Learning:** It improves the ability to engage in independent learning techniques.
- **Selection of tool :** It enables the student in selection of the proper tool for the investigation of the problem
- **Social Interaction:** Elicit views of the students and help them in interaction with the society and help reach conclusions in social groups
- **Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.
- **Ethics:** Recognize different values and ethics systems and self analyze including their own, understand the moral dimensions of their decisions, and accept responsibility for them.
- **Effective Citizenship:** Demonstrate empathetic social concern and equity-cantered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering



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- **Effective Communication:** Speak, Read, Write and listen clearly in person and through electronic media in English and in one Indian language and make meaning of the world by connecting people, ideas, books media and technology.
- **Self and Life long Learning:** Post Graduation course promotes Self and Life-long learning In the broadest according to the context of Socio and Economical changes.

BOARD OF STUDIES MEETING HELD ON

10thFebruary – 2022

Members Presented

1. **Prof. G Janakiramaiah,** Chairman BOS in Education (Combined) & Head, Dept.of Education, S.V.University, Tirupati.-***Chairman***
2. **Head,** Department of Education,SVU College of Arts,S.V.University,Tirupati-***Member***
3. **The Principal** IASE,S.V.University,Tirupati,- ***Member***
4. **Dr.M.Amareswara Raju,** Principal, Krishna Teja College of Education, Renigunta Road, Tirupati -***Member***
5. **Prof.Gara Latchanna**, Head Department of Education,University college of Arts and Commerce,Andhra University,Visakapatnam-***External Member***
6. **Prof.H.R.Jayamma,** Dept. of Education, Bangalore University, Bangalore -***External Member***

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TWO YEAR DEGREE OF MASTER OF EDUCATION-REGULAR PROGRAMME

As per the Action Plan of NEP 2020

CBCS-SEMESTER SYSTEM

(w.e.f. 2021 – 2022)

RULES AND REGULATIONS

The following are the resolutions made by the Board of Studies in Education, S.V.University, as per the action plan of NEP-2020 for the Two Year M.Ed. Regular Course (CBCS- Semester System) which will come into force with effect from the academic year 2021 – 2022.

1. **Admission**

   Candidates shall be admitted into Two year M.Ed degree course strictly in accordance with the rank secured at the entrance test, if any, or the rank determined on the basis of the marks secured as the qualifying examination or on the basis of any other criteria determined by the University from time to time, following the rules of reservation of seats for various categories of students. The applicants for entrance test shall be drawn from the following programmes:

   a. B.Ed. degree of 1year or 2 years duration

      or

   b. 4-years Integrated Teacher Education Degree Programme (B.EI.Ed/BSc.Ed/BA.Ed).

2. No candidate shall be admitted to the course of the Two year Degree of Master of Education (Regular), unless he/she has taken the B. Ed. degree in S.V.University or an equivalent degree from other University recognized by the S.V.University.

3. **Duration and Course of Study**

   The normal duration of the M.Ed course is two academic years. Each academic year is divided into two semesters. The two semesters in the first academic year are referred to as semester I and semester II and the two semesters in the second academic year are



referred to as semester III and semester IV. Each semester shall comprise of minimum 16 weeks of instruction or 90 working days.

4. No student shall be eligible for the Degree of Master of Education- Regular / unless he/she has completed the prescribed course of study in the University or in an affiliated college extending over Four semesters / two years comprising 100 days in each semester, ordinarily consecutive, and has passed the qualifying theory examination and has prepared a dissertation on an approved topic duly examined and approved by a panel of examiners.

5. Time for the Completion of the Course

The candidates have to complete the M.Ed. course in two years and a maximum period of time is 5 years of joining of the course.

6. Attendance

Candidates shall put the attendance not less than 90% of the total instructional hours in the prescribed course in each semester including field work, practicum, internship, project work, seminars, assignments, extension work & dissertation work etc. Condonation on shortage of attendance may be granted by the university authority to the candidates who have put in attendance of 80% and above on the submission of a certificate from a Medical Practitioner and also on payment of condonation fees prescribed by the University.

7. Candidates who have put in less than 80% of attendance are not eligible for grant of condonation on shortage of attendance and also they are not eligible to appear for the University examination of that semester. Such candidates shall have to repeat the regular course of study of the corresponding semester in the subsequent academic year, in order to become eligible to appear for the examination. The seats of candidates admitted for repetition of the semester are treated as extra seats, over and above the sanctioned strength.

8. Attendance shall be reckoned from the date of commencement of instruction as per the academic calendar. However, in the case of candidates admitted later (but within the stipulated time), the attendance will be reckoned from the date of admission.



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9. Participation in N.C.C. / N.S.S. Special / N.1. Camps or Inter Collegiate or Inter – University or Inter – State or National or International competitions or Debates, Youth Festivals or Educational tours approved by the University, form integral part of the curriculum. Participation in such activities are considered official and however, the total period of such a participation shall not exceed two weeks in a semester.
10. Instruction in various subjects shall be provided by the college as per the scheme of instruction and syllabi prescribed.
11. At the end of each semester, University Examinations shall be held as prescribed in the Scheme of Examination. The medium of instruction shall be only in English.
12. Each theory paper carries 100 marks of which 80 marks are earmarked for Semester – end Examination and 20 marks are earmarked for internal assessment to be awarded by the teacher concerned.On the basis of two internal tests for 10 marks, 5 marks for participation in seminars, group discussion and assignment and,5 marks for attendance. Two internal tests are conducted and the performance of the better of two will be taken. However, it is mandatory for a student to take the tests / seminar / group discussion and assignment.The minimum qualifying marks for the internal assessment in theory papers should be 10 out of 20 and 50% in other practicum.
13. There will be double valuation of theory papers of semester – end examination. The average of two will be taken. In case of difference of above 20 % of marks between the two valuations, it will be sent for third valuation. In such cases, the average of the two nearest marks of three independent valuations will be taken will be taken for the purpose of declaring the results.
14. Under Semester System there will be no supplementary examinations apart from the semester and examinations.

15. Passing Standards

A candidate should secure a minimum of 40% of marks in each semester-end theory paper of University examination and an aggregate of 50% of marks of all the papers of the semester for a pass. Further, a candidate should secure a minimum of 50% marks in seminar/project work / field work / dissertation / internship any such other assignment for a pass. If a candidate fails to secure an aggregate of 50% of marks for a pass in theory paper of a semester he/she has to secure 40% marks in semester – and

examination and 50% marks in such individual paper/papers (Semester-end examination + Internal marks put together) in the subsequent opportunity of the examination.

16. Award of Division

The results will be given in semester grade point averages (SGPA) and finally in cumulative grade point averages (CGPA) candidates who have passed all the examinations of the M.Ed Degree shall be awarded Classes / Divisions in accordance with the total aggregate marks secured by them in all the semester examinations taken together.

Letter Grade	**Grade Point**
O(Outstanding)	10
A+(Excellent)	9
A(Very Good)	8
B+(Good)	7
B(Above Average)	6
C(Average)	5
P(Pass)	4
F(Fail)	0
Ab(Absent)	0

The statutory requirement for eligibility to enter as assistant professor in colleges and universities in the disciplines of arts, sciences, commerce etc., is a minimum average mark of 50% and 55% in relevant postgraduate degree respectively for reserved and general category. Hence, it is recommended that the cut-off marks for grade B shall not be less than 50% and for grade B+, it should not be less than 55% under the absolute grading system. Similarly , cut-off marks shall be fixed for grade B and B+ based on the recommendation of the statutory bodies (AICTE, NCTE etc.,) of the relevant disciplines.

Award of Ranks

Only those candidates who appear and pass in all the examination papers of each semester at the first appearance are eligible for the award of Ranks.

Two-Year M.Ed. Programme: Major Features

The two-year M.Ed. programme is a professional programme in the field of Teacher Education that seeks to provide opportunities for students to:

- Extend as well as deepen their knowledge and understanding of education,
- Specialize in select areas of study and
- Develop research capacities,leading to specialization in either Elementary Education or Secondary Education.
- It's a professional programme that seeks to prepare:

  - Teacher Educators and

  - Other education professionals, including
- Curriculum developers,
- Educational policy analysts,
- Educational planners, administrators, supervisors, researchers,
- School head masters,with specialization either In Elementary Education (up to Class VIII) or in SecondaryEducation (Classes VI-X).

Overall Thrust: Fostering Quality in Teacher Education

Quality teacher education is broadly conceptualized asthe one which is:

- Effective for meeting the objectives,
- Relevant and responsive to the school education system,
- Mediated by adequate and appropriate inputs and teaching-learning processes,
- Equitable,
- Resource-efficient, and
- Capable of ensuring substantiative access (achieving expected learning outcomes)

Components of the two-year M.Ed. Programme

A Common Core that includes Perspective Courses, Tool Courses, Teacher Education Courses, and Self-development components.

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Specialization Branches where students choose to specialize in either

1. Elementary Education.

   or

2. Secondary Education.

Research leading to dissertation.

Field attachment/internship.

Assessment of Student Learning

- For each theory course, 20% marks to be assigned for continuous and comprehensive internal assessment and 80% marks for examination conducted by the examining body.
- The bases of internal assessment shall include individual/ group assignments, seminar presentations, field attachment internship appraisal reports, project reports, etc.

Programme Organisation

- The proposed programme will follow the following organisation and credit apportionment format:

  Year 1: Two semesters (16 to 18 weeks per semester) + inter- semester break + 3 weeks in summer.

  Year 2: Two semesters (16 to 18 weeks per semester) + 3 weeks inter-semester break.

  Total: Four semesters (72 weeks); + 6 weeks for field attachment during inter-semester break in total 78 weeks.

- Apart from the 6 weeks in the various inter-semester breaks, 3 weeks to be allocated to the field attachment and internship.
- Each year is to put in at least 200 working days exclusive of the days of admissions and inclusive of examination days.



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Semester-wise Curriculum Organisation

Semester – I

S.No.	Components of Study		Title of the Course	Contact hours	No. of Credits	IA Marks	End SEM Exam Marks	Total
1.	Core-Theory	1.	Perspectives of Educational Psychology	**6**	**4**	**20**	**80**	**100**
2.	Core-Theory	2.	Educational Studies	**6**	**4**	**20**	**80**	**100**
3.	Core-Theory	3.	Fundamentals of Educational Research	**6**	**4**	**20**	**80**	**100**
4.	Core-Theory	4.	Teacher Education	**6**	**4**	**20**	**80**	**100**
5.	Compulsory Foundation**(Related to Subject)**	5.	Foundations of Educational Philosophy	**6**	**4**	**20**	**80**	**100**
6.	Elective Foundation	6a.	Measurement and Evaluation	**6**	**4**	**20**	**80**	**100**
		6b.	Curriculum Studies					
7	**Audit Course**	7	Human Values and Professional Ethics -I	**0**	**-**	**100***	**-**	**-**
	Total			**36**	**24**	**120**	**480**	**600**
***Note: this paper is intended to provide awareness of the contemporary societal issues with only internal evaluation.**								
Inter-Semester Break (ISB) -1								
1.	Core Practicum		Communication Skills		**1**	**25**		**25**
2.	Core Practicum		Expository Writing		**1**	**25**		**25**
3.	Core Practicum		Self-development		**1**	**25**		**25**
4.	Tool Practicum		Dissertation – Review of Research Studies and Identification		**1**	**25**		**25**

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		of Research Problem					
5.	**Total**			**4**	**100**		**100**
Grand Total				**28**	**220**	**480**	**700**

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Semester – II

S.No.	Components of Study		Title of the Course	Contact hours	No. of Credits	IA Marks	End SEM Exam Marks	Total
1.	Core-Theory	1.	Educational Planning and Management	**6**	**4**	**20**	**80**	**100**
2.	Core-Theory	2.	Advanced Educational Research	**6**	4	**20**	**80**	**100**
3.	Core-Theory	3.	Guidance and Counseling	**6**	4	**20**	**80**	**100**
4.	Core-Theory	4.	Issues and Research in Teacher Education	**6**	4	**20**	**80**	**100**
5.	Compulsory Foundation**(Related to Subject)**	5.	Foundations of Educational Sociology	**6**	4	**20**	**80**	**100**
6.	Elective Foundation	6a.	Elementary Education	**6**	4	**20**	**80**	**100**
		6b.	Secondary Education					
	Total			**36**	**24**	**120**	**480**	**600**
Inter-Semester Break (ISB) -1I								
1.	Tool Practicum		Dissertation – Research Proposal Presentation		**2**	**50**		**50**
2.	Teacher Education Practicum		Internship in Teacher Education Institutions		**4**	**100**		**100**
3.	**Total**				**6**	**150**		**150**
Grand Total					**30**	**270**	**480**	**750**

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Semester – III

S.No	Components of Study		Title of the Course	Contact hours	No. of Credits	IA Marks	End SEM Exam Marks	Total
1.	Core-Theory	1.	Information and Communication Technology in Education	**6**	**4**	**20**	**80**	**100**
2.	Core-Theory	2.	Comparative Education	**6**	4	**20**	**80**	**100**
3.	Core-Theory	3.	Inclusive Education	**6**	4	**20**	**80**	**100**
4.	Generic Elective **(Related to Subject)**	4 a.	Economics of Education	**6**	4	**20**	**80**	**100**
		4 b.	Special Education					
		4 c.	Environmental Education					
5.	**Skill Oriented Course**	5	Life Skills Education	**6**	**4**	**0**		
	Total			**30**	**20**	**100**	**400**	**500**
6.	Open Elective **(For other Departments)**	6 a.	Teaching Strategies for Teachers	**6**	4	**20**	**80**	**100**
		6 b.	Value Education					
		6 c.	Human Rights Education					

- **A students shall choose any one among three generic electives (4a, 4b, 4c)**
- **The student shall choose any one among three open electives (6a, 6b, 6c) for other departments**

Inter-Semester Break (ISB) – III							
1.	Tool Practical	Dissertation – Data Collection		**2**	**50**		**50**
2.	Specialization Practical	Internship in Specialization		**4**	**100**		**100**
3.	**Total**			**6**	**150**		**150**
Grand Total				**30**	**270**	**480**	**750**

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Semester – IV

S.No.	Components of Study		Title of the Course	Contact hours	No. of Credits	IA Marks	End SEM Exam Marks	Total
1.	Core-Theory	1.	Advanced Educational Technology	**6**	**4**	**20**	**80**	**100**
2.	Core-Theory	2.	Psychology – Learner and Life	**6**	4	**20**	**80**	**100**
3.	Core-Theory	3.	Environmental Concerns in Secondary Education	**6**	4	**20**	**80**	**100**
4.	Generic Elective **(Related to Subject)**	4 a.	Human Values and Professional Ethics-II	**6**	4	**20**	**80**	**100**
		4 b.	Lifelong Education	**6**	4	**20**	**80**	**100**
		4 c.	Education for Rural Development					
		4 d.	Early Childhood Education					
	Total			**30**	**20**	**100**	**400**	**500**
5.	Open Elective **(For other Departments)**	5 a.	Personality Development and Soft Skills	**6**	4	**20**	**80**	**100**
		5 b.	Yoga Education					
		5 c.	Education for International Peace					

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➢ **A student shall choose any two among four generic electives (4a, 4b, 4c,4d)** ➢ **The student shall choose any one among three open electives (5a, 5b, 5c) for other departments**							
Inter-Semester Break (ISB) – IV							
1.	**Project work**	Dissertation – Report writing		**6**	**Internal and External Average 150**		**150**
2.		Viva Voce		**2**		**50**	**50**
3.	**Total**			**8**		**200**	**200**
Grand Total				**32**	**120**	**680**	**800**

Four Semesters Total Marks

Semesters	**Internal Marks**	**External Marks**	**Total**
I	220	480	700
II	270	480	750
III	270	480	750
IV	120	680	800
Total	**880**	**2120**	**3000**

Allotment of Credits and Activities in Inter Semester Breaks (ISB)

Inter Semester Break 1			
S. No	**Activities**	**Credits**	**Marks**
M.Ed ISB 1.1	**Communication Skills** ➢ Talk (or) Group Discussion. ➢ Introduction / Presentation of a Book (or) Article.(Book Review) ➢ Addressing the Assembly in a College. ➢ Conversation ➢ Role play (Group – Each individual is assessed) ➢ Self introduction ➢ Introducing Eminent / Inspiring/ Role model personalities. ➢ Latest trends / present issues. ➢ Hindu News paper Article Reading.	1 credit	25
M.Ed ISB 1.2	**Expository Writing** ➢ Creative Writing ➢ Books & Article (Write Up) ➢ Description of places visited. ➢ Writing to anEditor	1 credit	25

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	➢ Writing to the DistrictCollector ➢ Writing about an event / a happening. ➢ TV Script Writing ➢ Play let ➢ Dialogue writing ➢ Poetry (writing poems) ➢ Writing Songs		
S. No	**Activities**	**Credits**	**Marks**
M.Ed ISB 1.3	**Self Development** Sub activity (i): Self critical awareness as and when required to ➢ About one's Subject Knowledge ➢ About one's Teaching Competencies ➢ About one's Professional Qualities. ➢ About one's Interpersonal Relations. Sub-activity (ii):- Yoga Practices. ➢ Number of yogic exercises learnt ➢ How each yogic exercise helped in the maintenance of one's physical / mental health. Sub-activity (iii):- Meditation Practices. What is the effect of Pranayama ➢ How is it on oneself ➢ How is one helped in the 'let come' & 'let go' of mental status in the cleansing of the mind.	1 credit	25
M.Ed ISB 1.4	Review of Research Studies and Identification of Research Problem	1 credit	25
Inter Semester Break 2			
M.Ed ISB 2.1	A) Dissertation – Research Proposal Presentation Proposal Writing Proposal Presentation	2 credit	50
M.Ed ISB 2.2	**B) Internship in Teacher Education Institution** One Demonstration One Lecture Observation of Micro Teaching Practice – 10 students Observation of Macro Teaching – 5 students.	4 credits	100

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Inter Semester Break 3			
M.Ed ISB 3.1	A) Dissertation ➢ Preparation of Research Tool ➢ Data Collection	2 credit	50
M.Ed ISB 3.2	B) Internship in Specialization. ➢ Students Case Studies (2 Students) ➢ Institutional Case Study (Elementary / Secondary) ➢ Multimedia Lesson Presentation using Teaching Models ➢ Organization of Events like (a) Brain storming (b) Quiz c) Group Discussion d) Events of National Importance (e) Life Skills Activities (conduct the activity & write a report)	4 credits	100
Inter Semester Break 4			
M.Ed ISB 4.1	Dissertation Report Writing Viva	6 credits 2 credits	200
Total		**24 credits**	**600**

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Dissertation

Each candidate shall be required to submit a dissertation in a subject approved by the University. The dissertation shall be prepared under the direction of a teacher educator and submitted one month before the university examinations of the fourth semester.

A. Dissertation work should start during the first semester of first year.

B. It must be satisfactory in respect of literary presentation as well as in other respects and should be suitable for publication. Report should be written only in English except for the Telugu Language Topics.

C. It shall have a bearing on some aspect of education and embody either, (i) a record of original investigation, or (ii) a critical analysis of existing data or (iii) a combination of both.

D. The candidate shall indicate generally in his preface to the dissertation and in notes the source from which his/her information is taken, the extent to which he/she has availed himself of the work of others and the portion of the dissertation which he/she claims as his/her original work.

E. Every dissertation shall be accompanied by a certificate signed by the teacher educator who guided the candidate in the preparation of dissertation stating that the dissertation is genuine work of the candidate and that it is worthy of examination.

General Rules

1. Filled in Examination applications shall be submitted at the respective Departments along with the challan and other required documents on or before the prescribed dates.
2. Before applying for the examination, the student shall clearly know his eligibility for the examination. SMP / Debarred students will not be allowed to sit for the examination until clearance is received.
3. Students who have not put-in the required attendance during year / semester will not be permitted to sit for the examinations.
4. Hall tickets issued shall be carefully preserved by the students.
5. The prescribed examination fee shall be paid in the respective college office on or before the stipulated date.

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6. Original certificates will be issued after submission of No Dues certificates from the Hostel, Department and Library.

Evaluation Procedure

1. All the Theory papers and Dissertation shall be valued by two examiners, one of them being an examiner residing outside the University area. The average marks of the 2 independent valuations shall be considered for eligibility for pass in the examination. In case of disparity of 20% of marks or more, papers and dissertation shall be referred to a third examiner and the marks awarded by the third examiner will be the final marks..
2. In each paper, the internal marks 20% shall be awarded keeping in view the regularity of attendance, one assignmentand seminar and two internaltests in each paper of the semester.
3. There shall be a viva voce for the dissertation to be conducted by a panel of examiners comprising an external examiner from outside S.V.University, BOS Chairman in Education andThe Principal of the College /Head of Department will act as internal member to coordinate the viva-voce examination.
4. A Candidate shall be declared to have passed in the examination, if he obtains 40% of the marks in each paper and in dissertation 50% and also on aggregate.
5. A candidate who fails in Part II Dissertation shall be permitted to present a revised dissertation on the same subject without being required to produce any additional certificate of attendance.
6. A Candidate shall not be permitted to appear for the M.Ed. Degree Examination for more than Five years from the date of admission.
7. Practicum in the Inter Semester Breaks (ISB) and Internship has to be recorded in the form of project records and evaluated internally.
8. Evaluation of each paper will be done to the maximum of 100 marks including internal component of 20 marks (10 Marks Test + 5 Marks Seminar,Group discussion and Assignment and+ 5 Marks forAttendance).
9. At the end of each semester after evaluation of theory, practicum, internship and dissertation marks will be converted into grade letter and grade point (G.P) to every paper.From the grade points semester grade point average (SGPA) at the end of each



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semester and Cumulative grade point average (CGPA) at the end of all four semesters will be calculated. The details about SGPA & CGPA areshown below.

S. No.	Range of Marks	Grade letter	Grade Point
1	91-100	O (Outstanding)	10
2	81-90	A+ (Excellent)	9
3	71-80	A (Very good)	8
4	61-70	B+ (Good)	7
5	51-60	B (Above Average)	6
6	41-50	C (Average)	5
7	40	P (Pass)	4
8	Bellow 40	F (Fail)	0
9	Ab (Absent)	Absent	0



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Structure of the Question Paper

The question paper shall consist of two sections: A and B

Part-A shall consist of 16 short answer questions.Out of which 10 are to be answeredandeach question carrying5 marks. Each answer should not exceed 2pages.

Part-B consists of 4 essay questions, out of which the candidate has to answer 2 questions. Each question carries 15 marks. The answer should not exceed5 pages for each question.

The duration of examination shall be 3 hours.

M.Ed.. I / II / III / IV Semester-wise Examination

Structure of Examination Question Paper

Time: 3 hrs Max. Marks: 80

Section –A ` **10 x 5=50 Marks**

Section –Answer any TEN of the following questions. All questions carry equal marks.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.

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15.

16.

Section – B **2x 15=30 marks**

Section **B**, Answer any TWO of the following questions. All questions carry equal marks

17.

18.

19.

20.

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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester-I

PAPER – 1: PERSPECTIVES OF EDUCATIONAL PSYCHOLOGY

Objectives:

1. To enable the student to understand concepts and principles of Educational Psychology as an applied science.
2. To enable the student understand himself / herself and the learner.
3. To enable the student to understand implications of psychological theories and expositions for education.
4. To acquaint the student with the process of development and assessment of various abilities and traits.
5. To enable the student to design the learning situations suitable to the nature of learners and learning material
6. To acquaint the student with the states of mental health and ill health.
7. To emphasize the students holistic development, (Human Resources Development)

Course Content

Unit -1: Educational Psychology

1: **Scope of Educational Psychology**

1. Concept, Nature and Scope of Educational Psychology.
2. Methods of educational psychology.
3. Contribution of psychology and Indian psychology to Education.
4. Current concerns and trends in educational psychology.

2. Human Development: Implications for Education

1. Concept, Principles and sequential stages of human/personality development - Infancy, childhood, adolescence, early adulthood, later adulthood and old age.
2. Factors influencing development and their relative role in each stage, general characteristics of each stage and problems of each stage.



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3. Theories of Piaget, Freud, Erickson, Chomsky and Kohlberg.
4. Indian theory of psychological Development.

Unit-2: Learning: Implications for Education

1. Concept and Various view points on theories of learning, Laws of Learning (Thorndike).
2. Theories of Learning- Pavlov, Skinner, Hull, Gestalt, Lewin and Tolman.
3. Information processing – Sternberg, Vygotsky-Constructivism.
4. Gagne's levels of learning

Unit-3: Individual Differences-Implications for Education

1. Concepts of intra and inter individual differences and their implications.
2. Intelligence-cognitive and affective abilities, Identification or testing intelligence.
3. Theories of intelligence- Guilford, Gardner and Goleman.
4. Creativity-Nature and process, Identification or testing creativity, Fostering and guiding creative children.

Unit 4: Personality, Adjustment and Mental Health

1. **Personality:** Concept and Theories of Personality, Trait and type theory of Eyesenck, Psychoanalytic approaches – Freud and Jung, Social – Learning Theory – Bandura, Humanistic Approach – Roger's and Maslow
2. **Personality Assessment:** Personality inventories interview, checklists, observation, Sociometry and situational tests Projective Techniques– Rorschach, TAT, CAT, Story completion, Sentence completion
3. **Adjustment :** Introduction of Adjustment, Characteristics of Adjustment, Barriers of Adjustment, Areas of Adjustment, School/College Maladjustment Causes, Frustration – Conflicts, Defense Mechanism, Types of Adjustment, Concept and mechanisms of adjustment
4. **Mental Health:** Introduction to mental health , , Principles of mental hygiene – preventive, constructive and curative measures – at personal level and environmental level, Types of Psychological disorders-Neurosis, Psychosis and Psycho-somatic disorders

Practicum: Use of the following tests

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1. Intelligence Tests
2. Creativity Tests
3. Interest inventories
4. Attitude scales
5. Value scales
6. Tests in learning
7. Personality Test to Identify states of well being and ill being.

One Assignment & One Seminar

Reference Books

1. Pandey, Advanced Educational Psychology , Konark Publishers, Main Vikas Marg, Delhi.
2. Mangal S.K., (2002), Advanced Educational Psychology, Prentice – Hall of India, New Delhi.
3. Chauhan S.S., (1982), Advanced Educational Psychology, Vikas Publishing House, New Delhi.
4. Freeman Frank S., (1968),Theory and Practice of Psychological Testing, Oxford and IBH, Bombay.
5. Anne Anastasi, (1982), Psychological Testing, Mac Millan, New York.
6. Cronbach L.J., (1970), Essentials of Psychological Testing, Harper and Row, New York.
7. Hilgard and Bower,(1964), Theories of Learning, Englewood Cliffs, Prentice Hall, New Jersey
8. Hall Calvin S., Gardner Lindzey,(1957), Theories of Personality, Wiley Eastern Limited, Madras.
9. Elizabeth B. Hurlock,(1974), Personality Development, Tata McGraw Hill Publishing Co., New Delhi.
10. Elizabeth B. Hurlock, (1999), Developmental Psychology, Tata McGraw Hill Publishing Co., New Delhi.
11. Uday Sankar, Advanced Educational Psychology, Oxonian Press, New Delhi.
12. Uday Sankar, Personality Development, Wiley Eastern Limited, Bangalore
13. Kuppuswamy B.,(1964), Advanced Educational Psychology, Sterling Publishers, New Delhi.

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14. Coleman James C., Abnormal Psychology and Modern Life, Taraporevale Sons & Co., Bombay.
15. Mangal SK., Abnormal Psychology, Sterling Publishers, New Delhi.
16. Kuppuswamy B., Elements of Ancient Indian Psychology, Konark Publishers, Delhi.
17. Torrance E.P.,(1962), Guiding Creative Talent, Prentice Hall, Englewood Cliffs, New Jersey.
18. Skinner Charles E.(1996), Educational Psychology, Prentice Hall of India, New Delhi.
19. Goleman Daniel, Emotional Intelligence, Bantam Books, Broadway, New York.
20. Dandapani S.,(2002), A Text Book of Advanced Educational Psychology, Anmol Publications, New Delhi.
21. Jadunath Sinha, Indian Psychology, Vol., 1, 2,3, Mothilal Banarsidass, Bangalore,
22. Janak Pandey, Editor, Psychology in India Revisited, Development in the Discipline, Vol. 1,2,3. Sage Publications, Delhi.
23. Indra Sen, Integral Psychology, Sri Aurobindo International Center of Education, Pondicherry
24. Krishnamurti J., On Self Knowledge, Krishnamurti Foundation of India, Chennai.
25. Krishnamurti J., Freedom from the Known, Krishnamurti Foundation of India, Chennai.
26. Krishnamurti J., Education and Significance of Life, Krishnamurti Foundation of India, Chennai.
27. Sprinthall and Sprinthall (1990), Educational Psychology, Mc. Graw Hill, USA.



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester - I

Paper – 2: EDUCATIONAL STUDIES

Objectives:

(1) To acquaint the students with the general development and progress of education prior to independence.

(2) To acquaint the students with general development and progress of education after independence.

(3) To enable the students to understand the concept and meaning of problems of Education (social, economic, political)

(4) To enable the students to understand the various problems of education at different stage Primary, Secondary, Higher Secondary, higher education, Vocational, women, Handicapped etc.

(5) To enable the students to find out the reasons and evaluate the solutions to the education for different stages.

(6) To enable the students to understand the problems related to the policies of Government and to find out remedies.

Course Content

Unit – 1: History of Education

1. History of Ethics and Moral Education.
2. Philosophy of life and characteristics of Education.
3. Philosophy of life originates in the Vedas – aspect of religion, aspects of supremacies of karma action, place of spiritual and materialistic education.
4. Education during Buddhist Era and Islamic Education.

Unit – 2: Secondary Education in India

1. Educational Planning – Quality Education.
2. Vocationalization of Secondary Education. Report of working group on vocationalization of education. Report of National review committee on Higher Secondary Education.
3. Programmes of CBSE Schools, Programs of Kendriya Vidyalayas and Sarva Shiksha Abhiyan.
4. Secondary Educational Policies.

Unit – 3: Emerging Issues in Higher Education

1. Privatization in Education, Problem of Brain drain
2. Center - State relationship on education
3. Problem of protective discrimination
4. The language problem
5. Learning without burden
6. Religion and Education
7. Technical skills of learning
8. Challenges in Higher Education

Unit – 4: Education and Issues in Development

1. Health Education, Population Education, Education for rural development, Environmental Education, Science Education, Value Education, Girls Education, Education for Minorities – Religious, Ethnic, Linguistic, Tribal's.

2. Education of the disadvantaged section

3. Education of children with special needs

4. Information and communication technology

5. Role of UNO.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

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1. Aggarwal J.C. (1985), Theory and Principles of Education, Vikas Publishing House, New Delhi.
2. Arnstine, Donald (1967), Philosophies of Education ; Harper and Row Publishers, Incorporated, New York
3. Bali D.R. (1989), Introduction to Philosophy ; Sterling Publishers, New Delhi.
4. Bhatia KK (1977), Principles and Practice of Education, Kalyani Publishers, New Delhi.
5. Brent, A (1978), Philosophy and Educational Foundations, George Allen and Unwin, Boston.
6. Brubacher John S. (1983), Modern Philosophies of Education, Tata Mc. Graw-Hill Publishing Company Ltd., New Delhi.
7. Chaube S.P. (1993), Educational Philosophies in India, Vikas Publishing House Pvt. Ltd., New Delhi.
8. Connor, DJO (1975), An Introduction to the Philosophy of Education, Routledge & Keegan Paul, London
9. Dash, BN (1986), Educational Philosophy and Teaching Practice, Kalyani Publishers, New Delhi.
10. Morsy Zaghloul (1997), Thinkers on Education , UNESCO Publishing/Oxford and IBH Publishing
11. Pandey R.S., (1983) Principles of Education; Vinod Pustak Mandir, Agra.
12. Radha Krishna S. (1983), Indian Philosophy, Blackie and Son publishing, New Delhi.
13. Ranji Sharma G. (1987), Trends in Contemporary Indian Philosophy of Education –A Critical Evaluation, Nirmal Publishing, New Delhi.
14. Ruhela S.P. (1986), Human Values and Education, Sterling Publishers, New Delhi.
15. Schultz M (1985), Hindu Philosophy, Classical Publishing Company, New Delhi.
16. Seetharamu A.S. (1989), Philosophy of Education, Ashish Publishing House, New Delhi.
17. Sreerama Krishna A.S. (2002), Teacher and Education in Emerging Indian Society, New Era Publications, Guntur.



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18. Taneja, V.R. (1990), Socio-Philosophical Approaches to Education, Atlantic Publishing, New Delhi.
19. Ulrich Robert, History of Educational Thought, Eurasia Publishing House, New Delhi.

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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester - I

PAPER – 3: FUNDAMENTALS OF EDUCATIONAL RESEARCH

Objectives:

On completion of this course, the student will be able to:

- Describe the nature, purpose, scope and types of research in education.
- Understand the important features of different types of research.
- Explain the characteristics of qualitative and quantitative research in education.
- Conduct a literature search and select a problem for a research study.
- Select a sampling technique appropriate for a research study.
- Explain the procedure for construction of tool for a research study.
- Select and apply suitable statistical techniques for the analysis of data.

Course Content

Unit – 1: Introduction to Educational Research

1. Meaning, Purposes, Nature and Scope of Educational Research.
2. Types of Educational Research: Basic, Applied and Action research; Research paradigms in Education: Quantitative, Qualitative and Mixed research.
3. Research Problem: Sources of research problem, characteristics of good research problem, Definition of the research problem, evaluation of the research problem.
4. Related Literature – Purposes of Review; conducting the literature search using Internet and databases.

Unit - 2: Variables, Hypothesis and Sampling of Educational Research

1. Meaning and Classification of Variables.
2. Meaning, Types/Forms of hypotheses and characteristics of good hypothesis.
3. Population, Sample and characteristics of good sample.



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4. Sampling Techniques.

Unit – 3: Tools and Techniques of Data Collection

1. Tools of Data Collection: Questionnaires, Tests, Inventories and Rating Scales - Types, Uses and merits and limitations.
2. Methods or Techniques of Data Collection: Observation and Interview, their types, use, merits and limitations.
3. Principles of Construction of tools and techniques, Administration of tools and techniques.
4. Basic attributes of a good Research tool – Reliability, Validity and Usability.

Unit - 4: Descriptive Analysis of Quantitative Data

1. Scales of Measurement – Nominal , Ordinal ,Interval and Ratio Scales; Measures of Central tendencies – Mean, Median, Mode; Graphical Representation of Data – Bar Graph, Histogram, Frequency Polygon, Cumulative frequency curve, Ogive and Pie-diagram.
2. Measures of Dispersion – Range, Q.D., A.D. and S.D.
3. Measures of Relative Position – Percentile, Percentile Rank and Standard Scores: Z-Scores, T-Scores
4. Normal Distribution – Characteristics and Uses of N.P.C; Applications of N.P.C; Deviations of Normality: Skewness and Kurtosis.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Aggarwal Y.P. (1988). Statistical Methods: New Delhi: Sterling Publishers Pvt. Ltd.
2. Best J.W. (1999). Research in Education, New Delhi: Prentice Hall of India Pvt. Ltd.
3. Borg, W.R. and Gall, M.D. (1983). Educational Research – An Introduction, New York: Longman, Inc.
4. Clive Opie (2004). Doing Educational Research- A Guide for First time researchers. New Delhi: Vistar Publications.

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11. Reason, P. & Bradbury, H. (Eds) (2006). Handbook of action research: Concise paperback edition: Thousand Oaks, CA: Sage. 23
12. Scott, David & Usher, Robin (1996). Understanding Educational Research. New York: Rout ledge.
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15. Sharma, S.R. (2003). Problems of Educational Research. New Delhi: Anmol Publications Pvt. Ltd.
16. Travers, Robert M.W. (1978). An Introduction to Educational Research (4th edition). London: MacMillan.
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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester - I

PAPER – 4: TEACHER EDUCATION

Objectives:

To develop an understanding of

1. Concept, development and agencies of Teacher Education
2. Teacher Education programmes at different levels – their objectives, structure, curriculum, role and competencies.
3. Need for Teacher Education
4. Issues, problems and innovative practices n Teacher Education
5. Research and professionalism in Teacher Education.

Course Content

Unit -1: Introduction to Teacher Education

1. Meaning and nature of teacher education.
2. Need, scope and objectives of teacher education.
3. Changing context of teacher education in the Indian scenario.
4. Changing context of teacher education in the global scenario.

Unit - 2: Development of Teacher Education

1. Teacher Education in Pre-independence India.
2. Teacher Education in post-independence India.
3. National policy on teacher education, 1986.
4. Current trends in teacher education – interdisciplinary approach, internship, community living, orientation course, correspondence course, action research, team teaching and programmed instruction etc.

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Unit – 3: Agencies and Institutions of Teacher Education.

1. Agencies of Teacher Education at the state level and their role and functions.
2. Agencies of teacher education at the national level and their role and functions.
3. Agencies of Teacher Education at the international level and their role and functions.
4. Institutions of Teacher Education, DIET,CTE,IASE,RIE.

Unit – 4: Major Issues and Problems of Teacher Education

1. Maintaining standards in Teacher Education – admission policies and procedures, recruitment of teacher educators.
2. Service conditions of teacher educators.
3. Quality management in teacher education.
4. Privatization, Globalization and Autonomy in Teacher Education.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Arora, G.L. (2002) Teachers and their Teaching Delhi, Ravi Books.
2. Chanurasia Gulab (2000) Teacher Education and Professional Organizations Delhi, Authors press.
3. Dillon Justin and Maguire Meg (1997) Becoming a Teacher; Issues in Secondary Teaching Buckingham, Open University Press.
4. Dunking, Michael, J. (1987) The International Encyclopedia of Teaching and Teacher Education Oxford, Pergamum Press.
5. Elahi, Nizam (1997) Teacher's Education in India New Delhi, APH Publishing Corporation
6. Kundu, C.L. (1998) Indian Year Book on Teacher Education New Delhi, Sterling Publishers Privatization Ltd.
7. McNergney, Robert F. and Herbert, Joanne M. (2001) Foundations of Education: The challenge of Professional Practice Boston Allyn and Bacon.



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8. Misra, K.S. (1993) Teachers and their Education Ambala Cantt., the Associated Publishers.
9. Mohanty Jagannath (2000) Teacher Education in India
10. Murray, Frank B. (Ed.) (1996) Teacher Educator's Handbook; Building A base of Preparation of Teachers, san Francisco, Jossey – Bass Publishers.



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DEPARTMENT OF EDUCATION

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MASTER OF EDUCATION

1st Year, Semester - I

Paper 5: FOUNDATIONS OF EDUCATIONAL PHILOSOPHY

Objectives:

1. To enable the student to understand the nature and functions of Philosophy of Education.
2. To enable the student to understand the important Philosophies of Education
3. To enable the student to understand Indian Philosophical suppositions and their contribution to Education.
4. To enable the student to understand and use Philosophical methods in studying educational data.
5. To sensitize the student for critical appraisal of contributions made to education by prominent educational thinkers – Indian and Western.
6. To enable the student to understand concepts and process of social organization, social stratification and institution in relation to education.
7. To enable the student to understand relationship among culture, society and education.
8. To enable the student to know issues of equality and inequality in education.

Course Content

Unit 1: Philosophy and Education

1) Definition, meaning, nature, scope and branches of Philosophy.
2) Relationship between Philosophy and Education. Educational Philosophy and its functions-Speculative, Normative and Critical.
3) Definition, meaning and nature of Education. Types, Processes and Aims of Education.
4) Utility of the subject Educational Philosophy to the prospective teacher educators.

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Unit 2: Philosophical Bases of Education

1) Contribution of Idealism, Naturalism, Pragmatism, Realism, and Existentialism to Education (Aims, curriculum, methods of teaching, teacher and discipline.)
2) Contribution made to educational thought and practice by- Plato, Gandhi, Dewey, Rousseau and Tagore.
3) Epistemology-Meaning, Kinds and Instruments of knowledge.
4) Metaphysical problems and Education-with reference to nature of man, problem of freedom and the concept of God.

Unit 3: Democracy and Education

1) Education for citizenship- Fundamental Rights and Duties.
2) Nature of inequalities and measures to address them, Constitutional Provisions
3) Equity, Equality and Democratization of Education.
4) Secularism- contribution of Bhagavat Gita, Islam, Buddhism and Christianity to value formation.

Unit 4: Current Issues in Education and their Implications

1) Poverty, Unemployment and Education.
2) Violence and Peace Education.
3) Problems of Nation and solutions through Education.
4) National Integration and International Understanding.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Aggarwal J.C. (1985), *Theory and Principles of Education,* Vikas Publishing House, New Delhi.
2. Arnstine, Donald (1967), *Philosophies of Education* ; Harper and Row Publishers, Incorporated, New York
3. Bali D.R. (1989), *Introduction to Philosophy* ; Sterling Publishers, New Delhi.

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4. Bhatia KK (1977), *Principles and Practice of Education,* Kalyani Publishers, New Delhi.
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6. Brubacher John S. (1983), *Modern Philosophies of Education,* Tata Mc. Graw-Hill Publishing Company Ltd., New Delhi.
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8. Connor, DJO (1975), *An Introduction to the Philosophy of Education,* Routledge & Keegan Paul, London
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10. Morsy Zaghloul (1997), *Thinkers on Education* , UNESCO Publishing/Oxford and IBH Publishing
11. Pandey R.S., (1983) *Principles of Education*; Vinod Pustak Mandir, Agra.
12. Radha Krishna S. (1983), Indian *Philosophy*, Blackie and Son publishing, New Delhi.
13. Ranji Sharma G. (1987), *Trends in Contemporary Indian Philosophy of Education –A Critical Evaluation,* Nirmal Publishing, New Delhi.
14. Ruhela S.P. (1986), *Human Values and Education, Sterling Publishers, New Delhi.*
15. Schultz M (1985), Hindu Philosophy, Classical Publishing Company, New Delhi.
16. Seetharamu A.S. (1989), Philosophy of Education, Ashish Publishing House, New Delhi.
17. Sreerama Krishna A.S. (2002), *Teacher and Education in Emerging Indian Society*, New Era Publications, Guntur.
18. Taneja, V.R. (1990), *Socio-Philosophical Approaches to Education,* Atlantic Publishing, New Delhi.
19. Ulrich Robert, *History of Educational Thought, Eurasia Publishing House, New Delhi.*



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DEPARTMENT OF EDUCATION

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MASTER OF EDUCATION

1st Year, Semester - I

PAPER- 6 a: MEASUREMENT AND EVALUATION

Objectives:

1. To acquaint the students with the basic concepts and practices adopted in educational measurement and evaluation.
2. To help the student understand relationship between measurement and evaluation in education.
3. To orient the student with tools and techniques of measurement and evaluation.
4. To develop the skills and competencies in construction and standardization of tests.
5. To make the students understand how various requirements of education are measured,evaluated, interpreted and their results are recorded to help learners.
6. To enable students to prepare and use different kinds of psychological tests.
7. To equip students with skills to handle data and interpret results.
8. To enable students to participate in examination reforms.
9. To help students to carry out examination and evaluation work.

Course Content

Unit 1: Introduction to Measurement and Evaluation

1. Levels of Measurement– Nominal, Ordinal, Interval and Ratio; Concept of Measurement and Evaluation; Role of Evaluation in Education – Diagnosis, Improvement of teaching, Guidance, Prognosis survey and Placement.
2. Differences between Measurement and Evaluation; Types of Evaluation; Steps in the process of Evaluation.
3. Criterion referenced and Norm referenced evaluation.



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4. Teacher made tests and standardized tests; General steps of Test Construction (or Standardization)

Unit –2: Essentials of Test Construction

1. Item Analysis: Meaning and purpose; Item analysis of power test; Item analysis of speed test; problems of item analysis.
2. Reliability: Meaning of reliability; Methods (or Types) of reliability; Factors influencing reliability of test scores.
3. Validity: Meaning of validity; Types of validity; Factors influencing validity; Relation of validity and reliability.
4. Norms for Interpretation of Test Scores – Age, Grade, Percentile and Standard score norms (Z-scores, T-Scores, C-Scores).

Unit 3: Trait Measurement Devices

1. Measurement of Attitudes: Thurston's method of equal-appearing intervals, Likert's method of Summated ratings, Guttmann's scale.
2. Measurement of Interest: Strong Campbell interest inventory, Kuder preference Records.
3. Measurement of Intelligence: individual and group tests, verbal and non-verbal tests and performance test.
4. Measurement of Assessment: Self Report technique: Rating Scales, Problem check-lists and Projective techniques: Rorschach and Thematic Apperception Test

Unit 4: New Trends in Measurement and Evaluation

1. Continuous and Comprehensive evaluation
2. Marking and reporting methods (concept and current use): Written description of performance, Letter grades, Number grades, percentage grades, Pass-fail report, Profiles, Parent-teacher conference, Progress report.
3. Choice Based Credit System and Evaluation.
4. Computers in Evaluation.

Practicum

(1) One Seminar

(2) One Assignment

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Reference Books

1. Adams, G.S. (1964) *Measurement and Evaluation in Education, Psychology and Guidance*. New York: Holt, Rinehart and Winston.
2. Antony Stella (2001) *Quality Assessment in Indian Higher Education*: Issues of Future Perspectives, Bangalore, Allied Publishers Ltd.
3. Antony Stella and A. Granom (2001) *Assessment and Accreditation in Indian Higher Education*: New Delhi Books Plus.
4. Arun Kumar Singh (1986). Tests Measurement and Research Methods in Behavioural Sciences. New Delhi: Tata Mc Graw-Hill Publishing Company Limited.
5. Baker, E.L and Quellmalz, E.S Ed. (1980) *Educational Testing and Evaluation*. London: Sage Publications.
6. Baron, D. and Bernard, H.W. (1958) *Evaluation Techniques for Classroom Teachers*. New York: McGraw- Hill Book Co., Inc.
7. Bloom, S.B. Hastings, J.T. and Madans, G.F. (1971) Ha*ndbook on Formative and Summative Evaluation of student Learnin*g, New York: McGraw – Hill Book Co.
8. Bradfield, M.J. and Moredock, H.S. (1957) *Measurement and Evaluation in Education*. New York: The Macmillan Company.
9. Dave, R.H. and Patel, P.M. (1972) *Educational Evaluation and Assessment,* New Delhi : NCERT.
10. Ebel, R.L. (1966) *Measuring Educational Achievement*. New Delhi: Prentice – Hall of India Pvt. Ltd.
11. Furst, E.J (1958) *Constructing Evaluation Instruments*. New York, Longmans, Green and Co.
12. Greene, H.A. Jorgensen, a. N., Gerberich, J.R (1954) *Measurement and Evaluation in the Secondary School.* New York: Longmans, Green and Co.,
13. Greene, H.A., Jorgensen, A.N. Gerberich, J.R. (1953) *Measurement and Evaluation in the Elementary School.* New York: Longmans, Green and Co.
14. Gronlund, E.N. (1965) *Measurement and Evaluation in Teaching*. London: Collier – Macmillan Ltd.



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15. Gronlund, N.E. (1970) *Stating Behavioral Objectives for Classroom Instruction.* London: The Macmillan Co.
16. Marmar Mukhopadhyay (2001) *Total Quality Management in Education*, New Delhi, NIEPA.
17. Meherns, A.W. and Lehman, I.J. (1978) *Measurement and Evaluation in Education and Psychology*. New York: Holt, Rinehart and Winston.
18. Milliman, J. and Darling – Hammond, L. (1990) *The New Handbook of Teacher Evaluation: Assessing Elementary and Secondary School Teachers*. New Delhi: Sage Publications.
19. Nunally, J.C. (1964) *Educational Measurement and Evaluation*. New York: McGraw-Hill Book Company.
20. Patel, R. N. (1985) *Educational Evaluation – Theory and Practice*. Delhi: Himalaya Publishing Co.
21. Phillips, C. R (1968) *Evaluation and the Work of the Teacher.* California: Wadsworth Publishing Co. Inc.
22. Popham, W. James (1975) *Educational Evaluation*. New Jersey: Prentice – Hall, Inc.,
23. Puttaswamaiah, K. (1979) *Fundamental of Applied Evaluation*. New Delhi: Oxford and IBH Publishing Co.,
24. Schwartz, A and Tiedeman, S. C. (1957) *Evaluating Student Progress in the Secondary School*: New York: David Mckay Company, Inc.
25. Singh, Pritam (1989) *Handbook of Pupil Evaluation,* Bangalore: Allied Publisher Ltd.
26. Stanley, J. C (1964) *Measurement in Today's School*, New Jersey: Prentice – Hall, Inc.
27. Stanley, J.C. and Hopkins, K.D. (1978) *Educational Psychological Measurement and Evaluation.* New Delhi: Prentice Hall of India Pvt. Ltd.
28. Stronge, J.H. Ed. (1997) *Evaluating Teaching*. California: Corwin Publications, Inc.
29. Throndike, R. L. and Hagen, E. (1970) M*easurement and Evaluation in Psychology and Education*. New Delhi: Wiley Easter Pvt Ltd.
30. Tuckman, B.W (1972) *Conducting Educational Research*. New York: Harcourt Brace Jovanrich Inc.



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31. Wandt, E. and Brown, G.W (1957) *Essentials of Educational Evaluation*. New York: Holt, Rinehart and Winston.
32. Wrightone, J.W Justman, J. and Robins, I (1956) *Evaluation in Modern Education*, New Delhi: Eurasia Publishing House (Pvt) Ltd.
33. Yadav, M.S. and Govinda, R (1977) *Educational Evaluation: A Package of Auto-Instructional Material* Ahmedabad: Sahitya Mudranalaya.
34. Prem Kumar Jha Assessment and Evaluation in Higher Education, Vista International Publishing house
35. Robert Linn etal "Measurement and Assessment in Teaching" Pearson International education. 9th Edition.
36. D. Smith History of Measurement and Evaluation. Commonwealth publishers NewDelhi.

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DEPARTMENT OF EDUCATION

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MASTER OF EDUCATION

1st Year, Semester - I

PAPER –6 b: CURRICULUM STUDIES

Objectives:

The course will enable the student teacher to

1. To understand the meaning, need, scope, foundations and issues of curriculum.
2. Know about Planning of curriculum, principals, consideration and trends in curriculum planning.
3. Develop awareness about Development of curriculum – approaches, process, role of teachers and administrators in curriculum development, implementation and evaluation.
4. Acquire theoretical bases about curriculum evaluation, different aspects and approaches of curriculum evaluation.

Course Content

Unit 1: Introduction to Curriculum

1. Meaning and definitions of Curriculum, need and scope of Curriculum, concept of Curriculum and Syllabus and their differences.
2. Bases of Curriculum; Foundations of curriculum - philosophical, sociological, psychological and educational
3. The Curriculum process and its stages
4. Curriculum Issues – Discipline based issues, Subject-wise National Curriculum Framework –NCF 2005, NCTECF 2009, APSCF 2011.

Unit 2: Curriculum Planning

1. Meaning of Curriculum Planning, Principles of Curriculum Construction
2. Basic considerations in Curriculum Planning – Developmental, Social, Economic, Environmental, Institutional and Teacher related

3. Curriculum Planning at Various Levels, Trends in Curriculum - Curriculum in 20th century and possible future trends
4. Principles and approaches of curriculum organization.

Unit 3: Curriculum Development and Transaction

1. Approaches to curriculum development, models of curriculum development, process of curriculum development, development try-out.
2. Role of teachers in curriculum development, instructional systems, instructional techniques and materials – learner centered and teacher centered
3. Role of Administrators in implementation and evaluation of curriculum.
4. Need and strategies for curriculum change in 21st century.

Unit 4:Curriculum Evaluation

1. Concept, need and importance of Curriculum Evaluation
2. Sources of Curriculum Evaluation, aspects of Curriculum Evaluation – pre-testing/post- testing.
3. Norm-referenced and Criterion-referenced testing, evaluation approaches related to individual and group.
4. Methods of Curriculum Evaluation - evaluation during development & implementation, retructuring curriculum.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Aggarwal.J.C. (1990). Curriculum Reforms in India. Delhi: Doaba House.
2. Mamidi, M.R. and Ravishankar, S. (1984). Curriculum Development and Educational Technology. New Delhi: Sterling Publishers.
3. Kelly, A.V. (1989). Theory and Practice. London; Paul Chapman Publishing.
4. Cronback, J.Lee (1964). Evaluation for Course Improvement in New Curriculum. New York : Harper & Row
5. John Dewey (1966). The Child & the Curriculum – The School & Society.

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6. Ornstein, C. & Hunkins, P. (1988). Curriculum, Foundations, Principles and Issues.
7. D.Warwick (1975) : Curriculum Structure & Design, University of London Press.
8. Bhatt,B.D and Sharma,S.R. (1992) : Principles of Curriculum Construction, Delhi: Kanishka Publishing House.
9. Bloom, B.S (1977). Try-out and Revision of Educational Materials and Methods. In Lewy, A. (ed). Handbook of Curriculum Evaluation, Paris: UNESCO
10. Doll, R.C. (1986). Curriculum Improvement. Boston: Allyn and Bacon
11. Jenkins, D. (1976). Curriculum Evaluation. Milton Keynes: The Open University Press.
12. Malhotra, M.M. (1985). Curriculum Evaluation and Renewal. Manila : CPSC Publication.
13. Robert, M. & Mary, J. (1983). Curriculum Evaluation. In Pinchas, Tamir (ed) (1985). The Role of Evaluators in Curriculum Development. London: Croom Helm.
14. Stephen, W. & Douglas, P. (1972). Curriculum Evaluation. Bristol: NFER Publishing Co. Ltd.



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DEPARTMENT OF EDUCATION

SRI VENKATESWARA UNIVERSITY

MASTER OF EDUCATION

As per the action plan of NEP-2020

1st Year-Semester - I

Paper – 7: HUMAN VALUES AND PROFESSIONAL ETHICS- I

Objectives:

This course input is indeed

1. To help the students appreciate the essential complementary in between 'values ' and 'skill'
2. To ensure sustained happiness and prosperity which are the core aspirations of all human beings?
3. To facilitate the development of a holistic perspective among students towards life,
4. To enhance values of Self- Esteem and Self respect among students.;

Thus, this course is intended to provide a much needed orientation input in values education to the young enquiring minds.

Course Content

Unit - 1: Introduction of Ethical Values

1. Definition and Nature of Ethics
2. Its relation to religion, Politics, Business, Law, Medicine and Environment.
3. Need and Value of Professional Ethics.
4. Ethics Value and Spirituality
5. Setting Goals in life

Unit – 2Human Values and Teaching Profession

1. Distinguishing of Good and Bad
2. Ends and Means of human desires
3. Realities in Actual and Potential Values
4. Objective and Subjective Values

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5. Essential Human Values in view of Teaching Profession

Unit - 3: Personal Ethics

1. Nature of Self
2. Nature of interest
3. Good behavior and respect for elders
4. Importance of Good Food Habits during Adolescence
5. Desirable basic Human qualities
6. The need of Life, Skills during

Unit - 4: Professional Ethics

1. Virtue Ethics
2. Business Ethics
3. Medical Ethics
4. Legal Ethics
5. Environmental Ethics
6. Engineering Ethics

Unit -5: Social Ethics

1. Social Ethics
2. Value Education and Human Values
3. Organ trade
4. Human trafficking
5. Human rights violation and social disparities
6. Ethics of Media and its impact on Newspaper, T.V, Movies,

Practicum

(1) One seminar

(2) One assignment.

Practice exercises and case studies.

Text Books and Reference Materials

a. The Text Book

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R R Gaur, R Sangak, G P Bagaria, 2009, A Foundation course in Human Values and professional thics, Excel Books Private Limited , New Delhi.

b. Teachers Manual

R R Gaur, R Sangak, G P Bagaria, 2009, Teachers'sMamual: A Foundation course in Human Values and professional ethics, Excel Books Private Limited, New Delhi.

Video CD of Teachers Orientation workshop will be made available on website.

Reference Books

1. Ivan Illich,1974,Energy &enquiry, the trinity press, Worcester, and Harper Collins, USA
2. E.F Schumacher, 1973,small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Susan George 1976, how the Other Half dies, Penguin press, Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III,1972 Limits to Growth –Club of Rome's report , Universe Books.
5. ANagaraj, 1998, JeevanVidyaekParichay, Divya Path Santhan, Amarkathak,
6. P.L Dhar, RR Gaur,1990,Science and Humanism, Common wealth Publishers,
7. AN Tripathy, 2003, Human Values, New Age International Publishers.
8. Varinder Kumar, 2016, Human values and Professional ethics, Kalayani Publishers, New Delihi
9. SubbasPalekhar, 2000, How to practice Natural Farming, Pracheen(Vaidik) KrishiTantraShodh, Amaravati.
10. E G Seebhas& Robert L.Berry,2000, Fundamentals of Ethics for Scitist&Engineers, OxfordUniversity Press
11. M Govindrajan, S Natrajan& V. S Senthil Kumar, Engineering E (including Human Values), Estern Economy Edition, Prentice Hall of India Ltd.

Relevant websites, CDs, Movies and Documentaries

1. Value Education Websites, http://www.uptu.ac.in
2. Story of stuff, http://www.Storyofstuff.com
3. AL Gore, an Inconvenient Truth, Paramount Classics, USA

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4. Charlie Chaplin, Modern Times, United Artist, USA

5. IIT Delhi, Modern Technology the Untold Story

6. Anand Gandhi, Right here right now, Cycle wala production

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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester - II

Paper – 1: EDUCATIONAL PLANNING & MANAGEMENT

Objectives:

1. To enable the students to understand basic concepts of educational administration and management
2. To enable the students to acquire necessary knowledge and expertise of the principles and procedures of educational administration and management
3. To develop an understanding and appreciation of the role of different agencies of educational administration
4. To enable the students to understand how different branches of education are managed and administered and appreciate various aspects of educational planning and finance
5. To enable them to understand contemporary developments in educational management, planning and finance

Course Content

Unit - 1: Principles and Practices of Educational Management

1. Meaning, scope and importance of educational management.
2. Growth of educational management – Historical perspective.
3. Objectives and Principles of educational management.
4. Educational Administration at various levels: a. Centre b. State c. Local bodies and d. Private agencies

Unit - 2: Concepts of Educational Planning

1. Need, Importance and Goals of educational planning



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2. Micro and macro models of educational Planning, Approaches of educational planning - Social demand approach ,Rate of return approach and Man power requirement approach
3. Planning process: National and State level, Education in five year plans – inter sector allocation – education Decentralized planning – process, advantages and disadvantages.
4. Sources of finance for Education in India a. Public funding of education b. Fees c. Student loans d. Education cess e. External aid for education Budgeting: control of funds, grant in –aid policy at National & State levels

Unit - 3: Educational Finance

1. Importance of financing education, Effects of educational financing
2. Demand factors for finance in education, Budgetary control, management and reforms
3. Theoretical basis of educational finance Issues in the finance of education
4. Financing elementary, secondary and higher education

Unit - 4: Quality Management in Education

1. Meaning and importance of Quality
2. Quality in Higher Education
3. Accreditation Concept- Meaning, parameters.
4. Role of NAAC

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Helpier Andrew W, Administrative theory in Education, Macmillan Co., New York. (1967).
2. Bayne, C.D. & Robert L. Saundram, The Educational Management; (Artist & Practitioner) Charles. A Dones Pub. Company, Washington-Ohio. (1976)



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3. Bhatt B.D. & SDR Sharma, Educational Administration, Karishkar Pub. House New Delhi. (1992)
4. Clyde M. Campbell, Practical Application of Democratic Administration, Harper &Brother, New York. (1952)
5. Fowceet Glade-W., School Personnel Admn. Macmillan, New York.
6. Harold E. Moore & Newell D. Walters, Personnel Administration in Education Harper & Brother, New York. (1955)
7. International Encyclopedia of Economic of Education, Second Edition, Martin Carnoy.
8. Mathur S.S., Educational Administration – Principles and Practices, Krishna Brothers, Jhalandar.
9. Casteller William – B., The Personnel functions in Educational Administration, Macmillan publishing Co. inc., New York. (1976)
10. Blaug Mark: Economics of Education, Penguin, London (1970).
11. Cohn E.: Economics of Education, Lexington Mass – D.C. Heath Company. (1972)
12. Hedge O., Economic of Education, Himalaya Publishers New Delhi.
13. Jandhyala B.G. Tilak, Economics of Inequality in Education., Sage Publications, New Delhi (1985)
14. Panchamukhi: Research in Economics of Education, Fifth Survey of Educational Research 1988- 92: Trend Reports Vol I, New Delhi, NCERT.
15. Reddy Shiva B, Education and Rural Development in India, UNESCO: IIEP, Paris (2000)
16. Sacharopoulos George P & Woodhall M.: Education for Development, New York – OUP. (1985)
17. Thurow Laster C.: Investment in Human Capital, Belmont: Wadswarth Publishing Co. (1970)
18. John Vaizey, Economics of Education NCERT, Pandit Ed
19. Economics of Education Vol I & II – M. Blaug, Pengiun, London
20. Education – Man power – Economic growth – Horbison and Mayer

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21. Economics of Education, John Sheeham

22. Investment in Education, V.K.R.V. Raow



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester - II

Paper – 2: ADVANCED EUCATIONAL RESEARCH

Objectives:

On completion of this course, the student will be able to:

1. Describe the characteristics of different research methods in education.
2. Understand the difference between quantitative and qualitative research procedures.
3. Select a research method appropriate for a research study.
4. Prepare a research proposal for a research study.
5. Select and apply suitable correlation technique in a research study.
6. Select and use appropriate inferential statistical technique for a research study.
7. Prepare a research report in an appropriate format for a research study.

Course Content

Unit – 1: Methods of Educational Research

1. Phenomenology, Philosophical and Ethnological Research.
2. Historical Research and Case Studies.
3. Survey Research, Analytical Studies, Correlation Studies and Causal-Comparative Studies.
4. Experimental Research and Action Research.

Unit – 2: Research Proposal and Research Report

1. Format of Research Proposal.
2. Format of Research Report.
3. Style of writing the Report, References and Bibliography.



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4. Evaluation criteria for Research Report and Research Paper.

Unit – 3: Examining Relationship or Association

1. Correlation Techniques: Rank order, Product moment, Biserial and Point-biserial.
2. Regression and Prediction.
3. Chi-Square Test: Properties and Uses of Chi-Square Test; Chi-Square as a goodness of fit and test of independence (or association), Contingency coefficient and its uses.
4. Computer Data Analysis.

Unit – 4: Inferential Analysis of Quantitative Data

1. Fundamental Concepts of Inferential Statistics – Concept and uses of Inferential statistics, the 't' distribution, Sampling distribution, Standard error, Confidence interval and Levels of Significance, Degrees of freedom, Two-tailed and One-tailed test of significance, Errors in testing of hypothesis: Type-I and Type-II.
2. Testing the Significance of Statistical measures, viz., mean, S.D., Correlation coefficient and percentages.
3. Testing the Significance of difference between the following statistics for independent and correlated samples – Means (Including small samples), Percentages, Correlation coefficients.
4. ANOVA (One Way) and ANCOVA (One Way) – Concept, assumptions and computation.

Practicum:

(1) One Seminar

(2) One Assignment

Reference Books

1. Aggarwal Y.P. (1988). Statistical Methods: New Delhi: Sterling Publishers Pvt. Ltd.
2. Best J.W. (1999). Research in Education, New Delhi: Prentice Hall of India Pvt. Ltd.
3. Borg, W.R. and Gall, M.D. (1983). Educational Research – An Introduction, New York: Longman, Inc.
4. Christensen, L. (2007). Experimental Methodology. Boston: Allyn & Bacon.



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5. Clive Opie (2004). Doing Educational Research- A Guide for First time researchers. New Delhi: Vistar Publications.
6. Fisher, R.A. (1958). Statistical Methods for Research Workers. Edinburgh: Oliver and Boyd.
7. Fraenkel, J.R., Wallen, N.E. (1996). How to Design and Evaluate Research in Education. New York: McGraw Hill.
8. Garret, H.E. (2006). Statistics in Psychology and Education. Delhi: Surjeet Publications.
9. Guilford, J.P., and Benjamin Fruchter (1982). Fundamental of Statistics in Psychology and Education, Fifth Edition. New York: McGraw-Hill Book Company.
10. Kaul, Lokesh (1984). Methodology of Educational Research. New Delhi: Vikas Publications.
11. Kerlinger, F.N. (1986). Foundations of Behavioural Research. Fort Worth, TX: Harcourt Bmce Jovanovich.
12. Pamela Maykut & Richard Morehouse (1994). Beginning Qualitative Research - A Philosophic and Practical Guide. The Falmer Press London. Washington D.C.
13. Patton. M.Q. (2002). Qualitative Research and Evaluation Methods. Thousand Oaks: C.A: Sage.
14. Reason, P. & Bradbury, H. (Eds) (2006). Handbook of action research: Concise paperback edition: Thousand Oaks, CA: Sage. 23
15. Scott, David & Usher, Robin (1996). Understanding Educational Research. New York: Rout ledge.
16. Shank, G.D. (2002). Qualitative Research. Columbus, Ott: Merill, Prentice Hall.
17. Sharma, Bharti (2004). Methodology of Educational Research. New Delhi: Vohra Publishers and Distributors.
18. Sharma, R.A. ((1992). Fundamentals of Educational Research. Meerut: Loyal Book Depot.
19. Sharma, S.R. (2003). Problems of Educational Research. New Delhi: Anmol Publications Pvt. Ltd.
20. Stake, Robert E. (1995). The Art of Case Study Research. Thousand Oaks: C.A: Sage.



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21. Travers, Robert M.W. (1978). An Introduction to Educational Research (4th edition). London: MacMillan.

22. Van Dalen, Debonald, B. and Meyer, William J. (1979) Understanding Educational Research: An Introduction. New York: McGraw Hill.



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester –II

PAPER – 3: GUIDANCE AND COUNSELING

Objectives:

1. To enable the student to understand the concept, the need and scope of guidance.
2. To enable the student to understand the principles and problems of different types of guidance.
3. To enable the student to understand the concept and process of counseling.
4. To acquaint the student with the aims and principles of guidance programme.
5. To develop in student an understanding of various procedures of organizing various guidance services.
6. To enable the student to identify the situations for individual and group guidance services.
7. To enable the student to choose and use appropriate psychological tests to render guidance.

Course Content

Unit 1: Fundamental Concepts of Guidance

1. Concept, Assumptions and Need of guidance. Purpose, and Functions of Guidance. Scope,Types of Guidance and Significance of Guidance.
2. Guidance at different levels – Primary, Secondary and Higher Secondary School stages.
3. Agencies of Guidance – National, State and local levels.
4. Role of the teacher in Guidance.

Unit 2: Educational and Vocational Guidance



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1. Principles of Educational Guidance. Problems of Guidance. Guidance and classroom learning. Guidance for special learners. Induction Programme. Guidance and curriculum.
2. Strategies of Vocational Guidance- Career Corner , Career talk and Career Conference, Industrial Visit, Simulated Interview, Vocational Counseling.
3. Theories of Vocational Guidance - Super, Ginzberg, Havinghurst, Holland, Hoppock, and Anne Roes Theory of Guidance.
4. Nature of work, various motives associated with work. Occupational Information.

Unit 3: Personal and Group Guidance

1. Nature and Scope of Personal Guidance. Role of Counselor in Personal Guidance.
2. Concept, Scope and principles of Group Guidance. Advantages of Group Guidance. Planning of Group Guidance.
3. Procedure and techniques of group guidance.
4. Family, Health, Marital, Legal, Educational and Vocational guidance.

Unit 4: Counseling Process and Testing in Guidance Service

1. Concept, nature, principles of counseling. Characteristics of good counseling. Counseling for adjustment. Conducting counseling and Counseling for exceptional children. Difference between guidance and counseling.
2. Counseling approaches – Directive, Non-directive. Group counseling Vs. Individual counseling.
3. Use of tests in Guidance and Counseling. Tests of intelligence, aptitude, creativity, interest and personality;administering, scoring and interpretation of test scores.
4. Various types of Guidance Services - Orientation Service, Student Information Service, Counseling Service, Placement Service, Referral Service, Remedial Service, Follow up Service, Research Service and Evaluation Service. Evaluation of Guidance programme.

Practicum

1. One Seminar
2. One Assignment



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Reference Books

1. Aggarwal J.C., Educational Vocational Guidance and Counselling, Doaba House, Book Sellers & Publishers, Naisarak, Delhi
2. Anne Anastasi, Psychological Testing Macmillian, New York
3. Barki B.G. and Mukhopadhyay B,Guidance and Counselling - A Manual, Sterling Publishers Ltd., New Delhi
4. Bhatia B.D.& Safaya R.N., Educational Psychology and Guidance, Dhanpat Rai and Sons Jullundur- Delhi
5. Cronbach, L.J., Essentials of Psychological Testing, Harper & Row, New York.
6. Freeman – Frank S., Theory and Practice of Psychological Testing, Oxford and IBH, Bombay.
7. Gupta Dr. SK., Guidance and Counselling in Indian Education, Mittal Publications, Delhi.
8. Indu Deve, The basic essentials of Counselling, Sterling Publishers, Private Limited.
9. Kochhar S.K., Guidance and Counselling in Colleges and Universities, Sterling Publishers Ltd., New Delhi.
10. Kochhar S.K., Educational & Vocational guidance in Secondary schools - Revised and enlarged edition:, Sterling Publishers Ltd., New Delhi.
11. Narayana Rao S., Counselling and Guidance, Second Edition, Tata McGrow Hill Publishing Company Ltd., New Delhi.
12. Sharma N.R. M.A.L.T., Educational and Vocational Guidance, Vinod Pustak Mandir, Agra
13. Sitaram Dr., Guidance and Counselling, Jayaswal Prakashan Kendra, Lucknow.
14. Yogendra K. Sarma (2007), Principles of Educational and Vocational Guidance, Kanishka Publishers, New Delhi.
15. Rashmi Agrawal (2006), Educational, Vocational Guidance and Counseling, Shipra Publications, New Delhi



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester - II

PAPER – 4: ISSUES AND RESEARCH IN TEACHER EDUCATION

Objectives:

1. To develop in the student understanding of the concept, objectives and principles of teacher education.
2. To acquaint the student with existing practices regarding structure, curriculum and evaluation in the education.
3. To enable the student to understand teaching and training techniques.
4. To enable the student to organize various types of student teaching programme.
5. To enable the student to know the concept and practice of evaluation in teacher education.
6. To acquaint the student with the innovative practice in teacher education.
7. To develop in the student professional ethics and to develop in the student the commitment to the profession.
8. To acquaint the student with different agencies of teacher education in India and their rules and functions.
9. To acquaint the student with the role of professional organization of teacher educators.
10. To help the student to understand major issues and problems of teacher education.

Course Content

Unit 1: Teacher Education at Pre-Primary and Primary Levels

1. Objectives of Teacher Education Programme at pre Primary and Primary Levels as Recommended by the NCTE.
2. Structure of Teacher Education Programme at Pre Primary and Primary Levels as Recommended by the NCTE.

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3. National Curriculum Framework for Teacher Education Programme at Pre Primary and Primary Levels as Recommended by the NCTE.
4. Role and Competencies Required of the Teacher at the Pre Primary and Primary Levels.

Unit 2: Teacher Education at Secondary and Higher Secondary Levels

1. Objectives of Teacher Education Programme at Secondary and Higher Secondary Levels as Recommended by the NCTE.
2. Structure of Teacher Education Programme at Secondary and Higher Secondary Levels as Recommended by the NCTE.
3. National Curriculum Framework for Teacher Education Programme at Secondary and Higher Secondary Levels as Recommended by the NCTE.
4. Role and Competencies Required of the Teacher at the Secondary and Higher Secondary Levels

Unit 3: Teacher Education as a Profession

1. Concept of Profession and Professionalism
2. Developing Professionalism, Professional Ethics and Professional Code of Ethics of Teacher Educators.
3. Meaning and Components of Teacher Effectiveness through Performance Appraisal of Teachers and Teacher Educators.
4. Relationship between Teacher Effectiveness and Professional Ethics.

Unit 4: Research in Teacher Education

1. Nature and Scope of Research in Teacher Education.
2. Areas of Research in Teacher Education (Teaching, Teacher Characteristics, Teacher Performance, Teacher Education, Accountability Teacher Educators and Teacher Education Institutions)
3. Trends in Research in Teacher Education
4. Implications of Research for Teacher Education.

Practicum

(1) One Seminar

(2) One Assignment

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Reference Books

1. Altekur, A.S, Education in Ancient India, Nand Kishore Bros, Banaras, 1951.
2. Basu, A.N., Education in Modern India Orient Book Co., Calcutta, 1947.
3. Chaurasia, G., Innovations and Challenges in Teacher Education, Vikas Publications, New Delhi, 19773
4. Devgowda, A.C. Teacher Education in India, Bangalore Book Bureau, Bangalore, 1973.
5. Dutt, S., The Teachers and His World, Sukumar Dutt, Soamibagh, Agara, 1972.
6. Ebel, R.L. (ED), Teacher Education, Americal Association of Colleges, for Teacher Education, Queenta, 1956.
7. Goodigs R, et al. Changing Priorities in Teacher Education Nicholos Publication Co., New York, 1982.
8. Government of India Secondary Education Commission, Ministry of Education, Govt. of India, New Delhi, 1953.
9. Government of India University Commission, Government of India, New Delhi, 1947.
10. Government of India Education and Development: Report of Education Commission (1964-66) Govt. of India, New Delhi, 1966.
11. Government of India Report of the Working Group to Review Teachers Training programme in the light of the need for value-orientation, Ministry of Education and Culture, New Delhi, 1953.
12. Hilgased, FH (ED) Teaching the teachers: Trends in Teacher Education, George Allen and Union Ltd. London, 1971.
13. Harvilas, S. and Naik, J.P.A History of Education in India, Macmillan and Co. Bombay, 1951.
14. Jangire, N.K., Technology of Classroom Questioning, National Publication House, Daryaganj, New Delhi, 1982.
15. Jangira, N.K. & Singh, A. Core Teaching Skills: Microteaching Approach, NCERT, New Delhi, 1982.



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16. Jangira, N.K. Professional Enculturation: Innovative Experiments in Teaching and training Book worth of India, New Delhi, 1984.
17. Jangira, N.K., Teacher Training and Teacher Effectiveness: An Experiment in Teacher Education, National Publication House, Delhi, 1984.
18. Mitzal H.E., Encyclopedia of Educational Research (Section of Teacher Educational Programme), The Force press New York, 1982.
19. Nyjirhu S.N, (ed), Education of teacher of India (Vol.1)S.Chand and Co. Delhi.1968
20. N.C.T.E., Teacher Education Curriculum: A Frame Work, NCERT, New Delhi 1978
21. NCERT, The Third India Year book on Education, NCERT, New Delhi 1968
22. NECRT, Elementary Teacher Education, NCERT, New Delhi 1970
23. Pandey B.N., Second National Survey of Secondary Teacher Education in India. NCERT, New Delhi 1969
24. Pandey B.N and Khosla D.N., Student Teaching and Evaluation, NCERT, New Delhi 1969
25. Sabharwal N. Innovative Practice in Elementary Education institution in Indai. Vol.1 NCERT New Delhi, 1979
26. Shukla R.S., Emerging Trends in Teacher Education, Chugh Publication Allahabad 1978
27. Singh I.C., Micro Teaching: An Innovation in Teacher Education, National Psychological Corporation, Kacheri Ghat, Agra 1979.



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester – II

Paper – 5: FOUNDATIONS OF EDUCATIONAL SOCIOLOGY

Objectives:

1. To enable the students understand the nature and functions of Educational Sociology
2. To enable the students understand concepts and process of social organization, social stratification and institution in relation to education.
3. To enable the students understand relationship among culture, society and education.
4. To enable the students develop sociological imagination about the ramifications of culture, socialization, social change and education.
5. To enable the students understand the determinants of Socialization

Course Content

Unit - 1: Sociology and Education

1. Meaning, Nature and Scope of Sociological Foundations of Education.
2. Functions of Sociology and utility of Sociology to Teachers.
3. Sociological Aims of Education.
4. Education and Social Mobility.

Unit - 2: Concept of Social Organization

1. Characteristics of Social organization.
2. Social Groups and Characteristics.
3. Social Stratification and Education.
4. Concept of Equality in Education and Need for equality of Educational Opportunities to All.



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Unit - 3: Education and Social Change

1. Social Change - Definition, concept and Factors leading to Social Change.
2. Determinants of Socialization. (family, school, peer group and media).
3. Modernization – meaning and characteristics, relationship between education and modernization.
4. Culture – meaning and nature, relationship between culture and education, cultural conflict, cultural lag, pluralism, relativism.

Unit - 4: Sociological Determinants of Education

1. Religion, Culture, Science and Technology, Economic and Political conditions, Urbanization and Globalization.
2. Social Problems: Poverty, Unemployment and Crime.
3. Educational Programmes for Developing Social Values (NSS, NCC, Scouts and Guides, Social Service activities).
4. Functions of Society towards Education.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Aggarwal J.C. (1985), Theory and Principles of Education, Vikas Publishing House, New Delhi.
2. Bhatia K.K. (1977), Principles and Practice of Education, Kalyani Publishers, New Delhi.
3. Brent.A (1978), Philosophy and Educational Foundations, George Allen and Unwin, Boston.
4. Pandey R.S. (1983) Principles of Education; we know Pustak Mandir, Agra.
5. Ruhela S.P. (1986), Human Values and Education, Sterling Publishers, New Delhi.
6. Sree Rama Krishna A.S.(2002) , Teacher and Education in Emerging Indian Society, New Era Publications, Guntur.



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7. Taneja, V.R. (1990), Socio-Philosophical Approaches to Education, Atlantic Publishing, New Delhi.
8. Ulrich Robber, History of Educational Thought, Eurasia Publishing House, New Delhi.
9. Sociological Philosophy of Education. Y.K Sharma
10. Philosophical and Sociological Foundations of Education. S.K Murthy
11. Philosophical and Sociological Perspectives on Education. Dr. S.Arul Swamy
12. Philosophical Foundations of Education. Dr. T. Mrunalini
13. Philosophical and Sociological Foundations of Education. Raghunatha Safaya
14. Sociological Perspectives in Education. Suresh Chandra
15. Modernization and Social Change. Rajendra PandeyInequality of Social Change. Ambrebeteille



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

1st Year, Semester - II

PAPER – 6 a: ELEMENTARY EDUCATION

Objectives:

1. To make the students understand the nature and historical development of elementary education.
2. To enable the students to examine the development of elementary education policy in India after independence; and
3. To enable the students to understand the concept and objectives of elementary education and the rationale for universal elementary education;
4. To enable the students to know different policies and provisions of elementary education.
5. To develop an understanding in students about different strategies of improving elementary education.
6. To make the students to understand and apply the techniques useful in realising universalisation of elementary education.
7. To enable the students to describe and discuss emerging approaches to varying problems of elementary education.

Course Content

Unit 1: Elementary Education in India

1. History and status of elementary education and recommendations of different education commissions and policies [Kothari, NPE,1986& Yashpal].
2. Aims, objectives and rationale of elementary education.
3. Constitutional provisions and directive principles related to elementary education.

4. Elementary education as a fundamental right, as an instrument of empowerment and as a national development goals.

Unit 2: Universalisation of Elementary Education

1. Concept, meaning, objectives and justification of UEE.
2. Challenges & problems in the way of achieving UEE (access, enrollment, retention and drop out).
3. Measures towards realization of UEE [non-detention policy, free supply of uniform dress to girls and other backward communities, provision of mid-day meals, attendance scholarship for girls and SC/ST children].
4. Participation of NGOs in achieving UEE goals.

Unit 3: Strategies and Programmes in Elementary Education

1. Involvement of Panchayat Raj and Village Education Committees in Educational Planning & Management and DPEP.
2. SSA, OBB, Access to school and school mapping.
3. MDMS, Retention of children and Prevention of dropout rate.
4. Early Childhood Care and Education (ECCE),Integrated Education for Disabled Children (IEDC),Mahila Samakhya (MS) and Kasturba Gandhi Balika Vidyalaya (KGBV).

Unit 4: Curriculum and Evaluation in Elementary Education

1. Objectives, principles and organization of curriculum.
2. Innovative practices in curriculum at elementary level [Multi-Grade Teaching (MGT), Peer Learning (PL) and Co-operative Learning (CL)].
3. Evaluation at elementary education [principles, strategies and tools-term evaluation, competency based evaluation and continuous comprehensive evaluation].
4. Problems and Critical appraisal of present evaluation system in elementary education.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

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1. Elementary Education – D.S.Srivastava & Monica Tomar ISHA books , Delhi
2. Elementary Education- V. Krishnamacharyulu (2 vol) Neelkamal
3. Elementary Education in India, status, issues and concerns- Jagannatha Rao- Viva books- New Delhi



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUATION

1st Year, Semester – II

PAPER – 6 b: SECONDARY EDUCATION

Objectives:

1. To enable the students understand the nature, significance and the historical development of Secondary Education.
2. To enable the students understand the rationale and objectives of Secondary Education.
3. To enable the students to know about the different Institutions which provide Secondary Education.
4. To enable the students understand the different challenges and problems at the Secondary Education stage.
5. To enable the students know the various efforts of the State in the provision of Secondary Education.
6. To enable the students know the importance of Secondary Education and the need to make this stage of education very strong and practical .

Course Content

Unit 1: Concept, Objectives and Rationale of Secondary Education.

1. What is meant by Secondary Education? Significance and major objectives of Secondary

   Education
2. Secondary Education, the most important link between the Primary and Higher Education. What is expected of a student on the completion of Secondary Education?



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3. An overall view of the historical development of Secondary Education in the pre and postindependent India, with special reference to Wood's Despatch, Hunter Commission, Sadler Commission, Hartog Commission, Sargent Commission.
4. The Secondary Education Committee Report of 1952-53 or The Mudaliar Commission Report and it's recommendations.

Unit 2: Indian Government, Constitution and SecondaryEducation.

1. National and State Policies on Secondary Education, with special reference to Kothari Commission Report, National Policy on Education1968, Eshwarbhai Patel Commission Report, New Education Policy 1986, Malcom Adiseshaiah Commission Report, Janardhan Reddy Commission Report 1992, Yashpal Committee Report, and the POA 1992.
2. Constitutional Provisions and their respective implications for Secondary Education.
3. Different types of Institutions providing Secondary Education; Residential schools like Navodaya Schools, A.P.Residential Schools, Gurukul Pathashalas, Non – Residential schools like Kendreeya Vidyalayas, CBSE schools etc.
4. RMVA Rashtreeya Madhyamika Vidya Abhiyan. Status of Secondary Education with reference to the principles of equity and equality- class, caste, gender, tribe and groups.

Unit 3: Secondary Education- A Preparation for educational future of the students

1. Secondary Education- Personality Development- Inculcation of various kinds of Values through different curricular and co-curricular activities.
2. Secondary Education a 'Runway' for future education and careers.
3. Secondary Education- A terminating point or a 'Y' junction for the youth.
4. SUPW, Work Experience, Vocationalization of Secondary Education, Earn while you learn and other such concepts that have attempted to make Secondary Education productive.

Unit 4: Challenges and Problems of Secondary Education

1. Problems of enrollment and continuance.
2. Education of the differently - abled children.
3. Quality and Quantity of facilities- material and human.

4. Private and Government schools.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Altekur, A.S, Education in Ancient India, Nand Kishore Bros, Banaras, 1951.
2. Bhaskara Rao, Digumarti, Teacher Education India, Discovery Publishing House, New Delhi, 2005.
3. Dutt, S., The Teachers and His World, Sukumar Dutt, Soamibagh, Agara, 1972.
4. Government of India. Secondary Education Commission, Ministry of Education, Govt. of India, New Delhi, 1953.
5. Government of India. University Commission, Government of India, New Delhi, 1947.
6. Government of India. Education and Development: Report of Education Commission (1964-66) Govt. of India, New Delhi, 1966.
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8. Hilgased, FH (Ed). Teaching the teachers: Trends in Teacher Education, George Allen and Union Ltd. London, 1971.
9. Harvilas, S. and Naik, J.P. A History of Education in India, Macmillan and Co. Bombay, 1951.
10. Mukorji S.N.(ed) ,Education of teacher of India (Vol.1) S. Chand and Co. Delhi. 1968
11. N.C.T.E , Teacher Education Curriculum : A Frame Work, NCERT, New Delhi 1978.
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14. Shukla R.S. , Emerging Trends in Teacher Education, Chugh Publication Allahabad 1978

15. MHRD, Govt of India (1993) Education *for All – The Indian Scene.*

16. MHRD, Govt. of India (1992) Programme *of Action,* New Delhi.

17. MHRD, Govt. of India*, Mahila Samakhya – Education for Women's Equality,* New Delhi.

18. Naik, J. P. (1975). *Policy and Performance in Indian Education 1947-74,* New Delhi, Orient Longman.

19. NCERT (1994) *Fifth Survey of Education,* New Delhi.

20. NCERT *Education in the Indian Constitution, New* Delhi.



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – III

PAPER - 1: INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

Objectives:

On completion of this course the students will be able to

1. Explain the concept and scope of ET.
2. Explain the different instructional designs.
3. Understand the nature and scope of ICT in Education.
4. Appreciate the applications of ICT in Education.
5. Understand the process of ICT integration in teaching and learning.
6. Appreciate the scope of ICT for improving the personal and professional competence of teachers.
7. Understand the components and basic functionality of computer.
8. Know the instructional applications of internet and Web resources.
9. Understand the process of locating research studies available in the Internet and the use of online Journals and books.
10. Develop various skills to use computer technology for sharing information and ideas through the E-mail, Blogs and Chatting groups.

Course Content

Unit 1: Introduction to Information and Communication Technology

1. Meaning, Nature, Scope and Significance of ICT.
2. ICT resources for teaching and learning.



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3. Uses of ICT: Teaching-learning process, Evaluation, Research and Administration.
4. Role of ICT in personality development and professional development.

Unit 2: Computer, Internet and World Wide Web

1. Fundamentals of Computer: Meaning of Hardware and various Hardware components of a computer; Concept and types of Computer Software; Computer memory and its types; Meaning, types and functions of Operating System; Computer VIRUS and protection measures.
2. The Internet: Meaning of Internet, H/W and S/W requirements for Internet, Internet terminology, Applications of Internet in Education.
3. The World Wide Web: Concept of W.W.W; Distinction between Internet and W.W.W; Web pages and H.T.M.L; Web browsers and Web Search Engines; Web Surfing.
4. Educational Multimedia: Meaning and significance of Multimedia; Elements of Multimedia; Development of Multimedia Courseware.

Unit 3: Information Storage and Management

1. Data and Information: Types of data, File management.
2. Data storage and Data base management.
3. Meaning, Characteristics and benefits of cloud computing.
4. Management information systems in the field of education.

Unit 4: ICT in Education

1. E-Learning: Meaning, nature and characteristics of E-learning; E-learning and Class room dynamics; Advantages and limitations of E-learning.
2. Web Based Learning–Online Learning: Meaning, principles and categories of Web based learning; Merits and limitations of Web based learning; Meaning, significance, functions and advantages of Virtual Campus.
3. E–Journals and E–Books: Meaning, types, salient features and availability of E-Journals; Meaning, nature and significance of E – Books.
4. Electronic portfolio.

Practicum



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(1) One Seminar

(2) One Assignment

Reference Books

1. Ahmad, J., Ahmad, Md. S., & Khan, A. (2012). *Computer Applications in Education*. Hyderabad: Neelkamal Publications Pvt. Ltd.
2. Arulsamy, S. & Sivakumar, P. (2012). *Applications of ICT in Education*. Hyderabad: Neelkamal Publications Pvt. Ltd.
3. Barton, R. (2004). Teaching Secondary Science with ICT. Mc. Graw Hill International.
4. Bhaskara Rao, Digumarti (2013). Vidya Samachara Sankethica Sastram (ICT in Education). Guntur: Master minds Publications.
5. Cambridge, D. (2010). E-Portfolios for Lifelong learning and assessment. John Wiley and Sons.
6. Constantino, P.M., DeLorenzo, M.N. & Kobrinski, E.J. (2006). Developing a professional Teaching Portfolio: A Guide for Success. New Delhi: Pearson.
7. Imison, T. & Taylor, P.H. (2001). Managing ICT in the Secondary Schools. Heinemann: Oxford.
8. Intel Teach to the Future – Pre-Service Binder – Version 2.0.
9. Kirwadkar, A. & Karanam, P. (2010). E-Learning Methodology. New Delhi: Sarup Book Publishers Pvt. Ltd.
10. Mangal, S.K. & Uma Mangal (2011). Essentials of Educational Technology. New Delhi: PHI Learning Pvt. Ltd.
11. Norton, P. (2011). Introduction to Computers, 7th Edition. New Delhi: Tata McGraw-Hill Education Private Limited.
12. Roblyer, M.D. (2006). Integrating Educational Technology into Teaching. New Jersey: Pearson Prentice-Hall Inc.
13. Sharma, R.A. (1991). Technology of Teaching. Meerut: Loyal book depot.
14. Shukla, Satish, S. (2005). Basics of Information Technology for Teacher Trainees. Ahmedabad: Varishan Prakashan.



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15. Simmons, C. & Hawkins, C. (2009). Teaching ICT. New Delhi: Sage Publications.
16. Sinha, P.K. & Sinha, P (2011). Computer Fundamentals, 6th Edition. New Delhi: B.P.B Publications.

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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – III

PAPER – 2: COMPARATIVE EDUCATION

Objectives:

1. To help the students to understand comparative education as an emerging multi-education as discipline (with its scope and major concepts) of education.
2. To acquaint the students with educational systems in terms of factors and approaches of comparative education.
3. To orient the students with skills to assess the efficacy of educational systems of various countries in terms the prevailing trends in those countries.
4. To help the students to use the results of assessment made by various countries and to know the role of UNO and its various bodies for the promotion of Indian education.
5. To create a perspective in the students about the implications of education for solving the prevailing problems in India.

Course Content

Unit 1: Comparative Education

1. Introduction to Comparative Education: Meaning, scope, objectives and need for comparative education.
2. Major concepts of comparative education.
3. Sociological, scientific, historical, ecological, structural and functional factors – Cross disciplinary approach used in comparative education.
4. Approaches to comparative education.

Unit 2: Comparative Education at National and International Levels

1. Modern trends in comparative education– National and Global.



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2. Role of U.N.O. in improving educational opportunities among the member countries – protection of human rights.
3. Official organs of the U.N.O. and their educational activities.
4. Mufti culturalism in education.

Unit 3: Comparative Study of the Education Systems of various Countries

1. School Education (Elementary & Secondary) : USA, UK, Russia, Japan, India.
2. Higher Education: USA, Russia, UK, India.
3. Teacher Education: USA, Russia, UK, India.
4. Open Learning : India, Japan, USA, Russia, U.K.

Unit 4: Issues and Challenges in Comparative Education

1. Causes and solutions for Problems prevailing in developing countries
2. Poverty, Unemployment and Terrorism
3. Population explosion, Casteism and communalism
4. Illiteracy

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Beredy, G.Z.F. (1964), Comparative Methods in Education, Oxford & East Publishing Co., New Delhi.
2. Green,J.L.(1981):Comparative Education and Global Village,Anu Book,Shivji Road,Meerut
3. Hans,Nicholas(1965):Comparative Education,RoutledgeandKeganPaulLtd.,London
4. Sharma,Y.K.(2004):Comparative Education Comparative Study of Educational Systems, New Delhi: Kanishka Publishers
5. Rai, B.C., "Comparative Education", Prakashan Kendra, Lucknow (1972).
6. Sodhi, T.S., "A textbook of comparative education – Philosophy, Patterns & Problems of National Systems (UK, USA, Russia, India)", Vikas Publishing House Pvt., Ltd., New Delhi (1993).

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7. Biswas, A., & Aggarwal, J.C., "Comparative Education (India, U.K., U.S.A., U.S.S.R.)", Arya Book Depot, New Delhi (1986).
8. Sharma, R.N., "Education in Emerging Indian Society", Surjeet Publications, Delhi (2002).
9. David Pratt., "Curriculum – Design and Development", Harcourt Brace Jovanovich, New York (1980).



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – III

PAPER – 3: INCLUSIVE EDUCATION

Objectives:

On completion of this course the students will be able to

1. Understand the global and national commitments towards the education of children with diverse needs,
2. Appreciate the need for promoting inclusive practice and the roles and responsibilities of all concerned personnel,
3. Develop critical understanding of the recommendations of various commissions and committees towards teacher preparation for Inclusive Education,
4. Understand the nature of difficulties encountered by children and prepare conducive teaching learning environment in inclusive schools,
5. Analyze special education, integrated education, mainstream and Inclusive Education practices,
6. Identify and utilize existing resources for promoting inclusive practice.

Course Content

Unit 1: Introduction to Inclusive Education

1. Definition, Concept and Importance of Inclusive Education.
2. Historical perspectives on education of children with diverse needs.
3. Difference between special education, integrated education and Inclusive Education.
4. Advantages of Inclusive Education for all children.

Unit 2: Inclusive Education- Recommendations of Education Commissions and Committees

1. International Initiatives of IE: The World Declaration on Education for all and,

The UNICEF World Summit for Children, (1990).

2. National Initiatives of IE: Kothari Commission, IEDC, NPE (1986-92),

PIED, DPEP, PWD and SSA.

3. Initiatives for the gifted and talented children.
4. Current Laws and Policy Perspectives supporting Integrated Education.

Unit 3: Preparation for Inclusive Education at Elementary level

1. Concept and meaning of diverse needs.
2. Educational approaches: concept of remedial education, special education, Integrated Educationand Inclusive Education.
3. Building inclusive learning, friendly classrooms, overcoming barriers for Inclusion.
4. Role of teachers, parents and other community members for supporting Inclusion of childrenwith diverse needs.

Unit 4: Children with Diverse Needs

1. Sensory (hearing, visual, physically challenged and multiple disabilities).
2. Intellectual (gifted, talented and intellectually challenged children).
3. Developmental disabilities (autism, cerebral palsy, children specific learning disabilities), Slow learners and underachievement; Role of teachers in Inclusive Education.
4. Utilization of Resources: Human and Material resources and Community resources.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Ainscow, M., Booth. T (2003): *The Index for Inclusion: Developing Learning and Participation in Schools.* Bristol: Center for Studies in Inclusive Education.
2. Ahuja. A, Jangira, N.K. (2002): *Effective Teacher Training; Cooperative Learning Based Approach: National* Publishing house 23 Daryaganj, New Delhi 110002.

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3. Dr. A.S. Ramakrishna, M. Srinivasa Reddy, & P. Vinay Kumar: Perspectives in primary Education and Inclusive Education, (D.Ed.). New Era Publications Guntur. (Telugu Version)
4. Dr.Digumarthi Bhaskar Rao, Dr.B. Prasad Babu: Perspectives in primary Education and Inclusive Education, (D.Ed.). Sri Nagarjuna Publishers, Guntur. (Telugu Version)
5. Jangira N.K. and Mani, M.N.G. (1990): *Integrated Education for Visually Handicapped,* Gurgaon, Old Subjimandi, Academic Press.
6. Jha. M.(2002) *Inclusive Education for All: Schools Without Walls,* Heinemann Educational publishers, Multivista Global Ltd, Chennai, 600042, India.
7. Sharma, P.L. (1990) *Teachers handbook on IED-Helping children with special needs* N. C. E R T Publication.
8. Sharma P.L (2003) *Planning Inclusive Education in Small Schools*, R .I E. Mysore
9. Daniels Harry, & Garner Philip, (1999) (Inclusive Education (World Yearbook of Education).ISBN.07494 2237 8 (hb).
10. Jitender Kumar,(2013) Inclusive Education. Twenty first Century Publication; First

a. Edition.ISBN-10: 9380144423; ISBN-13: 978-9380144429.

11. Tim Loreman, Joanne Deppeler & David Harvey, (2010). Inclusive Education: Supporting diversity in the classroom –9781741759860, Allen& Unwin Publisher; 2nd edition. http://www.allenandunwin.com/.
12. SSA (2006): Responding to Children with Special Needs – A Manual for Planning and Implementation of Inclusive Education in Sarva Shiksha Abhiyan, MHRD, Department of Elementary Education and Literacy, MHRD, Govt. of India. Available on http://www.ssa.nic.in/childspl/ssa_plan_mannual.pdf.
13. Status of Disability in India – 2000, published by Rehabilitation Council of India.PP.445.
14. Ujala – III (2006): Five days teachers training Module for Teachers of Upper primary classes. P. 22 – 23. 21.
15. UNESCO (2006): Inclusive Education. Available on http://portal.unesco.org/education/en/ev.php-URI_ID.

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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester - III

PAPER – 4 a: ECONOMICS OF EDUCATION

Objectives:

1. To enable the students to understand Human Capital, Education and Employment analysis of earning, manpower planning and financing of education.
2. To acquaint the students with the political economy of education.
3. To develop among students understanding of labour markets.
4. To enable the students to forecast man power requirements in various streams.
5. To develop among the students an understanding of the financial aspects of education.
6. To develop awareness among students about the importance of economics to the field of education
7. To develop understanding about education both as consumption and investment
8. To develop understanding about the benefits and the costs of education and its role in human and economic development
9. To develop various abilities to understand the internal efficiency of the system of education
10. To enable them understand the contemporary developments in economics of education.

Course Content

Unit 1: Basic Concepts of Economics of Education

1. Concept, scope, significance, recent trends in economics of education.
2. Education as consumption and investment.
3. The concept and measurement of Human Capital.

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4. Education and its relation to Human Resource Development.

Unit 2: Education and Economic Development

1. Education and economic growth - methods and comparisons.
2. Education, Poverty and Politics of Development, Liberalization, Privatization, Globalization and Education.
3. Contemporary Economic reforms in India and their impact on Education, Education and employment.
4. Labor, Market and Education, Education and Migration (Internal and External).

Unit 3: Cost - Benefit Analysis in Education

1. Determinants of Educational Costs.
2. Problems in the Measurement of Costs and Benefits in Education.
3. Cost-Benefit Analysis in Education.
4. Concept of Rate of Returns and Returns to Education.

Unit 4: Economic Reforms and Education

1. Relationship between Poverty, Schooling and Education.
2. Privatization of State Education - Public - Private partnership in education.
3. Globalization and Education.
4. Economic Liberalization Policies in India and their impact on Education.

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Helpier Andrew W, Administrative theory in Education, Macmillan Co., New York. (1967).
2. Bayne, C.D. & Robert L. Saundram, The Educational Management; (Artist & Practitioner) Charles. A Dones Pub. Company, Washington-Ohio. (1976)
3. Bhatt B.D. & SDR Sharma, Educational Administration, Karishkar Pub. House New Delhi. (1992)

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4. Clyde M. Campbell, Practical Application of Democratic Administration, Harper &Brother, New York. (1952)

5. Fowceet Glade-W. , School Personnel Admn. Macmillan, New York.

6. Harold E. Moore & Newell D. Walters, Personnel Administration in Education Harper & Brother, New York. (1955)

7. International Encyclopedia of Economic of Education, Second Edition., Martin Carnoy.

8. Mathur S.S., Educational Administration – Principles and Practices, Krishna Brothers, Jhalandar.

9. Casteller William – B., The Personnel functions in Educational Administration, Macmillan publishing Co. inc., New York. (1976)

10. Blaug Mark: Economics of Education, Penguin, London (1970).

11. Cohn E.: Economics of Education, Lexington Mass – D.C. Heath Company. (1972)

12. Hedge O., Economic of Education, Himalaya Publishers New Delhi.

13. Jandhyala B.G. Tilak, Economics of Inequality in Education., Sage Publications, New Delhi (1985)

14. Panchamukhi: Research in Economics of Education, Fifth Survey of Educational Research 1988- 92: Trend Reports Vol I, New Delhi, NCERT.

15. Reddy Shiva B, Education and Rural Development in India, UNESCO: IIEP, Paris (2000)

16. Sacharopoulos George P & Woodhall M.: Education for Development, New York – OUP. (1985)

17. Thurow Laster C.: Investment in Human Capital, Belmont: Wadswarth Publishing Co. (1970)

18. John Vaizey, Economics of Education NCERT, Pandit Ed

19. Economics of Education Vol I & II – M. Blaug, Pengiun, London

20. Education – Man power – Economic growth – Horbison and Mayer

21. Economics of Education, John Sheeham

22. Investment in Education, V.K.R.V. Rao



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DEPARTMENT OF EDUCATION

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MASTER OF EDUCATION

2nd Year, Semester – III

PAPER – 4 b: SPECIAL EDUCATION

Objectives:

1 The student is able toacquire knowledge regarding various disabilities

2 To equip the students with ability to identify individuals with disabilities

3 To make students understand the need and types of rehabilitative measures

4 To train students to apply the techniques of educational interventions

5 To create awareness among public on the issues of disabilities and rehabilitation

6 To motivate students to act as agents in controlling the disabilities

Course Content

Unit 1: Meaning and Scope of Special Education

1. Concept of Impairment, Disability and Handicap, Classification of Exceptional Children, Brief History of Special Education.
2. Nature and Scope of Special Education, Importance and need of Segregated – Integrated - Inclusive Education.
3. Concessions and facilities for persons with Disabilities.
4. Recommendations given in NPE 1986, POA 1992 and PWD (Persons with disability Act) 1995; National Institutes of Handicapped and the Role of Rehabilitation Council of India (RCI).

Unit 2: Children with Sensory Physical Impairment

1. Visual Impairment : Blind and Low Vision, Identification, Characteristics, Causes, Preventive Measures, Educational Provisions, Aids and Appliances

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2. Hearing Impairment: Nature, classification, Identification, Characteristics, Etiological factors, Preventive measures, Educational Provisions, Amplification Devices, and Methods of Communication with Hearing Impaired.
3. Nature, Definition and Categories. Identification and Characteristics. Causes - Prenatal, Perinatal and Postnatal
4. Preventive measures and Educational Provisions. Barrier-Free School Environment.

Unit 3: Children with Mental Retardation and Learning Disability

1. Definition, Nature, Classification, Identification and Characteristics of mental retarded.
2. Causes of mental retardation – Chromosomal anomalies, congenital defects, Bio-Chemical irregularities, Prenatal, Peri-natal and Post-natal causes. Preventive measures of mental retarded. Different types of Educational Programmes for mentally retarded.
3. Meaning, Nature, Identification, Characteristics and Classification of learning disability – Dyslexia, Dysgraphia, Dyscalculia, Aphasia.
4. Preventive measures of learning disability. Educational Provisions – Multisensory Approach and Behavioural approach.

Unit 4: Educational Intervention and Preparation of Special Teachers

1. Nature and objectives of special schools. Concept of main streaming; integrated schools and support services provided within them' viz. Resource room, resource teacher, counselor, etc.
2. Concept of remedial teaching (specially for learning disabled children). Role of other (peer) members of the school (children as well as teachers). Family of the "concerned child" and the community in educating the child who is an exceptional one.
3. Roles and responsibilities of the teachers in the Special Education schools. Preparing psychological readiness among teachers to accept the responsibilities for learners with diverse needs and problems. Competencies of teachers & teacher educators – categories of competencies, methods of developing the competencies at pre-service and in-service levels.
4. Curriculum for teacher preparation and transaction modes.



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Practicum

(1) Observation of Special Schools for children with disabilities and report writing.

(2) A Report on present concessions and facilities for persons with Disabilities

(3) Guidance to the parents of Special children and report writing

(4) Undertaking any two cases of any two disabilities for educational intervention and Report writing.

Reference Books

1. Baine, D. (1998).Handicapped Children in Developing Countires, Assessment, Curriculum and Instruction. University of Alberta , Alberta .
2. Evan, P. and Verma, V. (Ed.) (1990) Special Education. Past Present and Future. The Faimer Press.
3. Longone,J.(1990). Teaching Retarded learners: Curriculum and Methods for improving instruction. Allyn and bacon : Boston .
4. Murichen, Joes S.J. and Kareparampil, G. (1995). Persons with Disabilities in Society. Trivandrum : Keral Federation of the Blind.
5. Narayana, J. & Kutty, A.T.T. (1989) Handbook for Trainers of the Mentally Retarded Persons. Pre-primary level. NIMH, Secunderabad
6. Overton, T. (1992). Assessment in Special Education: An Applied Approach. New York : McMillan
7. Panda, K.C. (1997). Education of Exceptional Children. New Delhi : Vikas Publications.
8. Peshwaria, R. and Venkatesan. S. (1992) Behavioural retarded children : A manual for Teachers. NIMH, Secunderabad.
9. Subba Rao, T.A. (1992). Manual on Developing Communication Skills in Mentally Retarded Persons, NIMH, Secundarabad.
10. Taylor, R.L. (1993). Assessment of Exceptional Students : Educational and Psychological Procedures. Boston : Allyn bacon.
11. Van Riper, C.A. and Emerick.L. (1990), Speech Correction – An introduction to speech pathology and audiology. Eighth Edition, Prentice Hall.



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DEPARTMENT OF EDUCATION

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MASTER OF EDUCATION

2nd Year, Semester - III

PAPER – 4 c: ENVIRONMENTAL EDUCATION

Objectives:

To Enable the students to

1. Understand the relationship between Human Beings and their Environment.
2. Develop sensitivity towards Environmental Disaster Management.
3. Acquire an understanding of the process of Environmental Education.
4. Develop skills and competencies as teachers for Management of Environmental Awareness Programmes.

Course Content

Unit 1: Introduction

1. Concept, importance, scope, Aims and Objectives of Environmental Education
2. Guiding principles and foundations.
3. Relationship between man and Environment.
4. Ecological and psychological perspective

Unit 2: Environmental Hazards

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1. Environmental pollution: physical, air, water, noise, chemical
2. Extinction of flora and fauna, deforestation, soil erosion
3. Need for conservation, preservation and protection of rich environmental heritage.
4. Programme of environmental education for primary education institutions.

Unit 3: Features of Curriculum for Environmental Education

1. Special nature of curriculum on environmental education.
2. Concept of environment and ecosystem. Nature system earth and biosphere abiotic and biotic components. Natural resources, abiotic resources.
3. Human systems - Human beings as part of environment, human adaptations to environment, population and its effect on environmental resources.
4. Technological system- industrial growth, scientific and technological invention and their impact on the environmental system.

Unit 4: Methods and Approaches in Environmental Education

1. Strategies and approaches, treating environment education as a separate subject, topical units, integration and interdisciplinary approaches. Methods - discussion, seminar, workshop. Dialogue, Problem Solving Field Surveys, project and Exhibition. Role of Media, print Films and TV.
2. Conservation of Natural Resources: Concept, need and Importance. Ways of Conservation of Natural Resource: Refuse, Reuse, Recycle, Reduce, Replace, Restore, Regenerate, and Reshape. Need for conservation, preservation and protection of rich environmental heritage.

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3. Programme of environmental education for primary, secondary and higher education institutions.
4. Programmes for Environmental Protection Environment and Legislation: The water (prevention and control pollution)Act, 1974. The Environment (protection)Act,1986. The wild life (Protection) Act, 1972. The Motor Vehicles Act, 1988. The Air (Prevention and Control of pollution) Act,1 989. The Indian Forest Act, 1927.

Practicum

1. One Seminar
2. One Assignment

Reference Books

1. Desh Bandhu & R.Dyal (1999): Environmental education for a sustainable future. Indian environmental Society. New Delhi.
2. Purushottam Reddy K & Narasimha Reddy D (2002): Environmental education, Neelkamal publications Pvt.Ltd.Hyderabad.
3. Singh R.B.& Suresh Misra (1996) : Environmental law in India – Issues and responses Concept Publishing Company, New Delhi.
4. Trivedi P.R.Sharma P.L.& Sudershan K.N.(1994): Natural environment and constitution of India. Ashish Publishing House,New Delhi.
5. Deshbandhu and G.Berberet (1987) : Environmental Education for conservation and Development, Indian Environment Society, New Delhi.
6. Gregory, K.J.and walling, D.E.(1981) Man and Environment Process, Butterworths,London.
7. Kumar, V.K.(1982) A study of Environmental pollution, Tara Book Agency,Varanasi.
8. Sapru, R.K.(1987) Environmental Management in India, Ashish Publishing, Delhi.
9. Saxena, A.B. (1986) Environmental Education, National Psychological corporation,Agra.
10. Dani,H.M.(1986): Environnemental Education, Chandigarh,Publication Bureau,Punjabuniversity.

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11. Nanda,K.V.(1997), Environmental Education,New Delhi,:APH Publishing Corpn.
12. Saxena,A.B.(1986), Environmental Education,Agra : National Psychological Corpn.
13. Sharma, R.C.(1981), Environmental Education, NewDelhi : Metropolitan Book Co.,
14. NCERT,(2000) National Curriculum Framework 2000.New Delhi.NCERT Press.
15. NCTE,(2005), Environmental Education Curriculum Frame working for Teachers & Teacher Education. New Delhi : NCERT Press.



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DEPARTMENT OF EDUCATION

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2nd Year, Semester – III

As per the action plan of NEP-2020

PAPER – 5: LIFE SKILLS EDUCATION

Objectives:

To enable the prospective teacher-educators

1. To be aware of the need and significance of Life Skills Education.
2. To develop the ability to identify different components of each skill.
3. To participate in all the activities meant for the development of life skills
4. To use various strategies and gain mastery over each of the ten core life skills.
5. To identify the necessary life skills appropriate to the context and implement them.

Course Content

Unit 1: Introduction to Life Skills Education

1. Nature of Life Skills Education at formative stage
2. Need and importance of Life Skills Education
3. Classification of Life skills
4. Classification of knowledge
5. Growth and Development of the learners' Life Skills at various stages of Education

Unit 2:Development of Cognitive Skills

1. Skill development through cognitive theory of learning
2. Creative Thinking, Critical Thinking, Decision Making and Problem Solving Skills
3. Components of each Cognitive Skill.
4. Strategies of Cognitive Skills -Brain storming and Block busting
5. Qualities of the skill developed person in each Cognitive Skill

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Unit 3: Development of Psycho-Social Skills

1. Development of Psychosocial skills
2. Meaning and nature of Self- Awareness, Empathy, Inter-personal relationship and Effective Communication skills.
3. Components of psycho-social skills
4. Learners 'Group discussion, Role-play, Narration, and Sharing
5. Qualities of the person dealing the psycho-social issues

Unit 4: Development of Coping Skills

1. Meaning and nature of coping skills
2. Coping skills for Emotions and Stress
3. Components of coping with emotions and coping with stress.
4. Coping strategies through Yoga, Meditation, Relaxation exercises
5. Development in the process of coping with anxiety and depression

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Goel, D.R. Coordinator (2005-2006). Quality Concerns and Education. Centre of Advanced study in Education. M.S.University of Baroda.
2. Sudha.V.Rao (2000). Adolescence Education. R.I.E, Mysore.
3. UNICEF (2006). Life Skills Modules – Adolescence Education Programme, UNICEF House, New Delhi.
4. Venkatesha Murthy C.G. and Prof.A.V.GovindaRao (2005). Life Skills Education Training Package, R.I.E, Mysore.
5. Xavier Alphonse (2004). We Shall Over Come. A Text Book on Life Coping Skills, MCRDCE Publication, Chennai.
6. Xavier Alphonse. Life Skills Programme. MCRDCE Publication, Chennai



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DEPARTMENT OF EDUCATION

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2nd Year, Semester - III

PAPER – 5 a: TEACHING STRATEGIES FOR TEACHERS

Objectives:

To Enable the students to

1. Acquire competency in different teaching skills
2. Understand the context of application of different strategies of teaching and also implement them.
3. Understand and appreciate the role of communication in effective teaching
4. Understand the impact of teacher communication on student's personality development

Unit – 1 : Essential Teaching Skills and the Teaching of Thinking

1. Essential Teaching Skills : The Foundation for Teaching Effectiveness
2. Beyond Effective Teaching : Teaching for Thinking and Understanding and Higher – Order and Critical Thinking
3. The Model Approach to Teaching
4. Information Processing

Unit – 2 : The Inductive Model : A Constructivist View of Learning

1. The Inductive Model : An Overview, Goals for the Inductive Model
2. Planning Lessons with the Inductive Model
3. Implementing Lessons Using the Inductive Model
4. Assessing Student Learning

Unit – 3 : Teaching Organized Bodies of Knowledge

1. The Integrative Mode : An Overview, Goals for the Integrative Model

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2. Planning Lessons with the Integrative Model and Implementing Lessons Using the Integrative Model, Assessing Integrative – Model Activities,
3. The Lecture – Discussion Model – An Overview, Theoretical Perspectives
4. Planning for Lecture – Discussion Lessons, Implementing Lecture – Discussion Lessons and Assessing Student Understanding in Lecture – Discussion Lessons

Unit – 4 : The Direct-Instruction Model

1. Direct Instruction : An Overview, Direct Instruction : Theoretical Perspective
2. Planning Lessons with the Direct – Instruction Model
3. Implementing Lessons Using the Direct – Instruction Model
4. Assessing Student Understanding

Practicum

1. One Seminar
2. One Assignment

References

1. Paul D. Eggen & Donald P. Kauchak (1966) Strategies for Teachers. Allyn and Bacon A Simon and Schuster Company, London.
2. Flander, N. A. (1970) Analyzing Teaching Behaviour Reading Massachusetts. Addison – Weley.
3. Travers, R. M. W. (1973) Second Handbook of Research on Teaching. Chicago : Rand McNally College Publishing Company.

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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – III

PAPER – 5 b: VALUE EDUCATION

Objectives:

1. To enable the students understand the need, nature and scope of Value Education.
2. To enable the students understand the importance of values and classification of values.
3. To enable the students understand the role of different people and media in fostering values.
4. To enable the students understand the approaches, teaching strategies and models of Value Education.
5. To enable the students understand the importance of Value Education and the different ways to execute the syllabus at various levels.

Course Content

Unit 1: Need, Nature and Concept of Value Education

1. Concept, Need and Nature of values.
2. Meaning and Classification of Values.
3. Sources of Values.
4. Values and Education – Their relationship and Significance of Value Education.

Unit 2: Models of Value Education

1. Value Clarification Model.
2. Social Action Model.
3. Consideration Model.
4. Rationale Building Model.

Unit 3: Approaches and Teaching Strategies for Inculcation of Values

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1. Form and content of Value Education at different stages.
2. Different approaches to Value Education- Direct, Indirect and Integrated approaches.
3. Strategies and Techniques for Value Education at different stages.
4. Contribution made by some eminent leaders of the world to Value Education. (Individual Studies may be taken up by the students)

Unit 4: Role of different Social Agencies in Value Formation

1. Role of Parents and Peer Group
2. Role of School and Teachers
3. Role of Religion and Media
4. Need of Orientation in Value Education to Prospective Teachers

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. B.K Passi and Prabhakar Singh (1991). Value Education, National Psychological Corporation. Agra.
2. Prof.S.P Ruhela,Prof.Raj Kumar Naik (2011). Value Education and Human Rights Education, Neelkamal Publications Pvt. Ltd.,Hyderabad.
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4. Tilak Raj, Bharadwaj (1992). Education of Human Values, Mittal Publications, New Delhi.
5. S.R Sharma (2006). Moral and Values in Education, COSMO Publications, New Delhi.
6. Dr.Kiruba Charles, V.Arul Selvi (2012). Peace and Value Education, Neelkamal Publications Pvt, Ltd. Hyderabad.
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9. Somanath Saraf (2002), Education in Human Values, Vikas Publishing House, Delhi.
10. Vedanta Kesari (2001), Values; The Key to a Meaningful life, Sri Ramakrishna Math, Chennai.
11. Peter Tomlison and Margret Quinton (1986), Values Across the Curriculum, The Falmer Press, Philadelphia.
12. Mujjeb.M. (1971), Education and Traditional Values, Meenakshi Prakashan, Delhi.
13. Avivashilingam.T.S. (1983), Inculcation of Social, Ethical and Spiritual Values in Education, Sri Ramakrishna Mission Vidya, Coimbatore.



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester - III

PAPER –5 c: HUMAN RIGHTS EDUCATION

Objectives

At the end of the course, the teacher educators will be able to

1. understand the concept, meaning of human rights
2. understand the need for human rights education
3. select and use the appropriate methods of teaching with respect to human rights education
4. understand the evolution of human rights movement at the international and national level
5. understand the role and functions of international and national level institutions to enforce human rights
6. understand and analyze the issues related to human rights violations with regard to the marginalized sections
7. understand the role of various agencies in promoting human rights education

Course Content

Unit 1: Concept, Meaning and History of Human Rights

1. Concept, Meaning, Need, Objectives and Principles of human rights education,
2. Classification of Human Rights.
3. Evolution and Historical Development of Human Rights in the global context.
4. Education as an agency to sensitize students towards human rights.

Unit 2: Indian Constitution and Commissions on Human Rights

1. Human Rights in Indian constitution: Constitutional provisions of Human Rights: Fundamental Rights, Directive Principles of State Policy, Women and Child Rights.



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2. Human Rights Commissions: NHRC, SHRC, Human Rights Courts, Their composition and functions.
3. International Councils and Commissions on Human Rights: International court of Justice, International criminal Tribunals and criminal courts. Amnesty International, International Red Cross.
4. Barriers in implementing Human Rights.

Unit 3: Curriculum, Methods of Teaching and Agencies of Human Rights Education

1. Curriculum of HRE at different Levels: Primary, Secondary and Higher Education.
2. Methods and Techniques of Teaching Human Rights: Lecture – Discussion – Case Study – Role Play and Simulation – Mock Trials– Cooperative Learning – Social Activities.
3. Agencies promoting Human Rights Education: Role of Family, Peer-group, Religious and Social Organisations, Media, School/Educational Institutions.
4. Training teachers for Human Rights Education.

Unit 4: Human Right Violations and Emerging Issues

1. Ragging - Eve Teasing, Human Trafficking – War and Terrorism , Child Labour – Exploitation of Labour, Patriarchism,– Domestic Violence – Sexual Harassment – Female Infanticide.
2. Tribal rights and forest protection.
3. Environmental issues and sustainable development.
4. Traditions, culture and Human Rights.

Practicum

(1) One Seminar

(2) One Assignment

Internship

Building a human rights garden on the school grounds and giving a case study based report as a required project by each student

Reference Books



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1. Varsha, C. (2009). Child labour: A socio legal perspective. Delhi: D.K. Agencies (P) Ltd.
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7. Gupta, U. N. (2006). Human rights. New Delhi: Atlantic Publishers & Distributors (p) Ltd.
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9. Peter, U. (2005). Human rights and development. India: Kumarian Press.
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12. Institute of Human Rights Education.
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17. Pachauri, S.K. (1999). Women and human rights. Delhi: APH Publications.
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22. Sharma, R.N (1992). Fundamental rights: Liberty and social order. New Delhi: Deep and Deep Publications.
23. Smith, Lesley (1988). Dimensions of childhood: A handbook of social education. London: Health Education Authority and UNICEF, U.K.
24. Bansal, V. K. (1987). Right to life and personal liberty in India. New Delhi: Deep and Deep Publications.
25. Agarwal,J.C, Education for values, environment and Human Rights,Shipra Publications, New Delhi.



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester - IV

PAPER - 1: ADVANCED EDUCATIONAL TECHNOLOGY

Objectives:

1. To enable the student teacher to understand about the meaning, nature and scope and significance of Educational Technology and its important components in terms of Hardware and Software.
2. To help the student teachers to distinguish between communication and instruction so that they can develop and design a sound instructional system.
3. To acquaint student teachers with levels, strategies and models of teaching for future improvement.
4. To enable the student teachers to understand about the importance of programmed instructions and researches in Educational Technology.
5. To acquaint the student teachers with emerging trends in Educational Technology
6. To develop awareness about uses of computer and information technology in the field of education
7. To develop understanding about the various aspects of information systems and multimedia developments.
8. To develop various skills to use computer technology for the purpose of education.
9. To inculcate interest about the use of technology in educational research.
10. To make students to understand the contemporary developments in the emerging technologies of education.

Course Content

Unit 1: Introduction to Information Technology

1. Definition Need and Scope of Information Technology.

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2. Categories of Information: Data, Information, Knowledge, Intellect.
3. Types of Information : By Source, By Channel, By Media, By Need .
4. Information Services; Library, Institute, Internet and developments in information technology and their uses to the field of education.

Unit 2: Communication and Instructional Technology

1. Theory of communication, Concept, Nature, Process, Components, Types and Classroom Communication.
2. Models of teaching: Meaning, Nature, Functions and Types of families of Models of Teaching.
3. Programmed instruction (linear/branching model) - Origin and types - linear and branching - Development of the programmed instruction material.
4. Future priorities in Educational Technology.

Unit 3: Technology of Teaching

1. Concept, Structure and Levels of Teaching (Memory Level, Understanding Level and Reflective level).
2. Innovations in teaching (Team Teaching, Educational Games, Simulation, Personalized System of Instruction PSI, CAI, CCTV and SITE etc.).
3. Techniques of Higher Learning (Seminar, Symposium, Workshop, Conference and Panel Discussion).
4. Action Research (Reflective Process – Progressive Problem Solving).

Unit 4:Interactive Learning Environments

1. Mass Media Approach in Education.
2. Instructional Resource Centers.
3. Concept and uses of Multimedia, Multimedia Building Block: Text, Graphics, Digital Video or Animation and Digital Audio.
4. Computer and Data Analysis: Data Base Packages - MS - Excel, - Data Entry - Variables - Import and Export of files - Data Manipulation - Data Transformation.

Practicum

(2) One Seminar

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(3) One Assignment

Reference Books

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2. Sharma.A.R., 1992, Educational Technology, Vinod Pustak Mandir, Dr. Rangeya Raghava Marg, Agra-2.
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4. Buch.M.B. and Santhanam.M.R., 1970, Communication in Classroom, Centre for Advanced Study in Education, Baroda.
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6. Srinivasa Rao. R (Ed), 1974, Multi-Media Communication, Sri Venkateswara University, Tirupati.
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8. Stones.E., 1968, Learning and Teaching, John Wiley and Sons, Inc., New York and London.
9. Romiszowski.A.J., 1970, A Systems Approach to Education and Training.
10. Sampath.K., Pannirselvam.A and Santhanam.S., 1990, Introduction to Educational Technology, Sterling Publishers Pvt. Ltd., L-10, Green Park Extension, New Delhi - 110016.
11. Chauhan.S.S., 1979, Innovations in Teaching-Learning Process, Vikas Publishing House, Pvt. Ltd., 5, Ansari Road, New Delhi - 110 002.
12. MangaI.S.K., 1985, Fundamentals of Educational Technology, M/S Prakash Brothers, 546, Books Market, Ludhiana - 141 008.
13. Murthy.S.K., 1984, Educational Technology and Teaching Behaviour (Technology of Teaching), M/SPrakash Brothers, 546, Books Market, Ludhiana -141008.
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Co., New Delhi -110 001.

16. Amidon. E.J. and Hough.J.B. (Eds) (1967); Interaction Analysis Theory, Research and Application, Addison Wesley Publishing Company; London.
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21. Singh.LC., 1977, Micro-Teaching: An Innovation in Teacher Education (Mimeo), NCERT, New Delhi -110 006.
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24. Walia.J.S., 1991, Technology of Teaching (Methodology of Teaching), Paul Publishers, 11 Gopal Nagar, Jalandhar City, Punjab.
25. Das.R.C., 1993, Educational Technology - A Basic Text, Sterling Publishers Pvt. Ltd., L-10, Green Park Extension, New Delhi -110 016.
26. Vedanayagam.E.G., 1989, Teaching Technology for College Teachers, Sterling Publishers Pvt. Ltd., L-10, Green Park Extension, New Delhi-110 016.
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29. Mayer Richard E, 2001. Multimedia Learning, Cambridge University Press, UK
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31. Schwatz & Schultz, (2000)Office 2000, BPB Publications, New Delhi,



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – IV

PAPER - 2: PSYCHOLOGY – LEARNER AND LIFE

Objectives:

1. To enable the students to understand psychology as an applied subject
2. To enable the students to understand himself / herself
3. To enable the students to understand emotions
4. To design a good learning situation
5. To acquit the student with states of mental health
6. To enable the student to develop into a holistic personality.

Course Content

Unit 1: Meaning and Nature of Psychology

1. Meaning and Methods of psychology.
2. Cognitive capacities-perception, cognition, memory, thinking, reasoning, problem solving, imagination.
3. Affective capacities-feelings, attention, attitudes and interests.
4. Human development.

Unit – 2: Emotions and Emotional Disorders

1. Emotions- Meaning and types.
2. Emotional expressions, bodily expressions, vocal expressions, Gestures and communications.
3. Emotions and social behavior.
4. Emotional disorders- fear, anxiety, anger and violence.

Unit 3: Learning, Memory, Motivation and Creativity



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1. Learning- meaning and types, learning difficulties
2. Memory-types, improvement of memory and reasons for forgetting
3. Motivation-types, motivation and achievement, self-motivation, attributions for success and failures
4. Creativity – Concept, process , development of creativity , blocks for creativity

Unit 4: Personality and Mental Health

1. Meaning and theories of personality, assessment
2. Positive attitude towards life, Successful social life and importance of fitness
3. Mental disorders, defense mechanisms
4. Personality in the new era

Practicum

(1) One Seminar

(2) One Assignment

Reference Books

1. Mangal S.K., (2002), General Psychology, Prentice – Hall of India, New Delhi.
2. Chauhan S.S., (1982), General Psychology, Vikas Publishing House, New Delhi.
3. Hilgard and Bower,(1964), Theories of Learning, Englewood Cliffs, Prentice Hall, New Jersey
4. Hall Calvin S., Gardner Lindzey,(1957), Theories of Personality, Wiley Eastern Limited, Madras.
5. Elizabeth B. Hurlock,(1974), Personality Development, Tata McGraw Hill Publishing Co., New Delhi.
6. Elizabeth B. Hurlock, (1999), Developmental Psychology, Tata McGraw Hill Publishing Co., New Delhi.
7. Uday Sankar, Personality Development, Wiley Eastern Limited, Bangalore
8. Coleman James C., Abnormal Psychology and Modern Life, Taraporevale Sons & Co., Bombay.
9. Mangal SK., Abnormal Psychology, Sterling Publishers, New Delhi.



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10. Kuppuswamy B., Elements of Ancient Indian Psychology, Konark Publishers, Delhi.
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12. Skinner Charles E.(1996), Educational Psychology, Prentice Hall of India, New Delhi.
13. Goleman Daniel, Emotional Intelligence, Bantam Books, Broadway, New York.
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DEPARTMENT OF EDUCATION

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MASTER OF EDUCATION

2nd Year, Semester – IV

PAPER – 3: ENVIRONMENTAL CONCERNS IN SECONDARY EDUCATION

Objectives:

The students will be able to

1. Understand the concept, scope and objectives of environmental education.
2. Acquaint the student with environmental problems and hazards.
3. Develop competencies and problems solving skills for environmental protection.

Unit I: ENVIRONMENTAL EDUCATION – CONCEPT, MEANING AND IMPORTANCE

15. Environmental Education - Characteristics and principles
16. Nature and scope of Environmental Education
17. Aims and objectives of Environmental Education
18. Environmental Awareness, Important issues in Environmental Education.

Unit II: ENVIRONMENTAL POLLUTION AND PROGRAMMES AT DEFFERENT LEVELS

1. Man and his relationship with environment, Environmental hazards and pollution - soil, air, noise, water, chemical and thermal, extinction of flora and fauna,
2. Need for conservation, preservation and protection of rich environmental heritage
3. Programme of environmental education for primary, secondary and higher education institutions
4. Biodiversity and conservation - Global warming, ozone depletion, acid rain, population explosion, urbanization, poverty and deforestation.



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Unit III: CURRICULUM AND ENVIRONMENTAL ASPECTS

1. Salient Features of Curriculum for Environmental Education, Concept of environment and ecosystem, Natural system, Natural Resources, Human Systems
2. Technological System, Remote sensing - Steps in preparation for Environmental curriculum at different levels of education. Environmental education
3. Role and Responsibilities of teachers, Problems of Environmental education.
4. Role of Government and Non-government Agencies for environmental protection. Nature study and Eco-clubs.

Unit IV: ENVIRONMENTAL EDUCATION STRATAGIES

1. Strategies and Methods of Environmental Education, approaches
2. Treating environmental issues as a separate subject, integrated approach, Discussion, seminar, workshop, dialogue, problem solving, field trips, projects, exhibition, role of media, films and television,
3. Study of environmental projects,
4. National organizations for Environmental Protection, National Policy on Environment and Environmental laws.

Practicum

1. One Seminar
2. One Assignment

References

1. Bharucha Erach, *Textbook of Environmental Studies*, New Delhi: Universities press, 2005.
2. Himonshu Vashist, *Environmental Education: problems and solutions,* Jaipur: Book Enclave, 2002.
3. Kalyani Devi, *Home and school: environment their influence on perceptual styles,* New Delhi : Discovery publishing House, 1997.
4. Kalyani Devi, *Environmental Deprivation and Perceptual tasks of preschool children*, New Delhi: Discovery publishing House, 1998.

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6. Kumar,S.B, *Environmental Problems and Gandhian Solutions* ,New Delhi: Deep & Deep Publications. 2002.
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2nd Year, Semester – IV

As per the Action Plan NEP - 2020

PAPER – 4 a: HUMAN VALUES AND PROFESSIONAL ETHICS - II

Objectives:

This course input is indeed

1. To help the students appreciate the essential complementary in between 'values ' and 'SKILL' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a holistic perspective among students towards life, it's realities, professions and happiness, based on a correct understanding of the human reality and the rest of Existence, such a holistic trustful perspective forms the basis of values based living in a natural way.
3. To highlights plausible implications of such a Holistic understanding in terms of esthetical human conduct, trustful and mutually satisfying human behaviors and mutually enriching interaction with Nature.

Thus, this course is intended to provide a much needed orientational input in values education to the young enquiring minds.

Course methodology

1. The methodology of this course is universally adaptable, involving a systematic and rational study of the human being vis-à-vis the rest of existence.
2. It is free from any dogma or value prescriptions.
3. It is a process of self-investigation and self- exploration, and not of giving sermons. Whatever is found as truth or reality is stated as proposal and student are facilitated to verify it in their own right based on their natural acceptance experiential validation,.

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4. This process of self exploration takes the form of a dialogue between the teacher and the student to begin with, and within the student himself/herself finally.
5. This self-exploration also enables them to evaluate their pre-conditionings and present beliefs.

Course Content

Unit - 1: Concept, Need, Nature and Process for Value Education

1. Concept, need and nature of human values in education.
2. Basic principles of value education; (i) Self exploration: its concept and process; Natural acceptance and experiential validation as the mechanism for self exploration (ii) Continuous happiness and prosperity - a look at basic human aspirations (iii) Right of understanding, relationship and physical facilities- the basic requirement for fulfillment of aspirations of every human beings with their correct prosperity (iv) Understanding happiness and prosperity correctly – a critical appraisal of the current scenario .
3. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit - 2: Understanding Harmony in the Family and Society- Harmony in Human Relationship

1. (i) Understanding the characteristics and activities of 'I' and harmony in 'I'. (ii) Understanding the harmony of I with the Body: Samyam and Swasthya: correct appraisal of physical needs, meaning of prosperity in detail Programs to ensure Samyam and Swasthya. (iii) Understanding harmony in the family – the basic unit of human interaction.
2. Understanding values in human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-Tripli; Trust (Viswas) and respect (Samman) as the foundational values of relationship.
3. (i) Understanding the meaning of Viswas; Difference between intention and competence. (ii) Understanding the meaning of Sommon, Difference between respect and differentiation; the other salient values in relationship. (iii) Understanding the harmony in the Sah-Astitva as comprehensive Human Goals.

4. Visualizing a universal harmonious order in society: Undivided society (*Akhand – Samaj*) Universal Order (*Sarvabhum –Vyawastha*)-from family to world family!

Unit - 3: Understanding Harmony in Nature and Existence – Whole existence as Co-existence

1. Understanding harmony in nature.
2. Inter-connectedness and self regulation in nature
3. Understanding existence as co-existence (Sah-Astiva) of mutually interacting units in all pervasive space.
4. Holistic perception of harmony at all levels of existence.

Unit - 4: Implications of the above Holistic understanding of Harmony on Professional Ethics

1. (i) Natural acceptance of human values

   (ii) Definitiveness of ethical human conduct.
2. (i) Basis for humanistic education, humanistic constitution and humanistic universal order

   (ii) Strategy for transition from the present state to universal human order.
3. Competence in professional ethics.
   a. Ability to utilize the professional competence in education for augmenting universal human order,
   b. Ability to identify the scope and characteristics of people friendly and echo friendly production system in the educational process,
   c. Ability to identify and develop appropriate technologies and management patterns in the teaching and learning process,
4. (i) Case studies of typical holistic technologies, management modules and production systems.

   (ii) At the level of individual: as socially and ecologically responsible, professionals.

   (iii) At the level of society: as mutually enriching institutions and organizations.

Practicum

(1) One seminar

(2) One assignment.

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Practice exercises and case studies.

Text Books and Reference Materials

a. The Text Book

R R Gaur, R Sangak, G P Bagaria, 2009, A Foundation course in Human Values and professional ethics, Excel Books Private Limited , New Delhi.

b. Teachers Manual

R R Gaur, R Sangak, G P Bagaria, 2009, Teachers's Mamual: A Foundation course in Human Values and professional ethics, Excel Books Private Limited, New Delhi.

Video CD of Teachers Orintation workshop will be made available on website.

Reference Books

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23. G.N. Raul, *Values and Education in Independent India,* The Associated Publishers, Ambala Cantt
24. Avivashilingam. T.S. (1983) *Inculcation of Social, Ethical and Spiritual Values in Education*, Sri Rama Krishna Mission Vidya, Coimbatore.
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Relevant websites, CDs, Movies and Documentaries

1. Value Education Websites, http://www.uptu.ac.in
2. Story of stuff, http://www.Storyofstuff.com
3. AL Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artist, USA
5. IIT Delhi, Modern Technology the Untold Story
6. Anand Gandhi, Right here right now, Cycle wala production



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – IV

PAPER – 4 b: LIFELONG EDUCATION

Objectives:

The student will be able to

1. Understand the concept of Life Long Education.
2. Know the meaning and concept of Non-Formal Education.
3. Aware of existing programmes and strategies for Life Long Learning.
4. Develop skill in Vocational Guidance.
5. Understand strategies for self-employment.

UNIT - I LIFE LONG LEARNING

1. Life Long Learning–Meaning, Concept, Aims and Objectives, Need and Importance,
2. Problems and Measures,
3. Various Programme of Life Long Learning in India with Special reference to: NAEP, NPE & NLM,
4. Adult Learner–Characteristics, Problem and Motivation Life Long Teaching – Different Methods, Role of Mass Media, Evaluation of Life Long Learning.

UNIT - II NON-FORMAL EDUCATION

1. Non-formal Education: Meaning, Concept, Scope,
2. Aims and Objectives,
3. Growth and Development, Curriculum Development.
4. Non-formal Education Instructors, Teaching Methods, Media and Materials.

UNIT - III DISTANCE EDUCATION

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1. Distance Education: Meaning, Definition, Function, Objectives, Nature and Characteristics, Scope and Limitation.
2. IGNOU (Indra Gandhi National Open University), Organization (NCERT) National Council for Education Research and Training),
3. CABE (The District Level Central Advisory Board of Education).
4. Models: CAPE (Comprehensive Approach for Primary Education Programme) – The Programme Envisaged in the New Policy on Education 1986.

UNIT - IV VOCATIONAL GUIDANCE AND SELF EMPLOYEMENT

1. Vocational Guidance: Meaning, Definition, Objectives, Aims, Need, Characteristics.
2. Process of Vocational Guidance: Vocational Guidance in India – Classification of occupations – Source of Information – Purpose Factors, Function of Vocational Guidance
3. Influence of Vocational Guidance on Educational Guidance.
4. Self – Employment: Meaning, Definition, Objectives, Characteristics, Traits Required, Barriers to self Employment: Generation of Awareness and Motivation – Referral Services.

Practicum

1. One seminar
2. One assignment.

Reference

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3. Ministry of Education (1987). *Adult Education Research- Future Directions*.
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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – IV

PAPER – 4 c: EDUCATION FOR RURAL DEVELOPMENT

Objectives:

The students will be able to

1. Know the concept, meaning of rural development.
2. Understand the theories and approaches in rural development.
3. Understand the role of various agencies in promoting rural development.
4. Acquire the knowledge of the local governance of rural development.
5. Understand the principles and methods of social work.

UNIT - I CONCEPT AND APPROACHES TO RURAL DEVELOPMENT

1. Rural Development - Growth and Development and Importance
2. Poverty and Rural Development 3
3. Role of Voluntary Organization VOs and NGOs. Approaches toRural Development in India: Broad Front Approach, Sectoral Approach, ParticipatoryApproach, Area Approach, Target Group Approach. Programmes
4. Poverty Alleviation Programmes, Programmes for Self and Wage Employment and Social Security, Other Development Programmes.

UNIT - II RURAL DEVELOPMENT INSTITUTIONS AND EXPERIMENTS

1. Cooperative Institutions Concept and Principles of Cooperation
2. Types and Working ofRural Cooperatives: Credit Cooperatives, Marketing Cooperatives, Dairy Cooperatives,Sugar Cooperatives, Weavers Cooperatives.
3. Stakeholder Participation
4. Non-Governmental Organizations: Concept, Structure, Funding, Problems andLimitations. Role of CBOs in Sustainable Rural Development.



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UNIT - III EXPERIMENTS IN RURAL DEVELOPMENT

1. Experimentsin Rural Development
2. Experiments in Rural Development before Independence
3. Sriniketan, Martandam,Sevagram, Baroda, Firka Development,
4. Nilokheri and Etawa Pilot Project.

UNIT - IV LOCAL GOVERNANCE AND RURAL DEVELOPMENT

1. Early Experiments in Panchayati Raj, 73rd Constitutional Amendment Act and Its Implication: Ashok Mehtha Committee Report, Its Salient Features
2. Role of PRIs in Rural Development. - Tamil Nadu Panchayati Raj Act (1994)
3. Panchayati Raj and Decentralization – Items of Development Activities in 11th Schedule of the Indian Constitution
4. Status of Women in India, Women and Political Participation, Women in Farm and Non Farm Sector, Women and Technology - Policy and Programmes for Women - Women in Local Governance – National Policy for Empowerment of Women (2001).

Practicum

1. One seminar
2. One assignment.

References

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3. Dantwala M.L., et. al., *Indian Agricultural Development since Independence***,** Oxford and IBH, New Delhi, 1991.
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2nd Year, Semester – IV

PAPER – 4 d: EARLY CHILDHOOD EDUCATION

Objectives:

To enable the prospective teacher-educators

1. Orient on policy and perspective of ECE in India and world
2. Understand the Psycho-Social context of Pre-School education
3. Understand the quality dimensions i.e. Curriculum, programme and work force for ECE.
4. Know the strategies, approaches-resources for ECE.
5. Develop knowledge and skills for research and evaluation in ECE and training of personnel.

Unit - I ECE Policy Perspectives and Psycho-Social Context of Pre-School Education

(1) ECE: Concept, Significance and Objectives of ECE.

(2) ECE in India: Policies and Programme in National Policy on Education (NPE, 1986) and POA (1992), National Plan of Action for children, 1992 and 2005; National Curriculum Framework (2005), National Curriculum Framework for Teacher Education (2009). ECE in Global Perspective: United Nations Conversation on Rights of the Child (UNCRC, 1989), Millennium Development Goals (2000) and Global Monitoring Report (UNESCO) 2007 – concerns and issues.

(3) Physical, Cognitive, Emotional and Social aspects of Pre - school education, Transaction from home to School.

(4) Socio – Cultural contexts in school and home, Child rearing practices in different cultures.

Unit - II Curriculum for Pre-School Education



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1. Curriculum for School Readiness
2. Physical, Cognitive, Language and Socio Emotional Dimensions; Characteristics of learning experiences and approaches
3. Different types of Pre-school Curriculum, Montessori, Kindergarten, Balwadi and Anganwadi
4. Support of workforce; Teachers, parents and community support in functioning of ECE centers.

Unit - III Strategies/Approaches and Resources for ECE

1. General principles to curricular approaches
2. Activity based/play - Way, Child
3. Centered, Theme - Based, Holistic, Joyful, Inclusive, Puppetry, Musical and Rhyme exercise, Dramatization, Role play, Art activities, Indoor and Outdoor play, Field trips and explorations as methods in primary and early primary stages.
4. Method of transaction - Local specific community resources; Human and materials and their integration to curricular activities, Preparation & use of learning and play materials. Community involvement in ECE programmes.

Unit - IV Training, Research & Evaluation in ECE

1. Need and significance of personnel involved in ECE programme, Status and nature of training programmes
2. Evaluation Pre-service training programmes.
3. Issues, concerns and problems in ECE; Areas of research studies in ECE
4. A critical Evaluation of ECE programmes with special reference to Indian context.

Practicum

(1) One Seminar

(2) One Assignment

References

1. NCTE (2009) National Curriculum Framework for Teacher Education, New Delhi.
2. Govt. of India (2005) National Plan of Actions for Children, 2005: Department of Women and Child Development, New Delhi.



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – IV

PAPER – 5 a: PERSONALITY DEVELOPMENT AND SOFT SKILLS

Objectives:

The student will be able to

Develop a positive attitude in life

1. Keep in good mental health
2. Reduce stress in life
3. Process dynamic and vibrant life
4. Enable then to improve their communicative behavior performance
5. Build capacity for introspection and facilitate development
6. Lead to effective performance in communication and develop self-confidence

UNIT I PERSONALITY DEVELOPMENT AND LEADERSHIP

1. Personality Development – Concept, Nature and Scope;
2. Development of positive thinking Leadership – Concept, Nature and Scope;
3. Types of Leadership;
4. Motivating the followers.

UNIT II STRESS MANAGEMENT

1. Stress Management – Concept of Stress and its scope.
2. Components of Stress; Techniques of Stress Management.
3. Emotional Intelligence – Concept and Scope;
4. Conflict and its Causes – conflict Management. Time Management – Concept and Scope; Principles of time management – Techniques for time management.

UNIT IIIDEVELOPMENT OF CAREER SKILLS



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1. Functional English: Starting a conversation – responding appropriately and relevantly
2. Role play in different situations, establishing a rapport. Vocabulary Building: Synonyms, Antonyms, one word substitutes, prefixes and suffixes, idioms and phrase. Applying for a job – Resume writing and effective profiling (C.V)
3. Attending interviews – Group Discussion – Telephone Skills – Basic and Telephone Communication,
4. Greetings – How to handle the telephone calls – manners – Giving instruction.

Unit IV: SOFT SKILLS

1. Communication Tasks - Leadership skills - Stress coping strategies - Group discussion
2. Training on Soft Skills - Training on Personality Development
3. Presentation Skills through On-Line and Off-Line
4. Creating and Posting Learning Content on Blogs

Practicum

1. One seminar
2. One assignment.

Reference

1. Jeanne Segal (2002): Raising Your Emotional Intelligence – Manga Books.
2. John C.Maxwell (2002): Developing the Leader within You – Manga Books.
3. Barbara Moses (2002): Career Intelligence – Manga Books.
4. Dale Carnegie (2002): How to Develop Self Confidence and Influence People by Public Speaking – Vermilion London.



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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – IV

PAPER – 5 b: YOGA EDUCATION

Objectives:

1. Comprehend the metaphysical concepts which support the yoga philosophy like the Purusha and Prakriti. Budhi (Mahat) and Ahamkar etc
2. Understand the meaning and relevance of yoga as a way to spiritual ascent of man via physical and mental integration.
3. Understand different types of Yoga – The Ashtang yoga, the Jnana Yoga. Bhakti yoga and other modern off-shoots.
4. Understand the socio-psychological basis leading to a dynamic transformation of personality.
5. Understand the scientific basis and therapeutic values of yoga.

Course contents

UNIT I: The Philosophy of yoga and its relationship to individual and social upliftment.

1. The meaning and definitions of Yoga.
2. Yoga as a way to healthy and integrated living.
3. Yoga as a way to socio-moral upliftment of man.
4. Yoga as a way to spiritual enlightenment – Atmanubhuti Pratykshanubhuti

UNIT II: Metaphysical basis of Yoga.

1. Concept of Purusha (pure consciousness) and Prakriti as basic components of cosmic reality.
2. Concept of Budhi (Mahat) and Ahamkar (The Ego) as basic components of prakriti of the individual.

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3. Further sun-divisions of Ahamkar – Mana (the mind), karmendris, Jnanedris and Tanmatras (the Suksham Sharir)
4. Nature of knowledge and knowledge getting process through Pramanas.

UNIT III: Different Types of Yoga Systems and Characteristics of Yoga Practitioner.

1. Ashtanga Yoga of Patanjali
2. Jnana Yoga, Bhakti Yoga and Karma Yoga of the Bhagwadgita
3. Internal Yoga of Aurobindo and modern off shoots of Yoga
4. Characteristics of a practitioner of Yoga.

UNIT IV: The instrumentals of yoga (Sadhana pad), Scientific basis of yoga – yoga and mental health.

1. The Ashtangamaarga: The Yama (observances).The Niyama (abstinences).Asana – The right postures, Pranayam –controlling the breadth.Pratyahara – controlling the senses.Dharana (concentration) and its methods.Dhyana (meditation) and its kinds.Samadhi – its various types.
2. Yoga and Bio-feedback,
3. Therapeutic values of yoga, Dhyana, and its therapeutic value.
4. Different Asana and their effects to promote a sound physical and mental health.

Practicum

1. One seminar
2. One assignment.

References

1. Aggarwal J.C. (1985), *Theory and Principles of Education,* Vikas Publishing House, New Delhi.
2. Bali D.R. (1989), *Introduction to Philosophy*; Sterling Publishers, New Delhi.
3. Bhatia KK (1977), *Principles and Practice of Education,* Kalyani Publishers, New Delhi.
4. Brent, A (1978), *Philosophy and Educational Foundations,* George Allen and Unwin, Boston.

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5. Brubacher John S. (1983), *Modern Philosophies of Education,* Tata Mc. Graw-Hill Publishing Company Ltd., New Delhi.

6. Chaube S.P. (1993), *Educational Philosophies in India,* Vikas Publishing House Pvt. Ltd., New Delhi.

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16. Sreerama Krishna A.S. (2002), *Teacher and Education in Emerging Indian Society*, New Era Publications, Guntur.

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DEPARTMENT OF EDUCATION

S.V.UNIVERSITY

MASTER OF EDUCATION

2nd Year, Semester – IV

PAPER – 5 c: EDUCATION FOR INTERNATIONAL PEACE

Objectives:

The students will be able to

1. Understand the theory and practice of peace education.
2. Create frameworks for achieving Peaceful and Nonviolent societies.
3. Promote awareness about the nature of conflicts and their resolution.
4. Investigate the causes of conflicts and violence within social and political structures of society.
5. Equip children and adults with personal conflict resolution skills.

UNIT - I PEACE EDUCATION

1. Meaning, Need, and importance, Aims and Objectives of Peace Education.
2. Impact of Globalization, Terrorism, Media and Development of New Technological Communication and Mass Destruction.
3. Peace Education in India: Gandhi's vision of Peaceful World Order and New Education - Basic Education, Adult Education, Education for Health and Hygiene
4. Education for Holistic Development, Satyagraha for Constructive Work.

UNIT - II CONCEPT OF PEACE

1. Peace as Love, Mutual Aid, Positive Interpersonal relations, Peaceful resolution of Conflict, Peace and Development.
2. Alternative defense, living with nature and preserving Life and Eco system (Gaia Peace) and Holistic Inner and Outer Peace.



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3. Peace as absence and abolition of war, as the minimization and elimination of violence, as removal of structural violence.
4. Peace with Justice, Peace and Nonviolent liberation technique (Satyagraha) and Disarmament.

UNIT - III PEACE EDUCATION FOR 21st CENTURY

1. Multidimensional aspect of Peace Education: Value clarification, analysis and creation.
2. Peace as New Life Style, Interpersonal relationship and Intercultural Peace.
3. Justice and Human Rights, Nonviolent Social Change and creating Peaceful structure, Disarmament, Human Security, UN Peace - Keeping Force and vision for Alternative Defense (Shanti Sena).
4. Peace with Nature and Environment - Education for International Understanding and peace - Resolution and Transformation of Conflict – Education for the Promotion of Culture of Peace and Nonviolence.

UNIT - IV TEACHING PEACE EDUCATION

1. Methods and approaches to Peace Education – Building Peace Curriculum, Peace Education and Removing the Bias towards Violence – Correcting Distortions.
2. Model of integrated Learning – Transactional Modalities - Cooperative Learning, Group Discussion, Project Work, Role Play and Story Telling.
3. Analytic Method – Case Analysis and Situation analysis, Transpersonal Strategies, Participatory methodologies – Dramatics, Literary Activities and Social Service Camps.
4. Research in Peace Education, International classroom, International Parliament, Peace Awards, Creating Models for Peace technology - development of new tools, techniques, mechanisms and institutions for building up peace and Engaging students in Peace Process.

Practicum

1. One seminar
2. One assignment.

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2. Andrews. M. L, 1998. Educating for Peacemaking abilities, Cambridge: Harvard.
3. Fountain .S, 1999. Peace Education in UNICER, New York: UNICER.
4. Grewal,J.S and Nirmal Sabharwal, 2004. Peace Education: Self-Instructional Package for Teacher Educators, New Delhi: NCERT.
5. Kruba Charles, 2012. Peace and Value Education, New Delhi; Neelkamal Publication.
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Structure of the Question Paper

The question paper shall consist of two sections: A and B

Part-A shall consist of 16 short answer questions. Out of which 10 are to be answered and each question carrying 5 marks. Each answer should not exceed 2 pages.

Part-B consists of 4 essay questions, out of which the candidate has to answer 2 questions. Each question carries 15 marks. The answer should not exceed 5 pages for each question.

The duration of examination shall be 3 hours.

M.Ed..III Semester-wise Examination

Structure of Examination Question Paper

Time: 3 hrs Max. Marks: 80

Section –A **10 x 5=50 Marks**

Section –Answer any TEN of the following questions. All questions carry equal marks.

1.
2.
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15.

16.

Section – B **2x 15=30 marks**

Section **B**, Answer any TWO of the following questions. All questions carry equal marks

17.

18.

19.

20.

Structure of the Question Paper

The question paper shall consist of two sections: A and B

Part-A shall consist of 16 short answer questions. Out of which 10 are to be answered and each question carrying 5 marks. Each answer should not exceed 2 pages.

Part-B consists of 4 essay questions, out of which the candidate has to answer 2 questions. Each question carries 15 marks. The answer should not exceed 5 pages for each question.

The duration of examination shall be 3 hours.

M.Ed.. I / II / III / IV Semester-wise Examination

Structure of Examination Question Paper

Time: 3 hrs Max. Marks: 80

Section –A **10 x 5=50 Marks**

Section –Answer any TEN of the following questions. All questions carry equal marks.

1.

2.

3.

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16.

Section – B **2x 15=30 marks**

Section **B**, Answer any TWO of the following questions. All questions carry equal marks

17.

18.

19.

20.

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SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF ENGLISH



Course

M.A. ENGLISH

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

About the English Department

The Department of English was established in 1954 by Prof. M.V. Rama Sarma as the Head, with Under-Graduate Course. Later it was opened for Post-Graduate courses in 1959 with core emphasis on English Literature. The same year saw the bifurcation of the department retaining PG course. The Department began with 10 students and gradually the intake has increased to 60. The thrust areas of the Department are British Literature, Indian Literatures in English, American and New Literatures besides Comparative Literature, Translation Studies and English Language Teaching giving importance to all the genres of English Literature. The Department has the unique distinction of having had an exclusive paper on Miltonic studies. Presently, the Department has the honor of introducing exclusive elective on the genre, short story. Along with the teaching of literatures, research and training programmes, production of teaching materials, and extension services are in progress to help improve language teaching standards in the University region. The department was shaped by Stalwarts like Prof. M.V. Rama Sarma, Prof. C. Subba Rao, Prof Viswanadhan, Prof. C.R. Visweswara Rao, Prof. T. Krishna Rao, Sri R.A. Jayantha, Smt. M. Suryakantha, Prof.M. Radhamani Gopalakrishnan, Sri. N.J. Richard, Prof. G. Nageswara Rao, Prof. M.R. Ashok, Prof. Erram Reddy, Prof. A. Hari Prasanna, Prof. M.A.K. Sukumar and Prof. Madhuranthakam Narendra.

Mission & Vision

- The M.A English programme offered by the Department of English,Sri Venkateswara University, is a state of the art programme both in its content and delivery. Equipped with six decades long legacy, the syllabus reflects both the hoary past and the dynamic changes that the contemporary students need in a globalized world.
- Apart from a firm emphasis on British literature, the syllabus encompasses an equal quantum of Indian, American, Post Colonial and other non-white World Literatures.
- The curriculum is continuously broadened to make the learners conscious of the present needs. Papers on Human Values and Professional Ethics, Women's Writings, Green Literary Studies and Subaltern Studies are aimed at sensitizing the students on literary creativity value systems, ethics, gender awareness and a respect for the hitherto marginalized sections.
- The multiple papers on English Language and Linguistics endow the students with a scientific knowledge of the English language and its multiple avatars in the contemporary world. Besides, a series of papers on Soft Skills, Communication Skills, etiquette etc equip the students with the necessary employability skills which are much needed in the current job market.
- Translation Studies, Comparative Literature and a deep study of Classics both within India and the world, broaden the students' literary horizons.

Choice Based Credit System (CBCS):

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses.

Students of this course would be able to:

- Play a major role in education, research and the public services;
- Understand and appreciate English Literature & Language
- Have an understanding and grasp of a broad based academic environment
- Be able to adapt and respond positively and flexibly to the changing
- circumstances;
- Develop the professional skills and personal attributes to deal with complex
- issues, both systematically and creatively;
- Have the capacity for individual work and teamwork;

- Be lifelong learners equipped with intellectual, academic and practical skills.

Programme Specific Outcomes:

- The students acquire knowledge in English Language, Linguistics, Literature, Communication and Soft Skills
- The students are honed for employment/further research
- They are equipped with life skills, values, ethics and rhetoric.
- Human values are taught through literature
- The Students are able to appreciate literary works not only in English, but also globally produced literatures.

Programme Objectives:

The prime objective of the M.A. and Ph.D programmes offered by the department is to enhanve the knowledge quotient of the learners and to make literary a lived experience, than a mere theoretical study. The syllabus is periodically updated at regular intervals, to retain its dynamism in catering to the students' success in competitive examination like UGC NET, JRF & SLET exams, to name a few. The infrastructure which includes books, e-journals and AV aids additionally enhances the quality of knowledge inputs which are delivered to the students.

To meet these ends, the department emphasizes on multiple areas of study, with a well-structured curricular design, relevant to the needs of the students of the Rayalaseema Region. The syllabus is both local and global too, since many of the texts and courses meet global standards. The dynamic team of Professors equipped with National and International exposure, spares no efforts in both delivering the subject knowledge and honing the students' skills to succeed in a challenging and competitive world.

Programme Outcomes:

- Imparts knowledge on English language studies, its history, and variety in a global context
- Familiarizes students with multiple accents: British, American, Indian, African etc.
- Instructs a scientific study of language through a study of Linguistics
- Furthers students in an advanced level of Literary Studies, Comparative Studies and Translation Studies
- Understand various genres, English and modes of linguistic and literary study.

- Develop critical thinking with the aid of Classical and Contemporary Critical theories.
- Makes the students on par with the best universities globally/nationally with highly relevant and frequently updated generic electives.
- Creates an ambience where students can relate life with literature
- Provides the necessary environment for the students to hone their literary, creative, critical, translation and research abilities
- Students gain substantial domain knowledge so as to facilitate their success in a highly competitive environment like UGC NET, SLET, Group Services and the like.
- Makes students employable in contemporary domains like content writing, BPO, advertising, news and mass media agencies.
- Converts students into language trainers and personality developers which are much needed in multinational setups, software sectors and other industries in a sprawling global economy

Programme Educational Objectives:

- To train the students in English Language, Linguistics, Literature, Communication and Soft Skills
- To make the students market ready for employment/further research
- To equip them with life skills, values, ethics and rhetoric, to transform them into more humane beings as Literary Studies are an important facet of Humanities studies in general
- To make them appreciate literary works not only in English, but also globally produced literatures.

SEMESTER – I

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	ENG 101	Poetry-I (From Chaucer to Browning)	6	4	Core-Theory	20	80	100
2	ENG 102	Drama (From Marlowe to Beckett)	6	4		20	80	100
3	ENG 103	Fiction-I (From Fielding to Dickens)	6	4		20	80	100
4	ENG 104	Prose- (From Bacon to Woolf)	6	4		20	80	100
5	ENG 105A	English Language and Linguistics	6	4	*CF	20	80	100
	ENG 105B	Rhetoric, Discourse and Writing	6	4		20	80	100
	ENG 105C	Classical Criticism	6	4		20	80	100
6	ENG 106A	American Literature	6	4	*EF	20	80	100
	ENG 106B	Technical Communication	6	4		20	80	100
Total			**36**	**24**		**120**	**480**	**600**
7	ENG 107	Human Values and Professional Ethics	0	0	Audit Course	100	--	--

- **All core papers are Mandatory**
- ***Compulsory foundation – Choose any one**
- ***Elective Foundation - Choose any one Paper**
- **Audit course – 100 Marks (Internal) – Zero Credit under self study**
- ** **Interested student may register for MOOCS with the approval of DDC**

SEMESTER – II

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	ENG 201	Poetry- (Classical and Twentieth Century)	6	4	Core-Theory	20	80	100
2	ENG 202	Shakespearean Studies	6	4		20	80	100
3	ENG 203	Fiction II (Twentieth Century)	6	4		20	80	100
4	ENG 204	Literary Masterpieces	6	4		20	80	100
5	ENG 205A	English Language Teaching	6	4	*CF	20	80	100
	ENG 205B	New Literatures in English (excluding Indian Literature in English)	6	4		20	80	100
	ENG 205C	Black Literatures	6	4		20	80	100
6	ENG 206A	Post-Colonial Studies	6	4	*EF	20	80	100
	ENG 206B	Landmarks in World Drama (Excluding Britain)	6	4		20	80	100
Total			**36**	**24**		**120**	**480**	**600**
7	ENG 207	Human Values and Professional Ethics	0	0	Audit Course	100	--	--

- **All core papers are Mandatory**
- ***Compulsory foundation – Choose any one**
- ***Elective Foundation - Choose any one Paper**
- **Audit course – 100 Marks (Internal) – Zero Credit under self-study**
- ****** **Interested student may register for MOOCS with the approval of DDC**

SEMESTER – III

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	ENG 301	Indian Writings in English -I	6	4	Core-Theory	20	80	100
2	ENG 302	Literary Criticism	6	4		20	80	100
3	ENG 303A	World Classics in English Translation	6	4	Generic Elective	20	80	100
	ENG 303B	Short Story						
	ENG 303C	Women's Writings	6	4		20	80	100
	ENG 303D	Comparative Literature						
4	ENG 304	Communication, Soft Skills & Etiquette	6	4	Skill Oriented	20	80	100
5	ENG 305A	Communicative English	6	4	Open Elective	20	80	100
	ENG 305B	English for Media						
Total			**36**	**24**		**120**	**480**	**600**

- **All core papers are Mandatory**
- **Generic Elective – Student has to choose any Two Paper**
- **Skill oriented Course is mandatory**
- **Open Elective are for the students of other Departments, Minimum one paper should be opted, extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study**
- **** Interested student may register for MOOCS with the approval of DDC**

SEMESTER – IV

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	ENG 401	Indian Writing in English -II	6	4	Core-Theory	20	80	100
2	ENG 402	Literary Criticism and Theory	6	4		20	80	100
3	ENG 403A	Green Cultural Studies	6	4	Generic Elective	20	80	100
	ENG 403B	Award Winning Works and Writers						
	ENG 403C	Subaltern Studies	6	4		20	80	100
	ENG 403D	Cultural Studies						
4	ENG 404	India & Literary Creativity	6	4	*MDC	20	80	100
5	ENG 405A	Soft Skills	6	4	Open Elective	20	80	100
	ENG 405B	Indian Literature in English Translation						
Total			**36**	**24**		**120**	**480**	**600**

- **All core papers are Mandatory**
- **Generic Elective – Student has to choose any Two Paper**
- **Multidisciplinary Course/ Project work is Mandatory**
- **Open Elective are for the students of other Departments, Minimum one paper should be opted, extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study**
- **** Interested student may register for MOOCS with the approval of DDC**

SEMESTER – I

Core-1:101	POETRY (From Chaucer to Browning)	5L:1T:0P	Credits:4
Internal Marks: 20	End Semester Examination Marks:80		

OBJECTIVES: To make the students understand the multiple genres of poetry

To create a taste for poetry and its nuances

UNIT – I:	**BACKGROUND**	**:**	Ode, Epic, Sonnet, Romanticism, Metaphysical poetry, Mock Heroic,
UNIT – II:	**(A) CHAUCER**	**:**	Prologue to Canterbury Tales
	(B) EDMUND SPENSER	**:**	Prothalamion
UNIT – III:	**(A) MILTON**	**:**	Paradise Lost, Book- IX *
	(B) JOHN DONNE	**:**	The Valediction, Forbidding Mourning, The Sun Rising, Batter My Heart, Three Personed God
UNIT – IV:	**(A) WORDSWORTH**	**:**	Tintern Abbey, Immortality Ode
	(B)*JOHN KEATS	**:**	Ode to a Nightingale, Ode to a Grecian Urn*
UNIT – V:	**(A) P.B. SHELLEY**	**:**	Ode to the West Wind, Ode to a Skylark
	(B) ROBERT BROWING	**:**	Andrea Del Sarto, Fra Lippo Lippi.

*Detailed Study

OUTCOMES: An understanding of the evolution of English poetry across ages

Appreciates the different sub genres like epic, lyric, ode etc

May inspire poetic creativity

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs					02	03	05	01		04		

Core-2:102	DRAMA (From Marlowe to Beckett)	5L:1T:0P	Credits:4
Internal Marks: 20	End Semester Examination Marks:80		

OBJECTIVES:

- To introduce the evolution English drama like mystery plays, moralities etc.,
- To introduce the Elizabethan theatre and beyond.
- To acquire knowledge on the historical, political, religious, social conditions of the times
- To make the students study the texts of great play wrights across ages, in order to understand the artistic and literary values

BACKGROUND: Mystery, Miracle plays, Moralities, Interludes, Tragedy, Comedy, Restoration Comedy, Comedy of Manners, Play of Ideas, Absurd Drama, Poetic Drama.

UNIT – I:	**Marlowe**	**:**	Dr. Faustus*
UNIT – II:	**William Congreve**	**:**	The Way of the World
UNIT – III:	**Bernard Shaw**	**:**	Pygmalion
UNIT – IV:	**T.S. Eliot**	**:**	Murder in the Cathedral*
UNIT – V:	**Samuel Becket**	**:**	Waiting for Godot

*Detailed Study

OUTCOMES: Students will be able to gain

- Understanding about different forms of drama like tragedy, comedy etc
- Knowledge about the conditions of the age and the reflection of it in the literary works
- Thorough understanding about the theatrical conditions and limitations
- Perceive the nuances of performance
- Recognize the transformation of human experiences into dramatic experiences.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs				02	01	05	04	03				

Core-3:103	FICTION I (From Fielding to Dickens)	5L:1T:0P	Credits:4
Internal Marks: 20	**End Semester Examination Marks:80**		

OBJECTIVES:

- To introduce the literary form of the novel and understand its rise.
- To introduce different kinds of novel and the novel like Picaresque Novel, Victorian Novel etc
- To acquaint the students with major novelists of early English Literature through their representative works.
- To develop in the students the ability to evaluate the novels in the perspective of their age
- To make the students understand the narrative techniques of the works

BACKGROUND : Aspects of the Novel, Rise of the Novel, Picaresque Novel, Women's Fiction, Victorian Fiction

UNIT- I: HENRY FIELDING **:** Joseph Andrews
UNIT- II: JANE AUSTEN **:** Pride and Prejudice
UNIT- III: CHARLOTTE BRONTE **:** Jane Eyre
UNIT IV: GEORGE ELIOT **:** Mill On the Floss
UNIT-V: CHARLES DICKENS **:** David Copperfield

OUTCOMES: Students will understand

- The aspects of the novel and also the rise of novel
- Different kinds of novel
- Aesthetic and literary merits of the novel
- The conditions of the age and the influence
- The different techniques of the novel

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs				05	02			04	03	01		

Core-4:104	PROSE (From Bacon to Woolf)	5L:1T:0P	Credits:4
Internal Marks: 20	End Semester Examination Marks:80		

OBJECTIVES: The aim of this course is to make students understand

- The rise and growth of English essay, and understand the factors responsible for its growth.
- The characteristics of aphoristic essay and the main contributors of this genre
- The salient features of social essay
- The characteristics of travelogues
- The origin and development of personal essay

BACKGROUND: Essay, Aphoristic Essay, Satire in Essay, Romantic Prose,

UNIT –I:*FRANCIS BACON **:** Essays: Of Studies, Of Truth, Of Youth and Age

UNIT –II: JOSEPH ADDISON **:** Selected Essays (From Coverley Papers) The Coverley Household, Sir Roger at Church, Hunting Scene with Sir Roger, His Account of his Disappointment in Love, Visit to Westminster Abbey. (MacMillan ed. K Deighton)

UNIT-III: * CHARLES LAMB **:** Dream Children, A Dissertation upon a Roast Pig, Old China, Chimney Sweepers

UNIT IV: THOMAS CARLYLE : Hero as Poet

UNIT V : VIRGINIA WOOLF : A Room of One's Own.

***Detailed Study**

OUTCOMES: After the completion of the course the students are able to

- Understand the genre of essay
- Differentiate the different forms of the essay
- Imbibe the deeper human values implied in the essay.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs				04	01			02		03		05

ENGLISH LANGUAGE & LINGUISTICS			
105 A	**Compulsory Foundation**	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

OBJECTIVES: The aim of this course is to understand

- The nature of human language, theories related to the origin and characteristics of language
- The way English developed as one of the languages of Indo-European family of languages and influence of foreign elements on the English language along with theories like Grimm's Law, Verner's Law
- The morphology and the different ways of word formation and semantics in the English language
- Identify the vowel and consonant sounds and speech patterns in English
- Understand the syntax of the English Grammar

UNIT – I:	**(A) English Language**	: Historical Periods – Old – Middle – Modern - Standard English
	(B) Foreign Influences	: Latin- Greek- French- Scandinavian
	(C) World Englishness	: American-Indian
UNIT – II:	**(A) Speech**	: Organs of Speech, English Sounds, Word Accent, Stress and Intonation
	(B) Sound Changes	: Grimm's Law- Verner's Law- The Great Vowel Shift
UNIT - III:	**Linguistics**	: (a) The Study of Language- What is Language Characteristics - Why study language? - Differences between Human and Animal Communication
UNIT – IV:	**The Basic Sentence Structure**	(b) Introduction to Linguistics- Definition-As a Science (c) Scope: Descriptive, Comparative, Historical Levels of Linguistic Analysis (d) Branches of Linguistics- Psycholinguistics, Sociolinguistics, Anthropological Linguistics, Computational Linguistics, Literary Stylistics.
UNIT – V:	**(B) Phonology**	Phoneme - Allophone- Morpheme -Allomorph Word Formation - Semantics Features of

Language - Theories - Language Universals Morphology – Morpheme – Affixes Morph - Allomorph (Simple, Compound and Complex Words)

REFERENCE BOOKS:

- SETHI,J. AND P.V. DHAMIJA. A Course in Phonetics and Spoken English (Phi)
- JONES, DANIEL. English Pronouncing Dictionary. 17th Edition. Ed. Peter
- GREENBAUM, SIDNEY; QUIRK, RANDOLPH (1990). A Student's Grammar of The English Language. Addison Wesley Publishing Company. Pp.496. ISBN 0-582-05971-2.
- Pushpinder Syal and Jindal: Introduction to Linguistics, PHI, EEE David Crystal: Linguistics
- Ralph Fasold and Jeff Connor Linton: An Introduction to Language and Linguistics. (CUP)

Outcomes:

- After the completion of the course the students are able to
- Understand the nature of human language with its theories and characteristics
- Trace the growth of English as an international language with different influences and theories of the language
- Know the structure of English word and ways of English word formation and changes in the meanings of the words.
- Learn the English sound system and intonation patterns
- Start practice of English sentences with proper grammatical and phonetic structures

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	02	04	01						05			03

RHETORIC, DISCOURSE AND WRITING			
105 B	**Elective Foundation**	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

To provide learners with the basics of rhetoric

To expose learners to various forms of discourse and its analysis

To help learners write effective paragraphs and essays

To enable learners to hone their grammatical and stylistic skills

UNIT– I

Definition of Rhetoric– Aristotle -Three Elements of Rhetoric: Presentative, Representative and Elaborative – Rhetorical Situation: Grammar, Logic, Aesthetics and Ethics – 5 Cannons of Rhetoric: Inventive, Arrangement, Style, Memory and Delivery–Art of Discourse

UNIT– II

Four Kinds of Discourse: Exposition, Argumentation, Description, Narration

UNIT– III

Topic Sentence, Paragraph Unity: Coherence and Flow, Methods of Developing Paragraphs, Discourse Markers

UNIT– IV

Structure of an Essay: Beginning, Middle and Closing, Tight and Loose Organization-Pitfalls to be avoided.

UNIT– V

Phrases – Clauses – Kinds of Sentences – Patterns of Sentences – Transformation of Sentences –Vocabulary– Punctuation

Suggested reading:

- Jaydeep and Anindhya. A Handbook of Rhetoric and Prosody. Orient Longman Aristotle: Art of Rhetoric. Penguin Day, Henry Noble. The Art of Discourse.
- James Paul Gee & Michael Handford: The Routledge Book of Discourse Analysis.
- Boulton, Marjorie. The Anatomy o fProse. London: Routledge & Paul,1954.
- Miriam, Joseph, and Marguerite McGlinn. The Trivium: The Liberal Arts of Logic, Grammar, and Rhetoric: Understanding the Nature and Function of Language. N.p. 2002.

- Weston, Anthony. A Rule book for Arguments. Indianapolis: Hackett Pub, 2009.
- Yáñezouza, Nuria. Grammar, Rhetoric and Usage in English: Preposition Placement, 1500-1900. Cambridge: Cambridge UP,2015

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01	05	02		03					04		03

CLASSICAL CRITICISM			
105 C	**Compulsory Foundation**	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

To enlighten the students with the literary values of classical criticism

To make the students understand the value of tradition and literary antiquity.

To give a foundation in classical critical studies of India and the West.

To impart a comparative perspective and a deep understanding of foundational texts in critical theory.

UNIT I: Ananda Vardhana : Structure of Poetic Meaning: The First Flash (From Dhvanyaloka)

UNIT II: Abinavagupta : "On Santa Rasa and Aesthetic Equipoise"

UNIT III: Plato : Republic,Chapter xxxv "How Representation in Art is Related to Truth"

UNIT IV: Horace : Ars Poetica

UNIT V: Longinus : On the Subline

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01		02	03		04	05					03

AMERICAN LITERATURE			
106 A	**Compulsory Foundation**	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

- To provide an idea of English literature in America
- To familiarize the important literary concepts that are prevalent in American literature
- To refer the concepts like Puritanism, transcendentalism, symbolism, impressionism etc
- To introduce the major writers of American literature through the study of their works
- To develop understanding of the history and cultural conditions of America through literature

BACKGROUND: Puritanism, Transcendentalism, Symbolism, and Impressionism

UNIT-I: *RALPH WALDO EMERSON : The American Scholar,

UNIT-II: (A) *WALT WHITMAN : Out of the Cradle Endlessly Rocking, Lilacs Last in the Dooryard Bloom'd

(B) EMILY DICKINSON : 76, 214, 712 (From Selected Poems of Emily Dickinson)

(C)*ROBERT FROST : After Apple Picking, Stopping by Woods, Road Not Taken

UNIT-III: NATHANIEL HAWTHORN : The Scarlet Letter

UNIT-IV: O'NEILL : The Hairy Ape

UNIT- V: TENESSEE WILLIAMS : A Street Car Named Desire

* Detailed Study

Outcomes: After the completion of the course the students are able to

- Learn about the evolution of American Literature
- Understand its relevance and importance
- Appreciate its different genres
- Perceive its value in the contemporary world

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	02			02		01			02	03		

TECHNICAL COMMUNICATION			
106 B	**Elective Foundation**	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

To equip the students with the skills of technical communication

To make the students employable in the current job market

To convert the learner into a prospective trainer.

To impart the necessary skills needed for growth in the educational and industrial sectors too.

UNIT I: (1) Basic of Technical Communication

INTRODUCTION: The Process of Communication Language as a Tool of Communication, Levels of Communication, Communication Net Works, The Importance of Technical Communication

UNIT II: (2) Technology in Communication,
Impact of Technology
Software for creating messages
Software for Writing Documents
Translating Documents

UNIT III Effective Presentation Strategies
Introduction
Defining Purpose
Analyzing Audience & Locale
Organizing contents
Preparing Outlines
Visual Aids
Kinesics
Proxemics
Para linguistics
Chromenics

UNIT IV : Letters, Memos, E mails

UNIT V : Reports, Instructions manuals and Technical Descriptions

Outcomes :

After the course, the student will be able to train others in technical communication

Students gain proficiency in language skills for employability.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01								02	03	05	04

HUMAN VALUES AND PROFESSIONAL ETHICS			
107	**Audit course**	**5L:1T:0P**	**Credits:4**
Internal Marks: 100	**End Semester Examination Marks:00**		

Objectives: The aim of the course is to understand

- The importance of human values and professional ethics in the contemporary materialistic world
- The values embedded in Bhagvad Gita and the other classics
- The importance of simple living in the modern world as suggested by Jainism of Mahaveera
- Buddha's suggestions of living through the Four Noble truths and the Eight Fold Path
- The nature of punishments for committing various crimes as mentioned in Manu Smriti

UNIT-I Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals – Ethical Values in various Professions.

UNIT-II Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.

UNIT-III Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non-stealing), urusharthas (Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).

UNIT-IV Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths - Arya astanga marga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.

UNIT-V Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Suggested Reading:

- John S Mackenjie: A manual of ethics.
- "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
- "Management Ethics - integrity at work' by Joseph A. Patrick and John F. Quinn, Response Books:New Delhi.
- "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
- Harold H. Titus: Ethics for Today
- Maitra, S.K: Hindu Ethics
- William Lilly: Introduction to Ethics
- Sinha: A Manual of Ethics

- Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
- Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
- Caraka Samhita: Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
- Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
- Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
- An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
- Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academy Hyderabad
- I.C Sharma Ethical Philosophy of India. Nagin & Co,Julundhar.

Outcomes: After the completion of the course the students are able to

- Realize the necessity of practicing Human values and Ethics in all walks of life including the profession they opt for
- Understand Bhagvad Gita as a guide for modern lifestyle
- Understand thought of Jainism and their necessity in contemporary living
- Understand the principles of Buddhism for a better living
- Understand the punishments given in Manu Smuriti for a comparison with modern punishments

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs		04	01			03		05				02

SEMESTER – II

POETRY – II (Classical & 20th Century)			
1:201	**Core**	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

To make the students understand contemporary poetry

To equip students with knowledge of rhyme, meter and poetry Scanning / appreciation

BACKGROUND : Modernism, Imagery, Symbolism, Movement poets, War Poetry

UNIT I: KALIDASA : Kumara Sambavam

UNIT II: *W.B. YEATS : Byzantium, A Prayer for My Daughter, The Second Coming

UNIT III: *T.S. ELIOT : The Waste Land

UNIT IV: (A) G.M. HOPKINS : Windhover, Thou Art Indeed Just My Lord

(B) DYLAN THOMAS : Do Not go Gentle into the Good Night.
Fern Hill

UNIT V (A)TED HUGHES : Thought Fox, Pike

(c) SUJATHA BHATT : Search for my Tongue, A Different History,
The Stare

Outcomes:

Sensitizes the students on the classical and contemporary poetic ethos Raises student awareness on movements like Modernism, War Poetry, Women's poetry, Symbolism etc,

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs					02	03	05	01		01		

SHAKESPEAREAN STUDIES			
Core-2:202		**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

- Students will be able to understand the Shakespearean Age.
- Grasp the tragic, comic and historical worlds of Shakespeare.
- Knowledge of Shakespeare in film representations
- Gain knowledge of Shakespearean criticism
- Develop a comprehensive understanding of Shakespeare and his timelessness.

UNIT 1. BACKGROUND : Age of Shakespeare, Play Houses, Actors, Quartos, Folios, Shakespeare in Films.

UNIT 2. Macbeth* :

UNIT 3. Twelfth Night :

UNIT 4. Henry IV part I :

UNIT 5. Criticism on Shakespeare : (a) Elizabeth Drama: "Shakespeare and the Poetry of the Life Spirit"- Aurobindo (from FUTURE POETRY)
(b) "Macbeth and the Metaphysic of Evil" Wilson Knight

Outcomes: Students will be able to gain

- An inside view of the Shakespearean World.
- Understand the large canvas of his creativity
- Remain updated on the various film versions of Shakespeare
- Trace the genealogy of Shakespearean Criticism in India and the world
- Appreciate the relevance of Shakespeare in the contemporary world.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs					02	03	05	01		01		

FICTION – II (20th Century)			
Core-3:203		**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

- To introduce the concepts of modern novel like stream of consciousness, psychological novel, political novel etc
- To introduce the concepts like theme, characters, plot and narration
- To acquaint the students to the novels of some of the great English Novelists
- To develop a deeper insight of the literary work and to learn human values

BACKGROUND:Stream of Consciousness, Victorian, Novel, Psychological Novel, Politics and Novel, Science Fiction

UNIT- I: THOMAS HARDY : Tess of the D'Urbervilles

UNIT- II: VIRGINIA WOOLF : Mrs. Dalloway

UNIT- III: D.H. LAWRENCE : Sons and Lovers

UNIT- IV: GRAHAM GREENE : The Heart of the Matter

UNIT-V: H.G. WELLS : The Time Machine

Outcomes: Students will know

- The concepts of modern novel like stream of consciousness, psychological novel etc
- The ability to evaluate the novel using appropriate theory and they will learn types of novel
- The great works of major novelist of modern age
- The ability to understand the technique of the Novel
- Ability to understand themes with life situations

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs				05	02			04	03	01		

LITERARY MASTERPIECES			
Core-4:204		**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

- To make the learner familiar with classics
- To increase their understanding of masterpieces
- To enhance learners' understanding of classics
- To make them understand the nuances of literary creativity

BACKGROUND **:** Epic Theatre, Women's Science Fiction, Mock Epic, Ballad, Romantic Poetry, Satire, Greek drama, Poetic Drama

UNIT I : Sophocles: Oedipus Rex

UNIT II : John Milton: Samson Agonistes *

UNIT III : Alexander Pope: Rape of the Lock *

UNIT IV : Swift's Gulliver's Travels (Chapters 1 &2)

UNIT V : Brecht: Mother Courage and Her Children

Outcomes:

- Students develop an understanding of classics
- Students cultivate a taste for masterpieces across cultures
- Students have an enhanced understanding of classics
- Students understand the complexity and beauty of classical literary
- creativity.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs		01	04			03	02		05			

English language teaching			
Core-5:205a	Compulsory foundation	**5l:1t:0p**	**Credits:4**
Internal marks: 20	**end semester examination marks:80**		

Objectives: This course is intended to

- Outline the growth of English education and its establishment as a discipline in contemporary India with the challenges encountered in the teaching and learning of English.
- Give different approaches, methods and techniques of teaching English as a second language
- Familiarize the ways of teaching LSRW skills, grammar and other types of texts like prose, poetry
- Examine the need and role of teaching materials, audio-visual aids in the teaching of English
- Familiarize the different evaluation procedures in the assessment of English learning

UNIT-I: ELT in India: Place-Importance-Problems and Objectives In Teaching- ESP-ESL

UNIT-II: Language Teaching Approaches, Methods and Techniques:
Structural – Oral – Situational – Communicative – Grammar – Translation
Method – Direct – Audio – lingual – Bilingual - communicative - Total Physical Response - the Silent Way - suggest podia

UNIT-III: TEACHING SKILLS: LSRW-Grammar-Vocabulary- Prose- Poetry

UNIT-IV: TEACHING MATERIALS: Lesson Plan - Audio Visual Aids - Computers - Language Lab - Syllabus - Structural Approach – Communicative Approach

UNIT-V: EVALUATION: Language Tests – Types – Principles - Characteristics of Good Tests and Execution

TEXTS:

- Penny UR. : A Course in Language Teaching
- Keith Johnson : Language Teaching and Skill Learning
- H.B. Allen (ed.) : Teaching English as a Second Language

Suggested reading:

- N.S. Prabhu : Language Pedagogy

- M. Calce Murcia : Teaching English as a Second or Foreign Language L. Mointesh (eds.)
- V.V. Yardi : Teaching English in India Today
- V.K. Gokak : Teaching English in India.

Outcomes: After the completion of the course the students will able to

- Understand the need, importance and challenges of teaching and learning English in Indian context.
- Choose the right approaches, methods and techniques for the learning and teaching of English
- Know the ways of imparting and learning language skills and ways of preparing lesson plans.
- Understand the importance of language lab, teaching materials and audio-visual aids in the learning and teaching of English.
- Know to test and testing components of language tests and examinations and evaluation procedures

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01					05	02				04	03

NEW LITERATURES IN ENGLISH (Excluding Indian English Literature)			
205B	Compulsory Foundation	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

To familiarize students with the New Literatures in English

To make students aware of the relationship in New Literatures in English

UNIT-I:	**(A)** *Derek Walcott	: Far Cry from Africa, Ruins of a Great House
	(B) *E.J. Pratt	: Brebeuf and his Brethren, The Dying Eagle
UNIT-II:	Wole Soyinka	: The Lion and the Jewel
UNIT-III:	**(A)** Margaret Lawrence	: The Stone Angel
	(B) Margaret Atwood	: Surfacing
UNIT-IV:	David Williamson	: Traveling North
UNIT V:	V.S. Naipaul	: A House for Mr. Biswas

Detailed Study

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs		01			03		02	05	04			

BLACK LITERATURES			
205C	Elective Foundation	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

To make the students be aware of the value of Black Literatures, Africa, America and UK.

To equip the students with knowledge in contemporary literary studies

To make students appreciate the nuances and value of literary creativity of Black writers both men and women.

To enhance students' knowledge of the "dark continent."

UNIT-I: *****Gabriel Okara: 1) Once Upon a Time
2) Spirit of the Wind
3) The Mystic Drum

*J.P.Clark: 1) The Casualties to Chinua Achebe
2) Olokun
3) Night Run

UNIT-II **:** Ralph Ellison: Invisible Man

UNIT-III **:** Lorraine Hansberry**:** A Raisin in the Sun

UNIT-IV **:** Zadie Smith: White Teeth

UNIT-V **:** Ngugi Wa Thiongo – Decolonizing the Mind

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs		05	02		03	01		04				

POSTCOLONIAL STUDIES			
206A	Compulsory Foundation	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

To familiarize students with the Postcolonial world

To make students aware of the relationship between post colonialism and Literature

BACKGROUND: KEY CONCEPTS: Colonialism, Post- Colonialism, Centre / Margin, Decolonialization, Imperialism, Eurocentrism, (From Key Concepts In Postcolonial Studies-Ashcroft Et Al.)

UNIT-I: **POETRY: BEN OKRI:** 1) An African Elegy 2) Living Is A Fire (African)*

JUDITH WRIGHT : Fire at the Murdering Hut (Australian)

A.D.HOPE : Australia (Australian)*

E.J.PRATT : The Dying Eagle (Canadian)*

ZUFILKAR GHOSE : This Landscape, These People (Pakistani)

MERVIN MORRIS : Literary Evening in Jamaica (Caribbean)

UNIT-II: DRAMA: RIGO : The Ecstasy of Rita Joe (Canadian)

UNIT-III: FICTION: ACHEBE : Things Fall Apart (African)

UNIT-IV: THEORY: AIME CESAIRE : Discourse on Colonialism

UNIT V: BILL ASHCROFT : Introduction to The Empire Writes Back

Suggested reading of the following:

- MEENAKSHI MUKERJEE – "Nation, Novel and Language" (from Perishable Empire)
- GAURI VISWANATHAN – "The Beginnings of English Literary Studies in India" (From Masks of Conquest)
- GAYATRI CHAKRABORTY SPIVAK - "Can The Subaltern Speak?"
- FRANTZ FANON – "The Fact of Blackness" (from Black Skins, White Masks)

Sources of suggested reading:

- Post colonialism – Mac Leod
- Key Concepts in Post Colonial Studies- Ashcroft Et Al
- The Post Colonial Studies Reader - Ashcroft Et Al
- Colonialism /Post colonialism. – Ania Loomba
- Ashcroft – The Empire Writes Back

Outcomes:

To enable students to understand postcolonial literatures across nations and languages.

To make students perceive the larger meaning of post colonialism

To make the students familiar with critical concepts and background to post colonialism and English language across nations/cultures.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs		01	04			02	03	05				

Landmarks in World Drama (Excluding Britain)			
206: B	Elective Foundation	**5L:1T:0P**	**Credits:4**
Internal Marks: 20		**End Semester Examination Marks:80**	

Objectives: To familiarize students with non British world theatre

To make students aware of the relationship between drama and life

To enable students' understanding of dramatic performance across nations

UNIT – I : Sudraka Mricha Katika (Indian Sanskrit)

UNIT – II : Eugene O' Neill Mourning Becomes Electra (American)

UNIT – III : Pirandello Six Characters in Search of an Author (Italian)

UNIT – IV : Ngugi Black Hermit (African)

UNIT – V : Adrienne Kennedy Funny house of a Negro (African American)

Outcomes: The learners will be able to understand the vaster gamut of world theatre

They will appreciate the diversity of theatrical performances.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01	04		03		02	05					

HUMAN VALUES AND PROFESSIONAL ETHICS			
207	**Audit course**	**5L:1T:0P**	**Credits:4**
Internal Marks: 100	**End Semester Examination Marks:00**		

Objectives: The aim of the course is to understand

The importance of human values and professional ethics in the contemporary materialistic world
The values embedded in our ancient thinkers and timeless classics
The importance of simple living and high thinking in the modern worldTo imbibe contemporary values and ethics in business, medicine, environment, media and social life.Enrichment of inner life in the contemporary world.

UNIT-I Value Education- Definition - relevance to present day - Concept of Human Values - self introspection – Self esteem. Family values-Components, structure and responsibilities of family- Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-II Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT-III Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

UNIT-IV Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest , Pollution and waste, Climate change, Energy and population, Justice and environmental health.

UNIT-V Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

Books for study:

- John S Mackenjie: A manual of ethics.
- "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
- "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.

- "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
- Harold H. Titus: Ethics for Today
- Maitra, S.K: Hindu Ethics
- William Lilly : Introduction to Ethics
- Sinha: A Manual of Ethics
- Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haughton.
- Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
- Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
- Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning,
- Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
- An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
- Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Education-Telugu Akademi, Hyderabad.
- I.C Sharma Ethical Philosophy of India. Nagin & co Julundha

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs					05	02	04	01			03	

SEMESTER-III

INDIAN WRITINGS IN ENGLISH -I			
Core-1:301		**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives: The course is aimed to

- Know the Indian English writings and movements associated with it in India
- Know the poetic features of Indian English poetry
- Know the dramatic styles of Indian English drama
- Know the beginning of Indian English Novel and its growth
- Know the merits of Indian English novelists and their writings and drawbacks if any

UNIT-I: BACKGROUND **:** English in India, Renaissance, Freedom Movement, Early Indian Romantics, Mysticism

UNIT-II: (A) SRI AUROBINDO **:** Savitri, Book I

(B)*TORU DUTT **:** Our Casuarina Tree, Sita

UNIT-III: *RABINDRANATH TAGORE: Muktha-Dhara

UNIT-IV: (A) RAJA RAO **:** Kanthapura

(B) MULK RAJ ANAND **:** The Untouchable

UNIT-V: (B) R.K.NARAYAN **:** The Guide

***Detailed Study**

Outcomes: After the completion of the course the students are able to

- Understand the Indian English writings and movements associated with it in India
- Understand the poetic features of Indian English poetry
- Understand the dramatic styles of Indian English drama
- Understand the beginning of Indian English Novel and its growth
- Understand the merits of Indian English novelists and their writings and drawbacks if any

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01			04	02	03				05		

LITERARY CRITICISM			
Core-2:302		**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives: To stimulate critical thinking in literature

To make students understand the differences between creativity and criticism in literature

BACKGROUND : Classical, Romantic, Neo-classical and Modernism

UNIT-I: ARISTOTLE : Poetics

UNIT-II: *DR. JOHNSON : A Preface to Shakespeare

UNIT-III: (A) COLERIDGE : Biographia Literaria, Chapter XIV

(B) MATTHEW ARNOLD : A Study of Poetry

UNIT-IV: (A)*T.S. ELIOT : Tradition and Individual Talent

(B)CLEANTH BROOKS : Irony as a Principle of Structure

Detailed Study

Outcomes: Imparts domain knowledge for the student in Literary Criticism

Equips the student with the evolution of English Literary Criticism from Aristotle to early twentieth centuryHelps students map the genealogy of Western canonical critical texts

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs						01	03	02	05	04		

Objectives:

- To introduce the major literary works of world literature in English translation

WORLD CLASSICS IN ENGLISH TRANSLATION			
303(A)	Generic Elective	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

- To make the students understand the various cultures of the world
- To develop a wider understanding of literature
- To acquire deeper insight into literature
- To appreciate the world literary traditions and to get an awareness of literary trends the world scenario

UNIT-I: BACKGROUND : Epic, Problem Play, Psychological Novel, Fable, Allegory

UNIT-II: HOMER : The Iliad, Canto 1

UNIT-III: DOSTEVESKY : Crime and Punishment

UNIT-IV: *IBSEN : A Doll's House

UNIT-V: FRANZ KAFKA : The Castle- *Detailed Study

Outcomes: Students will be able to get

- Knowledge of diverse cultures and people
- Rational thinking to identify and solve problems in literature
- Capacity for reflection, planning in different situations
- Understanding about moral principles
- Students will learn the values in life.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01			02		03	03			03		

SHORT STORY			
303(B)	Generic Elective	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives: The course intends to

- Bring awareness on short story as a genre and its place in the world today
- Bring awareness on the genesis of short story in the Eastern and the Western World
- Bring awareness on the elements and types of short story
- Familiarize the creativity of great short story writers of the world like Maupassant, Chakov, Poe, Marquez
- Familiarize the different techniques and themes employed by the prescribed writers for the study and develop ability to interpret critically.

Background: Tale-Fable-Story-Novelette-Types of Stories: Detective- Social Allegorical – Magic - Realism - aspects of the short story: story-plot- characters- narrative techniques-unities-Tone-setting-dialogue-telling and showing-structure-style

UNIT-I:	**(A) EDGAR ALLAN POE**	:	The Tell Tale Heart
	(B) O. HENRY	:	The Last Leaf
UNIT-II:	**(A) ANTON CHEKOV**	:	The Lady with the Pet Dog
	(B) GUY DE MAUPPASANT	:	Vendetta
UNIT-III:	**(A) OSCAR WILDE**	:	The Selfish Giant
	(B) SOMERSET MAUGHAM	:	The Ant and The Grasshopper
UNIT-IV:	**(A) GABRIEL GARCIA MARQUEZ**	:	Balthazar's Marvelous Afternoon
	(B) KATHERINE MANSFIELD	:	The Doll's House
UNIT-V:	**(A) RABINDRANATH TAGORE**	:	The Cabuliwallah
	(B) SRIPADA SUBRAHMANYA SASTRY	:	Attar of Roses

Suggested reading:

- Aycock, Wendell m. Ed. The Teller and the Tale: Aspects of the Short Story. Lubbock: Texas Tech Press, 1982.
- Barroll, J. Leeds, Austin M. Wright. The Art of The Short Story: An Introductory Anthology. Boston: Allyn and Bacon, 1969.

- Bates, H. E.The Modern Short Story: A Critical Survey. London: Nelson and Sons, 1945.
- Beachcroft, T. O. The English Short Story I. London: Longmans, Green, 1967.
- Beachcroft, T. O. The English Short Story II. London: Longmans, Green, 1967.
- Brooks, Peter. Reading for the Plot: Design and Intention in Narrative. Cambridge (Mass.); London: Harvard University Press, 1998.
- Buford, bill ed. More Dirt: The New American Fiction. Cambridge: Granta Publications, 1986.

Outcome: On completion of the course the students are able to

- Understand the significance of short story as genre of the contemporary world
- Understand the genesis of short story and concepts like fable, folk tale, short story
- Understand the elements of a short story like theme, setting, climax, technique and types of stories
- Enjoy and appreciate the stories of great masters like Maupassant and their style of narration.
- Learn to appreciate the works of great masters critically and may get motivated to attempt writing short stories.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	02				01		03	04	05			

303(C)	Generic Elective	5L:1T:0P	Credits:4
Internal Marks: 20	End Semester Examination Marks:80		

Objectives:

To familiarize students with Women's writings

To create an awareness between gender and creativity

BACK GROUND: Liberal Feminism, Radical Feminism, Marxist And Socialist Feminism, Black Feminism, Eco-feminism, French Feminism

UNIT I: PROSE: (A) *ALICE WALKER : In Search of Our Mothers' Gardens,
(B) HELEN CIXOUS : The Laugh of the Medusa

UNIT II: POETRY: *1. AKKA MAHADEVI : 1) Don't Despise Me.
2) Brother, You've Come
3) Not One, Not Two.
4) Would a Circling Surface Vulture.

(From Women Writing in India ed. Susi Tharu and Lalitha, OUP. VOL.1)

UNIT III: FEMALE SLAVE NARRATIVE : Incidents in the Life of a Slave Girl- Linda Brent

UNIT IV: DRAMA: (A) MANJULA
(B)PADMANABHAN'S : Lights' Out-

*** Detailed Study**

UNIT V: (Short Story) AMBAI'S : Squirrel

Suggested readings:

ROSEMARIE TONG : Feminist Thought: A More Comprehensive Introduction 3rd ed.
MARYWOLLSTONE CRAFT : A Vindication of the Rights of Women. Chaps. 4,5,7,8,12.
SIMONE DE BEAUVOIR : The Second Sex
JOHN STUART MILL : The Subjection of Women.
BETTY FRIEDAN : The Feminine Mystique. Carol. R. MXC. Cann & Suung

Kyuung. (EDS.)

FEMINIST THEORY : Local and Global Perspectives. Routledge, 2002.

MARY ELLMAN : Thinking about Women. New York: Harcourt Brace, 1963.

Out comes: Enables students to understand women's creativity across cultures, nations and genres Ushers gender sensitization through literary studies Perceives creativity as a tool of empowerment and unity amongst women.Understand gendered spaces in creativity and the genealogy of women's writings like Indian, African American, French etc.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01			02		03	03			03		

COMPARATIVE LITERATURE			
3:303(D)	Generic elective	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives: This course aims to

- Present the knowledge of world literary and cultural traditions in the global context.
- Familiarize the prescribed literary texts in comparison.
- Compare the texts taking into account the cultural, traditional and historical aspects.
- Discuss the role of the prescribed texts within the literary movements of the world.
- Develop to look at the literacy texts from the international perspective.

UNIT-I: THEORETICAL BACKGROUND:
RENE WELLEK AND AUSTEN WARREN – General, National and Comparative Literature (from Theory of Literature)

BASSNET - Comparative Literature

UNIT-II: KALIDASA'S Sakuntala & SHAKESPEARE'S The Tempest

UNIT-III: ALBERTCAMUS'S The Outsider & BUCHIBAABU'S Chivarakumigiledi

UNIT-IV: SAMUELBECKET'S Waiting For Godot & BADAL SARCAR'S Evam Indrajit

UNIT-V: HEMINGWAY`S The Old Man and The Sea & KESAVAREDDY He Conquered the Jungle

Outcomes: After the completion of the course the students are able to

- Understand national and world literatures and the need of comparative studies in the global world.
- Understand the ways of comparative analysis
- Know the critical ways of looking at the prescribed texts in a comparative perspective
- Understand the growth of literary genres in consonance with cultural, historical development of the societies of the world
- Gain ability to analyze and interpret literary texts using primary and secondary sources.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs		04			05				02		01	03

COMMUNICATION, SOFT SKILLS, & ETIQUETTE			
304	Skill oriented Course	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Prerequisite or Knowledge requirement for the Course : Student should have basic Knowledge on soft skills.

Objectives:

- To promote soft skills among the students so as to develop attributes that could enhance individuals 'interactions, earning power and job performance,
- To inculcate potential skills in the students to communicate effectively, take initiative, solve problems, and demonstrate a positive work ethics so as to demonstrate good impression and positive impact.
- To face the interviews with confidence, to secure a productive job and to sustain it with confidence and enhanced productivity.

Course learning outcomes (clos):

After completion of this course successfully, the students will be able to

CLO-1: Understanding soft skills, types of soft skills and intrapersonal skills
CLO-2: Exhibiting different types of people skills
CLO-3: Demonstrating oral communication skills through effective presentations
CLO-4: Exhibiting various modes of written communication
CLO-5: Developing employability skills

UNIT – 1: TYPES OF SOFT SKILLS & INTRAPERSONAL SKILLS:

Definition of soft skills – Types of Soft skills: Intra & Interpersonal Skills – Intrapersonal Skills: Self-Confidence, Self-awareness, Adaptability & Flexibility, Attitude, Assertiveness, SWOC, Resilience

UNIT- II: INTERPERSONALSOFT SKILLS:

Active Listening Skills - Goal setting – Negotiation& Persuasion skills - Time Management – Stress Management - Problem Solving and Decision-making Skills - Leadership Skills – Conflict Resolution

UNIT – III: ORAL COMMUNICATION SKILLS:

Presentation skills –JAM - Role Plays, Debate, Extempore, Public Speaking skills - GD Participation/facing techniques - Ability for planning, organizing, and coordinating GD

UNIT – IV: WRITTEN COMMUNICATION SKILLS:

Sentence Patterns - Paragraph Writing – Email Writing - Essay Writing - Report Writing – Memos - Situation Reaction Test

UNIT- V: EMPLOYABILITY SKILLS:

Non-verbal communication - E-mail etiquette- Telephone etiquette - Dining etiquette– Grooming – Resume writing - Interview Skills – HR Questions

References:

- Meenakshi Raman and Sangeeta Sharma (2015), Technical Communication: Principles and Practice, 3rd Edition, New Delhi: Oxford University Press.
- Ashraf Rizvi, M. (2017), Effective Technical Communication, 2nd Edition, New Delhi: Tata McGraw Hill.
- Hewing, Martin (1999), Advanced English Grammar: A Self-study Reference and practice Book for South Asian Students, Reprint 2003, New DelhI: Cambridge University Press.
- Minippally, Methukutty. M. (2001), Business Communication Strategies, 11th Reprint, New Delhi: Tata McGraw – Hill.
- Sasi Kumar. V and P.V. Dharmija (1993), Spoken English: A Self-Learning Guide Conversation Practice, 34th reprint, New Delhi: Tata McGraw – Hill.
- John, Seely (1988), The Oxford Guide to Writing and Speaking, Delhi: Oxford University Press.
- Peter, Francis (2012), Soft Skills and Professional Communication. New Delhi: Tata McGraw Hill.
- Print Singh, Prakash and Raman, Meenakshi (2006), Business Communication, New Delhi: Oxford University Press.
- British Council online resources.
- Wren& Martin (2019), High School English Grammar & Composition Regular Edition, New Delhi, S. Chand & Company Pvt. Ltd

COMMUNICATIVE ENGLISH			
305(A)	OPEN ELECTIVE	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives: The course intends to bring

- Awareness on recognizing the power of communication in day to day life
- Awareness on communication process, types and barriers of communication
- Awareness on the art of listening and speaking skills with knowledge of English sounds and intonation patterns
- Awareness on the ways of Reading and Writing skills with practical exposure
- Awareness on the syntax of the English language

UNIT-I: COMMUNICATION : Nature-Definition-Process -Types-Barriers

UNIT-II: ORAL COMMUNICATION : Body Language-Group Discussions-Interviewing-Debates- Presentations

UNIT-III: LANGUAGE SKILLS : Listening, Speaking, Reading and Writing

UNIT-IV:

(A) WRITING FOR PRINT MEDIA : Functions of the Press- Reporting- Newspaper Writing-Editing- Interviewing

(B) WRITING FOR
ELECTRONIC MEDIA : TV & Radio-Types of Radio and TV Programs – Impact of Radio and TV-
Film and Internet- Effects of Cinema on Society-
Advertisements-Advertising Concepts-
Types- Formats - Structure – Design of an Advertisement

UNIT-V : BPO ENGLISH : Types of BPO Businesses- English Usage- Commonly Confused Words- Errors in using
The Parts of Speech- Errors in Using
Punctuation- Redundancies- Style

Outcomes: On completion of the course the students are able to

- Understand the significance and importance of Communication in English in the present day world
- Understand communication process, the different types and barriers of communication
- Gain practical knowledge in acquiring listening and speaking skills with the help of group discussions, speeches etc.,
- Gain efficiency in the use of written English alongside spoken English
- Gain knowledge of the English Language grammatical and sound system and know about BPO

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs		04			05				02		01	03

ENGLISH FOR MEDIA			
305 (B)	Generic Elective	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives: The Course aims to

- Enable the students to write for the media
- Enable the students to in writing for media
- Give the students of an idea of language necessary for the media
- Enable the students in oral skills necessary for intentions
- Understand the function use of the English language

UNIT I: INTRODUCTION:

- Introduction to Journalism
- Types of Reporting
- News Writing and Editing

UNIT II: WRITING FOR THE MEDIA:

- Basic Principles of Writing: Writer, Purpose, Audience,
- Tone, Context, Reporting and Editing
- Feature Writing for Print and Electronic Media

UNIT III: ELECTRONIC MEDIA:

- News Writing for Electronic Media-TV and Radio
- Interview and Group Discussion Techniques
- Feature Writing

UNIT IV: INTERVIEWING:

- Techniques, Types and Formats
- Pre- Interview Home work
- Framing Questions

UNIT V: ADVERTISING:

A) Types; B) Ethics; C) Language

Reference books

- Buruah, U.L. This is All India Radio (Publications division, Govt. of India) Padmanabha Rao, R.A, Radio, 2001
- Parthasarathy, Rangaswami. Basic journalism (Macmillan)
- Vakil. Introduction to Mass Communications
- Narasimha Reddy C.V. Ed. Writing for Media (Dr BR Ambedkar AP Open University, Hyderabad)

Outcomes: After the completion of the course in students are able to

- Know the forms of communication in media
- Learn the writing skills necessary for the media
- Understand the use of language in different situations in wring for the media
- Learn the oral skills necessary for media like interview skills
- Practice the use of the English language and know the ethics involved in adventuring

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs		04			05				02		01	03

SEMESTER – IV

INDIAN WRITING IN ENGLISH - II			
Core-I:401		**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives: The course is aimed to

- Know the Indian English writings and movements associated with it in India
- Know the poetic features of Indian English poetry
- Know the dramatic styles of Indian English drama
- Know the beginning of Indian English Novel and its growth
- Know the merits of Indian English novelists and their writings and drawbacks if any

UNIT-I: BACKGROUND **:** Feminism, Symbolism, Realism, Magic Realism

UNIT-II: *NISSIM EZEKIEL: From Ten Twentieth Century Poets, OUP

UNIT-III: (A)*KAMALA DAS **:** From Ten Twentieth Century Poets, OUP

(B) A.K. RAMANUJAN **:** From Ten Twentieth Century Poets, OUP

UNIT-IV: SALMAN RUSHDIE **:** Midnight's Children

UNIT-V: GIRISH KARNAD : Hayavadana

***Detailed Study**

Outcomes: After the completion of the course the students are able to

- Understand the Indian English writings and movements associated with it in India
- Understand the poetic features of Indian English poetry
- Understand the dramatic styles of Indian English drama
- Understand the making of Indian English Novel and its growth
- Understand the merits of Indian English novelists

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01			04	02	03				05		

LITERARY CRITICISM AND THEORY II			
Core-2:402		**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives: To impart critical analysis in literature

To make students aware of the need for critical sensitivity

UNIT-I: THEORETICAL BACKGROUND: Sanskrit Criticism Psycho analytical Criticism- Archetypal Criticism Deconstruction - Feminism-Structuralism- Post modernism- Post Colonialism

UNIT-II: (A) *EDMUND WILSON (Marxist Criticism): Marxism and Literature

(B) LIONEL TRILLING (Psychoanalytical Criticism): Freud and Literature

UNIT-III: NORTHROP FRYE (Archetypal Criticism): The Archetypes of Literature

UNIT-IV: (A) EDWARD SAID (Postcolonial Theory): Orientalism (Introduction)

(B) JACQUES DERRIDA (Postmodernism/Deconstruction Theory) Structure Sign and Play in the Discourse of Human Sciences

UNIT-V: (A)*ELAINE SHOWALTER (Feminist Theory): Towards a Feminist Poetics

(B) BHARATA MUNI (Sanskrit Criticism): On Natya and Rasa (Translated by G.K. Bhatt)

***Detailed study**

Outcomes:

To make students learn the vast domain of contemporary critical schools

To make students aware of the Indian schools of criticism, especially the Sanskrit criticism

To empower students with the ability to apply critical theories to literary texts.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	02			02		01			02	03		

GREEN CULTURAL STUDIES			
3a:403(A)	Generic Elective	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

- To make the learners comprehend the fusion of literary and ecological studies.
- To sensitise the learners on ecological issues.
- To familiarize them with the Indian and western ecological though.t
- To make students think beyond western romanticism.
- To broaden their understanding of literature and culture.

BACKGROUND: Green Studies, Eco Feminism, Eco Materialism, Ecosophy, Environmental Crisis, Literary Ecology, Postcolonial Ecology.

UNIT I: (a) GLOTFELTY: Literary Studies in an Age of Environmental Crisis*

(b) RABINDRANATH TAGORE: Religion of the Forest *

UNIT II: (a) BHOOMI SUKTA: Atharva Veda 12.1

(b) WORDSWORTH: Prelude: Book I

UNIT III: (a) HENRY DAVID THOREAU: Walden

UNIT IV: AMITAV GHOSH: The Great Derangement

UNIT V: KESAVA REDDY: Moogavani Pillanagrovi: Ballad of Ontillu

Outcomes:

- Learners become aware of Indian and western attitudes to green cultural studies.
- Critically analyze western tools.
- Understand the antiquity of Indian thought and its sanctity.
- Appreciate Indian and western literary creativity on Nature.
- Understand the aftermaths and trauma of ecological devastation, and its literary representations.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	02			02		01			02	03		

AWARD WINNING WORKS AND WRITERS			
3b:403(B)	Generic Elective	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

To introduce the students to the stalwarts of English Literature;

To inculcate in the students, a taste of literary classics,

To make students appreciate the eternal values of great literature.

BACKGROUND: Nobel Prize, Pulitzer Prize, Booker Prize, Sahitya Akademi Prize, Existential fiction, American Drama, Post Colonial writings of India.

UNIT I: The Nobel Prize for Literature - Albert Camus: PLAGUE (1957) (Fiction)

UNIT II: Rabindranath Tagore: Gitanjali (1930) (Poetry)*

UNIT III: The Pulitzer Prize Arthur Miller Death of a Salesman (1949) (Drama)

UNIT IV: Booker Prize Aravind Adiga White Tiger (2008) (Fiction)

UNIT V: SāhityaAkademi Awards

UNIT IV: ShashiTharoor An Era of Darkness (2019) (Prose)

Outcomes:

The Student appreciates award winning literary works/writers

The student is aware of the various literary awards

The student appreciates the greatness of literary creativity across cultures

The students develop artistic models of great literary creativity

The students appreciate the diversity and unity among great literary creations across nations and times.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	02			02		01			02	03		

SUBALTERN STUDIES			
:403(C)	Generic Elective-4(a)	**5L:1T:0P**	**Credits:4**

Internal Marks: 20	End Semester Examination Marks:80

Objectives: The aim of this course is to understand

- The concepts like dalitism, feminism, marginalisation, and Subalterneity
- The poetic representations of pains and pleasures of subaltern with the help of prescribed texts
- The status of subaltern women and their convictions through the texts prescribed
- The first hand information of the subaltern in the form of autobiographical narration

UNIT – I: BACKGROUND: Dalitism, Feminism, Marginalism, Minority Literature

UNIT – II: POETRY: Detailed study

(A) ENDLURI SUDHAKAR (T.R. SHANTA GOKHALE): Neelika

(B) L. S. ROKADE (T.R. SHANTA GOKHALE): To Be or Not To Be Born

(From Arjun Dangle's Poisoned Bread, from The Oxford Anthology of Tamil Dalit Writing)

UNIT – III: FICTION- MAHASWETHADEVI: 1. Rudali, 2. Dropdi

UNIT – IV: AUTOBIOGRAPHY- VASANTH MOON: Growing Up Untouchable in India

UNIT – V: DRAMA-K. ENOCH: Munivahanudu

Primary & secondary sources

ELEANOR ZELLIOT: From Untouchable to Dalit (MANOHAR, NEW DELHI, 1998)

GAIL OMVEDT: Dalits and the Democratize Revolution, (Sage Publications, New Delhi, 1994)

ARJUN DANGLE ed: Poisoned Bread (Orient Longman, Bombay, 1992)

RAJ KUMAR: Dalit Personal Narratives (Orient Black Swan, New Delhi, 2010)

RAVI KUMAR &

R. AZHAGARASAN ED: The Oxford India Anthology of Tamil Dalit Writing. (Oxford University Press, New Delhi, 2012

Gail Omvedt - Dalits and the Democratic Revolution

Raj Kumar – Dalit Personal Narratives (Reading Caste, Nation and Identity)

Ravikumar & R.Azhagarasan – The Oxford India Anthology of Tamil Dalit Writing

Outcomes: With the completion of the course the students are able to

- Know the concepts of dalitism, feminism, marginalism and Subaltern aspects with relevant theories
- Appreciate and understand the struggles and sorrows of subalterns
- Recognize the pitiable docketing marginalized status of women
- Identity the struggles of subalterns in the society along with personal observation
- Know the pains of subalterns through the first hand narration

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01					04	02	03	05			

CULTURAL STUDIES	
3d:403(D)	Generic Elective-4(a)
Internal Marks: 20	**End Semester Examination Marks:80**

Objectives:

- Students gain knowledge in contemporary concepts of Cultural Studies
- To enable students to receive advanced knowledge of the concepts
- To enhance students critical thinking ability
- To broaden the students' understanding & appreciation of culture

Background:

- Cultural Studies
- Post colonialism
- Postmodernism
- Indian Cultural Theory
- Marxist Literary criticism

UNIT – I: ANAND K COOMARSWAMY: The Aims of Indian Art

UNIT – II: STUART HALL : Cultural Studies & its Theoretical Legacy

UNIT – III: RAYMOND WILLIAMS : Advertising: The Magic System

UNIT – IV: FRANTZ FANON : On National Culture

UNIT – V: MARARAND PARANJAPE : Postmodernism and India: Some Preliminary Anima Diversions

Outcomes:

- The student gains both the basic and advanced knowledge in the domain
- The student understands Cultural criticism across age & cultures
- Students are made familiar with Cultural Theory & theorists
- The learners enhance a critical knowledge of literary and non-literary texts
- A critique of pure theory emerges on completion of the course

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01		02	04		03						05

INDIA AND LITERARY CREATIVITY			
4:404	Multi Disciplinary Course	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

PREREQUISITE OR KNOWLEDGE REQUIREMENT FOR THE COURSE: Student should have taste for appreciating literature, creativity and the arts.

Objectives of the course: (CO's)

- To promote a taste for literary creativity in Indian Languages
- To inculcate a love for literary etudes
- To gain a comparative knowledge of Indian Literatures
- Knowledge of Data base and online resources for reading and research.

Course learning out comes (CLO's)

After completion of the course the students will be able to

CLO-1: Understand the antiquity of India literary creativity

CLO-2: Perceive literary creativity across various Indian language

CLO-3: Develop the concept of unity amidst the plethora of Indian creative literatures

CLO-4: Familiarize and use with deftness, online resources and database to further their knowledge/research skills

UNIT I: SANSKRIT - Kalidasa's Meghadootam (Poetry)

UNIT II: TELUGU - Gurajada Appa Rao's Kanya Sulkam transl. in English by Velcheru Narayana Rao Girls for Sale Penguin India 2011. (Drama)

UNIT III: HINDI - KABEER DAS (Poetry)

- Introduction of Kabeer Das
- Following 5 DOHE (Couplets) of Kabeer Das:
- Poti padhi padhi jag mua …….
- Guru govind dou
- Mati kahe kumhar se ……..
- Dukh me sumiran sab kare ……
- Sayee itana dijiye …..

URDU - MIRZA GHALIB

- Introduction of Mirza Ghalib

- The following Ghazal of Mirza Ghalib: Koi Ummid bar nahin ati
- Koi Surat Nazar nahin ati

UNIT IV: ENGLISH - RABINDRANATH TAGORE'S Sacrifice (Drama)

UNIT V: DIGITAL LIBRARY AND E-RESOURCES

Introduction to Digital Libraries – Concepts
Evolution of Digital Libraries - National Digital Library of India World Digital Libraries
E- Resources for Languages – E Books, E-Journals, E-Databases, E-Theses

Recommended books

UNIT I: SANSKRIT: Suggested Translations: (Any One would suffice)

- Meghadootam Translated by Chandra Rajan, Sahitya Akademy
- Translation by John Holcombe: http://www.textetc.com/exhibits/et- kalidasa-1.html

BACKGROUND: Introduction and importance of Kalidasa in Sanskrit Literature Date of Kalidasa – works of Kalidasa - style and eminence of Kalidasa Text:

Reference books:

- A short History of Sanskrit Literature. Pages.63 to 85, Hans Raj Aggarwal, Munshi Ram ManoharLal, Oriental Publishers and Booksellers, Post Box No1165, New Delhi – 6

UNIT II: TELUGU: Gurajada Appa Rao's Kanya Sulkam transl. in English by Velcheru Narayana Rao Girls for Sale Penguin India 2011.

UNIT III: HINDI and **URDU**

Reference books / links:

- Hindi: http://www.scribd.com
- Urdu: "The Famous Ghalib by Ralph Russell Roli Books Pvt. Ltd. M-75, GK II Market, New Delhi

UNIT IV: ENGLISH: RABINDRANATH Sacrifice (Text)

UNIT V: DIGITAL LIBRARY and E RESOURCES:

Recommended books

- Michael, Lesk. Understanding Digital libraries. Elsevier, 2005.
- Jeevan, V.K.J. E-Resources and Digital Services: ESS ESS Publications, 2011
- Gobinda, G. Chowdhury and Sudatta Chowdhury. Introduction to Digital Libraries. Facet Publishing, 2003.

Reference books / links:

- Hindi: http://www.scribd.com
- Urdu: "The Famous Ghalib by Ralph Russell Roli Books Pvt. Ltd. M-75, GK II Market, New Delhi

Essay questions

- Define Digital Library. Discuss in detail the evolution of digital libraries
- What do you mean by E-Resources? State the different types of e-resources available in languages.

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01	02		03	04	05						

SOFT SKILLS			
5a:405(A)	Open Elective-5	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives: The course aims to

- Introduce the significance of soft skills in modern job market
- Enhance the soft skills of the students with practice
- Develop skills like team work, time management, adoptability.
- Develop interpersonal communication of the students
- Develop essential written and spoken skills introducing the English syntax and phonetics

UNIT-1: Introduction- Teamwork skills – Emotional Intelligence skills

UNIT-II: Assertive Skills – Adaptability Skills – Problem Solving Skills

UNIT-III: Communication Skills – Introduction – Listening Skills – Oral Communication

UNIT-IV: Functional Grammar and Vocabulary

UNIT-V: Group Discussion – Interview Skills

Outcomes: On Completion of the course the students are able to

- Understand the importance and relevance of soft skills in modern life
- Improve their soft skills due to the practice sessions
- Master the skills like time management, adoptability, leadership, team work.
- Apprehend the ways of acquiring interpersonal skills
- Master the LSRW skills due to the practice sessions

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs		05					04	02			01	03

INDIAN LITERATURE IN ENGLISH TRANSLATION			
5:405(B)	Open Elective-5	**5L:1T:0P**	**Credits:4**
Internal Marks: 20	**End Semester Examination Marks:80**		

Objectives:

- To introduce the major literary work of Indian literature in English translation
- To promote the texts of out Indian authors and there by preserving Indian culture & heritage
- To introduce the relative literary concepts and theory to achieve the invocative use of language
- To instill values for morally responsible living in democratic society
- To enhance language competence

Background:

UNIT-I: *SRI SRI: To Poesy, Rhapsody, The March of History, (Translated BY SRI SRI) Forward March.

UNIT-II: TILAK: Ambrosia Dripped, Modernism & (Tr. By S.S. PRABHAKAR) Poesy, Song Immortal

UNIT-III: GURAJADA APPA RAO: Kanyasulkam

UNIT-IV: *VIJAY TENDULKAR: Silence! The Court is in Session

UNIT-V: U.R. ANANTA MURTHY: Samskara

***Detailed study**

Outcomes:

- Students become familiar with the literary works of our country
- Acquire knowledge about our country's great writers and their ideals
- Will get knowledge about the theory and concepts there by achieve literary competence
- Will learn about the morals and responsibilities
- Learn to acquire patriotism after knowing about the great literary works of our writers

MAPPING

POs	1	2	3	4	5	6	7	8	9	10	11	12
COs	01						02	03	04	05		

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF LINGUISTICS



Course

M.A. FOREIGN LANGUAGES AND LINGUISTICS

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

About the Department:

Linguistics is defined as the scientific study of Language, whether it is living or dead, old or modern, small or big. It is as interdisciplinary subject in which History, Epigraphy, Sociology, Anthropology, Psychology, Philosophy, Neurology, Speech Pathology, Physics, Mathematics, etc. are involved. The curriculum of the P.G. Programme in Linguistics of S V University has certain distinctive features. It provides emphasis to the Languages and introducing innovative subjects like: Inter Disciplinary Linguistics (Socio-linguistics etc.) and Applied Linguistics (Lexicography, Language Teaching etc.)

Vision:

- Provide a sound education in phonetics and phonology
- Transform of analyzing words, sentences and meanings
- Provide in expensive education services to the weaker section of society
- In calculate respect for languages of the world for ethical language values among students through good and experienced educational practices
- Recognizing the essential roles of language and society in the lives of citizens today and tomorrow we emphasize language literacy in our teaching and learning programmes.

Mission:

- To promote the discovery and broad communication of knowledge about the descriptive, historical, comparative , Interdisciplinary, Applied Linguistics etc.,
- To import to the students the contemporary advancements in the area of Linguistics
- To import a global prospective and such skills among students that benefits humanity in that areas.
- To develop research aptitude and a scientific advancement in that areas.
- Reinvent ourselves response to the changing demands of society with high moral values as a good citizen.

Choice Based Credit System (CBCS):

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed.

Students of this course would be expected to:

- Be able to play leading role in industry, research and the public services.
- Understand and appreciate major public concerns and issues associated with Linguistics.

- Have an understanding and grasp of international research environment where the frontiers of knowledge in Linguistics are under research;
- Be able to adapt and respond positively and flexibly to changing Circumstances.
- Develop the professional skills and personal attributes to deal with complex issues, both systematically and creatively.
- Have the capacity for individual work and teamwork.
- Be lifelong learners with intellectual and practical skills.

Department Objectives

The department is having the following objectives:

- To expose students o update curricula and to recent advances in the subject and enable the students to face NET, SET and RESET and other competitive examinations successfully.
- To create awareness among students about the latest streams of skills added in linguisticsof including subjects like ICT, Multidisciplinary Capacity building etc.,
- To improve sound, word, sentence and meaning so that the students can become familiar with linguistic field.
- To prepare students to attract and develop interest in applied linguistics areas like lexicography, translation, language teaching and language planning etc., so that the students can select linguistics as their career.
- The BOS in linguistics experts that this new framework of curriculum caters the need of enabling students of subject to accept new challenges of dynamically changing modern era.

Programme Specific Out comes

- The students understand the basic concepts of Linguistics and ability to analyze General Historical, Comparative, Interdisciplinary and Applied Linguistics Perspectives.

- The students will be exposed to alternative approaches on pronunciation, sentence Formation, dictionary making through exposure to course work in allied fields and ability to suggest and solve various Language and Linguistic problems.

Programme Objectives

Theprimaryobjectiveoftheprogrammeistoimpartqualityeducationinthesubjectof Linguistics as scientific study of languages and its applied branches to the students

- To meet the academic to applied aspects in Linguistics suited to real problems of regional and National needs
- To expose learners to frontier and thrust areas of Linguistics
- To train learners for better performance in various competitive examination and in research careers.

- To enable the learners to acquire and develop self- study habits
- To facilitate Higher education &research in Linguistics.
- To provide quality education offering skill based programs and motivate the students for self employment in applied branches of Linguistics.
- To Inculcate the spirit of resource conservation and love for nature
- Toprovidesopportunitiesforprofessionalandpersonaldevelopmentthroughcurricularandco-curricular activities.
- Provide consultancy and organize extension activities.

Programme Out comes

PO1. Engaging Language and Linguistic knowledge:

Applying the knowledge of Language and Linguistic structure

PO2. Problem Analysis:

Identify Phonetics, Phonology, Morphology and Syntax – analyze different structures

PO3. Define structures:

Identifying and difference between the structure of Phonemes, Morphemes, sentences and meanings. Identify Historical comparative Inter-disciplinary and Applied Linguistics areas.

PO4. Conduct investigation of Linguistic structures:

Users use research based knowledge and research methods including design of structures, analysis and implementing of data and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage:

Create, select, apply and usage appropriate techniques, resources and ICT tools including prediction and modeling to complex activities with an understanding of the limitations.

PO6.The Linguist and Society:

Apply reasoning informed by the contextual knowledge to access Societal, health, safety, Cultural and language issues, the consequent responsibilities relevant to the practice.

PO7. Environment and sustainability:

Understanding the impact of the professional Linguistic solutions in the Societal and environmental context and demonstrate the knowledge need for sustainable development.

PO8. Ethics:

Apply ethical principles and commit to human values and professional ethics, responsibilities, norms of the language and Linguistic practice.

PO9. Individual and Team work:

Function effectively as on individual, as a member or leader in diverse teams, in disciplinary settings. They are research works, Awareness programmes etc.,

PO10. Communication:

Communicate effectively on Linguistic activities of general, Interdisciplinary and applied areas, being able to comprehend and write effective reports, design documentation, make effective presentations give and receive clear instructions.

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PO11. Project Management and Finance:

Demonstrate knowledge, understanding of the language and Linguistic, management principles and apply these to once own work ,as a member and a leader in a team to manage projects in multi- disciplinary environments.

PO12. Life - long learning:

Recognize the need and importance of the preparation and ability to engage in independent and life -long learning in the broadest context of language and Linguistic change.

Programme Educational Objectives:

- Exposure of students to linguistics diversity and to provide tools of traditional and modern types to acquire this knowledge and skill.
- To update the syllabus essential for appearing i NET, SET, RESET and other competitive exams of UPSC and APPSC.
- To make aware the students to know the natural resources of country, to utilize by sustainable methods and conservation of Linguistic dialects.
- To develop trained and knowledge human resource for educational and research institutions and industries to use this human resource for self reliant India.
- To develop self employable ability and to apply knowledge of transcripts and dictionary makers.

The M.A. degree in Linguistics being offered by this University provides its students with a course of study that integrates a range of learning and teaching techniques relevant to their educational development and career ambitions. This Masters programme covers the latest developments in Linguistics and its specializations. It provides theoretical knowledge as well as training in intellectual skills to enable students to better understand and then solve some of the problems in this subject. Graduates in this programme will be induced into critical thinking, and would be able to solve complex problems in Linguistics. The students would also be inculcated with personal and problem-solving skills that will enhance their employability prospects. Enhanced competence of students has been the

key concern in designing and developing this syllabus. Careful thought has gone into selection of topics and setting their scope. Major areas of Linguistics like general, historical, comparative, interdisciplinary and applied linguistic areas have been included in the syllabus only after multiple rounds of thorough discussions and intensive study. Special attention has been paid to subjects like communication technology and ICT for enriching teaching and learning skills to incorporate the latest developments in these fields.

ProgrammeM.A.LINGUISTICS

CBCS Pattern (With effect from 2021-22)

The Programme of study and the Scheme of Examinations

Semester-I

S.No	Course Code	Components of Study	Title of the Course			Credit Hrs. / Week	No. of Credits	IA Marks	Sem. End Exam Marks	Total Marks
1	101	Core	1	Phonetics	Mandatory	6	4	20	80	100
2	102		2	Phonology		6	4	20	80	100
3	103		3	Morphology		6	4	20	80	100
4	104		4	Syntax		6	4	20	80	100
5	105A	Compulsory Foundation	5a	Language and Linguistics	Opt-1	6	4	20	80	100
	105B		5b	Semantics						
	105 C		5c	Structure of Language(Telugu/English)						
6	106 A	Elective Foundation	6a	Human Relations	Opt-1	6	4	20	80	100
	106 B		6b	Instructional Technology						
		Total				36	24	120	480	600
7		Audit Course		Human Values and Professional Ethics -I		0	0	100	--	--

*All Core papers are Compulsory

* Compulsory Foundation – Choose One Paper

* Elective Foundation – Choose one paper

* Audit Course – 100 Marks (Internal) – Zero Credits under self study

* Interested students may register for MOOC with the approval of the concerned DDC but it Will be considered for the award of the grade as Open elective only giving extra credits.

Semester-II

S.No	Components of Study		Title of the Course			Credit Hrs. / Week	No. of Credits	IA Marks	Sem. End Exam Marks	Total Marks
1	201:	Core	1	Historical Linguistics	**Mandatory**	6	4	20	80	100
2	202		2	Dialectology		6	4	20	80	100
3	203		3	Field Linguistics		6	4	20	80	100
4	204		4	Language Families of India and Comparative Dravidian		6	4	20	80	100
5	205 A	Compulsory Foundation	5a	Language Contact	**Opt-1**	6	4	20	80	100
	205 B		5 b	Natural Language Processing						
	205 C		5c	Endangered Languages						
6	206 A	Elective Foundation	6a	Literacy, Language Curriculum and Testing	**Opt-1**	6	4	20	80	100
	206 B		6 b	Communication Technology						
		Total				36	24	120	480	600
7		Audit Course	Human Values and Professional Ethics -II			0	0	100	--	--

*All Core papers are Compulsory

*Compulsory Foundation – Choose one paper

*Elective Foundation – Choose one paper

*Audit Course – 100 Marks (Internal) – Zero Credits under self study

* Interested students may register for MOOC with approval of the concerned DDC but it will be Considered for the awarded of the grade as open elective only giving extra credits.

for the award of the grade as pen elective only giving extra credits.

Semester-III

S.No.	Course Code	Components of study	Title of the Course			Credit Hours /Week	No. of Credits	IA Marks	Sem. End Exam Marks	Total Marks
1	301	Core	1	Language Acquisition and Child Language Development	Mandatory	6	4	20	80	100
2	302		2	Language Disorders and Speech Pathology		6	4	20	80	100
3	30A	Generic Elective	3a	Socio-linguistics	Opt-2	6 6	4 4	20 20	80 80	100 100
	303B		3b	Psycho-linguistics						
	303C		3c	Neuro-linguistics						
	303D		3d	Computational Linguistics						
4	304	Skill Oriented Course	4	ICT for Enriching Teaching and Learning Skills	Mandatory	6	4	20	80	100
5	305A	Open Elective	5a	Bilingualism	Opt-1	6	4	20	80	100
	305B		5b	Mass Media Communication						
	Total					36	24	120	480	600

* All Core papers are Mandatory

* Generic Elective – Choose Two papers

* Skill-Oriented Course is Mandatory

* Open Electives are for the Students of other Departments. Minimum One paper should be Opted. Extra Credits may be earned by opting for more number of Open Electives depending on the interest of the student through self study

* Interested students may register for MOOC with the approval of the concerned DDC

Semester-IV

S.No	Course Code	Components of Study	Title of the Course			Credit Hrs./ Week	No. of Credits	IA Marks	Sem. End Exam Marks	Total Marks
1	401	Core	1	Language Universals and Linguistic Typology	Mandatory	6	4	20	80	100
2	402		2	Research Methodology		6	4	20	80	100
3	403A	Generic Elective	3a	Lexicography	Opt-2	6	4	20	80	100
	403B		3b	Language Teaching		6	4	20	80	100
	403C		3c	Language Planning						
	403D		3d	Translation						
4	404	Multidisciplinary Course	4	Multidisciplinary Capacity Building	Mandatory	6	4	20	80	100
5	405A	Open Elective	5a	Branches of Linguistics	Opt-1	6	4	20	80	100
	405B		5b	Dictionary Making						
	Total					36	24	120	480	600

* All Core papersare Mandatory

* Generic Elective – Choose Two papers

* Multidisciplinary Course is Mandatory

* Open Electives are for the Students of other Departments. Minimum One paper should beOpted.Extra Credits may be earned by opting for more number of Open Electives depending on the interest of the student through self study.

*Interested students may register for MOOC with the approval of the concerned DDC

Core **LING:101 PHONETICS**

Objectives:

1. To understand the process of Communication and speech production, Classification and four procedures of speech production.
2. To analyze production of consonants and vowels.
3. To understand expressing secondary and double articulations and prosodic features.

Unit – I

The process of Communication: Speech production (Articulatory Phonetics), Speech transmission (Acoustic Phonetics), and Speech perception (Auditory Phonetics).

Unit – II.

The four processes of speech production: Air stream process: pulmonic, glottallic and velaric ;egressive and ingressive air streams, phonation process (State of the Glottis) Oral – Nasal process (position of the velum), articulatory process.(Consonant and Vowel production); Classification of speech sounds and their description; Consonants, Vowels and Diphthongs.

Unit – III.

Consonant production: Where a consonant sound is made (place of articulation), how it is made (degree of strictures and manner of articulation) and the state of the glottis (Voiced, unvoiced, etc.), stop consonants (Plosives, obstruents, implosives, clicks), types of closure and release. Affrication, aspiration etc.

Unit – IV.

Vowel production: Which part of the tongue is raised (front, back, central), how **m**uch it is raised (high or close, low or open, etc.,) and whether the lips are rounded (rounded vs. unrounded), Monopthongs vs. diphthong, various types of diphthongs.

Unit – V.

Secondary and double articulations: labialization, palatalization, velarization and pharyngealization and other secondary articulations: labio-velar, labio-palatal etc.,Prosodic or Suprasegmental or dynamic features: Length (quantity), Stress (accent), Tone and Intonation (speech melody or pitch variation), Juncture (pause), Voice quality.

Note: Practical classes on the topics: Listening tapes, recognizing the sounds, production of the sounds, and phonetic transcription.

Suggested Readings:

1. Abercrombie, D. 1967. **Elements of general phonetics**. Edinburgh. dinburgh University Press
2. Ladefoged, P. 1975. **A Course in phonetics**. New York. Harcourt Brace and Jovanovic.
3. O'Conner, J.D. 1973. **Phonetics.** Penguin Books Ltd.
4. Bloomfield, L. 1933**. Language**.NewYork.Hol& Rinehart and Winston.
5. Catford, J.C. 1989. **A practical introduction to phonetics**. Oxford. Clarendon Press.
6. Leiberanan, Philip & Blumstein, Sheila, E. 1991. **Speech perception and Acoustic phonetics.** London, Cambridge University Press.

7. O'Grady, William; et al. (2005). **Contemporary Linguistics: An Introduction** (5th ed.). Bedford/St. Martin's. ISBN 0-312-41936-

8. Stearns, Peter; Adas, Michael; Schwartz, Stuart; Gilbert, Marc Jason (2001). **World Civilizations** (3rd ed.). New York: Longman. ISBN 9780321044792.

Course Out Comes:

After completion of the course students will be able to

1. Understand the process of Communication and speech production, Classification and four procedures of speech production.
2. Analyze production of consonants and vowels.
3. Understand expressing secondary and double articulations and prosodic features.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2			3					3		3
CO2	2		3		2					1		2
CO3	2		3							2		2

LING:102 Phonology

Objectives:

1.To understand concept of Phoneme, Principals of Phonemic analysis and discovery procedures.2 .To analyze phonemes, Phonological systems and procedures of phonemics.

3. To analyze basic units of Phonology and concept of redundancy.

Unit – I

Phoneme: Concept and definition. Different aspects of the phoneme, Phonetic, Phonological, psychological, etc.Principles of phonemic analysis, the concepts of opposition, Contrast, minimal pair, distribution (Complementary, Free variation), Phonetic similarity, neatness of pattern (or pattern congruity of symmetry) and economy.Discovery procedures.

Unit –II.

The distinction between phone, phoneme and allophone: relation between Phonetics and Phonology. Types of phonemes, Types of phonological systems.Problems in phonology and phonological analysis; vowel and consonant systems, Suprasegmentals system, under lying representation, phonological rules.

Unit–III.

Phonemic premises and procedures: (a) Modification of sound by environments analogous, identical and mutually exclusive. (b) Phonetic symmetry of sound systems; (c) Fluctuation of sounds and (d) Structural pressure on the interpretation of segments and/or sequences of segments. Alternative solutions in Phonemic analysis. Distinctive feature theory: binary vs. nonbinary features, articulatory vs. acoustic features; Universal set of phonetic features.

Unit–IV.

Basic units of Phonology: Syllable, vowel and consonant. Macro segment and Micro segment, syllable peak, coda, onset and interlude, problems of demarcation of syllable boundary.

Unit- V

Phonological system (as set of items, phonemes) and structure (the permissible arrangement of consonant and vowel phonemes, constraints on combinations etc.). The concept of redundancy.

Suggested Readings:

1. Hocket, C.F. 1958. **A course in Modern Linguistics**. New York. Macmillan and Co.
2.Hymn, Larry, M. 1975. **Phonology: Theory and analysis**. New York. Holt Rinehart and Winston.
3.Jakobson, R & M. Halle. 1956. **Fundamentals of Language**. Part – I. Hague. Mouton & Co.
4. Pike, K.L. 1947. **Phonemes: A technique for reducing language to writing**. University of Michigen Press.
5. Vackek,J. 1966. **The linguistic school of Prague: An introduction to its theory and practice.** In the Prague school Reader in Linguistics.

6. Fudge, Eric. C. 1973. **Phonology; selected Readings**. London. Penguin.
7. Lass, Roger. 1991. Phonology: **An introduction to Basic Concepts**. London. Cambridge University Press.

Course Out Comes:

After completion of the course students will be able to

1.Understand concept of Phoneme, Principals of Phonemic analysis and discovery procedures.2 .Analyze phonemes, Phonological systems and procedures of phonemics.

3. Analyze basic units of Phonology and concept of redundancy.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	2		3		3			1		2
CO2	1	3							3			1
CO3	1		3		2				2			2

LING:103 Morphology

Objectives:

1. To analyze Morpheme, classification and types of morphemes
2. To analyze derivation, inflection, different models of grammatical description and Morpho - Phonemics
3. To express Intermediate constituents, types of constructions and Idioms.

Unit – I.

Morpheme as a unit of linguistic structure, criteria for identifying morpheme, Allomorph, Zero morph, Empty morph, Portmanteau morph, unique morpheme.

Unit –II

Classification of morphemes. Types of morphemes: free and bound, root, stem and suffix: word and compound.

Unit–III

Derivation and inflection, Different models and grammatical description.Item and Arrangement.Item and Process and, word and paradigm.

Unit–IV

The concept of morpheme, Relationship between morpheme and phoneme, morphophonemic alternations.Internal and external sandhi.Automatic and non- Automatic alternation, regular and irregular alternation; base form. Phonologically conditioned and morphologically conditioned alternation, morphology in generative frame work.

Unit –V

Immediate constituents: Morphological and syntactic. Types of ICs and markers, construction types endocentric and exocentric, syntactic linkage, word classes, parts of speech and grammatical categories. Idiom formation, types of Idioms.

Suggested Readings:

1..Hocket, C.F. 1958. **A course in modern linguistics**. York. Macmillan and Co.

1. Mathews, P.H. 1974. **Morphology**. Cambridge. Cambridge University Press.
2. Elson, B. &Pickelt, V. 1969. **An introduction to Morphology and Syntax**. California, Summer Institute of Linguistics.
3. Nida, E.A. 1946. **Morphology**. Ann Arbor. Michigan University Press.
4. Langacker, Ronanld W. **Fundamental of Linguistics Analysis**. New York. Harcourt Brace Jovanovich, Inc.
5. Joos,M. (ed.). 1957. **Readings in Linguistics**. Chicago University Press.
6. Bauer, Laurie. (2003). **Introducing linguistic morphology** (2nd ed.). Washington, D. Georgetown University Press. ISBN 0-87840-343-4.
7. Bauer, Laurie. (2004). **A glossary of morphology**. Washington, D.C.: Georgetown UP.

8.Bubenik, Vit. (1999). **An introduction to the study of morphology**. LINCON Coursebooks in linguistics, 07. Muenchen: LINCOM Europa. ISBN 3-89586-570-2.

Course Out Comes:

After completion of the course students will be ableto

1. Analyze Morpheme, classification and types of morphemes
2. Analyze derivation, inflection, different models of grammatical description and Morpho-Phonemics
3. Express Intermediate constituents, types of constructions and Idioms

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	3	1			3			2		2
CO2	2		3	2					1			3
Co3	2				3					1		3

LING:104 Syntax

Objectives:

1. To understand assumptions about language, components of grammar and sentence constituents
2. To analyze Phase structure rules, X-bar Notation and grammatical transformations
3. Understand categorical, sub-categorical information and selectional restrictions

Unit - I

Assumptions about language and grammar: Particular and Universal grammar;Adequacies of grammar-observational, descriptive and explanatory;Differencesbetween competence and performance, well formed ness and acceptability, intuition.

Unit- II

Grammar and its components-syntactic, semantic and phonological. Base structures and surface structures. Sentence and its constituents

Unit–III

Phrase structure rules and phrase markers, intermediary categories and the X – bar notation.Transformational component: Wh-movement, Np-movement.

Unit–IV

Categorical and sub categorical information: Partially and fully specified entries, selectional restrictions.

Unit - V

Grammatical transformations: Reflexivization, relativization, Extraposition, Equi- NP deletion, Coordination, Passivization, Pronominalization.

Suggested Readings:

1. Chomsky, N. 1965. **Aspects of the theory of syntax**. Cambridge. MIT Press.
2. Verma, S. K. and Krishnaswamy, N. 1998. **Modern Linguistics: An Introduction**. New Delhi. Oxford University Press.
3. Isaac, Chechamma. 1974. **An Introduction to the theory of Transformational Grammar.** Trivandrum. College Book House.
4. Raford, A. **Transformational Grammar: A first course**.
5. Radford, A. **Transformational syntax**.
6. Brown, Keith; Jim Miller (eds.) (1996**). Concise Encyclopedia of Syntactic Theories**. New York: Elsevier Science. *ISBN 0-08-042711-1*.
7. Carnie, Andrew (2006**). Syntax: A Generative Introduction** (2nd ed.). Oxford: Wiley-Blackwell. *ISBN 1-4051-3384-8*.

Course Out Comes:

After completion of the course students will be ableto

1.Understand assumptions about language, components of grammar and sentence

constituents

2. Analyze Phase structure rules, X-bar Notation and grammatical transformations
3. Understand categorical, sub-categorical information and selectional restrictions

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2		3	3								1
CO2	2				1		3					2
CO3	3		1						3			2

Compulsory Foundation

LING:105ALanguage and Linguistics

Objectives:

1. To understand notions of language and Approaches to the study of languages
2. To analyze structure of language and grammatical analysis.
3. To understand Linguistics and other fields.

Unit-I

Notions of Language: Language as Written Text-Philosophical and Literary notions; Language boundary, Dialect and Language; Language in spoken and written modes; Writing System.

Unit-II

Approaches to the study of languages: Semiotic approaches; use of language in family, Community and country; language as a system of communication; sign language; Features of language.

Unit-III

Structure of language: Philological, Morphological, Syntactic and Semantic lends and their interrelations. Synchronic vs Diachronic; Classification of Languages; Concepts of Language & People, idiolect and language.

Unit-IV

Grammatical Analysis: Notions of contrast and complementation; Paradigmatic and Syntagmatic relations; Notions of word classes and grammatical categories; Grammatical relations and case relations; notion of rule at different levels; description vs. explanation of grammatical facts.

Unit-V

Linguistics and Other Fields: Relevance of linguistics to other fields of enquiry- Philosophy, Anthropology, Sociology, Political Science, Psychology, Education, Computer Science and Literature.

Suggested Readings:

1. Akmajian, Adrian; Demers, Richard; Farmer, Ann; Harnish, Robert (2010). **Linguistics: An Introduction to Language and Communication**. Cambridge, MA: The MIT Press. ISBN 0-262-51370-6.
2. Crystal, David (1990). **Linguistics**.Penguin Books. ISBN 9780140135312.
3. Chomsky, Noam (1957). **Syntactic Structures**. The Hague: Mouton.
4. Agha, Agha (2006**). Language and Social Relations**.Cambridge University Press.
5. Bloomfield, Leonard (1914). **An introduction to the study of language**. New York: Henry Holt and Company.
6. Hocket, C.F. 1958. **A course in modern linguistics**. York. Macmillan and Co.
7. The **Handbook of Linguistics**. Blackwell.

Course Out Comes:

After completion of the course students will be ableto

1. Understand notions of language and Approaches to the study of languages
2. Analyze structure of language and grammatical analysis.
3. Understand Linguistics and other fields

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	2	2							2	2
CO2	3	1	2	2	3						1	2
CO3	2		3		2		2				1	3

LING:105B Semantics

Objectives:

1. To understand Nature and Scope of Semantics and types of meaning
2. To analyze lexical structure and Meaning and sentence structure and meaning
3. To understand Lexical context of Meaning and Theories of Meaning

Unit – I

Nature and scope of Semantics.The terms Semantics and Meaning.Linguistic and non-Linguistic contexts of meaning.Types of meaning.

Unit –II

Lexical structure and meaning: Componential analysis and its limitations, sense and reference, polysemy, Hyponymy, Homonymy, antonymy, synonymy. Lexical semantics.

Unit–III

Sentence structure and meaning: Grammar and Lexicon, word and sentence. Projection rules, ambiguity, person and deixis.

Unit–IV

Linguistic context of meaning: context as meaning, collocation, idioms, Lexical and glossal meaning. Meaning interaction.

Unit – V

Mental Lexicon, presupposition and implication, Entailment and inconsistency, Tautology and contradiction, Generative and interpretative theories of meaning.

Suggested Readings:

1. Palmer, F.R. 1976.**Semantics: A new out line**. London. Cambridge University Press.
2. Stephen Ullmann. 1962**. Semantics: An introduction to the science of meaning**. Oxford. Basil Blackwell.
3. Stephen Ullmann. **The principles of semantics**. Oxford. Basil Blackwell.
4. Thakur,D. 1999**. Linguistics simplified: Semantics**. Patna. BharatiBhawan publishers.
5. Steinberg, D.D. and Jakobovits, L.A. 1971. **Semantics**. Cambridge. Cambridge University Press.
6. Jackendoff, Ray; **Semantic Structures,** MIT Press, Cambridge, MA, 1990
7. Cruse, D.; **Lexical Semantics,** Cambridge University Press, Cambridge, MA, 1986
8. Nerbonne, J.; **The Handbook of Contemporary Semantic Theory** (ed. Lappin, S.), Blackwell Publishing, Cambridge, MA, 1996
9. Cruse, Alan; **Meaning and Language: An introduction to Semantics and Pragmatics,** Oxford Textbooks in Linguistics, 2004

Course Out Comes:

After completion of the course students will be able to

1. Understand Nature and Scope of Semantics and types of meaning
2. Analyze lexical structure and Meaning and sentence structure and meaning
3. Understand Lexical context of Meaning and Theories of Meaning

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3			2		3						2
CO2		2	3				3					1
CO3		3			3				2	3		2

LING: 105C Structure of Language(Telugu/English)

Objectives:

1.To understand characteristics of language(Telugu/English)

2. To understand Phonology and Morpho- phonemics in language(Telugu/English)

3. To understand Morphology and Syntax of language (Telugu/English)

Unit-I

General typological characteristics of Language Social and regional dialects of Language.

Unit-II

Phonology: Phonemes :Segmentals; suprasegmentals; syllable structure, Phonotactics, Phonological patterns;

Unit-III

Morpho Phonemics: morpheme structure,rules,general morphophonemic process – vowel and consonantal Sandhi.

Unit-IV

Morphology:Words and word classes Grammatical categories Inflectional, derivational and word formation.

Unit-V

Syntax: Word order, classification of sentences – simple, compound and complex, agreement.

Suggested Readings: (For Structure of Telugu)

1. Krishnamurthy, Bh. And JPL Gwynm. 1985. A grammar of Modern Telugu.Madras,Oxford University Press
2. ----------1957.Sandhi in modern colloquial Telugu.Indian Linguistics. 17.
3. ---------- 1968 Compound verb in Telugu Indian Linguistics (supplement)
4. Nagamma Reddy,K.1979.Problems of syllable division in Telugu, Dept. of Linguistics. Edinburgh University.
5. Rama Rao, C. 1999.telugu Vaakyam.Hyderabad.Andhra Pradesh SahityaAkademi.

Suggested Readings: (For Structure of English)

1. Hudson, Richard . 1998.**English Grammar**. London and New York: Routledge.
2. Given,T.1993. **English Grammar: a Function – Based Introduction**. Amsterdam/Philadelphia: John Bengamin publishing Company
3. Halliday, M.A.K. 1989. **Spoken and written Language**. Oxford: Oxford University Press.
4. Crystal, David. 1997. English Barbar, Charles. 1993. **The English Language - A historical introduction**. Cambridge. Cambridge University Press.
5. *Aarts, Bas (2011).* ***Oxford Modern English Grammar****. Oxford University Press.*ISBN 978-0-19-953319-0.

Course Out Comes:

After completion of the course students will be ableto

1. Understand characteristics of language(Telugu/English)
2. Understand Phonology and Morpho- phonemics in language(Telugu/English)
3. Understand Morphology and Syntax of language (Telugu/English)

CO-PO Mapping

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3		2				1			2
CO2	3		3		2					1		2
CO3	3		3		2				1			2

Elective Foundation

LING:106A Human Relations

Objectives:

1.To understand the introduction of Human Relations

2. To Analyze factors effecting Human Relations and Human Relations Skills

3. To understand Human Relations theory of management and industrial relations.

Unit-I

Introduction of Human relations Concept of Human relations – Examples of Human relations – What is Human relations and why is it important, personality values, attitudes perception, heredity, self estem,self efficiency, self image.

Unit-II

Factors affecting Human relations: Nature of human relations, The main characteristics of Human relations, Factors affecting Human relations – a) Individual b) workgroup c)Leader d) work environment e) Society, Impact of Technology.

Unit-III

Human Relation Skills: Communication, empathy, conflict resolution, Multi tasking, organization, negotiation, stress management

Unit-IV

Human relations - Theory of Management: What is Human relations theory? elements of Human relations theory, who are the primary contributors to Human relations theory

Unit-V

Industrial relations – Behavioral relations: Conceptions of the Manager, Specialized Management participative management, Responsibility to the worker, laisseze faire (Protestant Ethic), paternalism Responsibility to the community (develop public relations) Training and promotion.

Suggested Reading:

1. Baker Library (n.d) the Human Relations Movement: Harvard.htts://www.library.hbs.edu/hc/hawthorne/
2. Black,JS&Bright,DS (2019),Organizational Behaviour,OpenStox
3. Bright DS., & Cortes AH(2019) Principals of Management, OPenStox
4. Gitman,L.J.McDamel c., Shak A, Reece M, Kuffel L, Talsma B & Hyatt JC (2018) Instruction to Business, Open stocks
5. RadhaKrishna,Gali&NukalaSubbarayudu – Human Relations; SRK Publications,Tirupati,2021
6. SprielmanRM,Jenkins,WJ&Lovett,MD (2020) Psycholopsy 2e. Open Stox

Course Out Comes:

After completion of the course students will be ableto

1. .To understand the introduction of Human Relations
2. 2. To Analyze factors effecting Human Relations and Human Relations Skills
3. 3. To understand Human Relations theory of management and industrial relations.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3		2	1		3				2
CO2		2	3			1		3				2
CO3	2		3			1		3				1

LING: 106B Instructional Technology

Objectives:

1.To understand introduction of IT and types of IT in class room

2.To Analyze IT in Teaching and Learning and improvement of IT learning process

3.To understand IT in Educational Platforms

Unit-I

Introduction of Instructional Technology (IT) : Meaning of IT, Nature of IT, Definition of IT, Scope of IT, Characteristics of IT, Importance of IT

Unit-II

Types of IT in class room: Black Board, Over Head Projectors, Slide Projectors, Computers, LCD Projectors, Cam Coders, Digital Cameras, Design and Create Instructional material, Integration of Technology.

Unit-III

IT in Teaching & Learning: Virtual or On-line learning, offline learning, blended learning, use of digital resources, portfolio, affect of class rooms merits and de merits of IT, Role of IT.

Unit-IV

Improvement of IT Learning Process: Role of Technology in Modern classroom, uses of IT, Collaborative learning, cooperative learning, real time feed back, Instructional design.

Unit-V

IT in Education Platforms: SAMR (Substitution, Augmentation, Modification and Redefinition) frame work, Mimio studio (interactive white board Technology) ISTE (International Society of Technology Education). Google Fundamental Training,Remote Learning Environments.

Suggested Readings:

1. Kurt,S, Educational technology, An Overview in Educational Technology, November,18,2015, Retrived from https://educational technology.net/educational-technology-an- overview
2. NIKcholas Proven Zano – The complete Guide to ever note in Education
3. Tom Whitby Steven W Underson – Connectedness empowers learning
4. Corrianderson etc., Inclusive Language Education and Digital Technology
5. James B & Kirk Patrick Four levels of Training evaluation
6. Narvy Smokey and R Damels The Curious classroom
7. Mark Bames – Teaching the eye student
8. Heioi Hayes Jacobs – Curriculum 21st essential educaton for changing world.
9. RadhaKrishna,Gali&NukalaSubbarayudu – Instructional Technology; SRK Publications, Tirupati,2021

Course Out Comes:

After completion of the course students will be able to

1.Understand introduction of IT and types of IT in class room

2. Analyze IT in Teaching and Learning and improvement of IT learning process

3.Understand IT in Educational Platforms

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1		2		3			1	2			2
CO2	3				3			1				1
Co3	2			2	3			1	3	3		2

Audit Course

LING:107 Human Values and Professional Ethics – I

Objectives:

1.To understand Ethics and its relation and Ethical values.

2.To understand Nature of values and individual Society

3.To understand Bhagavad Gita, Buddhism, Jainism etc., and crime and theories of punishment

Unit-I

Definition and Nature of Ethics – Its relation to Religion, Politics, Business, law, Medicine and Environment.Need and Importance of Professional Ethics – Goals – Ethical Values in various Professions.

Unit-II

Nature of Values – Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts –right, ought, duty, character and Conduct

Unit-III

Individual and Society:Ahimsa (Non-Violence),Satya (Truth), Brahmacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues) – Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberatin).

Unit-IV

Bhagavad Gita – (a) Niskama Karma. (b) Buddhism – The Four Noble Truths – Aryaastangamarga, (c) Jainism – mahavratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.

Unit-V

Crime and Theories of punishment- (a) reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Suggested Readings:

1. John S Mackenjie: A manual of ethics
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D.lrwin Inc.
3. “Management ethics – integrity at work” by Joseph A. Petrick and John F.Quinn,Response Books: New Delhi
4. “Ethics in Managemnt” by S.ASherlekar, Himalaya Publishing House
5. Haarold H. Titus:Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu DharnaSastra or the Institute of Manu:Comprising the Indian System of Duties: Religious and Civil(ed) G.C.Haughton
10. SusrutaSamhita:Tr.KavirajKunjanlal,KunjalalBrishagratha, Chowkamba,Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20,21-32 and 74-77 only

11. CharakaSamhita: Tr.Dr.Ram Karan Sarma and VaidyaBhagavan Dash, ChowkambhaSaskrit Series office, Vaaranasi I,II,III Vol I PP 183-191
12. Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning 2001
13. Analyzing Moral Issues, Judith A.Boss, Mayfield publishing Company,1999
14. An Introduction to pplied Ethics (Ed.) John H. Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderbad.

I6C.Sharma Ethical Philosphy of India.Nagin&coJndhar.

Course Out Comes:

After completion of the course students will be ableto

1.Understand Ethics and its relation and Ethical values.

2.Understand Nature of values and individual Society

3.Understand Bhagavad Gita, Buddhism, Jainism etc., and crime and theories of punishment

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3					2		3	3			3
CO2	3						2	3	3			3
CO3	3					3		3	2			3

Semester-II

S.No	Components of Study		Title of the Course			Credit Hrs. / Week	No. of Credits	IA Marks	Sem. End Exam Marks	Total Marks
1	201:	Core	1	Historical Linguistics	**Mandatory**	6	4	20	80	100
2	202		2	Dialectology		6	4	20	80	100
3	203		3	Field Linguistics		6	4	20	80	100
4	204		4	Language Families of India and Comparative Dravidian		6	4	20	80	100
5	205 A	Compulsory Foundation	5a	Language Contact	**Opt-1**	6	4	20	80	100
	205 B		5 b	Natural Language Processing						
	205 C		5c	Endangered Languages						
6	206 A	Elective Foundation	6a	Literacy, Language Curriculum and Testing	**Opt-1**	6	4	20	80	100
	206 B		6 b	Communication Technology						
		Total				36	24	120	480	600
7		Audit Course	Human Values and Professional Ethics -II			0	0	100	--	--

*All Core papers are Compulsory

*Compulsory Foundation – Choose one paper

*Elective Foundation – Choose one paper

*Audit Course – 100 Marks (Internal) – Zero Credits under self study

* Interested students may register for MOOC with approval of the concerned DDC but it will be Considered for the awarded of the grade as open elective only giving extra credits.

for the award of the grade as pen elective only giving extra credits.

Core: LING:201 Historical Linguistics

Objectives:

1. To understand the major breakthroughs in historical Linguistics
2. To understand sound change ,Linguistics change and Semantic change
3. To analyses Internalreconstruction ,comparative method and Glottochronology

Unit - I

The major breakthroughs in historical linguistics: the genetic hypothesis, the regularity hypothesis, the phonemic hypothesis. Models of language classification: Genealogical, Typological and Arial. Principles of sub grouping.

Unit-II

Concept of a linguistic family: major language families of the world, characteristic features of the language families of India and mutual influences.

Unit – III

Sound change: gradual Phonetic change, structuralist model in describing sound change, phonetic and phonemic changes, conditioned and unconditioned change, types of sound changes, social motivation of sound change.

Unit -IV

Analogy: regularizing tendency of analogy, relation to change, types of sound change. Assumptions of Linguistic change: least effort, substratum theory, structural pressure. Linguistic borrowing: Causes and types, and effects of borrowing.

Unit-V

Semantic change: nature and types; Internal reconstruction and Comparative method – scope and limitations. Lexicostatistics or Glottochronology: assumptions, aims and method of application.

Suggested Readings:

1. Winfred P. Lehmann, **Historical Linguistics: An Introduction** (Second Edition) (Holt, 1973) ISBN 0-03-078370-4
2. RaimoAnttila, **Historical and Comparative Linguistics** (2nd ed.) (John Benjamins, 1989) ISBN 90-272-3557-0
3. Arlotto, Anthony. **Introduction to Historical Linguistics**. Boston. Houghton Mifflin Company.
4. King, R.D. 1969. **Historical Linguistics: An Introduction**. New Jersey: Prentice Hall.
5. Hoenigswalf, H.M. 1960. **Language change and Linguistic Reconstruction**. Chicago. University of Chicago Press.
6. Turtvent, E.H. 1942. **Linguistic Change**. Chicago. University of Chicago Press.
7. Jeffers, R.J. and IlseLehiste. **Principles and Methods for Historical Linguistics**.
8. Greenberg, J.H. 1957. **Essays in Linguistics**. Chicago. University of Chicago Press.
9. TheodoraBynon, **Historical Linguistics** (Cambridge University Press, 1977) ISBN 0-521-29188-7

10. Richard D. Janda and Brian D. Joseph (Eds), **The Handbook of Historical Linguistics** (Blackwell, 2004) ISBN 1-4051-2747-3

Course Out Comes:

After completion of the course students will be able to

1. Understand the major breakthroughs in historical Linguistics
2. Understand sound change ,Linguistics change and Semantic change
3. Analyses Internal reconstruction ,comparative method and Glottochronology

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		2			3			1			2
CO2	2		3				3					2
CO3		3			3		2		3	1		2

LING:202 Dialectology

Objectives:

1. To Understand the terms of Dialectology, history and development of dialect studies
2. To analyze types of dialects and variability
3. To understand dialect survey methodology and its approaches

Unit- I

Concept of idiolect, dialect, standard language: dialect area, dialect boundary, focal area, relic area and transitional area.

Unit- II

History and development of dialect studies: synchronic and diachronic; major linguistic atlases; German, French, American atlases. Dialect studies in India and Andhra Pradesh.

UNIT - III

Types of dialects and variability; variation along social parameters; geographical variation-intelligibility, isoglosses, pattering and gradation.

Unit –IV

Dialect survey methodology; preparation of questionnaire; data elicitation techniques: mapping of dialect variation and drawing of isoglosses: interpretation of dialect maps.

Unit –V

Notions of heterogeneity and variability-interactional and correlational approaches in survey methodology.

Suggested Readings:

1. Chambers, J.K. and Trudgil, Peter. 1990. **Dialectology**. Cambridge. Cambridge University Press.
2. Trudgil, Peter. 1983. **On Dialect: Social and Geographical perspectives**. Oxford. Blackwell.
3. Ferguson &Gumperz. : **Linguistic Diversity in South Asia**. Mouton.
4. Francil, W.N. 1987. **Dialectology: An introduction**. London. Longman.
5. Krishnamurti, Bh. 1962. **A Dialect Dictionary of Occupational Vocabulary, Vol. I: Introduction.**
6. Thomas, Alan R. (1967), **"Generative phonology in dialectology"**, Transactions of the Philological Society 66 (1): 179–203, doi:10.1111/j.1467-968X.1967.tb00343.x
7. Dollinger, Stefan (2015). **The Written Questionnaire in Social Dialectology: History, Theory, Practice.** IMPACT: Studies in Language and Society, 40. Amsterdam & Philadelphia: John Benjamins Pub. Co.

Course Out Comes:

After completion of the course students will be ableto

1. Understand the terms of Dialectology, history and development of dialect studies
2. Analyze types of dialects and variability
3. Understand dialect survey methodology and its approaches

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1			3		2		3			1		3
CO2			3						1		2	
CO3		3			3	1			3			2

LING:203 Field Linguistics

Objectives:

1. To understand scope and purpose of field linguistics and problems of investigating non-literary languages
2. To understand techniques and methods of elicitation and collection of Linguistic data
3. To analyze the collection, recording and processing of data.

Unit-I

The scope and purpose of field linguistics; Field linguistics as a branch of descriptive linguistics and its relation to other branches in linguistic sciences such as theoretical and applied linguistics.

UNIT-II

The problem of investigating non-literary languages.The role and importance of language informant in linguistic field work; Selection of informants, number of informants and the training of the informant to suit the goal of the project.Preparation of appropriate questionnaire.

Unit – III

Techniques and methods of elicitation: elicitation and its nature; scheduled versus analytical elicitation; steps in elicitation, analysis and checking for elicitation. Organization of work sessions. Eliciting relevant data at various levels of linguistics structure; sound, word, phrase, clause and sentence levels. The importance of collecting texts-training the informant to dictate the texts, translating them with his help and checking the texts with other member of the language community.

UNIT-IV

Collection of linguistic data; Factors which determine the kinds of data, obtaining relevant data and restricting its size to salient features. Investigators: self preparation for encountering the informant. The need for a pilot survey of the peoples languages and the area of investigation and the collection of sample data.

Unit – V

The recording of dialect of language material. Types and purposes of fieldtranscription. The mechanization of phonetic field work.The reliability and accuracy of phonetic field transcription.The phonetics training for field worker.Collection,analysisandprocessing of the data. The value
of phonetic and linguistic statements.

Suggested Readings:

1. Samarin W J. 1061. **Field Linguistics – Aguide to Linguistics field work**, New York
2.Nida, EA. 1978. (2nded.) **Morphology**.University of Michigan press.Srlion
3.Kiberik A.E. 1977 **The Methodology of Field infestations in Linguistics**Moulton 2 Co
4.Paul Newman and Mirth Ratlife (Eds.) **Linguistics, Field work,** UK Cambridge UniversityPress.

5.Crystal, David *(1990). Linguistics.Penguin Books.* ISBN 9780140135312.

6.Halliday, Michael A.K.*; Jonathan Webster (2006). On Language and Linguistics.* Continuum International Publishing Group*. p. vii.* ISBN 0-8264-8824-2.

7.Martinet, André *(1960). Elements of General Linguistics. Tr. Elisabeth Palmer* Rubbert (Studies inGeneral Linguistics, vol. i.). London: Faber. p. 15.

Course Out Comes:

After completion of the course students will be ableto

1. Understand scope and purpose of field linguistics and problems of investigating non- literary languages
2. Understand techniques and methods of elicitation and collection of Linguistic data
3. Analyze the collection, recording and processing of data.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	2						2	2		3
CO2	3		3		2	2			2			2
Co3	3			3	3	2			3	1		2

LING:204 Language Families of India and Comparative Dravidian

Objectives:

1.To understand language families of India

2.Toanalyze Dravidian Language Family and history and sources of each Dravidian Language.

3.Toanalyze vocalic, consonant and Sandhi systems, and reconstruction of Dravidian.

Unit - I

Language families of India.The concept of linguistic area and India as linguistic area.Reduplication, onomatopoeia, Echo words in Indian Languages and especially Dravidian Languages.

Unit -II

Dravidian language family: Proto-Dravidian, Sub-groups of Dravidian, literary and non-literary languages, cognates. The writing systems of the major literary languages of Dravidian.Special features of Dravidian languages.

Unit–III

A short sketch of the history and sources for each Dravidian language. Reconstructed Proto-Dravidian Culture. Language contact and vocabulary borrowing between language families: Indo-Aryan ad Austro-Asiatic words in Dravidian and Perso-Arabic and Western language (Portuguese and English) words in Dravidian.

Unit–IV

Dravidian Vocalic System, Vowels: quality, Diphthongs. Dravidian consonantal system, initial and intervocalic stops. Phonological innovations and retentions: exceptions to sound changes explained in terms of borrowing, analogy. Areal and lexical diffusion.

Unit-V

Phonological, Morphological and Syntactical reconstruction of Dravidian.Dravidian sandhi system. Dative subjects.

Suggested Readings:

1. Emeneau, M.B. 1980. **Language and Linguistic area**. Stanford, California, Stanford University Press.
2. Krishnamurthi, Bhadriraju. 2003.**The Dravidian Languages**. NewYork. Cambridge University Press.
3. "Dravidian languages". *Encyclopædia Britannica Online*. Retrieved10 December 2014.
4. Krishnamurti, Bhadriraju (2003). The Dravidian Languages. Cambridge University Press. ISBN 0521771110.
5. Subramanyam, P.S. 1997. **DravidaBhashalu**. Hyderabad. PS Telugu University.
6. Emeneau, M.B. 1970. **Dravidian Comparative Phonology: A sketch**. Annamalai Nagar, nnamalai University.
7. Kamilzvelebil. 1970. **Comparative Dravidian Phonology**. The Hague, Paris. Mouton.

Course Out Comes:

After completion of the course students will be ableto

1.Understand language families of India

2.Aanalyze Dravidian Language Family and history and sources of each Dravidian Language.

3.Analyze vocalic, consonant and Sandhi systems, and reconstruction of Dravidian.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3					2			1			1
CO2	3					2			1			2
CO3		3			2				1			2

Compulsory Foundation

LING:205A Language Contact

Objectives:

1. To analyze speech as social interaction and Interference
2. To analyze Indian language contact situation and effects of language contact
3. To understand Linguistic borrowing

Unit – I

Speech as social interaction: Speech functions and speech events; components of speech event-purpose, setting, participants. Linguistic variety, rules of speaking, cross cultural perspective, verbal and non-verbal behavior, reflection of social process in linguistic structures; speech and social identify; semantics of power and solidarity.

Unit – II

Language Contact:Types of Interference; Language Loyalty, Language attitudes, Language Maintenance and Shift; language convergence.

Unit - III

Indian Language contact situation, Historical situation, Multilingualism.

Unit – IV

Effects of Language contact:Bilingualism,Pidginisation and Creolization, language death, Majority languages and Minority languages.

Unit – V

Linguistic Borrowing – Lexical and Structural: Motivations – Prestige and Need filling (including culture based) ; classification of Loan words – Loan Translation, Loan blend, Calque; Assimilated and unassimilated words(Tadbhava&Tatsama); Bilingualism as a source for borrowing.

Suggested Readings:

1. Suzanne Romaine. **Bilingualism.**NewYork. Basil Blackwell Ltd.
2. Wallace E. Lambert. 1972. **Language Psychology and culture.** Stanford University Press.
3. Hohn Rubin. 1968. **National Bilingualism in Paraguay**. The Hague, Paris. Mouton.
4. Sarah Thomason, **Language Contact - An Introduction** (Edinburgh University Press 2001).
5. UrielWeinreich, **Languages in Contact** (Mouton 1963).
6. Sarah Thomason and Terrence Kaufman, **Language Contact, Creolization and Genetic Linguistics** (University of California Press 1988).

Course Out Comes:

After completion of the course students will be able to

1. Analyze speech as social interaction and Interference
2. Analyze Indian language contact situation and effects of language contact
3. Understand Linguistic borrowing

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3								2		3
CO2	2				3					1		2
CO3	1								3	3		2

LING;205B Natural Language Processing

Objectives:

1. To understand rationalist and empiricist approaches to language.
2. To analyze Mathematical Foundations, essential information theory and Entropy.
3. To analyze Tagging, Taggers, probabilistic parsing and clustering.

Unit – I

Rationalist and Empiricist Approaches to language, Non-categorical phenomena in language, language and cognition as probabilistic phenomena, The Ambiguity of Language: Why NLP is Difficult. Lexical resources, Word counts, Zipf'slaws,Collocations, Concordances.

Unit – II

Mathematical Foundations, Elementary Probability Theory, Probability spaces,Conditional probability and independence, Bayes' theorem, Random variables, Expectation and variance, Notation.

Unit – III

Essential Information Theory, Entropy: Joint entropy and conditional entropy. Mutual information.The noisy channel model, Relative entropy or Kullback-Leibledivergence.The relation to language: Cross entropy, The entropy of English.

Unit – IV

Part-of-Speech Tagging, The Information Sources in Tagging, Markov Model Taggers,The probabilistic model, The Viterbi algorithm, Hidden Markov Model Taggers, TaggingAccuracy and Uses of Taggers.

Unit – V

Probabilistic Parsing: Some Concepts, Parsing for disambiguation, Tree banks, Parsingmodels vs. language models. Clustering: Hierarchical Clustering, Single-link and complete-link clustering, Group-average agglomerative clustering. An application:Improving a language model, Top-down clustering, Non-Hierarchical Clustering.

Suggested Readings:

1. **Foundations of Statistical Natural Language Processing**-Christopher manning and HinrichSchutze
1999 Massachusetts Institute of Technology, Second printing with corrections, 2000United States of America.
2. Briscoe, Ted, and John Carroll. 1993. Generalized probabilistic Lr parsing of natural language
(corpora) with unification-based methods. **Computational Linguistics.**
3. Biber, Douglas, Susan Conrad, and 1998. **Corpus Linguistics:**Investigating language Structure and Use. Cambridge: Cambridge University press.

4. Boguraev, Branimir K. 1993. **The contribution of computational lexicography.**
In Madeleine Bates and Ralph M. Weischedel Challenges in antural Language.

Course Out Comes:

After completion of the course students will be ableto

1. Understand rationalist and empiricist approaches to language.
2. Analyze Mathematical Foundations, essential information theory and Entropy.
3. Analyze Tagging, Taggers, probabilistic parsing and clustering.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1		3	3						2			3
CO2		1		3			2		3			2
CO3		2				3	2		1	3	3	2

LING:205C Endangered languages

Objectives:

1.To understand scope of Endangered Language

2.Tounderstand reasons for Endangerment of languages and effects of Endangerment

3.Toanalyze criteria and Endangered Languages of India

Unit – I

Endangered language: definition and scope. Code mixing and code switching,Language maintenance, mother tongues and official languagesin India.

Unit – II

Reasons for endangerment of languages: Language dominance, Globalization, Language shift,Borrowing, Multilingualism, Multiculturalism and Multilingual Education.

Unit – II

Effects of Endangerment: Shrinking of language domains, Pidginization, Creolization, Language extinction,Language death.

Unit – IV

Criteria: Levels of language risk, Evaluation of language endangerment,EGIDS, Reasons for Indian languages extinction, Process of extinction.

Unit – V

Endangering languages: Protection and Prevention of endangered languages, Endangered languages of India.

Suggested Readings:

1. Brenzinger, Matthias (ed.) (1992) Language Death: Factual and Theoretical Explorations with Special
Reference to East Africa. Berlin/New York: Mouton de Gruyter. ISBN 978-3-11-013404-9.

2. Campbell, Lyle; &Mithun, Marianne (Eds.). (1979). The Languages of Native America: Historical and
Comparative Assessment. Austin: University of Texas Press. ISBN 0-292-74624-5.

3. Dorian, Nancy C. (1978). 'Fate of Morphological Complexity in Language Death: Evidence from East
Sutherland Gaelic.' Language, 54 (3), 590-609.

4. Dressler, Wolfgand&Wodak-Leodolter, Ruth (eds.) (1977) 'Language Death' (International Journal of
the Sociology of Language vol. 12). The Hague: Mouton.

5. Gordon, Raymond G., Jr. (Ed.). (2005). Ethnologue: Languages of the World (15th ed.). Dallas, TX:
SIL International. ISBN 1-55671-159-X. (Online version:http://www.ethnologue.com).

6. Harrison, K. David. (2007) When Languages Die: The Extinction of the World's Languages and the
Erosion of Human Knowledge. New York and London: Oxford University Press.

ISBN 978-0-19-518192-0.

7. Mohan, Peggy; &Zador, Paul. (1986). 'Discontinuity in a Life Cycle: The Death of Trinidad Bhojpuri.' Language, 62 (2), 291-319.

8. Sasse, Hans-Jürgen (1992) 'Theory of Language Death', in Brenzinger (ed.) Language Death, pp. 7–30.

Thomason, Sarah Grey & Kaufman, Terrence.(1991). Language Contact, Creolization, and Genetic Linguistics. University of California Press. ISBN 0-520-07893-4.

9. Timmons Roberts, J. & Hite, Amy. (2000). From Modernization to Globalization: Perspectives on Development and Social Change. Wiley-Blackwell. ISBN 978-0-631-21097-9.ed.

Course Out Comes:

After completion of the course students will be ableto

1.Understand scope of Endangered Language

2.Understand reasons for Endangerment of languages and effects of Endangerment

3.Analyze criteria and Endangered Languages of India

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3			3							1	2
CO2			3								1	2
CO3	3			2					1		1	2

Elective Foundation

LING: 206A Literacy, Language Curriculum and Testing

Objectives:

1.To analyze literacy as communication skill

2.To understand language acquisition and survey of language learning theories

3.To understand material for adult literacy and language testing

Unit-I

Literacy as communication skill, communicative needs of learning. Instruction through vernacular languages medium of instruction in education at different levels. Bernstein's elaborated and restricted codes. Formal and non-formal literacy programmes. Formal, early school education of normal children, non- formal: Audit education the under privileged children.

Unit-II

Language acquisition, nature and modeling.Learning disabilities among children and remedial measures.Orality and writing Role of linguistics in learning and teaching, problems evaluation. Teaching of reading and writing to adults and children.

Unit-III

A Short survey of language learning theories, stimulus response, and reinforcement theories, mediation theories, innate capacity theory, cognitive development theory (piaget).

Unit-IV

Materials for Adult literacy: Development of improved pace and context of learning (IPCL) material for Adult literacy teaching.

Unit-V

Principles and methods of language testing, definition, basic concept of testing.
Types of testing, aptitude, diagnostic prognostic. Achievement and proficiency
test requi8sites, Reliability and validity of tests.

Suggested Readings:

1. Athreya, Venkatesh and Shila Rani Chinkath.1996.Literacy and Empowerment. New Delhi. Sage Publication
2. Freire,P.andDonaldo Macedo.1987.Literacy: Reading the word and the World. London. Routledge and:Kegan Paul

3.Mackay,S.L.1996.Literacy and Literacies. In Mcka,S.L. and Hornberger,N.H.(ed).2002. Practice and LanguageTeaching Cambridge.UK

4. Mukharjee,A and Vasanta,D.(ed).2002.Practice and Research in Literacy,NewDelhi.Sage.
5. Rebecca,M.Valette.Modern Language Testing.New York Harcourt Brace and World Inc.

Course Out Comes:

After completion of the course students will be able to

1.Analyze literacy as communication skill

2.Understand language acquisition and survey of language learning theories of

3.Understand material for adult literacy and language testing

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3		1					2		1
CO2	3		3		1			1		3		2
CO3	3		3		1					2		1

LING: 206B Communication Technology

Objectives:

1.Toanalyze communication theory and Linguistic communication

2.To understand Artificial Intelligence, Machine Translation and Micro planner artificial languages

3. To analyze corpus based approach, Natural Language Processing and technological advances in Communication.

Unit - I

Communication theory: code, channel encoding, decoding, measurement and units of information, binit/bit. Redundancy – Noise – Channel noise, code noise.

Unit – II

Linguistic Communication: Message model of linguistic communication. Inferential approach to communication.Direct and indirect communication.Literal and non-literal communication.

Unit–III

Artificial Intelligence – Engineering approach. Cognitive – Science approach.Machine translation.Micro Planner artificial languages.

Unit–IV

Corpus based approach Computer corpora – machine readable corpora, automatic processing, automatic transmission fortification and limitations of corpora. Data capture. Natural language processing.

Unit –V

Technological advances in communication – Mass media print and electronic transmission.

Suggested Readings:

1. August E. Grant and Gennifer H. Meadows. **Communication Technology Update**. Ron
2. Kevac, Stephan Jones. **Introduction to Communications Technologies**: A Guide.
3. Susan Hunston. 2002. **Corpora in Applied Linguistics**. Cambridge. Cambridge University Press.
4. J. C. Richards and R. W. Schmidt (eds.). 1983. **Language and Communication**.
5. McEnery, T and Wilson A. 1996. **Corpus Linguistics**. Edingurgh. Edinburgh University Press.
6. Stubbs, M. 1996. **Text and Corpus Analysis**. Oxford. Blackwell
7. AksharBharati et al. 1995. **Natural Language Processing: A PaninianPerspective**.New Delhi. Prentice Hall.

Course Out Comes:

After completion of the course students will be ableto

1.Analyze communication theory and Linguistic communication

2.Understand Artificial Intelligence, Machine Translation and Micro planner artificial languages

3. Analyze corpus based approach, Natural Language Processing and technological advances in Communication.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3		2				3			2
CO2			2	3					3			1
CO3	1			3	2		3		3			2

Audit Course 207:Human Values and Professional Ethics-II

Objectives:

1. To understand value education and human values
2. To understand effectiveness to capability Medical and Business Ethics
3. To understand environmental and social ethics

Unit – I

Value Education – Definition – relevance to present day – Concept of Human Values – self introspection – Self esteem. Family values-Components, structure and responsibilities of family- Neutralization of anger – Adjustability – Treats of family life – Status of women in family and society – Caring for needy and elderly –Time allotment for sharing ideas and concerns.

Unit – II

Medical ethics – Views of Charka, Sushruta and Hippocrates on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals.Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients.Social justice in health care, human cloning, Problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit – III

Business ethics-Ethical standards of business-Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics

Unit - IV.

Environmental ethics-Ethical theory, man and nature-Ecological crisis, Pest control, Pollution and Waste, Climate change, Energy and population, justice and environmental health.

Unit – V

Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/Pregnancy. Ethics of media-Impact of Newspapers, Television, Movies and Internet.

Suggested Readings:

1. John S Mackenjie: A manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D.lrwin Inc.
3. "Management ethics – integrity at work" by Joseph A. Petrick and John F.Quinn,Response Books: New Delhi
4. "Ethics in Managemnt" by S.ASherlekar, Himalaya Publishing House
5. .Haarold H. Titus:Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu DharnaSastra or the Institute of Manu:Comprising the Indian System of Duties: Religious and Civil(ed) G.C.Haughton

10.Susruta Samhita:Tr.KavirajKunjanlal,KunjalalBrishagratha, Chowkamba,Chowkamba Sanskrit series,Vol I,II and III, Varnasi, Vol I OO, 16-20,21-32 and 74-77 only

11.Charaka Samhita: Tr.Dr.Ram Karan Sarma and VaidyaBhagavan Dash, ChowkambhaSaskrit Series office, Vaaranasi I,II,III Vol I PP 183-191

12.Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning 200113.Analyzing Moral Issues, Judith A.Boss, Mayfield publishing Company,1999

14.An Introduction to pplied Ethics (Ed.) John H. Piet and Ayodhya Prasad, Cosmo Publications.

15.Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.

16.I.C.Sharma Ethical Philosphy of India. Nagin&coJulundhar.

Course Out Comes:

After completion of the course students will be ableto

1.Understand value education and human values

2.Understand effectiveness to capability Medical and Business Ethics

3.Understand environmental and social ethics

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3						2	3				3
CO2	1						3	3				2
CO3							2	3				1

The Programme of study and the Scheme of Examinations

Semester-III

S.No.	Course Code	Components of study	Title of the Course			Credit Hours /Week	No. of Credits	IA Marks	Sem. End Exam Marks	Total Marks
1	301	Core	1	Language Acquisition and Child Language Development	Mandatory	6	4	20	80	100
2	302		2	Language Disorders and Speech Pathology		6	4	20	80	100
3	30A	Generic Elective	3a	Socio-linguistics	Opt-2	6 6	4 4	20 20	80 80	100 100
	303B		3b	Psycho-linguistics						
	303C		3c	Neuro-linguistics						
	303D		3d	Computational Linguistics						
4	304	Skill Oriented Course	4	ICT for Enriching Teaching and Learning Skills	Mandatory	6	4	20	80	100
5	305A	Open Elective	5a	Bilingualism	Opt-1	6	4	20	80	100
	305B		5b	Mass Media Communication						
	Total					36	24	120	480	600

* All Core papers are Mandatory

* Generic Elective – Choose Two papers

* Skill-Oriented Course is Mandatory

* Open Electives are for the Students of other Departments. Minimum One paper should be Opted. Extra Credits may be earned by opting for more number of Open Electives depending on the interest of the student through self study

* Interested students may register for MOOC with the approval of the concerned DDC

Core

LING:301 Language Acquisition and Child Language Development

Objectives:

1. To analyze language acquisition device and stages of language acquisition
2. To understand continuity and discontinuity approaches
3. To analyze the acquisition process and acquisition VS learning

Unit – I

Language acquisition device. Encoding and decoding speech and Language. Early attempts of linguistic development of a child.Competence and performance.Communicative competence.Production and comprehension of grammatical contrasts.

Unit – II

Stages of language acquisition. The period of prelinguistic development: cooing, babbling, sound play motherese (baby talk, care taker speech), environment.

Unit-III

Continuity and discontinuity approaches. One word stage (holophrastic stage) over extension associate complex. Two word stage pivot (pivot class of words) open class words telegraphic speech.

Unit – IV

The acquisition process. Acquisition of phonetic, Phonological,morphological syntactic and semantic principles: questions, negatives etc.

Unit- V

Acquisition Vs. learning.Acquisition of two languages critical period for language acquisition.First language acquisition and second language learning.Simultaneous and successive acquisition.Internal analogy and over generalization.

Suggested Readings:

1. Jill G.de Villers A.de. Villers – '**Language Acquisition'**, HarwardUniversityPress, Cambridge, Massachusetts and London, England

2. N.Chomsky**, Language and Mind**

3.CliffsNeo Jersey- **Psycho-Linguistics: Introductory Perceptions**; New York, Academic press.

4.Solsaporta and JR Bastian (Ed.) **Psycho-Linguistics, A Book of Readings**, New York. Hart, Rich hart, Winston.

5. Lightfoot, David (2010). "**Language acquisition and language change**". Wiley Interdisciplinary Reviews: Cognitive Science **1** (5): 677–684 doi:10.1002/wcs.39.ISSN 1939-5078.

6, Berk, Laura E. (2009)."9, **Language Development". Child development**. Boston: Pearson Education/Allyn&Bacon. ISBN0-205-61559- 637146042.

Course Out Comes:

After completion of the course students will be ableto

1. Analyze language acquisition device and stages of language acquisition
2. Understand continuity and discontinuity approaches
3. Analyze the acquisition process and acquisition VS learning

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3					2				1		3
CO2				3	3					3		2
CO3			3			3			3	1		2

LING:302 Language Disorders and Speech Pathology

Objectives:

1. To understand disordered communication, language and the brain
2. To understand articulation, language and hearing disorders
3. To understand speech pathology

Unit – I

Definition of Communication.Speech and hearing communication.Modes ofCommunication.Theories and models of human communication.Normal vs.Disordered communication.

Unit- II

Language and the Brain – Broca's aphasia – Wernicke's aphasia, conduction aphasia, expressive aphasia, receptive aphasia. Dominance, language area, Neurolinguistic processing. Definitions of Aphasia, Agnosia, Apraxia, Anarthria of Dysarthria, Dyslexia.

Unit –III

Disorders of articulation: Articulation disorders- dysarthria vs. dyslexia, Evaluation disorders, disorders of phonation: Pitch, intensity and quality disorders. Organic functional voice disorders etiology and diagnosis. Fluency disorders, Stuttering vs. stammering in children.

Unit –IV

Language disorders: Language handicap; the causes of language handicap. The classification of language handicap. Language disorders in children, mental retardation, childhood aphasia. Dyslexia and learning disability. Language disability in adults historical perspectives of aphasia, etiology, schizophrenia and dementia.Hearing disorders: Types of hearing loss, causes of hearing loss. Relationship between hearing loss and speech perception. Speech and language problems of the hearing handicapped.

Unit- V

Disorders of manner of production. Other (writing-Agraphia) language related disorders. Speech pathology localized lesions. Diffuse vs. Loss, problems of neurological cor-relates and their relevance to language. Time, the most significant dimension in language physiology – Innate mechanism for perception and production, Treatment of articulation, phonation and fluency disorders.Treatment procedures for language disorders.

Suggested Readings:

1. Obler, L. K. and Kris Gjerlow, **Language and the Brain**. NewYork. Cambridge University Press.
2. Catherine A. Jackson. **Linguistics and speech-language pathology, Linguistics**: **The Cambridge survey, vol. III**. New York. Cambridge University Press.
3. Mildred Freburg Berry. **Language disorders of children: The Bases ad diagnoses**. NewYork. Meredish Corporation.
4. Ruth Lesser. **Linguistic investigations of aphasia**, London, Edward Arnold pubklishers Ltd.

5. David Crystal. **Language, brain and handicap– VIII, The Cambridge encyclopedia of language**, New York. Cambridge University Press
6. "Stuttering". **Children and stuttering; Speech disfluency; Stammering**. U.S. National Library of Medicine - PubMed Health. 2012. Retrieved 8 December 2013.

Course Out Comes:

After completion of the course students will be ableto

1.Understand disordered communication, language and the brain

2.Understand articulation, language and hearing disorders

3.Understand speech pathology

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3				2		3	3	3	1
CI2				3	3							2
CO3	3								3	3		2

Generic Elective

LING:303A Socio-linguistics

Objectives:

1. To analyze language and society, Linguistic variability and language varieties
2. To analyze Sociology of language planning and Language and Social identity
3. To understand Sociolinguistic Methodology

Unit - I

Language and society: speech community; Linguistic competence and communicative competence, Linguistic variability; identification of Linguistic and Social variables, patterns of variation.

Unit - II

Language varieties: Regional, Social, formal and informal; standard non-standard, the concept of register and the dimensions of an act of communication- field, mode and the tenor, Vernacular, restricted and elaborated codes

Unit – III

Sociology of Language Planning: Language standardization and modernization; orthographic reform and Literacy; national Language and languages of winder communication; nationalism and nationalization.

Unit–IV

Language and Social Identity; Concept of linguistic and social inequality; linguistic prejudices and stereotypes; attitude analysis; Bernsteins concept of code; restricted and elaborate; the deficit theory.

Unit –V

Sociolinguistic Methodology: Methodological preliminaries; selecting speakers and linguistic variables, collecting texts; data processing and interpretation; method of quantification of linguistic variation; types of variables.

Suggested Readings:

1. Gimpertz, J.J. 1972. Introduction (in JJ Gumpertz, and D. Hymes (ed.) **Directions in sociolinguistics)**. New York. Holt. Rinehart & Winston
2. Hudson, Richard. 1980. **Sociolinguistic**s. Cambridge. Cambridge University Press.
3. Mesthrie, Rajend, Joan Swann, Andrea Deumert and William M. Leap. 2000. **Introducting Sociolinguistics**. Edinburgh University Press.
4. Williams, Glyn. 1992. **Sociolinguistics; a sociological critique**. London. Routledge.
5. Annamalai, E. 2001. **Managing Multilingualism in India**. New Delhi. Sage publ.
6. Fasold, Ralph. 1984. **Sociolinguistics of society**; Oxford. Basil Blackwell.
7. --------- 1986. **Sociolinguistics of Language**. Oxford. Basil Blackwell.

8. Paulston, Christine Bratt and G. Richard Tucker, eds. **Sociolinguistics: The Essential Readings.** Malden, Ma.: Wiley-Blackwell, 2003.
9. Deckert, Sharon K. and Caroline H. Vikers. (2011). **An Introduction to Sociolinguistics: Society and Identity**

Course Out Comes:

After completion of the course students will be able to

1.Analyze language and society, Linguistic variability and language varieties

2. Analyze Sociology of language planning and Language and Social identity

3. Understand Sociolinguistic Methodology

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3		1	3				3		2
CO2			2		1		3					2
CO3			3		1				3			2

LING:303B Psycho-linguistics

Objectives:

1. To understand an overview of Psycho-linguistics
2. To analyze speech production, perception, and comprehension.
3. To understand lexical processing , concept of meaning, bilingualism and language acquisition in children

Unit – I

Over view of Psycholinguistics and acquisition of language in spoken, written and signed media. Language and thought, Behavioristic, mentalistic and Cognitive approaches to the study of language.

Unit – II

speech perception and comprehension: linguistic cues in perception of vowels and consonants, segmental and suprasegmental cues in context, models of speech perception, analytic and synthetic. Process of comprehension, phonological and features, stress and intonation cues to structures, lexical access and mental lexicon, Semantic relation and segment comprehension processing, transformational model and strategy model.

Unit – III

speech production: planning and execution, discourse planning, sentence planning. Speech errors and sentence production errors and linguistic units, errors and sentence stress, word classes in speech errors, derivation and inflection in errors.

Unit – IV

Lexical processing and mental lexicon, meta linguistic ability, input to language learning, lexical access and word recognition, introduction to the concept of meaning.

Unit – V

Bilingualism, language acquisition in children, Environmental factors in language acquisition, Motherese language acquisition models, acquisition of phonology, cooing and babbling. Bilingualism and Cognitive development, language problems and bilingual children.

Suggested Readings:

1. Donald J. Foss and David T. Hakes, **Psycholinguistics: An introduction to the psychology of language.** Englewood. Prentice Hall. Inc.
2. Cliffs Neeo Jersey, **Psycholinguistics: Introductory perceptions**. Newyork.

Academic Press.3. Sol Saporta and J.R. Bastian. (ed.) **Psycholinguistics: A book of Readings.**Newyork. Holt. Rinehart and Winston.

3. Frederic J. Newmayar. (ed.). **Language: Psychological and Biological aspects (Volume-III, Linguistics).**Newyork. Cambridge University Press.
4. Cairnsm, H.S. and C.E. Cairns. **Psycholinguistics: A cognitive view of language.**Newyork.Holt. Rinehart and Winston.Levelt, W. J. M. (2013).
5. **A History of Psycholinguistics**: the pre-Chomskyan era. Part 1. Oxford: Oxford University Press. ISBN 978-0-19-965366-9.

6. Chomsky, Noam. (2000) **New Horizons in the Study of Language and Mind**
. CambridgeCambridge University Press

Course Out Comes:

After completion of the course students will be ableto

1. Understand an overview of Psycho-linguistics
2. Analyze speech production, perception, and comprehension.
3. Understand lexical processing , concept of meaning, bilingualism and language acquisition in children

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3			1						3
CO2	2			3	3	1						2
CO3	2					1			3			2

LING: 303C Neuro Linguistics

Objectives:

1. To understand of anatomy of brain and language and speech
2. To understand History of Neuro-linguistics
3. To analyze speech and language disorders and testing techniques

Unit-I:

Introduction to the anatomy of brain cerebral cortex cerebral hemisphere – cerebellum – medulla – md brain – corpus callaosum – major lobes – frontal lobe parietal lobe occipital lobe – temporal lobe – fissure - nervous and their functions.

Unit-II:

Language and speech – Basic linguistic units – Phonology morphology – syntax – semantics – linguistics and psychology, linguistics and neurology – Introduction to Neurolinguistics

Unit-III:

History of Neurolinguistics - P.Broca – c Wernike – Huglings Jackson, and others present day Neurolinguistics.

Unit-IV:

Speech and language disorders: Aphasia – classification of aphasia – other disabilities – Broca – Wernike, Semantic – jargon – motor – sensory dysphasia,paraphasia, dyslexia, Anomia, alexia, Dysarthria, paragrammatism, agrammatism, etc. etiology of the aphasias.

Unit-V:

Testing techniques: Western aphasia test battery – Oston Diagnostic aphasia Examination – evaluation of the above two test batteries a simple study of a language disorder.

Suggested Readings:

1. Sheila E. Blumstin.Linguistics: The Cambridge survey – III, Neurolinguistics: an over view of language – Brain relatioons is aphasia. New York Cambridge University Press.
2. Obler, L.K. and Kris Gjerlow. Language and Brain New York, Cambridge University Press
3. David Crystal. The Cambridge encyclopedia of language: Language, brain and handicap. New York. Cambridge University Press
4. Adrian AK Majian,Demers,R.A., Farmer,A.K. and Harnish,R.M. 1996.Linguistics: An introduction to language and communication. New Delhi, Prentice Hall
5. Mary – Louise Kean, Linguistics: The Cambridge Survey – Volume-III: Brain Structures and Linguistic capacity New York, Cambridge University Press.

Course Out Comes:

After completion of the course students will be able to

1.Understand of anatomy of brain and language and speech

2.Understand History of Neuro-linguistics

3.Analyze speech and language disorders and testing techniques

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		2			2				2		3
CO2	3		2			2				1		3
CO3	3		2			2			1	2		2

LING: 303D. Computational Linguistics

Objectives:

1.To understand Computational Phonetics , Phonemics, Morphology and Syntax

2. To understand computational semantics and Lexicography

3.To analyze application of computational linguistics

Unit-I

Computational Phonetics and Phonemics: Speech Production and Acoustic – Phonetics. Articulatory Phonetics: Acoustic Phonetics: Prosodic features, speech signal processing parameters and features of speech. Phonological rules and Transducers: Advanced issues in Synthesis – text-to-speech system: speech recognition-speech-to-text system.

Unit-II

Computational Morphology and Syntax: Morphology and Syntax: Morphology – morpheme; free, bound, segmentation and orthography – Inflectional, Derivational and Compositional morphology – word structure, Morphological analysis – different approaches. Representation of morphological information: MRD (Machine Readable Dictionary) for stems, for suffixes, morphological levels of organization of suffixes – morphophonemic's, The Lexicon and Morphotactics, Morphologicalparsing and Finite-State Transducers. Parsing-Parsing in traditional grammar; in formal linguistics, Classification of parsing; Top-down vs. Bottom-up;

Unit-III

Semantics and Knowledge representation: Representing Meaning: Computational Desiderata for Representations: Verifiability: Unambiguous Representations: Canonical Forum: Inference and Variables: Expressiveness: Meaning Structure of Language: Predicate-Argument Structure: First Order Predicate Calculus: Elements of FOPC; the Semantics of FOPC; Variables and Quantifiers; Inference.

Unit-IV:

Computational Lexicography: Lexicography – Dictionary – Stages of dictionary preparation 1) data collection, 2) entry selection, 3) entry construction and 4) entry arrangement, role of computers in each stage, computer based dictionary – making MRD (Machine Readable Dictionary), Lexical resources, Role of language corpus in Lexicography; Electronic Dictionary (ED); Advantages of ED over conventional dictionary – features of ED.

Unit-V:

Application of Computational Linguistics: Machine Translation (MT) – different approaches; direct interlingual, transfer problems in lexical transfer – Computer Aided Learning/Teaching titles – role of computational linguistics in language teaching; Building Search Engines; Information retrieval.

Suggested Readings:

1. Allen, J. 1995. Natural Language Understanding. The Benjamin Company.
2. Ganesan, M et al. 1994 Morphological Analysis for Indian Languages in Information Technology Applications in Language, Script and Speech (ed) S.S. AGARWAL. New Delhi:
3. Ganesan, M. 1999. Lexical transfer in Machine Translation: Some Problems and Remedies in Translation (ed) M. Valarmathi, Chennai: IITS

4. Hutchins , WJ. 1982. The evaluation of Machine Translation System in Practical Experience of machine
translation System (ed) V. Lawoon (ed), Noth-Holland publishing company.
5. Kening. KJ. Et al, 1983, An introduction to Computer Assisted language Teaching, UK: OUP
6. Lewis, D. 1992, Computers and translation, in Computers and Written Texts (ed) Christopher S. Butler, Oxford:Black well.
7. Meijs, W. 1992, Computers and Dictionaries, in Computers and Written Texts (ed) Christopher S.Butler,
oxford: Black well.
8. Meijs,W.1996, Linguistic Corpora and Lexicography, in annual Reviews of Applied Linguistics,Vol.16
9. Ritchie, DG. Etal, 1992 Computational Morphology, England: MIT
10. Yegnanarayana, B.Etal, 1992. Tutorial on speech Technology Madras: IIT

Course Out Comes: After completion of the course students will be ableto

1.Understand Computational Phonetics , Phonemics, Morphology and Syntax

2. Understand computational semantics and Lexicography

3.Analyze application of computational linguistics

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3				2				1			2
CO2	3			1	2				1			2
CO3	3				1							2

Skill Oriented Course

LING:304 ICT for Enriching Teaching and Learning Skills

Objectives:

1.To understand the concepts, importance and scope of ICT

2. To analyze computer networking and ICT enriched teaching&learning experiences.

3. To understand online teaching and learning experiences.

Unit-I

Concepts of Information and Communication Technology (ICT): Concept of Information Technology, Concept of Communication Technology, Concept of Instructional Technology, Concept of Computer Technology and Concept of Internet.

Unit-II

Importance and Scope of ICT: Need of ICT, Importance of ICT, Scope of ICT – Teaching Learning Process, Evaluation process, Research, Administration, Education and Publication.

Unit-III

Computer Networking: Software and Hardwares, Computer networking – Components and Types of Network Typology, Features of wireless Network, Benefits of Network.

Unit-IV

ICT enriched Teaching and Learning experiences: Approaches to integration ICT in Teaching Learning process, Application of ICT for enriching classroom experiences, What ICT brings to the classroom?, Multimedia educational Software for classroom situations, Project based learning, Differences between project and project based learning, Collaborative learning.

Unit-V

Online Teaching and Learning Experiences: e-learning, Virtual classroom, Web2.0 Technologies, Open Educational Resources (OER), Legal and ethical issues, Computer ethics and Legal issues.

Suggested Readings:

1. Subbarayudu,N. and Mohamad Ali – **Pedagogy Across ICT Integration** - Jayam Publications,Hyderabad,2015, ISBN 978-98-85108 – 65 – 5
2. Padma Tulasi, G, B. Srilatha and N. Subbarayudu – **ICT for Enriching Teaching andLearning,**Jayam Publications,2017, ISBN: 978-93-85108-18-1.
3. Ramesh Verma and Suresh K. Sharma, **Modern trendsin Teaching Technology,** Anmol publications Pvt. Ltd. New-Delhi.
4. www.ucs.mun.cal/nemurphy/stemnet/cle.3htmal

5. www.lifecircles-inc.com/..../constructism/...html
6. http://en.wikipedia.org/wiki/constructivistteachingmethods
7. http://www.bie.org/about2/stcenturyskills
8. project based learning-wikipedia, free encyclopedia
9. http:/www.lexiconreadingcenter.org/what.ismutisensoryteaching.

Course Out Comes:

After completion of the course students will be ableto

1.Understand the concepts, importance and scope of ICT

2. Analyze computer networking and ICT enriched teaching &learning experiences.

3. Understand online teaching and learning experiences.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3				3				1	2	2	2
CO2	3		1	2	3				1	2	2	2
CO3	3				3				1	2	2	2

Open Elective

LING: 305ABilingualism

Objectives:

1. to understand speech as social interaction
2. To analyze theory, types and Measurement of Bilingualism
3. To understand Bilingual Education and Bilingualism and ethnocentrism

Unit - I.

Speech as social interaction: Speech functions and speech events; verbal and non-verbal behaviour, speech and social identity, pragmatics of politeness expressions,communicative competence. Code mixing and code switching.

Unit – II

Theoryof Bilingualism, bilingual proficiency, effects of bilingualism, education and bilingualism, language of wider communication (LWC), out-group languages, language identity. Bilingualism as an aspect of Borrowing.

Unit – III

Types of Bilingualism: National, societal, and individual, co-ordinate and compound, stable and unstable, transitional and incipient, ambivalent and partial;

Unit -IV.

Measurement of Bilingualism: Quantitative and Quantitative aspects of languages; direct and indirect measurement of bilingual proficiency.

Unit–V

Social – Psychological Aspects of Bilingual Education, Language attitudes, motivation – instrumental and integrative. Bilingualism and Ethnocentrism.

Suggested Readings:

1. Suzanne Romaine. **Bilingualism.**NewYork. Basil Blackwell Ltd.
2. Kenneth Hyltenstam and Loraine K. Obler (ed.). **Bilingualism across the life span: Aspects of acquisition, maturity and loss.**
3. Kelley, L.G. **Description and measurement of Bilingualism**. University of Toronto Press.
4. Wallace E. Lambert. 1972. **Language psychology and culture.** Stanford. California. Stanford University Press.
5. Hohn Rubin. 1968. **National Bilingualism in Paraguay**. The Hague, Paris. Mouton.
6. Bloomfield, L. (1993). **Language**. New York: Holt.
7. Hamers, J.F., Blanc, M. (1989).**Bilinguality and Bilingualism**. Cambridge University Press

Course Out Comes:

After completion of the course students will be able to

1.Understand speech as social interaction

2.Analyze theory, types and Measurement of Bilingualism

3.Understand Bilingual Education and Bilingualism and ethnocentrism

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3			1	3				1			2
CO2	2				3	1			1			2
CO3	2		1		3				1			1

LING:305B. Mass Media Communication

Objectives:

1.To understand nature, Scope and Types of communication

2.To analyze communication process and models of communication

3.To understand theory of communication and Multimedia Technology

Unit - I

Communication – Nature and Scope of communication function of communication Types of communication, socio-psychological aspects of communication.

Unit-II

Communication Process – One step, two step and multi step flow of communication, verbal and non-verbal communication, different kinds of media, potentialities and limitations of media approach to communication, Media as instrument of social change education and environment.

Unit–III

Communication models, Laswell, Shannon and Weaver Osgood and Schnamm. Danca's helical model, Newcomb's ABX model, Gerbner model, innovation – Different models, uses and gratification of models.

Unit–IV

Communication Theories, normative theory, Selective exposure, Selective perception and selective retention, frame of reference, empathy, psychic mobility, bullet theory, theories of cognition and balance.

Unit -V

Multi media: Impact of convergence of Media, Telecommunications and Computer, Multi media opportunities for the broadcasting, multimedia and consumers expectations, multimedia technology critical to economic development. Role of Computer in the multimedia technology.

Suggested Readings:

1 .Dahama, O.P. & Bhatnagar,. 1989. O.P. **Education and communications for Development.** Oxford & IBH publishing co. New Delhi.

2. Kuppuswamy. **Communications and social development**. Delhi. Sterling publishers, 1976.

3..Yadava pradeepMathus, J.S. **Issues in Mass Communication. The Basic concepts**. New Delhi. Indian Institute of Mass Communication.

4.Richard A. Blum. **Television writing (from concept to contract).** London. Focal Press.

5.George A. Hough. **New writing**. The University of Georgia. Kanishka Publiers.New Delhi.

6.Mehta, D.H. 1979**. Mass communication and Journalism in India**. New Delhi. Allied Publishers, pvt. Ltd.

Course Out Comes:

After completion of the course students will be able to

1.Understand nature, Scope and Types of communication

2.Analyze communication process and models of communication

3.Understand theory of communication and Multimedia Technology

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3			1	3				1	3		3
CO2	3			2	3				1	3		3
CO3	3				3				1	3		2

Semester-IV

S.No	Course Code	Components of Study	Title of the Course			Credit Hrs./ Week	No. of Credits	IA Marks	Sem. End Exam Marks	Total Marks
1	401	Core	1	Language Universals and Linguistic Typology	Mandatory	6	4	20	80	100
2	402		2	Research Methodology		6	4	20	80	100
3	403A	Generic Elective	3a	Lexicography	Opt-2	6	4	20	80	100
	403B		3b	Language Teaching		6	4	20	80	100
	403C		3c	Language Planning						
	403D		3d	Translation						
4	404	Multidisciplinary Course	4	Multidisciplinary Capacity Building	Mandatory	6	4	20	80	100
5	405A	Open Elective	5a	Branches of Linguistics	Opt-1	6	4	20	80	100
	405B		5b	Dictionary Making						
	Total					36	24	120	480	600

* All Core papersare Mandatory

* Generic Elective – Choose Two papers

* Multidisciplinary Course is Mandatory

* Open Electives are for the Students of other Departments. Minimum One paper should be Opted.Extra Credits may be earned by opting for more number of Open Electives depending on the interest of the student through self study.

*Interested students may register for MOOC with the approval of the concerned DDC

LING:401L

Language Universals and Linguistic Typology

Objectives:

1. To analyze language universals and its role of universals in linguistic theory.
2. To understand linguistic typology as a principle of classification.
3. To analyze language families of South Asia, South Asia as a Linguistic area and selected areal features of South Indian languages.

Unit- I.

Language Universals – formal, substantive, implicational. Parameters and markednessprinciples.The role of universals in linguistic theory: Universal grammar and particular grammars, description and explanation.

Unit –II.

Linguistic typology as a principle of classification- analytic (isolating) vs. synthetic, agglutinating vs. fissional (inflectional) vs. polysynthetic, the concept of incorporation. Greenberg's typological indices and the re-interpretation of the classical taxonomy of language types. Typology at non-morphological levels of representation including basic word order typology.

Unit– III.

Language families of South Asia: Distribution, characteristics, enumeration, Areal, features and convergence processes.

Unit– IV.

South Asia as a linguistic area: empirical basis. The concept of Linguistic area. Linguistic change, borrowing, convergence, definitional problems. Diffusion area vs. linguistic area.

Unit – V.

Selected areal features of South Asian languages (dative subject construction, relativity, conjunctive, participle construction, compound verb construction, etc.

Suggested Readings:

1. Bernard Comrie. **Language Universals and Linguistic Typology**. Oxford. Basil Blackwell.
2. Hoseph H. Greenberg. **Universals of language**. London, The M.I.T. Press .
3. Swarajya Lakshmi, V. and AditiMukharjee. **Word orders in Indian Languages**. Hyderaba. Book Links Corporation.
4. AnvitaAbbi. 1992. **Reduplication in South Asian Languages: An Areal, Typological and Historical study**. New Delhi. Allied Publishing Ltd.
5. Emmon Bach and Robert T. Harms. **Universals in linguistic theory**. New York. Holt, Rinehard and Winston. Inc.
6. Croft, W. (2002**). Typology and Universals**. Cambridge: Cambridge UP. 2nd ed.

ISBN 0-521-00499-3

7. Greenberg, Joseph H. (ed.) (1963) **Universals of Language**. Cambridge, Mass.: MIT Press.
8. Song, Jae Jung (2001) **Linguistic Typology: Morphology and Syntax**. Harlow, UK:

Pearson Education (Longman).

9. Song, Jae Jung (ed.) (2011) **Oxford Handbook of Linguistic Typology**. Oxford: Oxford University Press.

Course Out Comes:

After completion of the course students will be ableto

1.Aanalyze language universals and its role of universals in linguistic theory.

2. Understand linguistic typology as a principle of classification.

3.Analyze language families of South Asia, South Asia as a Linguistic area and selected areal features of South Indian languages.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1		3		3		1			2			3
CO2			3			2			3			3
CO3				3	3	1			3	1	3	2

CoreLING:402 Research Methodology

Objectives:

1. To understand purpose, scope, methods and tools of research
2. To understand problem identification, methods of study and scientific methods in field work of research

3.To analyze research work convert to PDF

Unit -I

Research: its meaning, purpose and scope - Methods and tools in research – Scientific objectivity- Inductive and Deductive procedures. Research methods in Social Sciences, Humanities, Language and Literature.

Unit –II

Identification of the problem and selection of the topic for research-The reasons for selecting the problem- Its relevance and importance from the point of view of theory or application orcontribution to knowledge in general.

Unit–III

Methods in the study and collection of the material-The sources of material- collection of source material. Methods of collecting source material.

Unit–IV

Scientific methods in fieldwork: preparation of questionnaire, Scheme ofelicitation, interviews, etc. Monolingual (direct) and bilingual methods of collection of material –Participant observation, selection of informants: Bio-data-speech recording- Phonetic phonemic transcription.The need for a pilot survey and the collection of sample data. The recording of Language material. Types and purposesof filed translation: Analyzing the data. Preparation of the research report. References and bibliography.

Unit-V

Research work convert to PDF: MS word to PDF, EXCEL to PDF, Power point to PDF, Paint to PDF.

Suggested Readings:

1. Gopal, M. H. **Introduction to Research procedure in social sciences**.
2. MargerettStracy. **Methods of Research**.
3. Cambel, W. B. **Form and style in thesis writing**.
4. Tharmalingom, N. **Research Methodology**. Mumbai. Himalaya publishing House.
5. Kothari, C. R. **Research Methodology (Methods and Techniques)**. New Delhi. New Age International Publishers.
6. Petyt, K. M. **The study of dialect and introduction to Dialectology**. London. Andre Deutsch Limited.
7. Longcker, Ronald W. 1972. **Fundamentals of Linguistic Analysis**. New York. Barcourt Brace Jovanovich, Inc.
8. Francis, W. N. and Longman. **Dialectology – An introduction**. London.

9. Radha Krishna Gali and NukalaSubbarayudu, 2021 – **Research Work convert to PDF,**SRK Publications,Tirupati.

Course Out Comes:

After completion of the course students will be able to

1.Understand purpose, scope, methods and tools of research

2.Understand problem identification, methods of study and scientific methods in field work of research

3.Analyze research work convert to PDF

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3			3	3					1		3
CO2	3			3	3	1				2		3
Co3	3			3	3	1				2		3

Generic Elective

LING:403A. Lexicography

Objectives:

1. To understand lexicology and lexicography, notation and format, planning and organization.
2. To analyze types, number and size of dictionaries.
3. To understand dictionary making

Unit – I

Lexicology and Lexicography; Lexical and grammatical meaning ; Components of lexical meaning; Polysemy, Homonymy, Hyponymy, Antonymy, Synonymy; Paradigm, Canonical form; Derivation, Composition; Variation in Language

Unit - II

Notation and Format: Preface, Introduction, Guide to users, Guide to pronunciation.Abbreviations, Punctuations and Symbols, Appendices; Planning and organization.

Unit– III

Types of Dictionaries: Criteria of classification – Encyclopedic vs. linguistics, Synchronic vs. diachronic, general vs. restricted. General Dictionaries, standard descriptive, overall descriptive, Historical dictionaries, Restricted of special dictionaries, Pronouncing and spelling dictionaries. Indices and concordances. Dictionaries of synonymy, etc. Number of languages: Monolingual,bilingual, multilingual. Size of the dictionaries: small, medium, big. Academic dictionaries.

Unit –IV

Dictionary Making: Collection of material sources excerption, total and partial excerption- cleaning- Lexicographic context- Lexicographic achieves or scriptoria, Lexicographers knowledge of the language, use of informants; Selection of entries, Form of lexical units, Density of entries.

Unit – V

Construction of entries: lemma, pronunciation, grammatical indication. The main part of the entry, Lexicographic definition, use of synonyms, etc. Examples, glosses, labels;visual aids, sub-entries reduced entries, presentation of polysemy; Arrangement of entries: types of arrangement: Alphabetical, semantic or ideological.

Suggested Readings:

1. Droszewski. 1973. **Elements of Lexicology and semiotics**. The Hague. Mouton.
2. ing, R.A. 1982. **An introduction to lexicography**. Mysore. CIIL.
3. Zgusta, L. 1971. **Manual of Lexocography**, The Hague, Mouton.
4. Autonia, H. F. 1968. **Lexicography: Current trends in linguistics. Vol.** 4. ITA school. The Hague, Mouton.
5. House holder, F. W. and Sol Saparts (ed.) 1967. **Problems in Lexicography.** Bloomington. Indian University Press.
6. Bejoint, Henri (2000) **Modern Lexicography: An Introduction**, Oxford U.P. ISBN 978-0-19-829951-6

Course Out Comes:

After completion of the course students will be able to

1. Understand lexicology and lexicography, notation and format, planning and organization.
2. Analyze types, number and size of dictionaries.
3. Understand dictionary making

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3		3	1							3
CO2	2			3	3	3					3	2
CO3	2			3	1			3	3			3

LING:403B.Language Teaching

Objectives:

1. To analyze role of Linguistics in language teaching and Methods of language teaching.
2. To analyze language acquisition and second language learning and cognitive models of language learning/teaching.

3.To understand teaching aids, remedial teaching material and computer aidelanguage teaching

Unit - I.

Role of linguistics in Language Teaching: Principles of Language Teaching professional qualifications of Language Teaching. Role of Teacher in language analysis. Discourse analysis, language diversity and educational linguistics.

Unit -II.

Traditional methods of language teaching - grammar translation method,direct method,audio-visual method,Reading method and new methods. Relationship between linguistic theories of language and corresponding teaching methods contrastive analysis and error analysis.

Unit–III.

Language acquisition vs. second language learning, foreign language Teaching learning. Behavioristic and Mentalistic theories. Errors as learning strategies, internal processing- filter, organizer and monitor.

Unit-V.

Cognitive models of language learning/teaching. Attitude, aptitude and acculturation, Teaching material for the different models and target groups, selection, gradation, evaluation, feed back and reinforcement.

Unit -V.

Teaching Aids: Audio-visual, Audio-lingual, language laboratory, etc. Language testing; prognostic, diagnostic, proficiency. Achievement and close tests. Reliability and validity. Remedial teaching material and computer aided language teaching.

Suggested Readings:

1. Stern, H.H. **Fundamental concepts of Language Teaching**. Delhi. Oxford University Press.
2. Robert Lado**. Language Teaching**. Bombay-New Delhi. Tata McGraw-Hill
3. Valerie Kincella. **Language Teaching and Linguistics**. Survey. London. Cambridge University Press.
4. Edward M. Stack. 1960. **The language laboratory and Modern language teaching**. NewYork. Oxford University Press.

5. David Crystal. **The Cambridge Encyclopedia of Language**. NewYork. Cambridge University Press.

Course Out Comes:

After completion of the course students will be ableto

1. Analyze role of Linguistics in language teaching and Methods of language teaching.
2. Analyze language acquisition and second language learning and cognitive models of language learning/teaching.
3. Understand teaching aids, remedial teaching material and computer aide language teaching

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1		3	2			2				1		3
CO2			3	3		2				1	3	2
CO3			3		3	3			3	1		2

LING: 403C Language Planning

Objectives:

1. To understand Nature and Scope of language planning and communication technology
2. To analyze process and problems of language planning
3. To understand types and treatment of language planning

Unit-I:

Nature and Scope: Sociology of language and the notion of planning. The necessity of language planning. Basic premises of language planning. Linguistics and language Planning .Language Problems of developing nations. Language problems in political and administrative process; language problems in society: seeking solutions and making decisions. Variables and planning: Planning sensitive variables: Types of variables: Organizational attitudinal. Demographic and implementation.

Unit-II:

Communication Technology: Language use in Electronics and Mass Media. Basics of Communication. Language movements in India and abroad.

Unit-III :

Process of Language Planning: Major types of language planning. Corpus andstatus planning. Selection/Policy decision, stability/codification,expansion/elaboration, ferentiation/cultivation, code selection.National/Official language. Standardization and writing reform, elaboration, modernization of languages, promotion of language styles and registers, language policy in education, Comparative study of language planning, impact of nationalism on language planning, Agencies of language planning and their role. Implementation process and evaluation procedures. Providing information and feed back for language planning.

Unit-IV:

Problems of Language planning: Non-communication. Orthography, Evaluation of the variations within the standardized form. Limitations of language planning.

Unit-V:

Types and Treatment: A Short survey of basic types of langue conflict and language planning with special reference to he developing nations. Evaluation of language planning in India.

Suggested Readings:

1. Joshua A.Fishman. 1974. Advances in language planning. The Hague,Mouton
2. Fishman, J.A.Ferguson, C.A. and Gupta, J.D.Language problems of developing nations. New York.JohnWiley and sons, Inc.
3. Omkar N. Koul. 1994. Language development and Administration. New Delhi. Creative books.
4. Donna Christian, Linguistics: The Cambridge Survey(Vol.iv), Language Planning: The View fromLinguistics. New York. Cambridge University Press
5. Boris I.Kluyev. India national and language problems.NewDelhi.Sterling publishers Pvt.Ltd.

Course Out Comes:

After completion of the course students will be able to

1. Understand Nature and Scope of language planning and communication technology

2.Analyze process and problems of language planning

3.Understand types and treatment of language planning

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3			2			1			2
CO2			3			2			1			2
CO3			3			2						1

LING:403D. Translation

Objectives:

1.To understand the concept of translation

2.To understand principles and analysis of translation

3.To solve the exercises of translation

Unit –I

The concept of Translation, types of translation, word and sense, equivalence,word level and above word level, grammatical equivalence, formal and dynamic equivalence, loss and gain, ntranslatability, Machine translation. Is translation an art or Science? Translations interpretation, free vs. literal Translation.

Unit – II

Principles of translation, Catford, Nida, etc. Translation procedures: literal, paraphrasing, transcription, Transliteration, borrowing, Transference, neutralization; equivalent: cultural, functional, descriptive; reduction or expansion; thumb rules.

Unit – III

Analysis: word and text. Criteria for analysis, text types. Semantic and communicative translation. Varieties of general meaning, lexical vs. grammatical meaning ,componential analysis. Business language and advertisement,abbreviations and acronyms, coinage and acceptability; speed and adhoc solutions.

Unit – IV

Language development, term planning-challenges, principles in term planning.Metaphor translation. Translation of proper names, types of proper names, role of script in proper names translation. Evaluation and Testing. Role of translation in second language learning/teaching.

Unit – V

Translation exercises: Business letters, official letters, G.Os, Reports, Poetry and Fiction, etc. from English to Telugu, and from Telugu to English.

Suggested Readings:

1. Baker, M. 1992. **In Other words: A Course book on Translation**. London and New York: Routledge
2. Baker, M. (ed) 1998 Rout ledge, **Encyclopedia of Translation Studies,** London and New York. Rout ledge.
3. Catford, John C. 1965. **A Linguistics Theory of Translation,** London Oxford University Press.
4. Newmark, Peter. 1988. '**Translation Theory Practice** – Hall
5. Bassnett-McGuire, Susan 1980 **Translation Studies** London Methuen
6. Baker, Mona; Saldanha, Gabriela (2008). Routledge**Encyclopedia of Translation Studies**.New York: Routledge. ISBN 9780415369305.
7. Parks, Tim (2007). **Translating style: a literary approach to translation - a Translation Approach to literature**. New York: Routledge. ISBN 9781905763047

Course Out Comes:

After completion of the course students will be ableto

1.Understand the concept of translation

2.Understand principles and analysis of translation

3.Solve the exercises of translation

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3			2					1	2
CO2			3			2					1	2
CO3		2	3			2					1	2

Multidisciplinary Course

LING:404Multi-disciplinary Capacity Building

Objectives:

1.To understand Health and Environmental and Social Safety Studies

2.To analyze Physical and Health Education Studies

3.To understand Work Experience and Art Education

Unit-I:

Health and Environmental Studies: Personal hygiene, environmental cleanness(cleanness of hair, nails, teeth, eyes, skin, cloths, shoes, environment etc.,), Factors affecting nutrition level of an individual, need of balanced diet,Importance of balanced diet,, communicable diseases – prevention and care.

Unit-II

Social Safety Studies: Concept of Social safety, Road rules and Traffic symbols, concept and definitions of First Aid, Types First Aid, First Tool Kit/Box, Precautions to be followed in giving First Aid, 104 and 108 services.

Unit-III

Physical and Health Educational Studies: What is Physical Education, Concept, Definition, Importance and Objectives of Physical Education, Role of Physical Education in the development of Psycho – Motor Domain, what is Health Education, Concept, Definition, Importance and objectives of Health Education, Factors affecting Health, difference between Physical and Health Education, Leadership Qualities, Character Building.

Unit-IV

Work Experience: Concept, Scope and Need of Work Experience: Specific Significance of Work Experience of Quality Education, Objectives and Specifications of Work Experience, Basis of Work Experience – Philosophical, Psychological, Socio-Economical basis of Work Experience, de-centralization of Work Experience, Role of Community and Parent-Teacher Association of Work Experience, Dignity of Labour, digging or cleaning of brains, washing or repairing or dying of cloths, clean and green.

Unit-V

Art Education: Art and Aesthetics, Art and Society, Art and Human Development, Place of Visual and Performing Arts in Teaching, Art and Craft Indian Festivals and its Artistic Significance.

Suggested Readings:

1. Dash, B.N. – **Health and Physical Education**, Neel Kamal Publications, Pvt. Ltd., Hyderabad,2010, ISBN: 8183161871,9788183161879.
2. JanakiRamiah,G., GaliRadha Krishna and N.Subbarayudu – **Pedagogy of EnvironmentalStudies at Primary Level**, Jayam Publications, Hyderabad,2019,ISBN: 978-93-87114-33-3.
3. Krishamacharyulu,V. – **Elements of Work Experience,** Neel Kamal Publications Pvt. Ltd., Hyderabad, ISBN:978-81-8316-667-6 .

4. Krishamacharyulu,V. K.Ramanachary and K.VijayaRao – **SamarthyalaPempudala Capacity Building**, Neel Kamal Publications, Pvt. Ltd., Hyderabad,2019, ISBN: 978-81-8316-131-2
5. NCERT, New Delhi - **Work Experience in School Education**, Guide Lines.
6. RadhaKrishna,G and N.Subbarayudu – **Art Education**, Jayam Publications, Hyderabad,ISBN:978-93-85108-56-3

Course Out Comes:

After completion of the course students will be ableto

1.Understand Health and Environmental and Social Safety Studies

2.Analyze Physical and Health Education Studies

3.Understand Work Experience and Art Education

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3			2		3				1		2
CO2	3			2		3				1		2
CO3	3			2		3				1		3

Open Elective

LING 405A. Branches of Linguistics

Objectives:

1. To analyze Language and Linguistics, branches of Linguistics, speech organs.
2. To understand Phonology, Morphology, Syntax, and semantics.
3. To understand types of Interdisciplinary Linguistics and Branches of Applied Linguistics

Unit – I

Definition of Language and Linguistics; Branches of Linguistics. Phonetics – Types of Phonetics, Speech organs. Phonology- Phone, Phoneme and allophone, Types of Phonemes, Phonological Analysis.

Unit – II

Morphology: Morph, Morpheme and Allomorph. Types of Morphemes - Morphological Analysis.

Unit – III

Syntax: Particular and universal grammar, Syntactic, Semantic and Phonological components of grammar – sentences and its constituents.

Unit – IV

Semantics – The terms of Semantics and Meaning; Types of Meaning; Componential analysis, Projection Rules.

Unit – V

Diachronic Vs Synchronic; Types of Interdisciplinary Linguistics; Branches of Applied Linguistics

Suggested Readings:

1. Bloomfield, Leonard (1914). An introduction to the study of language. New York: Henry Holt and Company.
2. Chomsky, Noam (1957). Syntactic Structures. The Hague: Mouton.
3. Hocket, C.F. 1958. **A course in modern linguistics**.York. Macmillan and Co.
4. Bloomfield, L. 1933**. Language**. NewYork. Hol& Rinehart and Winston.
5. Pike, K.L. 1947. **Phonemes: A technique for reducing language to writing**. University of Michigen Press.
6. Nida, E.A. 1946. **Morphology**. Ann Arbor. Michigan University Press.
7. Langacker, Ronanld W. **Fundamental of Linguistics Analysis**. New York. Harcourt Brace Jovanovich, Inc.
8. Chomsky, N. 1965. **Aspects of the theory of syntax**. Cambridge. MIT Press.
9. Verma, S. K. and Krishnaswamy, N. 1998. **Modern Linguistics: An Introduction**. New Delhi. Oxford University Press.Palmer, F.R. 1976.**Semantics: A new out line**. London. Cambridge University Press.
10. Winfred P. Lehmann, **Historical Linguistics: An Introduction** (Second Edition) (Holt, 1973) ISBN 0-03-078370-4
11. RaimoAnttila, **Historical and Comparative Linguistics** (2nd ed.) (John Benjamins, 1989) ISBN 90-272-3557-0

Course Out Comes:

After completion of the course students will be able to

1. Analyze Language and Linguistics, branches of Linguistics, speech organs.
2. Understand Phonology, Morphology, Syntax, and semantics.
3. Understand types of Interdisciplinary Linguistics and Branches of Applied Linguistic

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3			2				2		1
CO2	3		3						1	1		2
CO3	3		3						1	2		2

405B. Dictionary Making

Objectives:

1. To understand types of dictionaries
2. To analyze Monolingual Dictionary Making
3. To analyze Bilingual Dictionary Making.

Unit – I

Definition of Dictionary or Lexicon; **Types of Dictionaries:**Encyclopaedic vs. linnguistic, Synchronic vs. Diachronic, General vs. restricted. General Dictionaries, Standard descriptive, overall descriptive.

Unit-II

Historical dictionaries**;** Special Dictionaries, Pronouncing vs spelling dictionaries. Indices and concordances. Dictionaries of synonymy, etc. Number of languages: monolingual, bilingual, multilingual. Size of the dictionaries: Academic dictionaries.

Unit –III

Monolingual Dictionary Making: Collection of material - excerption, - cleaning- Lexicographic context- scriptoria, use of informants; Selection of entries, Form of lexical units, Density of entries.

Unit – IV

Construction of entries: lemma, pronunciation, grammatical indication. The main part of the entry, Lexicographic definition, use of synonyms, etc. Examples, glosses, labels; visual aids, sub-entries reduced entries, presentation of polysemy; Arrangement of entries: types of arrangement: Alphabetical, semantic or ideological.

Unit-V:

Bilingual Dictionary Making: Collection of Material; Selection of entries Equivalent, translational and descriptive of explanatory equivalent, categorical equivalence. Form of entries: Lemma, spelling, pronunciation, grammatical information. Glosses and labels, examples.

Suggested Readings:

1. Sing, R.A. 1982. **An introduction to lexicography**. Mysore. CIIL.
2. Zgusta, L. 1971. **Manual of Lexocography**, The Hague, Mouton.
3. Autonia, H. F. 1968. **Lexicography: Current trends in linguistics. Vol.** 4. ITA school. The Hague, Mouton.
4. House holder, F. W. and Sol Saparts (ed.) 1967. **Problems in Lexicography.** Bloomington. Indian University Press.
5. Bejoint, Henri (2000) **Modern Lexicography: An Introduction**, Oxford U.P.

ISBN 978-0-19-829951-6

Course Out Comes:

After completion of the course students will be ableto

1.Understand types of dictionaries

2.Analyze Monolingual Dictionary Making

3.Analyze Bilingual Dictionary Making.

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3		3	2					1	1		2
CO2			3	2	1					2		2
CO3	3		3			3			2	1		3

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF HINDI



NEP REVISED SYLLABUS-2020

2023-2024

SRI VENKATESWARA UNIVERSITY

TIRUPATI

Vision

- Provide the knowledge of Literature, its background with philosophy.
- Developing the skills of Language, teaching and critical ability to understand literature.
- Provide the opportunity for needy to get job in regional, state and national level.
- To develop the awareness of environment. Importance of nature in human life and values.
- To develop the maturity of mind, maturity of thought and maturity of expression.

Mission

- To know the Hindi Language and get the knowledge of Hindi Literature to adopt research work and understand the Indian Society, Culture, Heritage and values.
- To impart the history of Hindi literature, the Knowledge of Ancient, Medieval and Modern literature will be obtained with knowledge of subaltern studies, Dalit and Women discourse.
- To know the Hindi language and knowledge of Hindi literature to get capability to teach Hindi as language or literature in School, College and University.
- To get knowledge of language and literature to qualify public examinations and get an opportunity to serve for Nation.
- To know the Translation methods of Hindi form different languages and get an eligibility to work of Translation in Hindi form other Languages in official and non-official level.

➢ The Department of Hindi offering 38 courses to develop language skills, knowledge of Hindi literature written by Hindi Scholars from all over country and as well as around the world. Where capacity of Translation professional behavior of Official language and field of Journalism and Mass Communications are also critical ability for analysis of the literature and further research work. In the two years M.A. Hindi program, students has to read 12 Core papers out of 38 Courses, which are mandatory for all.

Programme Specific Outcomes

➢ Other than Core Courses student has to opt any one out of three compulsory foundations and one from two Elective Foundation along with additional Audit Course for Zero credits in I and II semesters. In III and IV semester student has to opt two Generic Elective Course out of four in each semester, along with Mandatory paper of Skill Oriented and Multidisciplinary Course in each semester, and they has to opt minimum one Open

Elective from other discipline offered by other department in both semesters. M.A. program offered by department of Hindi is going to cover 12 Core Courses, 2 Compulsory foundation, 2 Elective Foundation, 2 Audit Course, 4 Generic Elective, one Skill Oriented and One Multidisciplinary Course and 2 Open Elective (12+2+2+4+1+1+2=24x4=96 Credits) majorly four field of Hindi Knowledge ie History, Language, Literature, Philosophy other than Audit Course.

- In New syllabus department offering Job oriented Course which will help to pass all types of Competitive exams in state and National level along with further study for research work. • Department has fully adopted the syllabus of UGC to pass all types of examinations in different level and get job opportunity in Hindi field.
- The Programme is covered Regional and International Literature along with the literature of Hindi for development of National Integrity, introduced the course on Translated Indian Literature, Comparative Indian Literature course along with Literature of Dalit, Tribal and Women for development of understanding of Socio-cultural scenario.
- To cover regional Importance of Culture and Literature. Department is offering a course on Hindi Literature of Andhra for understanding the contribution of Telugu speaking Hindi writers of Andhra Pradesh, along with Study of Comparative Literature course.
- To know the writing skill of NRI writers and contribution of them towards Hindi title we introduced a course called Pravasi Literature for understanding the International writing of Hindi.
- To understand the Hindi Language in historical, Philosophical and Practical way and also Literature of Hindi in all types such as Poetry, Prose, Novel, short stories, Drama and One Act Play, Essays, Criticism, Autobiography, etc.
- Department introduced program to understand Philosophy of Hindi Language and Literature, Indian and Western poetics, Modern Literary Critical theories and literary movements.
- Department is offered course to learn the History of Hindi Language and Literature-Old, Medieval and Modern Period to present time and Indian Comparative Literature.
- Human Values and Ethics-two Common papers implemented by the guidance of university adopted syllabus as per the guidance of university and prepared by the dept. of Philosophy.
- Department of Hindi offering two papers as External Elective for other department student, coming from different discipline to learn the language and Literature of Hindi in general.

Sri Venkateswara University

College of Arts, Department of Hindi

Tirupati-517502.A.P

(M.A.HINDI SYLLABUS)

Semester-I

Components of Study	Title of the Course	Hrs	Credits	IA	Sem. Exams	Total
Core-Mandatory	101–Sahitya ka Itihas	6	4	20	80	100
	102–Pracheen evam Madhaykaleen Kavya	6	4	20	80	100
	103–Aadhunik Kavita	6	4	20	80	100
	104–Samkaleen Kavita	6	4	20	80	100
Compulsory Foundation-Opt. 1	105-A-Samsamyik Kavita	6	4	20	80	100
	B-Sahityandolan	6	4	20	80	100
	C-Sahitya ki Vaichariki	6	4	20	80	100
Elective Foundation Opt. 1	106-A- Bhasha Vignan aur Hindi Bhasha	6	4	20	80	100
	B-Patrakarita aur Jansanchar madhayam	6	4	20	80	100
Audit Course	107-Human Values & Professional Ethics-I	0	0	00	00	000

Semester-II

Core-Mandatory	201-Aadhunik Sahitya ka Itihas	6	4	20	80	100
	202-Katha Sahitya	6	4	20	80	100
	203-Nataya Sahitya	6	4	20	80	100
	204-Aalochana Sahitya	6	4	20	80	100
Compulsory Foundation Opt. 1	205-A-Gadhya Sahitya	6	4	20	80	100
	B-Anya Gadhya Sahitya	6	4	20	80	100
	C- Andhra ka Hindi Sahitya	6	4	20	80	100
Elective Foundation Opt.1	206–A-Prayojanmulak Hindi aur Rajbhasha	6	4	20	80	100
	B-Anuvad ke Sidhanta aur Prayog	6	4	20	80	100
Audit Course	207- Human Values & Professional Ethics-II	0	0	00	00	000

Semester-III

Core-Mandatory	301-Bhartiya Kavya Shastra ki Parampara	6	4	20	80	100
	302- Hindi Kavya Shastra ka Vikas	6	4	20	80	100
Generic Elective Opt. 2	303-A-Dalit Sahitya	6	4	20	80	100
	B-Aadivasi Sahitya	6	4	20	80	100
	C- Narivadi Sahitya	6	4	20	80	100
	D- Pravasi Sahitya	6	4	20	80	100
Skill Oriented Course-Mandatory	304-Bhasha Shikshan ke Sidhanta aur Prayog	6	4	20	80	100
Open Elective Opt. 1	305-A-Vyavharik Hindi Vyakaran	6	4	20	80	100
	B-Hindi Sahitya ke Nirmata	6	4	20	80	100

Semester-IV

Core-Mandatory	401-Bhartiya Tulnatmak Sahitya	6	4	20	80	100
	402-Paschatya Samiksha Shastra	6	4	20	80	100
Generic Elective Opt. 2	403-A-Anudit Bhartiya Sahitya	6	4	20	80	100
	B-Asmitamulak Sahitya Vimarsha	6	4	20	80	100
	C-Sahitya ka Tulnatmak Adhayayan	6	4	20	80	100
	D-Anusandhan ke Sidhanta aur Dristiya	6	4	20	80	100
Multidisciplinary Course-Mandatory	404-Antar Jananushasnatmak Dristiya aur Pravidhiya	6	4	20	80	100
Open Elective Opt. 1	405-A-Manak Hindi aur Nagrilipi	6	4	20	80	100
	B-Aadhunik Hindi Sahitya ke Nirmata	6	4	20	80	100

(M.A.HINDI SYLLABUS)

	Semester-I	
Core Course Code-**101**	Title of the course :- **Sahitya ka Itihas**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course objective**

1. Student will get an introduction of history of Hindi literature, related on ancient and medieval period, along with literary forms, writing of poets and importance of their writing.
2. Student will be able to get knowledge of ancient, medieval literature, its trends, important writing and its values and relevance to that particular period.
3. Student will be able to get knowledge of various sections of devotional literature in Hindi.
4. Students will be able to understand the social, political, cultu ral and historical background of ancient and medieval literature.

- **Core-Semester-I-Mandatory-101-साहित्य का इतिहास**

I. इतिहास और साहित्येतिहास, हिन्दी साहित्येतिहास लेखन की परम्परा, आधारभूत सामग्री, साहित्येतिहास के पुनर्लेखन कीसमस्याएँ, हिन्दी साहित्य का काल विभाजन, सीमा निर्धारण और नामकरण । आदिकालीन साहित्य की पृष्ठभूमि, ऐतिहासिक परिदृश्य, साहित्य का स्वरूप-सिद्ध साहित्य, नाथ साहित्य, जैन साहित्य, रासो साहित्य, लोक साहित्य एव गद्य साहित्य, साहित्यिक प्रवृत्तियाँ, रचनाकार और रचनाएँ।

II. भक्ति काल-भक्ति का अर्थ, उद्भव और विकास, भक्ति का आरम्भिक स्वरूप, परिस्थितियाँ, भक्ति की धारायें, निर्गुण से सगुण का विकास, निर्गुण एवं सगुण में भेद और प्रमुख प्रवृत्तियाँ, भक्तिकाल की ऐतिहासिक पृष्ठभूमि, सांस्कृतिक चेतना । निर्गुण भक्ति का स्वरूप, आधार दार्शनिक पृष्ठभूमि, प्रमुख सम्प्रदाय, साहित्यिक परम्परा, साधना मूलक चिंतन, परिस्थिति-प्रभाव, कवित्व और काव्य रचना, साधना मार्ग, भक्ति साधना का स्वरूप।

III. हिन्दी संत काव्य- संत काव्य का वैचारिक आधार, संत काव्य की प्रमुख विशेषताएँ, भारतीय धर्म साधना में सन्त कवियों का स्थान, प्रमुख निर्गुण सन्त कवि-कबीर, नानक, दादू, रैदास।हिन्दी सूफी काव्य-सूफी काव्य का वैचारिक आधार एवं दार्शनिकता, सूफी प्रेमाख्यानकों का स्वरूप, हिन्दी सूफी काव्य की प्रमुख विशेषताएँ, हिन्दी के प्रमुख सूफी कवि और काव्य-मुल्ला दाऊद, कुतुबन, मंझन, जायसी।

IV. सगुण भक्ति-स्वरूप, आधार, भेद, दार्शनिक पृष्ठभूमि, अवतारवाद, प्रमुख सम्प्रदाय।हिन्दी कृष्ण काव्य-विविध सम्प्रदाय, वल्लभ सम्प्रदाय, अष्टछाप, भ्रमरगीत परम्परा, गीति परम्परा और हिन्दी कृष्ण काव्य, प्रमुख कृष्ण भक्त कवि और काव्य-सूरदास, नंददास, मीरा और रसखान। हिन्दी राम काव्य-विविध सम्प्रदाय, भक्ति का स्वरूप, दार्शनिक आधार, रामभक्ति शाखा के प्रमुख कवि और काव्य-तुलसीदास, अग्रदास, नाभादास।

V. रीतिकाल-रीति का अर्थ और परिभाषायें, रीतिसाहित्य का स्वरूप, रीति ग्रंथों के भेद, रीति काव्य, रीति ग्रंथ, रीति शास्त्र, रीतिकालीन कवि-रीतिसिद्ध, रीतिबद्ध, रीतिमुक्त, रीतिकालीन आचार्यो का आचार्यत्व, उत्तर मध्यकालीन काव्यधारायें और प्रवृत्तियाँ, रीतिकालीन परिस्थितियाँ, रीतिकाव्य के मूल स्त्रोत, रीति साहित्य की उपलब्धियाँ, प्रमुख कवि और उनकी रचनाएँ-मतिराम, देव, पद्माकर, केशवदास, भूषण, घनानन्द, रहीमदास, वृन्द।

- **Course- Out come**

1. The tradition of writing history of Hindi literature along with determining the time division of Hindi literature will get the knowledge of the background of the particular period of literature.
2. The origin and traditional development of the Bhakti literature and its trends and movements of particular period.
3. The development of ancient literary traditions in medieval poetry in the level of language, expressions and human kindness.
4. The form of devotional literature and achievement of the writers and philosophers in the Bhakti movements at national level.

	Semester-I	
Core Course Code no.**102**	Title of the course:- **Pracheen Evam Madhya Kaleen Kavya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Introduction of trends of the ancient literature developed in medieval poetry.
2. Special refrence of ancient and medieval poetry with the background of literature.
3. Student will be known about the ancient and medieval literature, especial reference of great writers of the particular peried.
4. Student will be able to get knowledge of different trends, branches of ancient and medieval literature.

- **Core-Semester-I-Mandatory-102-प्राचीन एवं मध्यकालीन काव्य**

I. आदिकालीन कविता का इतिहास-कवि और काव्य
   १. **चन्द बरदाइ**-पृथ्वीराज रासा-रेवातट
   २. **अमीर खुसरो**-अमीरखुसरों की पहेलियाँ और मुकरियाँ
   ३. **विद्यापति**-विद्यापति की पदावली-सं. डॉ. नरेन्द्र झा-पद संख्या-(१ से २५ तक)

II. निर्गुण भक्ति धारा की कविता का इतिहास-कवि और काव्य
   ४. **कबीर**- कबीर-सं. हजारी प्रसाद द्विवदी-पद संख्या-(१६० से २०९ तक)
   ५. **मलिक मोहम्मद जायसी**-जायसी ग्रंथावली- रामचन्द्र शुक्ल-(नागमती वियोग खण्ड)

III. सगुणभक्ति धारा की कविता का इतिहास-कवि और काव्य
   ६. **सूरदास**-भ्रमरगीत सार-सं. रामचन्द्र शुक्ल-पद संख्या-(२१से ७० तक)
   ७. **तुलसीदास**- रामचरित मानस-(उत्तरकाण्ड) योगेन्द्र प्रतापसिंह
   ८. **मीराबाई**-मीरा-सं. विश्वनाथ त्रिपाठी-पद संख्या-(१ से २० तक)

IV. रीति कालीन कविता का इतिहास-रीतिसिद्ध कवि और काव्य
   ९. **बिहारी लाल**-बिहारी रत्नाकर-सं. पं. जगन्नाथ दास रत्नाकर-(१ से ७० दोहे)

V. रीति कालीन कविता का इतिहास-रीतिमुक्त कवि और काव्य
   १०.**घनानन्द**- घनानन्द कवित्त- सं.विश्वनाथ प्रसाद तिवारी-(१से ३०पद)

- **Course Out comes**

1. Student will get information about ancient literature with especial study of Chandbardai, Vidyapati and Ameer Khusro.
2. Student will get the knowledge of the poetry of Kabeer, Tulasi, Jaysi and Surdash in medical Hindi literature under the background of Bhakti movement.
3. Student will get the knowledge of the poetry of Bihari and Ghananand in Post medieval Hindi literature.
4. Overall the student will get knowledge of ancient and medieval literature in the practical study with their social and philosophical era.

	Semester-I	
Core Course Code-**103**	Title of the course :- **Aadunik Kavita**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student able to know modern Hindi poetry in the background of independent movements,
2. Able to know how writers developed the awareness in Indian society to develop themselves and improve their confidence level to fight against British government for freedom.
3. Able to know how writers adopted literary movement of romanticism in Hindi literature, express their feelings and common man feeling of life in different level in poetry.
4. Student will be able to know the characteristics of post romanticism poetry along with the introduction of different issues and subjects in their poetry.

- **Core-Semester-I Mandatory-103-आधुनिक कविता**

I. भारतेन्दु युगीन हिन्दी कविता का इतिहास-कवि और कविता
   १.**भारतेन्दु हरिश्चन्द्र**-जय हिन्दी, भारत दुर्दशा, काशी की गंगा,

II. द्विवेदी युगीन हिन्दी कविता का इतिहास-कवि और कविता
   २. **अयोध्यासिंह उपाध्याय हरिऔध**-प्रियप्रवास
   ३. **मैथिलीशरण गुप्त**-साकेत-(नवमसर्ग)
   ४. **माखनलाल चतुर्वेदी**-पुष्प की अभिलाषा, नाश का त्यौहार, गंगा माँग रही है मस्तक,

III. छायावादो हिन्दी कविता का इतिहास-कवि और कविता
   ५. **जयशंकर प्रसाद**-कामायनी-(श्रद्धा, लज्जा, इड़ा सर्ग)
   ६. **सुमित्रानन्दन पंत**-परिवर्तन, प्रथम रश्मि, द्रुत झरो जगत के जीर्ण पत्र,

IV. छायावादो हिन्दी कविता का इतिहास-कवि और कविता
   ७. **सूर्यकांत त्रिपाठी निराला**-राम की शक्ति पूजा, सरोजस्मृति, जुही की कली,
   ८. **महादेवी वमा**-बीन भी हूँ मै तुम्हारी रागिनी भी हूँ, मै नीर भरी दुख की बदली, फिर विकल है प्राण मेरे,

V. छायावादोत्तर हिन्दी कविता का इतिहास-कवि और कविता
   ९. **रामधारी सिंह दिनकर**-उर्वशी-(तृतीय खण्ड)
   १०.**हरिवंश राय बच्चन**-आत्म परिचय, कवि की वासना, मुझे पुकार लो,

- **Course out comes**

1. Student will know the reflextion of independent movement and renaissance of Indian society in modern poetry.
2. Student will be able to get knowledge of their characteristics by knowing the essence of the poems of pre independent poets.
3. Student will know the subject, theme, characters, literary forms along with the development of Khari boli as the language of poetry.
4. Knowing the movement of romanticism in Hindi literarture, theme of the poetry, love of the nature, feeling of the mankind and society in their poems.

	Semester-I	
Core Course Code no.**104**	Title of the course :- **Samkaleen Kavitha**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be able to understand the poetry of post romantic period like – progressive, anti progressive, experimental and contemporary writing of poets.
2. Students will be able to get knowledge of philosophical background and ideological movement of progressive, post prograssive literature, social and political areas.
3. Student will be able to get knowledge of contemporary poetry, its social awareness, philosophical base and its reflection in Hindi literature.
4. Student will be able to aware post independent social, political, ideology development of poetry in modern period and its achievements, presented by contemporary poets in their writing.

- **Core-Semester-I Mandatory-104-समकालीन कविता**

I. प्रगतिवादी कविता का इतिहास-कवि और कवितायें-
   १. **नागार्जुन**-बादल को घिरते देखा है, अकाल और उसके बाद, शासन की बन्दुक,
   २. **केदारनाथ अग्रवाल**-बाप बेटा बेचता है, जनता, धरती,

II. प्रयोगवादी कविता का इतिहास-कवि और कवितायें-
   ३. **अज्ञेय**-हरी घास पर क्षण भर, असाध्यवीणा, कितनी नावों में कितनी बार
   ४. **धर्मवीर भारती**-कविता की मौत, टूटा पहिया, केवल तन का रिश्ता

III. नयी कविता का इतिहास-कवि और कवितायें-
   ५. **गजानन माधव मुक्तिबोध**-भूल और गलती, ब्रह्मराक्षस, अंधेरे में,
   ६. **सर्वेश्वरदयाल सक्सेना**-कुआनो नदी के पार, काठ की घंटियॉ, भेडिए,

IV. जनवादी कविता का इतिहास-कवि और कवितायें-
   ७. **शमशेर बहादुर सिंह**-टूटी हुई बिखरी हूई, पिकासोई कला, एक नीला दरिया बरस रहा,
   ८. **त्रिलोचन शास्त्री**-आत्मालोचन, सहस्त्रशीर्ष पुरूष, अपना ही घर,

V. समकालीन कविता का इतिहास-कवि और कवितायें-
   ९. **सुदामा पाण्डेय धूमिल**-नक्सलबाड़ी, मोचीराम, अकाल दर्शन,
   १०.**भवानी प्रसाद मिश्र**-गीत फरोश, सतपुड़ा के जंगल, अदम्य यह जनता

- **Course Outcomes**

1. Knowledge of the poems of progressive, experimental, new and contemporary trends of poetry in Hindi.
2. Student will get the meaning of the poems of different poets and their poetry, especial context to modern period.
3. Student will get the knowledge of new trends of Hindi poems and its issues express by the poets in different manner to understand their present time.
4. Student will understand the contemporary poems, its subjects, characters, ideology, their activities, reflections and reactions.

	Semester-I	
Compulsory Foundation Course Code no.**105 A**	Title of the course:- **Samsamyik Kavita**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Students will be able to get knowledge of philosophical background, ideological movement of literature, post colonial poetry along with social and political areas.
2. Student will be able to understand the poetry of contemporary period like –post emergency period, ideological, philosophical, socialogical and political movement of India reflected in contemporary writing.
3. Student will be able to get knowledge of contemporary poetry, along with social awareness, philosophical base and reflection of Femanist, Dalit and Trible movement in Hindi poetry.
4. Student will be able to aware post independent social, political, ideological development of poetry in contemporary period and its achievements.

- **Compulsory Foundation-Opt. I-105–A–समसामयिक कविता**

I. समसामयिक कविता का इतिहास–कवि और कवितायें
   १. **अरूण कमल**–शायर को कब्र, बस एक निशान छूट रहा था, उम्मीद,
   २. **राजेश जोशी**–मारे जायेंगे, निराशा, एक कवि कहता है

II. समसामयिक(जनवादी) कविता का इतिहास–कवि और कवितायें
   ३. **आलोक धन्वा**–जनता का आदमी, गोली दागो पोस्टर, कपड़े के जूतें
   ४. **वेणु गोपाल**–मै तुम्हारे साथ हूँ, उड़ते हुए, सफर

III. समसामयिक(नारीवादी) कविता का इतिहास–कवि और कवितायें
   ५. **कात्यायनी**–सात भाइयों के बीच चम्पा, इस लड़की से डरो, हाँकी खेलती लड़कियॉ,
   ६. **अनामिका**–स्त्रियाँ, बेवजह, कूड़ा बीनते बच्चे

IV. समसामयिक(दलित) कविता का इतिहास–कवि और कवितायें
   ७. **ओमप्रकाश वाल्मीकि**–बस्स बहुत हो चुका, तब तुम क्या करोगे, मेरे पुरखे
   ८. **जयप्रकाश कर्दम**–गूँगा नहीं था मै, तिनका–तिनका आग, सर्वनाम जिंदगी

V. समसामयिक(आदिवासी) कविता का इतिहास–कवि और कवितायें
   ९. **निर्मला पुतुल**–बाबा मुझे उतनी दूर मत ब्याहना, नगाड़े की तरह बजतें शब्द, अपने घर की तलाश में
   १०.**सुशीला टाकभौरे**–खोज की बुनियाद, विद्रोहिणी, स्त्री

- **Course Out Comes**

1. Knowledge of the poems of contemporary trends-progressive, experimental, new and contemporary trends of poetry in Hindi.
2. Student will get the meaning of the poems of different poets and their poetry, especial context to contemporary period.
3. Student will get the knowledge of new trends of Hindi poems and its issues express by Femanist, Dalit and Trible poets in different manner to understand their present time.
4. Student will understand the contemporary poems, its subjects, characters, ideology, their activities, reflections and reactions.

	Semester-I	
Compulsory Foundation Course Code no.**105 B**	Title of the course:- **Sahityik Andolan**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will know about the importance of literary movements in literature.
2. Student will be able to know the Bhakti movement of medieval period, independent movement, romantic movement and its reflections in literature.
3. Student will be able to get knowledge of progressive movement, changes world scenario, reflections in literature and cultural development of committed writers.
4. Student will be get the information of Dalit and feminist movement for democratic rights in Indian society for reformation of culturally, socially, ideologically and philosophically.

- **Compulsory Foundation-Opt. I-105-B-साहित्यांदोलन**

I. भक्ति आंदोलन : अध्यात्मवादी- सामंतवाद विरोधी
II. स्वतंत्रता आंदोलन : नवजागरणवादी- साम्राज्यवाद विरोधी
III. स्वच्छन्दतावादी आंदोलन : नव चेतनावादी- पूँजीवाद विरोधी
IV. प्रगतिशील और जनवादी आंदोलन : प्रगतिवादी और जनवादी- फासीवाद विरोधी
V. दलित और नारीवादी आंदोलन : अंबेडकरवादी-अस्मितावादी- वर्ण और वर्ग विरोधी

- **Course Out Comes**

1. Student will get knowledge of Bhakti movement of medieval period in arts, culture and literature.
2. Student will understand independent, romantic movement and its reflection in literature.
3. Student will be able to get knowledge of progressive and janvadi movement in Hindi literature.
4. Student will be get knowledge of Dalit, Tribal and Feminist movement in Indian socity for democratic right to reformation and get equality in Indian society.

	Semester-I	
Compulsory Foundation Course Code-**105C**	Title of the course:- **Sahitya Ki Vaichariki**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Philosophical background of history of literature will be known with traditions of historiography especial referernce to modernity.
2. Student will understand the critical and methodological base of renecienss and Independence movement in literary forms.
3. Student will know the concepts of medievality and modernity, various ideological philosophical developments in Hindi literature.
4. Student will understand the Historical materialist, ideological development of modern philosophy like democracy, socilism, Gandhian and Ambedkar philosophy along with litrary trends.

- **Compulsory Foundation-Opt. I-105-C-साहित्य की वैचारिकी**

I. मध्ययुगीनता और आधुनिक बोध और औद्योगिक संस्कृति,परम्परा और आधुनिकता, पुनर्जागरण, पुनरूत्थान और हिन्दी लोक-जागरण, भारतीय नवजागरण और स्वाधीनता आंदोलन की वैचारिक पष्ठभूमि,खड़ी बोली आंदोलन, फोर्ट विलियम कॉलेज, प्रेस की स्थापना, मुद्रण की व्यवस्था, विभिन्न संस्थाओं का योगदान ।

II. साहित्य में पुनर्जागरण और नवजागरण, हिन्दी नवजागरण, भारतेन्दु युग और हिन्दी नवजागरण, महावीर प्रसाद द्विवेदी युग और हिन्दी नवजागरण, राष्ट्वाद आर अंतर्राष्ट्रीयता।

III. हिन्दी साहित्य में प्रयुक्त विभिन्न विचारधाराओं का विकास-ऐतिहासिक भौतिकवादी दर्शन, द्वन्द्वात्मक भौतिकवादी दर्शन, जैविक दर्शन, विधेयवादी दर्शन, नवआदर्शवादी दर्शन।

IV. मार्क्सवाद, मनोविश्लेषणवाद, अस्तित्ववाद, उत्तरआधुनिकतावाद, गाँधीवादी दर्शन, अम्बेडकर दर्शन, लोहिया दर्शन।

V. भारतीय सांविधानिक-लोकतंत्र, समाजवाद, पंथनिरपेक्षता, दलित, स्त्री, आदिवासी एवं अल्पसंख्यक चेतना और विमर्श।

- **Course Out Comes**

1. Student will know the litrary traditions and modernity, renecienss and indipendent movement along with philosophy in Hindi literature.,
2. Renecienss in Indian society especial reference to Hindi speaking states and development of khariboli in Bhartenduyuga and Divediyuga.
3. Knowledge of various theories to understand the medievality and modernity, critical theory of history of literature and knowledge of historical materialistic development of philosophy.
4. Student will get knowledge of organic evolutional philosophy with different ideologies to understand constitutional rights, democracy, socilism, Gandhism Ambekarism and feminism in Hindi literature.

	Semester-I	
Elective Foundation Course Code-**106A**	Title of the course :- **BhashaVignan aur Hindi Bhasha**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**
    1. Able to know the development of language, vocabularies, words, terms, scripts and their nature, types, division, braches, importance, characteristics and historical development of Indo-Aryan languages, vedic culture, the origin and development of Hindi language.
    2. Student will be able to know the introduction of linguistics, various method of study of sounds, word form, phonology, stylistics, etc.
    3. Understand the nature, scope, importance, division and subdivision of language, base and concept of linguistical forms, morphology, syntax, semantics, vocabulary and structural meaning of Hindi language.
    4. Learning the various forms of Hindi sounds and will be familiar with Hindi composition, understand the syntax, vocabulary, script, and the problems of Hindi language in practical.

- **Elective Foundation-Opt.I-106-A-भाषा विज्ञान और भाषा का इतिहास**

I. भाषा विज्ञान की परिभाषायें, उपयोगिता, अन्य विज्ञानों से सम्बन्ध, अध्ययन की दिशायें, भाषा विज्ञान की शाखाएँ, भाषा का अर्थ. परिभाषायें, प्रकृति, लक्षण, विशेषताएँ, विविध रूप, भाषा उत्पत्ति के सिद्धांत, परिवर्तन की दिशायें और कारण, भाषाओं का वर्गीकरण, भारत के भाषा परिवार, भारतीय आर्य भाषाओं को ऐतिहासिक विकास, आधुनिक भारतीय भाषायें, हिन्दी भाषा और बोलियाँ-वर्गीकरण, क्षेत्र, हिन्दी भाषा का उद्भव और विकास, हिन्दी के विविध रूप, हिन्दी के विभिन्न अर्थ, पूर्वी हिन्दी और पश्चिमी हिन्दी, हिन्दी, उर्दू हिन्दूस्तानी।

II. ध्वनि विज्ञान-तात्पर्य और उत्पत्ति, ध्वनि यंत्र, ध्वनियों का वर्गीकरण, ध्वनियों के भेद, ध्वनियों का परिचय, विकार की दिशायें और कारण, ध्वनि गुण, ध्वनि ग्राम और ध्वनिनियम, ध्वनि परिवर्तन की दिशाये और कारण, हिन्दी की ध्वनियाँ और उसका वर्गीकरण, हिन्दी स्वरों का उच्चारण, व्यंजनों का उच्चारण, हिन्दी ध्वनियों का विकास-हिन्दी की स्वर ध्वनियाँ, व्यंजन ध्वनियाँ, आगत ध्वनियाँ, हिन्दी ध्वनियों का वर्णनात्मक इतिहास, हिन्दी ध्वनिग्राम।

III. रूप विज्ञान या पद विज्ञान- स्वरूप एवं परिभाषा, पद और वाक्य, पद और शब्द, पद और संबंध तत्त्व, अर्थ तत्त्व और संबंध तत्त्व अर्थ तत्व का स्वरूप और भेद, रूप परिवर्तन की दिशाएँ और कारण, रूपिम-विज्ञान, रूपग्रामविज्ञान, रूपिम या रूपग्राम, हिन्दी रूप रचना, हिन्दी के संज्ञा और उसके रूप, सर्वनाम, विशेषण और उसकी श्रेणियाँ और क्रिया, अव्यय और उसके प्रकार, हिन्दी शब्द भंडार, शब्दों के प्रकार, शब्द विस्तार, शब्द रूप-उपसर्ग, तत्सर्ग, तद्भव,देशी विदेशी, उपसर्ग, प्रत्यय, समास, हिन्दी शब्द रचना-उपसर्ग-स्वदेशी, विदेशी, , प्रत्यय-स्वदेशी, विदेशी, समास।

IV. वाक्य विज्ञान और अर्थ विज्ञान-वाक्य की परिभाषा, वाक्य की आवश्यकताएँ, वाक्य के अंग, वाकय रचना का आधार, वाक्य के प्रकार, वाक्य रचना के भेद, वाक्य रचना में परिवर्तन, वाक्य परिवर्तन की दिशाएँ , हिन्दी वाक्य रचना, हिन्दी वाक्य के प्रकार, अर्थ की परिभाषा एवं स्वरूप, अर्थ के प्रकार, अर्थ के नियामक तत्व, अर्थ की प्रवृत्तियाँ, शब्द और अर्थ का सम्बन्ध, अर्थ निर्णय के साधन, अर्थ परिवर्तन की दिशायें और कारण अर्थ विस्तार, अर्थ संकोच, अर्थ प्रसार, हिन्दी का आर्थी संरचना, विभिन्न अर्थ, शब्द, लिंग, वचन, कारक से अर्थ का सम्बन्ध, अर्थ विस्तार, अर्थ संकोच, अर्थ प्रसार।

V. लिपिविज्ञान-अर्थ की परिभाषा एवं स्वरूप, भाषा और लिपि में अन्तर, लिपि का उद्भव और विकास, भारत की प्राचीन लिपियाँ-ब्राह्मी लिपि, खरोष्ठी लिपि का उद्भव और विकास, देवनागरी लिपि का विकास, अंक, विशेषतायें, सुधारों का इतिहास, मानकीकरण, देवनागरी लिपि की वैज्ञानिकता। हिन्दी भाषा और देवनागरी लिपि का मानकीकरण।

- **Course out comes**
    1. They will acquire the knowledge of definitions, types, divisions and braches of linguistics; understand the history of Indo-Aryan languages with origin and development of Hindi language.
    2. They know the background of development of linguistics and languages-like sociological, psychological, historical, cultural and ideological along with classification of Hindi sounds and knowledge of Hindi vocabulary.
    3. They will know the importance of language as communication source; understand the meanings, form and syntax, development of Hindi Pronouns and Devanagari script.
    4. They will understand the meaning of phonetics, directions of sound, nature of morphology, phonology and philosophy of language.

	Semester-I	
Elective Foundation Course Code-**106 B**	Title of the course:- **Patrakarita aur Jansanchar Madhyayam**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Introduction to nature and development of journalism and electronic media along with the beginning of journalism in India and the introduction of Hindi journalism.
2. Will be familiar with the knowledge of journalism, writing and concept of news in Hindi, art of editing and writing related to journalism and the fundamental rights of journalism in democracy.
3. To understand the nature of mass media and the development of media in India, the means of telecommunication and the revolution of mechanical communication.
4. Writing skills of mass media and development of electronic medium, uses of internet in journalism and mass communications.

- **Elective Foundation-Opt.I-106–B–पत्रकारिता और जनसंचार माध्यम**

I. पत्रकारिता : अर्थ, परिभाषा, स्वरूप, पत्रकारिता का आरंभिक स्वरूप और प्रमुख प्रकार, पत्रकारिता का सैद्धांतिक स्वरूप और विकास,पत्रकारिता को नई भूमिका।

II. भारत में पत्रकारिता का आरम्भ, हिन्दी पत्रकारिता का उद्‌भव और विकास या काल विभाजन, पत्रकारिता और हिन्दी भाषा, हिन्दी के प्रमुख पत्रकार, हिन्दी पत्रकारिता की दिशा, समकालीन पत्रकारिता, हिन्दी पत्रकारिता मिशन से मीडिया तक, प्रजातांत्रिक व्यवस्था का चतुर्थ स्तम्भ के रूप में पत्रकारिता का दायित्व, वैश्वीकरण और पत्रकारिता।

III. इलेक्टानिक मीडिया की पत्रकारिता–आकाशवाणी, दूरदर्शन, वीडियो, केबल, मल्टी मीडिया और इंटरनेट की पत्रकारिता, सूचना प्रौद्योगिकी और हिन्दी पत्रकारिता।

IV. संचार–जनसंचार माध्यम : अभिप्राय, अवधारणा, स्वरूप और विकास यात्रा, आधुनिक जनसंचार माध्यम–संभावनाएँ, सीमाएँ व समस्याएँ, भारत में संचार माध्यमों का विकास, जनसंचार माध्यम के विविध रूप।

V. दूर संचार के साधन : टेलीग्राफ, टेलीप्रिण्टर, टेलेक्स, फक्स, रेडियो, यांत्रिक संचार की क्रांति–कम्प्यूटरों का विकास, इंटरनेट और हिन्दी : चुनौतियाँ और संभावनाएँ, इंटरनेट पर हिन्दी, इलेक्टानिक माध्यम।

- **Course- Out Comes**

1. They will get knowledge of the beginning of journalism and cultural development of Hindi journalism along with nature of mass media and the development of electronic media.
2. Student will get the knowledge of independent journalism, genres of writing, concept of news and telecommunication, revolution of mechanical communication.
3. They will know the general principles of editing, writing skills of journalistm, fundamental rights and knowledge of electronic media.
4. They will understand the working methods of mass media, development and importance of internet in world media in present scenario.

	Semester-I	
Audit Course Code no.**107**	Title of the course:- **Human values and Professional Ethics-I**	Credit -0
Internal Marks-00	End Semester Examination Marks:-00	

- **Course Objective**

1. Knowing about nature of ethics and nature of values.
2. Getting to know the ahimsa, satya and brahamacharys.
3. Knowing about Bhagvad Gita and Buddhism.
4. Crime and theories of punishment.

- **Syllabus**

I. Definition and Nature of Ethics – Its relation to Religion Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics – Goals – Ethical Values in various professions.

II. Nature of Values – Good and Bad , Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts – right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.

III. Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (celibacy), Asteya(Non possession) and Aparigraha (Non – stealing). Purusharthas (Cardinal virtues) – Dharma (Righteousness), Artha (Wealth), Kamal (Fulfillment Bodily Desires), Mokshal (Liberation).

IV. Bhagavad Gita- (a) Niskama karma. (b) Buddhism – The Four Noble Truths – Arya astanga marga, (c) Jainism – mahavratas and anuvratas. Values Embedded in Various Religious, Relirious Tolerance, Gandhian Ethics.

V. Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

- **Course outcomes**

1. Student will get knowledge nature of ethics and nature of values.
2. Student gaining knowledge of the ahimsa, satya, brahamacharya.
3. Student will get knowledge about Bhagvad Gita and Buddhism.
4. Gaining knowledge of the crime and theories of punishment.

	Semester-II	
Core Course Code-**201**	Title of the course:- **Adhunik Sahitya Ka Itihas**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Features of pre independent literature and various conditions of modern times will be familiar with the development of Hindi renaissance period, at the time of romanticism, consciousness and the features of renaissance period.
2. Student will get knowledge of various trends of romanticism, progressivism and post colonial poetry and different trends of prose.
3. Student will be familiar with Hindi prose and its writers, their writing in different field and development of modern trends of literature.
4. Student will be familiar with the background of modern literature-social, political, cultural, philosophical and ideological development in language, expressions, ethics and characteristics condition and direction in Hindi prose and poetry.

- **Core-Mandatory-201-आधुनिक साहित्य का इतिहास**

I. आधुनिक काल की सामाजिक, राजनीतिक, आर्थिक एवं सांस्कृतिक पृष्ठभूमि, हिन्दी गद्य का विकास, भारतेन्दु पूर्व हिन्दी गद्य, १८७७ की क्रांति और सांस्कृतिक पुनर्जागरण, भारतेन्दु युग : प्रमुख साहित्यकार, रचनाएँ और साहित्यिक विशेषताएँ, द्विवेदी युग : प्रमुख साहित्यकार, रचनाएँ और साहित्यिक विशेषताएँ।

II. हिन्दी स्वच्छन्दतावादी चेतना का विकास, छायावदी काव्य, प्रमुख साहित्यकार, रचनाएँ और साहित्यिक विशेषताएँ, उत्तर छायावाद की विविध प्रवृत्तियाँ-प्रगतिवाद, प्रयोगवाद, नयी कविता, नवगीत, समकालीन कविता-प्रमुख साहित्यकार, रचनाएँ और साहित्यिक विशेषताएँ।

III. हिन्दी उपन्यास का उद्भव और विकास, प्रमुख धाराएँ, साहित्यकार, रचनाएँ और साहित्यिक विशेषताएँ, हिन्दी कहानी का उद्भव और विकास, प्रमुख कहानी आंदोलन, साहित्यकार, रचनाएँ और साहित्यिक विशेषताएँ।

IV. हिन्दी नाटक का का उद्भव और विकास के चरण, हिन्दी नाटक और रंगमंच, भारतेन्दु युग, प्रसाद युग, प्रसादोत्तर युग, स्वातंत्र्योत्तर युग, साठोत्तर युग और नया नाटक, प्रमुख नाटककार, नाट्य कृतियाँ और साहित्यिक विशेषताएँ हिन्दी एकांकी का उद्भव और विकास, प्रमुख एकांकीकार और एकांकियाँ, उनकी विशेषताएँ।

V. हिन्दी गद्य की प्रमुख विधाएँ : निबंध का उद्भव और विकास, निबन्ध की धाराएँ, हिन्दी के प्रमुख निबन्धकार और निबन्ध, हिन्दी आलोचना का उद्भव और विकास, आलोचना की प्रमुख धाराएँ, आलोचक और उनका आलोचनात्मक लेखन, संस्मरण, रेखाचित्र, यात्रा साहित्य, जीवनी, आत्मकथा, रिपोर्ताज डायरी आदि का विकास, धाराएँ और प्रमुख लेखक तथा विशेषताएँ ।

- **Course Out comes**

1. There will get knowledge of various conditions of independent and renaissance era and the development of Hindi romanticism.
2. Student will get knowledge of various trends of romanticism, prograssivism and post colonial development of Hindi prose and its trends.
3. Student will get knowledge of pre and post independent trends of poetry and prose like novel, stories, dramas, one act plays, essays and criticism in modern Hindi literature.
4. Student will get knowledge with the development of traditions in modern era and their atmosphere, time, condition and directions in Hindi literature.

	Semester-II	
Core Course Code-**202**	Title of the course :- **Katha Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be able to know about the major novelists and short story writers and their writings in deferent period.
2. Student will know about the major novels and short stories in Hindi.
3. Student will get the knowledge of the traditions, types of novels and short stories in Hindi.
4. Student will be able to get the knowledge of Hindi short stories covered by different issues, problems and reflections of the Indian society.

- Core-Mandatory-202–**कथा साहित्य**

I. हिन्दी उपन्यास का इतिहास–प्रमुख उपन्यासकार और उपन्यास

१. **लाला श्रीनिवास दास**–परीक्षा गुरू
२. **प्रेमचन्द**–गोदान
३. **अज्ञेय**–शेखर एक जीवनी
४. **फणीश्वरनाथ रेणु**–मैला आँचल
५. **यशपाल**–झूठा सच

II. हिन्दी कहानी का इतिहास–कहानीकार और कहानियाँ

१. **चन्द्रधर शर्मा गुलेरी**–उसने कहा था
२. **प्रेमचन्द–ईदगाह**
३. **जयशंकर प्रसाद**–आकाशदीप
४. **सुभद्राकुमारी चौहान**–राही
५. **जैनेन्द्र**–अपना–अपना भाग्य
६. **भीष्म साहनी**–चीफ की दावत
७. **निर्मल वर्मा** –परिंदे
८. **शेखर जोशी**–कोसी का घटवार
९. **कृष्णा सोबती**–सिक्का बदल गया
१०. **ज्ञानरंजन**–पिता

- **Course Out come**

1. Student will be able to understand the Indian society by reading the major novel of Hindi.
2. Student will be able to understand the various dimensions of human life depicted in the short stories of Hindi.
3. Students will be able to know the socio-political, cultural problems and goodness by reading the characters depicted in Hindi short stories.
4. Knowledge of socio-historical political background by reading the major characters of novels and short stories in Hindi.

	Semester-II	
Core Course Code-**203**	Title of the course :- **Natya Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will know about the major dramatists and play writers in Hindi.
2. Student will get the knowledge of one act play in Hindi by reading main one act play.
3. Student will be able to get the knowledge of Hindi plays covered by different social issues and human problems in Indian society.
4. Students will be able to know the socio-political, cultural problems and goodness by reading the characters depicted in Hindi dramas and one act play.

- **Core-Mandatory-203-नाट्य साहित्य**

I. हिन्दी नाटक का इतिहास-नाटककार और नाटक

१. **जयशंकर प्रसाद**-चन्द्रगुप्त
२. **मोहन राकेश**-आधे अधूरे
३. **सर्वेश्वरदयाल सक्सेना**-बकरी
४. **धर्मवीर भारती**-अंधायुग
५. **शंकरशेष**-एक और द्रोणाचार्य

II. हिन्दी एकांकी का इतिहास-एकांकीकार और एकांकियाँ

१. **भारतेन्दु**-अंधेर नगरी
२. **रामकुमार वर्मा**-चारूमित्रा
३. **उपेन्द्र नाथ अश्क**-लक्ष्मी का स्वागत
४. **जगदीश चन्द्र माथुर**-रीढ की हड्डी
५. **भुवनेश्वर प्रसाद**-स्टाईक
६. **लक्ष्मीनारायण लाल**-मम्मी ठकुराइन
७. **विष्णु प्रभाकर**-वापसी
८. **मोहन राकेश**-अंडे के छिलके
९. **भारतभूषण अग्रवाल**-महाभारत की एक साँझ
१०. **ममता कालिया**-यहाँ रोना मना है

- **Course Out come**

1. Student will be able to understand the Indian society by reading the major play of Hindi.
2. Student will be able to understand the various dimensions of human life depicted in the one act play of Hindi.
3. Students will be able to know the socio-political, cultural problems and goodness by reading the characters depicted in Hindi one-act play.
4. Knowledge of socio-historical political background by reading the major characters of drama and one act play in Hindi.

	Semester-II	
Core Course Code-**204**	Title of the course :- **Aalochana Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be able to be aware of Hindi criticism, its subjects, issues raised by their writers and critics.
2. Student will be able to know the definitions, trends, types, importance and values of criticism of Hindi.
3. Student will be able to understand the nature of theoretical, ideological and historical development of criticism.
4. Student will get knowledge of Hindi criticism, its trends, major critics and their writings.

- Core-Mandatory-204–**आलोचना साहित्य**

I. आलोचना का स्वरूप, आलोचना की प्रक्रिया, सृजन और समीक्षक की संवेदना, समीक्षा के शाश्वत मूल्य, समीक्षा के भारतीय और पाश्चात्य मानदण्ड, समीक्षा की समस्यायें, समीक्षा के विविध रूप, व्यावहारिक समीक्षा, हिन्दी आलोचना के उदय की परिस्थितियाँ, प्रारम्भिक हिन्दी आलोचना का स्वरूप, पाश्चात्य समीक्षा दृष्टि और हिन्दी आलोचना।

II. हिन्दी आलोचना का विकासक्रम, शुक्लपूर्व हिन्दी आलोचना और आलोचक, शुक्लयुगीन आलोचना का स्वरूप और आलोचक, शुक्लोत्तर हिन्दी आलोचना और आलोचक, स्वातंत्र्योत्तर हिन्दी आलोचना, समकालीन हिन्दी आलोचना और प्रमुख आलोचक।

III. प्रमुख आलोचक–आचार्य महावीर प्रसाद द्विवेदी, आचार्य रामचन्द्रशुक्ल, बाबू गुलाब राय,आचार्य नन्ददुलारे वाजपेयी, आचार्य हजारीप्रसाद द्विवेदी।

IV. इलाचन्द्र जोशी, प्रकाशचन्द्र गुप्त, मन्मथनाथ गुप्त, डा.देवराज उपाध्याय, अज्ञेय, डा. रामविलास शर्मा, डा. नगेन्द्र, नलिन विलोचन वर्मा, डा. देवराज, मुक्तिबोध, शिवदान सिंह चौहान, अमृतराय, डा.रांगेय राघव, डॉ.नामवरसिंह, विश्म्भरनाथ उपाध्याय, शिवकुमार मिश्र, रमेशकुंतल मेघ, अशोक वाजपेयी ।

V. विजयदेव नारायण साही, लक्ष्मीकांत वर्मा, देवराज, रामस्वरूप चतुर्वेदी, रघुवंश, मलयज, नेमिचन्द्र जैन, निर्मल वर्मा, इन्द्रनाथ मदान, मैनेजर पाण्डेय ।

- **Course out- comes**

1. Knowledge of criticism of Hindi, its traditional base of development.
2. Knowledge of criticism, its trends, philosophical background, ideological development and historical process.
3. Knowledge of criticism of Hindi writers, their trends, philosophical, critical and theoretical development in practical criticism and its values implemented by different critics.
4. Importance of major critical trends and their critics, writing of criticism and their contribution in development of Hindi criticism.

	Semester-II	
Compulsory Foundation Course Code-**205A**	Title of the course:- **Gadhya Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be able to aware of Hindi essays and autobiography, its subjects, issues raised by their writers.
2. Student will be able to know the definitions, trends, types, importance, values of essay and autobiography in Hindi.
3. Student will be able to understand the nature of theoretical, ideological, historical development of essays and autobiography writing.
4. Student will get the knowledge of Hindi essays, autobiography, its trends, major writers and their writings.

- **Compulsory Foundation-Opt.I-205-A-गद्य साहित्य**

I. हिन्दी निबन्ध का इतिहास-निबन्धकार और निबन्ध

१. **भारतेन्दु**-दिल्ली दरबार दर्पण
२. **प्रताप नारायण मिश्र**-शिवमूर्ति
३. **बालकृष्ण भट्ट**-शिवशम्भू के चिट्टे
४. **रामचन्द्र शुक्ल**-कविता क्या है
५. **हजारी प्रसाद द्विवेदी**-नाखून क्यो बढते है
६. **अध्यापक पूर्ण सिंह**-मजदूरी और प्रेम
७. **विद्यानिवास मिश्र**-मेरे राम का मुकुट भीग रहा है
८. **नामवरसिंह**-संस्कृति और सौंदर्य
९. **कुबेरनाथ राय**-उत्तराफाल्गुनी के आस-पास
१०. **विवेकी राय**-उठ जाग मुसाफिर

II. हिन्दी आत्मकथा का इतिहास-आत्मकथाकार और आत्मकथाएँ-

१. **हरिवंशराय बच्चन**-क्या भूलूँ क्या याद करूँ
२. **राजेन्द्र यादव**-देहरि भई विदेस
३. **मन्नू भंडारी**-एक कहानी यह भी
४. **तुलसीराम**-मुर्दहिया
५. **रमणिका गुप्ता**-आपहुदरी

- **Course out- comes**

1. Knowledge of essays, autobiography of Hindi and its traditional base of development.
2. Knowledge of essays, autobiography and its trends, philosophical background, ideological development and historical process.
3. Knowledge of essays, autobiography of Hindi writers and their trends, philosophical, theoretical development of essays, autobiography and its values implemented by different writers.
4. Importance of essays, major autobiography, trends and contribution of their writers in development of Hindi essays and autobiography.

	Semester-II	
Compulsory Foundation Course Code-**205B**	Title of the course:- **Anya Gadhya Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be able to understand Hindi Prose, its subjects, issues raised by their writers.
2. Student will be able to know the definitions, trends, types, importance and values of Prose in Hindi.
3. Student will be able to understand the nature of theoretical, ideological and historical development of prose writing.
4. Student will get knowledge of Hindi prose, its trends of major writers and their writings.

- **Compulsory Foundation-Opt.I-205-B-अन्य गद्य साहित्य**

I. **संस्मरण-रामवृक्ष बेनीपुरी**-माटी की मूरतें **महादेवी वर्मा**-ठकुरी बाबा
II. **जीवनी- शिवरानी देवी**-प्रेमचन्द घर में **विष्णु प्रभाकर**-आवारा मसीहा
III. **रिपोताज-धर्मवीर भारती**-युद्ध-यात्रा **कृष्ण चन्दर**-जामुन का पेड़
IV. **यात्रा वृत्तांत-राहुल सांकृत्यायन**-मेरी तिब्बत यात्रा **अज्ञेय**-अरे यायावर रहेगा याद
V. **डायरी-मुक्तिबोध**-एक साहित्यिक की डायरी **रामविलास शर्मा**-पंचरत्न

- **Course out- comes**

1. Knowledge of Hindi prose and its traditional base of development.
2. Importance of prose, its tread, philosophical background, ideological development and historical process.
3. Knowledge of Hindi prose writers, their trends, philosophical and theoretical development of prose and its values implemented by different writers.
4. Importance of major prose trends, their writers, writing of prose and their contribution in development of Hindi prose.

	Semester-II	
Compulsory Foundation Course Code-**205C**	Title of the course:- **Andhra ka Hindi Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course objective**

1. Introduction of history of Hindi literature written by Andhra writers, its trends along with literary forms, writing of poets and importance of their writhing.
2. Student will be able to get the knowledge of literature, its trends, important writing, its values and relevance to that particular period writers of Andhra.
3. Student will be able to get the knowledge of various sections of literature in Hindi writer by Andhra Hindi writers.
4. Students will be able to understand the social, political, cultural and historical background of Hindi literature writer by Andhra Hindi writers.

- **Compulsory Foundation-Opt.I-205-C-आन्ध्र का हिन्दी साहित्य**

I. आन्ध्र की हिन्दी कविताएँ-
   १. कर्णवीर नागेश्वरराव-ढलितों की विनती
   २. चावलि सूर्य नारायण मूर्ति-चतुर्थ तरंग
   ३. डा.पांडुरंगाराव-चाँद को भी हँसी आयी
   ४. आपर्ति सूर्यनारायण-योजन गंधा
   ५. अन्नपुरेड्डी श्री राम रेड्डी-दर्पण के सामने
   ६. आलुरि बैरागी चौधरी-रूग्ण जीवन
   ७. सरगु आर कृष्णमूर्ति-हम को मत रोको
   ८. पी.आदेश्वरराव-कवि की निराशा
   ९. सी.एच. रामुलू-मधुर संघर्ष
   १०.के.रामा नायडु-अनल तरंग

II. आन्ध्र के हिन्दी उपन्यास-आदर्श की बलि वेदी पर-मिक्किलिनेनि सुब्बाराव-मारूति पब्लिशिंग हाउस, हैदराबाद
   लकुमा-बालशौरि रेड्डो-साहित्य भवन प्राइवेट लिमिटेड, इलाहाबाद

III. आन्ध्र की हिन्दी कहानियां-
   १. कर्णवीर नागेश्वरराव-भाग्य
   २. आरिग पुडि-रास्ता निकल ही आता है
   ३. इब्राहीम शरीफ़-परजे
   ४. विनायक राव विद्यालंकार-सभापति का चुना
   ५. बालशौरि रेड्डी-चांदी का जूता

IV. आन्ध्र के हिन्दी नाटक-चावलि सूर्य नारायण मूर्ति- समझौता-हिन्दी प्रचार प्रेस, मद्रास
   यडलपल्लिसीतारामय्या-वीर पांड्य कट्टबोम्मन-लोकमान्य हिन्दी पुस्तक मंदिर, विजयवाड़ा

V. आन्ध्र की हिन्दी एकांकियां-
   १. आरिगपूडि-नेपथ्य, बिजली और बारिश
   २. बालशौरि रेड्डी-सत्य की खोज
   ३. बालचन्द्रमांचाला-वीरपत्नी
   ४. कर्ण राजशेषगिरिराव-भौरे का पहाड़
   ५. एन.एस.दक्षिणामूर्ति-राष्ट की वेदी पर

- **Course- Out come**

1. The tradition of writing Hindi literature by Hindi writers of Andhra along with determining the time division of Hindi literature and background of the periodical literature.
2. The origin and traditional development of Hindi literature by Hindi writers of Andhra and its trends.
3. The development of Hindi literature writern by Hindi writers of Andhra, literary traditions in poetry and prose, development of Hindi language, expressions and human kindness by their writing in Hindi.
4. The form and achievement of the writings, philosophical, socialogical and pshycological background of their literature and contribution in national level.

	Semester-II	
Elective Foundation Course Code-**206A**	Title of the course:- **Proyajan Mulak Hindi aur Rajbhasha**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be able to aware of the various trends of Functional and Rajbhasha Hindi, familiar with office correspondence, its various forms of note writing.
2. Student will be able to get acquainted with the main elements of functional Hindi and the mutual correspondence between the state and central governments in Hindi.
3. Student will get knowledge of functional Hindi in practical as official language.
4. Knowing personal administrative, finance and public relations management. Get to know about functional Hindi and letter writing in Hindi as official language .

- **Elective Foundation-Opt.I-206-A-प्रयोजनमूलक हिन्दी और राजभाषा**

I. प्रयोजनमूलक हिन्दी का अर्थ, परिभाषा, क्षेत्र, विविध प्रकृतियाँ, प्रमुख प्रयुक्ति क्षेत्र और उसकी परिव्याप्ति संविधान में हिन्दी का स्थान, राजभाषा के रूप में हिन्दी का विकास, राजभाषा हिन्दी का कार्यान्वयन, राजभाषा अधिनियम-१९६३, १९७६, राष्ट्रपति आदेश-१९६०, राजभाषा संकल्प-१९६८, कार्यालयी भाषा के रूप में हिनदी का विकास, राजभाषा आयोग और राजभाषा संसदीय समिति और राजभाषा नीति।

II. प्रयोजनमूलक हिन्दी के प्रमुख तत्व-प्रशासनिक हिन्दी का स्वरूप एवं प्रशासन के क्षेत्र-सार्वजनिक ओर निजी क्षेत्रों में राजभाषा कार्यान्वयन का स्वरूप, केन्द्र एवं राज्य सरकारों का आपसी पत्र व्यवहार एवं विभिन्न अधिकारियों, मंत्रियों के मध्य सम्पर्क और वार्तालाप तथा प्रशासनिक पत्र व्यवहार में प्रयुक्त हिन्दी भाषा का स्वरूप, स्थिति, दशा एवं दिशा।

III. राज्य सरकारों के परस्पर आपसी पत्र व्यवहार एवं अधिकारियों केस्तर पर सम्पर्क एवं वार्तालाप में प्रयुक्त हिन्दी भाषा, केन्द्र सरकार द्वारा विदेशी सरकारों से सम्पर्क एवं पत्र व्यवहार तथा वार्तालाप में प्रयुक्त हिन्दी भाषा का स्वरूप ओर सीमायें, केन्द्र सरकार के विविध मंत्रालयों एवं अधिनस्थ विभागों में प्रयुक्त तकनीकी शब्दावली, पदनाम, नामपटल, सूचना पटल, कार्यालयी सूचनायें, विज्ञप्तियाँ, निविदा, नियुक्तियाँ और आवेदन आदि में हिन्दी भाषा का प्रयोग।

IV. राज्य सरकार द्वारा केन्द्र सरकार तथा अन्य राज्य सरकारों से आपसी सम्पर्क में प्रयुक्त भाषा के स्वरूप और अनुवाद की कटिनाइयाँ, केन्द्र एवं राज्य सरकारों के निजी कार्यालयो में कार्यान्विधियों के स्तर पर अनुवाद की आवश्यकतायें एवं कठिनाइयाँ।

V. कार्यालय पत्राचार और उसके विभिन्न रूप-संक्षेपण, पल्लवन, प्रारूपण और आलेख का स्वरूप और महत्व और उसकीजाँच, पत्राचार एवं उसके प्रकार-कार्यालय ज्ञापन, कार्यालय आदेश, परिपत्र, अर्धसरकारी पत्र, प्रस्तांकन, अनुस्मारिका,विज्ञापन, संकल्प, प्रेस, प्रेसनोट, नीलाम, समन, वाणिज्य व्यापार के पत्र और आवेदन पत्र । टिप्पण और आलेखन,आसादनों का पंजीकरण, आसादनों का वितरण, विविध अधिकारियों के द्वारा टिप्पण, टिप्पण के प्रकार, टिप्पण की पद्धतियाँ ।

- **Course Out Comes**

1. Knowledge of the various trends of Functional Hindi, Rajbhasha Hindi and its constitutional importance.
2. Knowledge of key elements of Functional Hindi and correspondence language of central and state government official work.
3. Student will get knowledge of correspondence and its types, official mailing, drafting, noting, corresponding types and its various forms in Functional Hindi.
4. Student will get knowledge of official language Hindi, personal administrative, and finance and public relations management in Hindi language, utility of Hindi language in official level, letter writing and using of technical vocabulary.

	Semester-II	
Elective Foundation Course Code-**206B**	Title of the course:- **Anuvad ke Sidhanth aur Prayog**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course objective**

1. Student will be able to know the meanings, types, process, methods and importance of translation.
2. Student will get to know the definitions, types, branches, tools of translation along with the various problems, solutions and linguistics issues in particular field.
3. Student will be able to understand the nature, types, principles, importance and uses of term of translation in practice.
4. Student will be able to get the knowledge of different types, features and constructions of translation in different field and discipline of knowledge.

- **Elective Foundation-Opt.I-206–B–अनुवाद के सिद्धांत और प्रयोग**

I. अनुवाद का अर्थ, स्वरूप, लक्षण, महत्व, अनुवाद कला, विज्ञान या शिल्प, सफल अनुवादक के गुण और सफल अनुवाद की विशेषताएँ , अनुवाद की प्रक्रिया एवं प्रविधि, अनुवाद के क्षेत्र।

II. अनुवाद के प्रकार, साहित्यिक अनुवाद और साहितयेत्तर अनुवाद मूलनिष्ठ अनुवाद एवं मूलाधृत अनुवाद–अन्य प्रकार–शब्दानुवाद, भावानुवाद, छायानुवाद, सारानुवाद, आशु अनुवाद, वार्तानुवाद, लिप्यांतरण, पुनर्रचना।

III. अनुवाद की शैलियाँ, समस्याएँ : अर्थपरक, शैलीपरक, अनुवाद के सिद्धांत : संदर्भ एवं प्रसंगोचित सिद्धांत, संकेतार्थ सिद्धांत, संतुल्यता का सिद्धांत, वर्णनात्मक एवं व्याख्यात्मक सिद्धांत, पच्चन अनुवादबोध, आशु अनुवाद सिद्धांत,सष्टीपूर्ति का सिद्धांत, पूर्णसरंचना का सिद्धांत।

IV. अनुवाद के उपकरण–बौद्धिक, भौतिक, यांत्रिक, कोश, पारिभाषिक शब्दावली, कम्प्यूटर, अनुवाद पुनरीक्षण : सम्पादन, मूल्यांकन, साहित्यिक अनुवाद की व्यावहारिक और वैज्ञानिक एवं तकनीकी साहित्य के अनुवाद की समस्याएँ ।

V. अनुवाद और भाषाविज्ञान की विभिन्न शाखाएँ, अनुवाद और व्यतिरेकी भाषा विज्ञान, अनुवाद और तुलनात्मक भाषा विज्ञान।

- **Course out comes**

1. Student will get to know of the form, process and methods of translation.
2. Student will gain the knowledge of types of translation as well as problems of translation.
3. Student will acquire the knowledge of translation tools and various branches of translation.
4. Student will know the principle of construction, nature and importance of translation in practical.

	Semester-II	
Audit Course Code no.**207**	Title of the course:- **Human Values and Professional Ethics-II**	Credit -0
Internal Marks-00	End Semester Examination Marks:-00	

- **Course Objective**
    1. Knowing about nature of value education and medical ethics.
    2. Getting to know the business and environmental ethics.
    3. Knowing about the social ethics.

- **Syllabus**

    1. Value Education Definition-relevance to present day – Concept of Human Values – self introspection to Self esteem. Family values Components, structure and responsibilities of family Neutralization of anger- Adjustability – Threats of family life- Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

    2. Medical ethics – Views of Charaka, Sushruta and Hippocatus on moral responsibility – of- medical practitioners. Code of ethics for medical and healthcare professionals, Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering an Ethical issues raised by new biological technology of or Knowledge.

    3. Business ethics – Ethical standards of business – Immoral and illegal practices and there solutions. Characterises of ethical problems in management, ethical theories, and causes of unethical behaviour, ethical abuses and work ethics.

    4. Environmental ethics – Ethical theory, man and nature – Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and Population, Justice and environmental health.

    5. Social ethics – Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media-Impact of Newspapers, Television Movies and Internet.

- **Course Outcomes**

    1. Student will get knowledge of value education and medical ethics.
    2. Student will get knowledge of the business and environment ethics.
    3. Gaining knowledge of the social ethics.

	Semester-III	
Core Course Code no.**301**	Title of the course:- **Bhartiya Kavya Shastra Ki Parampara**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be able to know the main poetics traditions of Sanskrit, with their principles of poetry, its trends, types, norms, traditions, values and importance of poetics.
2. Student will be able to get knowledge of Sanskrit poetics as traditional poetics and its development in Pali, Prakrit, Appabramsha and Hindi poetics.
3. Sanskrit poetics was developed as tradition of Hindi in ancient and medieval period, especial reference to post medieval Aacharyyas.
4. Student will be able to know thinkers of poetics in ancient and medieval period especial reference to Bhaktikaleen, Ritikaleen poets and Aacharyas.

- **Core-Mandatory-301-भारतीय काव्यशास्त्र की परम्परा**

I. संस्कृत काव्यशास्त्र की आचार्य परम्परा, काव्य का स्वरूप, काव्य के लक्षण, काव्य हेतु, काव्य प्रयोजन, काव्य के प्रकार, प्रकार, काव्य भेद-काव्य और रूपक, नाटक तत्व, रूपक के भेद, नाटक के भेद, काव्य-गीतिकाव्य, खण्ड काव्य, महाकाव्य, सहृदय की अवधारणा ।

II. काव्य आत्मा सम्बन्धी सिद्धांत-रससिद्धांत,अलंकारसिद्धांत, रीतिसिद्धांत, ध्वनिसिद्धांत, वक्रोक्ति और औचित्य सिद्धांत

III. भरत मुनि का रस सूत्र और उसके प्रमु ख व्याख्याकार, रस का स्वरूप, रस के अवयव, रस-निष्पत्ति, साधारणीकरण, शब्दशक्तियाँ और ध्वनि का स्वरूप,अलंकार, रीति, गुण, दोष, मिथक,फन्तासी, कल्पना, प्रतीक और बिम्ब।

IV. प्राकृत और अपभ्रंशकालीन काव्यशास्त्रीय परम्परा का विकास और प्रमुख काव्यशास्त्री, अपभ्रंश कालीन काव्यशास्त्रीय चिंतन की परम्परा और उसका विकास।

V. आदिकालीन काव्य चिंतन-सिद्धों, नाथों और जैनों का काव्य चिंतन, रासों रचनाकारों, विद्यापति और अमीर खुसरों का काव्य चिंतन । मध्यकालीन आचायों का काव्यशास्त्रीय चिंतन-भक्तिकाल के काव्यशास्त्रीय चिंतन-संतों, सूफियों और वैष्णव कवियों का काव्यशास्त्रीय चिंतन रीतिकालीन आचायों का काव्यचिंतन-केशवदास, चिंतामणि, भूषण, मतिराम, देव, बिहारी, घनानन्द इत्यादि।

- **Course Outcomes**

1. Knowledge of the Achary tradition of Sanskrit poetics and the main principles of poetry soul.
2. Student will be familiar with the poetic theory of Sanskrit, Pali, Prakrit, Apabramsha and Hindi with their ideological trends of modern literary personalities.
3. Knowledge of ideological thinking of poetry, as principals of poetics in ancient, medieval and modern period of post independence era.
4. Knowledge of writings of poetics by Acharyas, poets in ancient and medieval period.

	Semester-III	
Core Course Code no.**302**	Title of the course:- **Hindi Kavya Shastra Ka Vikash**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Poetic development in modern Hindi from pre independence to contemporary period especial developed by great Aacharyas of Hindi with their writings and ideological conceptual development of modern poetics.
2. Poetic development of Bhartiya aur Divedi yugeen literatry personalities and their writings.
3. Contribution of shuklayugin, shuklottar, romantic poets, thinkers and Aacharya in Poetics.
4. Poetics development by prograssive writers, post colonial poets and literary personalities.

- **Core-Mandatory-302-हिन्दी काव्यशास्त्र का विकास**

I. आधुनिक हिन्दी आचार्यो का काव्यशास्त्रीय चिंतन- भारतेन्दुयुगीन एवं द्विवेदी युगीन काव्य समीक्षा का विहंगावलोकन भारतेन्दु हरिश्चन्द्र, महावीर प्रसाद द्विवेदी, मिश्रबन्धु, पद्मसिंह शर्मा, कृष्णबिहारो मिश्र, अयोध्यासिंह उपाध्याय हरिऔध।

II. शुक्लयुगीन काव्य शास्त्रीय चिंतन-रामचन्द्र शुक्ल, श्यामसुन्दरदास, केशवप्रसाद मिश्र, लाला भगवानदीन, गुलाबराय, हजारी प्रसाद द्विवेदी,छायावादी काव्य चिंतन-जयशंकर प्रसाद, सूर्यकांतत्रिपाठी निराला, सुमित्रानन्दन पंत, महादेवी वर्मा, नन्ददुलारे वाजपेयी, विश्वनाथ प्रसाद मिश्र, नगेन्द्र, भगीरथ मिश्र, नलिन विलोचन शर्मा, रामकुमार वर्मा, शांतिप्रिय द्विवेदी।

III. प्रगतिवादी काव्य चिंतन-शिवदानसिंह चौहान, रामविलास शर्मा, प्रकाशचन्द्र गुप्त, रांगेय राघव, अमृतराय, रमेशकुंतल मेघ, शिवकुमार मिश्र, मैनेजर पाण्डेय।

IV. प्रयोगवादी काव्य चिंतन-अज्ञेय, विजयदेव नारायण साही, देवराज उपाध्याय, रघुवंश, इलाचन्द्र जोशी, लक्ष्मीकांत वर्मा, धर्मवीर भारती, विजेन्द्र स्नातक, डॉ. देवराज।

V. नव्यकाव्य चिंतन- मुक्तिबोध, नामवरसिंह, जगदीश गुप्त, रामस्वरूप चतुर्वेदी, कुमार विमल, अशोक वाजपेयी, निर्मल वर्मा, विद्यानिवास मिश्र इत्यादि ।

- **Course Outcomes**

1. Student will get knowledge of thinking of modern writers, about the creativity, its aspects, responsibilities of writers, values of writing.
2. Student will known the contribution of writing and justification of creativities etc., by development of theoretical criticism in the base of modern ideological and philosophical.
3. Student will get knowledge of poetic developed by great Aacharyas of Hindi by their writings and ideological conceptual development of modern poetics.
4. Student will be able to know the poetic development of pre independent and post colonial period ie romantic poets, thinkers, prograssive writers, contemporary poets and literary personalities.

	Semester-III	
Generic Elective Course Code no.**303A**	Title of the course:- **Dalit Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be familiar with the concept of dalit Literature and movement.
2. Student will be familiar with the characteristics of dalit literature, the ideological strength and philosophical power.
3. Dalit literature will be familiar with the problems of writing of history.
4. Student will be familiar with different types of dalit Literature ie poetry and prose, novel, short stories, autobiography etc.

- **Generic Elective-Opt.II-303-A-दलित साहित्य**

I. **दलित कविताएं**-
१.ओमप्रकाश वाल्मीकि-तब तुम क्या करोगे ?, शायद आप जानते हों, बस्स ! बहुत हो चुका
२.जयप्रकाश कर्दम-किले, वर्णवाद का पहाडा, लालटेन
३.श्योराजसिंह बेचैन-कौंच हूँ मै, अपराध बोध, लडकी ने डरना छोड दिया
४.मोहनदास नैमिशराय-आंदोलन, सच यही है, झाडूँ और कलम
५.सुशीला टाकभौरे-अनुत्तरित प्रश्न, ओ वाल्मीकि, विद्रोहिणी

II. **दलित कथा साहित्य**-उपन्यास-छप्पर : जयप्रकाश कर्दम, मुक्तिपर्व : मोहनदास नैमिशराय,
कहानियाँ-१.ओमप्रकाश वाल्मीकि-पच्चीस चौका डेढ सौ, ४.श्योराजसिंह बेचैन-अस्थियों के अक्षर
२. मोहनदास नैमिशराय-अपना गाँव, ५.कुसुम वियोगी-अन्तिम बयान
३.पुरूषोत्तम सत्यप्रेमी-प्रतिशोध

III. **दलित नाटक साहित्य**-नाटक-अछूतानन्द हरिहर-मायानन्द बलिदान माताप्रसाद-धर्म परिवर्तन
एकांकी-१.दयानन्द बटोही-नईपीढी :नये कर्णधार ४.कर्मशील भारती-गुनाहों की सजा
२.सूरजपाल चौहान-सच कहने वाला शूद्र है, ५.शीलबोधि-पक्षी की कैद
३.रूपनारायण सोनकर-कलेक्टर साहब की भैंस

IV. **दलित आत्मकथा**-जूठन :ओमप्रकाश वाल्मीकि, दोहरा अभिशाप-कौसल्या बैसंत्री

V. **दलित जीवनी**-ज्योतिबा फ्ले, सावित्रीबाई फ्ले, डॉ. अम्बेडकर, रामासामी पेरियार का जीवन परिचय

- **Course Out Comes**

1. Student will get to know the concept of dalit literature and literary movements, with philosophical base and its consciousness.
2. Student will get knowledge with the characteristics of dalit literature, ideological strength and philosophical power.
3. Student will get knowledge of traditional concept of dalit literature and the problems writing its own history.
4. Student will get knowledge of dalit literature in different form, its writers and literary trends like novel, short stories drama, one act play and autobiography etc.

	Semester-III	
Generic Elective Course Code no.**303B**	Title of the course:- **Aadivasi Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be familiar with the concept of trible literature and movement, values, cultural and methical development.
2. Student will be familiar with the characteristics of trible literature i.e ideological strength and philosophical power of trible culture.
3. Trible literature will be familiar with the problems of tribles life, culture, traditions and languages.
4. Student will be familiar with different types of trible literature ie poetry, prose, novel, short stories and autobiography etc.

- **Generic Elective-Opt. II-303-B-आदिवासी साहित्य**

I. **आदिवासी कविताएं**- १.निर्मला पुतुल-आखिर कब तक
२.महादेव टोप्पो-रचने होंगे ग्रंथ
३.जसिंता करकेट्टा-किताबों में ढुँढती हूँ
४.अनुज लुगुन-गुरिल्ले का आत्मकथन
५.ग्रेस कुजूर-कलम को तीर होने दो
६. रोज केरकेट्टा-पहली बारीश
७.फांसिस्का कुजूर-पहाड़ की बेटी
८.वंदना टेटे-कविताओं वाली नदी
९. रामदयाल मुड़ा-जंगल जल रहे है
१०.ओली मिंच-कुदरत का रिवाज

II. **आदिवासी कथा साहित्य**-उपन्यास-रणेन्द्र-ग्लोबल गांव के देवता,
महुआ माझी-मरंग गोडा नीलकण्ठ हुआ
कहानी-१. कॉमरेड मीणा-केदार प्रसाद मीणा
२.मंगलसिंह मुण्डा-महुआ का फ्ल,
३.रोज केरकेट्टा-आंचल का टुकड़ा
४. वाल्टर भेंगरा-जंगल की ललकार
५. रामदयाल मुंडा-उस दिन रास्तें में

III. **आदिवासी नाट्य साहित्य**-विनोद कुमार-बुधनी

IV. **आदिवासी आत्मकथा**-सीता रत्नमाल-जंगल से आगे **डायरी लेखन**-पुष्पराज-नंदीग्राम डायरी

V. **यात्रा वृत्तांत**-हरिराम मीणा-जंगल जंगल जलियांवाला **संस्मरण**-रामशरण जोशी-यादों का लाल गलियारें

- **Course Out Comes**

1. Student will get knowledge with the concept of trible literature and literary movements, philosophical base of trible literature and its consciousness.
2. Student will get knowledge with the characteristics of trible literature i.e ideological strength and philosophical power.
3. Student will get knowledge of traditional concept of trible literature and the problems writing its own history.
4. Student will get knowledge of trible literature in different form, its writers and literary trends like novel, short stories drama, one act play and autobiography etc.

	Semester-III	
Generic Elective Course Code no.**303C**	Title of the course:- **Narivadi Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. To know the nature of feminist thoughts and writings in Hindi.
2. To know the various dimensions of feminist thoughts in Hindi.
3. To know the position and direction of female personalities in Hindi.
4. To understand the literature of feminist writers like poetry, prose, short story, novel and autobiography etc.

- **Generic Elective-Opt. II-303-C-नारीवादी साहित्य**

I. **नारीवादी कविताएं** - १. **अनामिका**- डाक टिकट, छिटकी हुई ईंटें,
२. **कात्यायनी**-सात भाईयों के बीच चम्पा, हाँकी खेलती लडकियाँ,
३. **गगन गिल**-यह लडकी जब उदास होगी, एक दिन लौटेगी लडकी,
४. **अर्चना वर्मा**-शोकगीत, सबूत,
५. **निर्मला पुतुल**-अपने घर की तलाश में, क्या तुम जानते हों

II. **नारीवादी कथा साहित्य**-उपन्यास-इदन्नमम् : **मैत्रेयी पुष्पा**, दौड : **ममता कालिया**,
कहानियां-१.बोलने वाली औरत-**ममता कालिया** ४.सौदा-**चित्रा मृद्गल**
२.तीन किलों की छोरी-**मृदुला गर्ग** ५.मेरा घर कहाँ-**नासिरा शर्मा**
३. कोठरी में लड़की-**मृणाल पांडे**

III. **नारीवादी नाट्य साहित्य**-नाटक-**बिना दीवारों के घर**-मन्नू भंडारी **नंगा सत्य**-सुशीला टाकभौरे,

IV. **नारीवादी आत्मकथा**-**अन्या से अन्नया**-प्रभाखेतान, **पिंजरे की मैना**-चन्द्रकिरण सोनरेक्सा

V. **नारीवादी संस्मरण**-**हम हशमत**-कृष्णा सोबती, **कृति और कृतिकार**-मृदुला गर्ग

- **Course Out Comes**

1. Student will get the knowledge of nature of feminist thoughts and writings in Hindi.
2. Student will get the knowledge of the various dimensions of feminist thoughts in Hindi.
3. Student will get the knowledge of the position and direction of female personalities.
4. Student will get an opportunity to understand the literature like poetry, prose, short stories, novels and autobiography of feminist writers.

	Semester-III	
Generic Elective Course Code no.**303D**	Title of the course:- **Pravasi Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. To know the nature of literature thoughts and writings in Hindi by NRI.
2. To know the various dimensions of NRI literary thoughts in Hindi.
3. To know the position and direction of NRI personalities in Hindi.
4. To understand the literature of NRI writers like poetry, prose, short story, novel and autobiography etc.

- **Generic Elective-Opt. II-303-D-प्रवासी साहित्य**

I. **प्रवासी कविताएँ-**

१. सत्येन्द्र श्रीवास्तव-ख़ूनी खेतों के खिलाड़ी
२. मोहन राणा-अर्थ शब्दों में नहीं तुम्हारे भीतर है
३. डा.पद्मेश गुप्त-बर्लिन दीवार
४. शिखा वार्ष्णेय-गर्वीला प्रेम
५. ऋचा जैन-ब्राउन पॉपी
६.निखिल कौशिक-समझदार लोग
७. छुष्पा भार्गव-लंदन की बरसात
८.तोषी अमृता-शून्यता
९.तरूण कुमार-संवाद के फूल
१०.स्वाति पटेल-लंदन तुझसे प्यार हुआ

II. **प्रवासी कहानियाँ-**

१. तेजेन्द्र शर्मा-कोख का किराया
२. जकिया जुबैरी-साँकल
३. जयवर्मा-गुलमोहर
४. सुधा ओम ढींगरा-कौन सी जमीन अपनी
५.अनिल प्रभा कुमार-बे मौसम की बफं

III. **प्रवासी उपन्यास**-अभिमन्यु अनत-लाल पसीना उषा प्रियवंदा-रूकोगी नहीं राधिका

IV. **प्रवासी नाट्य साहित्य**-नाटक-प्रो.हरिशंकर आदेश-देशभक्ति,

V. **प्रवासी गद्य साहित्य**-यात्रा वृतांत-कृष्ण बिहारी-सागर के इस पार से उस पार,
डायरी-कृष्ण बलदेव वैद्य-ख्वाब है दिवाने का

- **Course Out Comes**

1. Student will get the knowledge of nature of NRI thoughts and writing skill in Hindi
2. Student will get the knowledge of the various dimensions of NRI thought in Hindi.
3. Student will get the knowledge of the position and direction of NRI personalities.
4. Student will get an opportunity to understand the literature like poetry, prose, short stories, novels and autobiography of NRI writings in Hindi.

	Semester-III	
Skill Oriented Course Code no.**304**	Title of the course:- **Bhash Shikshan ke Sidhanta aur Proyog**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course objective**

1. Student will be able to know the meanings, types, process, methods and importance of language teaching.
2. Student will get knowledge of definitions, types, branches, tools of language teaching along with the various problems, solutions and linguistics issues in particular field.
3. Student will be able to understand the nature, types, principles, importance and uses of term of language teaching in practice.
4. Student will be able to get knowledge of different types, features and constructions of language teaching in different level in practical.

- **Skill Oriented Course-Mandatory-304-भाषा शिक्षण के सिद्धांत और प्रयोग**

I. भाषा शिक्षण का उद्देश्य और स्वरूप, विविध आयाम–मातृभाषा, प्रथम भाषा, द्वितीय भाषा,पर भाषा, विदेशी भाषा, सम्पर्क भाषा, मातृभाषा शिक्षण और अन्य भाषा शिक्षण में अन्तर–द्वितीय भाषा शिक्षण और विदेशी भाषा शिक्षण।

II. भाषा शिक्षण की विधियाँ : व्याकरण विधि, अनुवाद विधि, व्याकरणानुवाद विधि, तुलनात्मक विधि, मिश्र विधि, मौखिक वार्तालाप विधि, प्रत्यक्ष विधि, सर्वभाषा विधि, अभिक्रमिक स्वाध्याय विधि,।

III. भाषा कौशल और उसका विकास, श्रवण, भाषण, वाचन और लेखन का कौशल का स्वरूप और उनके योग्यता प्राप्ति के विविध स्वरूप।

IV. भाषा शिक्षण में उपयोगी साधन सामग्री, औपचारिक भाषा शिक्षण–आकाशवाणी, सिनेमा, दूरदर्शन आदि, भाषा शिक्षण और अभिरचना अभ्यास–आधारभूत सिद्धांत और मान्यताएँ, अभिरचना अभ्यास की सार्थकता और सीमाएँ।

V. भाषा परिक्षण और मूल्यांकन, भाषा शिक्षण में निदानात्मक और अपचारात्मक विधियाँ, द्वितीय भाषा और विदेशी भाषा से रूप में भाषा शिक्षण, हिन्दी उच्चारण, वर्तनी और व्याकरण का शिक्षण।

- **Course out comes**

1. Student will get the knowledge of forms, process and methods of language teaching.
2. Student will gain the knowledge of types of language teaching as well as problems of the same.
3. Student will acquire the knowledge of language teaching, tools and various branches of language teaching.
4. Student will know the principle of construction, nature and importance of language teaching in practical.

	Semester-III	
Open Elective Course Code no.**305 A**	Title of the course:- **Vyavaharik Hindi Vyakaram**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**
  1. To know the nature and word wealth of Hindi language.
  2. To Know the Devanagari script, sound, vowels and consonants.
  3. Knowing sentence, gender, words, factor and meaning of Hindi tenses.

- **Open Elective-Opt.I-305-A-व्यावहारिक हिन्दी व्याकरण**

I. हिन्दी वर्णमाला-ध्वनि, वर्णमाला, लिपि-स्वर और व्यंजन-परिभाषा और वर्गीकरण, अनुस्वर, विसर्ग, संयुक्त व्यंजन, बारह खडी वर्तनी और उच्चारण।
II. हिन्दी की व्याकरणिक संरचना-प्रयोग एवं वर्गीकरण-संज्ञा, सर्वनाम, विशेषण, क्रिया विशेषण, समुच्चयबोधक, सम्बन्धबोधक, विस्मयादिक : परिभाषा और प्रकार।
III. हिन्दी वाक्य विचार-वाक्य परिभाषा और प्रकार-सरल वाक्य, संयुक्त वाक्य, मिश्र वाक्य, अर्थ के आधार पर वाक्य के प्रकार, हिन्दी वाक्य रचना, पदक्रम और अन्विति, वर्तनी शुद्धिकरण।
IV. हिन्दी लिंग, वचन कारक-पुल्लिंग, स्त्रीलिंग, लिंग पहचान, लिंग निर्णय के नियम, वचन-परिभाषा और स्वरूप-एकवचन, बहुवचन, वचन परिवर्तन के नियम, कारक-परिभाषा और प्रकार, कर्ता कर्म, करण, सम्प्रदान, अपादान, सम्बन्ध, अधिकरण, सम्बोधन।
V. हिन्दी काल अर्थ और वाच्य-काल-परिभाषा और प्रकार-वर्तमानकाल, भूतकाल, भविष्यत्काल, उनके भेद। अर्थ की परिभाषा और प्रकार, वाच्य : परिभाषा और प्रकार-कर्त्तावाच्य, कर्मवाच्य, और भाववाच्य, हिन्दी शब्द रूप-तत्सम्, तद्भव, दशज और विदेशी-परिभाषा और उदाहरण।

- **Course Outcomes**
  1. Student will get the knowledge of nature and word wealth of Hindi language.
  2. Student will get the knowledge of the Devanagari scruipt, sound, vowels and consonants.
  3. Student will gain knowledge of the Hindi sentence, gender, words, factor and meaning of Hindi tenses.

	Semester-III	
Open Elective Course Code no.**305 B**	Title of the course:- **Hindi Sahitya Ke Nirmatha**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

  1. To know about Amir khusro, Vidyapati and Kibeer as social reformer in Hindi.
  2. To know about Jayasi, Surdash and Tulasidas as great writers of Hindi literature.
  3. Knowing the characteristics of Mirabai, Raskhan, Rahim and Bihari as poets.

- **Open Elective-Opt.I-305-B-हिन्दी साहित्य के निर्माता**

I. अमीर खुसरो और खडीबोली — विद्यापति और कृष्ण भक्ति
II. समाज सुधारक कबीर — जायसी की प्रेम कथा
III. सूर का वात्सल्य — तुलसी की रामभक्ति
IV. मीरा के पद — रहीम के दोहे
V. रसखान के सवैये — बिहारी की श्रृंगारिकता

- **Course Outcomes**
  1. Student will get the knowledge of Ameer Khusro, Vidhayapati, Kabir, and Jayasi.
  2. Student will learn about the medieval poets-Sur, Tulsi, Meera, Raskhan, Rahim, Bhihari and importance of their poetries.
  3. Student will be able to get the knowledge of ancient and medieval poets and poetry, especial reference to Bhakti movement.
  4. Student will be able to get information regarding literary trends, developed in pre modern period.

	Semester-IV	
Core Course Code no.**401**	Title of the course:- **Bharatiya Tulnatmak Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course objective**
  1. Student will get the knowledge of comparative Indian literature with definitions, concept, nature and importance.
  2. Student will be able to know the developments of comparative Indian literature along with the literary movements, cultural traditions, social reformations and historical activity.
  3. Student will get the knowledge of ideological, philosophical, ethical, linguistically and sociological base of comparative Indian literature.
  4. Student will be able to know the different stages, trends, traditions, linguistically discourses, ideological and philosophical conciseness, historical reflections of literary and cultural movements.

- **Core-Mandatory-401-भारतीय तुलनात्मक साहित्य**

I. तलनात्मक साहित्य का अर्थ, परिभाषा और स्वरूप, आरम्भिक विकास, तुलनात्मक साहित्य,राष्टोय साहित्य, विश्व साहित्य सामान्य साहित्य में अन्तर, तुलनात्मक साहित्य के अध्ययन-अध्यापन की प्रविधि-प्रक्रिया और अपेक्षाएँ तुलनात्मक साहित्य के अध्ययन की प्रक्रिया और समस्याएँ ।

II. तुलनात्मक साहित्य और साहित्यिक सिद्धांत का सर्वेक्षण, तुलनात्मक साहित्य की उपयोगिता, क्षेत्र और चुनौतियाँ,तुलनात्मक अध्ययन का स्वरूप और समस्याएँ, आलोचना-प्रविधि, अनुवाद, अनुसंधान, तुलनात्मक अध्ययन बनाम तुलनात्मक साहित्य, तुलनात्मक साहित्य का अध्ययन एवं शोधकार्य, अनुवाद की भूमिका।

III. भारतीय साहित्य की अवधारणा और स्वरूप, विकास के चरण, सांस्कृतिक वैशिष्टय और मूल चेतना,भारतीय साहित्य का समाजशास्त्र और प्रभावित करने वाली चिंतन धाराएँ, अध्ययन और इतिहास लेखन की समस्याएँ।

IV. भारतीय साहित्य में भक्ति चेतना, औपनिवेशिक चेतना-राष्टोय और नवजागरणवादी चेतना, स्वच्छन्दतावादी और यथार्थवादी चेतना।

V. भारतीय साहित्य में प्रगतिवादी और जनवादी चेतना, उत्तरऔपनिवेशिक और उत्तरआधुनिक अस्मितामूलक चेतना-नारीवादी चेतना, दलित और आदिवासी चेतना इत्यादि ।

- **Course-Out-comes**

  1. Student will get information about the comparative Indian literature, its concept and form of Indian literature and various stages of development.
  2. Student will able to understand the problem of writing, devotional consciousness of comparative Indian literature with cultural features and influencing thoughts.
  3. Knowledge of national independence movements, renaissance, romanticism, realism, progressivism and post colonial realistic consciousness reflected in comparative Indian literature.
  4. In comparative Indian literature, the knowledge of democratic values, subaltern studies with their philosophy, movement of social reformation and identity in literature.

	Semester-IV	
Core Course Code no.**402**	Title of the course:- **Paschatya Samiksha Shashtra**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course objective**

1. Student will get the knowledge regarding philosophical and ideological development of pre Plato's period in western criticism by Greek thinkers.
2. Student will be able to know the trends of western criticism from Plato to I.A. Richards.
3. Student will understand classical, neo classical, new criticism, romantic and realistic critical theories in modern period.
4. Student will be able to know about Marxist, psychologist, existentialistic and post modern critical theories in western criticism.

- **Core-Mandatory-402–पाश्चात्य समीक्षा सिद्धांत**

I. **प्लेटो पूर्व युग और यूनानी आचार्य** : होमर, हेसिओद, पिंडार, गॉर्गियस, अरिस्तोफनीज, जेनोफनीज, हिरैक्लिटस, सुकरात, प्लेटो, अरस्तु, लौंजाइनस, लैटिन–रोमन आचार्य – बेन जॉनसन।

II. **नव्यशास्त्रवादी, रोमनानी और आधुनिक समीक्षक** –जॉन डाइडन, सैमुअल जानसन, विलियम वर्ड्सवर्थ, सैमुअल टेलर कॉलरिज, मैथ्यू अर्नाल्ड, बेनेदेतो क्रोचे, टी. ई. ह्यूम, टी.एस.इलियट, आई.ए.रिचर्ड्स।

III. **मार्क्सवादी चिन्तक और समीक्षक**–कार्ल मार्क्स, फडरिक एंजिल्स, वी.आई. लेनिन, मैक्सिम गोर्की, स्टालिन, माओ त्से तुंग, जी.बी. प्लेखानोव, राल्फ फॉक्स, अन्र्स्ट फिशर, हावर्ड फास्ट, क्रिस्टोफर काडवेल, जार्ज लुकाच, जार्ज थामसन।

IV. **मनोविश्लेषणवादी, अस्तित्ववादी और नयी समीक्षा के चिन्तक और समीक्षक**–सिगमड फायड, कार्ल गुस्ताव जुंग, ऐल्फड एडलर, सोरेन कीर्केगार्द, मार्टिन हेडेगर, कार्ल जास्पर्स, काक्का फान्ज, ज्यॉ पाल सार्त्र, अल्बेयर कामू, जे.सी.रैम्सन, एलेन टेट, क्लीन्थ ब्रुक्स, डब्लू, के.विम्साट, रेनेवेलेक, आस्टिन वारेन।

V. **समसामयिक आलोचक**–फर्नीनांड सस्यूर, रोमन जैकोब्सन,क्लाडे लेविनस स्त्रौस, रोला बॉर्थ, माइकेल फ्को, फडरिक जेमेसन, टेरी ईगल्टन, एडवर्ड सईद।

- **Course Out Comes**

1. Student will get the knowledge of Plato's pre period and introduction to Greak thinkers.
2. Student will get the knowledge of western criticism from Plato to post modernist period.
3. Student will get an introduction to all types of modern literary critical theories and thinkers.
4. Student will get the knowledge of historical, philosophical development of western criticism by the different thinkers of various fields of knowledge and disciplines.

	Semester-IV	
Generic Elective Course Code no.**403 A**	Title of the course:- **Anudit Bhartiya Sahitya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course objective**

1. Student will get the knowledge of translated poetry of Indian languages with meaning, types, process, methods and importance.
2. Student will be able to know the developments of translated short stories of Indian languages along with definitions, various problems, solutions and linguistics issues in particular field.
3. Student will get the knowledge of translated novels and dramas of Indian languages with ideological, philosophical, ethical, linguistically and sociological base.
4. Student will be able to know the different stages, trends, traditions, linguistically discourses, ideological, philosophical conciseness and historical reflections of translation of thinking with literary and cultural movements.

- **Generic Elective-Opt.II-403-A-अनुदित भारतीय साहित्य**

I. अनुदित कविताएँ-

१. **बंग्ला**-जहाँ चित्त भये शुन्य-रवीन्द्रनाथ टैगोर
२. **उड़िया**-वर्षा की सुबह-सीताकांत महापात्र
३. **तमिल**-स्वतंत्रता-सुब्रह्मयम भारती
४. **मलयालम**- गौरैय्या-अय्यप्प माणिकर
५. **मराठी**-पृथ्वी का प्रेम गीत-कुसुमाग्रज
६. **पंजाबी**-बहुमुल्य उपहार-भाईवीरसिंह
७.**असमिया**-धनश्री के लिए दो स्तबक-नवकांत बरूआ
८. **गुजराती**-वर दे इतना-उमाशंकर जोशी
९. **तेलुगु**-महाप्रस्थान-श्रीरंगम् श्रीनिवासराव श्रीश्री सुब्बाराव
१०.**कन्नड**-उजाला-दत्तात्रेय रामचन्द्र बेन्द्रे

II. अनुदित कहानियाँ-

१. **तेलुगु**-मुझ पर कहानी नहीं लिखोगे ?-बुच्चिबाबु
२. **कन्नड**-मॉ-यू.आर. अनंतमूर्ति
३. **तमिल**-शाप-मुक्ति-दुदमैपित्तन
४. **मलयालम**-तहसीदार के पिता-तकषि शिवशंकर पिल्लई
५. **पंजाबी**-अपरिचित, परिचित चेहरा-कर्तार सिंह दुग्गल
६. **मराठी**-भूख-बाबूराव बागुल
७. **गुजराती**-पोट आफिस-धूमकेतु
८. **सिन्धी**-अधिकार-मोतीलाला जोतवाणी
९. **उर्दू**-टोबाटेकसिंह-सहादत हसन मण्टों
१०. **बंगला**-काबुलीवाला-रवीन्द्रनाथ टैगोर

III. **अनुदित उपन्यास-उड़िया**-छह बीघा जमीन-फकीर मोहन सेनापति **बंगला**-अग्निगर्भ-महाश्वेता देवी

IV. **अनुदित नाटक-कन्नड**-हयवदन-गिरिश कर्नाड **तेलुग**-कन्याशुल्कम्- गुरूजाड़ा वेंकट अप्पाराव

V. **अनुदित कृति-मराठी**-गुलामगिरी-जोतिराव फले-अनु.डा.विमलकीर्ति

- **Course-Out-comes**

1. Student will get the information about translated Indian literature, its concept, form of Indian literature and various stages of development.
2. Student will be able to understand the problem of writing, devotional consciousness of translated Indian literature with cultural features and influencing thoughts.
3. Knowledge of national independent movements, renaissance, romanticism, realism, progressivism and post colonial realistic consciousness reflected in translated Indian literature.
4. In translated Indian literature the knowledge of democratic values, subaltern studies, their philosophy, movement for social reformation and identity in literature.

	Semester-IV	
Generic Elective Course Code no.**403 B**	Title of the course:- **Asmitamulak Sahitya Vimarsha**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Student will be able to aware of contemporary criticism, its subjects, issues raised by their writers and critics.
2. Student will be able to know the definitions, trends, types, importance and values of contemporary criticism of Hindi.
3. Student will be able to understand the nature of theoretical, ideological, historical development of contemporary criticism.
4. Student will get the knowledge of Hindi criticism, its trends, major critics and their writings.

- **Generic Elective-Opt.II- 403-B-अस्मितामूलक साहित्य-विमर्श**

I. दलित शब्द का अर्थ, अवधारणा, दलित चेतना का सामाजिक और सांस्कृतिक आधार, जीवन-यथार्थ, जातीय आधार, दलित साहित्य का अभिप्राय और स्वरूप, विशेषताएँ, लक्ष्य और उद्देश्य,अभिव्यक्ति।

II. दलित साहित्य की वैचारिकता और दार्शनिकता,दलित धर्म की सामाजिक और सांस्कृतिक परम्परा और उसका विकास, दलित साहित्येतिहास लेखन की समस्याएँ-नामकरण की समस्या, साहित्य के पहचान की समस्या, चेतना के विकास की समस्या, उद्देश्यो के प्राप्ति की समस्या और समाधान।

III. नारीवादी चिंतन और लेखन का स्वरूप, लक्ष्य, उद्देश्य और वैचारिक आधार, नारीवाद के रूप, हिन्दी में नारीवादी चिंतन और लेखन के तथ्य और मिथ, स्त्रीविरोधी मानसिकता, हिन्दी में स्त्री लेखन की दशा और दिशा, स्त्री विमर्श : नई अंतदृष्टियाँ।

IV. नारीवादी चिंतन के विविध आयाम-नारी अस्मिता, स्वतंत्रता, शिक्षा, रोजगार, साधिकारिता विवाह, व्यक्तिगत सम्बन्ध, प्रजनन अधिकार, प्रेमसंबंधों की स्वतंत्रता,बलात्कार के विरूद्ध संघर्ष, शारीरिक शोषण का प्रतिकार, नारी जीवन में धर्म और जाति, पारिवारिक जीवन और उत्तरदायित्व, उदारीकरण, आर्थिक नीतियों, सशक्तिकरण, पर्यावरण, समान नागरिक संहिता, महिला आरक्षण, दहेज विरोध, सतीप्रथा विरोध, संगठन और संघर्ष का अधिकार, कन्याभ्रूण हत्या का विरोध, बाल विवाह का विरोध, यौनशोषण का विरोध, स्त्री दमन की सैद्धांतिकी।

V. आदिवासी शब्द का अर्थ, अवधारणा, चेतना का सामाजिक और सांस्कृतिक आधार, जीवन-यथार्थ, जातीय आधार, आदिवासी साहित्य का अभिप्राय और स्वरूप, विशेषताएँ, लक्ष्य और उद्देश्य,अभिव्यक्ति, साहित्य की वैचारिकता और दार्शनिकता, आदिवासी धर्म की सामाजिक और सांस्कृतिक परम्परा और उसका विकास, आदिवासी साहित्येतिहास लेखन की समस्याएँ-नामकरण की समस्या, साहित्य के पहचान की समस्या, चेतना के विकास की समस्या, उद्देश्यो के प्राप्ति की समस्या और समाधान।

- **Course out- comes**

1. Knowledge of contemporary criticism of dalit, femanist and trible literary trends.
2. Knowledge of contemporary criticism, its tread, philosophical background, ideological development and historical process.
3. Knowledge of contemporary criticism of Hindi writers, their trends, philosophical and critical theoretical development, practical criticism and its values implemented by different critics.
4. Knowledge of major critical trends, their critics, writing of criticism and their contribution in development of contemporary criticism.

	Semester-IV	
Generic Elective Course Code no.**403 C**	Title of the course:- **Sahitya ka Tulanathmak Adhyayan**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. The nature of comparative literature and the method of teaching will be introduced.
2. Get acquainted with the nature and problems of comparative literature and study.
3. Study of comparative literature, research work and role of translation will be introduced.
4. Student will get an opportunity to for comparative study of Hindi and Telugu poetry, short stories, novels, dramas and biography etc.

- **Generic Elective-Opt.II-403-C-साहित्य का तुलनात्मक अध्ययन**

I. **हिन्दी तेलुगु कविताओं का तुलनात्मक अध्ययन**-भारतेन्दु हरिश्चन्द्र और कंदकूरि वीरेश लिंगम पंतुलु, सुमित्रानन्दन पंत और देवलपल्ली कृष्णशास्त्री, निराला और श्री श्री, अज्ञेय और गुरूपाठ वेंकटचलम् धर्मवीर भारती और राहुल भरद्धाज की कविताओं का तुलनात्मक अध्ययन

II. **हिन्दी तेलुगु कहानियों का तुलनात्मक अध्ययन**: जयशंकर प्रसाद और श्री श्री, यशपाल और कोडवटीगट्टी कुटुंबराव की कहानियाँ का तुलनात्मक अध्ययन

III. **हिन्दी तेलुगु उपन्यासों का तुलनात्मक अध्ययन**: प्रेमचन्द(गोदान) और वाचिरेड्डी सीता देवी (मट्टी मनिषि),नागार्जुन (दुखमोचन) और उन्नव लक्ष्मीनारायण (मालापल्ली) का तुलनात्मक अध्ययन

IV. **हिन्दी तेलुगु साहित्यिक कृतियों का तुलनात्मक अध्ययन** : नरेश मेहता(यह पथ बन्धूता) और गोपीचन्द (असमर्थूनी) का तुलनात्मक अध्ययन

V. **हिन्दी तेलुगु के दलित साहित्यकारों का तुलनात्मक अध्ययन** : जयप्रकाश कर्दम और कोल्कूरी ईनाक

- **Course Out Come**

1. Student will get the knowledge of study of comparative literature with different methods, nature and problem of comparative literature and studies.
2. Student will be able to know the study of comparative literature, research work and the role of translation etc.
3. Student will gain the knowledge of comparative study of Hindi-Telugu literature.
4. Student will get the knowledge of Hindi and Telugu literary trends and types of literature like novel, short stories, dramas, essays and subaltern studies of literature.

	Semester-IV	
Generic Elective Course Code no.**403 D**	Title of the course:- **Anusandhan Ke Siddhanth aur Dristiya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Know the nature, directions, types and methods of research like sociological, regional, textual, serveable, linguistic, poetics, comparative and psychological.
2. To know the methods of selecting topic and collection of material, preparing of notes, writing and arrangement of thesis,
3. Knowing about the interview, short notes, using of library, methods of preparing the notes, modification of thesis, editing, presenting, and writing of conclusion.
4. Knowing the critical theories using in research, research in literature, logistical, linguist problems of research and searching the solutions in research.

- **Generic Elective-Opt.II-403-D-अनुसंधान के सिद्धांत और दृष्टियाँ**

I. अनुसंधान का स्वरूप, शोध का लक्ष्य, उद्देश्य, शोधविषय का चयन, शोध कार्य की रूपरेखा, शोध की दिशायें, शोध के प्रकार या पद्धतियाँ।

II. विषय निर्वाचन, सामग्री-संकलन, हस्तलेखों का संकलन और उपयोग, ग्रंथालयों का उपयोग, क्षेत्रीय कार्य, साक्षात्कार, टिप्पणी व विषय ग्रहण करने की अन्य पद्धतियाँ, नोट लेखन की प्रणालियाँ ।

III. रूपरेखा, विषय-सूची, प्रस्तावना, भूमिका, शोध प्रबन्ध का आयोजन, संपादन और प्रस्तुतिकरण,शोध प्रबन्ध की अन्तिम रूपरचना, सुधार, परिष्कार एवं सम्पादन उपसंहार, सहायक ग्रंथों की सूची।

IV. संदर्भ-उल्लेख, पाद-टिप्पणी, परिशिष्ट, शब्दानुकृमणिका, नामानुकृमणिका, शोधसार।

V. शोध की समस्याएँ-तुलनात्मक साहित्यिक शोध, पाठ-संशोधन की समस्या,अनुसंधान की जटिलतायें।

- **Course Outcomes**

1. Student will get the knowledge of nature, directions, types and methods of research like sociological, regional, textual, linguistic, poetics, comparative and psychological.
2. Student will know the methods of selecting topic, collection of material, preparing of notes, writing and arrangement of thesis.
3. Student will get the knowledge of interview, preparing of short notes, using of library, methods of preparing the notes, modification of thesis, editing, presenting, and writing of conclusion.
4. Student will be able to know the using of critical theories in research of literature, logistical, linguist problems of research and searching the solutions in research.

	Semester-IV	
Multidisciplinary Course Code no.**404**	Title of the course:- **Antar Jananushasnatmak Drushtiya aur Pravidhiya**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**

1. Knowing the poetics, spiritual, mythological, materialist, realist, romantics, and views of study of literature.
2. Knowing about the sociological, historical, aesthetical and psychological vision.
3. Knowing the new critical, modernist, post modernist, structural and post structural critical theories and views.
4. Knowing the linguistics, stylistics, comparative, democratic, Ambedkaritic, feministic, colonial, post colonial, Gandian and humanitarian view of literature.

- Multidisciplinary Course-404–**अंतरज्ञानानुशासनात्मक दृष्टियाँ और प्रविधियाँ**

I. काव्यशास्त्रीय, आध्यात्मिक, मिथकीय, भौतिकवादी, यथार्थवादी, स्वच्छन्दतावादी, समाजवादी,

II. समाजशास्त्रीय, ऐतिहासिक, मार्क्सवादी, सौन्दर्यशास्त्रीय, मनोविश्लेषणवादी, अस्तित्ववादी,

III. नयी समीक्षा, आधुनिकतावादी, उत्तरआधुनिकतावादी, संरचनावादी, उत्तरसंरचनावादी, विखण्डनवादी,

IV. भाषावैज्ञानिक, शैलीवैज्ञानिक, तुलनात्मक, गाँधीवादी, लोकतांत्रिक, अम्बेडकरवादी, नारीवादी,

V. साम्राज्यवादी–औपनिवेशीकतावादी, उत्तरऔपनिवेशिकतावादी, मानवतावादी, उपभोक्तावादी, बहुसंस्कृतिवादी।

- **Course Outcomes**

1. Student will know the poetics, spiritual, mythological, materialist, realist, romantics and views of study of literature.
2. Student will be able to get Knowledge of sociological, historical, aesthetical and psychological vision of literature.
3. Students will know about the new critical, modernist and post modernist, structural and post structural view of literature.
4. Student will understand the linguistics, stylistics, comparative, democratic, Ambedkarist, feministic, colonial and post colonial, Gandhian and humanitarian view of literature.

	Semester-IV	
Open Elective Course Code No.**405 A**	Title of the course:- **Manak Hindi Aur Devnagari Lipi**	Credit -4
Internal Marks-20	End Semester Examination Marks:-80	

- **Course Objective**
  1. Knowing the standard Hindi form, design, vocabulary, sound, composition, vocabulary and sentence ideas.
  2. Know the development, use of Devanagari script in writing and formation of technical terminology.
  3. Student will know about the standardization of Hindi language and grammar, use of Hindi language in oral and writing.

- **Open Elective-Opt.I-405-A-मानक हिन्दी और नागरीलिपि**

I. मानक हिन्दी : मानक शब्द का अभिप्राय, भाषा के मानक रूप की विकास प्रक्रिया, स्वरूपगत आयाम, हिन्दी भाषा और व्याकरण का अंत: संबंध- अर्थ और परिभाषा, वर्ण विचार , ध्वनियाँ और उच्चारण , स्वर, व्यंजन और उसके भेद, शब्द भंडार : उत्पत्ति, शब्दों के भेद , तद्भव, तत्सम, दशज और विदेशी शब्दों का प्रयोग।

II. मानक हिन्दी की रूप रचना -संज्ञा, सर्वनाम, विशेषण, क्रिया, क्रिया विशेषण, सम्बन्धबोधक या परसर्ग, समुच्चय बोधक, विस्मयादिबोधक,अव्ययों की पदव्याख्या, शब्दभेदों में परिवर्तन।

III. मानक हिन्दी की शब्द रचना : संधि, समास, उपसर्ग, प्रत्यय और उसके भेद, अव्यय, मुहावरे और लोकोक्तियाँ, वाक्य विचार : परिभाषा, अन्वय, वाक्य के भेद, वाक्य-विग्रह, उपवाक्य, वाक्य शुद्धि, संक्षिप्तीकरण एवं पल्लवन।

IV. मानक हिन्दी में पत्र लेखन और उसके प्रकार, प्रारूप लेखन एवं निविदा सूचना, प्रतिवेदन, टिप्पण, प्रारूपण।

V. मानक हिन्दी की पारिभाषिक शब्दावली : अर्थ, गुण, शब्दावली निर्माण की प्रक्रिया, शब्दों के प्रकार, देवनागरी लिपि : परिचय, विशेषताएँ और मानकीकरण, लेखन और वर्तनी, वर्तनी की समस्याएँ।

- **Course Outcomes**
  1. Student will get the knowledge of Hindi forms, designs, vocabulary and sound composition and spelling problem.
  2. Student will get the knowledge of formation of terminology, to know the development and use of Devnagari script in practice.
  3. Student will know about the standard of Hindi, relation with grammar, use of Hindi language in oral and writing both levels.

	Semester-IV	
Open Elective Course CodeNo.**405 B**	Title of the course:- **Adhunik Hindi Sahitya Ke Nirmata**	Credit -4
Internal Marks-20	End Semister Examination Marks:-80	

- **Course Objective**
  1. To know the literary personalities of modern Hindi.
  2. To get the knowledge of writing of Hindi poets and writers.
  3. Getting to know the issues of literature and social relevance of their writings.

- **Open Elective-Opt.I-405-B-आधुनिक हिन्दी साहित्य के निर्माता**

I. भारतेन्दु हरिश्चन्द्र	सूर्यकान्त त्रिपाठी निराला
II. जयशंकर प्रसाद	महादेवी वर्मा
III. रामधारी सिंह दिनकर	प्रेमचन्द
IV. यशपाल	वृन्दावनलाल वर्मा
V. अमृतलाल नागर	भीष्म साहनी

- **Course Outcomes**
  1. Student will get the knowledge of the writer of modern Hindi.
  2. Student will get the knowledge of the Hindi writers and their writings.
  3. Student will be able to know about different trends of literature with writers.

Sri Venkateswara University

College of Arts, Department of Hindi

Tirupati-517502.A.P

Program Outcomes (POs)

Programme-M.A. Hindi

- **Objectives-**

1. To understand the literature of Hindi and as well as to opt Hindi language for research work in different areas either at individual level or comparative level to Indian languages and literature.
2. To comprehend the language structure of Hindi and obtain the opportunity to utilize Hindi language in the field of journalism and Mass communication, should able to act as journalist in the non-Hindi speaking region to acquire the local news which is to be presentable at National level.
3. To be able to use Hindi as official language and acquire the language skills to work as an officer in different areas such as Govt. semi Govt. private and corporate sector which can be either at state level or at national level.
4. To know the Translation method of Hindi from different languages and to get an eligibility to work as Translator in Hindi from other Languages either in official or non-official level.
5. To understand the Hindi language and knowledge of Hindi literature to get an ability to teach Hindi as language or literature in different levels, i.e. in School, College and University as teacher.
6. To acquire knowledge of language and literature to qualify different public examinations such as Civil Services, Group I & II Examinations, UGC-JRF, NET, SET, Hindi Translators and Hindi Officers Exams etc. to get an opportunity to serve the society and nation.

Programme Specific Outcomes (PSOs)

The Department of Hindi offering 38 courses to develop language skills, knowledge of Hindi literature written by Hindi Scholars from all over country and as well as around the world. Where capacity of Translation professional behavior of Official language and field of Journalism and Mass Communications are also critical ability for analysis of the literature and further research work.

In the two years M.A. Hindi program, students has to read 12 Core papers out of 38 Courses, which are mandatory for all. Other than Core Courses student has to opt any one out of three compulsory foundations and one from two Elective Foundation along with additional Audit Course for Zero credits in I and II semesters.

In III and IV semester student has to opt two Generic Elective Course out of four in each semester, along with Mandatory paper of Skill Oriented and Multidisciplinary Course in each semester, and they has to opt minimum one Open Elective from other discipline offered by other department in both semesters.

M.A. program offered by department of Hindi is going to cover 12 Core Courses, 2 Compulsory foundation, 2 Elective Foundation, 2 Audit Course, 4 Generic Elective, one Skill Oriented and One Multidisciplinary Course and 2 Open Elective (12+2+2+4+1+1+2=24x4=96 Credits) majorly four field of Hindi Knowledge ie History, Language, Literature, Philosophy other than Audit Course.

- In New syllabus department offering Job oriented Course which will help to pass all types of Competitive exams in state and National level along with further study for research work.
- Department has fully adopted the syllabus of UGC to pass all types of examinations in different level and get job opportunity in Hindi field.
- The Programme is covered Regional and International Literature along with the literature of Hindi for development of National Integrity, introduced the course on Translated Indian Literature, Comparative Indian Literature course along with Literature of Dalit, Tribal and Women for development of understanding of Socio-cultural scenario.
- To cover regional Importance of Culture and Literature. Department is offering a course on Hindi Literature of Andhra for understanding the contribution of Telugu speaking Hindi writers of Andhra Pradesh, along with Study of Comparative Literature course.
- To know the writing skill of NRI writers and contribution of them towards Hindi title we introduced a course called Pravasi Literature for understanding the International writing of Hindi.
- To understand the Hindi Language in historical, Philosophical and Practical way and also Literature of Hindi in all types such as Poetry, Prose, Novel, short stories, Drama and One Act Play, Essays, Criticism, Autobiography, etc.
- Department introduced program to understand Philosophy of Hindi Language and Literature, Indian and Western poetics, Modern Literary Critical theories and literary movements.
- Department is offered course to learn the History of Hindi Language and Literature-Old, Medieval and Modern Period to present time and Indian Comparative Literature.
- Human Values and Ethics-two Common papers implemented by the guidance of university adopted syllabus as per the guidance of university and prepared by the dept. of Philosophy.
- Department of Hindi offering two papers as External Elective for other department student, coming from different discipline to learn the language and Literature of Hindi in general.

Course Outcomes (COs)
Summery

- The Department of Hindi offering M.A. Programme with 38 courses for 96 Credits. Each course divided in to 5 units for the convenient of teaching and study.
- Each paper carry 4 credit with 20 marks for Internal and 80 marks for Semester End Examination.
- In this programme dept. divided 38 papers especially in 4 Major disciplines, to know, to learn and to get knowledge of Language, Literature, Philosophy and History with major concept.
- Department is offering four Core, one Compulsory Foundation and one Elective Foundation addition to Audit Course in I and II semester.
- In III and IV semester student has to study 4 core courses, 4 Generic Elective, one Skill Oriented Course and One Multidisciplinary Course compulsorily, other than Open Elective opted from different discipline offered by other departments.
- Offering as below-
- Course no. 101 and 201 related to History of Hindi Literature, In Course no.102, 103,104 and 105A student has to read Old, Medieval, Modern and Contemporary Hindi Poetry with present scenario.
- In Course no. 202, 203, 204,205A & B are given the opportunity to read Hindi Prose in different manner like- Novel, Short Stories, Drama, One act play, Essays and Criticism, Autobiography.
- Other than above literature courses, Course no. 205C, 303A, B, C, D, 401, 403A related to Subaltern studies, Literature of Dalit, Tribal, Feminist, International Hindi and Translated Indian Literature, Comparative Indian Literature and special reference to study of Comparative Literature of Hindi and Telugu.
- Course no. 105B & C, 403B is formed on the base of Major Literary Movement with Sociological, Historical, Philosophical, Ideological, Ethical, Psychological, Phonological and Linguistically background and movement of the Hindi Literature.
- Course no.204, 301, 302,402, 403B and 404 is related to Literary Movement and Modern Literary Critical theories with trends, values, aims and importance with their major concepts of Literature in Indian and Western Poetics, especial reference to Hindi Poetics developed form 10th century, literary critical theories and critics, their writing and contribution like Sociological, Historical, Philosophical, Ideological, Ethical, Psychological, Phonological and Linguistically, metrical, methodological, moralistic, Marxist, modernist and post modernist covered by colonial and post colonial scenario.
- Addition to above courses, department offering non Literature courses no.106A&B 206A&B 304,403D for developing language skill to work in different field of Hindi to cover linguistic, Hindi language, official language, Journalism and Mass communications, Translation theory and practical in official and Non official level for regular learners and researchers.
- Course no 107 and 207 in first and second semester students are studying Human Values and Professional Ethics-I and II, as per the guidance of University and syllabus papered by dept. of Philosophy for Zero Credit.
- Course no. 305 and 405 in III and IV semester department offering with multiple choices as External Elective for other department students, who were coming from different disciple to learn Hindi Language and Literature with grammar of Hindi Language and get Hindi Computer and Software knowledge.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF HISTORY



Course

M.A. HISTORY

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

DEPARTMENT OF HISTORY

S V UNIVERSITY, COLLEGE OF ARTS

About the Department:

The Department of History was established in 1959 with one Professor, one Reader and one Lecturer. Dr. M. Rama Rao was the founder Professor of the department. The aim of the department is to propagate the importance of studying history among the Indian youth in general and the students of Andhra Pradesh in particular

In research, the Department of History focuses on Medieval India, Freedom Movement, Tourism, Contemporary / Current History of India,68 Ph.D. and 105M.Phil. Degrees have been awarded as far. The Department has been providing guidance to the students who appear for Competitive Examinations like UPSC, SSC Bank Examinations, APPSC, UGC-NET, AP SET etc,

Vision

- Focus to make students to gain information and knowledge of ancient history through teaching and research

Mission

- Creating interest in students and promote studies in ancient history and culture of India. Making students to understand the globalization changes of present and past

Programme Specific Objectives:

- The courses of the department of History are designed with an aim to impart knowledge and skills in Ancient, Medieval and Modern Indian History, Andhra history, world history, contemporary history with emphasis on political, social, economic, religious, cultural developments, policies and changes.
- There are basic courses in core section on history which are thematic and cut across chronological divisions and regional polities.

- The ancient history courses encouraged the study on sources for the study, evolution of social structures, economy, civilizations, religious traditions, cultural developments, political processes as well as historical geography and chronology.
- Emphasis is also given to the study of Medieval history and culture with a focus on transition in Indian history from ancient to medieval and medieval to colonial period, through a reconstruction of structural continuities, regional polities, social and economic developments, as well as changes in the spheres of economic development, religion, culture and languages.
- The courses of historiography and historical methods intended to familiarize the students with approaches to historical studies with a focus on prominent historians and on the development of historical writing in modern India.
- The courses of contemporary history of India and world help the students to understand global relations and perspectives.
- The Tourism, skill development and science and technology courses can equip the students with the solid foundation to build upon the fundamentals, useful skills and expertise that can assist employment in Tourism Industry.
- The curriculum makes it possible for students to have comprehensive knowledge in History so as to enable them to clear competitive exams like UPSC, UGC NET, SET and take up teaching and research careers with confidence.

Programme Objectives:

- The courses of the department of History are designed with an aim to impart knowledge and skills in Ancient, Medieval and Modern Indian History, Andhra history, world history, contemporary history with emphasis on political, social, economic, religious, cultural developments, policies and changes.

Programme Outcomes:

- The students of the history acquire knowledge on Indian history of all periods, contemporary history world history and comparative analysis on global history.

Programme Educational Objectives:

- The curriculum makes it possible for students to have comprehensive knowledge in History so as to enable them to clear competitive exams like UPSC, UGC NET, SET and take up teaching and research careers with confidence.

SRI VENKATESWARA UNIVERSITY
Tirupati-517 502
Master of Arts
Subject: HISTORY

CBCS Pattern
(With effect from 2021-22)
The Courses of Study and the Scheme of Examinations

SEMESTER -I

	Components of Study	Course Number	Title of the Course	Instruction hours per week	Credits	IA Marks	End Semester Exam Marks	Total
SEMESTER-I	Core	HST 101	History of India Up to 650 A D	6	4	20	80	100
		HST 102	History of Indian Polity and Economy, 1206-1757	6	4	20	80	100
		HST 103	History of Modern India, 1757 – 1947	6	4	20	80	100
		HST 104	History of Modern World, 1900-1945	6	4	20	80	100
	Compulsory Foundation	HST 105 (A)	History of Andhrasupto 1336 A D	6	4	20	80	100
		HST 105 (B)	History of World Civilizations	6	4	20	80	100
	Elective Foundation	HST 106 (A)	Theoretical Concepts of Tourism	6	4	20	80	100
		HST 106 (B)	History of Medieval World	6	4	20	80	100
	Audit Course*	HST 107	Human Values and Professional Ethics-I.			**0**	**0**	**100**

* All **Core** Papers are **Mandatory**
*Compulsory Foundation – Choose **One** paper
*Elective Foundation - Choose**ONE**
*Audit Course – 100 Marks (Internal) – Zero Credits under self study
*Interested students may register for MOOC with the approval of the concerned DDC but it will considered for the award of the grade as open elective only given extra credits

SEMESTER -II

	Components of Study	Course Number	Title of the Course	Instruction hours per week	Credits	IA Marks	End Semester Exam Marks	Total
SEMESTER II	Core	HST 201	History of India 650-1206 A D	6	4	20	80	100
		HST 202	Social and Cultural History of India, 1206-1757	6	4	20	80	100
		HST 203	Freedom Movement in India, 1857 –1947	6	4	20	80	100
		HST 204	History of Contemporary World, 1945-2000	6	4	20	80	100
	Compulsory Foundation	HST 205	A) History of Vijayanagara Empire B) History of Modern Africa	6	4	20	80	100
	Elective Foundation	HST 206	A) Historical Application of Tourism in India B) Women Studies in Modern India	6	4	20	80	100
	Audit Course*	HST 207	Human Values and Professional Ethics-II			**0**	**0**	**100**

* All **Core** Papers are **Mandatory**
*Compulsory Foundation – Choose **One** paper
*Elective Foundation - Choose**ONE**
*Audit Course – 100 Marks (Internal) – Zero Credits under self study
*Interested students may register for MOOC with the approval of the concerned DDC but it will considered for the award of the grade as open elective only given extra credits.

SEMESTER -III

	Components of Study	Course Number	Title of the Course	Instruction hours per week	Credits	IA Marks	End Semester Exam Marks	Total
SEMESTER-III	Core	HST 301	Historical Method and Concepts	6	4	20	80	100
		HST 302	Contemporary History of India-I	6	4	20	80	100
	Generic Elective (Related to Subject)	HST 303 (A)	History of USA, 1776- 1963	6	4	20	80	100
		HST 303(B)	History of Modern Andhra, 1766 –1972	6	4	20	80	100
		HST 303 (C)	Indian Foreign Policy: An Introduction	6	4	20	80	100
		HST 303 (D)	Environmental History of Modern India	6	4	20	80	100
	Skill Oriented Course	HST 304	Communication and Soft Skills	6	4	20	80	100
	Open Elective (For other Departments	HST 305 (A)	Economic and Cultural History of India, 1757-1857	6	4	20	80	100
		HST 305(B)	Intellectual History of 19th Century India	6	4	20	80	100

* All **Core** Papers are **Mandatory**
***Generic Elective** – Choose **Two** papers
***Skill Oriented** course is **Mandatory**
***Open Electives** are for the Students of other Departments. Minimum **One Paper** should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.
*Interested students may register for MOOC with the approval of the concerned DDC.

SEMESTER –IV

	Components of Study	Course Number	Title of the Course	Instruction hours per week	Credits	IA Marks	End Semester Exam Marks	Total
SEMESTER-IV	Core	HST 401	Historiography	6	4	20	80	100
		HST 402	Contemporary History of India-II	6	4	20	80	100
	Generic Elective (Related to Subject)	HST 403(A)	International Relations and Organizations	6	4	20	80	100
		HST 403(B)	Constitutional History of India, 1773-1950	6	4	20	80	100
		HST 403(C)	History of Modern Asia 1868-1960	6	4	20	80	100
		HST 403 (D)	History of Modern Latin America	6	4	20	80	100
	Multidisciplinary Course/Project	HST 404	History of Science and Technology in India 1858-1947	6	4	20	80	100
	Open Elective (For other Departments	HST 405 (A)	Outlines of Andhra History and Culture	6	4	20	80	100
		HST 405 (B)	Health, Medicine and Society in Modern India	6	4	20	80	100

* All **Core** Papers are **Mandatory**
*Generic Elective – Choose **Two** papers
*Multidisciplinary/ Project Work is **Mandatory**
*Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.
*Interested students may register for MOOC with the approval of the concerned DDC.

HST 101: HISTORY OF INDIA UPTO 650A D

(Revised Syllabus)
(to come into effect from the academic year 2021-2022)

Objectives:

- The objectives of the course are to impart a comprehensive knowledge and understanding of history and culture of India up to 650 AD.
- The course introduces sources for the study, early culture and civilizations, development of different religious traditions, evolution of ancient Indian polity with major political events, political geography and chronology.
- It also deals with the age of foreign incursions, structure of early Indian society and the nature of economic transformation. Focus is also placed on analysis and explanation of ancient India's cultural achievements.

Unit I Sources for the Study – Indus Valley Civilization – Vedic Society – Janapadas and Mahajanapadas – territorial states – Monarchial and Republican – Religious Movements – Jainism, Buddhism and Ajivikas

Unit II Nandas and Mauryas : Polity, foreign relations, economy – Asokan edicts – Kautilya'sArthasastra – Megasthanes' Indica – Mauryan Administration, Art and Architecture

Unit III Sungas and Kanvas – Indo-Greeks and Sakas – Pallavas – Social conditions - Satavahanas and Western Kshatraps – Kushans – Society and Religion, trade and Commerce – Sangam Age – Polity, Society, Culture, Indo-Roman trade

Unit IV Guptas: Political consolidation, administration, land grants and agriculture, religion, Literature, art and architecture, science and technology, coins and currency

Unit V Empire of Harshavardhana – Invasion of Huns, Vakatakas, Chalukyas, Pallavas – land grants –society, religion and Art and Architecture.

Course Outcome:

- Students will have a familiarity with the sources, different political, social, economic, cultural and religious traditions of the Indian subcontinent upto650 C.E.
- Student will also be well versed with different analytical approaches and models of interpretation.

Suggested Readings

1. Bose, Social and Cultural History of Ancient India, Tirunelveli, 2001
2. Champakalakshmi, R, Trade, Ideology and Urbanization: South India 300 BC to AD 1300, OUP, Delhi, 1990
3. Chennadevaraj, Slavery in Ancient India, Delhi, 1960
4. Das, S.K., Education System of the Ancient Hindus, Kolkata
5. Kosambi, D. D., The Culture and Civilization of Ancient India in historical Outline, 1965
6. Lunia, B. N., Life and Culture in Ancient India, Agra, 1989
7. Majumdar, R. C., Ancient India, Kolkata, 1920
8. Rajkumar, Survey of Ancient India, 5. Vols. Tirunelveli, 2001
9. RomilaThapar, Ancient Indian Social History: Some Interpretations, Delhi, 1978
10. Sarma, L. P., History of Ancient India: Pre-Historic Age to AD 1200, Delhi, 1989
11. Sastri, K. A. N., A History of South India, Oxford, Chennai, 1956
12. Sastri, K. A. N., The Cholas, Oxford, Chennai, 1975
13. Sharma, R. S., Aspects of Political Ideas and Institutions in Ancient India, Delhi, 1968
14. Sharma, R. S., Perspectives in Social and Economic History of Early India, Delhi,

1983
15. Yazdani, G., History of the Deccan, Oxford, 1960

HST 102: History of Indian Polity and Economy, 1206-1757

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- This course is designed to impart thorough knowledge on the origin and emergence of Delhi Sultanate, the political, administrative and economic achievements.
- This course is also focuses on Mughal conquest of India, their rule and legacy.
- The course creates awareness among the students about their polity, policies, Administrative reforms, economic development.

Unit I Literary and Archaeological Sources, Arabic and Persian Sources - Foreign Accounts – A Brief political History of Delhi Sultanate, Mughals and coming of Europeans.

Unit II Indian Polity: The Islamic Theory of state, nature and Character of the sultanate, Balban's Theory of Kingship, Allauddin's Theory of kingship.

Unit III Structure of the Government: The sultan – Central Administration –provincial Administration – Mansab – Jagir- The Army – The Judiciary

Unit IV Economic Conditions: Agriculture and peasants –Village Economy, Land Revenue – Trade and Commerce, Industry and Merchants – Monetary system-Inland and Maritime Trade.

Unit V Growth of Towns and Cities: Nature of cities –Town Life-Slaves and Artisans – Technological Development in Medieval India

Course Outcome:

- Students can familiarize in understanding the continuity with changes in all spheres of history, polity and economy under the Delhi sultanates.

- Students can understand thoroughly the Mughal conquest of India, their rule, polity and legacy.

Suggested Reading

1. Athar Ali, The Mughal Nobility Under Aurangazeb, OUP, New Delhi, 2001.

2. Burton Stein, Peasant State and Society in Medieval South India, OUP, New Delhi,1986

3. Burton stein ,Vijayanagara. The New Cambridge History of India series, CUP: Cambridge, 2005.
4. Firdous Anwar, Nobility Under the Mughals, manohar publications: New Delhi, 2001
5. Fukazawa,F, The Medieval Deccan: Peasants, Social systems and states 16th -18th Centuries. OUP New Delhi, 1991
6. Habibullah, A.B.M .The Foundations of Muslim Rule in India, Central Books Depot:Allahabd,1967
7. Hermann kulke, ed. The state in India 1000-1700.OUP New Delhi, 1997

8. IrfanHabib, The Agrarian System of Mughal India, 1526-1707 New Delhi, 1999
9. Karashima, N., South Indian History and Society, OUP, New Delhi, 1984
10. Mehta .J.L. Advanced study in the History of Medieval India, Vol III Medieval Indian Society and Culture, Sterling Publishers: New Delhi, 1987(2006 Reprint)
11. Nilakantasastri, K.A. History of South India from pre-Historic Times to the all of Vijayanagar OUP: New Delhi, 1975

12. NuralHasan, Thoughts on Agrarian Relations in Mughal India people's publishing House: New Delhi, 1990
13. Qureshi,I.H.The Administration of the Mughal Empire. Low price publications: New

Delhi, 1979.

14. Richard Eaton, Essays on Islam and Indian History, OUP New Delhi, 2002
15. Salma Ahmed Farooqui, A Comprehensive History of Medieval India from the Twelfth to the Mid Eighieenth Century, pearson: New Delhi, 2011

16. Satish Chandra, History of Medieval India, Orient Black swan New Delhi, 2009

HST 103:History of Modern India 1757 –1947

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- This course is designed to impart knowledge on British conquest of India, expansion of power under company rule.
- It also dealt the policies and reforms of the Governor Generals in India.
- The course also focuses on India under the Crown, administration and reforms.
- It also focuses on Socio-religious reform movements and various phases of national movement.

Unit I: **Expansion and Consolidation of British Power:** British Supremacy in Bengal-Robert Clive-Warren Hastings-Lord Cornwallis, Revenue and Reforms- Lord Hastings-Policy of Subordinate Isolation-William Bentick and his reforms-Lord Dalhousie-Doctrine of Lapse-Resistance to British Rule-Sepoy Mutiny of 1857.

Unit II **Economic Organization, Change and Continuity:** Rural Economy – Commercialization of Agriculture- Free Trade policy-Drain of Wealth-Urban Economy-Artisans and Industrial production- rise of Internal markets and urban centres and communication-Posts, Telegraphs and Railway.

Unit III **India under the Crown-** Colonial Administration and Reforms- Lord Canning-Lord Lytton-Lord Ryppon-Central, Provincial, District and Judicial Administration- Acts of 1909, 1919, 1935- Rise of Modern Education and Press.

Unit IV **Socio-Religious Reform Movements**-Brahma Samaj, Rajarammohan Roy-PrarthanaSamaj-AryaSamaj, DayanandSaraswati-Theosophical Movement-Annie Besant-Wahabi, Deobandh and Aligarh Movements-Women and changing positions and attitudes

Unit V **National Movement and Independence:** Rise of Nationalism-causes-Indian National Congress- Moderates and Extremists-Division of Bengal (1905), Vandemataram Movement (1905-1911), Swadeshi Movement (1914-16)- Home Rule League(1916-1918) mGandhian Era(1920-47)- Non Cooperation and Khilafat Movements (1920-22)-Civil Disobedience Movement (1930-34)-Quit India Movement-Attainment of Independence 1947- Partition-Communal riots-Refugees.

Course Outcome:

- Student can gain knowledge on the English East India company rule and their reforms.
- It also inspires the students to understand the transition of power from company to crown, viceroys and their administrative reforms.
- The students also can acquire knowledge on Socio-cultural awakening and progress of national movement.

Suggested Readings

1. Anil Seal, The Emergence of Indian NationalisM, Bayly, C.A.,
2. Indian Society and the making of the British Empire, OUP, 1996
3. Bipan Chandra, Nationalism and Colonialism in Modern India, Delhi, OL,1981
4. DadabahaiNauroji, Poverty and Un-British Rule in India, London,1901
5. Desai, A.R., Social Backgrund of Indian Nationalism, Bombay, Popular Prakashan, 1986
6. Dharma Kumar , Cambridge Economic History of India, Vol-2, C1757-2003., OL Delhi 2005
7. Dutt, R.P., India today, ManishaGrihanthallaya, Culcutta, 1979
8. Eric Stokes, The English Utilitarians and India, OUP, Delhi ,1959
9. Fisher, M.H. , (ed), Politics of British Annexation of India, 1757-1857, OUP, Delhi, 1993
10. Gosh, Suresh Chandra , History of Education in Modern India, 1757-1998, OL,2000
11. Grover GL and Alka Mehta, A New Look at Modern Indian History From 1707 To The Modern Times, S.Chand, New Delhi,2018.

12. Markovits, C. ,Merchents, traders, Enterprenures , Indian Business in the Colonial Period, Orient Longman, 2007.
13. Nicholas Dirks, Castes of Mind : colonialism and making of Modern India, Permanent Block, 2003.
14. SumitSarkar, Modern India 1885-1947,Pearson Education India, New Delhi,2014

HST 104: History of Modern World, 1900-1945

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- The course is designed to promote knowledge on the history of modern world along with international relations.
- Students to learn World War I and II comprehensively.
- To teach contribution of Indian soldiers and conditions in Asia and Africa.

Unit I International Relations 1871-1914:Three Emperor's League 1881- Reinsurance Treaty 1887-Austro-German Alliance 1879-Triple Alliance 1882-Entente Cordiale 1904-Rivalry between Triple Alliance and Triple Entente. Origins of World War I – Its Nature – Peace Settlement and its long term consequences-Contribution of Indian soldiers in Europe, Africa and Asia in World War I – Russian Revolution - Economic Reforms

Unit II World between the Two World Wars: Working of the League of Nations and

Collective Security – Great Depression – Ideologies of Nazism, Fascism .

Unit III International Relations 1919-33: Attempts to improve International Relations-The

Washington Conference 1921-22, Genoa Conference 1922, The Dawes Plan 1924, The

Locarno Treaties 1925, The Kellogg-Briand Pact 1928, The Young Plan 1929, The World

Disarmament Conference 1932-33; France-Germany Relations 1919-33, USSR-Britain-

Germany-France Relations : International Relations 1933-39: Japan-China Relations-

Mussolini's Foreign Policy-Hitler's Foreign Policy

Unit IV Conditions in Turkey and Spain: Turkey – The Treaty of Sevres – The treaty of Lausanne –

Mustapha Kemal Pasha – Reforms and Modernization of Turkey – The Spanish Civil War -

Consequences of Civil War

Unit V World War II: Origins – Nature and Results of World War II– Contribution of Indian

soldiers in Europe, Africa and Asia in World War II -Nationalist Movements and

Decolonization- -Communist Revolution in China- Nationalist Movement in Indonesia

Course Outcome:

- Student can gain the knowledge on the history and consequences of the World between two World Wars pertaining to League of Nations, Great Depression, Nazism, and Fascism.
- Students will understand International Relations during 1919-39.
- Students can understand thoroughly about the Second World War and its impact.

Suggested Reading

1. Alison, P. W., History of Modern Europe, Mittal Publishers, New Delhi, 2005

2. Carr,E.H., International Relations Between the Two World wars, macmillan:London,1965
3. Fisher,H.A.L. History of Europe, Edward Arnold: London,1941
4. George Morton-Jack, The Indian Empire at War from Jihad to Victory the Untold Story of the Indian Army in the First World War, Little, Brown: London, 2018

5. Hazen, C.D. Modern Europe since 1789, S. Chand and Company :New Delhi,1986

6. Hobsbawm, E., Age of Extremes The short Twentieth Century, 1914-1991, Weidenfeld and Nicolson:London,1994

7. Jagdish P Sharma, World History New Horizons. Low price publication: New Delhi,1993.
8. Kaushik Roy, India and World War II War, Armed Forces, and Society,1939-45, OUP: New Dehi, 2016

9. Noel Cowen, Global History : A Short History, Macmillan, New Delhi, 1997

10. RanjanChakrabarti, A History, of the modern world An Outline primus Books: New Delhi, 2012
11. Roberts, J. M., Europe, 1880-1945, Orient Longman, Chennai, 1989

12. William, Woodruff, A Concise History of the Modern World, Macmillan, London,1998

HST 105 (a): History of Andhrasupto 1336 A D

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- The course aimed to impart comprehensive knowledge of the history of Ancient Andhra from earliest up to the end of Kakatiya dynasty.
- This course introduces to the students the geographical features, sources, political formation, the region under Maurya and Satavahana rule, rise of local powers, their role in political, social, economic, religious development, cultural heritage and inter dependence of the region.

UNIT- I:

Physical features – Impact on History and Culture of Andhra -Archaeological, Epigraphical and literary sources -Andhra - Andhradesa, Trilingadesa - Andhrajati. Pre-Mauryan Andhra – Andhradesa during the Mauryas.

UNIT-II:

Satavahanas - Origin and original home - Political History -Satavahana state and its Salient Features - Social and Economic conditions – Buddhism - Brahmanical religion - Education – Literature- Amaravati art

UNIT-III:

Post - Satavahana period – Rule of Ikshvakus - Salankayanas – Early Pallavas – Vishnukundins - Growth of rural economy – Urbanization with reference to Nagarjunakonda - Social and Religious conditions between 3rd and 7th centuries A.D- Nagarjunakonda art and architecture

UNIT-IV:

Chalukyas in Andhra - Eastern Chalukyas of Vengi - An overview of the Political History from 624 A.D to 1200 A.D. - Chalukya-Cholas - Early medieval society - Nature of Economy - Religious movements - Virasaivism - Srivaishnavism - Early Medieval Telugu literature, contribution to temple architecture

UNIT -V :

Kakatiyas – Political History of Kakatiyas – State and Polity - Land Revenue System - Growth of rural economy - Agrarian structure - Tank irrigation- Trade Guilds - Industries – Taxation -Society - Religious trends-Kalamukhas - SuddhaSaivism - Spread of Sri Vaishnavism– literature- art and architecture

Course Outcome:

- The study of comprehensive history of the country is incomplete without the study of regional history.
- Regional history is becoming more and more popular, for it has inherit potential of taping varied kinds of sources for understanding the divergent aspects of local heritage and culture.
- The students can develop thorough understanding on Ancient Andhra history and culture.

Suggested readings:

1. HanumanthaRao, B.S.L. - AndhrulaCharitra, Guntur, 1990.
2. HanumanthaRao, B.S.L. - Religion in Andhra, Hyderabad, 1973.
3. Yazedani, G. - Early History of the Deccan, Oxford, 1960.
4. Gopalachari, K. - Early History of the Andhra Country, Madras, 1941.
5. Gopala Reddy, Y. - A Comprehensive History of Andhra, Hyderabad, 1990.
6. Satyanarayana, K. - A Study of the History and Culture of the Andhras Vol.1 and II New Delhi, 1975.
7. Sastri, A.M. - Early History of Deccan: problems and perspectives, Delhi, 1987.
8. Ray, H.P. - Monastery and guild, Commerce under Satavahanas, Delhi, 1986.
9. Amita Ray. - Life and Art of Early Andhradesa, Calcutta, 1983.
10. DebalaMitra - Buddhist Monuments, Calcutta, 1971.
11. Sankaranarayana, S. - Vishnukundins and their times, New Delhi, 1977.
12. Comprehensive History of Andhras, Vol. I, II, III & IV
13. Krishna Kumari, M., - The Rule of the Chalukya - Cholas, Delhi, 1980.
14. Burton stein - Peasant State and Society in Medieval South India, Delhi, 1980.
15. ParabrahmaSastri, P.V., - The Kakatiyas, Hyderabad, 1983.
16. Rajendra Prasad, B., - Art of South India, Andhra Pradesh, Delhi, 1980.

17. Venkataramanaiah, N., - EasternChalukyas of Vengi, Madras, 1950.
18. Krishna Reddy, N., - Social History of Andhra Pradesh [7th to 13th Century A.D.] Delhi, 1991.

HST105b: HISTORY OF WORLD CIVILIZATIONS

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- The objective of this course is to look at the Ancient Egyptian, Mesopotamian, Greece, Chinese, Romans and Harappan civilizations.
- This course will also help the students to assess the ancient societies in the light of their contribution to political, social structure, religion, literature, science and technology, trade and commerce, Art and Architecture.
- We see urban centers in several parts of the ancient world and a well-established social, economic and administrative institution which need to be studied in order to understand how they shaped the present day world.

Unit I and to and Literature and Literature

Mesopotamian civilization – the significance of Fertile Crescent – Physical Geographical factors – The Sumerian and their state systems – Its contribution Material culture and Urbanization – Society – Economy – Religion, Language Literature – Art – Architecture – Scientific knowledge.

Unit II Pyramids –

Egyptian Civilization – Geographical and Physical factors – The Age of The imperial Age – Noted kings and their contribution – Economic system – Agriculture – Irrigation, trade and commerce – religion – Growth of Script – – Art – Architecture – Advances in Scientific knowledge.

Unit III Characteristic

Ancient Greece – Geographical factors and Historical Background-

Features of Greek Society – Polity, Slavery-City States-Athenian Democracy-Greco-Persian wars-Administration-Greek language-Literature-Art-Architecture-Philosophers-Science and Technology - Significance and Decline.

Unit IV Roman Civilization – Rise of Roman power –Great Roman kings and their conquests – Society – Political organization – Administrative structure - cultural contribution – Language and Literature – Art and Architecture - Monuments – Fall of Roman Empire.

Unit V Ancient China – Geographical and Physical features – Polity, Administration – Social system – Economy – Religion and Philosophy – Taoism – Confucianism and Buddhism – Science and Technology.

Course Outcome:

- Students gain familiarity with the rise and characteristic features of the ancient world Civilizations, its regional extent and variation.
- Students can understand the glory of the civilizations, the nature of its cities and material remains and institutions.

Suggested Readings

1. Basham.A.L, The Wonder that was India.
2. Bury, J., History of Greece
3. ChildeV.C., New Light on the Ancient Past
4. Finley., Ancient Culture and Society
5. George Raux., Ancient Iraq
6. Gordon Child, What Happened in History

7. Joseph Needham., Science and Civilization in China
8. Rao, B.V. Concise book of World History, Sterling Publishers Pvt. New Delhi. 1996
9. Savelle, Max (ed.) A History of World Civilization (2 Vols.)

HST 106 (a): THEORETICAL CONCEPTS OF TOURISM

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- The course aimed to introduce the students the fundamentals of tourism as foundation.
- The course dealt elaborately the basic concepts of tourism, its meaning, scope, types, travel, accommodation, organizers at national and international and promotion of tourism

Unit I Tourism: Definition, Meaning, Nature and Scope of Tourism – Types of Tourism – Motivations – Travel in ancient, medieval and modern times

Unit II Elements of Tourism: Accommodation – Transport – Catering – Entertainment

Unit III Travel Agency: Role of Travel Agency – Thomas Cook – The Grand Circular Tour – The American Express Company – Profile of Modern Travel Agency – Setting up of a Travel Agency – The Tour Operator – Group Inclusive Tour – IATA Accredition – Travel Trade Authority – UFTAA – WATA – ASTA

Unit IV Tourism Organizations: The Need for Organization – Factors influencing - Types of Organization – UN Conference Recommendations – The National Tourist Oganization – Functions of the National Tourist Organization – Tourism Organizations in India – Early History – IUOTO – WTO – PATA – European Travel Commission – IOTO

Unit V Tourism Promotion: Advertising – Publicity – Public Relations – Sales

Support – Modern Trends

Course Outcome:

- The students can gain fair understanding about the fundamentals of tourism and its basic concepts.
- The students can acquire professional knowledge to get opportunity in tourism industry.

Suggested Reading

1. Bhatia A. K., Tourism Development, Sterling Publishers, New Delhi, 2007
2. Bhatia A.K., International Tourism Management, Sterling Publishers, New Delhi, 2006,
3. BiswanathGhosh, Tourism and Travel Management, Vikas Publishing House Pvt Ltd., New Delhi, 1998
4. Seth, P. N., Successful Tourism Management, Sterling Publishers, New Delhi,1987
5. Seth, P.N and Sushma Seth Bhat, An Introduction to Travel and Tourism, Sterling Publishers, New Delhi, 2006
6. Mario D'Souza (ed), Tourism Development and Management, Mangal Deep Publications, Jaipur, 1998
7. Michael M. Coltman, Introduction to Travel and Tourism: An International Approach
8. Punia, B.K., Tourism Management: Problems and Prospects, Ashish Publishing house, New Delhi, 1997
9. Vanama, P. K., Trends in Tourism, Prabhu Publishers, Chennai, 2005

HST 106 (B) : HISTORY OF MEDIEVALWORLD

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objective

- It aimed to familiarize Medieval World history and developments broadly.
- The focus is made to instruct comprehensive knowledge on the rise of Christianity and Islam socio-cultural developments reformations, French revolution and transitionto modern Age

Unit I Middle Ages: Rise and Spread of Christianity – The Papacy – Byzantine Civilization – Rise and Spread of Islam – Saracen Civilization.

Unit II Feudalism – Origin – Merits and Demerits – Crusades – Causes and Results – Monastic orders of medieval Europe – Growth of Medieval Cities – Progress of Education and Rise of Universities.

Unit III Transition to Modern Age – Renaissance – Causes – Renaissance in Italy – Results of Renaissance – Geographical Discoveries of 15th and 16th Centuries – causes, Course and Results – Reformation in Germany, France and Switzerland – Counter Reformation.

Unit IV French Revolution and its impact – Romanticism – Industrial and Agrarian Revolutions– Causes, Course and Results – Revolutions of the 20th Century – China, Russia, Latin America.

Unit V Nationalism Vs Internationalism - League of Nations – United Nations De – Colonization – Nelson Mandela – Developments in Science and Technology – Philosophy, Arts and Literature during the Contemporary World.

Course Outcomes

- Student can gain thorough knowledge on the world in medieval ages and rise of Christianity

- Will understand Transition to Modern Age
- Possess knowledge on French Revolution and its Impact

Suggested Readings

1. Brinton, Crane et al., Modern Civilisation: A History of the Last Five Centuries.
2. Edward Macnall: Western Civilization – Their History and Their Culture, W.W. Norton & Company, New York, 1963
3. Gokhale, B.K: Indtroduction to Western Civilizations, S. Chand &Pvt.Ltd, New Delhi. 1973
4. Lenczowski, George, Middle East in World Affairs.
5. Savell, Max (ed.), A History of World civilization (2 Vols.)
6. Shapiro, Irwin (ed.), Universal History of the World.
7. Swain, J.E.: A History of World Civilization, Eurasia Publishing House Pvt.Ltd., New Delhi, 1994.
8. Webster, World History.
9. Wells, HG, A Short History of the World.

HST 107: Human Values and Professional Ethics-I.

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- The ethos of Indian culture has been value-oriented throughout the ages.
- The rich literary heritage of India is a treasure of values and ethics to be acquired, pursued and imparted to the future generations of the present day.
- An enquiry into varying dimensions of human values may lead to furtherance of our knowledge and to ethical values suited for the modern world.

UNIT- I:

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment.Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

UNIT-II:

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom. Good behavior and respect for elders, Character and Conduct.

UNIT-III:

Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha (Non- stealing).Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires). Moksha(Liberation).

UNIT-IV:

Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths – AryaAstangamarga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.

UNIT -V :

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Course Outcome:

- Students can understand the need and importance of human values and professional ethics which are essential for positive human behavior and actions in our daily lives.
- They inspire the fundamental goodness of human beings and society at large.

Suggested readings:

- 1. John S Mackenjie: A manual of ethics.
- 2. The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
- 3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
- 4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
- 5. Harold H. Titus: Ethics for Today
- 6. Maitra, S.K: Hindu Ethics
- 7. William Lilly: Introduction to Ethics
- 8. Sinha: A Manual of Ethics

HST 201: History of India 650-1206 A D

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- This course aims at imparting comprehensive historical knowledge pertaining to the early medieval India. This age witnesses the emergence of various local and regional dynasties in North and south India and their place in history and culture are dealt in detail.
- Apart from reviewing the broad political history of this period, the broader concept of regional polity, social, economic, religious, cultural and intellectual changes and also the theoretical framework of the Segmentary State are examined from various points of view.

Unit I Sources: Literary and Archaeological Sources, Polity-Political structure, Regional variations- Brief survey on Rastrakuta, Chola, Western Chalukyan dynasties of southern India, Major dynasties of north India Rajputs, Pratiharas, Chandellas and Palas.

Unit II Economy : - Agrarian Economy, Land grants, Agrarian organization, Irrigation, Handicrafts, Urban Economy, Trade and Trade routes, Maritime Trade, Urban settlements, Guilds, Traders and Craftsmen.

Unit III Society and Religion : Social Stratification, Caste and Untouchability, Status of Women, Educational ideas and Institutions- Bhakti movement - Sankaracharya, RamanujacharyaSchools of Vedanta and Mimamsa, their Philosophical Schools, Saivism, Vaishanavism, Tantricism.

Unit IV Literature : Sanskrit, Prakrit, Tamil and Apabhramhsa, Rise of regional Languages and Literature, Marathi, Kannada, Telugu and other Languages

Unit V Art and Architecture : Temple architecture, Evolution of major regional Styles,
Sculpture, Bronzes and Painting.

Course Outcome:

- Students can develop comprehensive knowledge on political, social, economic, religious and cultural history of early medieval India , regional polities and its impact
- Can also able to understand the circumstances lead to the invasions of Arabs and foundation of Muslim rule in India

Suggested Readings

1. Bose, Social and Cultural History of Ancient India, Tirunelveli, 2001 Das, S.K., Education System of the Ancient Hindus, Calcutta
2. Kosambi, D.D.,The Culture and Civilization of Ancient India, In Historical Outline, 1965
3. Lunia, B.N., Life and Culture in Ancient India, Agra, 1989
4. Majumdar, R.C., Ancient India, Calcutta, 1920
5. Rajkumar, Survey of Ancient India 5 Vol, Tirunelveli,2001
6. RomilaThapar, Ancient Indian Social History : Some Interpretations, Delhi, 1978
7. Sarma,L.P., History of Ancient India (Pre-historic age to A.D 1200)
8. Sastri, K.A.N., A History of South India, Madras, 1965
9. Sastri, K.A.N., The Colas, Madras, 1975

HST 202. SOCIAL AND CULTURAL HISTORY OF INDIA 1206 – 1757

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- It aimed to introduce Social Order and Hindu, Muslim Societies
- The course create awareness among the students about the changing pattern of society, women's participation in politics and analyses ,women centered issues in contemporary society, religious trends, , bhakti and sufi movements,
- To familiarize the progress of Persian and indigenous languages, education, literature, development of Art, Architecture, influence and impact of Islamic traditions on Hindu culture – vis-e-vis.

Unit I Hindu Social Divisions: Muslim Social Divisions- Synthetic factors of Hindu-MuslimSocial order- Conflict and Convergence of traditions- Nobility-Khans-Ulemas-Domestic servants and slave system- The Masses.

Unit II Position of women: Hindus and Muslim Societies- Marriage- Divorce-Sati-Jauhar- Property rights- Dress and Ornaments of Hindu- Muslim men and Women- Food habits-Untouchability, recreation and amusements- Sports and games- Festivals and Fairs of Hindus- Muslim Societies.

Unit III Development of Education: Hindu and Muslim Systems of Education-

Development of Literature , Sanskrit, Persian, Marathi, and other regional literatures.

Unit IV Religious reform Movements- Bhakti Movements of north India and its social reform Concept- Sufi movement, Influence of Islam on Indian Culture.

Unit V Development of Art and Architecture: Under Delhi Sultanates and Mughals-Development of Painting.

Course Outcome:

- Students can familiarize in understanding the continuity with changes in all spheres of history and culture during the medieval ages.
- Students can able to assess the contribution of Sultanates and Mughals to Indian culture.

Suggested Readings

1. Aiyangar, S.K. Sources of Vijayanagara
2. Eviot&Dewson, History of India as told by her own Historians
3. Habibulla, The Foundation of Muslim Rule in India
4. Sastri, Nilakanta, Historical Method (For sources)
5. Sen, S.P. Sources of Indian History, Vol. II
6. Sharma, S.R., Medieval India
7. Sharma, S.R., Crescent in India
8. Smith, V.A., Oxford History of India
9. Srivastava, Delhi Sultanate
10. VenkataRamanaiah. N. HistoryFurther Sources of Vijayanagara History

HST 203: FREEDOM MOVEMENT IN INDIA, 1857-1947

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- The course is design to provide comprehensive knowledge on the origin of nationalism, emergence of Indian National Congress.
- To provide knowledge on the phases of national movement elaborately.

Unit I Nationalism : Its meaning and different interpretations – Factors leading to growth of

Nationalism- Emergence of Indian National Congress- Moderates and Militant Nationalists-Swadeshi and Home Rule Movements

Unit II Emergence of Gandhiji : Non- Violence and Satyagraha- Rowlat and Khilafat issues-

Non- cooperation Movement- Swarajists - Civil disobedience Movement- Ministries at

Provincial level and Second World War

Unit III Revolutionary Nationalists: Bhagath Singh- Growth of Capitalist class and its role –

Growth of left Ideology and peasant and Working class movement, KisanMahasabha

Unit IV Growth of Communal Ideology and politics: Factors leading to Communalism- Formation of Muslim League and Hindu Mahasabha- National issues, Role of Congress

and Muslim League, Cripps proposals and Quit India Movement, Cabinet Mission, the

Partition and attainment of Independence

Unit V Freedom Struggle in Princely states: Socio, Political and Administrative

conditions-

Origin of Nationalism- Impact of Freedom Struggle of British India over Native States,

Haripura Resolution, 1938- Growth of Popular Movements- Lapse of Paramountacy-

Join India Movement- Vallabhai Patel and Integration.

Course Outcome:

- Students can gain comprehensive knowledge on the freedom movement from its inception upto independence in India
- The students can also able to understand the role of national congress and prominent leaders of national movement, problems and perspective in the progress of freedom movement.

Suggested Readings

1. Anil Seal, Emergence of Indian Nationalism
2. Bipan Chandra, Communalism in Modern India, Vikas, Delhi, 1987
3. Bipan Chandra, Nationalism in Modern India, Orient Longman, Delhi, 1981
4. Bipan Chandra, (ed), India's Struggle for Independence, 1857-1947
5. Brass, Paul, Plitics in India since Independence, Delhi, 1994
6. Brown, Judith, Gandhi's rise to Power in Indian Politics, 1915-22, OUP, 1972
7. Desai, A.R., Peasant Struggle in India, OUP, Delhi, 1979
8. Desai, A.R., Social Backgroud of Indian Nationalism, Mumbai, 1986
9. Guha, Ranajit, Elementary Aspects of Peasant Insurgency in Colonial India, OUP,Delhi, 1983

10. Jones, K., Social and Religious Reform Movement in Modern India, New Cambridge History, 1989

11. Low, D.A.(ed), Congress and the Raj : Facts of the Indian Struggle 1917-1947, Delhi, 1977

12. Ravinder Kumar, Social History of Modern India, OUP, Delhi, 1985

13. Sarkar, Sumit., Modern India, 1885-1947, Macmillan, 1985

14. Stokes, Eric, Peasant and Raj : Studies in Agrarian Society and Peasant Rebellion in Colonial India, Delhi, Vikas, 1978

15. Ganshyam Shah, Social movements in India, A review of Literature, Sage, Delhi, 2004

HST 204: History of Contemporary World, 1945-2000

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- To teach main events in Contemporary World History
- To instruct the political and economic aspects of Cold war.

Unit I **Cold War and its Impact**: Ideological and Political basis of Cold War-Pacts and Treaties-

NATO,WRSEW,ANZUS,SEATO,CENTO- Tensions and rivalries- between America and

Soviet Union-Non-aligned Movement

Unit II **The UN and The Concept of World Peace**: Regional Tensions-Palestine, Suez

Crisis, Kashmir, Cuba, Korea and Vietnam-Disarmament-Geneva Summit (1955), Test

Ban Treaty (1963),SALTI(1972).

Unit III **Cultural Revolution in China:** Civil Rights Movement in the U.S.-Apartheid in South

Africa – Evolution of the European Union since European Economic

Community (1958) – Maastricht Treaty (1993), Monetary Union (1999)- Euro zone-

Structure of the EU – Governance – Institutions – Economy, Military, Foreign Relations.

Unit IV **Indo-Pak Relations, 1947-1999 :** Kashmir Problom-Indo-Pak War of 1965-Tashkent

Declaration- Indo-Pak War of 1971- Emergence of Bangladesh- Shimla Agreement,

1972- SAARC-Bus Diplomacy-Kargil War of 1999.

Unit V **Disintegration of Socialist Block :**Its genesis and Process of Disintegration–End of Super
Power Rivalry – Liberalization- Globalization- Its Economic and Political Impact.

Course Outcomes

- The students can understand the Cold War and its Impact
- Possess knowledge on UN and the Concept of World Peace
- Gain the knowledge on the Disintegration of Socialist Block

Suggested Reading

1. Asa Briggs and Patricia clauin, Modern Europe 1787-Present Pearson Education, New Delhi, 2009
2. Dunbabin . I.P.D. International Relations since 1945,2 Vols. Longman London, 1994
3. Desmond Dinan, Ever Closer Union An Introduction to European Integration Palgrave Macmillan :Hampshire 1999
4. John McCormick, Understanding the European Union A Concise Introduction, Palgrave : New York, 2002
5. Keylor, W.R. The Twentieth Century World: An International History , OUP New Delhi, 1984.
6. Noel Cowen, Global History: A Short Overview, Blackwel Pub, USA, 2001
7. Norman Lovet, Mastering World History, Macmillan, New Delhi, 1997
8. Pinder, John, and Simon Usher wood. The European Union: A very short Introduction Oxford University press: Canada, 2008

9. RafiqueAfzal M., Pakistan: A History and Politics, 1947-1971, Oxford, New Delhi, 2001
10. Robert Ross, A Concise History of South Africa, Cambridge Cup, 1999
11. Spate, O. H. K., India and Pakistan, M M. Publishers, New Delhi, 1994

12. Staab, Andreas. The European Union Explained: Institutions, Actors, Global Impact, Indiana University press: Bloomingtom, 2008

13. Victoria Schofield, Kashmir in the Crossfire, Viva Books, New Delhi, 1997
14. William Woodruff, A Concise History of the Modern World, Macmillan, London, 1998
15. Yesilada, Birol A and David M Wood. The Emerging European Union, Longman: London, 2009
16. Young. I.W. Cold war Europe, 19489:A Political History, EawardArnolad, London,

HST 205 a. HISTORY OF VIJAYANAGARA EMPIRE

(to come into effect from the academic year 2021-2022)

Objectives:

- This course is designed to impart thorough knowledge on the history of theVijayanagaraempire.
- The course create awareness among the students about the political achievements of Vijayanagara rulers, their relations with the contemporary dynasties of south India, their polity, policies, Administrative reforms, economic development, women, society, religious trends, contribution toliterature, Art and Architecture.

Unit I Origin of Vijayanagara empire-Theories- Sangama, Saluva, Tuluva and Aravidu dynasties Administration under Vijayanagara Empire -The King and his Ministers-Central and

Provincial administration- Police and Military administration-Judiciary

Unit II **Society and Religion** - Social Life- Social Institutions-

Status of Women-Court Life-Devadasi system-Customs of Sati-Games and Amusements Religious Policy- Religious life of people- Saivism, Vaishnavism and Islam-Festivals

Unit III **Economy:** Methods of Agriculture-Systems of Land Tenure-Irrigation

system-taxation-economic prosperity-Trade and Commerce-guilds-Maritime trade-Trade relations with other countries- Communication and Transport

Unit IV **Literature :** Court poets-Ashtadiggajas and other poets-

Patronage to Telugu literature, Kannada and Tamil

Unit V **Art and Architecture** Architecture-Sculpture-Painting-Growth

of Art and Art forms-Hindu monuments-Indo-Sarsanic Architecture and its influence

Course Outcome:

- This course provides comprehensive knowledge on the last imperial political formation in South India and the history of Vijayanagara, Bahmani and contemporary pretty powers.
- It helps to understand with the context of polity, economy, culture, religious and ideological changes

Suggested Readings

Filliozat, Vasundhara, editor, 1999, Vijayanagara, As Seen by Domingo Paes and FernaoNuniz (16[th] Century Portuguese Chroniclers) and Others, National Book Trust, New Delhi.

KrishnaswamiAiyangar, Sakkottai, editor, 2003, Sources of Vijayanagar History, Reprint [Orig. 1919], New Delhi, Aryan Books International.

Longhurst, A. H., 1995, Hampi Ruins: Described and Illustrated, reprint, Asian Educational Services, New Delhi.

Michell, George, 1990, Vijayanagara: Architectural Inventory of the Urban Core, 2 volumes, Directorate of Archaeology and Museums, Mysore.

----------, editor, 2008, Vijayanagara, Splendour in Ruins, New Delhi, The Alkazi Collection of Photography, New Delhi and Mapin Publishing, Ahmedabad.

NilakantaSastri, K. A. and N. Venkataramanayya, editors, 1946, Further Sources of Vijayanagara History, 3 vols, Madras.

Sewell, Robert, 2000, A Forgotten Empire (Vijayanagar): A Contribution to the History of India, reprint, Asian Educational Services, New Delhi.

Stein, Burton, 1989, The New Cambridge History of India I.1, Vijayanagara, Cambridge University Press, Cambridge.

Verghese, Anila, 1995, Religious Traditions at Vijayanagara: As Revealed Through Its Monuments, Manohar, New Delhi.

Patil, Channabasappa, S. and Vinoda C. Patil, 1995, Inscriptions at Vijayanagara (Hampi), Directorate of Archaeology and Museums, Mysore.

HST 205. B.HISTORY OF MODERN AFRICA

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- To introduce Modern African History to students
- To make students aware of Colonial politics in Africa

Unit I Partition of Africa 1879-1901-European Interests in Africa-Development of Anglo-French Rivalry West Africa-Belgium & Congo-Germany enters Scramble 1883-1885-Restoration of British Initiative 1885-1891-European Conflicts in Africa-French Advance down Niger-British Expansion in Gold Coast &Nigeria-French in Central Sudan-British Reconquest-East Africa & Congo Basin-Rhodes & Central Africa-The Anglo-Boer War-Colonial Rule in Tropical Africa 1885-1914-Policies of Colonial Powers-French West Africa-British West Africa-Britain, Germany & Portugal East & Central Africa-Colonial Rule in Tropical Africa-Impact-Christian Missions & Western Education-Birth of Nationalism

Unit II The War & Mandate System-Dual Policy in British Africa-in East & Central Africa-Education in British Colonies-French Policy of Association-Colonialism & Nationalism-North & North East Africa 1900-1939-The Pan-Islamic Movement-French Rule in Maghrib-Morocco-Lyautey& al-Qrim-Beginnings of Nationalism in Maghrib-British in Egypt & Sudan-Italian Spheres of Influence-Libya-Somalia & Ethiopia-South Africa 1902-1939-South Africa after Boer War-1910:Union-Smuts & Hertzog- African Predicament-South-West Africa-The Last Years of Colonial Rule-1939-1945 War & Its Aftermath-Development-Last Phase of Colonialism-Progress in Education-Preparing for Democracy

Unit III Road to Independence- North & North-East Africa-Egypt & Sudan-States of the Horn-Libya &Maghrib-Africa from Sahara to Zambezi-Gold Coast-Ghana in British West Africa-Independence of French West Africa-East Africa: Mau Mau& Multiracialism-Belgian Congo-Madagascar-Road to Independence-

Central Africa-Central African Federation-Colonial Wars in Angola & Mozambique-From Rhodesia to Zimbabwe

Unit IV The Long Road to Democracy in Southern Africa-Protectorates & South-West Africa (Namibia)-Breakthrough in South Africa-Politics of Independent Africa-Democracy, Autocracy & Military Rule-From Military Rule to Civil War-Civil War & Cold War-Pressure of Population Increase

Unit V Economics & Society in Independent Africa-Years of Stagnation & Decline-Hard Road to Recovery-Into Third Millennium-Tragedy of Rwanda & Congo-Warlords in Liberia & Sierra Leone-Muslims in North Africa-Bumpy Path of Parliamentary Democracy-West Africa-East & South-Easter Africa-Southern Africa

Course Outcomes

- Students will be familiar with Road to Independence in Africa
- They will understand development and underdevelopment in Africa.

Suggested Reading

1. A.A. Bohen ed. General History of Africa VII: Africa under Colonial Domination 1880-1935, Paris, UNESCO, 1985
2. A.A.Mazrui ed. General History of Africa VIII: Africa since 1935, Paris,UNESCO, 1993
3. A.D.Roberts ed. Cambridge History of Africa: 1905-1940, Cambridge, 1986
4. Bill Freund , The Making of Contemporary Africa: The Development of African Society since 1800, Boulder, CO, 1998
5. David Birmingham, Decolonization in Africa, London, 1995
6. Frederick Cooper, Africa since 1940, Cambridge, 2002
7. John E Flint ed. Cambridge History of Africa V, c 1780-c1870, Cambridge, 1976
8. John D Hargreaves, Decolonization in Africa, Harlow, 1996
9. John Iliffe, The African Poor: A History, Cambridge, 1987
10. L.H. Gann and Peter Duignan eds. Colonialism in Africa 1870-1960, 5 vols,. Cambridge, 1969-75
11. Michael Crowder ed. Cambridge History of Africa VIII: 1940-1975, Cambridge, 1984

12. Roland Oliver and G.N.Sanderson ed. Cambridge History of Africa VI, c 1870-c 1905, Cambridge, 1985
13. Roland Oliver and Anthony Atmore, Africa Since 1800, Cambridge, 2004
14. Suzanne Miers and Richard Roberts eds. The End of Slavery in Africa, Wisconsin, 1985
15. Thomas Pakenham, The Scramble for Africa, London, 1991
16. World Bank, Can Africa Claim the 21st Century, Washington, 2000

HST 206 A.: HISTORICAL APPLICATION OF TOURISM IN INDIA

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- The aim of the course is to provide useful knowledge of the Tourism Industry in relevance to History and cultural attractions of India.
- The course can provide more in depth insight in to the specific aspects of tourism industry, besides special focus on Archaeological, historical, cultural and natural heritage of India as attractions of tourism .

Unit I Meaning and Nature of Tourism : Basic Components and Elements of Tourism- Brief History of Tourism in India

Unit II Types of Tourist destination in India –Monuments- Museums- Hill resorts- Sarais- Beaches- Wild life Sanctuaries

Unit III Important Heritage Circuits of India

A. Delhi- Agra-Jaipur
B. Sanchi-khajuraho

C. Belur-Halebidu- Hampi

D. Mahabalipuram – Kanchipuram- Tanjore

Unit IV Tourism Products of Andhra Pradesh and Telangana

A. Vishakapatanam Circuit

B. Amravati- NagrajunaKonda Circuit

C. Kornool Circuit

D. Tirupati Circuit

E. Warangal Circuit

Unit V Socio- Cultural Heritage of Andhra Pradesh : Dance Style- Performing Arts- Fairs and Festivals, Folk Cultures- Handicrafts

Course Outcome:

- The students can familiarize the knowledge needed to excel in tourism activities.
- It will equip the students with the solid foundation to build upon the fundamentals, useful skills and expertise that can assist employment in Tourism Industry.

Suggested Readings

1. A.P.Tourism Development Corporation, Discover of Andhra Pradesh and other Brochures

2. Archaeological Survey of India, Guide Books for Monuments

3. Bhatia,A.K., Tourism Development: Principles and Practices, Sterling Publishers, New Delhi, 2007

4. Husain, S. A., The National Culture of India, NBT, New Delhi,

5. Krishnadeva, Temples of North India

6. National Cultures of India and Dance Forms of India, NBT, New Delhi

7. Rajendhraprasad, B., The Art of South India, Andhra Pradesh

8. Ramraju, B., Folk Cultures of India

9. Sivaramamurthy, C., Indian Painting

10. Srinivasan, K.R., Temples of South India

206. b. Women Studies in Modern India

Objectives

- To introduce the emergence of Women Studies and approaches.
- To explain Modern Education and Women Awakening.

Unit I Evolution of Women Studies: Women and Caution – Nationalist – Marxist – Feministand Subaltern Approaches – Importance of Women's Literacy – Women as subject in History.

Unit II Women in Caste Hinduism and Islam: Women's Lives household and Agricultural Technology – Religious Rituals and Sentiments – Fertility and Family Size – Furnishings – Jewels and Clothing – Inheritance and Property Right and Marriage and Divorce – endowment and Colonial Acts and Women Questions.

Unit III Modern Education and Awakening of Women folk: Christianity – nationalist and Women Educationists – Religious Reform Movement and Women Question – Women Mobilization and organizations – National Council of Women – the Women's India Conference – All India Women Conference – the AryaMahilaSamaj.

Unit IV Women Movement: Caste base and Nature – Role of SavitriBaiPhule, Pandita Rama Bai – Tara baiShinde – DurgabaiDeshmukh – MuthuLaxmi Reddy and Sarojini Naidu.

Unit V Women in the Freedom Struggle: Pre-Gandhian Era – Campaign for female Franchise – Gandhian Movement and Women's Participation – Growth of Literary Movement and Women's Participation – Women in the revolutionary Struggle – Telangana Armed Struggle.

Course Outcomes

- The student can understand thoroughly the importance of Women Studies

- Will understand the role of Women in Hinduism and Islam
- Also gain knowledge about the Women participation in various movements in India.

Suggested Readings

1. Bipan Chandra, India's Struggle for Independence, 1857-1947, Penguin Books Pvt. Ltd., New Delhi, 1989
2. Desai, Neera, Women in Modern India
3. Forbs, G., Women in Modren India, Cambridge University Press, New Delhi, 1996
4. Gupta, N. I., Women Education through Ages.
5. Kaur, Manmohan, Women in India's Freedom Struggle.
6. Krishnamurthy, J., Women in Colonial India.
7. Ray, Bharati (ed.), From the Seams of history: Essays on Indian Women.
8. Sarkar, Sumit, Modern India, Macmillan, New Delhi, 1983
9. Majumdar, R.C., History of the Freedom Movement in India 3 Vol.
10. Maurice Guyer and Appadurai, A., Speeches and Documents on Indian Constitution, vol. I
11. Punnias, K.V., Constitutional History of India,1858-1918
12. Pylee, M.V., Constitutional History of India, 1600-1950.
13. Shiva Rao, B., Framing of the Indian Constitution, 4 Volumes

HST 207: Human Values and Professional Ethics-II.

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- The ethos of Indian culture has been value-oriented throughout the ages.
- The rich literary heritage of India is a treasure of values and ethics to be acquired, pursued and imparted to the future generations of the present day.
- An enquiry into varying dimensions of human values may lead to furtherance of our knowledge and to ethical values suited for the modern world.

UNIT- I:

Value Education- Definition - relevance to present day - Concept of Human Values - self introspection – Self-esteem - Family values-Components, structure and responsibilities of family Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-II:

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals.Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT-III:

Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

UNIT-IV:

Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, CI imate change, Energy and population, Justice and environmental health.

UNIT -V :

Social ethics- Organ trade.Human trafficking.Human rights violation and social disparities, Feminist ethics.Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

Course Outcome:

- Students can understand the need and importance of human values and professional ethics which are essential for positive human behavior and actions in our daily lives.
- They inspire the fundamental goodness of human beings and society at large.

Suggested readings:

1. John S Mackenjie: A manual of ethics.
1. The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
2. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
3. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
4. Harold H. Titus: Ethics for Today.
5. Maitra, S.K: Hindu Ethics.
6. William Lilly: Introduction to Ethics.

HST 301: HISTORICAL METHOD AND CONCEPTS

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- This course aims at developing greater understanding the meaning, scope, purpose, principles and facets of history.
- It also aims at introducing the student to the main features of research methodology
- This course is intended to familiarize the students with approaches to historical studies in the twentieth century with a focus on prominent historians and on the development of historical writing in modern India.

Unit I Meaning and definitions of History: Nature – Scope – Relations with other Social Sciences – History as Science and Art – Causation – Objectivity – Historicism and Historical Synthesis

Unit II Historical Sources: Primary – Archaeological, Archival/Literary and Autobiographical – Secondary Sources – Biographies – Published Works – Oral Tradition

Unit III Major theories of History: Linear Theory – Cyclic Theory – Historical Materialism – Post- Modernist and Structuralism

Unit IV Methodology: Heuristics or External Criticism – Hermeneutics or Internal Criticism –

Synthetic Operations – Exposition or Presentation

Unit V Philosophy of History: Auguste Comte – Karl Marx – Oswald Spengler – Arnold Toynbee

Course Outcome:

- It provides a critical overview of one of the most dynamic areas of modern historical inquiry—global history.
- The students can familiarize with historical studies, the theories and methods used in the practice of history writing.
- Students also gain foundation knowledge on Historical Methods and fundamentals of research methodology

Suggested Reading

1. Bajaj, Satish K., Research Methodology in History, Anmol Publications, New Delhi, 2000
2. Carr, E. H., What is History, Macmillan, London, 1969
3. Collingwood, R. G., The Idea of History, Oxford University Press, Oxford, 1966
4. Manickam, S., Theory of History and Method of Research, Pudumam Publishers, Madurai, 2000
5. Manickam, V., On History and Historiography, Clio Publications, Madurai, 2003
6. Rajayyan, K., History in Theory and Method, Ratna Publications, Madurai, 2000
7. Sastri, K. A. N., & H. S. Ramanna, Historical Method in Relation to Indian History, Chennai, 1956
8. Sheik Ali, B, History: Its Theory and Method, Macmillan, Chennai, 2001
9. Sreedharan, E., A Text Book of Historiography (500 BC to AD 2000), Orient Longman, Chennai, 2000
10. Subramanian, N., Historiography and Historical Methods, Ennes Publications, Udumalpet, 1999
11. Venkateswaran, G., A Study of Historiography, V. C. Publications, Rajapalayam, 2005

HST 302: CONTEMPORARY HISTORY OF INDIA - I

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- The course intended to introduce the Contemporary History of India after independence.
- To explain in detail the constitution of India foreign policy, economic reforms.

Unit I **The Partition of India:** Colonial Legacy- Integration of Princely States–The Kashmir And Hyderabad issues

Unit II **The Republican Constitution of India:** Salient features–Fundamental Rights– Directive Principles of State policy – Powers and Functions of President – Amendments

Unit III **Indian Foreign Policy:** Non-Alignment– India's Role in Korea, Indo-China, Hungary – The Suez Crisis – India and the Super Powers – Indo-Pak Relations –Sino-Indian Relations.

Unit IV **Indian Economy1947-65:** Planning and Public Sector–Achievements-Industry- Infrastructure- Health and Education – Science and Technology – Social Change

Unit V **Agricultural Growth and Green Revolution:** Cooperatives-Overview of Land Reforms -Formation of Andhra - the States Reorganization Commission 1956

–

Emergence of Andhra Pradesh

Course Outcomes

- Student can acquire the contemporary political, economic issues.
- Can gain thorough understanding Functioning of Parliamentary Democracy in India
- India's foreign policy relations with other nations

Suggested Readings

1. Bipan Chandra, AdityaMukerji, MrudulaMukherji, India **after** Independence, Penguin India, New Delhi, 2000
2. Bipan Chandra, AdityaMukerji, MrudulaMukherji, India **Since** Independence, Penguin India, New Delhi, 2008
3. Bhupender Singh, Autonomy Movements and Federal India, Rawat, New Delhi, 2002
4. IqbalNarain, State Politics in India, Rawat, New Delhi, 2002
5. IqbalNarain, Politics in a Changing India, Rawat, New Delhi, 1994
6. Paul R. Brass, The Politics of India Since Independence, Cambridge, New Delhi, 1997
7. Ramakanth, R. M (ed), India's Partition Precludes and Legacies, Rawat, New Delhi, 2005
8. SajalBasu, Regionalism, Ethnicity and Left Politics, Rawat, New Delhi, 1997
9. Selig Harrison, India: The Most Dangerous Decades, Rawat, New Delhi,1997
10. V.P. Dult, India's Foreign Policy Since Independence, National Book Trust, New Delhi, 2007

HST 303 A: HISTORY OF USA, 1776-1963

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- To introduce basics of History of USA
- To explain Slavery, Progressive Era, US Role in World wars

Unit I American war of Independence: Causes and Consequences, Formation of Confederation
and its Problems. Forming of the Federal Constitution, Its Salient features. George Washington as the first President of USA: Administration of John Adams – Thomas
Jefferson and his Republicanism, James Madison and the War of 1812.

Unit II James Munroe-Andrew Jackson and his Democracy –Territorial Expansion-ouisiana Purchase 1803 and the acquisition of Florida, 1819, Annexation of Texas, 1845, Settlement of Oregon, 1846. The Mexican War, 1846-1848.

Unit III Causes and Results-Issue of Slavery and the anti- Slavery Movement, Missouri Compromise, 1820 and the Compromise of 1850. Civil War : Causes, Course and ignificance – Role of Abraham Lincoln during the Civil War.

Unit IV Factors responsible for the growth of US Imperialism Progressive Era (1900-1917)-
Domestic Policies of T.D.Roosevelt, William H. Taft and Woodrow Wilson-U.S Foreign Policy after 1900- F.D. Roosevelt, Taft and Wilson.

Unit V U.S.A. and the First World War: Wilson's Fourteen Points and the Peace Treaty of

1919- Washington Conference. U.S.A and the Second World War: Beginning of the Cold

War- Harry S. Truman - Fair Deal and Truman's Doctrine- The administration of Dwight

D. Eisenhower and John F. Kennedy.

Course Outcomes

- Students were able to possess understanding about American War of Independence
- Will understand Issue of Slavery and Anti Slavery Movement and Progressive Era

Suggested Readings

1. Parkes, H.B., The United States and South America, Cambridge, Mass, 1948.Allen H.G., Great Britain and the United States, New York, 1955

2. Brannon J.H., History of the Americas, New York, 1963

3. Beard, C.A., and Mary R. Beard, New Basic History of the United States, New York, 1960.

4. Billington, R.A., American History, Peterson, 1963

5. Current, R.N.W., et, al., American History: A Survey, New York, 1979.

6. Daniel,W.M., American Indian, New York, 1957.

7. Franklin, J.H., From Slavery to Freedom, Chicago, 1966

8. Hill, C.P., A History of the United States.

9. McKinley, T. and Hall, S., History of the Indian Tribes of America, Philadelphia

10. Parkes, H.B., The United States and South America, Cambridge, Mass, 1948.

HST 303 B. History of Modern Andhra 1766 – 1972

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

The course aimed to impart comprehensive knowledge of the history of modern Andhra in context of regional as well with national events.

- The course introduces coming of Europeans, Andhra under French and British rule, role of Andhras in various phases of freedom movement.
- The study also intended to focus on the movement of separate Andhra state , movement for formation of Andhra Pradesh

UNIT-I French Rule in Andhra 1750-1759- British Acquisition- Missions and acquisition of Northern Circars 1766- Delayed acquisition of MurtlzanagarCircar 1788, Establishment of British Indirect rule over Telangana,1798. Acquisition of Rayalaseema Districts,1800- Acquisition of Chittoor and Nellore Districts,1801.

UNIT-II Andhra Under Company: Survey and Settlement of Rayalaseema,1801-1805- Revolt of ChittoorPalegars,1802-1805- Services of Collin Mackenzie, C.P. Brown and Arthur Cotton: Revolt of PalegarNarsimha Reddy,1846 - Effects of the Company Rule

UNIT-III Social and cultural awakening: Veeresalingam - his service to Telugu literature ; socialReforms activities - Growth of Telugu Journalism- Reforms of Salar Jang- KomarrajuLakshamanaRao – Establishment of Krishnadevaraya Andhra BhashaNilayam and VignanaChandrikaMandali. Political Awakening : Role of District Associations – Vandemataram Movement in Andhra – Andhra Movement- Andhra MahaSabha- Home rule Movement in Andhra- Andhra Congress Circle- Chirala-Perala Struggle- Palanadu Forest Satyagraha- No Tax Campaign of Pedanandipadu-Rampa Rebellion and AlluriSitaramaRaju- Andhra Jana Sangham.

UNIT-IV Developments during 1926-1947 : Establishment of Andhra University-Salt

Sstyagraha in Andhra- The "Sri Bagh" Pact – Quit India Movement in Andhra- Nizam- Andhra MahaSabha- Hyderabad State Congress-MadapatiHanumanthaRao- TelanganaArmed Struggle.

Unit IV Shaping of Modern Andhra Pradesh : Police Action on Hyderabad, 1948 ; Dar Commission, 1948 ; J.V.P. Report, 1949 ; Martyrdom of PottiSriramulu ; Formation of

Andhra State, 1953; Gentlemen's Agreement, 1956.

UNIT-V Emergence of Andhra Pradesh, 1956- State's Border disputes- Srikakulam Armed

Struggle, 1966-1970-Telangana Agitation, 1969 – Jai Andhra Movement, 1972 – Six Point Formula –Revocation of President Rule.

Course Outcome:

- The students can understand the history of Andhra under company and crown rule.
- Assess the role of Andhras in the freedom movement.
- Acquire thorough knowledge on the causes and course of the movement of separate Andhra state, movement for formation of Andhra Pradesh

Suggested Readings

1. Burton Stein, Thomas Munro, Delhi, 1989.
2. Frykenburg, R.E., Guntur District,1788-1848, Oxford, 1965
3. Mangamma, J., Book Printing in India, 1746-1847, Nellore, 1975
4. Patabhirama Reddy, M., Peasant and State In Modern Andhra History,Vijayawada,1985
5. Peter Sohmitten, Telugu Resurgence , New Delhi, 2001
6. RamanaRao, A.V., Economic Development of Andhra Pradesh,1756-1957, Bombay, 1958
7. Rao, P.R., Modern History of Andhra Pradesh, New Delhi, 1993
8. SarojiniRegani, Nizam-British Relations,1824- 1857, Hyderabad, 1963

9. SaradaRaju, A., Economic Conditions in Madras Presidency, 1800-1850, Madras, 1941
10. SudershanRao, Y., Andhra Between two Empires, Hanmakonda, 1991
11. A.P. State Committee, Freedom Struggle in Hydrabad, Vol. II-IV, Hyderabad, 1956-1966
12. BhaskaraRao, N., Politics of Leadership in an Indian State : Andhra Pradesh, Vijayawada, 1968
13. Kesavenarayana, B., Political and Social Factor in Andhra, Vijayawada, 1976
14. Naidu, Ch.M., Salt Satygrha in Coastal Andhra, Delhi 1986.
15. NarayanaRao, K.V., Emergence of Andhra Pradesh, Bombay, 1973.
16. RamanaRao, A.V., Economic Development of Andhra Pradesh, 1966-1957, Bombay, 1958.
17. Ramakrishna, V., Social Reform in Andhra, New Delhi, 1983.
18. SarojiniRegani, Highlights of Freedom Movement in Andhra Pradesh, Hyderabad, 1968.

HST 303 c: Indian Foreign Policy: An Introduction

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- To introduce basics of Indian Foreign Policy
- To explain the evolution of Indian Foreign Policy during and After Cold War

Unit-I **Foundations of Indian Foreign Policy:** Nehru- Non- Alignment-Basic parameters-
Early Years- Role in International Affairs- The Korean War- Indo-China- Suez Canal-
Relations with USA and USSR

Unit-II **India's Relations with the South Asian Nations:**Pakistan- Problem of Kashmir-
Emergence of Bangladesh- Shimla Agreement- Nepal- Bhutan- Maldives- Sir Lanka

Unit-III **Sino- Indian Relations:**Panchasheel –Tibetan Problem- Sino- Indian War, 1962 and
aftermath- Role of Super Powers

Unit – IV **Disintegration of USSR:**Economic Reforms and Liberalization in India, 1991-
Changing Relations with the US and Russia from Cold War to Post Cold War

Unit- V **Indian Foreign Policy in the 21st Century:**9/11 Terrorist Attack- Terrorism and
Increased attention and importance to India- Globalization- Relations with the US, Russia and China

Course Outcomes

- Students can acquire knowledge on Foundations of Indian Foreign Policy.
- Will understand India's Relations with South Asian Nations.
- Indian Foreign Policy in the 21st Century.

Suggested Readings

1. Appadorai, A., Domestic Roots of Foreign Policy, OUP, New Delhi, 1981.
2. Badhopadhya, J., Making of India's Foreign Policy, Allied Publishers, New Delhi, 2008
3. Behera, N.C., (ed), International Relations in South Asia: Search for an Alternative Paradigm, Sage Publications, New Delhi, 2008.
4. Bertsch, G.K., et.al (eds), Engaging India: US- Strategic Relations with the World's Largest Democracy, Routledge, New York, 1999
5. Bhargav, G.S., South Asian Security after Afghanistan, Lexington Books, Toronto, 1983
6. Bipan Chandra, et.al (eds), India Since Independence, Penguin, New Delhi, 2008
7. Dixit, J.N., India's Foreign Policy 1947-2003, Picus Books, New Delhi, 2003.
8. Dutt, V.P., India's Foreign Policy Since Independence, NBT, New Delhi, 2007
9. Ghosh, A. et.al, (eds), India's Foreign Policy, Pearson, New Delhi, 2009
10. Jetley, Nancy (ed), Indian Foreign Policy: Challenges and Prsopects, New Delhi, 1999
11. Muni, S.D., Indian's Afghan Policy: Emerging from the Cold, Vol-1, Pentagon Press,New Delhi,2007
12. Murthy, P., Managing Suspicion: Understanding India's Relations with Bangladesh, Nepal, Bhutan and Sri Lanka, Knowledge World, New Delhi, 2000
13. Pant, H.V., India's Foreign Policy in a Unipolar World, Routledge, New Delhi, 2009
14. Rajiv. S., Challenge and Strategy: Rethinking India's Foreign Policy, Sage, New Delhi, 2009
15. Rana, A.P, Imperatives of Non- Alignment: A Conceptual Study of India's Foreign Policy Strategy in the Nehru Period, Macmillan, New Delhi, 1976.
16. Saran, S, India and its Neighbors in Indian Foreign Policy, Foreign Service Institute, New Delhi, 2007
17. ShashiTharoor, PaxIndica India and the World of the 21st Century, Penguin, New

Delhi, 2012

18. Sisodia N.S et.al (eds), Emerging India, Promila and Co, New Delhi, 2005
19. Varma, S.N., Foreign Policy Dynamic: Moscow and India, Deep and Deep, New Delhi, 1999.

HST 303.D. ENVIRONMENTAL HISTORY OF MODERN INDIA

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- To familiarize History of Environment in Modern India
- To instruct Social Issues and Legislation

Unit I Environment: Environmental Factors – Ecology – Multi - Disciplinary Nature of Environmental Studies – Importance of Environmental Studies – Natural Resources – Forest Resources – Water Resources – Land Resources – Mineral Resources

Unit II Use of Resources and Environment: Food gathering stage – Pastoralisim – Settled Cultivation – Industrial Revolution – Deforestation and Environment – Neolithic stage – River Valley Civilizations – Empires and Environment – Exploitation of Forest Resources – Colonial Forest Acts and Forest Codes.

Unit III Social Issues and Environment: Concept of Sustainable Development – Issues for Sustainable Development – Rio Conference – Basic Aspects ofSustainability – Efforts for Sustainability

Unit IV Environmental Legislations: Environmental Ethics in India – Environmental Legislationin India – Air, Water, Noise Pollution, Wildlife – Forest Protection Laws and Hazardous Waste Management Laws – Enforcement of Environmental Legislations.

Unit V Urban Environment: Urban Ecology – Critical Issues – Indian Urban Environment – Environment and Human Health

Course Outcomes

- Students can gain primary knowledge on Environmental factors.
- Will understand Social Issues and Environment.
- Students were able to get precise idea about the history of Environmental Legislation.

Suggested Readings

1. Bharucha, E., Text book of Environmental Studies for Undergraduate Courses, Universities Press, New Delhi, 2013.
2. Cunningham, W. P &T. H. Cooper, Environmental Encyclopedia, Jaico Publishing house, Bombay, 2001
3. Guha, R., Environmentalism: A Global History, OUP, New Delhi, 2000
4. Keith, S., Environmental Hazards, Routledge, New Yark 1996
5. Lead India, Rio, Johannesburg and beyond: india,s Progress in Sustainable development, Orient longman, New delhi, 2003
6. Manivasakam, N., Environmental Pollution, NBT, New Delhi, 1992
7. Saxena, H.M., Environmental Studies, RawatPublictions, New Delhi, 2006
8. Smith, G.H., (ed.), A Conversation Natural Resources, New York, 1965.
9. Turk, J., Introduction to Environmental Studies, Chicago University press, Chicago, 1985

HST .304 .COMMUNICATION AND SOFT SKILLS

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- To promote soft skills among the students so as to develop attributes that could enhance interactions, earning power and job performance.
- To inculcate effective communication, take initiatives, solve problems, and demonstrate a work ethics and create a positive impact.

Unit – 1: ***Types of Soft Skills& Intrapersonal Skills****:* Definition of soft skills – Types of Soft skills: **Intrapersonal Skills**– : Self-Confidence, Self-awareness, Adaptability & Flexibility, Attitude, Assertiveness, SWOC, Resilience

Unit- II: ***InterpersonalSoft Skills:***Active Listening Skills - Goal setting – Negotiation& Persuasion skills - Time Management - Stress Management - Problem Solving and Decision-Making Skills - Leadership Skills – Conflict Resolution

Unit – III: ***Oral Communication Skills:*** Presentation skills –JAM - Role Plays, Public Speaking skills - GD Participation and co ordination.

Unit – IV: ***Written Communication Skills:***Essay Writing - E mails- Report Writing – Memos.

Unit- V: ***Employability Skills*****:** Body Language - E-mail etiquette- Telephone etiquette - Dining etiquette– Grooming -Resume writing - Interview Skills.

Course Outcomes:

- Students can understand soft skills, types of soft skills and intrapersonal skills
- It also helps in exhibiting different types of people skills

Suggested Reading:

1. Meenakshi Raman and Sangeeta Sharma (2015), ***Technical Communication: Principles and Practice, 3rd Edition,*** New Delhi: Oxford University Press.
2. Ashraf Rizvi, M. (2017), ***Effective Technical Communication,*** 2nd Edition, New Delhi: Tata McGraw Hill.
3. Hewing, Martin (1999), ***Advanced English Grammar: A Self-study Reference and practice Book for South Asian Students,*** Reprint 2003, New DelhI: Cambridge University Press.
4. Minippally, Methukutty. M. (2001), ***Business Communication Strategies***, 11th Reprint, New Delhi: Tata McGraw – Hill.
5. Sasi Kumar. V and P.V. Dharmija (1993), ***Spoken English: A Self-Learning Guide Conversation Practice,*** 34th reprint, New Delhi: Tata McGraw – Hill.
6. John, Seely (1988), ***The Oxford Guide to Writing and Speaking,*** Delhi: Oxford University Press.
7. Peter, Francis (2012), ***Soft Skills and Professional Communication.*** New Delhi: Tata McGraw Hill.
8. Print Singh, Prakash and Raman, Meenakshi (2006), ***Business Communication***, New Delhi: Oxford niversity Press.
9. British Council online resources.
10. Wren& Martin (2019), High School English Grammar & Composition Regular Edition, New Delhi, S. Chand & Company Pvt. Ltd

HST 305 A: ECONOMIC AND CULTURAL HISTORY OF INDIA, 1757-1857

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- To introduce British understanding of Indian Society
- To teach Socio-Religious Reform Movements and Economy

Unit I Structure of Indian Society in A.D 1757: British Understanding of Indian Society- Orientalists, Evangelicals and Utilitarians.

Unit II Socio-religious Reform Movement: Raja Rammohan Roy and Brahma Samaj- its impact - Company's Social Policy and the Reform measures- Company's Policy towards Indian religious institutions.

Unit III Education: Warren Hastings, the Asiatic Society of Bengal- The Charter Act of 1813- Orientalists VsAnglicists- Macaulay's Minute and Bentinck's Resolution, 1835.

Unit IV The Growth of Press: Early History- the Censorship of Press Act, 1799- Thomas Munre's Recommendations and Licensing Regulations, 1823- Liberation of the Press,1835 and Licensing Act, 1857.

Unit V Economy: Conditions of Agriculture and Irrigation- Commercial Policy and the Decline of Indian Industry- Droughts and Famines and the Government's attitude- Development of Transport and Communication System- Drain of Wealth.

Course Outcomes

- Students were able to understand the Structure of Indian Society during the British rule.
- Will understand Socio-Religious Reform Movements, its impact on society, role of press and economic issues.

Suggested Readings

1. Bipan Chandra, Modern India, New Delhi, 1986

2. Burton Stein, Thomas Munro- The origins of Colonial State and His vision of Empire, Oxford, 1989
3. Datta, K.K., Socio-Cultural Background of Modern India

4. David, M.D., Cultural History of Modern India, Allahabad, 1972

5. Frykenburg, R.E., (ed), Land Tenure and Peasant in South India, New Delhi, 1977
6. George, D., Bearce, British Attitude Towards India, 1784-1858, London, 1961

7. Grover, B.L., A New Look at Modern Indian History, S.Chand& Co., New Delhi, 1992
8. Kaye, John William, The Administration of the English East India Company, Allahabad, 1966
9. Majumdar, R.C., (ed), History and Culture of the Indian People, Vol. XI
10. Peter Red (ed), Rural India: Land ,Power and Society under British Rule, London, 1983

HST 305.B. INTELLECTUAL HISTORY OF THE 19th CENTURY INDIA

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- The aim of this paper is to provide knowledge to the students about the pioneer intellectuals of Nineteenth Century India.
- Students will understand who created awareness among the Indians towards social and religious harmony.

UNIT-I Introduction - Definition of Intellectual History - Nature of Intellectual History.

UNIT-II Social Thinkers : Raja Ram Mohan Roy - Iswar Chandra VidyaSagar– Keshab Chandra Sen - VeerasalingamPantulu - D.K.Karve - R.G.Bhandrakar - PanditaRamabai - JothibaPhule - B.M.Malabari - Sir Syed Ahmed Khan.

UNIT-III Religious Thinkers :Debendranath Tagore - DayanandSaraswati - Ramakrishna Paramahamsa - Vivekananda - Saint RamalingaAdigal.

UNIT-IV Political Thinkers :DadabhaiNaoroji - M.G.Ranade - S.N. Banerjee - R.C. Dutt -- G.K.Gohkale.

UNIT-V Litterateurs and Scientists :Bankim Chandra Chatterjee - J.C.Bose - P.C.Roy –SrinivasaRamanuja.

Course Outcomes

- Students are expected to draw inspiration from the vision and mission of the intellectuals of 19th Century India who led a principled life.

- Students will get inculcated with the values and moral principles which the intellectuals of 19th Century India preached.

Reference Books:

1. *Datta , K.K : A Social History of Modern India, The Macmillan Company, New Delhi, 1975.*
2. *Grover, B.L & Grover: A New Look at Modern Indian History, (From S. S.Chand and Co, 1707 to, the Modern Times) New Delhi, 2006.*
3. *Naravane, V.S : Modern Indian Thought, Orient Longman, New Delhi, 1978.*
4. *RomainRollan : The Life of Ramakrishna, Advaita Ashram, Almora, 1930.*
5. *VishnooBhagwan : Indian Political Thinkers, Atma Ram & Sons, New Delhi, 1999.*

HST 401: HISTORIOGRAPHY

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- This course is intended to familiarize the students with approaches to historical studies in the twentieth century with a focus on prominent historians and on the development of historical writing in modern India.
- It makes a critical evaluation of the impact of Orientalism on Indian historiography, the Imperialist, Nationalist, Class, Elite, Subaltern and Gender approaches and their influence on the writing and interpretation of Indian history.

Unit I Traditions of Historical writing: Greek-Roman-Chinese-Arabic and Persian-Indian

Historical Tradition-itihasaPurana-Semi Historical Works-the Ramayana-The Mahabarata

Unit II Approaches to History : Church Historiography - Enlightenment – Romanticist-Positivist-

Marxist- Annales School- Subaltern Approaches

Unit III Themes in Indian History: Economic-Labour-Peasant-Varna-Jati-Jajmani System-Gender-

Religion-Culture-Environment-Science and Technology

Unit IV Major Debates in History : Socialistic Debates : Weber and Marx- Economic Debates:
DadabhaiNaoroji and R.C. Dutt

Unit V Select Indian Historians :R.G.Bandarkar-G.S.Sardeasai- JadunathSarkar-R.C. Majundar-

D.D.Kosambi-K.A.N.Sastri-K.M.Panikkar

Course Outcome:

- It provides a critical overview of one of the most dynamic areas of modern historical inquiry—global history.
- The students can familiarize with historical studies, approaches theories and methods used in the practice of history writing.

Suggested Readings

1.Bajaj,Satish K., Research Methodology in History, Anmol Publications, New Delhi,2000

2.Carr,E,H., What is History, Macmillan, London, 1969

3.Collingwood, R,G., The Idea of History, Oxford University Press, Oxford, 1966

4.Gardiner, P,(ed)., Theories of History, Oxford, 1959

5.Rajayyan,K., History in Theory and Method, Ratna Publications, Madurai, 2000

6.SheikAli,B, History-Its Theory and Method, Macmillan, Chennai, 2001

7.Sreedhran, E., A Text Book of Historiography(500BC to AD 2000), Orient Longman, Cheenai,
2000

8.Stern, Robort W., Changing India, Cambridge University Press, New Delhi, 1993

9.Subramanian, N., Historiography and Historical Methods, Ennes Publications, Udumalpet, 1999

10.Venkateswaran, G., A Study of Historiography, V.C. Publications, Rajapalayam, 2005

HST 402: CONTEMPORARY HISTORY OF INDIA - II

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- To introduce Contemporary History of India From 1960s to 2000
- To explain Indian Economy and Reforms

Unit I **Functioning of Parliamentary Democracy :**Coming of Swatantra party–the KMPP

And KLP- the Socialist Party- the Communist Party- RSS-Jan Sangh-theCongress

split, 1969- Emergence of Regional Parties

Unit II **The Emergency :**Indira Gandhi and the Allahabad Judgement- the J.P. Movement–

theJanata Party Rule, 1977-1980- Indira Gandhi returns to Power 1980- India and the

NAM- the Sikh problem- Operation Blue Star- Assassination of Indira Gandhi, 1984 –

Rajiv Gandhi's Succession : Crisis in Sri Lanka- TIE- Defeat of Congress 1989- Coalition Politics- Assassination of Rajiv Gandhi, 1991

Unit III **Indian Economy 1965-91** Mid 1960s crisis and response- Achievements-Gross Domestic

Savings,Gross Domestic Capital Formation, MRTP Act etc

Unit IV **Economic Reforms since 1991** Reforms during Indira Gandhi-Rajiv Gandhi-

P.V.Narasimha
Rao-Effect of Reforms-Indian Economy in the New Millennium-Breakthrough in Growth-Relationship with external world-Challenges in New Millennium

Unit V **Revival and Growth of Communalism:** Hindu and Muslim Communalism-Caste-Untouchability- Indian Foreign Policy since 1991- Look East Policy-USA-Russia-China-South Asia.

Course Outcomes

- Students were able to understand the Functioning of Parliamentary Democracy in India
- Acquire knowledge on Emergency and its Aftermath
- Able to assess the significance of Economic Reforms since 1991

Suggested Readings

1. Bipan Chandra, AdityaMukerji, MrudulaMukherji, India **after** Independence, Penguin India, New Delhi, 2000
2. Bipan Chandra, AdityaMukerji, MrudulaMukherji, India **Since** Independence, Penguin India, New Delhi, 2008
3. Gandhi, K., India Beyond Sixty, Allied Publishers, New Delhi, 2009
4. Giseal Non, the Indian Challenge, Allied publishers, New Delhi, 1992
5. Michel Brecher, Nehuru a Political Biography, OUP, New Delhi, 1998 Nanda, B.R.,
6. Jawaharlal Nehuru- Rebel and Statesman,OUP, New Delhi, 1998
7. Paul R., Brass, the Politics of India since Independence OUP, New Delhi, 1997
8. Panjab,K.L., The Indomitable Sardhar , BharatiyaVidyaBhavan, Bombay, 1990

HST 403 a: INTERNATIONAL RELATIONS AND ORGANIZATIONS

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- To introduce dimensions of International Relations.
- To teach aspects of International Organizations

Unit-I **Concept of International Relations:** The State System and its corollaries- Concept of Sovereignty- Nationalism versus Internationalism- National Power- Elements of National Power.

Unit-II Diplomacy: Functions of Diplomats: Diplomatic rules and Procedures; Origins of Modern Diplomacy and its conditions; Democratic and totalitarian Diplomacies; other kinds of Diplomacy.

Unit-III Instrument of National Policy: Techniques of Propaganda; Pre and Post World War II; Economic Instruments- International trade, International cartels; Other Economic Instruments.

Unit-IV Balance of Power: Nature and Characteristic – Bipolar and Multi Polar World- Devices for Balance of Power- Collective Security and Balance of Power- Foreign Policies during the inter- war period: The USA, The USSR, The Great Britain, France and Germany.

Unit-V International Organizations: United Nations- Structure and Role- Maintenance of International Peace and Security- Socio- Economic and Cultural achievements of the UN- Reforming of the UN.

Course Outcomes

- Students can possess knowledge on the Concept of International Relations
- Were able to understand Balance of Power
- Can gain knowledge on International Organizations

Suggested Readings

1. Hartmann, F.H., Readings in International Relations
2. Catherine, H., A Short History of International Relations, New York, 1951
3. Morgenthau, H.J., Politics Among Nations, Calcutta 1969
4. Palmer and Perkins, International Relations: The world Community in Transition, Calcutta, 1969
5. Quincy, W., The Study of the International Relations, Bombay, 1970.
6. Srivastava, L.S.and V.P. Joshi, International Politics and Relations, Hyderabad, 2012

HST 403 b: Constitutional History of India, 1773-1950

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- To introduce the evolution of the Indian Constitution
- To teach Agitations and Reforms for the Constitution

Unit I **Formation of English East India Company** : Annexation of Bengal and Clive's Dual government – Regulating Act,1773- Pitts India Act,1784- Lord Cornwallis reforms – Constitution of the Company rule- Lord Wellesley- Lord Hastings – Lord Dalhousie – Charter Acts of 1813,1833 and 1853- Centralization of the Powers - Great Revolt of 1857- its significance

Unit II **Establishment of Crown's Rule:** Queen Victoria's Proclamation Act, 1858- Lord Canning – Era of Legislative devolution- Indian Council Act of 1861 and 1892- Indian factor in Legislatures- Relations between Central and Provincial governments – Organization of Civil Services – Administration under the Crown- Lord Ripon and the Local self government

Unit III **Nationalist agitations and the Reforms :** Indian National Congress and the demand for Swaraj- Lord Minto- Indian Council Act 1909(Minto-Morley Reforms)- World War I and India's Co-operation- Montague- Chemsford India Act 1919- Congress rejection- Working of the Dyarchy in Provinces – Muddiman Committee Report- Simon commission- Nehru Report- Lahore Resolution, 1929- Round Table Conference

Unit IV **Background of Communal Award:** Poona Pact, 1932- Joint Parliamentary Committee Report- Government of India Act, 1935- Provincial Autonomy- World War II and the India's reaction, resignation of Congress Ministers- Cripps Mission of 1942- Muslim League – Jinnah and demand for Pakistan- Simla Conference of 1945- Cabinet Mission plan of 1946- Interim Government- Communal Disturbances

Unit V **Mountbatten Plan:** Partition and Independence – Republican Constitution of India- Constituent Assembly- Forming of India's Constitution- Salient features, Fundamental rights and directive principles

Course Outcomes

- The course helps the students to gain require knowledge on the enactment of various acts introduced by the British
- Students will also understand the impact of the legislations, National Agitations and its Prospective.

Suggested Readings

1. Basu, D.S., Commentary on the Constitution of India, 2 vol.
2. Benerjee, A.C., Indian Constitutional Documents, 1757-1947 4 vol.
3. Coupland, A., The Constitutional Problem in India.
4. GajendraGadkar. P.B., The Constitution of India, Oxford, 1969
5. Keith, A.B., A Constitutional History of India, London, 1936.
6. Keith, A.C., Speeches and Documents in Indian Policy,vol.I&II

HST 403. C. History of Modern Asia 1868-1960

(to come into effect from the academic year 2019-2020)

Objectives:

- To introduce the evolution of Modern Asia
- To explain Modernization in Asia

Unit I .**Japan** : Transition from feudalism to capitalism- Crisis of Tokugawa Bakuhan system -
Meiji Restoration :Its nature and Significance- Political Reorganization- Military Reforms - Social, cultural and educational reforms (bunmeikaika) - Financial reforms and educational development in the'Meiji'era - Meiji Constitution

Unit II **Japanese Imperialism**(a) China(b)Manchuria(c) Korea - Democracy and Militarism/Fascism -Popular/People' s Rights Movement - Nature of political parties
- Rise of Militarism-Nature and significance - Second World War-American occupation
-Post-War Changes

Unit III **Emergence of Modern Korea**- The old order and Institutional Decay:JoseonKorea –
Korea's interactions with the Western powers andKorea's unequal treaties with Japan-Attempts at social, political and economic reformsin Korea - Japan's colonization: March First Movement andthe growth of Korean nationalism; in situationaltransformation 1910-1945 - Post-War Changes

Unit IV **Modern West Asia** Leaders, Modernization, Ideologies andMovements: Kemal Ataturk
Pasha and reforms inTurkey; modernization of Iran under Reza Shah Pahlavi; Orientalism; Ottamanism; Arabism and Zionism.

Unit V **World War II and Post war conflicts** in theMiddleEast: Rise of Arab nationalism; West
Asia andWorld War II; creation of Israel; Arab–Israel conflict

Course Outcomes

- Students can possess knowledge on Japanese Imperialism.
- Will understand Emergence of Modern Korea and Modern West Asia

Suggested Readings

1.Beasley, The Modern History of Japan.Frederick A. Praeger, London 1963.

2.Bruce Cummings, Korea's place in the Sun: Modern History,
W.W.Norten and Co., 1992

3.ChowTse Tung, The May Fourth Movement: Intellectual Revolution
in Modern, China. 1913.

4.Jon Livingstone, et. al., The Japan Reader (Imperial Japan : 1800
1945), Vol. I

5.MikisoHane, Modern Japan: A Historical Survey.Westview Press, 1992. Ann Arbor

6.Kenneth B. Pyle, The Making of Modern Japan. 1978. Lexington, Massachusetts.

7.Michael J. Seth, A concise history of Modern Korea,Rowman and
Littlefield,2009

8.NathanielPeffer, The Far East: A Modern History. Ann Arbor:
University of Michigan Press, 1958.

9.Ramon H. Mayers and Mark R. Peattie(ed), The Japanese Colonial
Empire, 1895-1945,Princeton: Princeton University Press, 1984West Asia

10.Catherwood, Christopher, A Brief History of the Middle East, Robinson, London, 2006
Pappe, Ilan, The Modern Middle East, Abingdon, Routledge, 20005,

11.Fromkin, David, A Peace to End all Peace: The Fall of the Ottoman Empire and the Creation of the Modern Middle East, Owl Books, Paperback 2001(New York: Avon Books, 1989)

12.Hourani, A.H, The Emergence of the Modern Middle East, London, Macmillan, 1981.
----------A History of the Arab Peoples. London, Faber and Faber, 1991.

13.Hourani, Albert, Khoury, Philip and Wilson, Mary C. (Eds.), The Modern Middle East. London, I.B. Tauris, 2004.

14.Lewis, Bernard, Shaping of the Modern Middle East, New York, Oxford University

Press, 1994
15.Phillip K. Hitti - History of the Arabs, Macmillan &Co, London 1960
Sachar, Howard M., A History of Israel: From The Rise of Zionism to our Time, second edtion, Alfred A. Knopf, USA, 1996
16.S.N.Fisher - The Middle East, Routledge and Kegan Paul,1966

HST 403. D.HISTORY OF MODERN LATIN AMERICA

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- To introduce History of Modern Latin America to students.
- To make students aware of Dictatorship, Socialism and Liberalism in Latin America.

Unit I — The Independence of Latin America-Background-Causes of Revolution-Liberation of South America-Simon Bolivar-San Martin-Brazilian Independence-Mexico's Road to Independence-Latin America in the 19th century-Decolonization and search for National identities 1821-1870- Fruits of Independence-Mexico, Argentina, Paraguay, Uruguay and Upper Peru, Chile, United Provinces of Central America-Independence and the Failure of the Union 1810-1865-Race, Nation and meaning of Freedom 1821-1888-Brazil-Antislavery Movement, Peru,Cuba Gran Colombia

Unit II — Brazil:The Triumph of Neocolonialism and the Liberal state 1870-1900-Mexican Politics & Economy-Argentine Politics & Economy-Chilean Politics & Economy-Brazilian Politics & Economy- Central American Politics & Economy-Guatemala, Nicaragua, El Salvador-Venezuelan Politics and Economy-Colombian Politics & Economy

Unit III — Latin America since 1900: Mexican Revolution and the Populist Change-The Great revolution 1910-1920-Rule of the Millionaire Socialists- Cardenas & Populist Interlude-The Big Bourgeoisie in Power 1940-1976-Brazil-Decline & fall of Old Republic 1914-1930-Vargas & Bourgeois Revolution 1930-1954-Reform & reaction 1954-1964-Argentina-Radical Era 1916-1930-Military Intervention & the State 1930-1943-Peron Era 1943-1955- Collapse of Populism 1955-1973- Cuba-Independence & Spanish-Cuban American war-Dependent Development and Popular Struggle 1902-1953-Revolution in Power 1959-2003

Unit IV — Limits of Populism 1952-1968-1952 Bolivian Revolution-Peru-Populism & Broken Promises-Military Corporatism & Revolution 1968-1975-Collapse of

Military Corporatism 1975-1990-Chile-Alessandri & the Rise of Populism 1920-1970- Chilean Road to Socialism 1970-1973- Lands of Bolivar-Authoritarian Politics in Colombia 1903-1930-Revolution 1934-1958-Reform & Repression 1958-1974-Drug Trafficking & repression 1974-2000-Venezuela –Liberal Tyranny 1908-1935-Military Populism & Dictatorship 1945-1958-Limited Democracy & Populist Resurgence 1958-1969-Populist Problems 1969-1988-Neoliberalism 1988-2003

Unit V Deconstructing the State: Dictatorship and Neoliberal Markets-Brazil Dictatorship in Crisis 1978-1983-Military Dictatorship & Neoliberalism in Chile 1973-1990-Military Dictatorship & Neoliberalism in Argentina 1976-1990-Neoliberalism & Authoritarian state in Mexico 1977-1994- The Two Americas: United States-Latin American relations –An Imperial Power 1898-1945-War with Spain-The Mexican Revolution-Defending the Empire & Capitalism 1945-1981-Cuban Revolution & the United States-Return to Gun Boat Diplomacy 1981-2003

Course Outcomes

- Students will be identify struggles for Independence in Latin America
- They will understand the politics of the Western Powers in Latin America..

Suggested Reading

1. Alexander Dawson, Latin America since Independence: A History with Primary Sources, Routledge, 2014
2. Benjamin Keen and Keith Haynes, A History of Latin America, Wadsworth Cengage Learning, 2013
3. James A. Wood and Anna Rose Alexander ed, Problems in Modern Latin American History: Sources and Interpretations, Rowman& Littlefield, 2019
4. John Charles Chasteen , Born in Blood and Fire – A Concise History of Latin America, W. W. Norton & Company, 2016
5. Peter Smith and James Green, Modern Latin America, Oxford University Press, 2018
6. Thomas E. Skidmore, Peter H. Smith and James N. Green, Modern Latin America, Oxford University Press,2013

HST 404. HISTORY OF SCIENCE AND TECHNOLOGY IN INDIA 1858- 1947

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- This course as multidisciplinary designed to promote knowledge on emergence and character of Science and Technology, technological development in India since 1858.
- To familiarize scientific developments medical education and health sciences.
- It also focus on communication, transport development and scientists.

UNIT-I Introduction - Scientific Tradition in India - Introduction of Modern Sciences by the Europeans - Asiatic Society of Bengal - Zoological Survey of India - Botanical Survey - Geographical Survey - Trigonometrically Survey - Development of Meteorological and Astronomical Sciences.

UNIT-II Learned Institutes for Development of Science - Indian Association for the Cultivation of Science - Indian Science Congress Association - Institution of Engineers - National Academy of Sciences - Indian National Science Academy.

UNIT-III Medical Education and Research - Technical Education and Research – Agricultural Education and Research - Veterinary Science - Agriculture and Irrigation - Food Crops - Commercial Crops - Plantation Crops - Engineering and Industry - Cottage Industry - Rural & Urban Arts and Crafts.

UNIT-IV Transport and Communication - Roads and Bridges - Harbours - Ports and Lighthouses - Waterways.

UNIT-V Great Scientists - S.Ramanujam, J.C.Bose - C.V.Raman - Role of Universities and Scientific Institutions.

Course Outcomes

- This paper will make the students to understand how far Science and Technology has progressed in India and resulted in bringing Socio-Economic changes in the Society.

Reference Books

1. *Gupta, S.P. Science, Technology and Society in Modern Age.*
2. *Gupta, S.P. Modern India and Progress in Science and Technology.*
3. *KalpanaRajaram : Science and Technology in India.*
4. *VadilalDagli : Science and Technology in India, S.Chand& Co, Ltd, New Delhi, 1982.*
5. *Varghese Jeyaraj, S.: History and Science and Technology, Anns Publications, UthamaPalayam, 2004.*
6. *Venkatraman, R. :History of Science and Technology. Ennes Publications, Madurai,1988.*

HST 405 (a): Outlines of Andhra History and Culture

(Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives:

- The course aimed to impart knowledge of the history and culture of Andhra.
- This course introduces to the external students about the geographical features, sources, political formation, Satavahana rule, rise of local powers, their role and a brief survey on various phases of Andhra history upto 2014.

UNIT- I:

Physical features – Impact on History and Culture of Andhra -Archaeological, Epigraphical and literary sources -Andhra - Andhradesa, Trilingadesa - Andhrajati.

UNIT-II:

Satavahanas – Ikshvakus and Eastern Chalukyas in Andhra and their contribution

UNIT-III:

The Legacy and contribution of Kakatiya, Vijayanagara, Reddi and Qutbshahi dynasties.

UNIT-IV:

Social and cultural awakening: Veeresalingam; RaghupathiVenkataratnam Naidu- Growth of Telugu Journalism- KomarrajuLakshmanaRao – Establishment of Krishnadevaraya Andhra BhashaNilayamand VignanaChandrikaMandali.

UNIT -V :

Andhra movement : Origin and Growth – Andhra Mahasabhas — Movement for separate Andhra –Formation of Andhra State, 1953 –Emergence of Andhra Pradesh, 1956 -Telangana

Agitation, 1969 – Jai Andhra Movement, 1972 – Separate Telangana Movement- bifurcation of Andhra Pradesh 2014.

Course Outcome:

- The study of comprehensive history of the country is incomplete without the study of regional history.

  The external discipline students can develop thorough understanding on Andhra history and culture.

SUGGESTED READINGS:

1. HanumanthaRao, B.S.L. - AndhrulaCharitra, Guntur, 1990.
2. Gopala Reddy, Y. - A Comprehensive History of Andhra, Hyderabad, 1990.
3. Satyanarayana, K. - A Study of the History and Culture of the Andhras Vol.1 and II New Delhi, 1975.
4. Comprehensive History of Andhras, Vol. I, II, III & IV
5. ParabrahmaSastri, P.V., - The Kakatiyas, Hyderabad, 1983.
6. Rao, P.R., Modern History of Andhra Pradesh, New Delhi, 1993
7. NarayanaRao, K.V., Emergence of Andhra Pradesh, Bombay, 1973.

HST 405.b. HEALTH, MEDICINE AND SOCIETY IN MODERN INDIA

Revised Syllabus)

(to come into effect from the academic year 2021-2022)

Objectives

- The aim of this paper is to provide knowledge to the students about the Public health systems in Colonial times.
- Students will learn the difference between the Western and Indigenous Medical systems.

UNIT-I Towards evolving apolicy of public health- pre- colonial systems of preventive medicine and therapies – Early concerns about health

UNIT-II Potential sources of disease and epidemics and colonial medical intervention – Popular perceptions and response to colonial medical intervention.

UNIT-III Divergence and Convergence – Colonial discourse on tropical disease – Dialogue between Western and Indigenous systems.

UNIT-IV Politicization of health – Resolving the issue of gender – political economy of Health – Public debate over health.

UNIT-V Nationalist perspective – Political mobilization against western medicine.

Course Outcomes

- Possess knowledge and awareness about the Public health
- Able to understand the Western and Indigenous Medical systems.

Reference Books:

1. Amold, David, Colonizing the Body: State, Medicine and Epidemic Disease, The Nineteenth Century India, OUP, 1993
2. Amold, Devid, The New Cambridge History of India: Science, Technology and Medicine in Colonial India, CUP, 2000.
3. Bala, Poonam, Imperialism and Medicine in Bengal: A Socio – Historical Perspective, Sage, 1991
4. Forbes, Geraldine, The New Cambridge History of India, Women in Modern India, CUP, 1996.
5. Harrison, M., "Quarantine, Pilgrimage and Colonial trade: India 1866 – 1900", Indian Economic and Social History Review, 29 (1992)
6. Harrison, M. Public Health in British India: Anglo Indian Preventive Medicine 1859 – 1914, CUP, 1994
7. Helen, Lambert, "The Culture logic of Indian Medicine: Prognosis and Etiology, Rajasthan's Popular Therapeutics", Social Science and Medicine, 34(1992)
8. Hume, J.C. "Colonialism and Sanitary Medicine : The Development of Preventive Health Policy in Punjab, 1860 – 1900, Modern Asian Studies, 20 (1986)
9. Kakar, Sanjeev, Leprosy in British India, 1860 -1940: Colonial Politics and Missionary Medicine, Medical History, 40 (1996)
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SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF HUMAN RIGHTS AND SOCIAL DEVELOPMENT

Course

M.A. HUMAN RIGHTS AND DUTIES

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

About the Department

- The M.A. programme in Human Rights & Duties consists of 4 semesters and 24 courses/papers in all spread over a period of 2 years.
- Each semester will have 6 compulsory courses/papers of 4 credits each.
- M.A. third and fourth semester will consist of 4 taught courses and one project and viva-voce exam.
- A student is required to pass all the 24 compulsory courses and earn a total of 96 credits to obtain the degree of M. A. Human Rights and Duties.
- Every taught course is divided into 5 units. Evaluation scheme for each paper consists of 20 marks for the average of two internal assessments and 80 marks for the end semester examination.
- An updated reading list consisting of essential and suggested readings follows the syllabus for every paper. The respective subject teacher may hand out additional references to the student during the course of teaching.
- The first two semesters will have a CBCS paper and the next two semesters will have one CBCS course in addition to courses designated as Ability Enhancement and Skill Enhancement papers.

Vision

The Programme M.A. Human Rights is offered to meet current demands of the youth and public. Also, to create awareness on the public service aspects to the society. This Programme aims to creating equity in education by providing opportunity to rural people for whom higher Education in unreachable.

Human Rights and Duties course include subject-specific skills and generic skills, including transferable global skills and competencies, the achievement of which students are able to demonstrate for the award of MA Degree in Human Rights and Duties qualification. It is to develop expertise to:

- Explore the conditions and dimensions of empowering and transformative learning processes
- Provide an advanced qualification for students wanting to better understand the nature of international human rights in the face of global political, economic, social, legal, ethical and environmental challenges
- Describe and critique the differing approaches, perspectives, and models of human rights and how they impact the ways in which human rights education is carried out in diverse settings

- Design, conduct, analyze and present findings using diverse research tools and methods in order to create knowledge and awareness about human rights issues
- Drawing on critical pedagogies, produce advocacy tools and curricular resources to be used in formal or non-formal educational contexts to address human rights violations
- Analyze the gap between universal rights and grassroots realities in local, regional and global contexts with attention to issues of power, privilege, and marginalization
- Identify diverse methodological tools and skills needed to conduct ethical research
- Synthesize contextual understanding, reflective analysis, theoretical frameworks, and methodological training to inform the production of a thesis and field-based research projects
- Provide grounding in research methods relevant to the advanced study of global issues and develop learner's ability to apply these skills appropriately in an individual dissertation.
- Provide opportunities for the development of practical skills necessary to work in organizations confronted by these challenges; ensure comparability of learning levels and academic standard across universities and
- Focus on knowledge and skill for further study, empowerment and citizenship.

Mission

- **Knowledge** – providing information about human rights and the mechanisms that exist to protect those rights
- **Values, beliefs and attitudes** – promoting a human rights culture through the development of these processes
- **Action** – encouraging people to defend human rights and prevent human rights abuses
- To train the young men and women for facing the challenges of the pluralistic society and the rising conflicts and tensions in the name of particularistic loyalties to caste, religion, region and culture
- To study the effects of draconian laws and unlawful use of State’s machinery and force by the enforcement agencies
- To necessitate human rights education to evolve strategies and schemes for tackling such attitudes like employing bonded labour, practicing untouchability, perpetrating sati and help members internalize more humane and egalitarian approach in their social relations.
- To create an environment as well as an understanding that human rights can easily become vulnerable to abuse of various structures and processes of power
- To ensure comprehensiveness and incorporation of national, regional and international

perspectives related to human rights

- To work in close cooperation with National Human Rights Commission and other statutory Commissions on Women, Minorities, SC and ST and Linguistic Minorities, NGOs and Media Organizations for promoting Human Rights Education;
- To collect data related to the existing educational and training facilities in the areas of human rights in different parts of the country in general and Andhra Pradesh in particular for designing a need based Master's and Doctoral Programmes in Human Rights.
- To provide formal training for students in human rights and social development at the Post Graduate and Doctoral levels
- To promote human rights literacy / awareness among general students community, teachers and law enforcers
- To undertake research into specific and sensitive human rights issues; and
- To encourage concern or empathy for those who experience violation of their rights, by providing legal and other forms of counseling.

Program Specific Outcome:

- The Post Graduate Programme in Human Rights is designed to provide advanced Human Rights knowledge, perspectives and skills to wide cross sections of the learners.
- Choice Based Credit System curriculum of this course is very inclusive and has offered choice to the students to select electives/optional from other disciplines.
- The nature of this course is choice based as well as theoretically and practically relevant which offered job opportunities in the teaching, research and NGOs sectors to the learners.

Programme Objectives:

The Department of Human Rights and Social Development was established in December 1997, under the UGC Innovative Programme by upgrading the erstwhile Centre for Studies in Human Rights and Social Development. It has started M.A. P.G. Degree course in Human Rights and Duties in the academic year 2000-2001.Twenty P.G. students are admitted every year through the Directorate of Admissions. The M. Phil and Ph.D. Research Programmes were introduced in the academic year 2006-2007. The Department had organized several National Seminars, and workshops on the various themes of Human Rights. The Department has also organized Refresher Courses and Guest lecture programmes by inviting several eminent resource persons on the themes of Human Rights.

The Post Graduate Programme in Human Rights is designed to provide advanced Human Rights knowledge, perspectives and skills to wide cross sections of the learners. Choice Based Credit System curriculum of this course is very inclusive and has offered choice to the students to select electives/optional from other disciplines. The nature of this course is choice based as well as theoretically and practically relevant which offered job opportunities in the teaching, research and NGOs sectors to the learners. In terms of content of the course, it focuses on classical and advanced concepts and theories, research methods and perspectives, social issues of development, issues of casteism, environment, minorities, women, backward classes in India, etc are covered. The aim of this programme is not only theoretically oriented to the students alone, but also make able to analyze the social reality by using scientific, logical methods and theoretical perspectives over the contemporary issues.

Knowledge – providing information about human rights and the mechanisms that exist to protect those rights;

i) **Values, beliefs and attitudes** – promoting a human rights culture through the development of these processes; and
ii) **Action** – encouraging people to defend human rights and prevent human rights abuses;
iii) To train the young men and women for facing the challenges of the pluralistic society and the rising conflicts and tensions in the name of particularistic loyalties to caste, religion, region and culture;
iv) To study the effects of draconian laws and unlawful use of State's machinery and force by the enforcement agencies;

v) To necessitate human rights education to evolve strategies and schemes for tackling such attitudes like employing bonded labour, practicing untouchability, perpetrating sati and help members internalize more humane and egalitarian approach in their social relations.

vi) To create an environment as well as an understanding that human rights can easily become vulnerable to abuse of various structures and processes of power;

vii) To ensure comprehensiveness and incorporation of national, regional and international perspectives related to human rights;

viii) To work in close cooperation with National Human Rights Commission and other statutory Commissions on Women, Minorities, SC and ST and Linguistic Minorities, NGOs and Media Organizations for promoting Human Rights Education;

ix) To collect data related to the existing educational and training facilities in the areas of human rights in different parts of the country in general and Andhra Pradesh in particular for designing a need based Master's and Doctoral Programmes in Human Rights.

x) To provide formal training for students in human rights and social development at the Post Graduate and Doctoral levels;

xi) To promote human rights literacy / awareness among general students community, teachers and law enforcers;

xii) To undertake research into specific and sensitive human rights issues; and

xiii) To encourage concern or empathy for those who experience violation of their rights, by providing legal and other forms of counseling.

The M.A postgraduate Programme in Human Rights and Duties involve skills expected to be gained by a student through studies that support in sharpening competence for augmenting contemporary knowledge base, acquiring new learning and skills, identifying with future studies, engaging well in a preferred career and performing a positive role as enlightened citizen in the society. The characteristic, profundity and magnitude of the learning experiences made available to the students support them to unfold the quality attributes in the following manner:

1. Disciplinary Knowledge:

Aptitude to manifest wide and extensive knowledge in the field of study and comprehension of one or more disciplines constitute part of postgraduate attributes including how other disciplines relate to the field of knowledge. An international perspective in the area of study also gives a wider learning of the subject. In the specialised course on Human Rights, the constant review and renewal of subject and courses assure coverage of recent developments. Quality education and training build a condition in which learning is exchanged, critically evaluated and used in contemporary situations

with the aptitude to review, examine and integrate and utilize actual learning in the appropriate field.

2. Communication Skill:

Classroom discussion and formal presentations render a suitable opportunity to sharpen oral communication and written assessment skills. They create ability to manifest ideas and thoughts in writing and orally to communicate confidently their viewpoints. By expressing adeptness to listen meticulously, they can read and write logically as well as give obscure information in explicit and succinct manner. With practice as a part of interdisciplinary team, students become able to choose and employ the proper form and methods of communication.

3. Critical Thinking:

The ability to apply critical reasoning to issues through independent thought and informed judgment are important postgraduate attributes integrating information from a wide range of sources. The postgraduates are able to apply analytical thought to body of knowledge and critically evaluate ideas, arguments, claims, beliefs on the basis of empirical evidence from open-ended and reasoned perspectives. They become able to identify relevant assumptions or implications and formulate coherent arguments.

4. Research Related Skills:

Research papers and other research tasks are expected to develop a degree of creativity, originality and discovery that benefits a postgraduate programme of the highest quality and to which students are encouraged. An ability is developed to undertake supervised research, including the design and conduct of investigations in a systematic, critical manner. Identification of appropriate problem and research questions, a critical analysis of the literatures, data analysis by using software and ICT, drawing logical conclusion are integral part of research skills. Postgraduate programme in Human Rights are designed to enhance skills in legal research and analysis, which are tested in all forms of assessment. All postgraduates demonstrate, through subject assessment, their ability to develop substantial research-based scholarship. Research related skill involves a sense of inquiry and capability for asking relevant questions, defining problems, articulation, ability to recognise cause and effect relationship, formulate hypothesis, and to report the result of experiment or investigation.

5. Self-Directed Learning:

The demanding nature of postgraduate attributes requires effective time-management and an ability to work independently. The prior of programmes ensure that all postgraduates have developed the ability to work with relative autonomy which provides a foundation for future leadership roles. Ability to work and learn independently and effectively leads to generating innovative ideas in the changing environment to investigate problems and to have creative solution. Self-learning and application of competence in exploring also help in solving nonfamiliar problems. This leads to

application of one's learning to real life situation and critical sensibility to lived experiences. Well-developed problem-solving abilities also contribute to flexibility of approach.

6. Ethical and Social Understanding:

Profound respect for truth and intellectual integrity including the ethics of scholarship add to the ability to embrace values in conducting one's life and in formulating position about ethical problems from multiple perspectives appreciating environmental and sustainability issues. This postgraduate attribute fosters understanding of social and ethical responsibility and ability to apply ethical standards in order to attain unbiased and truthful actions in all aspects of life. It also involves appreciation of the philosophical and social contexts of a discipline with knowledge of other cultures and appreciation of cultural diversity.

7. Quality of Team Work:

Team work, as postgraduate attributes, creates capacity to value and work effectively and respectfully with diverse team and to facilitate coordinated effort for a common cause. It involves training in mapping out tasks of a team, setting directions and formulating an inspiring vision.

After completion of this course, student would get job opportunities in the fields of teachings, research, NGOs and Governmental sectors. This course also helps students to qualify the NET/JRF and Competitive Exams MPSC/UPSC/Social Welfare Departments etc.

8. Investigation:

Equip Knowledge to investigate on contemporary burning issues and problems of the community in a scientific way.

9. Design:

Develop skills and scientific attitude in identification of problems, develop research design, carryout research, conduct case and interventional studies and prepare report by applying appropriate software.

10. Professionalism:

Understand and discover the knowledge on organizational services and its aims acquire practical knowledge and experience by working with people and examine policy ideas and priority of the community through research and theoretical ideas by safeguarding ethics and values of social work profession. Demonstrate to work in a thoughtful and systematic way, justify methods of working with a meaningful intervention, and apply skills by combine thinking using the senses.

11. Impacts of course on society and environment:

Demonstrate immense impact on communities through awareness and empowerment programmes by applying relevant social work methods. Help people in solving personal, familial and societal problems through adjustment and adaptation by way of social justice. Able to organize various environments related programs sensitize the people on environmental issues in order to maintain public eco-friendly relations.

12. **Life Long Learning:**

Associate in self-discipline and self-directed continues learning by involving in national and international professional organizations and thereby aims to improve the personal and professional development in social work methods.

Prgramme Learning Outcomes:

Programme Learning Outcomes in Human Rights and Duties course include subject-specific skills and generic skills, including transferable global skills and competencies, the achievement of which students are able to demonstrate for the award of MA Degree in Human Rights and Duties qualification. It is to develop expertise to:

- explore the conditions and dimensions of empowering and transformative learning processes;
- provide an advanced qualification for students wanting to better understand the nature of international human rights in the face of global political, economic, social, legal, ethical and environmental challenges
- describe and critique the differing approaches, perspectives, and models of human rights and how they impact the ways in which human rights education is carried out in diverse settings
- design, conduct, analyze and present findings using diverse research tools and methods in order to create knowledge and awareness about human rights issues
- drawing on critical pedagogies, produce advocacy tools and curricular resources to be used in formal or non-formal educational contexts to address human rights violations
- analyze the gap between universal rights and grassroots realities in local, regional and global contexts with attention to issues of power, privilege, and marginalization
- identify diverse methodological tools and skills needed to conduct ethical research
- synthesize contextual understanding, reflective analysis, theoretical frameworks, and methodological training to inform the production of a thesis and field-based research projects
- provide grounding in research methods relevant to the advanced study of global issues and develop learner's ability to apply these skills appropriately in an individual dissertation

- provide opportunities for the development of practical skills necessary to work in organizations confronted by these challenges
- ensure comparability of learning levels and academic standard across universities
- focus on knowledge and skill for further study, empowerment and citizenship.

Prgramme Educational Objectives:

- The programme provides the student with the capacity to identify issues and problems relating to the realisation of human rights, and strengthens the ability to contribute to the resolution of human rights issues and problems. It also develops investigative and analytical skills.
- It refers to actually existing international law and associated legal and political mechanisms as well as processes of far-reaching social and cultural change.
- This programme offers courses in human rights in both theory and practice from legal, historical, philosophical, political and social science-based perspectives.

M.A. HUMAN RIGHTS AND DUTIES

SEMESTER-I

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	HR 101	Human Rights: Concepts and Theoretical Perspectives	6	4	Core-Theory	20	80	100
2	HR 102	Human Rights in India the constitutional and Legal Framework	6	4		20	80	100
3	HR 103	Human Rights and Duties Education	6	4		20	80	100
4	HR 104	Rights and the implementation Machinery	6	4		20	80	100
5	HR 105	A Working Class and Human Rights and Duties B Human Rights Education, Teaching and Training	6	4	CF	20	80	100
6	HR 106	A Human Rights Activism and Role of NGOs B Social Movements and Human Rights in India	6	4	EF	20	80	100
Total			**36**	**24**		**120**	**480**	**600**
7	HR 107	Human Values and Professional Ethics - I	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core Papers are Mandatory**
- **Compulsory Foundation – Choose One paper**
- **Elective Foundation - Choose ONE**
- **Audit Course – 100 Marks (Internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will considered for the award of the grade as open elective only given extra credits**

SEMESTER - II

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	HR201	Human Rights and Indian Polity	6	4	Core-Theory	20	80	100
2	HR202	Emerging Dimensions of Human Rights	6	4		20	80	100
3	HR203	Human Rights: The International Context	6	4		20	80	100
4	HR204	Research Methodology, Statics and Computer Applications	6	4		20	80	100
5	HR205	A Human Rights – The Socio Economic Context B Societal Problems of Human Rights in India	6	4	CF	20	80	100
6	HR206	A Human Rights and Criminal Justice System B Media and Human Rights	6	4	EF	20	80	100
Total			**36**	**24**		**120**	**480**	**600**
7	HR207	Human Values and Professional Ethics - II	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core Papers are Mandatory**
- **Compulsory Foundation – Choose One paper**
- **Elective Foundation - Choose ONE**
- **Audit Course – 100 Marks (Internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will considered for the award of the grade as open elective only given extra credits.**

SEMESTER-III

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	HR 301	Social Movements and Human Rights and Duties	6	4	Core-Theory	20	80	100
2	HR 302	Science, Technology, Human Rights and Duties	6	4		20	80	100
3	HR 303	A Human Rights and Duties – Advocacy and Extension work and Viva-Voce	6	4	Generic Elective	20	80	100
		B Socially/Economically Disadvantaged people and Human Rights and Duties	6	4		20	80	100
		C Human Duties and Responsibilities						
		D Children and Human Rights and Duties						
4	HR 304	Soft Skills	6	4	*SOC	20	80	100
6	HR 305	A Historical and Philosophical Perspectives of Human Rights	6	4	Open Elective	20	80	100
		B Human Rights and Duties in India						
Total			**36**	**24**		**120**	**480**	**600**

- **All Core Papers are Mandatory**
- ***Generic Elective – Choose Two paper**
- ***Skill Oriented course is Mandatory**
- ***Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- ***Interested students may register for MOOC with the approval of the concerned DDC.**

SEMESTER-IV

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	HR 401	Human Rights in Andhra Pradesh	6	4	Core-Theory	20	80	100
2	HR 402	Development, Trade and Human Rights	6	4		20	80	100
3	HR 403	A International, Humanitarian and Refugee Laws	6	4	Generic Elective	20	80	100
		B Environment and Human Rights and Duties						
		C Human Rights and Criminal Justice System	6	4		20	80	100
		D Minorities and Human Rights and Duties						
4	HR 404	Dissertation and Viva – Voce	6	4	*MDC	20	80	100
6	HR 405	A Development, Globalization and Human Rights	6	4	Open Elective	20	80	100
		B Women and Human Rights and Duties						
Total			**36**	**24**		**120**	**480**	**600**

- **All Core Papers are Mandatory**
- ***Generic Elective – Choose Two paper**
- ***Multidisciplinary/ Project Work is Mandatory**
- ***Open Electives are for the Students of other Departments. Minimum One Paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- ***Interested students may register for MOOC with the approval of the concerned DDC.**

M.A. HUMAN RIGHTS AND DUTIES

SEMESTER – I

HR-101: HUMAN RIGHTS: CONCEPTS AND THEORETICAL PERSPECTIVES

Objectives:

Thepaperseekstoelaboratetheconceptual,philosophical,theoreticalandhistoricalaspectsofhumanrightsandduties.Itisinfiveunits,namelynatureandscopeofHumanRights,conceptsofrights,liberalandMarxianperspectivesofhumanrights,alternativeandthirdworldperspectivesandIndianperspectives.

UNIT I: ***Nature and Scope of Human Rights***

- Meaning of HumanRights
- Types of HumanRights
- Importance of Study of HumanRights
- Scope of the study of HumanRights
- Limitations of the study of HumanRights.

UNIT II: ***Concept of Rights***

- Concepts of liberty, freedom, equality, justice and humandignity
- Concepts of individual and collective, state, civil society, power andimmunity
- Relation between rights andDuties

UNIT III: ***Liberal and Marxian / Perspectives of Human Rights***

- Rousseau
- J.S.Mill
- KarlMarx

UNIT IV: ***Alternative and Third World Perspectives***

- FeministicPerspectives
- Spike Peterson
- Chomsky

UNIT V: ***Indian Perspectives***

- JyotiraoPhule
- MahatmaGandhi
- Ambedkar

Suggested Readings

1. Abdul P. Vijapur and Kumar Suresh, *Perspectives on Human Rights,* Manak Publications, NewDelhi,1999
2. Bhiku Parekh, *Colonialism, Tradition and Reform : An Analysis of Gandhi's Political Discourse,* Sage Publications, New Delhi,1989
3. Campbell, Tom, *Human Rights from Rhetoric to Reality,* Basil Blackwell, Oxford, 1986
4. Donnely, Jack, *The Concept of Human Rights in Islam,* Gyan Publishing House, New Delhi,1998
5. Haragopal G (coord) *Course Material for P.G.Diploma in Human Rights (*five volumes), Centre for Distance Education, University of Hyderabad,1998
6. Haragopal.G, *Gandhian World View : A Civil Liberty Perspective*, North Eastern Hill University, Shilong,1991
7. *Human Rights Programme, Indian Journal of Human Rights,* Special issue, *"Human Rights: Theoretical Perspectives",* University of Hyderabad, Jan-June, 1998
8. Krishna Iyer V.R, *The Dialectics & Dynamics of Human Rights in India : Yesterday, Today and Tomorrow*, Eastern law House, Calcutta,1999
9. Lohia, Rammanohar, *Struggle for Civil Liberties,* AICC,1936
10. Mclaren Peter and Leonard Peter (ed)., *Paulo Freire : A CriticalEncounter,* Routledge, London, 1995
11. Midgal, Kohli, Shne (eds) *State Power and Social Forces: Domination and Transformation in the Third World,* Cambridge University Press,1994

12. Mill J.S, *On Liberty,* Cambridge University Press, Cambridge,1989
13. Nino, Carlos, *Ethics of Human Rights,* Clarendon, London,1991
14. Noam Chomsky, *World Orders, Old and New,* Oxford University Press,1999
15. Pandey,Veenapani,*InternationalPerspectivesonHumanRights,*MohitPublications,NewDelhi,1999
16. Perry Michael J, *The Idea of Human Rights,* Oxford University Press,1998
17. Peterson Spike, "*Whose Rights? A Critique of the "Givens" in Human Rights Discourse"*, Vol 3, No. 1 & 2, *Indian Journal of Human Rights*, Jan-Dec1999
18. PiersonChristophere,*MarxistTheoryandDemocraticPolitics*, DishaPublications,Delhi,1989
19. Sharma R.S, *Perspectives in Human Rights Development,* Common Wealth Publishers, Delhi,1996
20. StrassLeo, *Natural, RightsandHistory,* TheUniversityofChicagoPress, Chicago, 1952

Course Outcomes:

1. To Expose the students about nature and concept of Human Rights.
2. To apprise the students about the Liberal. Marxian prerspectives.
3. To expose the students that alternative, third world and Indian Perspectives of Human Rights,

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2	1	2	1	2	2	1		3
CO 2	3	1		2		2	1	2	2	1		3
CO 3	3	1		2	1	2	1	2	2	1		3
CO 4												

HR-102: HUMAN RIGHTS IN INDIA: THE CONSTITUTIONAL AND LEGAL FRAMEWORK

Objectives:

Thispaperfocusesonthenormativeandinstitutionalaspectsofhumanrightsanddutiesagainsttheb ackdropofthepoliticsandsocietyinIndia.Dividedintofiveunites,itdealswiththeconstitutionandhumanri ghtsandduties,speciallawsfortheprotectionofvulnerablesectionsofthepeople,implementationandenfo rcementmechanisms,problemsofenforcement.Thispaperalsodealsrightsoftheaccused,therightsofinm atesofprisonsandcustodialhome,accessofjustice,righttocompensation,punishmentandadministration ofjustice.

UNIT I: Evolution of Human Rights in India

- Human Rights during freedomstruggle
- Constituent Assemblydiscussions

UNIT II: ***Human Rights Enshrined in the Indian Constitution***

- Thepreamble
- The Fundamentalrights
- The Directive Principles of StatePolicy
- The FundamentalDuties

UNIT III: ***Indian Laws Relating to Human Rights***

- Protection of Human Rights Act,1993

UNIT IV: ***Judiciary and Human Rights in India***

- Public Interest Litigation(PIL)
- Judicial Activism and LandmarkJudgments

UNIT V: ***Criminal Justice system in India***

- ConstitutionalProvision

- Substantive Criminal Law(IPC)
- Procedural Criminal Law(CrPC)
- EvidenceAct
- Investigation
- Fairtrial
- Treatment of undertrials
- Preventive Detention Laws
- Crime andPunishment

Course Outcomes:

1. Students to know the Indian Constitution and Human Rights.
2. To understand the Judiciary and Human Rights.
3. To understand about Criminal Justice system in India.

References:

1. Bajwa G.S, *Human Rights In India : Implementation and Violations,* Anmol Publications,New Delhi,1995
2. Basu D.D, *Human Rights in Constitutional Law,* Prentice Hall, New Delhi,1994
3. BhallaS.L,*HumanRights:AnInstitutionalFrameworkforImplementation,*Doctashelf, 1991
4. Chandra Sekhar Rao, R.V.R & Prasad V.S (eds), *Indian Constitution andPolity,*Sterling Publishers, New Delhi, 1991
5. Chandra U, *Human Rights,* Allahabad Law Agency Publications, Allahabad,1999
6. GiridharGomango, *Constitutional Provisions for the SCs and STs,* Himalaya Publishing House, New Delhi,1986
7. Gokulesh Sharma, *Human Rights and Social Justice,* Deep & Deep Publications,1997
8. Gokulesh Sharma, *Human Rights, Legal Remedies,* Deep & Deep Publications,2000
9. Haragopal G. (coord), *Course Material for Post-Graduate Diploma in HumanRights,*Centre for Distance Education, University of Hyderabad, Hyderabad, 1998
10. Khanna H.R, *Constitution and Civil Liberties,* Radha Krishna Prakashan, New Delhi, 1978
11. Krishna Iyer V.R, *Lawyers and Social Justice,* B.R.Publishing Corporation, Delhi, 1989
12. Krishna Iyer, V.R, *Human Rights and Inhuman Wrongs,* B.R.Publishing Corporation, 1990
13. Krishna Iyer, V.R, *The Dialectics & Dynamics of Human Rights in India: Yesterday, Today and Tommorow,* Eastern Law House, Calcutta, 1999
14. MoolChandSharma&BhagwatiP.N.J,*Court,ConstitutionandHumanRights,*Universal Books Traders, Delhi, 1995
15. Pandey Jitendra & Dubey R.K, *Civil Liberty Under the Indian Constitution,* Deep & Deep Publications, New Delhi, 1992
16. Paras Diwan, *Human Rights and the Law,* Deep & Deep Publicaitons, Allahabad, 1998
17. Seervai H.M, *Constitutional Law of India,* N.M.Tripathi Ltd, Bombay,1988
18. Singh Seghal B.P, *Human Rights in India - Problems and Perspectives,* Deep & Deep Publications, New Delhi, 1999
19. Subramaniam S, *Human Rights Training,* Manas Publications, New Delhi,2000

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2	1	2		2		2		3
CO 2	3			2	1	2		2		1		3
CO 3	3	1		2	1	2		2		2		3
CO 4												

HR-103: HUMAN RIGHTS AND DUTIES EDUCATION

Objectives:

Thefiveunitswhichthispaperdealswithistheimportanceofhumanrightsanddutieseducation. Thepaperalsoaimsatimpartinghumanrightseducationatglobal,nationalandstatelevelsthroughtargetgroupsitalsofocusesonmethodstechniquesusedforthepromotionofHumanRightsand DutiesEducationandthebasicsofhumanrightseducationarealsogiveninthispaper.

UNIT I: ***Importance of Human Rights and Duties Education***

- Need for and importance of Human Rights education in the promotion and protection of HumanRights
- Objectives of Human Rights and DutiesEducation
- Factors promoting Human Rights Education - Positive attitudes - Pro-social behaviour - elimination of prejudice and promotion ofpeace

UNIT II: ***State of Human Rights Education***

- Global Efforts - United Nations, UNESCO Vienna Declaration and Programme of Action and International NGOEfforts
- National Efforts - Government of India and State Governments - National Human Rights Commission and State Human Rights Commission - NGOEfforts

UNIT III: ***Target Groups for Human Rights and Duties Education***

- Role of UGC and Universities
- Formal system - Students at primary, secondary and territory levels
- Non-formal education - Activists groups, NGOs, grass root level workers and other civil society institutions, Labour unions.
- Training of teachers, police and prison officials, lawyers, judges, armed forces, civil servants and legislators and media personnel.

Unit IV: ***Methodology of Human Rights and Duties Education Methods and Techniques***

- Teaching in the formal mode
- Non-formal training
- Awareness generation
- Counselling
- Areas of Research in Human Rights
- Extension
- Mass media and Human Rights Education - Information Technology - Print and Electronic media -Internet
- Use of multi-media to reach non literate people and children - Audio-visual aids, games, toys, and participatory methods

UNIT V*: Content of Human Rights Education*

- Basic Human Rights values
- Rule of law and protection of Human Rights
- Information on Violations
- Social responsibility in Human Rights
- Human nature – Different Interpretations
- Limitation of Human Rights Education

Course Outcomes:

1. To expose students about the importance of Human Rights and Duties education.
2. To apprise the students about the target groups for Human Rights
3. To expose the students about the content of Human Rights Education.

Suggested Readings:

1. Behan Sharad Chandra, "*Human Rights Education, Linkages with Educational Reforms and Social Transformation",* Education in Asia, 15(2), 1995, Pp.38-44
2. Blumenfeld Jones, Donalds, "*Democracy, Education and Human Rights : A Critical Analysis",* Education in Asia, 13(2),1993
3. Chatrath K.J.S (ed), *Education for Human Rights and Democracy,* Indian Institute of Advanced Study, Shimla,1998
4. Chaurasica, "*Education for Human Rights and The Rights of the Child",* Education in Asia, 13(1),1993
5. Conley Marshall W M, *Human Rights Education : Present and Future trends,* Canadian and International Education, Barot,Elisabeth
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7. Ghosk A.K, "*Human Rights Education",* University News, 36(15), Pp. 4 & 11,1998
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9. Haragopal.G(coord), *CourseMaterialforPost-GraduateDiplomainHumanRights,* Centre for Distance Education, University of Hyderabad, Hyderabad, 5-Volumes, 1998
10. Mohanty Jagannath, *Human rights Education*, Deep & Deep Publications, New Delhi, 2000
11. National Council of Teachers Education, *Human Rights and National Values,* Self learning model, NCTE, New Delhi,1996
12. NCERT, *Human Rights : A Source Book,* NCERT, New Delhi,1996
13. Norrel A, "*Educational Planning and Human Rights in Developing Society : Some Experiences of Trinidad and Tobago",* Compare, 24(2)1994
14. Sen Sankar, *Human Rights in a Developing Society,* S.B.Nangia, New Delhi,1998
15. Subramaniam S, *Human Rights International Challenges*, Manas Publications, (Vol I &

II), New Delhi,1997

16. UNESCO, "*Teaching of Human Rights",* Education in Asia*, 15, (1&2), 1995*
17. UNESCO, *Education for Human Rights : An International Perspective,* UNESCO, Paris, 1994
18. University Grants Commission, *UGC IX Plan Approach to Promotion of Human Rights Education in Universities and Colleges,* New Delhi, 1998
19. Vaidyanatha R.V, "*Basic Education and Human Rights",* Journal of Educational Planning and Administration, 11(1),1997

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3			2		2		2		1		3
CO 2	3			2		2		2		1		3
CO 3	3	1		1		2		2		1		3

HR-104: RIGHTS & THE IMPLEMENTATION MACHINERY

Objectives:

This paper purports to deal with the general aspects of implementation of Human Rights and duties, international norms, standards and mechanisms. This is in five units. It includes the problems in accessing justice through courts / tribunals, implementation of Human Rights and the police, statutory commissions and humanrights.

UNIT I: ***Human Rights Implementation Under U.N. System***

The UN Commission on Human Rights - The International Court of Justice- The Human Rights Committee-European Commission on Human Rights-Inter-American Commission on Human Rights-African Commission on Human Rights - Domestic application of international human rights norms – Asian Commission of Human Rights.

UNIT II: ***Implementation Machinery in India***

- The Indian legal system-Ordinary process of law under Civil and Criminal Procedure Codes and The Indian EvidenceAct
- Constitutional provisions under Article 32 and Article226
- Adequacy of the Constitutional and legislative protection for human rights-Alternativeremedies
- Reforms needed-Law reform-Human Rightscourts

UNIT III: ***Problems in Accessing Justice Through Courts/Tribunals***

- Perquisites - locus standi, cause of action, fees
- Delays inlitigation
- Cost involved in courtproceedings
- Complexity andtechnicality

UNIT IV: ***Implementation of Human Rights and the Police***

Investigation procedure and maintenance of law and order-Criminal Justice process and protecting the vulnerable sections of the society like women, Dalits, children and minorities-Role of police, military and paramilitary personnel during emergencies.

UNIT V: ***Statutory Commissions and Human Rights***

Protection of Human Rights Act, 1993- National Human Rights Commission-National Commissions for Women, Scheduled Castes and Tribes, Backward classes and Minorities.

Course Outcomes:

1. To expose the students about the implementation machineries at National Level and International Level.
2. The students understand about how the problems in Accessing Judice through Courts and Tribunals.
3. To expose the students that statutory bodies of Human Rights.

Suggested Readings:

1. Agarwal H.O, *Implementation of Human Rights Covenants With Special Reference to India,* Kitab Mahal, Allhabad,1983
2. Amnesty International, *Human Rights in India:* Amnesty International Reports, Vistaar, New Delhi (variousissues)
3. Bajwa, *Human Rights in India - Implementation and Violations,* Anmol Publications, New Delhi,1997
4. BaxiUpendra, *The Crisis of Indian Legal System,* Vikas Publishing House, Delhi,1982
5. Bhalla S.L, *Human Rights : An Institutional Framework for Implementation,* Doctashelf, 1991
6. James Vadackumchery, *Human Rights Friendly Police : A Myth or Reality?,* A.P.H Publishing Corporation, New Delhi,2000
7. Madhava Menon N.R, *Right to Work: Some Relevant Questions,* (Occasional paper), Department of Human Rights and Social Development, Sri Venkateswara University, Tirupati,2000
8. Manoj Sinha K, *Implementation of Basic Human Rights,* Manak Publications, New Delhi, 1999
9. Nagendra Singh, *Enforcement of Human Rights,* Eastern Law House, Calcutta,1986
10. Naresh Kumar, *Constitutional Rights of Prisoners,* Mittal Publications, Delhi,1986
11. PalaiArun Kumar, *National Human Rights Commission of India - Formation, Functioning and Future Prospects,* Atlantic Publishers, New Delhi,1999
12. Paras Diwan and Peeyushi Divan, *Women and Legal Protection,* Deep & Deep Publications, New Delhi,1998
13. Pylee, *Constitutional Government in India* S. Chand and Co, New Delhi,1984
14. Sahu, Asima, *Human Rights Violations and the Law*, Pointer Publishers, Jaipur,1999
15. Sangeeta Ahuja; *People, Law and Justice: A Case Book of Public Interest Litigation, Vol 1&2, Orient Longman, New Delhi,1997*
16. Sharma H.C, *Politics and Human Rights,* Book Enclave, Jaipur,1999
17. Singh, Nagendra, *Enforcement of Human Rights in Peace and War and the Future of Humanity,*

Eastern Book Corporation, New Delhi,1986

18. Sinha Manoj K, *Implementation of Basic Human Rights,* Manas Publications, New Delhi, 1999
19. SitaramKakarala, *Civil Rights Movements in India,* Ph.D Thesis, Surat, South Gujarat University,1993
20. Subramanian S, *Human Rights Training,* Manas Publications, New Delhi,2000
21. Verma R.S (ed), H*uman Rights : Burning Issues of the World* (3 vols), Indian Publishers, Delhi,2000

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3			2		2	1	1		2		3
CO 2	3			2		2	1	2		2		3
CO 3	3			2		2	1	1		2		3
CO 4												

HR-105(a): WORKING CLASS AND HUMAN RIGHTS AND DUTIES

Objectives:

Labourwelfarehasforlongbeenoneofthecrucialareasofhumanrightsandduties dividedintonineunits.Thispaperdealswithconceptualissues,statusoftheworkingclass,workersrightsandduties,emergingproblems,conflictingrights,internationalstandards,Indianframework,andenforcementagencies.

UNIT I: ***Working Class: conceptual Issues***

- Definition
- Classification
- Working classmovement
- From Laisses Faire to welfarestate
- Privatization, Liberalisation andGlobalisation

UNIT II: ***Status of working class***

- Women labour
- Child labour
- Contractuallabour
- Bondedlabour
- Agriculturallabour
- Migrantlabour

UNIT III: ***Basic Rights and Duties: Their content, Scope and Implications***

- Association and Assembly
- Work with equality anddignity
- Right to Education andInformation
- Right toStrike
- Right toHealth
- SocailSecurity
- Collectivebargaining
- Workers' participation in management

- Retrenchment, termination anddisplacement

UNIT IV: ***Conflicting Rights : Worker's benefit Vs. Employer's inconvenience***

- ILO Labourstandards
- Debate on Social clause andWTO
- Code of international industrialdiscipline
- Role of international labouragencies

UNIT V: ***Indian Framework***

- Constitutionalprotection
- National: State machinery, workers organisations
- Workers' rights andduties
- Employer's responsibilities andduties
- Dispute settlementmechanisms

Course Outcomes:

1. To understand the students about the status of working class, concept and issues.
2. To expose the student about the basic rights and duties of various sections.
3. To understand the Indian Constitutional Frame work.

Suggested Readings:

1. ILO, *Comparative Analysis of the International Covenants on Human Rights and International Labour Conventions and Recommendations,* Official Bulletin (Geneva), Vol. 52, No.2, 1969, pp.181-216.
2. ILO, *Migrant Workers,* Geneva ; International Labour Office,1974.
3. ILO, *Trade Union Rights and Their Relation to Civil Liberties,* Geneva : World Campaign for Human Rights,1996.
4. UN Centre for Human Rights, *The Right to Migratory Workers,* Geneva : World Campaign for Human Rights,1996.
5. Diller, Jaenlle M. and David A. Lany, "Child Labour Trade and Investment : Towards the Harmonization of International Law", American Journal of International Law, Vol. 91, No.4, 1997, pp.663-96.
6. Jain, Mahavir, *Boded Labour Justice through Judiciary,* New Delhi :Manak Publications, 1997.
7. Jenks, C.W., *Human Rights and International Labour Standards,* London : Stevens,1960.
8. Kumar, Bindal, *Problems of Working Children,* New Delhi : APH Publications,2000.
9. Mehata, P.L., *Child Labour and the Law,* New Delhi : Deep and Deep,1996.
10. Mistra, L.D., *Child Labour in India,* Oxford UniversityPress.
11. Prakash, S.S., *Bonded Labor and Social Justice,* New Delhi : Deep and Deep,1990.
12. Ramanathan, Usha, "On Engaing with the Law : Revisiting Child Labour", *Journal of Indian Law Institute,* Vol.40, 1998, pp.263-83.
13. Sahoo, Umesh Ch., "Child Labour and Legislation", *Economic and Political Weekly,* Vol. XXV, NO. 46, 17 November 1990, pp.2531-34.
14. Saksena, K.P., "Recent Supreme Court Judgement on Child Labour : A Critique", in K.P. Saksena, eds., *Human Rights : Fifty Years of India's Independence,* New Delhi : Gyan Publishing House, 1999, pp.73-78.
15. Saxena, Anu, *Human Rights and Child Labour in Indianindustires,*1999.
16. Sankaran, Kamala, "Human Rights and the World of Work", *Journal of Indian Law Institute,*

Vol. 40, Nos. 1-4, 1998, pp. 284-94 Vol. 40, Nos. 1-4, 1998, pp.284-94.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2	1	2		2	1	2		3
CO 2	3	3		2	1	2		2		2		3
CO 3	3	3		2	1	2		1	1	2		3
CO 4												

HR-105 (b): Human Rights Education, Teaching and Training

Objectives:

1. This paper purports the origins of Human Rights, UNO and Human Rights Education Policies,
2. To learn about the principles and practice in teaching of Human Rights education.
3. The student learns about the training aspects of Human Rights.

Unit I: Origin, Development and Significance of Human Rights Education –Approaches to Human Rights Education – Contemporary Development in Human Rights Education.

Unit II: UNO and Human Rights Education Policies – Human Rights Education Policy in India – Growth of Teaching in Human Rights Education.

Unit III: UN Advisory Services and Technical Cooperation in Human Rights Education – National Assistance and Technical Cooperation of Human Rights Education – Functionaries in Human RightsEducation.

Unit IV: Principles and Practice in Teaching of Human Rights Education – Curriculum for Human Rights Education (School, College and University Levels) – Human Rights Education: Problems andChallenges.

Unit V: Training Aspects of Human Rights Education: Design, Techniques, Aids and Issues – Research Priorities in Human Rights Education – Contemporary Approaches in Human Rights Education.

Course Outcomes:

1. To expose the student about the origin, UNO and Human Rights education policies.
2. To apprise the students about the principles and practice in teaching of Human Rights Education.
3. To understand the student about training aspects of Human Rights.

References:

1. Saxena, K.P., Teaching Human Rights: A Manual for Adult Education, Landy Books,New

Delhi,1996.
2. Ponaiyan, M and Panch Ramalingam, Education and Human Rights, P.R.Books, New Delhi, 1999.
3. Subramaniyam, S. Human Rights Training, Manas Publications, New Delhi,2000.
4. Vinod Sharma, Human Rights Violation – A Global Phenomenon, APH Publication, New Delhi,2002.
5. Naseema, C., Human Rights Education – Conceptual and Pedagogical Aspects, Kanishka Publishers & Distributors, New Delhi,2008.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2		2	1	2	1	2		3
CO 2	3	2	1	2		2	1	2		2		3
CO 3	3	2	1	2		2	1	2	1	2		3
CO 4												

HR-106 (a): Human Rights Activism and Role of NGO's

Unit I: NGO – Meaning, Nature and Importance – Aims and Objectives – Characters of Human Rights NGOs – Types .

Unit II: Establishing the NGOs Board of Directors – Develop the NGOs Bye-laws – Register the NGO – Funding and Fund -Raising – Office Management.

Unit III: NGOs and the Human Rights Movement – Human Rights Activism and Role of NGOs.

Unit IV: Role of NGOs for implementing UN Decade for Human Rights Education – Human Rights Education in India.

Unit V: NGOs and Protection of Human Rights within the UN System – NGOs, Human Rights and the Third World – Role of NGOs in promoting Human Rights.

Course Outcomes:

1. To expose the students about the different types of Human Rights Activisms.
2. To identify the student that the different Types of NGO's and their role for promoting the Human Rights.

References:

1. Dr. Kaushelendra Mishra, NGOs in the Human Rights Movement, Navyug Publishers & Distributors, New Delhi,2008.
2. Atik-ur-rahaman S.M., Effects and Impacts of NGO's in Modern World, Aadi Publications, Jaipur, 2011.
3. Antti Pentikaiinen, Creating Global Governance – The Role of Non-Governmental Organizations in the United Nations, Helsinki, Finnish UN Association,2000.
4. Global Policy Forum, NGOs and the United Nations, New York, Global Policy Forum,1999.
5. Julie Fisher, The Road from Rio: Sustainable Development and the Non- governmental Movement in the Third World, Westport, Praeger,1993.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2	1	2		2		3
CO 2	3	2		2		2	1	2		2		3
CO 3	3	2		2		2	1	2		2		3
CO 4												

HR-106(b): Social Movements and Human Rights in India

Objective:

This paper aims at a sociological study of human rights and duties in India. Through five units, it encompasses a conceptual perspective, impact of social and religious reforms movements and human rights, political and ecological movements and human rights, and the role of international and national institutions in promoting human rights.

Unit I Conceptual Perspective

- Concept of social movement
- Types of movements
- Ideology, organization
- Mobilization leadership
- Social Movements as promoter of social change and Human Rights

Unit II Social and Religious Reforms Movements and Human Rights

- BrahmoSamaj
- Arya Samaj
- Dalit Movements
- Tribal Movements
- Women's Movements Other Movements

Unit III Political Movements and Human Rights

- Freedom Movements
- Peasant Movement Regional and Ethnic identity Movements (Separatist & Terrorist Movement)

Unit IV; Ecological/Environment Movements and Human Rights

- Chipko Movement
- Narmada BachaoAndolan
- Role of State and Judiciary

Unit V: Role of NGOs in Promoting Human Rights

- Importance of NGOs as promoters of social causes
- NGOs and People Movements, PUCL, PUDR etc.
- NGOs Contribution of NGOs to Human Rights Education

Course Outcomes:

1. To expose the students about the role of NGOs for protecting human rights.
2. To Understand the student about the Political Movements, Ecological and Environmental Movements of Human Rights.
3. To apprise the student about the various types of Social and Political Reforms of Human Rights.

Suggested Readings:

1. Eide, Asbjorn, "Human Rights Movement and the Transformation of International Order",Alternatives, vol.11, no.3, 1986, pp.367-402.
2. Karna, G.N., "Disability Rights Movement: Conceptual Framework and Its Implications for India", Disabilities and Impairments, vol.14, no.1, 2000, pp.15-22.
3. Kaushik, Vijay, Women's Movements and Human Rights (Jaipur: Pointer Publishers,1999).
4. Kothari, Smitu, "Human Rights Movement in India: A Critical Overview", Social Action, vol.40, no.1, 1990, pp.1-15.
5. Puri, Balraj, 'Role of Human Rights Groups in Kashmir', Radical Humanist, Vol.54, No.4, July 1990, pp.25-28.
6. Roy, JaytilakGuha, "Human Rights Movement in Modern India", in A.P.Vijapur and Kumar Suresh, eds., Perspectives on Human Rights (New Delhi: Manak Publications, 1999), pp.50-58 Steiner,
7. Henry J., Diverse Partners: Non-Governmental Organisations in the Human Rights Movement: The Report of a Retreat of Human Rights Activists (Massachusetts: Harvard Law School, 1990).
8. Tyagi, Y.K., "Golden Jubilee of Unfinished Task: The United Nations Human Rights Movement",International Studies, vol.32, no.4, 1995, pp.441-60.
9. Tyne, Claude H. Van, India Freedom Movement (Delhi: Akashdeep Publishing House, 1990).

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2		2	1	2	1	2	1	3
CO 2	3	2	1	2		2	1	2	1	2	1	3
CO 3	3	2	1	2		2	1	2	1	2	1	3
CO 4												

Audit Cours-107: Human Values and Professional Ethics – I

Objectives:

1. To learn the concepts of the nature of the ethical values in various professions.
2. To learn the nature of values.
3. To learn about Ahimsa, Satya, Moksha etc,.

I. Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in variousProfessions.

II. Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect forelders.

III. Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires),Moksha(Liberation).

IV. Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths - Arya astangamarga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, GandhianEthics.

V. Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu andYajnavalkya.

Course Outcomes:

1. To expose the student about the concept and nature of human values.
2. To understand the student about nature of Values, Ahimsa and various religion theories.
3. To assess the student about various Crime and Theories of punishments.

Books for study:

- John S Mackenjie: A manual ofethics.
- "The Ethics of Management" by Larue Tone Hosmer, Richard D. IrwinInc.
- "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, ResponseBooks:NewDelhi.
- "Ethics in Management" by S.A. Sherlekar, Himalaya PublishingHouse.
- Harold H. Titus: Ethics forToday
- Maitra, S.K: HinduEthics
- William Lilly : Introduction toEthics
- Sinha: A Manual ofEthics
- Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.)G.C.Haughton.
- Susruta Samhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77only.
- Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP183-191.
- Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning,2001.
- Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company,1999.
- An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
- Text book for Intermediate logic, Ethics and Human Values , board of Intermediate Education & Telugu AcademicHyderabad
- I.C Sharma Ethical Philosophy of India. Nagin &coJulundhar.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	3	1	3	2	3	1	3	1	3
CO 2	3	1	1	3	1	3	2	3	1	3	1	3
CO 3	3	1	1	3	1	3	2	3	1	3	1	3
CO 4												

SEMISTER II

HR-201: HUMAN RIGHTS AND INDIAN POLITY

Objectives:

This paper focuses on the normative and institutional aspects of human rights and duties against the back drop of the politics and society in India. It is divided into five units, it deals with basic structure of Indian polity, political process, legislative process, administrative structure and role of people's agencies in human rightspromotion.

UNIT I: Basic Structure of Indian Polity

- Changing nature of IndianState
- Parliamentarydemocracy
- Federal form of government
- Separation ofpowers
- Independent judiciary
- Judicial review of legislative and executiveactions

UNIT II: Political Process

- Multiparty system in Indian – Their ideologies and values, implications for human rights
- Electoral politics and question ofrights
- Role of money, power, prevention of SC,ST and vulnerable groups, impersonation electoral violence, booth capturing, religion andcaste
- People's Empowerment (73rd and 74th Amendments)

UNIT III: Legislative Process

- Ratification / adoption of International Covenants / Agreements /Treaties
- Legislative response to Human Rights needs andviolations

UNIT IV: Administrative Structure

- Role of the executive / bureaucracy in Human Rights promotion andprotection
- Transparency and accountability of executive – Right toinformation
- Executive autocracy and arbitrariness, bias, nepotism, red-tapism and corruption in executive decisions and implications for humanrights
- Special Agencies for protection of human rights – NHRC, SC&ST Commission, BC Commission, MinorityCommission

UNIT V: Role of People's Agencies in Human Rights Promotion

- Organizations of thepoor
- NGOs
- Associations for civil and democraticrights
- Civil LibertiesMovements
- Environment protectionmovements

Course Outcomes:

1. To expose the students about the concept of basic structure of Indian Polity, administrative structure in India.

2. To apprise the student about the role of People's Agencies for protecting and promotion of human rights in India.

3. To understand the students about the Legislative Procedure and implementation process in India.

Suggested Readings:

1. Abul Kohli, *India's Democracy : An Analysis of Changing Society Relations*, Orient Longmann Publications,1991
2. BaniBorgohain, *Human Rights Social Justice and Political Challenge*, Kanishka Publishers, Distributors, New Delhi,1999
3. Basu, D.D, *Introduction to the Constitution of India,* Printice Hall, New Delhi,1999
4. Bhagwati P.N, *Dimensions of Human Rights*, Society for Community Organization Trust, Madurai,1987
5. ChandhokeNeera, *State and Civil Society*, Sage Publications,1995
6. Desai A.R. (ed.,), *Violation of Democratic Rights in India,* Vol. I, Popular Prakashan, Bombay,1986
7. Gopal, NirajaJayal (ed), *The Democratic Process in India,* Oxford UniversityPress,1999
8. Haragopal G, *Political Economy of Human Rights,* Himalaya Publishers, Bombay,1998
9. Jha. S.N, *Decentralization and Local Politics,* Sage Publications,1999
10. Kamal, K.L and Meyer R.C, *Democratic Politics in India,* Vikas Publications, New Delhi,1977
11. Kashyap Subhash C, *Human Rights and Parliament*, Metropolitan Book, New Delhi, 1978
12. Lieten. G.K, *Development, Devolution and Democracy*, Sage Publications, 1996
13. McGuire John and Peter Reeves and Howard Brasted, *Politics of Violence*, Sage Publications,1996
14. Mitra Subrata. K, *Democracy and Social Change in India,* SagePublications,1999
15. Narayanam V.N & Sabharwal Jyothi, *India at 50 : Bliss of Hope and Burden of Reality*, Sterling Publishers, New Delhi,1997
16. Nivedita Menon, *Gender and Politics in India,* Oxford University Press,1999
17. Rajni Kothari, *Caste in Indian Politics,* Orient Longmann Publications, 1971
18. Rajni Kothari, *Politics in India,* Orient Longmann Publications,1975
19. Sharma. H.C, *Politics and Human Rights*, Book Enclave, Jaipur,1999
20. Singh Sehgal. B.P, *Human rights in India (Socio – Political Dimension of Human Rights)*, Deep & Deep Publications, New Delhi,1999
21. Sumanta Banerjee (ed), *Shrinking Space (Minority Rights in South Asia)*, Manohar Publisher and Distributors, New Delhi,1999

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2	1	2	1	2	1	2	1	3
CO 2	3	2	1	2	1	2	1	2		2		3
CO 3	3	2	1	3	1	2	1	2	1	2		3
CO 4												

HR-202: EMERGING DIMENSIONS OF HUMAN RIGHTS

Objectives:

This paper encompasses five units covering the changing dimensions of state sovereignty, Human Rights violations by non-state entities such as corporations, other business entities, terrorists and other armed groups, militant religious groups, Professional groups, Right to future and rights of future generations, right to peace (and disarmament), right to clean environment. It also deals with the international humanitarian law.

UNIT I: Human Rights and Changing Dimension of State Sovereignty

- Centres of power and humanrights
- Indivisibility of humanrights.

UNIT II: 'Humanitarian' Intervention and Human Rights

- International PeaceKeeping
- InternationalMonitoring
- Good Governance:
  a) 'Humanitarian' assistance
  b) 'Humanitarian'intervention

UNIT III: Human Rights and Duties and Commercial Corporations (National and Multi-National)

Rights of investors, consumers, citizens, workers andothers

UNIT IV: Human Rights and Duties and Non-State ArmedGroups

- Conflicts on grounds of religion, cast, language, ethnicity, culture etc. and therole ofviolence
- Problems of defining a"terrorist"

- Anti-terrorist laws and humanrights
- Grievance redressal mechanisms, rehabilitation of victims and practitioners of violence

UNIT V: Rights of the Future Generation

- Right to Peace: Dangers of War: nuclear, biologicaletc.
- Right to Clean Environment: Environmentaldestruction.
- Right to Development: Rise of towns and slums, right to shelter, basicneeds.
- Right to Human Security : Rise in Transnational crimes, respect for humandignity
- Concept of trusteeship of natural resources.

Suggested Readings:

1. Agrawala, S.K., *Public Interest Litigation : A Critique* (Bombay : N.M. Tripathi,1985).
2. Begu, S.M., ed., *Human Rights in India : Issues and Perspectives* (New Delhi : APH Publishing Co.,2000).
3. Bhargava, Rajeen, "Right to Culture", *Social Scientist*, Vol. 18, No. 10, October 1990, pp 50-59.
4. Gallagher, Margaret, *Becoming Aware of Human Rights and the Family (Paris : UNESCO,1985).*
5. Khajuria, Sapna and Saugata Mukherjee, "Organ Transplantation: Legal Framework Examined", Journal of Indian Law Institute, Vol. 39, 1997, pp.299-311.
6. Kumar and Sharma, *Human Rights and the Indian Armed Forces*(1995).
7. Kusum,"SupplyofHumanOrgansforTransplantation",*JournalofIndianLawInstitute,*Vol. 34, 1992, pp. 399-415.
8. Mathur, K.M., *Crime, Human Rights and National Security* (New Delhi : Gyan Publishing House,1999).
9. Misra, P.C., "Right to Shelter : A Human Rights Perspective", *Journal of Indian Law Institute,* Vol. 40, 1998, pp.230-42.
10. Naidu, M.V., "National Security and Civil Liberty", in K.P. Saksena, ed., *Human Rights : Perspectives and Challenges (New Delhi : Lancers Books, 1994), pp.79-96.*
11. Nawaz, M.K., "Does International Law Recognize a Right to Housing", *Indian Journal of International Law,* Vol. 36, No. 2, 1996, pp.80-84.
12. Sahni, Satpal, "Media and Human Rights", in B.P. Singh Sehgal, ed., *Human Rights in India : Problems and Perspectives* (New Delhi : Deep and Deep, 1995), pp.204-207.
13. Sayamala, C., "Hazardous Contraceptives and the Right to Life", *Journal of Indian Law Institute,* Vol. 40, 1998, pp.174-99.
14. Sharma, B.R., *Freedom of Press under the Indian Constitution* (New Delhi : Deep and Deep,1994).
15. Sharma, Gokulesh, *Human Rights and Social Change* (New Selhi : Deep and Deep, 1998).

Course Outcomes:

1. To expose the students about the Human Rights and Duties of Non-State ArmedGroups and Commercial Corporations.
2. To understand the students about the rights of future generation.
3. To apprise the students about the Human Rights and Changing Dimension of State Sovereignty and Humanitarian' Intervention.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	2	2	2	2	1	3
CO 2	3	1		2		2	2	2	2	2	1	3
CO 3	3	1		2		2	2	2	2	2	1	3
CO 4												

HR-203: HUMAN RIGHTS: THE INTERNATIONAL CONTEXT

Objectives:

Thispaperaimsatdealingwiththeinternationalhumanrightsdevelopment.Itisoffiveunitscon sistingevolutionofhumanrightsininternationallevelandregionaldimensionsofcivilandpoliticalrigh tsandspecialconventionsanddeclarationwithregardtovariousclassesofpeople.

UNIT I: Evolution of Human Rights

- MaganaCarta
- Bill of Rights inEngland
- American Bill ofRights
- Declaration of Rights in France for Men andWomen
- The World War crimes-Defeat ofFascism
- Recognition of international community on the universal nature of humanrights

UNIT II: ***U.N. and Human Rights***

- U.N.Charter
- Universal Declaration of Human Rights

UNIT III: ***Regional Dimensions of Civil and Political Rights***

- The European Declaration of HumanRights
- American Declaration of Human Rights
- African Declaration of Human Rights
- Islamic Declaration of Humanrights
- International Covenant on Civil and Politicalrights
- International Covenant on Socio-economic and Culturalrights
- Optional Protocol to the International Covenant on Civil and PoliticalRights

UNIT IV: Special Conventions

- Convention on the Elimination of All Forms of Discrimination AgainstWomen
- Convention on the Rights of theChild
- Convention on the International Status of Refugees and Elimination of Racial Discrimination
- Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment
- Protection of Rights of Labour andI.L.O.

UNIT V: ***International Conventions / Declarations***

- Tehran, Rio, Vienna, Cairo and CopenhagenDeclarations
- The Bejing Conference onWomen
- The Beijing + 5Conference
- Universal Human Rights – Problems and prospects

Suggested Readings

1. Alston, Philip (ed), *Promoting Human Rights Through Bills of Rights: Comparative Perspectives,* Oxford University Press,1999
2. Alston, Philip, (ed), *United Nations and Human Rights : A Critical Appraisal,Clarendon,*Oxford, 1995
3. BaxiUpendra, *Mambrino's Helmet? Human Rights for a Changing World,* Har-Anand Publications,1994
4. Blackburn Robert and Busuttil James, *Human Rights for the 21st Century*, Wellington House, London*,*1997
5. Brownlielan, *Basic Documents on Human Rights*, Clarendon Press, Oxford*,*1994
6. Chandra Satish, *International Documents on Human Rights*, Mittal Publications, New Delhi*,*1990
7. Donnelly Jack, *International Human Rights,* West View Press,Boulder,1993
8. Haragopal .G, *Political Economy of Human Rights; Emerging Dimensions,* Himalayan Publishers, New Delhi,1997
9. Haragopal.G(coord),*CourseMaterialforPost-GraduateDiplomainHumanRights,*Centre for Distance Education, University of Hyderabad, Hyderabad, 5-Volumes.
10. Johari J.C, *Human Rights and new World Order*, Anmol Publications, NewDelhi,1996
11. Kent Ann, *Between Freedom and Substance-China and Human Rights,* Oxford, Hong Kong,1993
12. Ketcher Martin, Europe Between The Wars- A Political, History, Longman,London,1977
13. Khanna S.K, *War and Human Rights*, Dominant Publishers, Delhi*,*1999
14. Krishna Iyer. V.R, *Human Rights and Inhuman Wrongs*, B.R. Publishing House*,*1990
15. NCERT, *Human Rights : A Source Book*, National Council of Educational Research and Training, New Delhi*,*1996
16. Sharma N.R, *Human Rights in the World*, Pointer Publishers, Jaipur*,*1999
17. SymonidesJanusz, *Human Rights, New Dimensions and Challenges*, UNESCO*,*1998

Course Outcomes:

1. To understand the students about the evolution of human rights and UN charter of human rights.
2. To expose the students about regional dimensions of human rights and special conventions on human rights.
3. To understand the students about International conventions on human rights and duties.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	2	2		2		3
CO 2	3	1		2		2	2	2		2		3
CO 3	3	1		2		2	2	2	1	2		3
CO 4												

HR-204: RESEARCH METHODOLOGY, STATISTICS AND COMPUTER APPLICATIONS

Objectives:

The objective of the course is to introduce the students to the fundamentals of research methodologies, methods and techniques. As the focus is on social science research, the course includes approaches and methods in this field. It will provide a conceptual understanding of the methods and techniques. It will also help the students in developing a research orientation and learn the basic framework of research

process.***UNIT – I: Foundations of Social Science Research***

- The Research Process: Major steps in Human RightsResearch
- Types of Research Designs: Exploratory, Descriptive, Diagnostic andExperimental
- Hypothesis: Meaning - Types - Sources of hypotheses - Attributes of a sound hypothesis
- Inter-relation between theory andresearch.
- Importance of research in Human Rights: Potential areas forresearch

UNIT – II: Sampling and Methods of Data Collection

- Sampling: Types Methods andTechniques
- Observation: Participant andNon-Participant
- Questionnaire: Preparation, advantages andlimitations
- Interview Schedule : Conducting an interview, Advantages andLimitations
- CaseStudy
- Reportwriting

UNIT – III: Participatory Rural Appraisal (PRA)

- Foundations of PRA; Principles ofPRA
- Mapping: Transect Walk, Social Mapping, Resource Mapping, Venn Diagram (Chapati/ RelationshipDiagram).
- Ranking : Wealth/Well-being Ranking, Pair-wiseRanking

UNIT – IV: Statistical Techniques

- Statistics: Definition, uses, importance and limitations of Statistics in SocialSciences
- Diagrammatic Representation – Uses and Limitations ofdiagrams
- Measures of Central Tendency and Dispersion – The Mean, Median and Mode; StandardDeviation
- Correlation
- Tests of Significance : Chi-Square test, F-Ratio, 'T'test

UNIT-V: Computer Applications

- Componentsofacomputer:ALU,CPU,MemoryandI/Odevices
- Hardware andsoftware
- Networking andinternet
- SPSS
- UsesofcomputersinSocialSciences

.

Suggested Readings:

1. Agarwal Y.P (ed) *Introduction to Statistics for Social Sciences,* Sterling Publishing*, New Delhi,1987*
2. Carol Tylor Fitz Gibbon and Lynn Lyons Morries, *How to Analyze Data ?,* Sage Publications, New Delhi,1997
3. Charles. W. Lachemmeyer,*The Essence of Social Research,* A Copernican Revolution, New York,1973
4. David. S. Moore, *Statistics, Concepts and Controversies, (Fourth ed),* W.H. Freeman Company, New York,1997
5. Dennis. P. Forcese and Stephen Richer, *Social Research Methods,* PrinticeHall,Inc, New Jersey,1973
6. Hanshbonger, Thad. R, *Introductory Statistics, A Decision Map,* Macmillan Publishing Co, London,1977
7. Hekim Catherine, *Secondary Analysis in Social Research,* George Allen &&Unwin, London,1982
8. Jit. S. Chandran, *Statistics for Business & Economics,* Vikas Publishing,1998
9. Kothari. C.R *Research Methodology, Methods & Techniques, WishwaPrakashan, Mumbai,1997*
10. Medhi. J*, Statistical Methods(An Introductory Text)* New Age International Publishers, Bombay,1995
11. *RAPIDEX Computer Course, Rapidex, New Delhi,2000*
12. Stultz, *Learn MS-Office,* B.P.B Publications Delhi,2000
13. Sydney. B. Newell, *Introduction to Micro-computing,* John Wiley & Sons, New York, 1989
14. Somesh Kumar, Methods of Community participation,2002.

Course Outcomes:

1) Student to Know Scope of Social Research.
2) To Understand Data Analysis.
3) Understand About Types of Data Collections

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	2	2	2	2		1	2	2		3
CO 2	3	3	2	2	2	2		1	2	2		3
CO 3	3	3	2	2	2	2		1	2	2		3
CO 4												

HR-205(a): HUMAN RIGHTS – THE SOCIO ECONOMIC CONTEXT

UNIT I: The Socio-Economic background and Human Rights

- Rights Approach toDevelopment
- Religion – Humanism, secular & morallegacies
- Social stratification and HumanRights
- Patriarchy-gender differences and humanrights
- Rural-urban disparities and humanrights
- Poverty and HumanRights
- Untouchability
- Caste system, caste based prejudice, discrimination, Other socialdeprivations

UNIT II: Economic Context

- Poverty, culture of poverty
- Economicdeprivation
- Share inresources
- Privatization & deprivation of humanrights
- Globalization and humanrights

UNIT III: Violence and Human Rights

- Atrocities against SC, SCWomen
- Land-grabbing of triballands
- Forced eviction oftribals

UNIT IV: Basic Human Need, Human Rights and Development

- UN concept of minimum needs – Relevance otIndia
- Access to cleanwater
- Right to adequate nutrition, housing, health care, education and cleanenvironment
- Right toWork
- Human rights and human development

UNIT V: Human Rights of r Vulnerable Groups

- Dalits

- Women
- Agriculturallabour
- Unorganizedlabour
- Migrantlabour
- Industriallabour
- DisabledPeople
- Aged

Suggested Readings

1. Ajit Kumar Danda, *Tribal Economy in India*, Inter-India Publications, New Delhi,1991.
2. Ambedkar B.R, *TheUntouchable,*
3. BaxiUpendra (ed), *The Right to be Human*, Lancer International, New Delhi,1987
4. BharathiSadasivam, *The Impact of Structural Adjustment on Women : A Government and Human Rights Agenda*, Human Rights Quarterly No. 19. ,1997
5. Flavia Agnes, *Law and Gender Inequality (The policies of Women's Rights in India),* Oxford University press, NewDelhi
6. Gita Ramaswamy, *The Child and the Law*, A.P Judicial Academy and UNICEF, Hyderabad,1996
7. James Massey, *Dalits in India,* Manohar Publishers & Distributors, NewDelhi
8. Jodhka S.S, *"Agrarian Change and Attached Labour : Emerging Patterns in Haryana Agriculture"*, Economic and Political Weekly, September 6,1974
9. Khanna S.K, *Women and the Human Rights,* Commonwealth Publishers, NewDelhi
10. KrishnarajMaithreyi (ed), *Gender and the Household Domain : Social and Cultural Dimensions*, Sage Publications, New Delhi,1989
11. Madhava Menon N.R, *Right to Work: Some Relevant Questions,* (Occasional paper), Department of Human Rights and Social Development, Sri Venkateswara University, Tirupati,2000
12. Myrow Weiner, *The Child and the State in India*, Oxford University Press, New Delhi,1991
13. Neera Burra, "*Child Labour in India, Poverty, Exploitation and Vested Interest",* Social Action, Vol 36, New Delhi,1986
14. Naidu V.J &Ramdass M, *Right to Employment as a Fundamental Right: Some Soio-Economic Dimensions,* (Occasional paper), Department of Human Rights and Social Development ,Sri Venkateswara University, Tirupati,2000
15. Pal R.M, Bhargava G.S.(ed), *Human Rights of Dalits (Societal Violation),* Gyan Publishing House, New Delhi,1999
16. Sankar Rao C.N, S*ociology,* Chand .S& Co, New Delhi,1995
17. Saxsena K.P., *Human Rights: Fifty years of India's Independence*, Gyan Publishing House, New Delhi,1999
18. Sen A.K &Dreze Jean, *Indian Development : Selected Region Perspectives,* Oxford University Press, NewDelhi,1996
19. Sen. A.K *Poverty and Famines, Oxford UniversityPress*

20. Shah. S.M, *Rural Development Planning and Reforms,* Abhinav Publications, New Delhi,1977
21. Sharma R.N, *Indian Society,* Media Promoters & Publishers, Bombay,1981
22. Subramanian. S, *Human Rights Training*, Manas Publications, I & II Volumes, New Delhi*,*2000
23. UNDP, Human Development Report, 1996, 1997,1998, 199, Oxford, NewDelhi
24. Weiner, Mayron, "*Child Labour in India, Putting Compulsory Primary Education on the Political Agenda",* Economic and Political Weekly, 9-16 Nov1996

Course Outcomes:

1. To expose the students about the socio, economic background of human rights.
2. To apprise the students about human rights of vulnerable groups.
3. To understand the students about the basic human need for development with respect to human rights.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3			2	1	2		2		2		3
CO 2	3			2	1			2		2		3
CO 3	3			2	1	2		2		2		3
CO 4												

HR-205(b): Societal Issues of Human Rights in India

Objective:

Societal problems of human rights are sought to be dealt with through five units. They encompass concept and approaches, and a special focus on social, economic, political, health and cultural problems that underlie human rights deprivations in Indian society.

Unit I: Concepts and Approaches

- Concept of societal problems and human rights
- Theoretical approaches to social problems and social changes
- Causes and types of social problems
- Societal problems and human rights

Unit II: Social Problems

- Problems of hierarchy
- Problems of minorities, scheduled caste and scheduled tribes
- Population explosion
- Violence against women and children
- Problems of aged and disabled

Unit III: Economic Problems

- Poverty and unemployment
- Privatization, liberalization and globalization
- Corruption, consumer rights
- Problems of sustainable development

Unit IV: Political Problems

- Regionalism, terrorism
- Assaults on democracy

Unit V: Cultural Problems

- Lack of cultural humanist values in education,
- cultural relativism National and universal cultural conflicts and tensions Problems of composite culture

Suggested Readings:

1. Alam, Aftab, ed., *Human Rights in India: Issues and Challenges* (New Delhi: Raj Publications, 1999).
2. Begum, S.M., ed., *Human Rights in India: Issues and Perspectives* (New Delhi: APH Publishing Co., 2000).
3. Chauhan, Abha, "*Dowry-related Crimes: Violation of Human Rights," in A.P.Vijapur and Kumar Suresh, eds., Perspectives on Human Rights* (New Delhi: Manak Publications, 1999), pp.120-36.
4. Desai, A.R., ed., *Violations of Democratic Rights in India* (Bombay: Popular Prakashan, 1986).
5. Ghosh, S.K., *The Law of Preventive Detention in India* (Bombay: N.M. Tripathi, 1969).
6. Hussain, Delwar, "*Combating Terrorism without Violating Human Rights: Some Options Revisited", Bliss Journal*, vol.15, no.3, pp.277-98.
7. Sehgal, B.P.Singh, *Human Rights in India: Problems and Perspective (New Delhi: Deep and Deep Publications*, 1996).
8. Sen, Shanker, "*Indian Prisons: A Survey*", in K.P.Saksena ed., Human Rights: Fifty Years of India's Independence (New Delhi: Gyan Publishing House, 1999), pp.99-105.
9. Sorabjee, Soli J*., "State of Human Rights",* Social Action, vol.40, no.1, 1990, pp.16-24. Tarkunde, V.M., *"Human Rights: An Overview",* in K.P. Saksena, ed., Human Rights: Fifty Years of India's Independence (New Delhi: Gyan Publishing House, 1999), pp.129-36.
10. Tiwana, S.S., *"National Human Rights Commission and Human Rights Violations in India"*, in M.P.Dube and Neeta Bora, eds., Perspectives on Human Rights (New Delhi: Anamika Publishers, 2000), pp.80-90.
11. Tyagi, Y.K*., "Human Rights in India: An Overview",* International Studies, vol.29, no.2, 1992, pp.199-208.

Course Outcomes:

1. To understand the student about the societal problems of human rights.
2. To understand the students about the social problems of minorities, scheduled caste and scheduled tribes.
3. To expose the students about Regionalism, terrorism.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	1	1		1		3
CO 2	3		1	2		2	1	1		1		3
CO 3	3			2		2	1	1		1		3
CO 4												

HR-206(a): HUMAN RIGHTS AND CRIMINAL JUSTICE SYSTEM

Objectives:

This paper covers various aspects and theories criminal justice system. It is pertinent to understand the conceptual and basic legal procedures and legal terminology as part of human rights discourse. The objective of this paper is also to understand the operational mechanism, legal system, police system including prisons as an instrument envisaged by the framers of the Constitution. These provisions are quite significant to protect one's basic rights. With the evolving society, issues and reforms in terms of deviant activities, including drug addiction, new types of computer related crimes, i.e., cyber crimes and white collar crimes will also be taken up. Overall, the paper offers a unique correlation between human rights and criminal justice system in India.

UNIT I: ***Conceptual Perspective***

i) Concept of Crime and Criminal Liability
ii) Offences Involving HumanRights
iii) Role of Criminal JusticeSystem

UNIT II: ***Human Rights Problems***

i) Police Atrocities andAccountability
ii) Violence against Women andChildren
iii) CommunalViolence
iv) Caste and ClassConflicts
v) Maintenance of Law andOrder
vi) Terrorism andInsurgency

UNIT III: ***Rights of Accused***

i) DoubleJeopardy
ii) AgainstSelf-incrimination
iii) Production beforeMagistrate
iv) FairTrial

v) SpeedyTrial

vi) Appeal

UNIT IV: ***Rights of Inmates of Prisons and Custodial Homes***

i) ProtectionHomes

ii) Reformative and other Institutions

iii) Prisons

UNIT V: ***Right to Legal Aid, Access to Justice and Speedy Justice***

i) Right to LegalAid

ii) Right toCompensation

iii) OrdinaryCourts

iv) SpecialCourts

v) District Human RightsCourts

vi) Nyaya Panchayats

vii) Human RightsSensitization

Suggested Reading

1. Amnesty International, "Campaign for the Abolition of Torture", *Philosophy and Science Acation*, Vol. 5, Nos. 3-4, 1984, pp.205-208.
2. Aroras,Nirmal,"CustodialTortureinPoliceStationsinIndia:ARadicalAssessment", *Journal of Indian Law Institute,* Vol. 41, Nos. 3 and 4, 1999, pp. 513-29.
3. Bakken,T.,"InternationalLawandHumanRightsforDefendantsinCriminalTrials", *Indian Journal of International Law,* Vol. 25, 1985, pp. 411-523.
4. Bansal, V.K., *Right to Life and Personal Liberty* (New Delhi : Deep and Deep,1986).
5. Burgers, J.H., "The Fights against Torture", *International Commission of Jurists,* No. 32, 1984, pp.47-48.
6. Chevigny, Paul, Police Power : Police Abuses in New York City (New York : Pantheon Book,1969.
7. Devasia, V.V. and LeelammaDevasia, Human Rights and Victimology (New Delhi, 1999).
8. Diwan Paras, "Torture and the Right to Human Dignity", *Supreme Court Cases,* Vol. 4, 1981.
9. Ghosh, S.K., *Torture and Rape in Police Custody* (New Delhi : Ashish Publishing House, 1993).
10. Manohar, Sujata V., "Judiciary andHumanRights", *Indian Journal of International Law,* Vol. 36, 1996, pp.39-54.
11. Melden, A.I., ed., *Rights and Prisons* (Oxford :Blackwheel,1977).
12. Pachauri, S.K., Prisoners and Human Rights(1999).
13. Rajan, V.N., *Whither Criminal Justice Policy (1983).*
14. Sharma, S.C., *Police and Human Rights(1999).*
15. Vadackumchery, James, *The Police and Delinquency in India* (New Delhi : APH Publishing Corporation,1991).

Course Outcomes:

1. To expose the students about Rights of Inmates of Prisons and Custodial Homes.
2. To understand the students about the Right to Legal Aid, Access to Justice and Speedy Justice.
3. To expose the students that the problems of human rights.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3			2	1	2	1	2		1		3
CO 2	3			2	1	2	1	2		1		3
CO 3	3			2	1	2	1	2		1		3
CO 4												

HR-206(b): MEDIA AND HUMAN RIGHTS

UNIT-I: Media

Definition-Various forms of media – Print, Electronic (Broadcast), Art media – radio, television, internet

UNIT-II:Reporting

Downsizing, dumbing down and 'infotaining' – Types of reporting - The culture of breaking news – Impact of bias, propaganda and distortion, evaluating sources, protecting confidentiality of sources, interviewing experts and victims.

UNIT-III: Media ethics and the issues in handling sources

Meaning of defamation, libel and slander, Yellow journalism, Women and Media- Content, Portrayal and Access

UNIT-IV: Duties of media, social responsibility

Paid news, conspiracy of silence; Intersection of media and human rights, Human rights organizations and media regimes

UNIT-V: Report Writing

Techniques and styles of writing for various types of media, editing, and concise writing – Presentation of reports - Impact of Investigative journalism on human rights issues.

Suggested Readings:

1. Arnett, Peter. "Goodbye World — Why Foreign News is Vanishing fromAmerica's
2. Newspapers", American Journalism Review, November 1998, pp.50-67.
3. Bagdikian, Ben H. The Media Monopoly. Boston: Beacon Press, 1983 and 1997editions.

4. Burnheim, Sally. The Right to Communicate — The Internet in Africa. London: Article 19,1999.
5. Casmir, Fred, ed. Communications in Eastern Europe — The Role of History, Culture, and Media in Contemporary Conflicts. Mahwah: Lawrence Erlbaum Associates,1995.
6. Cohen, Stanley. Denial and Acknowledgement: The Impact of Information about Human Rights Violations. Jerusalem: Centre for Human Rights, the Hebrew University of Jerusalem,1995.
7. Comor, Edward A. "Governance and the 'Commodisation' of Information", Global Governance 4, 2, April-June 1998, pp.217-233
8. Stanley Cohen, Denial and Acknowledgement: The impact of information about Human Rights violations, Jerusalem,1995
9. Human Rights violations: Communicating the information, London: index onCensorship,1995
10. Kayoko Mizuta, "Human Rights and the Media, in Asian media information and communication centre, Media and Human Rights in Asia, Singapore: AMIC,2000
11. DeneenL.Brown,"JournalistsFeelShackledbyNewOwner",TheinternationalHeraldTribune, 2002
12. John Keane, The Media and Democracy, Cambridge: Policy Press,1991
13. John Naughton, "With the Rusty Sword of Touth Television's influence and the systemic crisisin serious Journalism", Times Literary Supplement,1998
14. Douglas Farah, "Death of a crusading Journalist puts pressure on Burkina Faso president", The Washington post,2000

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	2		2	1	3	1	2	1	3
CO 2	3	1	1	2		2	1	3	1	2	1	3
CO 3	3	1	1	2		2	1	3	1	2	1	3
CO 4												

Audit Course-207: Human Values and Professional Ethics – II

Unit – I: Value Education: Definition- relevance to present day concept of human values; Self introspection-Selfesteem. Family values-Components, structure and responsibilities of family; Neutralization of anger – adjustability – threats of family life – status of women in family and society – caring for needy and elderly – time allotment for sharing ideas andconcerns.

Unit–II: Medical ethics: Views of charka, Sushurta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to justice in health care, human cloning problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology orknowledge.

Unit-III: Environmental ethics: Ethical theory, Man and nature- Ecological crisis, Pest control, Pollution and waste Climate change; Energy and population, justice and environmental health.

Unit- IV: Social ethics: Organ trade, human trafficking, Human rights violation and social disparities; Feminist ethics, surrogacy/pregnancy; Ethics of media - Impact of Newspapers, Television, Movies and Internet.

Suggested Books:

1. John S Mackenjie: A manual ofethics
2. “the Ethics of Management” by Larue Tone Hosmer, Richard D.IrwinInc.
3. “Management Ethics – integrity at work\ by joseph A.Petick and john f. Quinn Response Books:Newdelhi
4. “Ethics in managemen’ByS.A.Sherlkar, Himalaya PublishingHouse,
5. Harold H. Titus: Ethics forToday
6. Maitra.S.K. HinduEthics
7. William Lilly: Introduction toEthics
8. Sinha.A Manual ofEthics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian system ofDuties: Religious and Civil (ed)G.C.Haughton

10. Susruta Samhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. ChowkambaSankrit series, VolI,II and III, Varnasi, Vol I OO, 16-20,21-22 and 74-77only.
11. CarakaSamhita :Tr.Dr.Ram Karan Sarna and Vaidya Bhagavan Dash,Chowkambha.

Course Outcomes:

1. To expose the student about the concept and nature of human values.
2. To understand the student about nature of Values, Ahimsa and various religion theories.
3. To assess the student about various Crime and Theories of punishments.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	2		2	1	3	1	2	1	3
CO 2	3	1	1	2		2	1	3	1	2	1	3
CO 3	3	1	1	2		2	1	3	1	2	1	3
CO 4												

SEMESTER III

HR-301: SOCIAL MOVEMENTS AND HUMAN RIGHTS AND DUTIES

UNIT I: Conceptual Perspective

- Concept of socialmovement
- Types ofmovements
- Ideology,Organization
- Mobilizationleadership
- Social Movements as promoter of social change and HumanRights

UNIT II: Social and Religious Reforms Movements and Human Rights

- BrahmoSamaj
- AryaSamaj
- DalitMovements
- TribalMovements
- Women's Movements
- SufiMovements

UNIT III: Political Movements and Human Rights

- FreedomMovements
- PeasantMovement
- Regional and Ethnic Identity Movements (Separatist & TerroristMovement)
- Sarvoday Movement and Land ReformMovements
- Trade UnionMovements
- Students'Movements

UNIT IV: Ecological / Environment Movements and Human Rights

- Chipko Movement
- Narmada BachaoAndolan

UNIT V: Role of International and National Institutions in Promoting Human Rights

- Role of the United National Human RightsCommission
- Role of National Judiciary andBar
- NGOs and People Movements, PUCL, PUDR,etc.
- TheMedia

Suggested Readings

1. Eide, Asbjorn, "Human Rights Movement and the Transformation of International Order", *Alternatives,* Vol. 11, No.3, 1986, pp. 367-402.
2. Karna, G.N,., "Disability Rights Movement; conceptual Framework and its Implications for India",*Disabilities and Impariments*Vol. 14, No. 1,2000,pp.15-22.
3. Kaushik, Vijay, *Women's Movements in India:* A Critical Overview", *Social Action,* Vol. 40.1, 1990, pp.1-15.
4. Kothari, Smitu, "Human Rights Movement in India : A critical Overview", *SocialAction,* Vol. 40, No. 1, 1990, PP. 1-15.
5. Puri. Balraj, "Role of Human Rights Groups in Kashmir",1972.
6. Reddaway, Ptere, *Uncensored Russia : The Human Rights Movement in The Saviet Russia,* Delhi : National Academy,1972.
7. Roy, JaytilakGuha, "Human Rights Movement in Modern India", In A.P. Vijapur and Kumar Suresh, eds., *Perspectives on Human Rights,* New Delhi : Manak Publications, 1999, pp.50-58.
8. Shapiro, Joseph P., *No Pity People with Disabilities,* Foreign a New Civil Rights Movement,1994.
9. Steiner. Henry J., *Diverse Partners: Non-Governmental Organizations in the Human Rights Movement: The Report of A Retreat of Human Rights Activists,* Massachusetts: Harvard Law School, 1990.
10. Thoolen, H. and B. Verstappen, *Human Rights Missions,* The Hague: Martinis Nijhoff, 1986.
11. Tyagi, Y.K., "Golden Jubilee of Unfinished Task: The United Nations Human Rights Movements", *International Studies,* Vol. 32, No.4 1995, pp. 441-60.
12. Tyne, Claude H. Van, *India Freedom Movement,* Delhi :Akashdeep Publishing House, 1990.

Course Outcomes:

1. To expose the student about conceptual perspectives of social movements and human rights.
2. To apprise the students about the social, political and religious reforms movements and human rights.
3. To expose the students that the role of International and National Institutions in promoting Human Rights.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	2		1	1	2		2	1	3
CO 2	3	1		2	1	1	1	2		2	1	3
CO 3	3	1	1	2		1	1	2		2	1	3
CO 4												

HR-302: SCIENCE, TECHNOLOGY, HUMAN RIGHTS AND DUTIES

Course Objectives:

The course aims to provide students with theoretical and conceptual tools to understand the way scientific and technological decisions are made and the implications of these decisions on human rights and social development. Contemporary operationalisation amongst others in Life Sustaining Technologies, IVF, GMO and Euthanasia is contextualised. The discussion on Technology 'in' control and 'out' of control puts the "developments" in Science and Technology in perspective.

UNIT I: *Conceptual Perspective*

- Concept of science & Technology as a tool for furtherance of human and social welfare, scientifictemper
- Debates over'development'
- Quality of life : spiritualism versus materialism : the need for balancing ofvalues
- Modernization,urbanization

UNIT II: *International parameters of Human Rights and Science & Technology*

- Article5ofUniversalDeclarationofHumanRights1948;Article7ofthe International Covenant on Civil and Political Rights 1966; Convention on Prevention and Punishment of Crime of Genocide 1948; Convention on the Protection of All persons form being subjected to torture and other cruel, inhuman or degrading treatment or punishment 1984
- Article 7 (prohibition of experimentation on human person) of the International Covenant on Civil and Political rights 1966, Constitution of the World Health Organisation, UN General Assembly Resolution 37/194 on Protection against products harmful to health and the environment 1982, UNESCO Universal declaration on the human genome and human rights1997
- Convention on the International right of Correction 1952, UN Declaration on a New International information and communication Order 1978, UNESCO convention on Technical and vocational education 1989, International Code of Conduct on the Transfer of technology 1993, other developments on the internationalplane

UNIT III: *Bio Technology Development and Human Rights*

- Developments in biotechnology : human cloning, feticide and abortion; in-vitro fertilization and surrogate parenthood, organ transplantation and sale of human organs, human performance augmenting drugs and technologies (e.g., use of steroids in sports, hormones, viagra-likedrugs)
- Life sustaining technologies: artificial organs, kidney dialysis, life sustaining drugs

UNIT IV: ***Freedom of Information, thought and Expression***

- Revolution in informationtechnology
- Right to information, right to education, right to communication, freedom of the press and other information media, right toentertainment
- Applicable legalnorms
- Cyber Crimes, online pornography

UNIT V: ***Right to Development, Clean Environment and Public Safety***

- Safety aspects of new technologies such as chemical and nuclear technologies : issues of waste disposal, public concerns of safety, protection of theenvironment

Suggested Readings

1. UN Centre for Human Rights, *Advisory Services and Technological Cooperation in the Field of Human Rights,* Geneva : World Campaign for Human Rights,1996.
2. UN Centre for Human Rights, *Report of the International Consultation on AID and Human Rights,* Geneva, 26-28 July 1989, New York : UN Department of Public Information,1982.
3. UN, *Human Rights and Scientific and Technological Development,* New York : UN Department of Public Information, 1982.
4. WHO, *Health as a Bridge for Peace and Human Rights,* Geneva : WHO,1996.
5. WHO, *Protection of Human Rights in the Light of Scientific and Technological Progress in Biology and Medicine,* Albany : WHO,1975.
6. Bankowski, I., ed., *International Ethical Guidelines for Bromedial Research Involving Human Subjects,* Geneva : WHO,1993.
7. Johnstone, Ann and others, eds., *New Technologies and Development*, Geneva : UNESCO, 1986.
8. Mechael, James, *Privacy and Human Rights : An International and Comparative Study with Special Reference to Documents in Information Technology*, Paris : UNESCO,1994.
9. Mukherjee, Sipra G., "Promotion of Human Rights and Science Education", in K.P. Saksena, ed., *The tEaching about Human Rights,* New Delhi : HURITER, 1985, pp. 55-60.
10. Petersen, Kerry, "Abortion Laws :Medicalisation, Autonomy and Equality", in AntornyAnghie and Garry Sturgess, eds., *Legal Visions of the 21st Century,* Supra, pp.167-182.
11. Nawaz, M.K., "Law, Human Rights and Computer", *Indian Journal of InternationalLaw,* Vol. 25, Nos. 3 and 4, July-Dec. 1985, pp. 612-20.
12. Satyamala, C., "Hazardous Contraceptives and the Rights to Life", *Journal of the Indian Law Institute,* Vol. 40, 1998, pp.174-199.
13. Sisskind, Charles, *Understanding Technology,* New York :Feffer and Sinons,1973.
14. Zinian, John and others, eds., *The World of Science and the Rule of Law,* Oxford University Press,1986.

Course Outcomes:

1. Understand the basic concept in science and technology and also about Indian perspective on science and technology.
2. Ability to know about the Right to Adequate Food, Agricultural, Biotechnology Impact of on Agriculture, Food Biotechnology and Revolution in Information Technology.
3. Analyse know rights to health and application of Biotechnology in Medicine and also about Intellectual Property Rights.
4. Assess the use of natural resource Environmental Biotechnology and Use Technologies

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		1		2	1	2		1		3
CO 2	3	2		1		2	1	2		1		3
CO 3	3	2		1		2	1	2		1		3
CO 4												

HR-303(a): HUMAN RIGHTS AND DUTIES ADVOCACY AND EXTENSION WORK

UNIT I:*Advocacy*

i) Concept : Role ofBiases

ii) Objectives of advocacy in protection and promotion of human rights and duties.

UNIT II: *Peoples Movements and Public Advocacy*

Role of Social and Political Movements, NGOs and activists.

UNIT III: *Issues for Advocacy*

i) Societal issues : Poverty, gender bias, caste and communal strife, child labour, bonded labour, child prostitution, abuses of women,etc.

ii) Actions of State : legislative, judiciary, executive : police atrocities,etc.

UNIT IV: *Strategies*

Mobilizing public opinion : Social justice lobbying, legislative lobbying, media advocacy, networking, lawyering.

UNIT V: *Procedural Aspects*

i) Reporting Human Rights violations : Guidelines, definitions, selection of information, protocol information, data protection, datautilization.

ii) Documentation of Human Rightsviolations.

iii) Fact-Finding : NGO's fact finding, Fact-finding standards : Fact-finding process.

iv) Liasing with national and state human rightsinstitutions

v) Use of informationmedia.

Course Outcomes:

1. To understand the students that the issues for peoples movements and public advocacy on human rights and duties
2. To understand the students on extension work with respect to human rights.
3. To understand the students about the uses of NGOs fact finding and uses of information media.

Reference :

1. Baxi, Upendra, "Teaching and Research in Human Rights : ARE-exploration", *Indian Journal of International Law,* Vol.22, 1982, pp. 353-60.
2. Bhagwati, P.N., *Legal Aid as Human Rights* (Dharwad :JagrutBharut,1985).
3. Chatrath K.J.S., ed., *Education for Human Rights and Democracy* (Shimla : Indian Institute of Advanced Studies,1998).
4. Haksar, Nandita, "Human Rights in Legal education", *Journal of Indian Law Institute,* Vol.40, Nos.1-4, 1998, pp.317-24.
5. Pal, R.M. ed., *Human Rights Education* (New Delhi : PUDR,1995).
6. Jaswal, P.S. and N. Jaswal, "Right to education and Human Rights" in B.P.Singh
7. Sehgal, ed., *Human Rights in India : Problems and Perspectives* (New Delhi : Deep and Deep, 1995), pp.120-29.
8. Mani, V.S., "Human Rights Teaching in Indian Universities : An Overview", in Canadian Human Rights Foundation, Canadian Human Rights Commission and national
9. Human Rights Commission of India, *Seminar on Human Rights Education and National Institution, New Delhi* (Montreal, 1996), pp.81-92.

10. Subramanian, S., *Human Rights Training, Volumes I and II* (Allahabad : Vohra Publishing,1989).
11. UNESCO, *Human Rights Teaching : International Congress on Education of Human Rights and Democracy* (Montreal : UNESCO,1993).
12. UNESCO, *Manual for Human Rights Education : Primary and SecondaryLevel* (Paris : UNESCO, 1997).
13. UNESCO, *The Teaching of Human Rights : Proceedings of the International Congress on the Teaching of Human Rights, Vienna, 12-16 September 1978* (Paris : UNESCO,1980).
14. UNESCO, *World Directory of Human Rights Research and TrainingInstitutions* (Paris: UNESCO, 1995)

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	3	2		2	1	1	2	2		3
CO 2	3	3	3	2		2	1	1	2	2		3
CO 3	3	3	3	2		2	1	1	2	2		3
CO 4												

HR-303(b): SOCIALLY / ECONOMICALLY DISADVANTAGED PEOPLE AND HUMAN RIGHTS AND DUTIES

UNIT I: *Status of Disadvantaged people in Contemporary Indian Society*

- Concept identification and problems of disadvantaged groups – SC, ST &OBCs.
- Role of social reformers, Periyan, M.N. Roy, NarayanaGuru.

UNIT II: *Constitutional Safeguards*

- Fundamental Rights and Directive Principles under theConstitution.
- Special protection under Articles 330,332,334,335,338,339,340,341 & 342, Fifth and SixthSchedules.

UNIT III: *Special Protection : Laws and Policies*

- Special laws : protection of civil rights act 1955, scheduled castes and scheduled tribes (prevention of atrocities) Act 1989, employment of Manual scavengers and construction of dry latrines (prohibition) Act1999
- Policies of government :reservations, quotas, special drives andschemes

UNIT IV: *Institutional ;Mechanisms for Protection of SC / ST, and OBCs*

- National Commissions, StateCommissions
- Non-GovernmentalOrganizations
- The Information Technology, Massmedia
- Role of Educationalinstitutions

UNIT V: *International Norms, Standards andConferences*

- UN Declaration on the Indigenous Peoples 1995, UN voluntary Fund for Indigenous Populations1985.

- ILO Convention NO. 169 concerning Indigenous and Tribal Communities1989.

Course Outcomes:

1. To expose the students about the concept of the Constitutional Safeguards and Special Protection Laws and Policies.

2. To understand the students about the concept of the disadvantaged people in the Indian Society.
3. To understand the students about the Institutional Mechanisms for protecting the human rights of the disadvantaged groups.

Suggested Readings

1. Government of India, *Towards Equality : Report of the Committee on the Status of Women,* New Delhi, Governmetn of India.
2. UN Centre for Human Rights, *Discrimination against Women, Geneva :*World Campaign for Human Rights,1994.
3. UN, *Action for Gender Equality and the Advancement of Women,* New York : UN Department of Public Ifnormation, 1999.
4. UN, *Huamn Rights and Disabled Persons,* Geneva : World Campaign for Human Rights, 1993.
5. Bhargava, G.S. and R.M. Pal, eds, *Human Rights of Dalits : Societal Violation,* New Delhi : Gyan Publishing House,2000.
6. Bhatia, K.L.andothers, *Social Justice of R. B.R. Ambedkar,* New Delhi : Deep and Deep,1995.
7. Desai, Neera and MatireyiKrishnaraj, eds., *Women and Society in Indian,* Ajanta Publicatiosn,1987.
8. Desai, Neera and Vibuti Patel, *Indian Women,* Bombay : Popular Prakashan,1990.
9. Desai, Neera, *A Decade of Women's Movement in India,* New Delhi : Himalaya PublishingHouse.
10. Devasia, V.V. and L. Devasia, *Woman, Social Justice and Human Rights,*1999.
11. Khan, Mimtaz Ali, *Human Rights and the Dalits,* new Delhi : D.K. Oyvkusgersm1996.
12. Omvedt, Gail, *Dalits and the Democratic Revolution*,1994.
13. Shrma, SwranLata, *Gender Discrimination and Human Rights,* New Delhi : K.K. Publications,2000.
14. Vijapur, A.P., "Towards equality : Promoting Human Rights of the Untouchables in India", in A.P. Vijapur, ed., *Essays on International Human Rights,* New Delhi : South Asian Publishers, 1991, pp.117-44.
15. Warti, Dipangshu Chakra, *Atrocities on Indian Women,* New Delhi : APH Publishing Corporation,1999.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	1	1		2		3
CO 2	3	1		2		2	1	2		2		3
CO 3	3	1		2		2	1	2		2		3
CO 4												

HR-303(c): HUMAN DUTIES AND RESPONSIBILITIES

UNIT I: *Concept of Human Duties and Responsibilities*

Moral / Ethical; Social / Economic; Legal / Political; Traditional / Modern; Eternal / Universal; Changing Dimensions

UNIT II: *Human Values*

- Foundations of Human Duties: Religious, Moral, Social, Ideological, Political / Social /Cultural.
- Values of Humanism : Justice, Equality, liberty, HumanDignity

UNIT III: Co-Relationship of Human Rights and Duties

- Right Oriented society : AcquisitiveSociety.
- Duty – Oriented Society : HarmoniousSociety.

UNIT IV: *Evolution of Human Duties and Responsibilities*

- Ancient, Medieval, ModernTimes
- Impact of Social Changes inSocieties
- Criteria of Identification : ValueSystems

UNIT V: *Identification of Human Duties & Responsibilities*

- Duties towards self : Body andMind
- Duties towards Family
- Duties towards Community
- Duties towards Society
- Duties towardsNation-State
- Duties towardsHumankind

- Duties towards MotherEarth

Course Outcomes:

1. To understand the student about the concept of human duties and responsibilities.

2. To expose the student about human values and values of humanism.

3. To apprise the students about evaluation of human duties.

Suggested Readings

1. Alasdair, Maclntyre, *After Virtue – A Study in Moral Theory* (London,1981).
2. Baade, H.J., *Legal Problems of a Code of Conduct for Multinational Enterprises* (Boston, 1980).
3. Encyclopaedia of Applied Ethics (New York,1998).
4. Eqing, Alfread Cyril, *Ethics* (London, 1953).
5. Kammingo,Menno.T.,*InterstateAccountabilityforVio0lat;ionsofHumanRights* (Philadelphia : Pennsylvania, 1992).
6. Kothari, D.S., *Some Thoughts on Science and Religion* (New Delhi,1977).
7. Lerner, N., *Group Rights and Discrimination* (Dordrecht :MartinusNijhoff,1990).
8. Mohanti, M., *Peoples Rights* (New Delhi : Sage Publications,1998).
9. Pandey, J. and R.K. Dubey, *Civil Liberty under Indian Constitution* (New Delhi : Deep and Deep,1995).
10. Pateman, Corole, *The Problem of Political Obligations* (Oxford,1985).
11. Ramchandran, B.G., *The Right to Life in International Law* (Dordrecht : MartinusNijhoff,1985).
12. Rehman, M.M. and others, *Human Rights and Human Development : Concepts and Contexts* (New Delhi : Manak Publications,2000).
13. Russell, Bertrand, *Religion and Science* (Oxford,1935).
14. Sunga, Lyal S., *International* Responsibility in International Law for Serious Human Rights Violations (Dordrecht :MartinusNijhoff,1992).
15. Tyagi, Y.K., "Human Dignity, National Security and ItnernationalResponsibility : Search for a Symbiosis", in K.P. Saksena, ed., *Human Rights : Perspective and Challenges* (New Delhi : Lancers Books, 1994), pp.45-78.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	1	2	1	2	1	3
CO 2	3	1		2		2	1	2	1	2	1	3
CO 3	3	1		2		2	1	2	1	2	1	3
CO 4												

HR-303(d): CHILDREN AND HUMAN RIGHTS AND DUTIES

UNIT I: *International Norms for Protection of the Child*

- ILO conventions on restrictions and prohibition on child labour including ILO convention on Child Labour1999.
- UN Convention on the Rights of the Child 1989, Optional Protocol on Sale of Children, Child Prostitution and Child Pornography 2000, Declaration ofSocial and Legal Principles relating to the Protection and Welfare of Children with Special Reference to Foster Placement and Adoption1986.
- World Summit for Children : Declaration and Plan ofAction.

UNIT II: *Indian Constitution and Protection of the Child*

- Fundamental Rights and Directive Principles under the IndianConstitution.
- Special Protection for the Child: Article 15(3), Art. 21(A) & 23 and Articles 24, Article 39(e) & (F) Articles45.

UNIT III: *Status of Child in Contemporary IndianSociety*

- Impact of problems of poverty andilliteracy
- Social and cultural practices regarding girl child : feticide, childmarriage.
- Child labour (in construction, carpet, glass, bangles, and other industries, in unorganized sectors), forced labour, sale ofchildren.
- Child abuse inside and outside homes, trafficking in children, children,children and custodialcrimes.
- Street children : Child andcrime

UNIT IV: *Special Laws and Policies for Protection of the Child*

- Child Labour (Prohibition and Regulation) Act 1986, Children (Pledging of Labour Act 1933, Young Persons (Harmful Publications) Act 1956, Child Marriage Restraints Act 1929, Pre-Natal Diagnostic Techniques (Regulation and

Prevention of Misuse) Act 1956, Children's Act 1960, Orphanages and other Charitable Homes (Supervision and Control) Act 1960, Juvenile Justice Acts 1986 and 2000.

UNIT V: *Institutional Mechanism for Protection of the Child*

- Constitutional Mechanisms : Role of Legislature, Executive andJudiciary.
- National Human Rights Commission, National Commission for Rights of the Child.
- Non-Governmentalorganizations.
- The InformationMedia.

Suggested Readings

1. Burra, Nera, *Born to Work, Delhi : Oxford University Press,* 1995.
2. UNICEF, *The Child and the Law,* New Delhi : UNICEF,1994.
3. UN, *Convention on the Rights of the Child*, New York : UN Department of Public Information,1991.
4. UNICEF, *Impact of Armed Conflict on Children,* New York : UNESCO,1996.
5. Agrawal, S.P., *Handbook on Child,* New Delhi : Concept Publishing Company,1992.
6. Chandrasekhar, Prabha, *"Need of the Child for Good Magazines",* in K.P. Saksena, ed., Human Rights in Asia : Problems and Perspectives, New Delhi : Hriter, 1984, pp. 110-120.
7. Gupta, Sriniwas, "Rights of Child and Child Labour : A Critical Study", *Journal of Indian Law Institute,* Vol. 37, No. 4, October to December 1995, pp.531-42.
8. Khanna, S.K., *Children and the Human Rights,* New Delhi : Commonwealth,1998.
9. Murthy, K. Radhakrishna, *Street Children in Visakhapatnam : A study in Relative Present Day,*1962.
10. Pachauri, S.K., *Children and Human Rights,* New Delhi – APH Publishing Corporation, 1999.
11. Sachar, Rajinder, "Rights of the Child", World Focus, Vol. 13, No.3, March 1992, pp. 22-23.
12. Seth, Leila, "Rights of the Child", *India International Centre Quarterly,* Vol. 20, No. 4, 1993, pp.79-90.
13. Kumar, Bindal, *Problems of Working Children,* New Delhi : APH Publications,2000.
14. Mehta, P.L., *Child Labour and the Law,* New Delhi : Deep and Deep,1996.
15. Sharma, A.K., "Human Rights Violations of Street Children and Child Labour in India", in B.P. Singh Sehgal, ed., *Human Rights in India : Problems and Perspectives,* New Delhi : Deep and Deep, 1995, pp.187-91.

Course Outcomes:

1. To understand the student about the concepts of Child Labour and protecting norms at National and International level.
2. To apprise the student that the status of children in Indian society with respect to human rights.
3. To understand the students about the National and International mechanisms for protecting the child rights.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		1	2		3	1	2		2		3
CO 2	3		1	2		3	1	2		2		3
CO 3	3		1	2		3	1	2		2		3
CO 4												

HR-304: SOFT AND EMPLOYABILITY SKILLS

UNIT-I: Soft Skills and Listening

Soft Skills: Meaning and Importance - Hard Skills versus Soft Skills - Self Concept: Self - Awareness, Self Development and Self Realization – Power of Positive Attitude – Etiquette and Manners.

Listening: Types of Listening, Effective Listening and Barriers to Listening – Assertive Communication

UNIT-II: Communication Skills

Verbal or Oral Communication: Forms, Types of Speeches and Public Speaking – Presentation: Elements of Effective Presentation and Use of Visual Aids in Presentation.

Written Communication: Strategies of Writing – Business Letters: Form, Structure and Formats –Types of Business Letters – Memos – Agenda and Minutes.

Non-verbal Communication: Body Language and Proxemics.

UNIT-III: Interpersonal Skills:

Relationship Development and Maintenance and Transactional Analysis.

Conflict Resolution Skills: Levels of Conflict and Handling Conflict - Persuasion - Empathy - Managing Emotions – Negotiation: Types, Stages and Skills.

UNIT –IV: Employability Skills

Goal Setting, Career Planning, Corporate Skills, Group Discussion, Interview Skills, Types of Interview, Email Writing, Job Application, Cover Letter, Resume Preparation.

UNIT-V: Professional Skills

Decision Making Skills – Problem Solving – Emotional Intelligence – Team Building Skills – Team Spirit – Time Management .

Stress Management: Resolving Techniques.

Suggested Readings:

1. Ghosh, B.N. Managing Soft Skills for Personality Development. (Ed). New Delhi: Tata
2. McGraw Hill Education Pvt. Ltd., 2012.
3. Krishna Mohan and Meera Banerji. Developing Communication Skills. (2nd Edition). New
4. Delhi: MacMillan Publishers India Ltd., 2009.
5. Neera Jain and Shoma Mukherji. Effective Business Communication. New Delhi: Tata
6. McGraw Hill Education Pvt. Ltd., 2012.

Supplementary Readings:

7. Rao, M.S. Soft Skills - Enhancing Employability: Connecting Campus with Cororate. New
8. Delhi:I.K International Publishing House Pvt. Ltd., 2011.
9. Ashraf Rizwi, M. Effective Technical Communication. New Delhi: Tata McGraw Hill
10. Education Pvt. Ltd., 2010.
11. Bretag Tracey, Crossman Joanna and Bordia Sarbari. Communication Skills. New Delhi:
12. Tata McGraw Hill Education Pvt. Ltd., 2012.

Course Outcomes:

1. To understand the student that the concepts of soft skills with respect to human rights.
2. To understand the student in employability skills in human rights aspects.
3. To expose the students that the professional skills for team building and problem solving.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2	1	2	1	2	2	2	1	3
CO 2	3	2	1	2	1	2	1	2	2	2	1	3
CO 3	3	2	1	2	1	2	1	2	2	2	1	3
CO 4												

HR-305(a): Historical and Philosophical Perspectives of Human Rights

Course Objectives:

1. To give a basic understanding to the concepts of human rights, human values, dignity, justice and equality.
2. To outline the Magna Carta-Billof Right-French and American- Declaration and Uncharted on human rights.
3. To define the theories of human rights in various inter disciplinary dimensions
4. To know about the contribution of prominent thinkers in human rights

Unit-I A Conceptual Understanding of Human Rights

- Human Rights Concept, Definition, Meaning & Nature, Human Values: Liberty, Equality, andJustice

Unit-II Historical Foundation of Human Rights

- Historical Development: Magna Carta, British Bill of Rights, American Bill of Rights French Revolution and its Goal of Liberty Equality and Fraternity, MarxistRevolution

Unit-III Theories and Classification of Human Rights

- Three Generation of Human Rights, Theory of Natural Rights,Legal/Positive Theory of Rights, Marxist Theory of Rights, Feminist Perspectives of Human Rights

Unit-IV Rule of Law and Human Rights

- Rule of Law and Human Rights: Concept, Origin, Historical Development in Greek and English Civilization and its Contribution to the Development ofRights

Course Outcomes:

1. To expose the student that the a basic understanding to the concepts of human rights, human values, dignity, justice and equality.
2. To understand the students that the theories of human rights in various inter disciplinary dimensions.
3. To apprise the student that the concept of Magna Carta-Billof Right-French and American- Declaration and Uncharted on human rights.

Suggested Readings:

1. Alston, Phillip (ed.), (1992), *The United Nations and Human Rights: A Critical Appraisal,*
2. Oxford: Clarendon Press.
3. Bachr, Peter R, (1999), *Human Rights: Universality in Practice,* New York: Palgrave. Baxi, Upendra, (2002), *The Future of Human Rights*, New Delhi: Oxford University Press. Bhagwati, P.N., (1987*), Dimensions of Human Rights*, Madurai: Society for Community Organization Trust.
4. Davidson, Scott, (1993), *Human Rights*. Buckingham: Open University Press. Donnelly, Jack, (1989), *Universal Human Right in Theory and Practice*, Ithaca: Cornell UniversityPress.
5. Dube, M.P. and Neeta Bora, (ed.), (2000), *Perspective on Human Rights*, New Delhi: Anamika Publishers.
6. Freeman, Michael, (2003), *Human Rights: An Interdisciplinary Approach*, Cambridge: Polity Press.
7. Hargopal, G. (1999), *Political Economy of Human Rights*, Hyderabad: Himalaya.
8. Jacobs, Francis G and R.C.A. White, (1996), *The European Convention of Human Rights,*
9. Oxford: Clarendon University Press.
10. Kannabiran, K.G. (2003), *The wages of Impunity: Power, Justice and Human Rights*, New Delhi: Orient Longman.
11. Kothari, Smitu and Harsh Sethi, (ed.), (1991), *Rethinking Human Rights: Challenge for theory and Action,* New Delhi: Lokayan
12. Krasno, Jean A, (2005), *The United Nations,* New Delhi; VivaLangleyLauterpacht, Hersch, (1945), *An International Bill of the Rights of Man*. NewYork:Columbia University Press.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	2	2		1	1	3
CO 2	3	1		2		2	2	2		1	1	3
CO 3	3	1		2		2	2	2		1	1	3
CO 4												

HR-305(b): Human Rights and Duties in India

Course Objectives:

The course deals with the constitutional provisions and institutional arrangements for Human Rights and Human Rights violations in India. It aims to provide a theoretical and practical understanding of the structure and implications of Human development, Public Policy and New Economic Policy. The last segment of this course deals with the rights of the marginalised groups and issues of health, education and gender justice. The agenda of the Sustainable Development Goals in the context of India is also taken up in order to understand the latest developments in Public Policy.

Unit-I Constitution, Human Rights and Duties

- Fundamental Rights, Directive Principles of State Policies, Fundamental Duties: Relationship Between Them, International Human Rights andthe IndianConstitution.

Unit-II Human Rights and Judiciary

- Judiciary: Article 32(Supreme Court and High Court) Article 226 (High Court), Judicial Activism and PIL, Legal Aid, Judicial Interpretations: Landmark Judgments (Delhi Domestic Working Women's Forum V Union of India (1995), People's Union for Civil Liberties (PUCL) V Union of India (1997), Sheela Barse V State of Maharastra(1983).

Unit-III Implementations and Enforcements Mechanisms

- Human Rights Commission. National and States Human Rights Commissions, Extra-ordinary Situation and Human Rights in India, Emergency Powers of President, Governor and Human Rights, (Art. 352, 356, 371,-A, 317-B, 371-C and 371-F) Proclamation of the Extra-ordinary Laws **(**MISA, NASA TADA and Armed Forces Special Power Act1958).

Unit-IV Violation of Human Rights and Civil Society in India

- Human Rights Violations in Private and Public Domain; Within the Family, by Dominant Castes and Religious Groups, Riots and Violence in Connection with Inter-Community Tensions, Unequal Access to NaturalResources.

Suggested Readings:

1. Desai, A.R. (ed.), (1986), *Violations of Democratic Rights in India*, Bombay: Popular Prakashan.
2. Sathe S.P., (2004), *Judicial Activism in India*, New Delhi:OUP.
3. Austin, Granville, (2000), *Working of Democratic Constitutions: The Indian Experience*, New Delhi: Oxford UniversityPress.
4. Austin, Granville, (2002), *The Indian Constitutions: Cornerstone of a Nation*, New Delhi: OUP.
5. Dikshit, R.C., (1998*), Human Rights and the Law, Universal and Indian*, New Delhi: Deep andDeep.
6. Kashyap, Subhash C., (1978), *Human Rights and Parliament,* Delhi: Metropolitan.Kirpal, B.N. et al., (2004), Supreme but Not Infallible, New Delhi: OUP
7. Mehta, P. L. and NeenaVerma, (1995), *Human Rights Under the Indian Constitutions*, New Delhi: Deep and DeepPublications.
8. Sathe S.P., (2004), *Judicial Activism in India*, New Delhi:OUP
9. Rao, K. Subha, (1962), *Fundamental Rights under Constitution of India*, Madras: Madras University.
10. Sehgal, B.P. Singh (ed.), (1999), *Human Rights in India: Problems and Perspectives*, New Delhi: Deep andDeep.

Course Outcomes:

1. To understand the students about the concepts of Constitutional Human Rights and Responsibilities.
2. To apprise the students that Extra-ordinary situations and human rights in India.
3. To understand the violations of rights in present Civil Society in India.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	2	2		2		3
CO 2	3	1		2		2	2	2		2		3
CO 3	3	1		2		2	2	2		2		3
CO 4												

SEMESTER - IV

HR-401: HUMAN RIGHTS IN ANDHRA PRADESH

UNIT I: ***Society in Andhra Pradesh***

- Social Stratification and problems of Caste andUn-touchability.
- Status and Deprivation of Rights of Dalits, STs, OBCs andMinorities.

UNIT II: ***State, Government and Human Rights***

- State and Human Rights situation in AndhraPradesh
- Police and custodialviolence
- Role of Judiciary in Protection of Human Rights and JudicialActivism

UNIT III: ***Vulnerable Groups and Human Rights***

Problems and deprivation of Human Rights of agricultural, industrial, unorganized, migrant and child labour

UNIT IV: ***Women and Human Rights***

- Patriarchy and gender inequality in AndhraSociety
- Problems ofWomen
- Domestic Violence – nature, forms andreasons
- Women's Association, activism andMoments
- State Women's Commission – its functions andactivities

UNIT V: ***Human Rights Movement in Andhra Pradesh***

- Role of Government, Human Rights Organisations, Association, NGOs and educational institutions in creating awareness and protection of HumanRights
- Role or civil libertiesorganisations
- Nature, forms and types of campaign

Suggested Readings:

1. Balagopal,K.,*ProbingsinthePoliticalEconomy,AgrarianClassesandconflicts,* Hyderabad, Perspectives, 1988.
2. *The Chundur Carnage,* Vijayawada, APCLC,1991.
3. *V;iolence Against Women in the Family, Visakhapatnam,* APCLC, 1991.
4. Rajni Kothari*, Caste in Indian Politics,* Myron Weiner, Party Politics inIndia.
5. Boyly, Susan, *Caste, Society and Politics in India,* Cambridge University Press,2000.
6. Srinivasa, M.N. and others, *Dimensions of Social Change inIndia.*
7. Srinivas, *Caste "Its Twentieth Century Avatar.*
8. Haragopal, G., *Political Economy of Human Rights,* Himalaya Publishers, Bombay,1998.
9. *CuddapahJillaPalegallu (Faction Leaders of CuddapahDistrict.*
10. *Swechcha (Bulletin of APCLC)* See the issues from 1985-1998, Hyderabad,APCLC.
11. *KhaatlaPaddaParstramalu*(The Sick Mills of AndhraPradesh)
12. *KarnuluZillaPalegallu (Faction Leaders of KurnoolDistrict).*
13. Balagopal. L., *Probing in the Political Economy of Andhra Pradesh.,* Hyderabad, CESS, 1990.
14. Seetharam, K., "Civil Liberties Movement in India", Unpublished Doctoral Dissertation, Centre for Social Studies, Baroda,1995.

Course Outcomes:

1. To expose the students about various Human Rights Movements at National and State Andhra Pradesh) Level.
2. To understand the concept of social stratification and problems of Caste and Un-touchability.
3. To expose the students that the gender inequality and various gender violation in Andhra Pradesh.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	1	2	1	2	1	3
CO 2	3	1		2		2	1	2	1	2	1	3
CO 3	3	1		2		2	1	2	1	2	1	3
CO 4												

HR-402: DEVELOPMENT, TRADE AND HUMAN RIGHTS

Objectives :

This paper is in five units. It seeks to highlight the impact of trade and development on human rights. The six units that it comprises deal with the role of human rights in development, general aspects of international trade and development, the role of TNCs, trade-related sanctions for human rights violations, trade, human rights and the question of sovereignty, and international trade and human rights perspective in India.

UNIT I: ***Role of Human Rights in Development***

- Various Theories ofdevelopment
- Vision of theNIEO
- Development and trade off on HumanRights

UNIT II: ***International Trade and Development***

- From ITO to WTO
- Unequal terms of trade imposed by the Uruguay Round of GATTnegotiations
- Role of unfair terms of trade in human rightsviolations
- Trance Nationals Companies (TNCs) and their functioning
- Destruction of environment byTNCs
- Monopolies and right todevelopment
- Technology and workersrights
- From consumer rights to humanrights

UNIT III: ***Trade, Human rights and the Question of Sovereignty***

- National control over internationaltrade
- Codes of conduct andTNCs
- Sovereign states and peoples rights : issue of economicsovereignty
- Human Rights standards and international trade

UNIT IV: ***Trade – Related Sanctions for Human Rights Violations***

- Debate on the socialclause

- Sanctions imposed by unilateral / bilateral trade terms, blockade of Cuba, US sanctions on ThirdWorld
- Trade related sanctions under the multi-lateralsystem

UNIT V: ***Human Rights of Vulnerable Groups***

- WTO & India and impact on India'seconomy
- Regulation ofTNCs
- Impact of GATT-WTO

Suggested Readings:

1. ILO, *Freedom of Association and Effective Bargaining,* Geneva : ILO,1983.
2. UN, *Declaration of the Right to Development,* New York : UN Department of Public Information,1988.
3. Bhagwati, P.N., "Indian Family and Ethical Dilemmas of Human Rights to Development", *Denver Journal of International Law and Policy,* Vol. 19, No.1, Fall 1990, pp.67-76.
4. Jain, Devaki, "Working with Human Rights to Development", *Mainstream,* Vol. 29, No.7,8 December, 1990, pp.29-33.
5. Mallik, Ross, *Development, Ethnicity and Human Rights in South Asia,* New Delhi : Saga,1998.
6. Menon, N.R. Mdhava, "State of Economic and Social Rights", in K.P. Saksena, ed., *Human Rights: Fifty Years of India's Independence,*New Delhi : Gyan Publishing House,1999,pp.145-155.
7. Panjabi, Rane K.L., "Development within Human Rights", *Georgia Journal of International and Comparative Law,* Vol. 21, No.2, 1991, pp. 245-56.
8. Rehman, M.M. and others, *Human Rights and Human Development : Concepts and Contexts,* New Delhi : Mank Publications,2000.
9. Roy, Chowdhury, Subrata, ed., *The Rigth to Development in International Law,* Martinus, Nojhoff Publishers,1992.
10. Saksena,K.P.,"HumanRightsandtheRighttoDevelopment",*InternationalStudies,* Vol. 28, No.1, 1991, pp. 41-54.
11. Sen Shankar, *Human Rights in a Developing Society,* New Delhi : A.P.H. Publishing, 1998.
12. Shepherd, George W. and Ved Nanda, eds., *Human Rights and Third World Developments,* Westport : Greenwood Press, 1985.
13. Soedjatmoko, *Development and Freedom,* Tokyo: The Simul Press,1981.
14. Varma, S.K., "Development of Human Rights and Globalization of Economy", *Journal of Indian Law Institute,* Vol. 40, Nos. 1-4, 1998, pp.217-29.
15. Weeranmantry, C.G., "The Rights to Development", *Indian Journal of InternationalLaw,* Vol.25,1985, pp. 482-505.

Course Outcomes:

1. To understand the student about the concept of human rights of various vulnerable groups ath National and International level.
2. To apprise the student about the Trade related human rights violations and Trade development.
3. To understand the student about the role of human rights in development.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	3	1	3	2	3	1	3	1	3
CO 2	3	1	1	3	1	3	2	3	1	3	1	3
CO 3	3	1	1	3	1	3	2	3	1	3	1	3
CO 4												

HR-403(a): INTERNATIONAL HUMANITARIAN AND REFUGEE LAWS

Objectives:

This paper is in five units. The first unit aims at international humanitarian law, and the second unit aims at dealing with the implementation and enforcement of IHC. The remaining three units are with regard to refugee status and the law dealing with their protection under international laws.

UNIT I: ***International Humanitarian Law (IHL)***

- Origin and development ofIHL
- Doctrine of military necessity versus the principles ofhumanity
- Role of IHL in non-international armedconflicts
- National perspectives onIHL
- Role of International Red Cross andNGOs

UNIT II: Implementation and Enforcement of IHL :

- Concept of protectingpower
- UnitedNations
- International criminal Courts andTribunals
- Unilateralism : 'humanitarian' intervention versus statesovereignty
- Humanitarianassistance

UNIT III: ***International Refugee Law***

- The History of International Refugee Law : Cold War Origins to Rights of People who are not Citizens.
- Relationship between IHL, Refugee Law and HumanRights
- Determination of RefugeeStatus
  - Under the Refugee Convention 1951 and Protocol1967
  - Problem of Refugees in non-armed conflict situations (economic, environmental, naturaldisasters)

UNIT IV: Protection under International law

- Right of non-refoulement
- Right to Asylum
- UNHCR and Refugeeprotection

- Special problems of protection of Refugee women andchildren

- International law and Internally Displaced Persons : UN Guiding Principles on Internal Displacement 1998
- Protection inIndia
  - Indian critique of UNHCR and theConvention
  - Protection without legislation : CaseLaw
  - Status of refugees in India underUNHCR

UNIT V: Solution to Refugee problem

- Resettlement in thirdcountry
- Repatriation : Voluntary orForced
- Local Assimilation
- ProtectiveZones

- Rights and Duties of the InternationalCommunity
  - Concept of burdensharing
  - Finding durable solutions : roots of refugeeproblem

Suggested Readings:

1. Abi-Saab, Rozemary, " The Principles of Humanitarian Law according to the International Court of Justice", *International Review of the Red Cross, No. 259, 1987, pp.367-78.*
2. Bankowski,I.,ed.*,InternationalEthicalGuidelinesforBiomedicalResearchInvolvingHuman Subjects*

   (Geneva : WHO, 1993).
3. Bond, B.E., Harrel, *Imposing Aid : Emergency Assistance ot refugees* (Oxford University Predd,1985.
4. Carlier,Jean, *Who is a Refugee ? A Comparative Case Law Study* (The Hague : Kluwer Law International,1971).
5. Chimni, B.S. *International Refugee Law: A Reader* (New Delhi : Sage Publications,2000).
6. *Geza, Herczegh,* Development of International Humanitarian Law (Budapest :AkademiaiKiado,1984).
7. Gill, Goodwin, *The Refugee in International Law* (Oxford : Oxford University Press,1996).
8. Grahl-Madsen, Atle, *The Status of Refugees in International Law* (Leiden : A.W. Sijthoff,1972).
9. Hathaway, James C., *The Law of Refugee Status* (Toronto :Butterworkths,1991).
10. Muntarbhorn, Vitit, *The Status of Refugees in Asia* (Oxford : Clarendon Press,1993).
11. Patil, V.T. and P.R. Trivedi, *Refugees and the Human Rights* (Delhi : Authors press,2000).
12. Sinha, Majoj K., "Is Humanitarian Intervention Permissible under International Law?", *Indian Journal of International Law,* Vol. 40, 2000, pp.51-61.
13. Verhaegen, Jacques, "Legal Obstacles of Prosecution of Breaches of Humanitarian Law", *International Review of the Red Cross, No. 261, 1987, pp.607-20.*
14. Zolberg, Aristide R. and others*, Escape form Violence : Conflicts and the Refugee Crisis in the Developing World* (New Delhi : Ox ford University Press,1989
15. Bhagwati, P.N., "International Aspect of Right to Life, Peace and

Development", *Denver Journal of International Law and Policy,* Vol.19, No.1, Fall 1990, pp.67-76.

16. Chakrabarty, Manik, *Human Rights and Refugees Problems, Law and Practices* (New Delhi: Deep and Deep Publications,1998).
17. Giri, T.N., "Rights of Refugees with Reference to Right to Education", in A.P. Vijapur and Kumar Suresh, eds., *perspectives on Human Rights* (New Delhi : Manak publications, 1999), PP.332-344.
18. Mani, "Humanitarian Intervention and International Law", *Indian Journal of International Law,* Vol. 39, 1999, pp.32-46.
19. Patil, V.T. and P.R. Trivedi, *Refugees and the Human Rights* (Delhi : Authors press,2000).
20. Saxena, J.N., "Environment Degradation and Refugees", *Indian Journal of International Law,* Vol. 36, 1996, pp.72-79.
21. Sinha, Manoj. K., 'Is Humanitarian Intervention Permissible under International Law?", *Indian Journal of International Law,* Vol. 40, 2000, pp.51-61.
22. UN Centre for Human Rights, *International Humanitarian Law and Human Rights* (Geneva: World Campaign for Human Rights,1992).
23. UN Centre for Human Rights, *Special Issue on Human Rights and Humanitarian Law and Human Rights and Refugee Law* (New York,1992).
24. UNESCO, *International Dimensions of Humanitarian Law* (Paris : UNESCO,1988).
25. UNHCR, *The State of World's Refugees: A Humanitarian Agenda*(1997-98).

Course Outcomes:

1. To expose the students about the concepts of International Humanitarian Law and Implementation enforcements of IHL.
2. To apprise the student about the concept of International Refugee Law and protection under International Law.
3. To understand the students about solution to Refugee Problem.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2	1	2		2	1	2		3
CO 2	3	3		2	1	2		2		2		3
CO 3	3	3		2	1	2		1	1	2		3
CO 4												

HR-403(b): ENVIRONMENT AND HUMAN RIGHTS AND DUTIES

Objectives:

This paper focuses on the interrelationship between environment and human rights and duties. In five units it encompasses conceptual aspects, the right to clean environment, an international perspective, national, regime, issues of environmental protection and role of variousagencies.

UNIT I: ***Concept of Environment.***

i) Meaning, scope anddefinitions.

ii) Concern for Environment: Historicalperspective.

iii) Pollution and its effects on environment and life onearth.

UNIT II: ***Right to Clean Environment.***

i) Content andScope.

ii) Right to Environment, Right to Life and Right to Development.

iii) SustainableDevelopment.

UNIT III: ***Environment and International Regime.***

i) StockholmDeclaration.

ii) Rio-Declaration

iii) UDHRand

iv) International Conventions andDeclarations.

UNIT IV: ***National Regime and EnvironmentalProtection.***

i) ConstitutionalSafeguards.

ii) LegislativeProvisions.

iii) Judicial Approach toEnvironment.

iv) Committees, Commissions and Pollution Control Boards both national and stategovernments.

UNIT V: ***Environmental Protection and Role of various agencies.***

i) NGOs

ii) Human RightsActivists.

iii) EducationalInstitutions.

iv) Mass Media.

v) Community Participation for Environmental Protection andDevelopment.

Suggested Readings:

1. Balasubramanium,V.,"EnvironmetnandHumanRights:ANewFormofImperialism", *Economic and Political Weekly,* Vol. 33, No. 8, 22-27, Feb. 1998, pp. 389-90.
2. Batra, J.C., "Natural Resource Conflicts and the Rigth to Safe Environment", in K.P. Saksena, ed., *Human Rights : Perspectives and Challenges* (New Delhi : Lancers Books, 1994), pp.222-228.
3. Birnie, Paticia and Allan Boyle, *International Law and the Environment* (Oxford : Clarendon,1992.
4. Blowers, Andrew, ed., *Environmental Policy in International Context(1996).*
5. Cadwell,LyntonKeith,*InternationalEnvironmentalPolicy:inInternationalContext* (1996).
6. Chandrasekharan, N.S., "Environmental Protection : Two Steps Forward, One Step Back", *Journal of Indian Law Institute,* Vol. 30, No. 2, April – June 1998, pp.184-95.
7. Feinberg, J., *The Rights of Animals and Unborn Generations in Philosophy and Environmental Crisis(1974).*
8. Finnies, J., *Natural Law and Natural Rights* (Oxford : Clarendon Press,1980).
9. Gromley, W. Paul, *Human Rights and Environments : The Need for International Co-operation*(1976).
10. Mahawal,S.,"RighttoSafeEnvironment",*TheNeedforInternationalCo-Operation* (1976).
11. Nagore, Arjun Prasad, *Biological Diversity and International EnvironmentalLaw* (1996).
12. Pathak,R.S.,"HumanRightsandDevelopmentoftheEnvironmentalLawinIndia", *Commonwealth Law Bulletin,* Vol. 11, 1988, pp. 1171-80.
13. Shelton, Dinah, "Human Rights, Environmental Rights and the Right toEnvironment", *Stanford Journal of International law,* Vol. 28, No. 1, 1991, pp. 103-81.
14. Trindade, A.C., "Human Rights and the Environment", in JanuszSymonides, ed., *Human Rights : New Dimensions and Challenges* (Sydney : UNESCO, 1998), pp.117-44.

15. Trivedy, PriyaRanjan, *International Environmental Laws*(1997

Course Objectives:

1. To expose the student about the concept of Environment and rights to clean environment.
2. To apprise the students about the International regimes for protection.
3. To understand the students about the role of various agencies for protecting environment with respect to human rights.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2	1	2	2	2		2		3
CO 2	3	1		2	1	2	2	2		2		3
CO 3	3	1		2	1	2	2	2		2		3
CO 4												

HR-403(c): International Human Rights System

Unit-I Concern for Human Rights

- Concern for the protection of the Individuals in Anti- Slave Trade Treaties, Rise of Nazism, Fascism, Holocaust and Human Rights Issues in International Relations

Unit-II International Organisations and Human Rights

- League of Nations (mandate system, social and economic welfare), ILO and Labour Rights, United Nations (UN Charter, UDHR**,** International Covenant on Economic, Social and Cultural Rights, International Covenant on Civiland Political Rights (1966), UNESCO Declaration of the Responsibilities of the Present Generations Towards Future Generation1997.

Unit-III UN Organs and Human Rights

- UN Commission of Human Rights (UNCHR), UN Children Fund(UNICEF), UN High Commission for Refugee (UNHCR), UN Education, Scientific and Cultural Organization(UNESCO).

Unit-IV Human Rights and International Politics

- Human Rights and Cold War: Tehran Conference (1968), Helsinki Declaration (1975), Vienna Conference (1993), Human Rights: Under the New WorldOrder

Suggested Readings:

1. Bloed, A. and others, (1993), *Monitoring Human Rights in Europe*, Dordrecht, MartinusNijhoff

2. Buergenthal Thomas, The Advisory Practice of the Inter- American Human RightsCourt, *American Journal of International Law, vol. no.1.*

3. The Inter-American Court of Human Rights, *American Journal of International Law, vol.76*

4. The Domestic Status of the European Convention on Human Rights: A SecondLook, *International Commission of Jurist, vol. 7, no 1*

5. Buergenthal Thomas, The Advisory Practice of the Inter- American Human RightsCourt, *American Journal of International Law, vol. no.1.*

6. The Inter-American Court of Human Rights, *American Journal of International Law, vol.76*

7. The Domestic Status of the European Convention on Human Rights: A SecondLook, *International Commission of Jurist, vol. 7, no*

8. Davidson, Scot, Remedies for Violations of the American convention on HumanRights *International and Comparative Law Quarterly, vol. 44, no.2.*

9. Drzemkzewski, A., The Sui Generis Nature of the European Convention on HumanRights, *International and Comparative Law Quarterly, vol. 29, no.1*

Course Outcomes:

1. To expose the student about the concept of the International Human Rights systems.
2. To understand the student about the International Organisations for protecting the Human Rights.
3. To understand the students about the UN Organs and Human Rights.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2		2	1	2	1	2	1	3
CO 2	3	2	1	2		2	1	2	1	2	1	3
CO 3	3	2	1	2		2	1	2	1	2	1	3
CO 4												

HR-403(d): MINORITIES AND HUMAN RIGHTS AND DUTIES

UNIT I: ***Concept and Evolutionary Perspective***

- Minority Religion-Humanistic, Moral Notions ofRights.
- Minorities as a socio-economic – religious, linguistic, regional /category.

UNIT II: ***Institutional Mechanisms for Protection of Minorities***

- Constitutional mechanisms : Legislature. Executive andJudiciary.
- Non-GovernmentalOrganizations.
- The informationmedia.
- Role of minority educationalinstitutions.
- Reservation as anissue.

UNIT III: ***International Protection of Minorities***

- Declaration on the Rights of Persons Belonging to National or Ethnic, Religious and Linguistic Minorities 1992. Human Rights Covenants 1966. Racial Discrimination Convention1965.
- UN Commission on Human Rights. Sub-commission on Minorities. Committees under the Human Rights Covenants and Racial DiscriminationConvention

UNIT IV: ***Rights and Duties of Minorities under the Indian Legal System***

- ConstitutionalFramework
  - Fundamental Rights, Directive Principles and FundamentalDuties.
  - Special provisions in Articles 26 to 30, 331,333,336 & 337 of theconstitution.
- Special Laws andPolicies
  - National Commission for Minorities Act1992.
  - Caste (Disabilities Removal) Act1950.

- Policy of secularism and politics ofminorities.

UNIT V: ***Minorities and Human Rights Challenges***

- Analysis of communal riots.
- Role of Government, Para militaryforces.
- Role ofNHRC.
- Communal harmony and nationalintegration.

Course Outcomes:

1. To student understand that the concept of evolutionary perspectives and Institutional mechanisms for protection of Minorities.
2. To expose the student that rights and duties of Minorities under in the Indian System.
3. To apprise the student that the Minorities and human rights challenges.

Suggested Readings:

2. Abdel, Ali and Wahid Wafi, "The Problem of Human Rights in the Islamic Teaching in the Islamic Tradition", *Human Rights Teaching,* Vol.4, 1985, pp.38-43.
3. Kabir, Humayun, "Human Rights : The Islamic Tradition and the Problems of the World Today", *Human Rights Teaching,* Vol. 4, 1985, pp.18-19.
4. Mahmood, Tahir, ed., *Human Rights in Islamic Law,* New Delhi : Genuine Publications, 1993.
5. Rai, L.D., *Human Rights in Hindu-Buddhist Tradition,* New Delhi : D.D. Publishers, 1996.
6. Thamilmaran,V.T.,"Ethnic,SocialandReligiousConflicts:RightsofMinorities",in K.P. Saksena, eds, *Human Rights : Perspectives and Challenges,* New Delhi : Manak Publishers, 1999.
7. Thapar, Romila, "The Problem of Human Rights in the Hindhu and BuddhistTraditions", *Human Rights Teaching, 1985,* pp. 34-37.
8. Ghosh, S.K., *Communal Riots in India,* New Delhi : Ashish Publishing House,1987.
9. UN Centre for Human Rights, *Minority Rights,* Geneva : World Campaign for Human Rights,1998.
10. Brolmann, C. and others, eds., *Peoples and Minorities in International Law,* Dordrecht :MartinusNijhoff,1993.
11. Phillips, A. and A. Rosas, eds., *The UN Minority Rights Declaration,* London,1993.
12. Reddy, Jagmohan, *Minorities and the Constitution,* Bombay : Bombay University Press, 1981.
13. Shetha, D.L. and Gurpreet Mahajan, ed., *Minority Identities and the Nation State,* New Delhi : Oxford University Press,1999.
14. Thornberry, Patrick, *International Law and the Rights of the Minorities,* Oxford : Clarendon Press,1991.
15. Rahman, A., "Religious Rights vs Women's Rights in India : A Test Case for International Human Rights Law", *Columbia Journal of International Law,* Vol. 28, 1990, pp.473-98.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2		2	1	2	1	2	1	3
CO 2	3	2	1	2		2	1	2	1	2	1	3
CO 3	3	2	1	2		2	1	2	1	2	1	3
CO 4												

HR-404: Dissertation and Viva-Voce

HR-405 (a): Development, Globalization and Human Rights

Course Objectives

1. To study the role of Human Rights in Development and various theories of development.
2. To evaluvate the Globalisation and its impact on agriculture, environment, labour, women, culture and health.
3. Analyses the new international Economic Order (NIEO),WTO GATT and International Trade and Human Rights Perspective in India.

Unit-I Connotations of Development

- Modernization and Dependency Approach, Human Rights Approach to Development, Development, Poverty and Exclusion, Integrating the Human Rights Approach in Development; Towards an EthicalDevelopment.

Unit-II Human Rights and Question of Sovereignty

- National Control Over International Trade, Codes of Conduct and TNCs, Sovereign States and Peoples Rights: Issue of Economic Sovereignty, Human Rights Standards and InternationalTrade

Unit-III Globalization and Human Rights

- Globalization: Meaning, Voices for and Against, Globalization and itsImpact on Agriculture, Labour, Women, Environment, Cultureetc.

Unit-IV International Trade and Human Rights

- International Trade and Development, WTO, Unequal Terms of Trade Imposed by the Uruguay Round of GATT Negotiations, Impact on

Social System Transnational Corporations (TNCS) and Human Rightsviolations.

Suggested Readings:

1. Baxi, Updenra, (1983), the New International Economic Order, Basic Needs and Rights; Notes towards Development of the Right to Development*, Indian Journal of International Law, vol. 23,-45.*

2. Baxi, Upendra, (1998), "*The Development of the Right to Development*", in JanuszEymonides, (eds), Human Rights: *New Dimensions and Challenges*, Sydney: UNESCO

3. Centre for Development and Human Rights, (2004), *The Right to Development-A Primer.* New Delhi:Sage

4. Cheria, Anita et al, (2004), *Human Rights Approach to Development; Resource Book*, Books for Change, Banglore

5. Jain, Devaki, (1990), Working with Human Rights to Development, *Mainstream, vol. 29, no. 7.*

6. Mallik, Ross, (1998), *Development, Ethnicity and Human Rights in South Asia*, Sage, NewDelhi

7. Menon, N.R. Madhava, (1999), *State of Economic and Social Rights*, in K.P. Saksena, (ed.) *Human Rights; Fifty Years of India's Independence*, Gyan PublishingHouse New Delhi

8. O' Byrne, Darren J, (2003), Human Rights; An Introduction; Pearson, NewDelhi,

9. Raj, SuhenduRanjan, (1999), "Development Perspectives and Human Rights",in

A.P. Vijapur and Kumar Suresh, (eds.) Perspectives on Human Rights, Manak Publications, New Delhi;

10. Rehman, M.M. et al. (2000), *Human Rights and Human Development; Concepts and Contexts,* Manak Publications NewDelhi.

Course Outcomes:

1. Understand to role of Human Rights in Development and various theories of development.
2. Analyses the new international Economic Order (NIEO),WTO GATT and International Trade and Human Rights Perspective in India.
3. Evaluvate the Globalisation and its impact on agriculture, environment,

labour, women, culture and health.

4. Know about the Transnational Corporations (TNCs) and Human Rights violations and Impact of GATT-WTO on sovereignty.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2		2	1	2	1	2	1	3
CO 2	3	2	1	2		2	1	2	1	2	1	3
CO 3	3	2	1	2		2	1	2	1	2	1	3
CO 4	3	1	1	1		1	1	2	1	1	2	3

HR-405(b): WOMEN AND HUMAN RIGHTS AND DUTIES

UNIT I: ***The Constitution of India and the Status of Women***

- Fundamental Rights and directive principles under theconstitution
- Special provisions for the protection of women : Article 15(3), Article 39(d) & (e), Article 243-D &243-T.
- Land –markjudgments.

UNIT II: ***Perspectives and Status of Women***

- Poverty, illiteracy lack of independence, oppressive social customs and gender bias.
- Violence against and abuse of women in public and privatedomains.

UNIT III: ***International Norms for Protection of Women***

- ILO conventions for protection of femalelabour
- UNESCO Convention against Discrimination in Education1960.
- Convention for the Suppression of the Traffic in Persons and of the Exploitation of the Prostitution of Others1949.
- UN Convention on Political Rights of Women1952.
- Convention on Nationality of Married Women1957.
- Convention on Consent to Marriage, Minimum Age for Marriage and Registration of Marriages1962.
- Documents of the Four World Conferences on Women: Mexico1975.
- Copenhagen1980.
- Nairobi1985.
- Declaration on the Elimination of Violence against Women 1993.
- Beijing1995.

UNIT IV: ***Special Laws and Policies for Protection of Women***

- Special Laws : Suppression of Immoral Traffic Act1956.
- Maternity Benefit Act 1961, Dowry Prohibition Act1961.
- Medical Termination of Pregnancy Act1971.
- Equal Remuneration Act1976.

- Commission of Sati (Prevention) Act1982.
- Indecent Representation of Women (Prohibition) Act1986.

UNIT V: ***Institutional Mechanisms for Protection of Rights of Women***

- Constitutional mechanisms : Legislature, Executive and Judiciary (special contribution ofjudiciary)
- Statutory mechanism : National Commission for Women, National Human Rights Commission, StateCommissions
- The Non-GovernmentalOrganizations.
- The Information Technology and Mass –Media.
- Role of Human RightsEducation.

Suggested Readings:

2. UN Centre for Human Rights, *Discrimination against Women,* Geneva : World Campaign for Human Rights,1994.
3. UN, *Action for Gender Equality and the Advancement of Women,* New York : UN Department of Public Information, 2000.
4. UNESCO, *Human Rights of Women,* Paris : UNESCO,1999.
5. Alnasir, M.A., "Human Rights and Female Feticide", in B.P. Singh Sehgal, ed., *Human Rights in India : Problems and Perspectives,* New Delhi : Deep and Deep, 1985, pp. 156-65.
6. Bag, R.K., "Domestic Violence and Crime Against Women : Criminal Justice Response in India", Journal of Indian Law Institute, Vol. 39, Nos. 2-4, 1997, pp.359-75.
7. Vijayakumar.V.,*TraditionalFutures-LawandCustominIndia'sLakshadweepIslands,* Oxford University Press, New Delhi, 2006.
8. Bag, R.K., "Domestic Violence and Crime Against Women : Criminal Justice Response in India", Journal of Indian Law Institute, Vol. 39, Nos. 2-4, 1997, pp.359-75.
9. Bernardi.M.J.,*InternationalLegalInstrumentsontheHealthofChildrenandWomen,* Geneva, 1997.
10. Cook, R., ed., *Human Rights of W omen,* Philadelphia,1994.
11. Dasai, Neera, *A Decade of Women's Movement in Indai,* New Delhi : Himalaya Publishing House,1988.
12. Devasia, V.V. and L. Devasia, *Woman, Social Justice and Human Rights*, 1999.
13. Peters, Tulic and Andrea Wolper, eds, Women's Rights, *Human Rights,* New York : Routledge,1995.
14. Rahaman, A., "Religious Rights vs Women's Rights with Reference to the Scheduled Castes and the Scheduled Tribes", in A.P. Vijapur and Kumar Suresh, eds, Perspectives on Human Rights, *New Delhi : Manak Publications, 1999, pp.152-62.*
15. Sharma, SwarnLata, *Gender Discrimination and Human Rights,* New Delhi : K.K. Publications,2000.
16. Warti, Dipangshu Chakra, *Atrocities on Indian Women,* New Delhi : APH Publishing Corperation,1999.

Course Outcomes:

1. To expose the students about the concept or the status of women in various sectors with respective human rights.
2. To expose students about the National and International norms for protection at International and National level.
3. To apprise the students about the Institutional mechanisms for Protection of rights of women.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	2		2	1	3	1	2	1	3
CO 2	3	1	1	2		2	1	3	1	2	1	3
CO 3	3	1	1	2		2	1	3	1	2	1	3
CO 4												

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF LAW

Course

B.A. LAW
(5 YEARS BA LLB INTEGRATED COURSE)

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the department

- The Post Graduate Department of Law, Sri Venkateswara University, Tirupati was started in 1976 with Master of Law Course (LL.M – Latin Legum Magister) with specialization in Constitutional and Legal Order, along with Ph.D. Programme continued. Subsequently started BA.LL.B.5 Year integrated Course in the year of 2013.

Vision

- "To impart holistic knowledge of law and mould students to be competent legal professionals, committed to the cause of community development through sustained academic activities and thereby promoting empowerment through legal education for building ethical society."

Mission

- To provide healthy environment and opportunities to all student to contribute positively in the process of administration justice.
- To enrich standards and quality of teaching so as to achieve academic excellence.
- To enhance existing skills and to develop soft skills of students.
- To enable students coming from rural areas to cope with ever growing challenges of life.
- To inculcate professionally acceptable values in our students.

Choice Based Credit System (cbcs):

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed.

Students of this course would be expected to :

- Knowledge of legal matters, policy, theories and case studies
- Understanding of contemporary politics, sociology and ethics/morality
- Professional expertise in law, including command of technical Legal language
- Experience and skills in mooting
- Ability to draft legal documents
- Ability to understand complex issues from multiple perspectives
- Ability to construct and defend an argument persuasively
- Excellent professional communication skills, spoken and written, including presentation skills
- Self-management, including planning and meeting deadlines
- General IT skills
- General research skills
- General numerical skills
- Interpersonal and teamwork skills
- Analytical and reasoning skills
- Legal research skills
- Problem solving skills

Program Specific Outcomes:

- BA LLB or Bachelor of Legislative Law is an undergraduate degree, which focuses on integrating knowledge regarding law and other subjects to the candidates. Students are also introduced to law case studies, which will help them practice for their career in the law field.
- To train learners for better performance in various competitive examination Judicial and UPSC, APPSC etc.,
- To enable the learners to acquire and develop self- study habits and case studies.
- To facilitate Higher education & research in Law.

Programme Objectives:

The primary objective of the program is to impart quality education in the subject of Law as a basic Law of the land and its applied throughout the India.

- BA LLB or Bachelor of Legislative Law is an undergraduate degree, which focuses on integrating knowledge regarding law and other subjects to the candidates. Students are also introduced to law case studies, which will help them practice for their career in the law field.
- To train learners for better performance in various competitive examination Judicial and UPSC, APPSC etc.,
- To enable the learners to acquire and develop self- study habits and case studies.
- To facilitate Higher education & research in Law.
- To provide quality education offering skill based programs and motivate the students for self employment as practicing as an advocate in Courts throughout India.
- To conduct Moot Courts and Internships, different progaramms as Legal aid and Legal literacy of local interests and to educate the rural people about their rights.
- To provides opportunities for professional and personal development through curricular and co- curricular activities.

- Provide and organize extension activities.
- To shape the learners to become worthy citizens of the Nation in the field of Law and interrelated fields.

Programme Outcomes :

- The student should acquire the knowledge with various case laws related to various aspects of law.
- When you graduate with a BA LLB Integrated Course you will have learned how to work at Courts, Law Firms, ADR's and NGO's.
- The student understanding the basic legal concepts, Constitutional principles and Legal theories related to various Legal Phenomena and their relevancies in the day-to-day life and the apply Law Principles in Supreme Court, High Courts District Courts and Lower Courts, Quasi-Judicial Bodies Alternative Dispute Resolution Tribunals, CAT, Labour Courts, etc., dealing with Civil and Criminal Cases.
- The student could apply the skills to deal with Civil, Criminal and Constitutional Matters.
- The students analyzed and realized how developments in Law that will helps in the developments of the social sciences such as Political Science, Economics, Sociology. This approach will helps in providing better solution and new ideas for Legal Developments.
- Attains knowledge in Constitution, Intellectual Property Rights, Civil and Criminal Laws, International Law, Commercial Laws, Practical Training and Moot Court.
- Perform, Assess and implement practical techniques and procedure in their practical training in Moot Courts and analyses the facts of the case.

Program Educational Objectives:

- Exposure of students to provide them traditional and modern techniques to acquire knowledge and skill in the field of Law.
- To update the syllabus essential for appearing to judicial exams and other competitive exams of APP, UPSC and APPSC.
- To make aware the students to know the Law of the Land, to implement the same in their profession.
- To develop trained and knowledgeable to practice as an advocates in courts and companies;
- To develop self employable ability and to apply knowledge in their profession.

The BA LLB 5 Years Integrated Course in Department of Law being offered by this University provides its students with a course of study that integrates a range of learning and techniques relevant to their educational development and career ambitions. The 5 Years BA LLB Course is an amalgamation of Humanities and Law streams, which allows candidates to study subjects such as Political Science, Economics, Sociology, Administrative Law, Criminology, Family Law and Major Laws so on. Students planning to pursue BA LLB should possess a skill set in order to perform well in the course and later have a prosperous career. Some skills that candidates should have for the course include: Confidence, Research skills, Convincing skills, Verbal and written communication skills, Good judgement skills, Integrity, Presentation skills, Objectivity, Ability to work for long hours and Time management skills. In the five-year BA LLB course, students are taught theoretical subjects as well as given practical exposure that is helpful in succeeding in the field. Practical exposure is given to students in the form of projects, internships, moot courts and much more.

The Department is having the following objectives:

1. To train students for national, transnational and international practice and for globalization.

2. To engage the students in critical intellectual enquiry into discipline of law and use of ICT in law teaching.
3. To establish a robust mechanism for students' feedback, for quality assurance and for placement.
4. To train students and young advocates to stand up for the rule of law, to inculcate an aspiration for improvement of the law and for the operation of legal system and for the achievement of social justice.
5. To educate and train students for community leadership and for civic responsibility. To play "outreach" role in terms of providing services to the community, through clinical programmes, extensive networking and building partnerships.

I SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	1.1	General English - I	**5**	**1**	**-**	**6**	**20**	**80**	**100**
2		1.2	Political Science – I	**5**	**1**	**-**	**6**	**20**	**80**	**100**
3		1.3	Sociology - I	**5**	**1**	**-**	**6**	**20**	**80**	**100**
4		1.4	Contracts – I (General Principles Of Law Of Contract)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
	Total						**24**	**80**	**320**	**400**

II SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	2.1	General English - II	**5**	**1**	**-**	**6**	**20**	**80**	**100**
2		2.2	Political Science – II	**5**	**1**	**-**	**6**	**20**	**80**	**100**
3		2.3	Economics – I	**5**	**1**	**-**	**6**	**20**	**80**	**100**
4		2.4	Contracts-II (Special Contracts)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
	Total						**24**	**80**	**320**	**400**

THIRD SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	3.1	Political Science- III	**5**	**1**	**-**	**6**	**20**	**80**	**100**
2		3.2	Economics- II	**5**	**1**	**-**	**6**	**20**	**80**	**100**
3		3.3	Law of Torts And Consumer Protection Law	**5**	**1**	**-**	**6**	**20**	**80**	**100**
4		3.4	Constitutional Law – I	**5**	**1**	**-**	**6**	**20**	**80**	**100**
	Total						**24**	**80**	**320**	**400**

FOURTH SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	4.1	Political Science-IV	**5**	**1**	**-**	**6**	**20**	**80**	**100**
2		4.2	Sociology – II	**5**	**1**	**-**	**6**	**20**	**80**	**100**
3		4.3	Constitutional Law-II	**5**	**1**	**-**	**6**	**20**	**80**	**100**
4		4.4	Administrative Law	**5**	**1**	**-**	**6**	**20**	**80**	**100**
	Total						**24**	**80**	**320**	**400**

FIFTH SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	5.1	Political Science-V	**5**	**1**	**-**	**6**	**20**	**80**	**100**
2		5.2	Economics – III	**5**	**1**	**-**	**6**	**20**	**80**	**100**
3		5.3	History of Courts, Legislation and Legal profession in India	**5**	**1**	**-**	**6**	**20**	**80**	**100**
4		5.4	Law Of Crimes- I (IPC)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
5		5.5	Family Law – I	**5**	**1**	**-**	**6**	**20**	**80**	**100**
	Total						**30**	**100**	**400**	**500**

SIXTH SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	6.1	Political Science-VI	**5**	**1**	**-**	**6**	**20**	**80**	**100**
2		6.2	Sociology – III	**5**	**1**	**-**	**6**	**20**	**80**	**100**
3		6.3	Legal Language and Legal Writing	**5**	**1**	**-**	**6**	**20**	**80**	**100**
4		6.4	Jurisprudence	**5**	**1**	**-**	**6**	**20**	**80**	**100**
5		6.5	Environmental Law	**5**	**1**	**-**	**6**	**20**	**80**	**100**
	Total						**30**	**100**	**400**	**500**

VII SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	7.1	Property Law (Including Transfer of Property Act and Easement Act)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
2		7.2	Labour Law –I	**5**	**1**	**-**	**6**	**20**	**80**	**100**
3		7.3	Company Law	**5**	**1**	**-**	**6**	**20**	**80**	**100**
4		7.4	Public International Law	**5**	**1**	**-**	**6**	**20**	**80**	**100**
5		7.5	Interpretation of Statutes (Optional-I)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
	Total						**30**	**100**	**400**	**500**

VIII SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	8.1	Labour Law – II	**5**	**1**	**-**	**6**	**20**	**80**	**100**
2		8.2	Family Law – II	**5**	**1**	**-**	**6**	**20**	**80**	**100**
3		8.3	Taxation Law	**5**	**1**	**-**	**6**	**20**	**80**	**100**
4		8.4	Intellectual Property Rights Law (Optional-II)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
5		8.5	Land Law Including Tenure and Tenancy System (Optional-III)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
	Total						**30**	**100**	**400**	**500**

IX SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	9.1	Civil Procedure Code and Limitation Act	**5**	**1**	**-**	**6**	**20**	**80**	**100**
2		9.2	Law of Crimes – II (Criminal Procedure Code)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
3		9.3	Law of Evidence	**5**	**1**	**-**	**6**	**20**	**80**	**100**
4	**Generic Elective**	9.4	Banking Law (Optional-IV)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
5		9.5	Media Law with RTI Act (Optional-V)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
6		9.6	Probation, Parole and Prison Administration	**5**	**1**	**-**	**6**	**20**	**80**	**100**
7	**Open Elective**	9.7a	Local Self Government including Panchayat Administration	**5**	**1**	**-**	**6**	**20**	**80**	**100**
8		9.7b	White Collar Crime							
	Total						**30**	**100**	**400**	**500**

X SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	10.1	**Practical Training I :** Drafting Pleading and Conveyancing	**2**	**0**	**4**	**6**	**90**	**10**	**100**
2		10.2	**Practical Training II :** Professional Ethics and Accounting System	**4**	**2**	**0**	**6**	**20**	**80**	**100**
3		10.3	**Practical Training III :** Alternative Dispute Resolution	**3**	**0**	**3**	**6**	**50**	**50**	**100**
4		10.4	**Practical Training IV :** Moot Court Exercise and Internship	**2**	**0**	**4**	**6**	**90**	**10**	**100**
5		10.5	Penology and Victimology (Optional – VI)	**5**	**1**	**-**	**6**	**20**	**80**	**100**
	Total						**30**	**270**	**230**	**500**
			Grand Total				**276**			**4600**

GENERAL ENGLISH -I

Objectives:

1. It enables to understand the structure and functional of grammar units.
2. To equip a wide range of vocabulary so as to enable to use language more efficiently.
3. To provide a platform to develop confidence and to enhance communication skills

Unit 1 : Grammar and usage (Communication skill: Simple sentences (One clause): their phrase structure, Tense and concord, New modifiers (Determiners, prepositional phrases clauses), Basic Transformation: a) Passives b) Negatives c) Questions, Complex and Compound sentences (use of connectives), Conditionals, Reported Speech, Questions tags and short response, some common errors

Unit 2 : Vocabulary (communication skills):Legal terms (relevant to the subject paper of LL.B student),Use of legal terms and idiomatic expression

Unit 3 : Comprehensive skills: Reading comprehension (principles and practice),Listening comprehension Unit 4 : Composition skills: Paragraph writing, Formal Correspondence, Note taking.

Prescribed books-

1. Wren and Martin: English Grammar and Composition
2. Eroforn-Home,Mac Millan: Essay, Precise, Composition
3. Comprehension
4. Berry.T.E: The Most Common Mistakes in English
5. Ishitiaque Abidi: Law and Language

Reference books-

1. Close.R.A: A reference Grammar for students of English
2. Dallas: Read to Understand

3. Control Institute of Indian Language: Speed Reading

Outcome of the course:

1.To equip the pre-presentations steps, to understand the
structure of a good presentation and device various grammar technique.
2.enables to give good oral presentation and increases their speed and efficiency while reading.
3. enable to become global citizens.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	1	3	2	2	3	2	3	3	1	3
CO2	3	3	1	2	2	3	3	2	2	3	1	3
CO3	3	3	2	1	2	3	1	2	1	3	1	2

POLITICAL SCIENCE-I

Political science I

Objective:

1. To analyse the concept, ideas and theories of political thoughts
2. To explain the western and India political thought though the concept of state

To describe the separation of power theory and different political organization

POLITICAL SCIENCE-I

Unit 1 : Political theory:

Unit 2 : Nature of State:- Theories of origin of the State; State as a conceived by different schools of thought; forms of Government; Constitution of Government.

Unit 3 : Main Currents of Western Political Thought: Natural Law and Natural Rights; Liberalism; socialism, Marxism and idealism.

Unit 4 : Main Currents of Indian Political Thought: Classical Hindu concept of the State; Islamic concept of the State; Liberalism in India, Marxism in India, Gandhism and Sarvodaya in Indian political thought.

Unit 5 : Conception of Political and Legal Sovereignty.

Unit 6 : The totalitarian State

Unit 7 : Political organization:. Organization of Government: Unitary, Federal, Quasi-Federal and Confederal Constitutions-One-Party democracies; military rule, Presidential and parliamentary form with reference to India, U.K. France, Canada, USSR, U.S.A and UNO

Unit 8 : The legislature, Executive and Judiciary; the Doctrine of Separation of powers, parliamentary sovereignty and independence of the judiciary. 9

Unit 9 : Conceptions of representation, public opinion and participation. BOOKS PRESCRIBED Finer.H: theory and Practice of Modern Government. 1. Appadoria: Substance of Politics. 2. Dunning: History of Political Thought. 3. Varma.S.P: Modern Political Theory. 4. Lasky.H.J: The State in Theory and Practice. 5. Gettel.R.C: History of Political Thought. 6. Wheare.K.C: Federal Government.

1. Shriam Maheswari, Local – self government in India

2. M.Venkatarangaiya and G.Raam Reddy, Panchayati Raj in A.P.

3. Iqbal Narain, Panchayat Raj Administration

4. Introduction to constitution of India, Nrij Kishore Sharma

5. L.P.Sharma , History of Medieval India, 1000-1740 AD.

6. Report of High Power Committee on Panchayat Raj

7. Rural and Urban ship Committee Report

Outcome:

1. To gain the knowledge and skill development of various forms of governments

2. To able to understand various political sovereignty to get employability

3. To learn theory and practical knowledge government of organisations employability and skill development.

	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO 8 Ethic	PO 9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO 1	3	2	2	3	2	3	2	3	3	3	3	2
CO 2	3	3	2	2	2	3	3	2	2	3	2	2
CO 3	3	3	3	3	3	2	2	2	3	3	3	3

SOCIOLOGY-I

Objectives of the Course:

1. Sociology is the science that deals with the study of the manifestations, systems and social relations.
2. A careful analytical and descriptive study through the pursuit of different research methods.
3. To reach the rules and laws governing the conduct of these phenomena and social relations.

Unit 1: Sociology as a science:

a Data, concepts and theory.

b The Comparative method.

Unit 2: Basic concepts in sociology

a Structure and function.

b Status and role.

c Norms and values.

d Intuitions, community and association

Unit 3: Social institutions:

a Marriage, family and kinship.

b Economic institutions.

c Political intuitions.

d Religious institutions.

e Educational institutions.

Unit 4: Social Stratification, Caste and class

Unit 5: Social control, order and stability.

Unit 6: Coercion, conflict and change.

Unit 7: Sociology as a discipline.

Unit 8: Law and society, sociology of law, sociology of legal profession.

Books prescribed

1 : T.B.Bottomore: Sociology: Guide to problems and Literature.

2 : Peter Worsley et.al: Introducing Sociology.

3 : M.Haralambos: Sociology: Themes and Perspectives.

4 : Andre Beteille: Inequality and Social Change.

5 : N.K.Vose: The structure of Hindu Society.

6 : David G. Mandelmaum: society in India.

7 : Ramesh thapper (ed): Tribe, Caste and Religion in India.

8 : Andre Beteille: Inequality and Social change.

9 : Andre Beteille: The Backward classes and the New social order.

Outcome of the Course:

1.students are expected to gain the basic idea regarding the various fundamental concepts approaches and different thoughts propounded by the eminent sociologists in sociology

2.This help in enhancing the skill and competency to understand the basic foundation of sociology

3.The students becom able to apply these theoretical as well as practical Ideas to understand the society in which they live

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1			3	2	3	3	3	3	3	3	2	2
CO2		2	2	2			2	2		3	1	
CO3		2	2	1	2	2	2		2	1		1

CONTRACTS-I
(General Principles of Law of Contract)

Objectives:

1. Imparts knowledge relating to the features of contract through which the contracts entered into.
2. To ensure that the rights and obligations arising out of a contract are honored and that the legal remedies are made available to those who are affected.
3. Analysis of kinds of contract that can be specifically enforced and the methods of enforcement forms a significant segment of the study.
4. Apply the subject in framing the contracts agreement and thoroughly deal with the breach of contracts.

UNIT-1. History and nature of contractual obligations-writs of debt, covenant and account-actions on the case and on assumptionist consideration-moral basis for contractual obligations subjective and objective theories sanctity of contracts.

UNIT-2. Agreement and contract definitions, elements and different kinds.

UNIT-3. Proposal and acceptance: Their various forms-essential elements, communication and revocation-proposal and invitations for proposal-floating offers-tenders-dumping of goods.

UNIT-4. Consideration. Nudum pactum-its need, meaning, kinds, essential elements privity of contact and considerations-its exception adequacy of consideration 10 present, past and adequate consideration, unlawful consideration and its effects views of law commission of India on consideration-evaluation of the doctrine of consideration.

UNIT-5. Capacity to contract: Meaning-incapacity arising out of status and mental defect minor's agreements-definition of "minor"-accessories supplied to a minor-agreements

beneficial and detrimental to a minor affirmation ratification in cases by a person of an agreement made by him while he was a minor-agreements and estoppels-evaluation of the law relating to minors agreements-other illustrations of incapacity to contract.

UNIT-6. Free consent: Its need and definition-factors vitiating free consent 6.1. Coercion-definition-factors elements-duress and coercion-various illustrations of coercion- doctrine of economic duress-effect of coercion-evaluation of Sec.15. 6.2. Undue influence-definition-essential elements-between which influence independent advice- paradarhanashin women-unconscionable bargains effect of undue influence. 6.3. Misrepresentation-definition-misrepresentation of law and of fact-their effects and Illustrations 6.4. Fraud-definition-essential elements-suggestion-false suppression .when does silence amounts to fraud? Active concealment of truth-importance of intention. 6.5. Mistake-definition-kinds-fundamental error-mistake of law and of fact-their effects-when does a mistake vitiate free consent and when does it not vitiate from consent?.

UNIT-7. Legality of objects 7.1. Void agreements-lawful and unlawful consideration and objects Void, Voidable, Illegal and unlawful agreements and their effects. 7.2. Unlawful considerations and objects 7.2.1. Forbidden by law 7.2.2. Defeating the provision of any law 7.2.3. Fraudulent 7.2.4. Injurious to person or property 7.2.5. Immoral 7.2.6. Against public policy 7.3. Agreements without consideration 7.3.1. Agreements without consideration 7.3.2. Agreements in restraint of marriage 7.3.3. Agreements in restraint of trade-its exceptions-sale of good will, sec.11 restrictions, under the partnership act, trade combinations exclusive dealing agreements, restraints on employees under agreements of service. 7.3.4. Agreements in restraint of legal proceedings-its exception 7.3.5. Uncertain agreement 7.3.6. Wagering agreements-its exceptions.

UNIT-8. Discharge of a contract and its various moods: 8.1. By performance-conditions of valid tender of performance-how? By whom? Where? When- in what manner? Performance of reciprocal promises- time essence of contract. 8.2. By breach-anticipatory breach and present breach. 11 8.3. Impossibility of performance-specific grounds of frustration-application to leases- theories of frustration-effect of frustration-frustration and restitution. 8.4. By period of limitation. 8.5. By agreement recession and alteration-their effect-remission and waiver of performance extension of time-accord and satisfaction.

UNIT-9. Quasi contracts or certain relations resembling those created by contract.

UNIT-10.Remedies in contractual relations. 10.1. Damages-kinds-remoteness of damages ascertainment of damages. 10.2. Injunction-when granted and when refused-why? 10.3. Refund and restitution 10.4. Specific performance-why? When? 10.5. Specific performance of contracts under Specific Relief Act 1969 10.6. Recession of contracts 10.7. Cancellation of instruments 10.8. Declaratory decree

Prescribed books-

1 : Indian Contract Act,1872 and Specific Relief Act, 1963 and their commentaries.

2 : Guest-Anson. A.G. Law of Contract (24th Edn 1974)

3 : Avtar Singh. Dr -Law of Contract.

Refrence books-

1: Cheshire. G.C & Fifoor. H.S -The Law of Contract. (2 Edn. 1976).

2 : Chitty- Chitty on contracts- General Principles Vol-I (22 Edn. 1977).

3 : Kapur. J.L)Ed) Pollock and Mulla on the Indian Contract and Specific Relief Acts (9 Edn. 1972).

4 : Dalal J.H (Ed) Mulla on the Indian Contract Act (10 Edn. 1977).

Outcome of the course:

1. Awareness on specific enforcement of a contract, kinds of contract, legal rules relating to entering into a contract

2. Analysis of kinds of contract that can be specifically enforced and the methods of enforcement forms a significant segment of the study.

3. Acquire knowledge about the legislation, case laws both national and international.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	2	2	2	3	1	3	2	3	1	3

CO2	2	2	2	2	3	3	2	1	1	3	1	3
CO3	3	3	2	3	3	3	2	3	2	1	1	3

General English – II

Objectives:

1. To understand major and minor forms of foreign words and phrases ,Latin and English affixes.
2. To enable comprehensive skills like brief writing and drafting of reports.
3. To Acquaint knowledge on basic sentence structure based on its knowledge and usage

Unit 1: Vocabulary 1. Foreign words and phrases (important Latin and English affixes) 2. Certain set of expression and phrases 3. One word substitution 4. Words of ten confused

Unit 2: Comprehension skills 1. Concern logical fallacies 2. Comprehension of legal texts 3. Use of cohesive devices (Legal drafting) 4. Precise-writing, summarizing and briefing 5. Brief-writing and drafting of reports 6. Essay writing on topics of legal interests 7. Varieties of sentence structures and verb pattern

Unit 3: Speech writing 1. Reading aloud (knowledge of proper pauses) 2. Key sounds, their discrimination and account 3. Consulting a pronouncing Dictionary 4. Rapid reading and debating exercise.

Unit 4 : M.K. Gandhi-The Law and Lawyer : Lord Denning-due process of Law parts I to III : M.C. Setaved-My Life : M.C. Chagla: Roses in December

Prescribed books-

1 : Selected materials drawn from renowned judgments

2 : Materials drawn from legal notices, petition, appeals, court orders, statutes, bills, rules etc

3 : Lifco-legal drafting

Refrence books-

1 : David Green- contemporary English Grammar, Structure composition (MacMillan) Chapters XLI and XLII

2.B.M.Gandhi

3.Yash Pal Sharma

Outcome of the course:

1. Enable to appreciate the literary work such as L.S.R.W [Listening, speaking, reading and writing]
2. Brings awareness on soft skills set to work cohesively with the team as a team player and make to learn drafting skills used in practice as an Advocate.
3. Aims to use legal terms to fulfil the skill in writing legal language.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	1	3	3	2	2	2	2	3	1	3
CO2	3	3	1	2	3	3	2	2	2	3	1	3
CO3	3	3	2	1	3	2	2	2	2	3	1	2

POLITICAL SCIENCE-II

Objective of the Course:

1. To explain the concept of foundations of political obligations.
2. To point out various theories of political obligations related to state, government, power, authority, legitimacy and punishment.
3. To find out the problems of punishment to disobeyed citizens by state.

Foundation of Political obligation

Unit 1: Conceptions of power, authority and legitimation

Unit 2: Legitimacy of power-The classical (Hobbes, Locke) and Roussoue and modern (Max Weber, Karl Marx, Durkheim) approaches to the notion of political obligation

Unit 3: Utilitarianism (both rule and act utilitarianism) as approaches to political obligation

Unit 4: The problem of civil disobedience and political obligation with particular reference to Gandhian and Neo-Gandhian thought

Unit 5: The problem of obedience to unjust laws

Unit 6: Foundations of promissory and contractual liability

Unit 7: The problem of punishment: Use of force by State against the citizen, the basis of Criminal sanction

Unit 8: The contemporary crisis of legitimation

Books prescribed

1 : Rajani Kothari-Democratic policy and social change in India: Crisis and opportunities (Allied publishers, 1976)

2 : Karl Lowernestein-Political power and the Government process

3 : Nisbet R.A, The Sociological Tradition, 1967, Heinemonn, London, Part- II- Chapter-4 Authority for authority and power.

4 : Bierstedt Ropbert: Power and progress, 1974 McGraw-Hill, New York and Delhi

5 : Leiser; (ch 12-Civil disobedience) Liability justice and Hurton

6 : George Lichthein: A short history of socialism (1976)

1. Shriam Maheswari, Local – self government in India

2. M.Venkatarangaiya and G.Raam Reddy, Panchayati Raj in A.P.

3. Iqbal Narain, Panchayat Raj Administration

4. Introduction to constitution of India, Nrij Kishore Sharma

5. L.P.Sharma , History of Medieval India, 1000-1740 AD.

6. Report of High Power Committee on Panchayat Raj

7. Rural and Urban ship Committee Report

Outcome of the Course:

1.To explore the knowledge about the foundations of political obligations.

2.This paper highlights the Indian Government and Politics and enables the student to focus on the political processes and actual functioning of the political system.

3 To acquire law of problems of punishment by the state the disobeyed citizens.

Programme outcome

Course	PO1 knowledge	PO2 Analysis	Po3 Design	Po4 Development	Po5 Modern Tool	Po6 Society	Po7 Environment	Po 8 Ethic	Po9 Team Work	Po10 Communication	Po1 Programme Management 1	Po12 Life Long Learning
Co1	**3**	**3**	**2**	**2**	**2**	**2**	**1**	**3**	**2**	**3**	**3**	**3**
Co2	**3**	**3**	**2**	**3**	**1**	**2**	**1**	**3**	**2**	**3**	**1**	**3**
Co3	**3**	**3**	**3**	**2**	**2**	**3**	**1**	**3**	**2**	**3**	**2**	**3**

ECONOMICS-I

Objective of the Course:

1. The overarching goals of macroeconomics are to maximize the standard of living and achieve stable economic growth.
2. The goals are supported by objectives such as minimizing unemployment, increasing productivity, controlling inflation, and more.
3. The role of credit and banking system help towards the development of the society.

Unit 1: Economics as a Science and its relevance to Law.

Unit 2: Economics as a basis of Social Welfare and Social Justice.

Unit 3: Free Enterprise, Planned Economics and Mixed Economics.

Unit 4: General Principles of Economics;

i. Demand supply

ii. Markets, determination of prices; Business organizations; perfect competition, monopoly, monolistics competition, oligopoly control of monopolies and prevention of economic concentration.

iii. Labour and Wages.

iv. Capital and Money

v. Saving, Consumption, Investment, Theory of National Income or National Income determination

Unit 5: International comparisons of developmental strategies and experiences, theories of economic growth and problems of development, Technology and Economic Growth.

Unit 6: Banking and Fiscal Policy:

i. Resource Mobilization and fiscal resources, Taxation.

ii. The role of credit and banking system, rural money markets.

iii. International financial institutions.

books for reference

1. Leftwitch: Richard H. The price systems and resource allocation(New York) The Dryden Press, 1982).
2. Grandt Commission Report: North South-A programme for survival (London Pan Books,

1980).
3. Work Development Reports (1983): Public by World Bank Oxford University Press).
4. Lepsey and Steimner: Economics (New York: Herper and Row, 1981).

Expected Course Outcome:

1. To understand the basic principles and concepts of economics
2. To familiarize the students with the theories of economics such as demand, supply, price, Price determination, money, wages, banking, and taxes, etc.
3. To Analysis the economic approach to Law

Course	PO1 knowledge	PO2 Analysis	Po3 Design	Po4 Development	Po5 Modern Tool	Po6 Society	Po7 Environment	Po8 Ethic	Po9 Team Work	Po10 Communication	Po1 Programme Management 1	Po12 Life Long Learning
Co1	**2**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**2**	**2**	**3**
Co2	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**3**
Co3	**2**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**1**	**3**	**2**	**3**

CONTRACTS-II (Special Contracts)

Objectives:

1. Imparts different types of special contracts.
2. Knowledge on rights and duties of the persons who are entering into different type of contracts.
3. Knowledge about different national and international case laws and existing legislation.
4. Application of knowledge to enter into a contracts and remedies when there is a breach of contract.

Unit-1. Indemnity and guarantee: 1.1. Indemnity and guarantee (Sec. 134, 127) Indian Contract Act 1872 1.2. Contract of indemnity A.Definition B.Rights of indemnity holder C.Liability of indemnifier. 1.3. Contract of guarantee A.Definition B.Essential characteristics of contract of guarantee C.Distinction between contract of indemnity and contract of guarantee D.Kinds of guarantee E.Rights and liabilities of surety F. Discharge of surety G. Contract of Bailment and (Sec. 148-181 of Indian Contract Act 1872).

Unit-2. Bailment 2.1. Definition 2.2. Essential requisites of bailment 2.3. Kinds of bailment 2.4. Rights and duties of bailor and bailee 2.5. Termination of bailment 2.6. Pledge A.Definition B.Rights and duties of pawnor and pawnee C.Pledge by Non Owners.

Unit-3. Contract of Agency (Sec. 182-238 of the Indian Contract Act 1872) 3.1. Definition of agent 3.2. Creation of agency 3.3. Rights and Duties of agent 3.4. Delegation of authority 3.5. Personal liability of agent 3.6. Relations of principal with third parties 3.7. Termination of agency.

Unit-4. Contract of sale of goods (The Indian Sale of Goods Act 1930). 4.1. Formation of Contract 4.2. Subject matter of Contract of Sale 4.3. Conditions and Warrantees 4.4.

Express and Implied conditions and Warranties 4.5. Caveat Emptor 4.6. Property, Possession and Risk 4.7. Passing of Property 15 4.8. Sale of non-owners 4.9. Delivery of goods 4.10. Rights and duties of seller and buyer before and after sale. 4.11. Rights of unpaid seller.

Unit-5. Contracts of partnership (The Indian Partnership Act,1932). 5.1. Definition and nature of Partnership 5.2. Formation of Partnership 5.3. Test of Partnership 5.4. Partnership and other Associations 5.5. Registration of Firms 5.6. Effect of non-registration 5.7. Relation of Partners 5.8. Rights and Duties of Partners 5.9. Properties of the Firm 5.10. Relation of Partners to third parties 5.11. Implied authority of a partner 5.12. Kinds of Partners 5.13. Minor as Partners 5.14. Reconstitution of a Firm 5.15. Dissolution of firm.

Unit-6. Negotiable Instruments Act, 1881

Prescribed books-

1 : Indian Contract Act, 1872 (Sec. 124-238)

2 : The Sale of Goods Act, 1930.

3 : The Partnership Act, 1932.

4 : Negotiable Instrument Act, 1881.

5 : Cheshire and Fifoot-The Law of Contract.

6. : Chitty- on contracts (Specific Contracts) Vol-II

7 : Pollock and Mulla-Indian contracts and Specific Relief Act.

8: Pollock and Mulla- Sale of Goods and Partnership Acts.

9: Avtar Singh-Law of Contracts.

10 : Khargumwallah-The Negotiable Instruments Act

Outcome of the course:

1.The course taught about special contracts like indemnity, guarantee bailment pledge agency which we come across in contemporary society.

2.Provides an insight into the justification for special statutory provisions for certain kinds of contracts.

3. Application of knowledge to enter into a contracts and remedies when there is a breach of contract.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	2	2	1	3	1	3	2	2	1	3	1	3
CO2	3	2	3	2	1	3	1	2	2	2	1	3
CO3	2	3	3	1	3	3	1	3	2	2	1	3

POLITICAL SCIENCE –III (Indian Political Thought)

Objective

1. To examine the political organization of Indian political thinkers like Manu, Koutailya and Goutham Budda
2. To explain the Indian National movement and their thoughts like M. K. Gandhi, Nehrue.Jayaprakas Narayana, M. N. Roy and Dr. B. R. Ambedkar.
3. To analyse the Hindu and Islamic concept of state and Sarvodaya in political thought

POLITICAL SCIENCE –III (Indian Political Thought)

Indian political thought of the following persons.

1. Manu
2. Koutailya
3. Dandhism
4. Nehru
5. Jaaprakash narayanan
6. Dr.B.R.Ambedkar
7. Goutham Budda
8. M.N.Roy
9. Hindu Concept of State and Islamic Concept of State
10. Gandhism and Sarvodaya in political thought
11. Liberalism and Marxism in India

1. Shriam Maheswari, Local – self government in India

2. M.Venkatarangaiya and G.Raam Reddy, Panchayati Raj in A.P.

3. Iqbal Narain, Panchayat Raj Administration

4. Introduction to constitution of India, Nrij Kishore Sharma

5. L.P.Sharma , History of Medieval India, 1000-1740 AD.

6. Report of High Power Committee on Panchayat Raj

7. Rural and Urban ship Committee Report

Outcomes:

1. To gain the skill development though the views of their thoughts and inspiring lifestyle
2. To understanding the status of political thinkers and employment facilities
3. To able to understand skill development though their thoughts

	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	2	2	2	2	3	2	2	2	3	2	3
CO2	3	2	2	3	2	3	2	2	3	3	3	2
CO3	3	2	2	2	3	2	3	3	2	3	3	2

ECONOMICS – II

Objectives of the Course:

1. It aims to reduce the population of people living below the poverty line and provide them access to employment and social services.
2. Increasing the standard of living by increasing the per capita income and equal distribution of income is one of the main aims of India's economic planning.
3. To analyses the international financial investments towards the developing countries.

Unit 1 STRUCTURE OF INIDAN ECONOMY:

1. Structure of Indian economy
2. Estimates of national income in India
3. post – independence economic polices in India

Unit 2 POVERTY AND INCOME DISTRIBUTION

1. Trends and inter-regional variations in the incidence of rural poverty
2. Unemployment generation schemes
3. Labour, productivity and wages

AGRICULTURAL ECONOMICS:

1. Basic Characteristics of the economy and its transformation
2. Evolution of agrarian relations, integrated rural
3. Development Commercialization of agriculture
4. Economics of farm management
5. Agricultural credits

Unit 3 THE LOGIC OF INDIA'S DEVELOPMENT STRATEGY

a Planning process

b Priorities between agriculture and industry

c Choice if technology

d Role of public private and joint sectors

e Large, medium and small scale industries

Unit 4 PROBLEM OF CONTROL IN ECONOMIC CONCENTRATION:

a Regulation of the private corporate sector (controls, licence quota)

b Anti-monopolies and restrictive practices, regulations

c Prioning

d Labour relations

Unit 5 FOREIGN INVESTMENT:

a International investments

b International aid

c International corporations

d Trends in New Economic Order

Unit 6 EXPORT AND IMPORT polices, import substitution and export promotion

Unit 7 CREDITS AND BANKING SYSTEM IN INDIA

Including regulations of banking

Books prescribed:

1. Rudder Datt and sundaram – Indian economy, DelhiS Chand & Co. 1982

2.A .N .Agrawals – Indian Economics, New Delhi, Vikas 1979

3. K K Dogett – Indian Economics

4. Gunner Myrdal of world poverty

5. C T Kurien : Planning, poverty and social transformation (Allied publications)

6. C H Hannamantha Rao & P C Joshi, Reflections of Economic Development and social change essays in honour of VKRV Rao (Allied 1979)

Outcome of the Course:

1. The students to know about theories of population, National income, poverty, Employment, regulation.
2. To understand the basic concepts of Agricultural economics, credits and commercialization of Agriculture
3. To analysis the private company, small, and large scale industries, Labour productivity, foreign trade, import export etc.

Course	PO1 knowledge	PO2 Analysis	Po3 Design	Po4 Development	Po5 Modern Tool	Po6 Society	Po7 Environment	Po8 Ethic	Po9 Team Work	Po10 Communication	Po1 Programme Management 1	Po12 Life Long Learning
Co1	2	3	2	3	2	3	3	3	2	3	3	3
Co2	3	2	2	3	3	3	3	2	3	3	3	3
Co3	2	3	2	3	2	3	3	2	3	2	3	3

LAW OF TORTS AND CONSUMER PROTECTION ACT

Objectives

1. To provide Compensation
2. To ensure Relief to the effected party

Unit-1. Evolution of law of torts

1.1. Its development by courts in England.

1.2. Forms of Action

1.3. Emergence of specific remedies from case to case.

1.4. Reception of Law of Torts in India.

1.5. Principles of Equity Justice and good conscience

1.6. Definition, nature, scope and objects

1.7. A Wrongful act violation of a duty (in rem) imposed by law, duty which is owned to people generally, Legal damages-damnum sine injuria and injuria sine damno

1.8. Tort distinguished from crime, breach of contract – The concept of Unliquidated damages- changing scope of Law of Torts: Expanding characterduites owned to people generally due to complexities of modern society, scientific and technological progress, industrialization, organization, specialization, occupational hazards-objects-prescribing standards of human conduct, redressal wrongs by payment of compensation, prescribing unlawful conduct by injunctions.

Unit-2. Principles of liability in torts

2.1. Fault

2.2. Wrongful intent

2.3. Negligence

2.4. Liability without fault

2.5. Violation of Ethical codes

2.6. Statutory liability

2.7. Fatal Accidents Act-Railway Act-Workmen's compensation Act-Motor vehicles Act-Carrier Acts-Insurance Laws.

2.8. Place of motive in torts.

2.9. Extinguishments of liability in certain situations:

2.10. Death, Actio personalis mortium cumpersona-Exceptions-Law reform (Miscellaneous Provisions) Act, 1934.

2.11. Waiver and Acquie

Unit-3. Justification in tort:

3.1. Volenti non fit injuria-What is free consent? Informed consent, mere knowledge and knowledge coupled with assumption of risk.

3.2. Necessity, Private and Public.

3.3. Plaintiff's default

3.4. Act of good and Inevitable Accident 18

3.5. Private defense

3.6. Statutory Authorisation

3.7. Judicial and Quasi-Judicial Acts

3.8. Parental and Quasi Parental Authority

Unit-4. Doctrine of sovereign immunity and its relevance in India

4.1. Liability of state-sovereign and non-sovereign functions, Croen proceedings Act of U.K Federal Tort Claims Act of U.S.A.

4.2. Constitution of India (Arts 294 and 300)

4.3. Act of state

Unit-5. Vicarious liability:

5.1. Basis, Scope and Justification

5.2. Express Authorization

5.3. Ratification

5.4. Abetment

5.5. Special Relationships

5.6. Master and servant-arising out of and in the course of employment who is master? Control test who is servant, borrowed servant independent contractor?.

5.7. Principal and Agent

5.8. Corporation and Principal Officer

Unit-6. Torts against persons and personal relations:

6.1. Assault, Battery, Mayhem

6.2. False Imprisonment

6.3. Defamation-Libel, slander including law relating to privileges

6.4. Marital Relations, Domestic Relations, Parental Relations, Master and Servant Relations. 6.5. Malicious prosecution

6.6. Shortened Expectation of life.

6.7. Nervous shock.

6.8. Defenses.

6.9. Trespass to land, Trespass ab initio, dispossession

6.10. Movable property-Trespass to goods, Detinue, Conversion

6.11. Torts against Business interests-Injurious Falsehood, Misstatements passing off.

Unit-7. Absolute/strict liability:

7.1. Basic concepts

7.2. Theories of Negligence

7.3. Standards of care, Duty to take care, carelessness inadvertence

7.4. Doctrine of contributive Negligence.

7.5. Res ipsa liquitor and its due to Negligence with special reference to consumer protection law.

7.6. Professional liability due to Negligence with special reference to consumer protection law. 7.7. The rule in Ryland v. Fletcher. Principle for application of these rules.

7.8. Storing of dangerous things.

7.9. Escape of dangerous things-application of principles in concrete cases of damage arising out of industrial activity. (The Bhopal Disaster, Oelum, Gas Escape, Machua Dam Burst, M.C. Mehta sace, Nuclear Installations and their hazards).

7.10. Liability under Motor Vehicle Act, Railway Act etc.

Unit-8. Nuisance 19

8.1. Definition, Essentials, Types

8.2. Acts which constitute nuisance-obstructions of highways, pollution of air, water, noise, interference with light and air.

Unit-9. Legal Remedies:

9.1. Legal remedies

9.2. Award of damages-simple, special, punitive

9.3. Remoteness of damages-foreseability and directness tests

9.4. Injunction

9.5. Specific restitution of property

9.6. Extra-legal remedies-self help, re-entry in land, re-capture of goods, distress damage feasant abetment to nuisance

9.7. Judicial process in Tort-Dilatoriness-Complicated rules of procedures and evidence - Experts in trial process, reports of testing labs-Court fees, problems of access

Unit-10. Common Law and the Consumer:

10.1. Duty to take care and liability for negligence: Manufacturers and traders and providers of services such as lawyers, doctors and other professionals

10.2. Caveat emptor and Caveat Venditor

10.3. Deceit and false advertisement

10.4. Liability for hazardous and inherently dangerous industrial activity.

10.5. Product liability-EEC directives

10.6. Right to common property resources-right to pass and repass on pathways

10.7. Consumer Protection Act, 1986.

Suggested reradings

1. Thomson Reuters - Law of Torts and Consumer Protection Act
2. Dr.R.K.Bangia - Law of Torts
3. J.N.Pandey – Law of Torts

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Develop Ment	P05 Modern Tools	P06 Society	P07 Environ ment	P08 Ethic	P09 Team Work	P010 Commu nication	P011 Project Manage ment & finance	P012 Lifelong Learning
C001	3	3	1	2	3	3	3	3	2	3	1	3
C002	3	3	2	2	2	3	3	3	3	2	1	3
C003	3	3	1	2	2	3	3	3	3	3	1	3

CONSTITUTIONAL LAW – I

The objective of the course:

1. To make the children understand the intent of the framers of the constitution and its interpretation in the context of balancing Justice, Rights and Governance.
2. To realise the status and importance of fundamental rights, fundamental duties and directive principles of state policy and relations among them by understanding the articulation of its basic values under the Constitution of India.
3. To Understand and exercise legal rights and remedies and be aware of one's duties within the legal framework.

UNIT 1: Preamble Federal Secularism Social justice and the interpretation of preamble

UNIT 2: The union and its territory – Admission or establishment of new States – Formation of a new State- Alteration of bounders of existing states.

UNIT 3: Citizenship- Right of citizenship of persons migrated from Pakistan, and persons of Indian origin residing outside of India, voluntary acquiring citizenship of foreign state not to be citizens continuance of the rights of citizenship, Citizenship Act.

UNIT 4: Fundamental Rights - Definition – Laws inconsistent with or in derogation of the fundamental rights- The Right to equality, equality of opportunity – Prohibition of discrimination on grounds of religion, race caste, sex or place of birth.

UNIT 5 : Right to freedom- Freedom of Speech and Expression – Freedom of the press – Freedom of Speech and Contempt of Court – Freedom of Assembly – Freedom of Association – Freedom of Movement – Freedom of Reside and Settle – Freedom of Profession / Business e.t.c – Property and Social Control 1950 to 1978 – Property and Social Control – After 1978- Freedom of Religion.

UNIT 6: Right against exploitation Prohibition of traffic in human beings and forced labour – Prohibition of employment of children in factories e.t.c. – Protection of interests of minorities – Right of minorities to establish and administer educational institutions.

UNIT 7 : Personal Liberty- Right of an accused – Double jeopardy – Right against self – Incrimination – Right against Retrospective Punishment – Right to life and personal Liberty – Meaning of Art 21, Gopalan case- " Personal Liberty " Meaning in Maneka Gandhi, Sunil Batra e.t.c

UNIT 8 : Constitutional Remedies- Art 32 enforcement of fundamental rights – Power of parliament to modify the rights the conferred by this part in their 3 application to forces etc.

Unit 9: Fundamental Rights and Directive Principles: Directive Principles – Reasons for incorporation – Directive Principles – Direction of social change – A new social order- The interrelation ship of Fundamental Rights and directive principles- Judicial balance- Constitutional amendments Arts 31 –A, 31- B, and 31-C to strengthen Directive Principles- Judicial policy towards directive principles form Champakam to Minerva Mills- What is "State" ? Art 12 – Naresh Vs State of Maharashtra – is Judiciary "State"?

Books prescribed:

1. H. M. Seervai – Constitution of India
2. Granville Austin – The Indian Constitution cornerstone of a Nation
3. Dr. J. N. Pandey – Constitution Law
4. M. P. Jain – Constitution Law
5. P. M. Bakshi – The Constitution of India
6. D. D. Basu – Introduction to the Constitution of India
7. V. N. Shukla – Constitution of India
8. Granville Austin – Working a Democratic Constitution

The outcome of the Course:

1. The students become aware of the significance of the Indian constitution as a fundamental law of the Land.
2. Understanding the constitution and its values and protecting and nurturing the ideals of the framers of the constitution.
3. Ensuring knowledge about the various Fundamental Rights and duties and the Directive Principles that are fundamental in the governance of the country.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Commutation	PO11 Programme Management	Po12 Life Long Learning
CO1	3	3	3	2	3	3	3	3	2	3	2	3
CO2	3	3	3	2	3	3	3	3	2	3	3	3
CO3	3	3	3	2	3	3	3	3	2	3	3	3

POLITICAL SCIENCE –IV

(Principles of Public Administration)

Objectives :

1. To analyse the Nature, Scope and importance of public administration and relationship with the other social science
2. To explain the Development emerging Trends, personnel administration through the Human relation approach
3. To learn the Financial administrator through the Budgeting

POLITICAL SCIENCE –IV (Principles of Public Administration):

Unit-1.Introduction : nature and scope of public administration, its importance with special reference to developed societies, relations with other Social Sciences; Politics, Sociology , Economics and Law, Differences between Public Administration and Private Administration, Evolution of Public Administration as a Classical, Neo Classical and Behavioral discipline and Evolution of Public Administration - New Public Administration and onwards.

Unit-2.Classical and Behavioral theories; Luther Gullick, Henry Fayol, F.W. Taylor, Max Weber, Chester Bernard and Herbert Simon.

Unit-3.Development and emerging Trends; Waldo, Weidner, F.W.Riggs, Dror,Ostrom.

Unit-4. Public Personnel Administration, Concept and Importance, Methods, and machinery of recruitment, Training and Development, Motivation, Grievances and Human Relations.

Unit-5.Financial Administration: Nature, Scope and importance of financial administration, agencies of Financial Administration, Principles of Budgeting , reparation and passing of Budget, Public Enterprises, Planning Commission and Evaluation.

Books prescribed

1. M.Venkatarangaiya and G.Raam Reddy, Panchayati Raj in A.P.

2. Iqbal Narain, Panchayat Raj Administration

3. Introduction to constitution of India, Nrij Kishore Sharma

4. L.P.Sharma , History of Medieval India, 1000-1740 AD.

5. Report of High Power Committee on Panchayat Raj

6. Rural and Urban ship Committee Report

Outcomes :

1. To gain the skill development and employment facilities to learn the public administration
2. To understanding the human relations and personnel management employability facilities.
3. To gain financial and budgeting knowledge

Know the skill development and employability.

	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO 1	3	3	2	3	2	3	2	3	3	3	3	2
CO 2	3	2	3	3	2	3	3	3	3	3	2	3
CO 3	3	3	3	3	2	2	3	3	3	3	3	2

SOCIOLOGY – II

The study of Indian society

1.students are expected to gain knowledge to the intricacies of the industrial society in India

2. Ability to analyse the special features of the industrial society in India.

3. This help in enhancing the skill and competency to understand the industry and urbanization in the progress of a nation.

1 The development of Indian society

a Unity and Diversity

b Continuity and change, ancient, medieval

2 India as a plural society; variations of

a Cultural diversities

b Linguistic, religions, political, economic and

cultural communities

3 Major institutions of Indian society

a Family

b Caste

c Village

4 Tribe and caste in the traditional order

5 Caste and class in contemporary India

6 The backward classes

7 Trends of change in Indian society - rural and urban

8 Indian cultural values and development

9 Impact of Muslim and British culture

Books prescribed:

1 N. K. Bose, The structure of Hindu society, New Delhi,

Orient Longman, 1975

2 G S Gurye – Caste: Class and occupation

3 Romesh Thapper (ed) Tribe, Caste and Religion in

India, New Delhi, Mac Millan, 1977

4 Andhra Esteile: The backward classes and the new
social order
5 A R Desai: Rural sociology
6 M.K. Srinivasan: Social change in Modern India
7 K M Kapadia: Marriage and family in India
8 Government of India publication: Social Legislation
9 Prabhu – Hindu social organization
10 Kingsley Davis: Human Society

BOOKS RECOMMENDED:

1. David G. Mendemanm : Society in India, Bombay, popular Prakashan.
2. Harvey Johnson: Sociology; A systematic introduction
3. Mac. Iver and page; Society.

Outcome of the Course:

1. This course elaborates nature of crimes its causes and the ways of to solve the problems as well as objectives of punishment.
2. Its kinds and its various theories of punishments and also problems of women, challenged groups explosiveness of population and control growth of population, unemployment, poverty, environmental.
3. Communication problems, linguist, regional terrarium problems which our country facing.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Commutation	PO11 Programme Management	Po12 Life Long Learning
CO1		2	3	3	3	3	3	3	3	3	2	2
CO2		1	2	3		2	2		2	3	1	1
CO3			1	2	1	2	1	3	2	2	1	1

CONSTITUTIONAL LAW-II

Objectives of the Course:

1. This course focuses on the power of the federal government and the allocation of decision-making authority among got institutions including federation and separation of powers.
2. To examine the centre-state relation in a federal system.
3. Understand the principles of Natural Justice and theories for the interpretation of the law and its significance in judicial decisions.

Unit 1: Federalism:

1.1: Federalism-Principles-Comparative study of other Federations. Why India has a Federal Government.

1.2: Indian Federalism-President of India-Council of state-Process of Constitutional Amendment. Identification of Federal features.

1.3: Legislative relations between the Centre and the State

1.4: Administrative Relations-Centre States.

1.5: Financial Relations-centre-states

1.6: Governor‟s position from the Perspective of Federalism.

1.7: Center‟s Powers over the States-Art. 356.

1.8: J&K-Special status.

1.9: Critical problems of Indian Federalism. Sarkaria Commission-Greater Autonomy v. Central Control. One party domination. The emergence of Political Federalism. Growth of Regional Parties.

Unit 2: Parliamentary government:

2.1: West Minister Model-Indian experience before independence-Choice of Parliamentary Government

2.2: President of India-Election, Qualifications, Impeachment, salary

2.3: Council of Ministers-President‟s constitutional position.

2.4: Governor and State Government-Constitutional Relationship

2.5: Legislative Process-Privileges, freedom of speech. The practice of law-making etc.,

2.6: Legislative Privileges v. Fundamental Rights. In re. Art. 143 of the Constitution of India.

2.7: Prime Minister-Cabinet System-Collective responsibility Individual responsibility. President-Prime minister relationship.

2.8: Party system-Anti –defection law. Freedom of an A.P. /M.L.A to dissent.

Unit 3: Constitutional process of adaptation and alteration:

3.1: Methods of Constitutional Amendments-Written-Unwritten, Rigid-Flexible Constitutions. Provisions can be amended by ordinary procedure, special procedure, and Review of Constitutional Amendments.

3.2: Limitations upon Constitutional amendments Shankari Prasad, SajjanSingh.

3.3: Golaknath v. Punjab-Why should federal Rights be immune from the process of Constitutional Amendment.

3.4: Basic structure doctrine as a limitation-Kesavanand Bharathi.

3.5: Development of the Basic Structure Doctrine. Constituent Power of the Supreme Court. Vaman Rao v. Minerva Mills.

3.6: Indira Gandhi v. Raj Narain; Judicial Consensus on Basic Structure Doctrine.

3.7: Legislative and Judicial Attempts to bury the Basic Structure Doctrine; Legitimation of the Basic Structure Doctrine. Special Bench to Reconsider the Basic Structure Issue. Forty-second Constitutional Amendment. Forty fourth Constitutional Amendment .

3.8: Minerva Mills and subsequent developments of the Basic Structure Doctrine. Responsibility of the Court; Activism v. Restraint.

Unit 4: Emergency:

4.1: Emergency-need for such a provision. Types of Emergencies, Experience in other democracies.

4.2: Proclamation of emergency-conditions-Art. 352-Effect of Emergency on Centre-State Relations.

4.3: Emergency and suspension of Fundamental Rights Arts. 358, 359- Makhan Singh Tarasikha to A.D.M. Jabalpore.

4.4: Financial emergency.

Unit 5: Services under the constitution.

5.1: Doctrine of Pleasure (Art. 310)

5.2: Protection against Arbitrary Dismissal, Removal or Reduction in Rank (Art. 311)

5.3: Tulsiram Patel-Exceptions to Art. 311.

Unit 6: Judicial process under the constitution.

6.1: Judicial Review-Art. 32, 226, 227.

6.2: Nature of Judicial Review.

6.3: Court system in India: Backlogs, Arrears, Alternatives, Lok Adalats, etc,

6.4: Judges, Appointments, Conditions of service etc,

6.5: Subordinate Judiciary.

6.6: Jurisdiction of Supreme Court and High court.

6.7: Advisory Jurisdiction of the Supreme Court.

6.8: Public interest Litigation.

Suggested readings

1: Basu.D.D -Commentary on the Constitution of India.

2: Hidayatullah.M (Ed) -Constitutional Law of India

3: Seervai.H.M -Constitution of India.

4: Austin.G –Indian Constitution A cornerstone of a Nation.

5: Banerjee.A.C –Constitutional History of India.

6: Khanna.H.R –Making of India‟s Constitution

7: Shiva Rao.B –Framing of India‟s Constitution.

8: Jain.M.P –Indian Constitutional Law.

9: Relevant volumes of the Annual survey published by Indian Institute

The outcome of the Course:

1. Know about the enforcement remedies available under the constitution of India and about access to justice through public interest litigation.
2. Comprehend the basic feature of the Constitution of India and the importance of the role of the Judiciary in ensuring checks and balances; and
3. Understand the meaning, nature and concept of federalism, and its essential features and be able to familiarize yourself with the Indian federal structure and its status quo in the contemporary era.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Commutation	PO11 Programme Management	Po12 Life Long Learning
CO1	3	3	3	3	3	3	3	3	2	3	2	3
CO2	3	3	3	3	3	3	3	3	2	3	2	3
CO3	3	3	3	3	3	3	3	3	2	3	2	3

ADMINISTRATIVE LAW

OBJECTIVES-

1.The course is designed for students to understand Administrative law is an individual interface with state due to the radical change in the philosophy regarding. The role and function of the state (laissez Faire to welfare) The opportunities of interaction with administrative law was increased many folds and continue to increase .

2. It provides detail understanding the functions of the government and the executives and protecting the rights of the citizens and maintaining the law and order and its implementation.

3.The main objective of the administrative law is to limit the powers of the government to protect citizens against their abuse.

[ADMINISTRATIVE LAW]

Unit-1. Evolution, Nature and Scope of Administrative Law

1.1. From a Laissez Faire to a Social Welfare State; State as regulator of private interest; State as provider of services; Other functions of Modern State; Relief; Welfare

1.2. Evolution of Administration as the fourth branch of government; Necessity for delegation of powers on administration

1.3. Evolution of agencies and procedures for settlement of disputes between individual and administration

1.3.1. Regulatory Agencies in the United States

1.3.2. Conseil d' Etate of France

1.3.3. Tribunalization in England and India

1.4. Relationship between Constitutional Law and Administrative Law and Public Administration

1.5. Separation of Powers: To what extent relevant to administrative functions?

1.6. Rule of Law and Administrative Law

1.7. Definitions of Administrative Law

1.8. Scope of Administrative Law

1.9. Emerging trends: Positive duties of administration under the modern social welfare legislation and compulsions of planning

Unit-2. Bureaucracy in India

2.1. Nature and Organization of civil service; Central and State

2.2. It's hierarchical character; Accountability and Responsiveness

2.3. Powers and Functions

2.4. Attainment of developmental and social welfare goals through bureaucracy; Problems and perspectives

2.5. Class character and Structure

2.6. Administrative deviance; Corruption; Nepotism; Mal-administration; Disciplinary proceedings and Prosecutions under Prevention of Corruption Act.

Unit-3. Legislative powers of administration

3.1. Necessity for delegation of legislative power

3.2. Constitutionality of delegated legislation; Powers of exclusion and inclusion an power to modify statute.

3.3. Requirements for the validity of delegated legislation

3.3.1. Consultation of affected interests and public participation in decision making

3.3.2. Publication of delegated legislation

3.4. Administrative directions; circular and policy statements

3.5. Legislative Control of delegated legislation

3.5.1. Laying procedures and their efficacy

3.5.2. Committees on delegated legislation-their constitution-function and effectiveness

3.5.3. Hearings before Legislative Committees

3.6. Judicial Control of delegated legislation-Doctrine of Ultra Vires

3.7. Sub-Delegation of legislative powers

Unit-4. Judicial powers of administration

4.1. Need for devolution of adjudicatory authority on administration

4.2. Administrative Tribunals and other adjudicating authorities their ad hoc character-Compare administration of justice in court with that of Tribunals (Ref.Robson)

4.3. Nature of Tribunals; Constitution; Procedure; Rules of evidence, etc., with special reference to the following:

4.3.1. Central Board of Customs and Excise

4.3.2. MRTP Commission 25

4.3.3. ESI courts

4.3.4. Service Tribunals

4.4. Jurisdiction of Administrative Tribunals and Other authorities; Distinction betweenquasi-judicial and administrative functions and relevance of this distinction in the light of recent decisions of the Supreme Court

4.5. The Right to Hearing; Essentials of hearing process, Bias (no one can be a judge in his own cause); Oral Hearing, etc.,

4.6. Rules of Evidence- No evidence; Some evidence and Substantial evidence rules

4.7. Requirements regarding Reasoned Decisions.

4.8. The Right to Counsel

4.9. Institutional Decisions

4.10. Administrative Appeals

4.11. Council on Tribunals and Inquiries in England

4.12. US Regulatory Agencies and Administrative Procedures Act, 1946

4.13. Emerging trends of Tribunalization in India as a means to relieve congestion in the courts and utilization of administrative expertise

Unit-5. Judicial Control of Administrative Action

5.1. Preliminary

5.1.1. Courts as the final authority of determine legality of administrative action; Problems and Perspectives

5.1.2. Exhaustion of Administrative Remedy

5.1.3. Standing; Standing for Social Action Litigation

5.1.4. Laches

5.1.5. Res Judicata

5.2. Grounds of Judicial Review: Scope of judicial review

5.2.1. Jurisdictional error/ultra vires

5.2.2. Abuse and non exercise of jurisdiction

5.2.3. Error apparent on the face of the record

5.2.4. Violation of Principles of Natural Justice

5.2.5. Primary jurisdiction

5.2.6. Absence of ripeness

5.2.7. Political Question

5.2.8. Doctrine of Legitimate Expectation

5.3. Methods of Judicial Review

5.3.1. Statutory Appeals

5.3.2. Mandamus

5.3.3. Certiorari

5.3.4. Prohibition

5.3.5. Quo-warranto

5.3.6. Habeas corpus

5.3.7. Declaratory Judgment and Injunctions

5.3.8. Specific Performance and civil suits for compensation

5.3.9. Fact-finding Commissions

Unit-6. Administrative Discretion

6.1. Need for administrative discretion

6.2. Administrative discretion and Rule of Law

6.3. Malafide exercise of discretion

6.4. Constitutional imperatives and use of discretionary authority

6.5. Irrelevant Considerations

6.6. Non-exercise of discretionary power

6.7. Discretion to prosecute or to withdraw prosecution

6.8. Limiting, confining and restructuring discretion-general discretion, technical discretion

Unit-7. Liability for wrongs: (Tortuous and Contractual)

7.1. Tortuous Liability: Sovereign and Non-sovereign functions

7.2. Crown Proceedings Act of UK and Torts Claims Act of US

7.3. Statutory Immunity

7.4. Act of State

7.5. Contractual liability of Government

7.6. Government privilege in legal proceedings; State secrets, Public interest, etc.,

7.7. Right to Information and Open government

7.8. Estoppel and Waiver

Unit-8. Corporations and Public undertakings

8.1. State Monopoly; Remedies against arbitrary action or for action against public policy

8.2. Liability of public and private corporations of departmental undertakings

8.3. Legal Remedies 8.4. Accountability; Committee on public undertakings, Estimates committee, etc.

Unit-9. Informal methods of settlement of disputes and grievance redressal procedure

9.1. Conciliation and mediation through Social Action Groups

9.2. Use of media, lobbying and public participation in policy making

9.3. Public inquiries and Commissions of inquiry

9.4. Ombudsman, Parliamentary Commissioner

9.5. Lok pal, lokayukta

9.6. Vigilance Commission

9.7. Congressional and Parliamentary Committees

Prescribed books-

1 : D.D.Basu,Comparative Administrative Law (1998).

2 : Wade,Administrative Law (Seventh Ed, Indian print 1997), Universal ,Delhi

3 : J.C.Garner, Administrative Law(1989)

4: M.P.Jain, Cases and Materials on Indian Administrative Law, Vol.I and II (1996)Universal,Delhi.

5 : Jain & Jain, Priniciples of Administrative Law (1997),Universal Delhi.

6 : P.Sathe,Administrative Law (1998) Butterwroths-India,Delhi.

Outcomes-

1.The course on administrative law must lay emphasis on understanding the structure and modus operandi of administration.

2. Law students usually develop a wide range of skills and they are transferable to any carriers and its focusing on the development of and historical back ground of the administrative law and knowing about delegated legislation and separation of powers and also about the functions of the courts and tribunals and constutional provisions with the help of various judgement delivered by the Supreme Court and high courts.

3. It helps in the functions of the courts and tribunals and the constitutional provisions through various judgements.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	2	3	2	1	1	2	1	1	2	3	1	2
CO2	3	3	1	2	3	1	1	2	2	1	1	3
CO3	2	1	3	3	3	1	1	1	3	3	1	1

POLITICAL SCIENCE –V

(International relations and Organizations)

Political science-V

Objectives :

1.To deal with issues relating to international politics and organizations

2. To analyze national power, war, international law for maintain peace and the method of balance of power

3.To discusses the concepts of UNO and its main organs

POLITICAL SCIENCE –V (International relations and Organizations):

The course is divisible in to two major parts;

Part – 1 :International Relation and Part – 2 : International Organization Part – 1 : The world community, sovereign state, transnational political parties, and transnational non-official organizations such as the churches, multinational corporations, scientific, cultural and other organizations. Components of national power, population, geography, resources, economic organization, technology and military force. Limitations on national power, international morality, public opinion , international law, fear of violence and destruction, war with conventional and nuclear weapons. Major sources of conflict; East and West and North and South rivalries, territorial claims, resources, population migrations, international trade, balance of payments and protectionism. Causes of I world war, II world war , Study of various Treaties Avoidance of war and facilitation of peaceful change; Alliance and balance of power approach; Collective security and disarmament, diplomacy and peaceful resolution of conflicts by negotiation , mediation, conciliation and resource to international organization arbitration and judicial settlement; the cultural approach and the UNESCO, promotion of international cooperation and the functional approach, the Specialized Agencies. The case for against world government.

Part - II Inter- governmental organizations and their constituent instruments; the standard pattern of organization. The annual or periodical plenary conference, the committee or council to take decision during the period between the plenary conferences, the secretariat. The special features of the I.L.O. and international financial institutions. The United Nations and its principal organs; the relationship between the United Nations and Regional Organizations, Specialized Agencies and International Non-Government Organizations.

Books prescribed

1. M.Venkatarangaiya and G.Raam Reddy, Panchayati Raj in A.P.

2. Iqbal Narain, Panchayat Raj Administration

3. Introduction to constitution of India, Nrij Kishore Sharma

4. L.P.Sharma , History of Medieval India, 1000-1740 AD.

5. Report of High Power Committee on Panchayat Raj

6. Rural and Urban ship Committee Report

Outcomes :

1.To gain the knowledge and employability through the international organisations.

2.To understand skill development through the international law.

3.To gain the knowledge and skill development through the UNO and its main organs.

	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	2	3	2	3	2	3	3	3	3	2
CO2	3	2	3	3	2	3	3	3	3	3	2	3
CO3	3	3	3	3	2	2	3	3	3	3	3	2

ECONOMICS – III

Objectives of the Course:

1. The objective of macroeconomic policies is to maximize the level of national income.
2. Providing the economic growth to raise the utility and standard of living of participants in the economy.
3. There are also a number of secondary objectives which are held to lead to the maximization of income over the long run

Unit – I: Money, inflation and monetary, Policy, Money, function of money, Primary or main or original functions, Secondary functions, contingent functions.

Unit II: Kinds of Money, Money can be classified according to various basis, Role or importance of Money, Objective of Monetary policy, monetary policy for under developed or developing economy.

Unit – III: Central and Commercial Banking, Central Bank, Principles of central Banking, Functions of central Banks, functions of commercial banks, Utility of commercial Banks, Balance sheet of the Bank Specimen of a balance sheet.

Unit – IV: Role of credit and Baking system; Negative role of credit, Banking credit systems, Principles of credit creation by banks, Principles of sound lending Creation of credit basing on primary or, passive deposits, Creation of credit basing or derivative or active deposits, Multiple Expansion of Credit through the banking system, Limitation of bank rate policy, condition to be fulfilled or limitations.

Unit – V: Rural Money Markets; Non-institutional agencies or private sources, Money-lenders are popular in rural areas due to many reason, organized rural money market, objective of NABARD

Unit – VI: Resource Mobilization and Fiscal Resources, Domestic or internal sources of resources mobilization, External resources.

Unit – VII: Public Expenditure, Public Debt and Budgeting

Unit – VIII: Fiscal Policy, Objective of fiscal policy in under developed countries. Fiscal policy and trade cycles (1) Fiscal policy during inflation (2) Fiscal policy in a depression. Bringing to stabilisator or correction of disequilibrium of Balance of payments, Trade Measures, Other Corrective measures, monetary measures and devaluation.

Unit – IX Role of Capital Formation, Credit and Banking System.

Unit – X International Financial Institutions, IMF and IBRD

The International Monetary Fund (IMF), Structure and management of the IMF< Resources of the IMF,

a) Aid to countries

b) Repurchase of purchases

c) Stand by Arrangements

d) Exchange Stability (Determination of par Value)

e) Control against the IMF

f) Criticism against the IMF and

g) Achievement of the IMF

Books recommended:

1. Myneni, Principles of Economics, Allahabad Law Agency ,Fairabad ,Haryana.
2. Ruddar dath and K.P.M. Sundharam , Indian Econmy,S.Chand &company, New Delhi.
3. B.P. Tyagi , Public Finance, Meerut.
4. A.C. Agarwal , Public Finance Theory & practice ,Lakshimi Narayana Agrwal, Agra-3.
5. T.N. Hajela, Public Finance, Konark Publishers PVT Ltd main vikas Marg, Delhi.

Outcome of the Course:

1. To understanding of the international economic relations.
2. Assess the role of capital formation, central and commercial Banking System.
3. To understanding the public expenditure, public debt and budgeting and rural money markets

Course	PO1 knowledge	PO2 Analysis	Po3 Design	Po4 Development	Po5 Modern Tool	Po6 Society	Po7 Environment	Po 8 Ethic	Po9 Team Work	Po10 Communication	Po1 Programme Management 1	Po12 Life Long Learning
Co1	2	3	2	2	2	3	2	3	2	3	2	3
Co2	2	3	3	3	2	3	3	2	3	2	2	3
Co3	2	3	2	3	3	3	2	2	3	3	3	3

HISTORY OF COURTS LEGISLATURE AND LEGAL PROFESSION IN INDIA – I

Objectives

1. Stating Advantages disadvantages and features of Administration of Civil, Criminal Courts
2. Discussing different enactments – i.e Advocates Act, 1961

Unit-1.COURTS

1.1 Administration of Justice in the Presidency Towns (1600 – 1773) And the development of courts and judicial institutions under The East India Company

1.2 Warren Hastings Plan of 1772 and the Adalat System of Courts – Reforms made under the Palan of 1774 and re – organization in 1780 29

1.3 Regulating Act of 1773 – Supreme Court at Calcutta– its composition, power and functions – failure of the court – Act of 1781 –Supreme Court vis – a – vis Mofussil Courts

1.4 Judicial measures of Lord Cornwallis 1781, 1790, 1793 progress of Adalat system under Sir. John Shore

1.5 Conflicts arising out of the dual judicial system tendency for amalgamation of the two systems of Courts – The Indian High Courts under the Government of India Act, 1915 – High Courts under the Government of India, 1935 – High courts under the Indian Constitution

1.6 Development of Rule of law, separation of powers, Independence of judiciary

1.7 Judicial Committee of Privy Council as a Court of Appeal and its jurisdiction to hear appeals from Indian decisions – Abolition of the Privy Council to hear appeals from Indian decisions

1.8 Court system generally under the Constitution of India

Unit-2.LEGAL PROFESSION

2.1 Legal profession in Pre – British India – Role,Training and functions

2.2 Law practitioners in the Mayor's Courts established Under the Charter of 1726

2.3 Organization of legal profession under the Charter of 1774

2.4 Legal profession in Company's Courts

2.5 Provision for enrolment of Advocates, Vakils and Attorneys Under Legal Practitioner's Act, 1853

Recommended source materials:

1 Herbert Cowell, The History and Constitution of the Courts and Legislative Authorities in India – 6th Ed. Rev. S S Bagchi, Calcutta, Macker, Spink, 1936

2 Sr. Courtenay llbert, The Government of India, 2nd Ed. London, OUP 1907 2 M P Jain – Outline of Indian Legal History, Dahawantra Mechanical and Law Book House, Delhi

3 A B Keith – A Constitutional History of India, 1600 -1935, 2nd Ed. Allhabad, Central Book Depot, 1961

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Development	P05 Modern Tools	P06 Society	P07 Environment	P08 Ethic	P09 Team Work	P010 Communication	P011 Project Management & finance	P012 Lifelong Learning
C001	3	3	1	2	3	3	3	3	2	3	1	3
C002	3	3	2	3	2	3	3	3	3	2	1	3
C003	3	3	1	2	3	3	3	3	3	3	1	3

LAW OF CRIMES-I (IPC)

Objectives:

1. Defines the concept of crime and what constitute an offence.
2. Indian Penal Code is the major substantive law which deals with definitions of various crimes committed in India and their punishments.
3. Knowledge about the essential principles of criminal liability by a study of range of offences under the Indian penal code

Paper – 5.4

LAW OF CRIMES-I (IPC)

Unit-1.General 1.1. Conception of Crime 1.2. State's power to determine acts or omissions as crimes 1.3. State's responsibility to detect, control and punish crime 1.4. Distinction between crime and other wrongs 1.5. Pre-colonial notions of crime as reflected in Hindu, Muslim, tribal laws 1.6. The Colonial reception-Macaulay's draft based essentially British notions 1.7. I.P.C a reflection of different social and moral values 1.8. Applicability of I.P.C 1.8.1. Territorial 1.8.2. Personal 1.9. Salient features of the I.P.C

Unit-2.Elements of Criminal Liability 2.1. Author of crime-natural person and a fit subject for punishment, companies and corporations 2.2. Mens rea-evil intention 30 2.3. Importance of mens rea 2.4. Recent trends of fix liability without mens rea in certain socio-economic offences 2.5. An act in furtherance of guilty intent 2.6. An omission as specifically includes in the Code 2.7. Injury to another

Unit-3. Group Liability 3.1. Stringent provision in case of combination of persons attempting to disturb peace 3.2. Common intention 3.3. Abetment 3.3.1. Instigation,

aiding and conspiracy 3.3.2. Mere act of abetment punishable 3.4. Unlawful assembly 3.4.1. Basis of liability 3.5. Criminal conspiracy 3.6. Rioting as a specific offence

Unit-4.Stages of Crime 4.1. Guilty intention-mere intention not punishable 4.2. Preparation 4.2.1. Preparation not punishable 4.2.2. Exception in respect of certain offences of grave nature or of peculiar kind such as possession, counterfeit coins, false weights and measure 4.3. Attempt 4.3.1. Attempt when punishable-specific IPC provisions 4.3.2. Tests for determining what constitutes attempt proximity equivocally and social danger. 4.3.3. Impossible attempt

Unit-5.Factors negativing guilty intention 5.1. Mental incapacity 5.1.1. Minority 5.1.2. Insanity-impairment of cognitive facilities, emotional imbalance 5.1.3. Medical and legal insanity 5.2. Intoxication-involuntary 5.3. Private defence-justification and limits 5.3.1. When private defence extends to causing of death protection body and property 5.4. Necessity 5.5. Mistake of fact

Unit-6.Types of punishment 6.1. Death 6.1.1. Social relevance of capital punishment 6.1.2. Alternative to capital punishment 6.2. Imprisonment for life, with hard labour, simple imprisonment 6.3. Forfeiture of property 6.4. Fine 6.5. Discretion in awarding punishment 6.6. Minimum punishment in respect of certain offences

Unit-7.Specific offences against human body 7.1. Causing death of human beings 31 7.1.1. Culpable homicide 7.1.2. Murder 7.1.2.1. Distinction between culpable homicide and murder 7.2. Specific mental element requirement in respect of murder 7.3. Situation justifying treating murder as culpable homicide not amounting to murder 7.3.1. Grave and sudden provocation 7.3.2. Exceeding right to private defense 7.3.3. Public servant exceeding legitimate use of force 7.3.4. Death in sudden fight 7.3.5. Death caused by consent of the deceased-Euthanasia 7.3.6. Death caused by person other than the person Intended 7.3.7. Miscarriage with or without consent 7.4. Rash and negligent act causing death 7.5. Hurt-grievous and simple 7.6. Assault and criminal force 7.7. Wrongful restraint and wrongful confinements-kidnapping from lawful guardianship and from outside India 7.8. Abduction

Unit-8.Offences against women 8.1. Insulting the modesty of a woman 8.2. Assault or criminal force with intent to outrage the modesty of a woman 8.3. Causing miscarriage without woman's consent 8.4. Causing death by causing miscarriage without women's consent 8.5. Kidnapping or abducting woman to compel her to marry or force her to illicit intercourse 8.6. Buying a minor for purposes of prostitution 8.7. Cruelty by husband or relatives of the husband 8.8. Rape 8.9. Custodial rape 8.10.Marital rape 8.11.Cruelty by husband or relatives of the husband 8.12.Common law remedies to protect against obscene/indecent depiction of woman

Unit-9.Offences against property 9.1. Theft 9.2. Cheating 9.3. Extortion 9.4. Robbery and dacoity 9.5. Mischief 9.6. Criminal misrepresentation and criminal breach of trust 9.7. Criminal trespass 9.8. Forgery

Unit-10.Offences by or relating to public servants 10.1. Public servant taking gratification of other than legal remuneration 10.2. Public servant induced by illegal or corrupt means to do or not to do an act 10.3. Public servant obtaining valuable thing without consideration connection with official functions. 10.4. Public servant framing incorrect document without intent to cause injury 10.5. Unlawful buying or bidding by public servant 32 10.6. Special legislation dealing with prevention of corruption, prevention of corruption Act, objective and scope 10.7. False evidence and offences against public justice

Unit-11.Offences against the State 11.1. Waging attempting conspiring to wage or collecting the ammunition to wage war against the Government of India 11.2. Assaulting President or Governor of a State with an intent to compel or restrain the exercise of any lawful power 11.3. Sedition 11.4. War against a power at peace with the Government of India are committing depredations on the territories or such powers 11.5. Permitting or aiding or negligently suffering the escape of or rescuing of harbouring, a state of prisoner

Unit-12.Defamation 12.1. Defamation 12.2. Punishment for defamation 12.3. Printing or engraving matter known to be defamatory 12.4. Sale of printed or engraved substance containing defamatory matter

Prescribed books-

1. Gaur.K.D-Criminal Law-Cases and materials (1985 Edn)
2. Ratanlal-Dhirajlal-Law of Crimes (1987) 23rd Edn.
3. Huda-Law Crimes
4. Kenny-Outlines of Criminal Law (Chapt 1to3)
5. Ratanlal-Dhirajlal-The Indian Penal Code
6. Achuthen Pillai.P.S-Criminal Law
7. Nigam,R.C-Law Crimes in India-Vol

Outcome of the course:

1. A proper understanding of crimes, methods of controlling them
2. The Indian Penal Code is a major criminal law help the students in their future endeavors as a lawyers judges and their respective legal fields.
3. Acquires knowledge on various offences and their punishments and implement their knowledge in punishing the offenders.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	2	3	3	3	2	3	3	3	1	3
CO2	3	2	1	2	3	3	1	2	2	1	1	3
CO3	3	3	3	2	3	3	1	3	2	1	1	3

FAMILY LAW -1

OBJECTIVES

1. Impart knowledge relating to issues of the family such as marriage, adoption, maintenance, guardianship and divorce.
2. Acquaint students regarding customs and influence of religion on these issues and social evils such as Sati, Child Marriage, etc.,
3. Introduce students to the existing personal and secular laws on these issues and allied matters

Unit-1. Marriage and Kinship

1.1. Evolution of the institution of marriages and family

1.2. Role of religion, rituals and practices in moulding the rules regulating marital relations

1.3. Types of family based upon; lineage-patrilineals, matrilineal, authority, structure patriarchal and martriarchal, location-patrilocal and matrilocal and number of conjugal units nuclear extended, joint and composite.

1.4. Applicability of law

1.4.1. Who is a Hindu?

1.4.1.1. Who is s Muslim?

1.4.1.2. Who is a Christian?

1.4.2. Sources of Hindu law, Muslim law and Christian law 33

Unit-2. Customary practices and the State

2.1. Polygamy

2.2. Concubinage

2.3. Child marriage

2.4. Sati

2.5. Dowry

2.6. State intervention through various legal measures

Unit-3. Conversion and its effect on family

3.1. Marriage

3.2. Adoption

3.3. Guardianship

3.4. Succession

Unit-4. Matrimonial Remedies

4.1. Non-judicial resolution of marital conflict problems

4.1.1. Customary dissolution of marriage-unilateral divorce, divorce by mutual consent and other modes of dissolution

4.1.2. Divorce under Muslim personal law-Talaq and Talaq-e-tafweez

4.2. Judicial resolution of marital conflict problems A general perspective of matrimonial fault theory and principles of irretrievable breakdown of marriage

4.3. Nullity of marriage

4.4. Option of puberty

4.5. Restitution of conjugal rights

4.6. Judicial separation

4.7. Desertion-a ground for matrimonial relief

4.8. Cruelty-a ground for matrimonial relief

4.9. Adultery- a ground for matrimonial relief

4.10. Other grounds for matrimonial relief

4.11. Divorce by mutual consent under Special Marriage Act, 1954, Hindu Marriage Act, 1955 and Muslim law(Khula and Mubaraat)

4.12. Bars to matrimonial relief

4.12.1. Doctrine of strict proof

4.12.2. Taking advantage of one's own wrong and disability

4.12.3. Accessory

4.12.4. Connivance

4.12.5. Collusion

4.12.6. Condonation

4.12.7. Improper or unnecessary delay

4.12.8. Residuary clause-no other legal ground exists for refusing the matrimonial relief

Unit-5. Alimony and maintenance

5.1. Maintenance of neglected wives, divorced wives, minor children, disabled children and parents who are unable to support themselves under the Code of Criminal Procedure, 1973

5.2. Alimony and maintenance as an independent remedy-a review under different personal laws

5.3. Alimony and maintenance as ancillary relief, alimony, pendentilite and permanent maintenance

5.4. Maintenance of divorced Muslim women under The Muslim Women (Protection of Rights on divorce) Act, 1996-a critical review 34

Unit-6. Child and the Family

6.1. Legitimacy

6.2. Adoption

6.3. Custody, maintenance and education

6.4. Guardianship

Unit-7. Family and its changing patterns

7.1. New emerging trends

7.1.1.Attenuation of family ties

7.1.2.Working women and their impact on spousal relationship, composition of family, status and role of women and decision making authority structure.

7.2. Factors affecting the family-demographic, environmental, religious, legislative

7.3. Process of social change in India-Sanskritisation, Westernization, secularization, universalisation, partiarchilisation and modernization including industrialization and urbanization

Unit-8. Establishment of Family court

Unit-9. Securing of a Uniform Civil Code

9.1. Religious pluralism and its implication

9.2. Connotations of the directive contained in Article 44 of the Indian Constitution Impediments to the formulation of the Uniform Civil Code

Suggested readings

1.Gaur.K.D-Criminal Law-Cases and materials (1985 Edn)

2. Ratanlal-Dhirajlal-Law of Crimes (1987) 23rd Edn.

3. Huda-Law Crimes
4. Kenny-Outlines of Criminal Law (Chapt 1to3)
5. Ratanlal-Dhirajlal-The Indian Penal Code
6. Achuthen Pillai.P.S-Criminal Law
7. Nigam,R.C-Law Crimes in India-Vol-I
8. Stewart,S.W-A Modern view of Criminal Law (Pergamon Press Oxford 1969)
9. Gari Sing Gour-Penal Law of India
10. Bhatt,V.R-Essays in Criminal Law
11. Relevant volumes of the Annual survey published by Indian Law institute

Outcomes

1.Awareness on codified and uncodified personal laws and secular laws .

2.Develop problem-solving skills and practical knowledge in seeking relief through appropriate authorities

3. Awareness on various socio legal issues.

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Development	P05 Modern Tools	P06 Society	P07 Environment	P08 Ethic	P09 Team Work	P010 Communication	P011 Project Management & finance	P012 Lifelong Learning
C001	3	3	1	3	3	3	3	3	2	2	1	3
C002	3	3	1	3	2	3	3	3	2	3	1	3
C003	3	3	1	3	3	3	3	3	3	2	1	3

POLITICAL SCIENCE – VI

(local- self-government)

Political science-VI

Objectives:

1. Examine the local self government to ancient to modern India
2. To analyse the different committees on Panchayat Raj Institutions
3. To explain the evolution of local self government and Constitutional status

PAPER -6.1 POLITICAL SCIENCE – VI (local- self government)

Unit-1.Introduction, Historical back ground of the Panchayat Raj Institutions in India, village administration in ancient India , Position of Panchayat Raj during Medieval period, Panchayat Raj institution under the period of British rule.

Unit-2.Concept of Local-self Government Gandi-Vinoba's grama swaraj

Unit-3.Theory of decentralized local self government

Unit-4.Local-government in rural India and Community development programmes

Unit-5.Balwantrai Mehata Committee, 1957, Ashok Mehata Committee, 1978 and their recommendations on Panchayati Raj system.

Unit-6.The concept of Panchayti Raj

Unit-7.Gramasabha, village and Panchayat, Panchayat Samithi, Zilla Parishad

Unit-8.Panchayat Raj and State Government, Supervision and guidance, General need, present methods and proposals and a new approach.

Unit-9.Political parties and Panchayat Raj

Unit-10. Changing pattern of Panchayat Raj

Unit-11. 73rd and 74th Constitutional Amendment, Dr.L.M. Singhvi and P.K. Thunga recommendations.

Unit-12. Election for Local self –governments: The Panchayat, the Municipalities, the Scheduled and Tribal Areas and the Election Commission for the purpose.

Books recommended :

1. Shriam Maheswari, Local – self government in India

2. M.Venkatarangaiya and G.Raam Reddy, Panchayati Raj in A.P.

3. Iqbal Narain, Panchayat Raj Administration

4. Introduction to constitution of India, Nrij Kishore Sharma

5. L.P.Sharma , History of Medieval India, 1000-1740 AD.

6. Report of High Power Committee on Panchayat Raj

7. Rural and Urban ship Committee Report

Outcomes:

1. To gain the skill development though local self government
2. To understanding the employability facilities to panchayat Raj Institutions
3. To gain the skill development charging the pattern of Panchayat Raj and employment facilities to the constitutional status

	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	2	2	3	2	3	3	3	3	3	3	3
CO2	3	3	2	3	3	3	2	2	2	2	3	2
CO3	3	3	2	2	2	3	2	3	3	3	3	2

SOCIOLOGY –III

(Rural, Urban and Tribal Sociology)

Objectives of the Course:

1. It helps in understanding the different concepts, various organisations associated with the rural India.
2. Ability to analyze the concepts of village community in India.
3. This help in enhancing the skill and competency to understand the rural urban differences, rural problems as well as sociological explanations in rural aspects.

1. Human ecology, rural communities, urban communities and Tribal Communities and their characteristics, issues and problems.

2. Village, Municipalities and Corporations, Gram Swaraj, Community Development.

3. Rural Poverty, Bonded Labour, Agricultural Labour, Rural Employment, Town and Country Planning Environmental Issues, Role of local bodies in Law enforcement.

4. Role of GOs and NGOs in rural and urban settings. Corporate social responsibility in combating rural and urban problems.

5. Gram Nyayalaya, Lok Adalats, Right to Information Act, Legal Literacy.

6. Social Work as a Profession, Methods and techniques of Social Case Work, Social Group work, Community Development and Social Action.

7. Law and Public Opinion, Law as an Instrument of Social Change

8. Tribe and Caste in the traditional Order-Caste and Class in Contemporary India – The Backward Classes.

9. Trends of change in Indian Society – Indian Cultural values and Development – Coercion, Conflict and Change – Sociology as a Discipline _ Law and Society – Sociology of law and sociology of Legal Profession.

Books Recommended :

1. Harvy Johnson ; Sociology- systematic Instruction.

2. Sharma ; Sociology

3. Mao- Iwer and Page – Sociology

4. Kingsley Davis; Human Society;

5. M.Haralambos; Sociology- Themes and Perspectives , Delhi Oxford University Press

6. N.K.Bose: The Structure of Hindu Society, New Delhi, Orient Longman

7. David G. Mandelrsum, Society in India, Bombay, Popular Prakashan

8. Romesh Thappar (ed); tribe , Caste and Religion in India, New Delhi, Macmillan

9. Andre Betalle. The Backward Classes and New Social Order, Delhi, Oxford University Press.

10. A.R.Desai, Rural Sociology

11. M.N.Srinivas , Caste in Modern India.

12. Andre Betalle: Inequality and social change, Delhi, Oxford University Press.

Outcome of the Course:

1. This course elaborates nature of crimes its causes and the ways of to solve the problems as well as objectives of punishment.
2. Its various theories of punishments and also problems of women, challenged groups explosiveness of population
3. The control growth of population, unemployment, poverty, environmental and communication problems, linguist, regional terrarium problems which our country facing.

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Development	P05 Modern Tools	P06 Society	P07 Environment	P08 Ethic	P09 Team Work	P010 Communication	P011 Project Management & finance	P012 Lifelong Learning
C001		3	3	3	3	3	3	3	3	3	3	3
C002		2	2	2	3	3	2	3	2	3	2	2
C003	1	1	2	2	2	2	1	3	3	3	2	2

LEGAL LANGUAGE AND LEGAL WRITING

Objectives

1. Laying foundation of legal terms, Legal Maxims.
2. Talking with difficult kinds of issues of Civil and Criminal
3. Brief or Summary Submissions before (simple precise courts) before courts of law

Unit-1. FUNDAMENTAL PRINCIPLES OF LEGAL WRITING:

1.1. Concisions-clarity, cogency

1.2. Simplicity of Structure

1.3. Attention and awareness of Practical, legal import of sentences

1.4. Communicative Skills

Unit-2. GENERALLY USED LEGAL TERMS AND EXPLANATIONS IN LEGAL PROFESSION

PART-B

Unit-3.The student shall be explained about reading for understanding the contents and Organization of the text,reading for details & language study, vocabulary identification of source of law and case law. Use of legal dictionaries. For the above purpose a passage from a referred law book, journal or judicial decision may be given from the passage. The student may be asked to1 Identify “Legal Terms” 2 Explain those terms 3 Use equivalent other terms 4 Identify case law 5 Analyze the point of law involved 37 6 Precise 7 Answer the questioned put based on that passage

PART-C

Unit-4.CONSTITUTION: Salient features of Indian Constitution

Unit-5.CONTRACTS: Essentials of valid contract-Indemnity, Guarantee, Bailment, Pledge, Partnership, Negotiable Instruments, Hindu Marriage and ground of divorce

Unit-6.TRANSFER OF PROPERTY: Classification of movable and immovable Properties, essentials of gift, lease, mortgage, sale of agreement to sell, will.

Unit-7.EVIDENCE: Definition of Evidence Fact-Fact in Issue, Relevance of facts.

Unit-8.CRIMES: Essentials of Crime-Various categories of crimes.

Unit-9.TORTS: Definition of Torts-Various categories of Torts.

Unit-10. CRIMINAL PROCEDURE CODE: Cognizable, non-cognizable offences arrest, warrant , bail , FIR – Hierarchy of courts.

Unit-11. CIVIL PROCEDURE CODE: Meaning of Order, Rule, Decree Judgment-Hierarchy of Courts.

Part-D

Unit-12. Pleadings and conveyancing in English - Plaint, Written Statement, Sale and Agreement to sell, Gift, lease, Mortgage, Will

Suggested readings

1 Misra S.K – Legal Language and Legal Writing

2 Srikantha Mishra – Legal Language and Legal Writing

3 Sridhar M – Legal Language

4 Chaturvedi A.N – Principles and form of Pleading and Conveyancing

5 De Souza – Conveyancing

6 Mogha – Law of Pleadings

7 Mogha – Indain Conveyance Narayana P.S – Pleadings and Practice (Civil and Criminal)

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Development	P05 Modern Tools	P06 Society	P07 Environment	P08 Ethic	P09 Team Work	P010 Communication	P011 Project Management & finance	P012 Lifelong Learning
C001	3	3	1	2	3	3	3	3	2	3	1	3
C002	3	3	2	3	2	3	3	3	3	2	1	3
C003	3	3	1	2	3	3	3	3	3	3	1	3

JURISPRUDENCE

Objectives

1. Impart knowledge about various concepts of Law, Legal Philosophies and schools of legal theory.
2. Introduce students to the existing legal system in India

Unit-1. Need to study Jurisprudence; Its relationship with political; power structures and just society.

Unit-2. What is a Concept?

2.1. Concept; Ideas and Notions

2.2. What is Theory? Difference between theory; hypothesis; conjecture; and opinions .

Unit-3. What is a Norm?

3.1. Difference between maxims, rules, principles and customary rules

3.2. Differences between Primary Rules and Secondary Rules.

3.3. What is a Normative System

Unit-4. Concept of Law; Its difference with laws of natural science, social sciences, statistics, history 38

4.1. Laws on obligation

Unit-5. Why are Laws obligatory?

5.1. Define and discuss the following legal concepts: liability, obligation, sanction, coercion, compulsion, duty, estoppel, promise, Dharma with case material

5.2. Contractarian Theories: General-will theories and Free-will theories and Autonomous theories particularly Positivist theories connected development of Austin onwards: Reference to Dworkin; Rawls and Marxian terms of the Doctrine of withering away of state, including Transcendental Theories.

5.3. Whom does the law obligate? Personality; people; state-with particular reference to Directive Principles of State Policy; locus standi, Randhir Singh, Golaknath and other relevant cases.

Unit-6. Theories of Authority

6.1. Types of authority; legislative, judicial and customary-their binding nature.

6.2. Bindingness with regard to Precedent. Determination of ratio and methods of Wanbaugh, Salmond, Good Hart, Simpson's approach in Jacob's case. Also the studying factors of Ilewlyn (information to be provided that there is no distinction between making and declaring, basing on Gestault psychology. (Ref: Peter Brett)

Unit-7. Limits on Legislative Authority

7.1. Positivist view that there are no limits. Discuss with reference to Austin, Kelsen, Golaknath and D.C Wadhwa'scase.

7.2. Natural Law view that the limits are defined by principles of morality or natural justice; the legislation, from whatever source, must be in accordance with such principles. Discuss with reference to Aquinas, Finnis.

7.3. The Rationalists view that the limits are set by rational principles of justice Discuss with reference to Kant, Rawls.

7.4. The Basic Structure Doctrine-that the limits are set by the Basic Structure of the Constitution or the law itself; any legislation contrary to the basic structure is non-law (ref: KesavanandaBharathi'scase)

7.5. Define and discuss the basic legal Concept of Reasonableness with reference to Indian cases. State of Madras v. V.G. Row (1952 SC 196). Dwaraka Prasad Laxmi Narayan v. State of U.P (AIR 1954 SC 224). KrishanchandaArora v. Commissioner of Police (1961 3 SCR 135. Hardhan Shah v. State of West Bengal (1975 3 SCC 198). Air India v. NargeshMeerza(AIR 1987 SC 1829). Maneka Gandhi v. Union of India (1978 2SCR 621).

Unit-8. The Functions of Law

8.1. Law as the upholder of the moral order in the society

8.2. Concept of Dharma and connection between Law and Morality

8.3. Law for bringing efficiency and social stability; the utilitarian views

8.4. The differences between the ends of a legal order, a political order and a religious order. Arethey interchangeable? Can one replace another? Issue concerning the dialectics of law

8.5. Law as a means of Social Control

8.6. Law as Volksgeist

Suggested readings

1. Bodenheimer Jurisprudence – The philosophy and Method of Law

2. Fitzgerald, Salmond on Jurisprudence
3. W.Friedmann , Legal Theory
4. M.D.A Freeman Lloyd's Introduction to Jurisprudence
5. H.L.A Hart, the Concepts of Law
6. Dias - Jurisprudence

Outcomes

1. Develop analytical skills and logical thinking
2. Enabling students in understanding the legal and constitutional values
3. Equip students with contemporary legal problems and possible solutions

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Development	P05 Modern Tools	P06 Society	P07 Environment	P08 Ethic	P09 Team Work	P010 Communication	P011 Project Management & finance	P012 Lifelong Learning
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C003	3	3	2	3	2	3	3	3	3	3	1	3

ENVIRONMENTAL LAW

Including Wild Life Protection Act

Environmental law:

1.Provides an understanding of environmental pollution, environmental protection and conservation
2.Imparts knowledge on international conventions on environmental Protection
3.Imparts knowledge on climate change which is a global problem

Unit-1. The meaning of environment and pollution: 1.1. Definition, as defined in the Environment Protection Act: 1986 Sec. 2(a); "Pollution" as defined in the same Act, Sec 2(a), (b), (c), (d), (e); and in the water (Prevention and Control of Pollution) Act, 1974. "Forests", as defined in the Indian Forest Act, 1927, and the Forest conservation Act, 1980. the intended meaning of environment in Constitution, Articles 15(2) (b), 24, 39 (a), (b), (c),(e), (f), 47, 48 A, 49. 1.2. Causative factors of Pollution.

Unit-2. Subject matter of environmental laws:

Unit-3. Types and functions of environmental laws 3.1. Primary Protective Laws 3.1.1.For human-beings: Laws pertaining to: (a) Water (b) Air, (c) Noise, (d) Nuclear radiation, (e) Toxic substances. 3.1.2.For non human-beings: Laws pertaining to (a) Wild life (b) Marine life, (c) Forests, (d)Minor-forests, e) restrictions on trade. 3.2. Primary planning laws 3.2.1.For production :: Laws pertaining to : (a) Land use (b) Irrigation, (c) Industries, (d) Mining, (e) Grazing-land, (f) Catchments areas, (g) Wet land, (h) Estuaries. 3.2.2.For distribution :: Laws pertaining to : (a) Land ceiling (b) Town planning/zoning, (c) Slums, (d) Housing, (e) Recreational areas, (f) Parks, (g) Sanctuaries, (h) Biospheres.

Unit-4. Secondary laws: 4.1. Pertaining to the administration and functioning of Pollution Control Boards; Water- Boards; the Factories Acts, Forest Act Land Reform and Development Acts, industries Act, etc., 4.2. Laws relating to the administration within the

Ministry of Environment and forest. 4.3. Laws relating to the collection, dissemination and publication of data by the Boards of Ministry, concerning. : a) Hazardous material, b) Endangering industries, c) Levels of pollution; and d) Types of safety measures available and implemented. 4.4. Laws relating to the role of the lower courts (including the Forest Courts).

Unit-5. Tertiary laws: 5.1. Constitutional provisions concerning inter-state relations that concern acquisition, regulation and distribution natural resources, (Water, Forests, Mines, Oil) (with special emphasis on Art. 14, 19, 31-A, 31-B, 31-C, 39(b)&(c); Union list; 6, 52, 56, 57. State list: 17, 18, 21, 23. Concurrent List: 17, 17-A, 17-B, 18, 20,and Ninth Schedule. 5.2. Constitutional provisions: The Constitution of India Art. 14, 15, 2(b), 19(e), 21, 31-c, 32, 38, 39, 32, 37, 48-A, 49, 51, 51-A(g).

Unit-6. International parameters of environment: 6.1. Stockholm Declaration and its impact. 6.2. Rio Summit 6.3. United Nations Environmental Programme (UNEP). 40 6.4. State responsibility for environmental pollution 6.5. North South Perspective.

Unit-7. Legal strategies regulation 7.1. Deterrence through criminal liability, strict liability, Absolute Liability and Vicarious liability. 7.2. Principles of calculating penalties and economic sanctions against offenders. 7.3. Principles and methods of standardization 7.4. Managerial 7.4.1.Principles of tortuous liability 7.4.2.Estoppel 7.4.3.Strategies of incentives, through non-taxation, deductions etc., 7.4.4.Methods of recovery through insurances, sureties, bonds etc., 7.5. Environmental courts/Tribunals

Unit-8. Rights in common law: 8.1. Basis of occupancy, usufruct and group or collective rights of indigenous communities in national and international laws.

Unit-9. Natural rights theories and its advocacy in environment related issues: 9.1. Right to life. 9.2. Right to livelihood 9.3. Right to reside 9.4. Right to development 9.5. The rights of future generations

Unit-10. Multinational corporate liabilities: In the legal responsibilities of multinational funding agencies.

Unit-11. Judicial activism and environment:

Prescribed books-

1.Gurdip Singh, Environmental Law

2.S.C.Sasthry, Environmental Law

3.S.C.Tripathi, Environmental Law

4.P.Lela Krishnan environmental law

5.Dr.N.Maheshwara swamy

Outcome of course:

1.Learnt to protect the environment and bring awareness among people about climate change ,conservation , environment protection techniques.

2. It enables to acquaint the various laws which governs our eco system.

3.Acquires basic knowledge of environment, pollution and various laws to reduce the environmental pollution.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	1	3	1	3	3	2	3	1	1	3
CO2	3	3	2	2	2	3	3	3	2	1	1	3
CO3	3	3	2	1	2	3	1	3	1	1	1	2

PROPERTY LAW

(Including Transfer of Property Act and Easement Act)

Property law:

Objectives:

1. Imparts knowledge on the concept of property ,the nature of property rights and the general principles governing the transfer of property
2. Knowledge on the substantive law relating to particular transfers such as sale, mortgage, lease ,exchange , gift and actionable claims.
3. Imparts knowledge on concept of trust and concept of will, easement rights.

PROPERTY LAW (Including Transfer of Property Act and Easement Act)

Unit-1.Jurisprudential contours of property 1.1. Concept and Meaning of Property: New Property; Governmental largesse 1.2. Kinds of property: Movable and Immovable property; Tangible and Intangible property; Intellectual property; Copyright; Patents and Designs; Trademarks 1.3. Private and Public property: Natural resources as property; Privatization of public property 1.4. Capitalist and socialist analysis of property: Property in means of Production 1.5. Possession and ownership as man; property relationship; Finder of lost goods 1.6. Social Functions of Property

Unit-2.LAW RELATING TO TRANSFER OF PROPERTY 2.1. General Principles of transfer of Property 2.2. Specific Transfers 2.2.1. Sale

Unit-3.Mortgage 3.1. Mortgage 3.2. Kinds of Mortgages, Simple Mortgage, Mortgage by conditional sale; distinguished from sale with a condition for repurchase. Usufructuary Mortgages, English Mortgage. 3.3. Distinguished from Mortgage by conditional sale, Mortgage by deposit of title deeds; 3.4. When registration is

necessary? Anomalous Mortgage 3.5. Systematic constraints; When formalities are required? Formalities effect of non - Registration; Debt may be proved 3.6. Rights of Mortgagor; Right to Redeem; distinction between “Due” and “Payable”; Clog on redemption; Partial redemption; Accession to mortgaged property and Improvements; Mortgagor’s power to lease 3.7. Rights and liabilities of Mortgagee; Right to Foreclosure or Sale; Rights to sue for mortgage money; Accession to mortgaged property; Rights of mortgagee in possession; Substituted Security 3.8. Liabilities of a Mortgagee in possession 3.9. Postponement of Prior Mortgage 3.10.Marshalling and Contribution 3.11.Who may Sue for redemption? 3.12.Conventional Subrogation; Legal Subrogation; “Redeem Up and Foreclose Down”

Unit-4.Actionable Claims, Security Interests in Immovables

Unit-5.Charges

Unit-6.Leases

Unit-7.Exchange

Unit-8.Gift

Unit-9. 9.1. Easements 9.2. Creation of Easements 9.3. Nature and Characteristics of Easements 9.4. Extinction of Easements 42 9.5. Riparian Rights 9.6. Licenses

Unit-10.Recordation of Property Rights 10.1.Law relating to Registration of documents affecting property relations; Exemption of leases and mortgages in favor of Land Development Bank from registration 10.2.Recordation of rights in agricultural land with special reference to respective states 10.3.Investigation of title to property 10.4.Law relating to Stamp Duties 10.5.Of the liability of instruments to duty 10.6.Duties by whom payable 10.7.Effect of not only duty stamping instruments; examination and impounding of instruments; inadmissibility on evidence impounding of instruments

Outcomes:

1. To deal with property related civil matters in courts
2. To understand the various modes of transfer of properties such as sale, mortgage, lease ,exchange , gift and laws applicable to such transfers.
3. Awareness on trusteeship , will and easement rights in dealing with those cases in courts

Suggested readings

1. Textbook on Transfer of Property Act, Dr. Avatar Singh
2. Text book on Transfer of Property Act, R.K.Sinha
3. Textbook on Transfer of Property Act, Dr. G.P.Thripathi
4. Textbook on Transfer of Property act, vepa .P. Saradhi

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	2	2	3	3	3	3	1	2	1	3	1	3
CO2	3	2	3	2	3	3	1	2	2	2	1	3
CO3	2	3	3	3	3	3	1	3	2	2	1	3

LABOUR LAW-I

OBJECTIVES

1. Impart knowledge about the development of labour jurisprudence in India
2. Acquaint students regarding existing legislation protecting worker's rights, dispute Redressal mechanism
3. Introduce students to the collective bargaining process as an effective means to solve disputes

Unit-1.HISTORICAL PERSPECTIVES OF LABOUR

1.1. Labour though the ages; Slave labour; guild system; Division on caste basis; Labour during feudal days

1.2. Colonial labour law and policy

1.3. Labour capital conflicts: exploitation of labour, profit motive, poor bargaining power, poor working conditions, unorganized labour, surplus labour, division of labour and super specialization, lack of alternative employment

1.4. International Labour Standards and their implementation

1.5. From laissez faire to welfare state: transition from exploitation to protection and from contract to statute

Unit-2.TRADE UNIONISM

2.1. Labour Movement as a counter measure to exploitation,

2.2. History of Trade Union Movement in India Right to trade union as part of human right to freedom of association, amalgamation, rights and liabilities, dissolution

2.3. Legal Control, and protection of trade union, registration, amalgamation, rights and liabilities; dissolution

2.4. Problems, multiplicity of unions, over politicization intra – union and inter – union rivalry, outside leadership, closed shop and union – shop, recognition of unions

Unit-3.COLLECTIVE BARGAINING

3.1. Concept of collective bargaining

3.2. International norms, conditions precedent; merits and demerits

3.3. Bargaining process

3.3.1. Negotiation

3.3.2. Pressurization: Strike and Lockout, go slow, work to rules, gherao

3.4. Structure of bargaining: plant, industry and national levels

3.5. Duration and enforcement of bipartite agreement

3.6. Reforms in law

Unit-4.STATE REGULATION OF INDUSTRIAL RELATIONS 43

4.1. Theoretical foundations social justice, labour welfare, public interest, productivity, Industrial peace and development, price control

4.2. Methods of regulation

4.2.1. Recognition of mutual arrangements

4.2.2. Assistance to bipartite settlements: conciliation, voluntary arbitration, formulation of standing orders

4.2.3. State prescription of machinery: reference for adjudication (the political overtones), adjudicatory mechanisms (how do they differ from courts?) award, its binding nature, judicial review of awards

4.2.4. State prescription of standards in lay off, strike, lockout, retrenchment, closure and transfer of undertakings

4.3. The Conceptual conundrum: industry, industrial dispute, workmen 4.4. Unfair Labour Practices

Unit-5.Discipline in Industry: restrains on managerial prerogatives

5.1. Doctrine of Hire and Fire: history of management's prerogative

5.2. Fairness in disciplinary process

5.2.1. Punishment for misconduct: meaning of misconduct

5.2.2. The right to know: the charge sheet

5.2.3. The right to defined: domestic enquiry, notice, evidence, cross examination, representation, unbiased inquiry officer and reasoned decision

5.2.4. renatal (permission) and Postnatal (approval); control during pendency of proceedings (S.33 of the I.D.Act.)

Unit-6.Legal Control and protection of trade unions: Indian Trade Union Act of 1926:

6.1. Registration , rights and liabilities of trade union.

6.2. Amalgamation and dissolution of trade union.

6.3. Problems; multiplicity of unions, over politicization, intra – union and inter – union Rivalry, outside leadership, closed shop and union- shop.

6.4. Recognition of unions.

6.5. Amendments to Trade Union Act and reforms in law.

Unit-7.Law relating to service conditions:

7.1. Industrial employment (standing Orders) Act, 1946- Scope and Object of the Act,

7.2. Model Standing Orders, and matters to be incorporated in standing orders (Schedule to the Act)

7.3. Submission of draft standing order, certification and modification of standing orders :

7.4. nterpretation of standing orders and power of appropriate Government to make rules

7.5. Concept of misconduct, disciplinary action and punishment for misconduct.

Unit-8. Law relating Industrial Disputes: Industrial Disputes Act, 1947-

8.1. Conceptual conundrum: industry, industrial dispute, workmen;(Sec.2 'J'K' and 'S');

Unit-9.Law relating Industrial Disputes: Industrial Disputes Act, 1947

9.1. Disputes settlement machinery

9.2. Conciliation officers,

9.3. Board of Conciliation,

9.4. Labour court,

9.5. Industrial Tribunal and National Tribunal – duties and powers; (Sec.3-10)

9.6. Reference for adjudication Voluntary Arbitration (Sec 10 & 10A).

9.7. Award its binding nature and Judicial review of awards. (Sections 18 & 11-A). 44

9.8. Statutory limitations on strikes and lock-outs; unfair labour practices – prohibition and penalties, (Sec.22-31 & 25-T, 25U).

9.9. General and special provisions relating to lay-off, retrenchment and closure (Sections 25A- 25S and 25K – 25R).

Unit-10. Recommendations Second Labour Commission on Industrial Disputes.

Suggested readings

1. R.F.Rustomji : The law of Industrial Disputes in India
2. J.N.Malik :Trade Union Law
3. Bagri :Law of Industrial Disputes, Kamal Law House, 2001.
4. Srivastava :Law of Trade Uniuons, Eastern Book Company, 4th Edition,2002
5. Khan &Khan :Labour Law,Asia Law House,Hyderabad

Outcomes

1.Enabling students in understanding the significance of the protection of rights ensures social justice

2. Awarweness on existing laws and need for reforms , various socio legal issues

3. Finding solutions through problem solving skills and knowledge about redressal mechanism ensuring labour welfare and social justice.

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Development	P05 Modern Tools	P06 Society	P07 Environment	P08 Ethic	P09 Team Work	P010 Communication	P011 Project Management & finance	P012 Lifelong Learning
C001	3	2	1	3	2	3	3	3	2	2	1	3
C002	3	3	2	2	3	3	3	3	3	3	1	3
C003	3	3	1	3	3	3	3	3	3	3	1	3

COMPANY LAW

Objectives

1.The course is designed to understand the formation , management and other activities of the company .

2.Company law is legislation that is concerned with corporate governments and operation of companies and related rules and regulations company law aids with various regulations in the business environment .

3. This course aims to impart the student ,corporate management, control possible abuses and their remedies and government regulations ,the winding up process of the company.

[COMPANY LAW]

Unit 1: Meaning of Company: Various theories of Corporate Personality; Creation and Extinction of company

Unit 2:

2 Forms of Corporate and Non – corporate organizations

2.1 Corporations, Partnerships and other associations of persons

2.2 State Corporations, Government companies

2.3 Public Sector, Small Scale, Co – operative, Corporate and Join Sectors;

2.4 Foreign Collaboration; their role functions and accountability;

2.5 Companies and the Rule of Law, their Civil and Criminal Liability, their Essential Characteristics

Unit 3: FORMALITIES OF A COMPANY:

3.1 Law relating to companies; Public and Private companies Act, 1956

3.2 Need of company for development; Formation of a company; Registration and Incorporation

3.3 Memorandum of Association: Various clauses :Alteration there in: Doctrine of Ultra Vires Articles of Association: Binding force; Alteration; its relations with Memorandum of Association; Doctrine of Constructive Notice and Indoor Management; Exceptions

3.4 Prospectus: Issue – contents- liability for misstatements- Statement in lieu of prospectus

3.5 Promoters – position – duties and liabilities

Unit 4 :SHAREHOLDERS AND DIRECTORS

4.1 Shares, General Principles of allotment, Statutory Restrictions, Share certificate its objects and effects; Transfer of share, Restrictions on transfer, Procedure for transfer, refusal of transfer, role of public financial institutions, relationship between transferor and transferee, issue of shares at premium and discount

4.2 Shareholder: Who can be and who cannot be a shareholder? Modes of becoming a shareholder, calls on shares, forfeiture and surrender of shares, lien on shares, rights and liabilities of shareholder

4.3 Share Capital: kinds, alteration and reduction of share capital, further issue of capital, Conversion of loans and debentures into capital, duties of court to protect the interests of creditors and shareholders

4.4 Director's position, appointment, qualifications, vacation of office, removal, resignation, powers and duties of directors, meeting, registers, loans, remunerations of directors, role of nominee directors, compensation for loss of office, managing directors and other managerial personnel

Unit 5: DIVIDENDS, DEBENTURES, BORROWING POWERS

5.1 Meetings, kinds, procedure, voting

5.2 Dividends, payment capitalization of bonus shares

5.3 Audit and Accounts

Unit 6: DEBENTURES, BORROWING POWERS

6.1 Debentures: meaning, need, floating charge, kinds of debentures, shareholder and debenture holder, remedies of debenture holders

6.2 Protection of Minority Rights

6.3 Prevention of oppression and who can apply? When can he apply? , powers of The court and of the Central Government?

6.4 Borrowing powers, effects of unauthorized borrowing charges and mortgages, Loans to other companies investments, contracts by companies

Unit 7: OTHER ALLIED ASPECTS

7.1 Private companies, nature, advantages conversion into public company, foreign Companies, government companies, holding and subsidiary companies

7.2 Investigations, powers

7.3 Reconstruction and Amalgamations

7.4 Defunct Companies

Unit 8 WINDING UP: Types: by court, reasons, grounds, who can apply?

8.1 Procedure

8.2 powers, of liquidator

8.3 powers of court

8.4 consequences of winding up order

8.5 voluntary winding up by members and creditors

8.6 winding up subject to supervision of court

8.7 Liability of past members

8.8 Payment of liabilities preferential payments

8.9 Unclaimed dividends

8.10 Winding up of unregistered company

Unit 9 :LAW AND MULTINATIONAL COMPANIES:

9.1 Collaboration, agreements for technology transfer

9.2 Control and regulation of foreign companies, taxation of foreign companies, share capital in such companies

Unit 10: Law Reforms

Prescribed books-

1. Avatar Singh: Company Law, Eastern Book company, Lucknkow

2. Anantha Raman, lectures on company Law, Wadhwa and Company

3. KailashRai, Company Law , Allahabad Law Agency, Allahabad

4. Majumdar, Company Law, Taxman Publications

5 . Tandon M.P. ,Company Law, Allahabad Law Agency, Allahabad

6. Palmer, Company Law

7. .Gover, Company Law

8. Ramaih, A Guide to Companieis Act, Wadhwa Publications

Outcomes-

1.The course enables the students to gain basic knowledge, provisions of the company under 2013 amendment act in relation to the types of companies, Memorandum and Articles of association and also administration of company. The students who practice company law understand the official and legal issues faced by companies

2.They also get understanding of the financial structure, management , modes of investment and the liabilities of the company and other forms of the business.

3.This course enable the students to understand the statutory controls and the framework within which the business be conducted by formation of the company, identifying other drives like cooperating issues like capital market, shares, adventures and bankruptcy code 2016.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	2	1	2	1	2	2	1	1	2	3	1	2
CO2	3	3	1	1	3	1	1	2	2	1	1	3
CO3	1	1	3	3	3	2	2	1	3	3	1	2

PUBLIC INTERNATIONAL LAW

Objectives:

1. To understand the basic concepts of international law such as law of sea, law of air etc,.
2. To understand international relations in legal perspective.
3. Imparts knowledge on international trade and economics.

PUBLIC INTERNATIONAL LAW

Unit-1.STATES AS SUBJECTS OF INTERNATIONAL LAW 1.1. Nature of International Law 1.2. Evolution nature of state as a subject of International Law 1.3. Criteria of Statehood 1.4. Distinction between State and Governments 1.5. Recognition of States and Governments 1.6. The notion of State Succession

Unit-2.STATES AS MAKERS OF INTERNATIONAL LAW 2.1. Custom- Creation through State Practice 2.1.1. Concept of "State practices" creative of "Custom" 2.1.2. Types of Custom 2.1.3. Proof of Custom 2.1.4. Place of customary International Law in the evolution, and for the future, of international law 2.1.5. Treaties 2.1.6. Concept of treaties 2.1.7. Types of treaties (bilateral/regional/multilateral; dispositive/non dispositives; Law – creating) 46 2.1.8. Authority to enter into treaties which special reference to India and SAARC 2.1.9. Essential of a valid treaty, with special reference to Jus Cogens 2.1.10. State Succession to treaties 2.1.11. Selected problems in treaty interpretation

Unit-3.International adjudication 3.1. General principles of civilized nations and juristic writing (publicists) as acknowledged Subsidiary 3.2. International Law Creating Act. 3.3. The Resolution of the General Assembly as Law Creating Acts 3.4. The Status of Specialized United Nations Agencies 3.5. The role of international NGO's in international law creation

Unit-4.Individuals, non state communities and peoples in international law 4.1. The traditional discourse concerning Individual as a subject and object of international law 4.2. The basic modification, post charter, in the position of the individual

Unit-5.Equitable resource utilization and just world order 5.1. The traditional concepts of State Jurisdiction 5.2. The reformulation of the law of the common heritage or mankind 5.2.1. From mare liberum to the common heritage of mankind

Unit-6.SEA LAW 6.1. Territorial Waters 6.2. Continental Shelf 6.3. Sea – bed and Ocean – floor 6.4. Special problem of Antarctica.

Unit-7.AIR LAW 7.1. The law of outer space, the moon Treaty, Geo Stationary object in outer space 7.2. Problems of liability in the case of hazards 7.3. The emerging law concerning trans – boundary pollution accident (Chernobyl, Bassle and Bhopal)

Unit-8.INTERNATIONAL ECONOMIC LAW 8.1. The IBRD, The IMF 8.2. The GATT 8.3. The UNCTAD; W.T.O

Unit-9.INTERNATIONAL ORGANISATION 9.1. INTERNATIONAL ORGANISATIONS 9.1.1. League of Nations 9.1.2. United Nations 9.1.3. The General Assembly 9.1.4. The Security Council 9.1.5. The International Court of Justice (ICJ) 9.1.6. The Economic and social Council 9.1.7. The Tursteeship Council 9.1.8. The Secretariat 9.2. Specialised Agencies 9.2.1. International Labour Organisation (ILO) 9.2.2. World Health Organisation (WHO) 9.2.3. United Nations Educational, Scientific and Cultural Organisation (UNESCO)
Unit-10. International Law – Terrorism

Suggested readings

1. International law and Human Rights by S.K.Kapoor
2. Public International law, Dr. Gurupreet Singh
3. Public International Law, B.k.Ahuja
4. Public International Law, Sanganiya

Outcomes:

1. Enables to draft international treaties.
2. Understand how international law today influences and interacts with domestic law in a diversity of substantive areas.
3. To make evident knowledge and understanding of the international rights frame work ,its origins and justifying theories.

	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	3	3	3	3	1	2	3	3	1	3
CO2	3	3	3	2	3	3	1	3	2	2	1	3
CO3	2	3	3	2	3	3	1	2	2	2	1	3

INTERPRETATION OF STATUTES

Objectives:

1.To understand the statutes by using various construction methods when there is an ambiguity in words

2.The true intention of law makers will be taught by the interpretation of Statutes.

3.The role of courts and guided principles for interpretation of modern problems in the society

Interpretation of statutes:

Unit-1. INTRODUCTION 1.1. Difference between construction and interpretation 1.2. Concept and power of interpretation 1.2.1. Literal construction 1.2.2. Other principles of interpretation 1.3. General principles of interpretation 1.3.1. The Primary rule: literal construction 1.3.2. The other main principles of interpretation 1.3.3. Reading words in their context: the external aspect 1.3.4. Reading words in context: the statutory aspect

Unit-2.BENEFICIAL CONSTRUCTION 2.1. Restrictive construction 2.1.1. Consequence to be considered 2.1.2. Presumption against changes in the common law 2.1.3. Mens rea in statutory offences 2.2. Construction to prevent evasion of abuse 2.2.1. Consequence to prevent evasion 2.2.2. Construction to prevent abuse of powers

Unit-3. 3.1. Theoretical or ideological approaches to interpretation 3.2. Judicial restraint 3.3. Judicial activism 3.4. Juristic restraint

Unit-4.PRESUMPTIONS REGARDING JURISDICTION 4.1. Presumptions against ousting established jurisdictions 4.2. Presumptions against creating new, and enlarging established jurisdictions 4.3. How far statutes affect the crown 4.4. Further presumptions regarding

jurisdiction 4.4.1. Territorial extent of British legislation 4.4.2. How far statutes conferring rights affect foreigners 4.4.3. Presumptions against a violation of international law

Unit-5.CONSTRUCTIVE TO AVOID COLLISION WITH OTHER PROVISIONS 5.1. Construction most agreeable to justice and reason 5.1.1. Presumption against intending what is inconvenient or unreasonable 5.1.2. Presumption against intending injustice or absurdity 5.1.3. Presumption against impairing obligation, or permitting advantage from one's own wrong 5.1.4. Retrospective operation of statutes 5.2. EXCEPTIONAL CONSTRUCTION 5.2.1. Modification of the language to meet the intention 5.2.2. Equitable construction 5.2.3. Strict construction of penal laws 5.2.4. Statutes encroaching on rights or imposing burdens

Unit-6.SUBORDINATE PRINCIPLES 6.1. Usage and contemporanea exposition 6.2. Construction imposed by statute 48 6.3. Construction of words in bonam partem 6.4. Change of language 6.5. Understanding associated words in a common sense, and the expressio unius rule 6.6. Generic words following more specific 6.7. Meaning of some particular expression

Unit-7.Intentions attributed to the legislature when it expresses none 7.1. Imperative and directory enactments 7.2. Absolute and qualified duties 7.3. Impossibility of compliance 7.4. Waiver 7.5. Public and private remedies

Unit-8.STARE DECISIS 8.1. The doctrine as inherited by us 8.2. Techniques of innovation (subversion) of stare decisions 8.3. Supreme Court's authority to overrule its own decisions (e.g. The Antalya's Case) 8.4. Advisory jurisdiction and its import on precedent 8.5. Prospective overruling in India 8.6. Objections to judicial review as anti majoritarian

Unit-9.STATUTORY INTERPRETATION AS ASPECTS OF JUDICIAL PROCESS 9.1. Rules of statutory interpretation their judge made character 9.2. Legalism and rule of literal interpretation 9.3. Creativity: mischief and golden rule 9.4. Self discipline: rules of construction in Fiscal and Criminal Statutes 9.5. Technicality rules as to necessary and implied repeal: Rules for interpretation of codifying, consolidating and amending statute 9.6. Values and interpretation

Unit-10. CONSTITUTIONAL INTERPRETATION 10.1.Differentiation from statutory interpretation; Rex Vs. Burah as example 10.2.Literal interpretation 10.3.Harmonious

construction 10.4.Reference to Constituent Assembly debates 10.5.Pith and Substance 10.6.Occupied field 10.7.Residuary power 10.8.Repugnancy 10.9.Amending power 10.10. Directive Principles as sources of Constitutional Interpretation

Prescribed books-

1.Ajit Prakashan, Interpretation of Statutes

2.Dr.M.P.Tondan, Interpretation of Statutes

3. Interpretation of Statutes, Dr.Ashok.K.jain

4. Interpretation of Statutes, P.Krishna swamy

5.Prof.T.Battacharya, Interpretation of Statutes

6.D.S.Chopra, Interpretation of Statutes

outcome of the course:

1.The course will help to solve the real life problems and to face the tough situation rationally

2.Brings awareness on the judicial interpretation which involves construction of words, phrases, and expressions

3.Acquires knowledge on the old and existing statutes contextually relevant and it is used to develop certain rules doctrines and principles by the courts.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	1	3	1	3	3	2	3	1	1	3
CO2	3	3	2	2	1	3	3	3	2	2	1	3
CO3	3	3	2	3	3	3	2	3	2	1	1	2

LABOUR LAW- II

Objectives

1. Impart knowledge relating to issues of wages, health and safety provisions of workers, social security measures
2. Acquaint students with evil practices of child labour, bonded labour and exploitation of weaker sections of labour
3. Acquaint students with legislations extending protection of labour rights and social security

Unit-1. REMUNERATION FOR LABOUR

1.1. Theories of Wages: marginal productivity, subsistence, wages fund, supply and demand, residual claimant, standard of living

1.2. Concepts of Wages (minimum wages, fair wages, living wages, need based minimum Wages)

1.3. Components of Wages: dearness allowance, principles of fixation

1.4. Disparity in Wages in different sectors: need for rationalization and national approach

1.5. Wage determining process: modes and modalities

1.5.1. Unilateral fixation by employer

1.5.2. Bilateral fixation

1.5.3. Conciliation, arbitration and adjudication

1.5.4. Wage Board and Pay Commission

1.5.5. Principles of wage fixation

1.6. Concept of bonus; computation of bonus

1.7. Protection of Wages: nonpayment, delayed payment, unauthorized deductions, remedial measures

Unit-2.Health and Safety

2.1. Obligations for health and safety of workmen legislative controls: factory, mines and plantations

2.2. Employer's liability

2.2.1. Workmen's Compensation

2.2.2. Employees State Insurance

2.2.3. Liability for hazardous and inherently dangerous industries; environmental Protection

Unit-3.Labour Welfare

3.1. Welfare provided by the employers and through bipartite agreements and by statutory prescription

3.2. Provident Fund and Family Pension

3.3. Gratuity

3.4. Interstate migrant workmen; regulation of employment and conditions of service

3.5. Regulation of working hours: Statutory controls

3.6. Woman and labour force

3.6.1. Equal Remuneration Law, maternity benefits protective provisions for women under Factories, plantations and mines laws

3.7. Employment of young persons: prohibition of employment of children, regulation of employment of young persons

Unit-4.Protection of the weaker sectors of labour

4.1. Tribal labour: need for regulation

4.2. Beedi workers

4.3. Unorganized labour like domestic servants: problems and perspectives

4.4. Bonded labour: socio – economic programmes for rehabilitation

4.5. Contract labour regulation

4.6. Constitutional dimensions of labour standards 50

Unit-5.Law relating to wages and bonus :Theories of wages: marginal productivity , subsistence, wage fund , supply and demand , residual claimant , standard of leaving concepts of wages (minimum wage, fair wage, leaving wage, needbased minimum wage): Constitutional provisions : Components of wages:

5.1. Minimum wages Act, 1948: Objectives and constitutional validity of the Act: procedure for fixation and revision of minimum rates of wages: exemptions and exceptions :

5.2. Payment of wages Act, 1936: Regulation of payment of wages Authorized Deductions ,

5.3. Payment of Bonus Act,: Bonus- Its Historical back ground , present position and exemptions , Payment of Bonus (Amendment) Act, 2007

Unit-6.Social Security against employment injury and other contingencies :

6.1. Concept and development of social security measures :

6.1.1. Concept of 'Accident arising out of' and 'in the course of the employment ': Doctrine of notional extension and doctrine and added peril:

6.1.2. Total and partial disablement:

6.1.3. Quantum and method of distribution of compensation

6.2. Employers liability to pay compensation for employment injury: Legal Protection : Workmen's Compensation Act, 1923

6.2.1. Benefits provided under the Act:

6.2.2. Employees State Insurance Fund and Contributions:

6.2.3. Machinery for the implementation of the Act:

6.2.4. ESI Court and appeal to High Court

6.3. Employees State insurance Act, 1948:

Unit-7.Law relating to retirement benefits :

7.1. Employees Provident Fund and Miscellaneous Provisions Act, 1952; Family Pension Scheme1971and Employees Pension Scheme 1995:

7.1.1. The changing rules regarding Employees Provident Fund and Pension Schemes;

7.2. Payment of Gratuity Act, 1972 – Concept of gratuity, Eligibility for payment ofgratuity, Determination of Gratuity, Forfeiture of gratuity

Unit-8.Contract Labour:

8.1. Problems of Contract Labour: Process of Contractualisation of labour

8.2. Legal Protection: Contract Labour (Regulation and Abolition) Act, 1970; Controversy regarding Abolition of contract labour and their absorption; Land mark cases: Air Indian Statutory Corporation. V. United Labour Union, (1977) & SAIL case (2002);

8.3. Proposed amendment and its impact on the contract labour.

Unit-9.Unorganized Sector:

9.1. Problem of Definition and Identification; Unionization problems

9.2. Historical backdrop of proposed bills on social security for unorganized sector (2004, 2005 & 2007)

9.3. Unorganized Sector Worker's Social Security Act, 2008.

Unit-10. LAW REFORMS

Suggested books

1. Taxman's Labour Laws
2. Dr. L. Padmavathi – Lectures on Labour Laws II
3. Dr. SR Myneni – Labour Laws II

Outcomes

1. Awareness on existing social security laws with special reference to women, children and young persons
2. Enabling students in understanding the latest developments in labour laws.
3. Develop practical knowledge about remedial mechanism.

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Development	P05 Modern Tools	P06 Society	P07 Environment	P08 Ethic	P09 Team Work	P010 Communication	P011 Project Management & finance	P012 Lifelong Learning
C001	3	3	1	2	3	3	3	3	2	3	1	3
C002	3	3	2	3	2	3	3	3	3	2	1	3
C003	3	3	1	2	3	3	3	3	3	3	1	3

Family law – II

Objectives:

1. Imparts knowledge about joint family property, separate property and its inheritance partition.
2. Concept of Succession in Hindu personal laws and Islamic personal laws.
3. Imparts knowledge about personal laws based on the religions and eventually enabling us to fulfill the constitutional directives of uniform civil code

FAMILY LAW – II

Unit-1.JOINT HINDU FAMILY (MITHAKSHARA AND DAYABHAGA) 1.1. Mithakshara Joint Families 1.2. Mithakshara coparcenary – formation and incidents, Property under Mithakshara law – separate property 1.3. coparcenery properties 1.4. Dayabhaga coparcenary - formation and incidents 1.5. Property under Dayabhaga law Kartha of the Joint Family – his position, powers privileges and obligations 1.6. Alienation of property – separate and coparcenary 1.7. Debts – Doctrine of Pious Obligation and antecedent debt 1.8. Partition and Re – union

Unit-2.Joint Hindu Family as a social security institution and impact of Hindu Gains of Learning Act and various tax laws in it

Unit-3.INHERITANCE 3.1. Hindus 3.2. Historical perspective of traditional Hindu Law as background to the study of Hindu Succession Act,1956. 3.3. Succession to property of a Hindu male dying intestate under the provisions of Hindu Succession Act, 1956 3.4. Devolution of interest in Mithakshara coparcenary with reference to the provisions of Hindu Succession Act, 1956 3.5. Succession to property of Hindu female dying intestate under the Hindu Succession Act, 1956 3.6. Disqualifications relating to Succession 3.7. General rules of Succession 3.8. Marumakkattayam and Aliyasantana Laws governing people living in Travancore, Cochin and the districts Malabar and South Canara

Unit-4.NEW PROPERTY CONCEPTS, SUCH AS SKILL, JOB ETC, AS NEW FORMS OF PROPERTY

Unit-5.SETTLEMENT OF SPOUSAL PROPERTY: 5.1. A need for development

Unit-6.MUSLIM LAW OF INHERITANCE AND SUCCESSION 6.1. Rules governing Sunni and Shiva law of inheritance 6.2. Differences between Shia and Sunni laws 6.3. Administration of Estates

Unit-7.Wills under Muslim Law

Unit-8.INDIAN SUCCESSION LAW 8.1. Domicile 8.2. Intestate succession

Unit-9.Will – Codicil 9.1. Interpretation - re vocation of will 9.2. Bequests – Conditional – Contingent or void bequests 9.3. Legacies 9.4. Pro- Sale and letter of administration 9.5. Executor – Administrators 9.6. Succession – Certification 52 Paper – 8.3

Prescribed books-

1.Dr.punam Pradhan Saxena family law II
2.Dr.ashok .K.Jain family law II
3.Mayank madhaw family law II
4.Dr.Paras diwan family law II
5.B.M. Gandhi family law II

Outcome of the course:

1.Awareness on codified and uncodified portions of personal and secular laws
2.Develops practical knowledge on inheritance, partition and helps to solve property related issues in joint family system
3.Develops knowledge on process of succession in Hindu and Islam religions

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	2	2	3	3	3	2	1	1	1	1	3
CO2	3	3	1	3	1	3	1	2	2	2	1	3
CO3	1	3	3	1	3	3	1	3	2	1	1	3

TAXATION LAW

Objectives:

1.Imparting knowledge about Fundamental principles, concepts and basic rules in determining imposition of the taxes.
2.Explaining Basic concepts determining in the imposition of direct and indirect taxes and also statutory exemptions, classification of income and heads of income.
3.Basic Constitutional Provisions – and entries in three lists, Scope of Tax Laws, Tax and Fee. Capital Receipt and Revenue Receipt distinguished.

TAXATION LAW

Unit-1.a) Constitutional Provisions – Arts. 265 to 289 – Scope of Tax Laws : b) Tax and Fee. Capital Receipt and Revenue Receipt distinguished.

Unit-2.Direct Tax Laws: a)Income Tax Law: Historical out line, Definitions – 'Income' 'Agriculture Income" ' Previous Year' and 'Assesses' Incidence of Tax and Residential Status. Statutory exemptions (Ss 10 to 13A) classification of Income and Heads of Income (Ss 14 to 59): b) Assessment (Ss.109 to 158) 1. Collection and Recovery of Tax (Ss 19A – 234) 2. Double Taxation Relief/ Clubbing of Incomes (Ss 50-66).

Unit-3.Income Tax Authorities, a)Settlement of cases (S.245). b)Appeals and Revisions (Ss246-269), c)Penalties, offences and Prosecution (Ss270 -280).

Unit-4.Wealth Tax Act: Definitions of Asset, Net Wealth. Valuation Date , Deemed Assets . Exempted Assets.

Unit-5.Indirect Tax Laws

Unit-6.a) Central Sales Act.1956 – Historical outline – Definitions – A detailed study of S. 4 to 6A – Registration of Dealers –Liability in special cases (Ss 16 to 18)

Unit-7.A.P. General Sales Tax Act, 1957 –Definitions: Business – Dealer-Casual Dealer – Total turnover – Registration of dealers (S. 12)

Unit-8.VAT, Scope of VAT, problems and prospects in its application,

Unit-9.Sales Tax Authorities (Ss3 and 4)

Unit-10.Reforms in Law

BOOKS REFERRED

1.Kapil Singhania, Direct Taxes Law&Practice, 2022
2.K. Raj, Taxation Laws

Outcomes:

1.Different kinds of Direct tax laws and Indirect Tax.
2.Income tax authorities - Settlement of cases Appeals and Revisions Penalties, Offences, and Prosecution.
3.Wealth Tax Act Definitions of Asset, Net Wealth. Valuation Date, Deemed Assets, Exempted Assets. Central Sale Tax Act, VAT Sales

	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	3	3	3	3	1	2	3	3	1	3
CO2	3	3	3	2	3	3	1	3	2	1	1	3
CO3	2	3	2	2	3	2	1	2	3	1	1	3

LAND LAWS INCLUDING TENURE AND TENANCY SYSTEM

Objectives:

1. Imparts knowledge on ownership of land and doctrine of emanant Domain
2. Imparts knowledge on land acquisition, land holding, land ceiling land grabbing etc,.
3. Understanding the tenancy reforms, alienation in scheduled areas.

Paper – 8.5 LAND LAWS INCLUDING TENURE AND TENANCY SYSTEM

Unit-1.Ownership of land doctrine of eminent domain

Unit-2.Doctrine of Escheat

Unit-3.Movement of land reforms 3.1. Pre – independence position zamindari settlements, ryotwari settlement, mahalwari system, intermediaries, absentee landlordism, large holdings 3.2. Post independence reforms 3.2.1. Abolition of Zamindaries 3.2.2. Laws relation to abolition of intermediaries

Unit-4.Laws relating to acquisition of property and government control and use of land, Land Acquisition Act. 1894

Unit-5.Laws relating to ceiling on land holding

Unit-6. 6.1. Urban land ceiling 6.2. Agricultural land ceiling

Unit-7.Laws relating to tenancy reforms 7.1. Land to the tiller 7.2. Rent control and protection against eviction

Unit-8.Laws relating alienation/ assignment in scheduled areas

Unit-9.Laws relating to grabbing

Unit-10. Forest laws: Conservation of Forest Act

BOOKS REFERRED

1. Dr. G.B. Reddy, Land laws

2.Justice, K. Ramaswamy, New Law on Land Acquisition in Andhra Pradesh and Telangana

3.Anita. B. Gogia's Laws relating to Land Grabbing in Andhra Predesh.

Outcomes:

1. Awareness on land ownership and possession, escheat.
2. Understanding about the land acquisition by the government, holding on land ceilings, land grabbing.
3. Awareness on eviction of land and rules relating to assignment of lands by the governments.

	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	2	3	3	3	3	3	1	2	3	3	1	3
CO2	3	3	3	2	3	2	2	3	2	2	1	3
CO3	2	3	2	2	3	2	1	2	3	1	1	3

INTELLECTUAL PROPERTY RIGHTS

Objectives-

1. It gives in-depth understanding to the students about the various forms of the Intellectual Property Rights, its relevance and business impact in the changing global business environment. Besides this, the students will also be acclimatized with the leading International Instruments concerning Intellectual Property Rights Protection.
2. To identify the significance of practice and procedure of Patents and to make the students understand the statutory provisions of different forms of IPRs in simple forms.
3. To learn the procedure of obtaining Patents, Copyrights, Trade Marks &Industrial Design

[INTELLECTUAL PROPERTY RIGHTS]

Unit1: INTRODUCTION

1.1 The meaning of intellectual property

1.3 Competing rationales of the legal regimes for the protection of intellectual Property

1.3 The main forms of intellectual property ; copy right, trade marks, patents, designs, geographical indicators merchandise, franchise and forms of unfair competition

1.4 The competing rationales for protection of rights in

Unit – 2: Copyright – Trademarks – Patents - Designs

2.1 Introduction to the leading international instruments concerning intellectual Property rights:

2.2 The Berne Convention, Universal Copyright Convention

2.3 The Paris Union The World Intellectual Property Rights Organization (WIPO)

2.4 UNESCO

2.5 TRIPS

2.6 TRIMS

2.7 WTO

Unit 3: SELECT ASPECTS OF THE LAW OF COPYRIGHT IN INDIA

3.1 Historical evolution of the law

3.2 Meaning of copyright

3.3 Copyright in literary, dramatic and musical work

3.4 Copyright in musical and dramatic work and cinematograph films

3.5 Ownership of copyright

3.6 Assignment of copyright

3.7 Author‟s special rights

3.8 Notion of infringement

3.9 Criteria of infringement

3.10 Infringement of copyright by films of literary and dramatic works

3.11 Importation and infringement

3.12 Fair use provisions

3.13 Video piracy

3.14 Aspects of copyright justice

Unit 4: Remedies, especially the possibility of Anton pillar injunctive relief in India

Unit 5: INTELLECTUAL PROPERTY IN TRADEMARKS

5.1 The rational of protection of trade marks as

(a) an aspect of commercial and

(b) of consumer rights

5.2 Definition; conception of trade marks

5.3 Registration

5.4 Distinction between trademark and property mark

5.5 The doctrine of honest concurrent user

5.6 The doctrine of deceptive similarity

5.7 Passing off and infringement criterial of infringement

5.8 Standards of proof in passing off action

Unit 6: Remedies

Unit 7: THE LAW OF INTELLECTUAL PROPERTY – PATENTS

7.1 Conception of patent

7.3 Historical overview of the patents law in India

7.3 Patentable inventions with special reference to biotechnology products entailing creation of new forms of life

7.4 Process of obtaining a patent: application, examination, opposition and sealing of patents; general introduction

7.4.1 The problem of limited locus standi to oppose, specially in relation to inventions having

potential of ecological and mass disasters

7.4.2 Wrongfully obtaining the invention

7.4.3 Prior publication or anticipation

7.4.4 Obviousness and the lack of inventive step

7.4.5 insufficient description

7.5 Rights and obligations of a patentee

7.5.1 Patents as chose in action

7.5.2 Duration of patent: law and policy consideration

7.5.3 Use and exercise right

7.5.4 Right to secrecy

7.5.5 The notion of abuse of patent rights

7.6 Special categories

7.6.1 Employee invention: law and policy consideration

7.6.3 Combination and selection patents

7.6.3 International patents, transfer of technology, know how and problems of self reliant development

7.6.4 Biotechnology Patents

7.6.5 Patents in nuclear power –new varieties of plant breedsand medicinal plants

7.6.6 Compulsory licenses

7.7 Infringement

7.7.1 Criterial of infringement

7.7.2 Onus of proof

7.7.3 Modes of infringement: the doctrine of colorable Variation

7.7.4 Defense in suits of infringement

Unit 8: Remedies

Unit 9: INTELLECTUAL PROPERTY AND REMEDIES UNDER CRIMINAL LAW

Consideration of some aspects of reform in the law of intellectual property

Unit 10: Information Technology and exclusive marketing rights

Prescribed books-

1.Bainbridge David I- Intellectual Property Law

2.Cornish W.R.- Intellectual Property Law

3.Ganguli Prabhudda- Intellectual Property Law

5.Kamath Nanda- Law relating to computers, Internet & E- commerce

6.Narayanan P - Intellectual Property Law

Outcomes-

1. It helps in understanding statutory provisions to protect particular form of IPRs by Analyzing rights and responsibilities of holder of Patent, Copyright, Trademark, Industrial Design etc.
2. Understanding to Identify procedure to protect different forms of IPRs national and international level.
3. The students can understand how to protect their rights in the IP from others and also know about rights and remedies available against the infringement to their rights.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	2	1	2	1	2	2	1	1	2	3	2	3
CO2	3	3	1	2	3	1	1	2	2	1	2	3
CO3	2	1	3	3	3	2	2	1	3	3	2	1

CIVIL PROCEDURE CODE AND LIMITATION ACT

Objectives:

1. Major procedure law for trail in civil cases.
2. The subject gives practical knowledge about different procedure that are followed in lower courts, High courts and supreme court in connection with civil cases.
3. Court practice in civil cases improves the skills and helps in removing the difficulties that might arise during the course of trail.

Unit-1.INTRODUCTORY 1.1. Concepts of Civil Procedure in India before the advent of the British Rule 1.2. Evolution of Civil Procedure from 1712 to 1901 1.3. Principle features of the Civil Procedure code 1.4. Importance of State Amendments 1.5. Types of procedures – inquisitorial and adversary importance of observance of procedure

Unit-2.SUITS 2.1. Concept of laws suit 2.2. Order I, Parties to suit 2.3. Order II, Frame of suit 2.4. Order IV, Institution of suit 2.5. Bars and suit; Doctrines of Sub Judice and Res judicata 2.6. Place of suing (Sec. 15,20) Territorial jurisdiction 2.7. 'Cause of Action' and Jurisdictional bars 2.8. Summons (Sections 27,28,31 Orders IV, VI, IX) 2.9. Service of foreign summons (sec. 29) 2.10. Power for order (sec. 30, order XI)

Unit-3.PLEADINGS: (ORDER VI) 3.1. Material Facts 3.2. Forms of pleading 3.3. Condition precedent 3.4. Presumptions of law 3.5. Striking out/amendment

Unit-4.PLAINT: ORDER VII 4.1. Particulars (esp. in money suits/suits for immovable property) 4.2. Showing defendants interest and liability 4.3. Ground of Limitation 4.4. Return of plaint 4.5. Rejection of plaint 4.6. Production and listing of documents 4.7. Written Statement 4.8. Counter claim 4.9. Set off 4.10.Framing of issues

Unit-5.APPEARANCE AND EXAMINATION 5.1. Appearance 5.2. Exparte procedure 5.3. Default of portion 5.4. Summoning and attendance of witnesses 5.5. Examination 5.6. Admissions 5.7. Production, Importing, Return of Documents 5.8. Hearing 5.9. Affidavit 5.10.Order XVII 56 5.11.Adjournments , judicial discretion and problems arrears

Unit-6.JUDGMENT AND DECREE 6.1. Concepts of judgment decree and interim Orders and stay 6.2. Injunctions 6.3. Appointment of Commissions, Receivers 6.4. Costs

Unit-7.EXECUTION (ORDER XXI) 7.1. Concept of 'Execution' 7.2. General Principles of Execution 7.3. Power for Execution of Decrees (sec.38-46) 7.4. Procedure for Execution (sec51-54) 7.5. Enforcement: Arrest and Detention (sec 55-59) 7.6. Attachment (sec 60-64) 7.7. Sale (sec 65-67)

Unit-8.SUITS IN PARTICULAR CASES: 8.1. Suits by or against Government (sec 79-82) 8.2. Suits by aliens and by or against foreign Rulers Ambassadors (Sec 83,87(a)) 8.3. Suits relating to public matters (sec 91,93) 8.4. Incidental and supplementary proceedings (sec75-78, 94-95) 8.5. Suits by or against minors, persons with unsound mind, indigent persons etc. 8.6. Inter pleader suits

Unit-9.APPEALS AND COMISSION 9.1. Appeals from Original Decrees (sec. 96-99A) and Order XLI 9.2. Appeals from Appellate Decrees (Sec 100-103) 9.3. Appeals from Orders (sec 101-106) (Order XLIII) 9.4. General Provisions Relating to Appeals (sec 107-108) 9.5. Appeals to the Supreme Courts (sec109) 9.6. The rationale of Commissions 9.7. Order XXVI 9.8. Social-legal Commissions of inquiry in : Social Action or 'Public' Interest Litigation

Unit-10.LIMITATION 10.1.Concept of limitation-why limitation? 10.2.General principles of Limitation. 10.3.Extension-Sufficient cause-acknowledgement 10.4.Legal Disability-condo nation-when comes to an end? 10.5.Limitation Act of 1963 (excluding Schedules)

Prescribed books-

1.Mayank madhaw, Civil Procedure Code

2.Dr.Avtar singh, Code of Civil Procedure

3.D.N.Mathur, Code of Civil Procedure

4.C.K. Thakker, Code of Civil Procedure

5. Code of Civil Procedure, Dr.Promodh kumar singh

6. Code of Civil Procedure , Dr.Medha kolhatkar

Outcome of the course:

1.Awareness on various stages through which a civil case passes, and the connected matters.

2. law of limitation brings awareness about time limitation to deal with various legal issues.

3. Develops knowledge on trial procedure on civil cases and improves the practical application of laws

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	3	2	2	3	1	3	1	3	1	3
CO2	3	3	2	2	1	1	2	3	2	1	1	3
CO3	3	3	3	1	1	3	1	3	2	2	1	3

LAW OF CRIMES – II

(Criminal Procedure Code)

Objectives:

1. Criminal Procedure code is major procedural law dealing with the concept of procedure adopted in criminal courts.
2. The course enhances the skill of the students to handle the criminal cases in Lower courts, High courts, and Supreme courts.
3. The topics like arrest, search and seizure, pre-trial process like FIR and trial process enhances the skills of the students in practical approach when they are practicing.

LAW OF CRIMES – II (Criminal Procedure Code)

Unit-1.INTRODUCTORY 1.1. The rationale of Criminal Procedure: The importance of Fair Trail 1.2. Constitutional perspectives: Articles 14,20 and 21 1.3.The variety of Criminal procedures 1.4. The organization of Police, prosecutor, Defense, Counsel and Prison Authorities and their duties, functions and powers 57 1.5. Types of procedures-inquisitorial and Advisory-importance of observance of procedure

Unit-2.PRE-TRIAL PROCESS ARREST :SEARCH AND SEIZURE 2.1. The distinction between cognizable and non-cognizable offences: relevance and adequacy problems 2.2. Steps to ensure accused's presence at trail: Warrant and summons cases 2.3. Arrest with and without warrant (sec 70-73 and 41) 2.4. The absconder's status (sec82-85) 2.5. Rights to arrest 2.5.1. Rights to be informed of the grounds of arrest (sec.55,60(1),75) 2.6. Rights to be taken to the Magistrate without delay (sec56-57) 2.7. Rights of not

being detained for more than 24 Hours (sec 57 Article 22(2) of the Constitution of India) 2.8. Rights to consult legal practitioner and legal aid 2.9. Rights to be examined by a medical practitioner (sec54) 2.10.Search warrant (sec.83,94,97,98)and Searches without warrant (sec.103) 2.11.Police search during investigation (sec, 153, 165,166) 2.12.General Principles of search (sec.100) 2.13.Seizure (sec.102) 2.14.Constitutional aspects of validity of search and seizure proceedings

Unit-3.PRE – TRIAL PROCESS: FIR 3.1. FIR (sec.154) 3.2. Evidentiary value of FIR (sec. 145,157 of Indian Evidence Act) 3.3. Pre – trial process: Magisterial power to take cognizance (sec.195-199 Cr.P.C.)

Unit-4.TRIAL PROCESS AND FAIR TRIAL 4.1. Commencement of proceedings (sec.200, 201,202) 4.2. Dismissal of complaint (sec. 203,204) 4.3. Bail 4.3.1. Bailable and non – bailable offences (sec.436,437,439) 4.3.2. Cancellation of bails (sec.437(5)) 4.3.3. Anticipatory Bail (sec.438) 4.3.4. Appellate Bail powers – suspension of sentence (sec.389(1),395(1), 437(5)) 4.3.5. General Principles concerning bond (sec.441-450) 4.3.6. Constitutional principles regarding bail 4.4. Conception of fair trial 4.5. Presumption of innocence 4.6. Venue of trial (sec.177-189) jurisdiction of criminal courts 4.7. Right of accused to know the accusation (sec.221-224) 4.8. The trial must generally be held in accused's presence (sec.205, 273, 317) 4.9. Right of cross examination and to offer evidence in defense 4.10.Constitutional interpretation of Article 21 as a right to speedy trial

Unit-5.CHARGE 5.1. Form and content of charge (sec.211, 212, 216) 5.2. Separate charges for distinct – offences (sec.218, 219, 220, 221, 223)

Unit-6.PRELIMINARY PLEAS TO BAR THE TRIAL: 6.1. Jurisdiction (Sec.26, 177-188, 461, 462, 479) 6.2. Time limitations – Rationale and scope (sec.468, 473) 6.3. Pleas of autrefois acquit and autrefois convict (sec.300, 22(d)) 6.4. Issues – estoppel 58

Unit-7.TRIAL BEFORE A COURT OF SESSION (Procedural steps and substantive rights under sec.226- 236)

Unit-8.JUDGEMENT 8.1. Form and content (sec.354) 8.2. Summary trial (sec. 260-265) 8.3. Post conviction orders in liew of punishments; emerging panel policy(ss.360, 361, 31) 8.4. Compensation and cost (sec.357, 358) 8.5. Modes of providing judgment (sec.353, 362, 363)

Unit-9.APPEALS AND REVISION 9.1. No appeal in certain cases (sec.372, 375, 376) 9.2. The rationale of appeals, review, revisions 9.3. The multiple range of appellate remedies 9.3.1. Supreme Court of India (sec. 374, 379, Articles 132, 134) 9.3.2. High Court (sec.374) 9.3.3. Sessions Court (sec.374) 9.3.4. Special right to appeals (Sec. 380) 9.3.5. Governmental appeal against sentencing (sec.377, 378) 9.3.6. Judicial power in disposal of appeals (sec.168) 9.3.7. Legal aid in appeals

Unit-10.PROBATION AND PAROLE AND PROCEDURE UNDER PROBATION OF OFFENDERS ACT AND SPECIAL PROCEDURES IN CRIMINAL MATTERS 10.1.Problems and principles 10.2.Suspension of sentence 10.3.Meaning of Parole 10.4.Authority granting parole 10.5.Supervision 10.6.Conditional release 10.7.Procedure under Juvenile Justice Act. 10.8. Juvenile Justice system 10.9.Treatment and rehabilitation of juveniles 10.10. Juvenile – adult crimes 10.11. Protection juvenile offenders, legislative and judicial role 10.12. Concept of juvenile delinquency

Books referred:

1. Swamy N.M, Law relating to Criminal Procedre
2.Padala Ramireddy, Criminal Procedure Code,
3.A.K.Pillai, Code of Criminal Procedure

Outcomes:

1. Helps to identify, explain and apply the principles of criminal law.
2. Enables to access, use, interpret and apply complex statutory material to solve criminal law problems
3. Enables to obtain a fair idea how the code works and criminal justice delivery system.

	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	2	3	3	3	3	1	2	3	3	1	3
CO2	3	3	3	2	3	2	2	2	2	2	1	3
CO3	2	3	3	2	3	2	1	2	3	2	1	3

LAW OF EVIDENCE

Objectives

1. To findout the Authenticity of Evidences produced by parties
2. To sustain Fair Justice

Unit-1.INTRODUCTORY

1.1. Conceptions of evidence in classical Hindu and Islamic Jurisprudence

1.2. Evidence in Customary Law Systems (Non – state law)

1.3. The introduction of the British 'Principles' of evidence

1.4. The main features of the Indian Evidence Act.

1.5. Other Acts. Which deal with evidence (special reference to CPC, Cr.P.C., Central Act. Such as Banker's Book Evidence Act., Fiscal and Revenue Laws etc.,

1.6. Problem of Applicability of Evidence Act. 59

1.6.1. Administrative Areas

1.6.2 Administrative Tribunals

1.6.3 Industrial Tribunals

1.6.4 Commissions of Enquiry

1.6.5 Court – martial

1.6.6 Need for industrial Tribunals, Commissions of Enquiry, Court Martial, Unfair means of examination, Arbitration, Disciplinary proceedings

Unit-2.CENTRAL CONCEPTIONS IN LAW OF EVIDENCE

2.1 Facts: Sec. 3; Definition, distinction (relevant facts/ facts in issue)

2.2 Evidence: Oral and documentary (is 'real' or 'material' evidence Covered by this) – Primary and Secondary evidence

2.3 Circumstantial Evidence, Direct Evidence and Hearsay evidence

2.4 Presumption (sec.4)

2.5 'Proved' ,'Disproved' and Not Proved

2.6 Witness

2.7 Appreciation of Evidence

Unit-3.FACTS: RELEVANCY

3.1 The Doctrine of Res Gestae (sec.6,7,8,9)

3.2 Evidence of Common Intention (sec.10)

3.3 The problems of relevancy of 'Otherwise' Irrelevant become Relevant Facts (sec.11)

3.4 Relevant facts for proof of custom (sec. 13)

3.5 Facts concerning bodies and metal state (sec.14 & 15)

Unit-4.ADM ISSIONS AND CONFESSIONS

3.1 General principles concerning Admissions(sec. 17-23)

3.2 Differences between 'Admission' and 'Confession' The problems of non – admissibility of confessions Caused by inducement, threat or promise (sec. 24)

3.3 Inadmissibility of Confession made before a Police Officer (sec.25)

3.4 Admissibility of 'Custodial' Confessions (sec 26)

3.5 Admissibility of 'information' received from an accused Person in custody; with special reference to the problem of discovery based on 'Joint statement' (sec. 27)

3.6 Confession by Co – accused (sec. 30)

4.7 The problems with the judicial action based on a 'Retracted Confession'

Unit-5.DYING DECLARATION OTHER STATEMENTS BY PERSONS WHO CAN NOT BE CALLED AS WITNESSES

5.1 The justification for relevance on dying declaration (sec. 32)

5.2 The judicial standards for appreciation of evidentiary value of dying declarations

5.3 Section 33(2) to (8); General Principles

5.4 Special problems concerning violation of women's rights In marriage in the Law of Evidence (sec. 32 (6))

Unit-6.RELEVANCE OF JUDGMENTS

6.1 General principles (sec. 40 – 44)

6.2 Admissibility of Judgments in civil and criminal matters (sec. 43)

6.3 'Fraud and "Collusion" (sec.44)

Unit-7.EXPERT TESTIMONY

7.1 General Principles (sec. 45- 50)

7.2 Who is an Expert? Types of Expert Evidence

7.3 Opinion on Relationship especially proof of marriage (sec. 50) 60

7.4 The Problems of Judicial defense to expert testimony

Unit-8.ORAL AND DOCUMENTARY EVIDENCE

8.1 General Principles concerning oral evidence (sec. 59 -60)

8.2 General principles concerning documentary Evidence (sec. 67 – 90)

8.3 General Principles Regarding Exclusion of oral by Documentary Evidence

8.4 Special problems regarding Hearsay Evidence

8.5 Estoppel in relation to oral and Documentary Evidence

Unit-9.WITNESSES, EXAMINATION AND CROSS EXAMINATION

9.1 Competency to Testify (sec. 118)

9.2 State Privilege (sec. 123)

9.3 Professional Privilege (sec. 126,127, 128)

9.4 Approver Testimony (sec.133)

9.5 General Principles of Examination (sec. 135 – 166)

9.6 Leading Questions (sec. 141- 143)

9.7 Lawful Questions in Cross Examination (sec. 146)

9.8 Compulsion to answer questions put to witness (sec. 147, 153)

9.9 Hostile Witness (sec. 154)

9.10 Impeaching of the standing or credit of witness (sec. 155)

Unit-10.BURDEN OF PROOF AND ESTOPPEL

10.1 The General and Special Exceptions to Probandi (sec. 101)

10.2 General and Special Exceptions to Onus Probandi

10.3 The justification of presumptions of the Doctrine of Judicial Notice

10.4 Justification as to presumption as to certain offences (sec. 113- A)

10.5 Presumptions as to Dowry Death (sec. 113 – B)

10.6 The Scope of the Doctrine of Judicial Notice (sec. 114)

10.7 Why Estoppel? Introduction as to the Rationale (sec. 115)

10.8 Estoppel, Resjudicata and Waiver: and Presumption

10.9 Estoppel as a matter of

10.10 Estoppel by Deed

10.11 Estoppel in fair

10.12 Equitable and promissory Estoppel

10.13 Questions of corroboration (sec. 156, 157); Accomplice

Improper admission and of witness in civil and criminal cases - Arising out of discussion of these areas the class should take Up issues of law reform. The Sixty Ninth Report on the Indian Evidence Act by the Law Commission of India proposes many Changes. Some of these must by promotion of Human Rights in the administration of justice

Books referred:

1.Padala Rami Reddy, Law of Evidence, 1872

2. The Law of EVIDENCE by Batuk Lal

3. Principls of The Law of Evidence, Dr. Avathar Singh.

Outcomes of the course.

1. Evidence is an imperative part of every case, whether it is a criminal case or a civil suit as it validates a fact.

2.Thus various types of evidence can be used for proving and disproving facts. Moreover, evidence helps in curbing down the time dedicated to a particular case

3. It can be concluded that the evidence is for judicial behaviour like the reasoning for logic.

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Develop Ment	P05 Modern Tools	P06 Society	P07 Environment	P08 Ethic	P09 Team Work	P010 Communication	P011 Project Management & finance	P012 Lifelong Learning
C001	3	3	1	2	3	3	3	3	2	3	1	3
C002	3	3	2	3	1	3	3	3	3	2	1	3
C003	3	3	1	2	3	3	3	3	3	3	1	3

BANKING LAW

Objectives-

1.Banking law deals with the evolution and development of the Banking system in India and its structure. the role and powers and functions of the RBI and types of banks, legal issues governing the relationship between the banker and customers services provided by the Banking sector.

2.The study of this subject also helps to prevent such bank failures by prescribing minimum capital requirements and also ensures the balanced development of banking companies.

3.After completion of the course, the law students are able to understand the concepts and practice and adopt the latest technology in money transactions like PhonePe, Google pay, and ATMs and other financial services like the payment systems

Unit-1. The Nature and Development of Banking

1.1. History of Banking in India – Evolution

1.2. Constitutional perspectives – Union list entries 36,37, 38,43,44,45 And 46 State list, entry 30 of List II

Unit-2. RELATIONSHIP OF BANKER AND CUSTOMER

2.1. Banker, banking business, meaning of customer, types of accounts

2.2. Contract between banker and Customer, general relation, legal relation, their rights and duties

2.3. Banker's Lien

2.4. Banking instruments, bank notes, bankers drafts, deposit receipts, Letter of credit, indemnities, traveler's cheques, postal order, Dividend warrants, bonds

Unit-3. LAW RELATING TO BANKING COMPANIES IN INDIA

3.1. The Banking Companies Act. 1949, Extent and application, business of Banking companies, control and management by reserve bank, suspension of business and winding up of banking companies, special provisions for speedy disposal of winding up of proceedings

Unit-4. The Banking Regulation Act,1948

Extent and application business of Banking companies, provisions for winding up

Unit-5. Reserve Bank of India Act, 1934

Characteristics, and functions, objectives legal status and organizational structure, functions such as; banking, Currency, banker to government, exchange control over non banking companies and supervision of other banks (see sections 17,18 and 42).

Co – operative banking law: Banking Regulation (Co- operative Societies) Rules, 1966 – Co –operative Credit Society Act. 1904 and 1970

Unit-6. NATIONALISATION OF BANKS:

6.1. Banking Companies (Acquisition and Transfer of undertaking) Act. 1969 and 1970

6.2. Legislative competence for nationalization: Entries 43, 44 and 45 of List – I Entry 42 of List – III, Entry 7 and 52 of List – I, Entries 24, 26, 27 of List – II, 33 of List – III: Entries 54, 56 of List – I: Articles 19(1) (f), 19(5), 31, 31 (1)

6.3. Banks before and after nationalization: growth, assets and liabilities, efficiency and profitability, recovery frauds in banks, bank robberies

Unit-7. FOREIGN EXCHANGE CONTROL AND BANKING FOR NONRESIDENTIAL INDIANS

7.1. FERA , 1974, authorized dealers in foreign exchange, restrictions on dealing on payment (Sections 3 to 10, 13 to 17, 19 22 to 27 only)

Unit-8. Law relating to negotiable instruments: Negotiable Instruments Act, 1881

8.1. Meaning, Kinds of negotiable instruments, promissory notes

8.2. Bills of exchange, holder, holder in due course, parties

8.3. Negotiation, presentiment, discharge from liability

8.4. Dishonour, noting and payment for honour cheques, crossing of cheques, pledge land II stocks, shares, life policies, documents of title to goods, guarantee and hypothecation

Unit-9. Reforms in Indian Banking Law:

The Indian banking commission and banking laws, committee of Government of India, A review of their Recommendations

Prescribed books-

1.Sheldon, Law of Banking

2.Tunner, Law of Banking

3.Gulati, Banking Companies Act.

4.Maheswari, Banking Law and Practice

5.Ravi. R Mehta, Fundamentals of Banking

6.Promod Kumar Mukherjee, Modern Banking Theor

Outcomes-

1.To know the history of banking in India and its evolution till date. And also about the banking Regulation act,1949 which is the primary source of regulation for the Banking Companies Act.

2.Understanding the legal relation between banker and customer, role of RBI, Deposit Insurance corporation of India.

3. Use of ICT in banking infrastructure and security issues.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	2	1	2	3	2	2	1	1	2	3	1	1
CO2	3	3	2	2	1	1	1	2	2	1	1	3
CO3	2	1	3	3	3	2	2	1	1	3	2	1

MEDIA LAW WITH RTI ACT

with the right to information act (optional paper – v)

Objectives of the Course:

1. Identify in law that relates to different aspects of the media.
2. Areas that come under media law are broadcast television, radio, and preprint media, such as newspapers and recent internet through things like social media or digital media.
3. Media law relates to legal regulation of the telecommunication industry information technology, broadcasting, adverting the entitlement industry, and censorship as the internet.

Unit – 1: Mass media – Types of – Press Films, Radio Television. Ownership patterns – Press – Private – Public, Ownership patterns – Films – Private, Ownership Patterns – Radio & Television, Public, Difference between visual and non – visual media – impact on peoples minds.

Unit – 2: Press – Freedom of speech and Expression – Articles 129 (1) (a): Includes Freedom of the press, Laws of defamation, obscenity, blasphemy and sedition, Law relating to employees wages and service conditions, Price and page Schedule Regulation, Newsprint and Control Order, Advertisement – is it included with in freedom of speech and expression? Press and the Monopolies and Restrictive Trade Practices Act

Unit – 3: Films -How far included in freedom of speech and expression? Censorship of films – Constitutionally, The Abbas Case, Difference between films and press – Why Pre censorship valid for films but not for the press? Censorship under the cinematography Act.

Unit-4: Radio and Television – Government Monopoly; Why Government department? Should there be an autonomous corporation? Effect of television on people. Report of the Chanda Committee, Government Policy, Commercial advertisement, internal security of serials, etc. judicial Review of Doordarshan decisions: Freedom to telecast.

Unit – 5: Constitutional Restrictions; Radio and television subject to law of defamation and obscenity, Power to legislate – Article 246 read with the seventh schedule, Power to impose tax – licensing and license fee.

Unit – 6: Right to Information: Development of RTI in India

Unit – 7: Right to Information Act , 2005; its implementation

Unit – 8: Right to Information Decisions; Decisions of Judiciary

Unit – 9: RTI and Decisions of Chief Central Information commissions and State Information Commission under the RTI Act, 2005.

Unit – 10: Law Reforms in India

Books Recommended :

1. M.P.Jain, Constitutional Law of India (1994) Wadhwa.
2. H.M. Seervai, Constitutional Law of India Vol.1. (199)Tripathi, Bombay.
3. Rajeev Dhavan "On the law of the Press in India" 26JI.L/288(1984).
4. Rajeev Dhavan, "Ligitimating Government Rehtoric: Reflections on some Aspects of the Second Press commission " 26 J. L /391 (1984)
5. Soil Sorabjee, Law of person Censorship in India (1976).
6. Justice E.S. Venkatramaiah, Freedom of Press: some Recent Trends (1984)
7. D.D. Basu, The Law of Press of India (1980)
8. Right to Information Act, 2005, SP Sathe, 2006.
9. Right to Information in India, Solu Nigam

Outcome of the Course:

1. The student will have a good knowledge of the main legal issues of the freedom of expression and information and of the media system and will be able to deal with the challenges of the technological evolution of the sector
2. Media is a hybrid of traditional and business law. It provides access to diverse fields in the industries and has various career opportunities.
3. Through this subject the law student gets opportunities to work as legal advisors in print media such as news-papers magazines and electronic media such as news channels

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Commutation	PO11 Programme Management	Po12 Life Long Learning
CO1	3	3	3	3	3	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3	2	3

PRACTICAL TRAINING – I

Drafting, Pleading and Conveyancing

Objective of the Course:

1. This course is designed for training the students in the drafting of pleadings and conveyances and other essential documents.
2. This course will help the students to enhance legal drafting skills. It not only focuses on the theory of effective drafting guidelines but also provides relevant formats to assist in understanding practical application of concepts and developing the necessary skills of drafting legal documents.

A DRAFTING:

General Principles of drafting and relevant substantive rules shall be taught.

B PLEADINGS:

1 CIVIL

1 Plaint

2 Written statement

3 Interlocutory Application

4 Original Petition

5 Affidavit

6 Execution Petition

7 Memorandum Petition

8 Petition under Articles 226 and 32 of the Constitution of India

2 CRIMINAL

1 Complaint

2 Criminal Miscellaneous Petition

3 Bail Application and

4 Memorandum of appeal and revision

C CONVEYANCING:

1 Sale Deed

2 Mortgage Deeds

3 Lease Deed

4 Gift Deed

5 Promissory Note

6 Power of attorney

7 Will

Drafting and pleadings will include 15 exercises and carry 45 Marks, Conveyancing will include 15 exercises and carries 45 Marks. These 30 exercises shall be recorded. Each student shall be served with different Problems for the purpose of the exercise.

Books prescribed:

1. M.C. Agarwal and G.C. Mogha, Mogha's Law of Pleadings in India
2. M.R. Mallick, Ganguly's, Civil Court: Practice and Procedure

Outcome of the Course:

1. A student who acquires the requisite knowledge, perfection and proficiency in the drafting of these matters, shall undoubtedly become a perfect legal professional. He will be an asset in the legal world
2. The students learn to draft different types of contracts including commercial agreement professional service agreements employment agreements.
3. It helps students to draft different deeds and agreements.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethics	PO 9 Team Work	PO10 Communication	PO11 Programme Management	Po12 Life Long Learning
CO1	3	3	3	2	3	3	3	3	2	3	2	3
CO2	3	3	3	2	3	3	3	3	2	3	3	3
CO3	3	3	3	2	3	3	3	3	2	3	3	3

PRACTICAL TRAINING – II

Professional Ethics and Accounting System

Objectives of the Course:

1. In the changing world of legal practice, a high standard of ethics and professional conduct is the only tool that can ensure a stimulant justice system.
2. Through this subject the student will get acquainted with utility of code of legal ethics as a profession, recent trends and development in legal ethics.
3. Through this subject the students will be introduced to the goals and responsibilities of legal professionals

Unit 1:

1.1 Law and legal profession – development of legal profession in India

1.2 Right to practice – a right or privilege? Constitutional guarantee under article 19 (g) and its scope

Unit 2:

2.1 Regulation governing enrolment and practice. Practice of law – Whether a business?

2.2 Solicitors firm – whether and industry

2.3 Elements of advocacy

UNIT 3: ETHICS

3.1 Seven lamps of advocacy

3.2 Advocates duties towards public, clients, court, towards other advocates and legal aid

3.3 Bar Council code of ethics

UNIT 4: DISCIPLINARY PROCEEDINGS:

4.1 Professional misconduct – disqualifications

4.2 Functions of Bar Council of India/ State Bar Councils in dealing with disciplinary proceedings

4.3 Disciplinary committee

4.4 Disqualification and removal from rolls

* 50 Selected opinions of the Disciplinary Committee of Bar Councils And 10 major judgments of the Supreme Court on the subject to be Covered

UNIT 5:

5.1 Bar – Bench relations

UNIT 6: ACCOUNTANCY OF LAWYER

6.1 Nature and functions of accounting

6.2 Important branches of accounting

6.3 Accounting and law

6.4 Use of knowledge of accountancy in legal disputes especially arising out of law of contracts, tax law etc.

6.5 Accountancy in lawyers office / firm

6.5.1 Basic financial statements

* Income & Loss accounts
* Balance sheet – interpretation thereof
* Feature of Balance sheet

6.5.2 Standard costing

There shall be a University written examination on this paper For 80 Marks and viva – voce examination carrying 20 Marks. The viva – voce board. The candidate shall get a minimum 1/3rd of marks allocated for each component and 40% on the aggregate

Books prescribed:

1. Charles Sampford and Hugh Breakey - Law, Lawyering and Legal Education: Building an Ethical Profession in a Globalizing World.
2. Prof. Dr. R. Venkat Rao – Legal Ethics and the Profession of Law.
3. Ann Southworth and Catherine L. Fisk - The Legal Profession: Ethics in Contemporary Practice.
4. Donald Nicolson and Julian Webb - Professional Legal Ethics: Critical Interrogations.
5. Dr. S. P. Gupta – Professional Ethics, Accountancy for Lawyers and Bench-Bar Relations.

The outcome of the Course:

1. This subject creates awareness about the unique work culture of the law fraternity and in part such knowledge of its role as feature lawyer's judges' prosecutors and administrators etc.,

2. Through this course students will be able to recognize the most common ethical and professional liability channels and will know methods for resolving them with the highest professional standards.
3. The students will understand the importance of integrity, honesty, diligence accountability and commitment to excellence in interaction with other lawyers governing bodies clients and the public.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethics	PO 9 Team Work	PO10 Commutation	PO11 Programme Management	Po12 Life Long Learning
CO1	3	3	2	2	3	3	3	3	2	3	2	3
CO2	3	3	2	2	3	3	3	3	2	3	2	3
CO3	3	3	2	2	3	3	3	3	2	3	2	3

PRACTICAL TRAINING - III

Alternate Dispute Resolution

Objectives

1. To save the precious time, money of the parties to the suit
2. To ensure speedy justice
3. Ensuring preventive steps than curatives, Conciliation and Counseling Procedure

Unit-1.Judicial dispute resolutions ; Characteristics, Operation Principles, Party participation and Control Short focus on issue, Reasoned Decision, Finality, 68 Adversary Process, what course do and do not do effectively? Advantages and Disadvantages of such resolution.

Unit-2.Alternative dispute resolution , Alternative to formal adjudication – Techniques processes, Unilateral – Bilateral – Triadic (Third party) Intervention, Advantages – Limitations, Distinction between arbitration – conciliation and negotiation, Distinction between judicial settlement and alternative dispute resolution.

Unit-3.Self help, avoidance and lumping Negation mediation ,conciliation, arbitration and distinctions in between Alternate models in dispute resolutions, Role of Panchayat, Role of GramaSabhas, Lokpal, LokAdalats, Family Courts,

Unit-4.The Arbitration and conciliation Act, 1996. Background of the Act, Definitions of "Arbitration","Arbitrator", Arbitration agreement", Appointment of "Arbitrator", grounds for changing the arbitrator, termination of Arbitrator.

Unit-5.Proceedings in arbitral tribunals and enforcement of awards, Arbitral Award Termination of Proceedings, Setting aside of arbitral award, Finality and Enforcement, Appeals, enforcement of foreign awards, New York and Geneva Convention Awards.

Unit-6.Section 89 and O-10, R-1-AB and C of CPC Conciliation, Meaning and definition conciliation agreement, appointment of conciliator, powers and function of conciliator, techniques of successful conciliation proceedings, enforceability.

Unit-7.Other Alternative modals of dispute resolution, Family Courts, Family Courts Act, 1984,family council ling techniques, Tribunals, Motor Accent.

Unit-8.Tribunals, MV Act, relevant provisions, Administrative Tribunals, Consumer Forms.

Unit-9.Legal Services Authority

Unit-10. Role of NGO's in Dispute resolutions.

Out come of the course:

1. To settle the matters by arbitration and conciliation without court procedure
2. To get maximum benefit by arbitration and to save money and time
3. The Arbitration touches all areas of the Law.

Course	P01 Knowledge	P02 Analysis	P03 Design	P04 Development	P05 Modern Tools	P06 Society	P07 Environment	P08 Ethic	P09 Team Work	P010 Communication	P011 Project Management & finance	P012 Lifelong Learning
C001	3	3	1	2	3	3	3	3	2	3	1	3
C002	3	3	2	3	2	3	3	3	3	2	1	3
C003	3	3	1	2	3	3	3	3	3	3	1	3

PRACTICAL TRAINING –IV

Moot Court exercise and internship

Objective of the Course:

1. It is a component for a student as it helps to know the real court's work and proper code of conduct. The importance of dress code and the use of formal language.
2. The student will get the experience of practical knowledge of real court experience.
3. This subject is a great way to develop once confident speaking writing skills and research acumen

This paper will have three components of 30 marks each and viva voice is 10 marks
A MOOT COURT (30 MARKS)
REQUIREMENTS:
1 Three Moot Courts in the year
2 10 Marks for each
3 The Moot Court shall be based on the assigned problem to be prepared by the faculty concerned
4 Evaluation by principal/ head concerned, an advocate and teacher concerned
5 Out of 10 Marks are allotted for each problem 5 Marks are to be allotted for written Submission and 5 Marks for oral advocacy
a Written submission shall include a brief summary of facts, issues involved rivisions of land agreements, citation, prayer etc.
b Marks for oral advocacy may be awarded for communications skills, presentation, language, provisions of law, authorities quoted, court manners etc.
B OBSERVANCE OF TRIAL in two cases, one Civil case minimum and record his observations step by step of different stages of litigations/ proceedings in the 2/3 years of 3 years law course of 4/5 year in 5years law course
C INTERVIEWING TECHNIQUES AND PRE-TRIAL PREPARATIONS (30 Marks)
REQUIREMENTS:
1 Each student has to maintain a diary to record Interactions with clients, preparation of documents and court papers
2 The students should observe two interviewing sessions with clients at lawyers' office/ legal Aid Office this shall be recorded in the diary which will carry 15 Marks

3 Each student will further observe the preparation of documents and court papers and record such observance in the dairy. This carries 7.5 Marks

4 Each student shall observe the procedure for filing the petition and record the same in the dairy. This carries 7.5 Marks

5 The dairy shall clearly indicate the dates on which the above observations are made and shall be authenticated by the advocate concerned

6 Evaluation of the above dairy shall be made by the teacher concerned and the advocate

D There shall be a viva – voce examination of all the above three components. This carries 10 Marks

Books prescribed:

1. A Beginners path to Moot Court – Prof. Nomita Agarwal, Former Dean, Faculty of Law, University of Delhi & Mukesh Anand, Advocate.
2. Moot Court and Mock Trial – Art to and Art of Advocacy: Essentials of Court Craft – Prof. K. L. Batia
3. Dr. Kailash Rai – Moot Court Pre-Trial preparation and participation in trial proceedings
4. Nani Palkhivala – Court Room Genius

Outcome of the Course:

1. Moot Court experience can allow future lawyers, Judges and arbitrators to improve their drafting research and argumentation skill.
2. Moot Court gives the student a fair idea and expertise on argumentation skills interpretation skills analytical thinking logical and legal resolving public speaking court mannerisms which are essential for all students to have successful legal career.
3. Developed advanced problem-solving skills in order to analyse complex fact scenarios in order to identify the relevant legal issues.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Commutation	PO11 Programme Management	Po12 Life Long Learning
CO1	3	3	3	2	3	3	1	3	3	3	3	3
CO2	3	3	3	2	3	3	1	3	3	3	3	3
CO3	3	3	3	2	3	3	1	3	3	3	3	3

Penology & Victimology

Objectives:

1.fundamental knowledge on psychology of criminals
2.knowledge on policy system, white collar crimes, punishment, prison administration ,law reforms, probation of offenders, parole.
3.knowledge on proper exercise of discretion in sentencing the offenders

PENOLOGY AND VICTIMOLOGY :

Unit-1.Dimensions of Crime in India, Nature and extent of Crime in India 1.1. Reporting of Crime Statistics and problem of accurate reporting of Crime 1.2. Victim Studies, self – reporting 1.3. Costs of Crime, some factors for evaluating the rate of crime in India1.4. Territory: Population: Heterogeneity: Human values 1.5. General approaches to crime control 1.6. Continental approaches: Social defense 1.7. Social approaches: Crime Prevent Control 1.8. Crimes of the powerful, Organized crime-smuggling, traffic in narcotics 1.9. White collar crime:- corruption in public life, Socio 1.10.Economic crime: Adulteration of Food and Drugs: fraudulent trade practices 1.11.Crimes in the professions – Medical, Legal Engineering 1.12.State Criminality 1.13.Perpetrators of ordinary crime 1.14.The situation criminal 1.15.The chronic offender 1.16.Criminality of Women 1.17.Young offenders 1.18.Criminal gangs 70 1.19.Crimes of the marginalized with special reference toi. Forest offences; ii. States offenders, vagrants, prostitution.

Unit-2.The Police and to Criminal Justice 2.1. The Police System 2.2. Structural organization of Police at the center and the states 2.3. Mode of recruitment and training 2.4. Powers and duties of police under the police acts 2.5. Criminal Procedure Code and other laws 2.6. Arrest, search and seizure and Constitutional imperatives 2.7. Methods of police investigation 2.8. Third degree methods, Corruption in police 2.9. Relationship between police and prosecution 2.10.Liability of police for custodial violence 2.11.Police Public relations, Select aspects of National Police Commission Report.

Unit-3.Punishment of Offender some discarded modes of punishment 3.1. Corporal punishment: Whipping and flogging 3.2. Mutilation and Branding 3.3. Transportation Exile 3.4. Public execution 3.5. An appraisal of these modes of punishment 3.6. Punishments under the Indian Criminals Law 3.7. Capital punishment 3.8. Imprisonment, Fine, Cancellation or withdrawal of licenses, etc,

Unit-4.The Prison system 4.1. Administrative organization of prisons 4.2. Mode of recruitment and training 4.3. The Jail Manual, Powers of prison officials 4.4. Prisoners classification – Male, Female: Juvenile and Adult: Under trial 4.5. Constitutional imperatives and prison reforms and convicted prisoners 4.6. Open Prisons 4.7. Violation of prison code and its consequences 4.8. Appraisal of imprisonment as a mode of punishment.

Unit-5.Treatment and correction of Offenders 5.1. The need for reformation and rehabilitation of offenders undergoing punishment/imprisonment, 5.2. Classification of offenders through modern diagnostic techniques 5.3. The role of psychiatrists, psychoanalysts and social workers in the prison 5.4. vocational and religious education and apprenticeship programmes for the offenders 5.5. Group counseling and re-socialization programmes 5.6. Prisoners Organizations for self-government. 5.7. Participation of inmates in community services, 5.8. An appraisal of reformative techniques suggested forms of treatment of offenders under the IPC (Amendment) Bill, 1972 5.9. Efficacy of imprisonment as a measure to combat criminality and the search for substitutes.

Unit-6.Re-socialization processes

Unit-7.Probation, The Probation of Offenders Act, 1958. 7.1. The attitude of judges towards probation, Mechanism of probation and standards of probation services, 71 7.2. Problems and prospects of probation, 7.3. The suspended sentence.

Unit-8.Parole, Nature of Parole 8.1. Authority for granting parole 8.2. Supervision Paroles 8.3. Parole and conditional release 8.4. Release of the offender 8.5. Problems of the released offender 8.6. Attitudes of the Community towards released offender 8.7. Prisoner Aid Societies and other voluntary Organization 8.8. Governmental action 8.9. An appraisal.

Unit-9.Nature and Development, 9.1. Its expanding dimensions, typology of victims, compensation, compensation by application of Article 21 and 300A 9.2. Victim and criminal justice, emerging trends and policies.

Unit-10. Law Reforms INTRODUCTION: 1. Criminilogy: Meening and Definition 2. Criminilogy: Its Nature and Scope 3. Criminilogy: Whether aScience 4. Criminilogy and criminal Law 5. Criminilogy and Penology 6. Criminilogy,penology and Criminal Law.

Prescribed books-

1.Dr.S.S.Sri vastava penology and Criminal Law.
2.Dr.Shiva Shankar Singh Criminal Law.
3.Prof.N.V.Paranjape penology
4.Dr.Ashok.K.Jain penology
5.Dr.Rega surya roa Criminal Law
6.Dr.D.K.Biswas Criminilogy and Penology

Outcome of the course:

1.The course help the students to gain the practical knowledge on criminal administration system.
2.Awareness on white collar crimes, prison reforms, probation of offenders and parole.
3.Brings awareness on criminal polices including theories of punishment, their supposed philosophical and sociological justification.

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern Tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	3	3	2	3	1	3	3	2	3	2	1	3
CO2	3	3	3	2	2	3	3	3	2	2	1	3
CO3	3	3	2	1	2	3	2	3	1	3	1	2

S.V.U COLLEGE OF ARTS
SRI VENKATESWARA UNIVERSITY: TIRUPATI

DEPARTMENT OF LAW



Course
PG DEPARTMENT OF LAW

Choice Based Credit System (CBCS)
Academic Year 2023-2024
Amended as per NEP-2020

About the Department

The Post Graduate Department of Law, Sri Venkateswara University, Tirupati was started in 1976 with Master of Law Course (LL.M – Latin Legum Magister) with specialization in Constitutional and Legal Order, along with Ph.D. Programme continued. Subsequently started BA.LL.B.5 Year integrated Course in the year of 2013.

Vision

- "To impart holistic knowledge of law and mould students to be competent legal professionals, committed to the cause of community development through sustained academic activities and thereby promoting empowerment through legal education for building ethical society."

Mission

- To provide healthy environment and opportunities to all student to contribute positively in the process of administration justice.
- To enrich standards and quality of teaching so as to achieve academic excellence.
- To enhance existing skills and to develop soft skills of students.
- To enable students coming from rural areas to cope with ever growing challenges of life.
- To inculcate professionally acceptable values in our students.

Department Objectives :

The Department is having the following objectives:

- To train students for national, transnational and international practice and for globalization.
- To engage the students in critical intellectual enquiry into discipline of law and use of ICT in la teaching.
- To establish a robust mechanism for students' feedback, for quality assurance and for placement.
- To train students and young advocates to stand up for the rule of law, to inculcate an aspiration f improvement of the law and for the operation of legal system and for the achievement of social justice
- To educate and train students for community leadership and for civic responsibility. To play "outreac role in terms of providing services to the community, through clinical programmes, extensiv networking and building partnerships.

Programme Specific Outcomes

- This programme focuses on integrating knowledge regarding law and other subjects to the candidates. Students are also introduced to law case studies, which will help them practice for their career in the law field.
- To train learners for better performance in various competitive examination Judicial and UPSC, APPSC etc.,
- To enable the learners to acquire and develop self- study habits and case studies.
- To facilitate Higher education & research in Law.

Programme Outcomes :

- The student should acquire the knowledge with various case laws related to various aspects of law
- When you graduate with a BA LLB Integrated Course you will have learned how to work Courts, Law Firms, ADR's and NGO's.
- The student understanding the basic legal concepts, Constitutional principles and Legal theori related to various Legal Phenomena and their relevancies in the day-to-day life and the apply La Principles in Supreme Court, High Courts District Courts and Lower Courts, Quasi-Judicial Bodi Alternative Dispute Resolution Tribunals, CAT, Labour Courts, etc., dealing with Civil ar Criminal Cases.
- The student could apply the skills to deal with Civil, Criminal and Constitutional Matters.
- The students analyzed and realized how developments in Law that will helps in the developmen of the social sciences such as Political Science, Economics, Sociology. This approach will helps providing better solution and new ideas for Legal Developments.
- Attains knowledge in Constitution, Intellectual Property Rights, Civil and Criminal Law International Law, Commercial Laws, Practical Training and Moot Court.
- Perform, Assess and implement practical techniques and procedure in their practical training Moot Courts and analyses the facts of the case.

Program Educational Objectives:

- Exposure of students to provide them traditional and modern techniques to acquire knowledge ar skill in the field of Law.
  - To update the syllabus essential for appearing to judicial exams and other competitive exan of APP, UPSC and APPSC.
  - To make aware the students to know the Law of the Land, to implement the same in the profession.
  - To develop trained and knowledgeable to practice as an advocates in courts and companies;
  - To develop self employable ability and to apply knowledge in their profession.

I SEMESTER

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks	Total	
				L	T	P		I	E	
1	**Core**	1.1	Mass Media Law	**4**	**2**	**-**	**6**	**20**	**80**	**100**
2		1.2	Public Utilities Law	**4**	**2**	**-**	**6**	**20**	**80**	**100**
3	**Foundation Course**	1.3	Law and SocialTransformation in India	**4**	**2**	**-**	**6**	**20**	**80**	**100**
4		1.4	Indian Constitutional Law, The New Challenges	**4**	**2**	**-**	**6**	**20**	**80**	**100**
	Total					**-**	**24**	**80**	**320**	**400**

Semester - II

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	2.1	Union – State Financial Relations	**4**	**2**	**-**	**6**	**20**	**80**	**100**
2		2.2	Constitutionalism, Pluralism and Federalism	**4**	**2**	**-**	**6**	**20**	**80**	**100**
3	**Foundation Course**	2.3	Judicial Process	**4**	**2**	**-**	**6**	**20**	**80**	**100**
4		2.4	Legal Education and Research Methodology	**4**	**2**	**-**	**6**	**20**	**80**	**100**
	Total					**-**	**24**	**80**	**320**	**400**

Semester-III

S.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	3.1	Human Rights	**4**	**2**	**-**	**6**	**20**	**80**	**100**
2		3.2	National Security, Public Order and Rule of Law	**4**	**2**	**-**	**6**	**20**	**80**	**100**
3		3.3	Practical Training	**-**	**-**	**6**	**6**	**100**	**-**	**100**
4	**Generic Elective**	3.4a	Environment Protection and the Law	**4**	**2**	**-**	**6**	**20**	**80**	**100**
5		3.4b	IntellectualProperty RightsLaw							
6	**Open Elective**	3.5a	Cyber Crimes and Law	**4**	**2**	**-**	**6**	**20**	**80**	**100**
7		3.5b	Evolution and Concept of ADR							
	Total						**24**	**160**	**240**	**400**

Semester - IV

.No	Components of Study		Title of the Paper	Hours per Week			Credits	Max Marks		Total
				L	T	P		I	E	
1	**Core**	4.1	Dissertation and Viva-Voce	-	-	**24**	**12**		**Dissertation - 150 Viva – 50**	**200**
2	**Open Elective**	4.2a	Law of ConsumerProtection	**4**	**2**	**-**	**6**	**20**	**80**	**100**
3		4.2b	International Human Rights (MOOC / Online							
	Total						**12**		**200**	**200**
			Grand Total				**84**			**1400**

Note:-

1. Student has to choose one paper out of two in Generic elective in the III Semester.
2. Students of other discipline other than law course can choose one paper out of two in Open elective in the III Semester and IV Semester. In the IV Semester Paper 4.2b – International human Rights is MOOC / Online course only.
3. Duration of examination for each paper in all the semesters is 3 Hours except for Practical Training in III Semester and Dissertation and Viva-Voce in IV Semester.

P.G. DEPARTMENT OF LAW
SEMESTER – I

I-SEMESTER

BRANCH – CONSTITUTION AND LEGAL ORDER

COURSE – 1.1 :MASS MEDIA LAW.

Objectives of the course:

Mass media such as press, radio and television, films, play a vital role in socialisation, culturalization and modernisation of a society. The visual media are bound to have a much greater impact on human mind. But while these media have such a potential value as many educators, they are also susceptible to destructive and harmful uses for promoting criminal anti-social and selfish escapist tendencies. While their positive potential as mass educators has to be harnessed for developmental purposes, their negative, harmful potential has to be curbed in public interest. Law plays a dual role vis-a-vis such media. On the one hand, it protects the creative freedom involved in them, on the other, it has to regulate them so as to avoid their possible abuse.

This paper will deal with such interaction between law and mass media.

Syllabus:

Unit - 1. Mass media - Types of - Press Films, Radio Television

Ownership patterns - Press - Private – Public, Ownership patterns - Films – Private, Ownership patterns - Radio & Television, Public, Difference between visual and non-Visual Media- impact on People's minds.

Unit - 2. Press - Freedom of Speech and Expression - Article 19 (1) (a)

Includes Freedom of the Press, Laws of defamation, obscenity, blasphemy and sedition, The law relating to employees' wages and service conditions, Price and Page Schedule Regulation. Newsprint Control Order, Advertisement - is it included within freedom of speech and expression? Press and the Monopolies and Restrictive Trade Practices Act.

Unit - 3. Films - How far included in freedom of speech and expression?

Censorship of films – constitutionality, abbas Case, Difference between films and Press - why pre-censorship valid for films but not for the press? Censorship under the Cinematograph Act.

Unit - 4. Radio and Television - Government monopoly.

Why Government departments ? Should there be an autonomous corporation? Effect of television on people, Report of the Chanda Committee, Government policy, Commercial advertisement, Internal Scrutiny of serials, etc. Judicial Review of Doordarshan decisions: Freedom to telecast.

Unit - 5. Constitutional Restrictions

Radio and television subject to law of defamation and obscenity, Power to legislate - Article 246 read with the Seventh Schedule, Power to impose tax - licensing and licence fee.

Select bibliography

- M.P. Jain, Constitutional Law of India (1994) Wadhwa.
- H.M. Seervai, Constitutional Law of India Vol.I (1991) Tripathi, Bombay.
- Bruce Michael Boyd, "Film Censorship in India: A Reasonable Restriction on
- Freedom of Speechand Expression ". 14 J.I.L.I. 501 (1 972).
- Rajeev Dhavan "On the Law of the Press in India" 26 J.I.L.I. 288 (1984).

Expected Course Outcomes:

At the end it is expected that the student will be able to :

Mass media such as press, radio and television, films, play a vital role in socialisation, culturalization and modernisation of a society. The visual media are bound to have a much greater impact on human mind. But while these media have such a potential value as many educators, they are also susceptible to destructive and harmful uses for promoting criminal anti-social and selfish escapist tendencies. While their positive potential as mass educators has to be harnessed for developmental purposes, their negative, harmful potential has to be curbed in public interest. Law plays a dual role vis-a-vis such media. On the one hand, it protects the creative freedom involved in them, on the other, it has to regulate them so as to avoid their possible abuse.

COURSE–1.2 : PUBLIC UTILITIES LAW

Objectives of the course:

Public utilities are government monopolies, which are services rather than commercial enterprises. The law of public utilities is contained in the statutes of incorporation and judicial decisions given by courts while resolving disputes between the utilities and their consumers or employees or traders or others entering into business relations with them.

In this paper a student will study :

- government policy in regard to such utilities in general and to each utilitin particular,
- the growth and evolution of the public utilities;
- patters of the laws of incorporation and
- powers, functions and liabilities of the public utilities vis-a-vis their employees, consumers and others.

Syllabus

Unit - 1. Growth and evolution of public utilities and their legislation

Railways, Electricity, Gas, Road Transport, telephone, post and telegraph service,

Police, Fire Brigade, Banking service, etc. Government and Parliamentary Control Constitutional division of power to legislate, Public Utilities law - Why government monopoly?

Unit - 2.Administrative Authorities and Fair hearing

Structure of the Administrative Authorities, Subordinate legislation, QuasiJudicial

Decision – Administrative Discretion.**Unit - 3. Public Utilities And their Employees : Consumer Protection**

Application of Articles l6 and 311, Application of Industrial law- right to strike, Rights of consumers protected by the Consumer Protection Act, Rights Arising from law of Contract and law of Torts

Unit - 4. Public Utilities and Fundamental Rights

The right to equality: the airhostess case, Are Public utilities "State" for the purpose of article 12 of the Constitution? Extension of the concept of State

Unit - 5. Liabilities and special privileges of public utilities

In contract, In tort, In criminal law

Select bibliography

- P.M. Bakshi, Television and the Law, (1986)

- Vasant Kelkar, "Business of Postal Service" 33 I.J.PA. pp. 133-141 (1987)
- G. Ramesh, "Characteristic of Large Service Organisation in a Developing Country Like India" 32I.J.PA. 7 (1986)
- Nalini Paranjpe, "Planning for Welfare in the Indian Railways" 31 I.J.PA. 171180 (1985)
- S.P. Sathe, Administrative Law (1998)
- Jain & Jain, Principles of Administrative Law, (1986)
- Jagdish Ul, Handbook of electricity Laws, (1978)

Expected Course Outcomes:

At the end it is expected that the student will be able to :

- government policy in regard to such utilities in general and to each utility in particular, (b) the growth and evolution of the public utilities;
- patters of the laws of incorporation and
- powers, functions and liabilities of the public utilities vis-a-vis their employees, consumers and others.

COURSE – 1.3 :LAW AND SOCIAL TRANSFORMATION IN INDIA.

Objectives of the course:

This course is designed to offer the teacher and the taught with –

- awareness of Indian approaches to social and economic problems in the context of law as a means of social control and change; and
- a spirit of inquiry to explore and exploit law and legal institutions as a means to achieve development within the framework of law. The endeavour is to make the students aware of the role the law has played and has to play in the contemporary Indian society

Syllabus:

UNIT 1.Law and social change

Law as an instrument of social change, Law as the product of traditions and culture. Criticism and evaluation in the light of colonization and the introduction of common law system and institutions in India and its impact on further development of law and legal institutions in India.

UNIT -2.Community, religion and the law

Caste as a divisive factor, Non-Discrimination on the ground of caste, Acceptance of caste as a factor to undo past injustices, Protective discrimination, Protective discrimination: Scheduled castes, tribes and backward classes. Reservation; Statutory Commissions., Statutory provisions. Freedom of religion and non-discrimination on the basis of Religion, Religious minorities and the law.

UNIT –3.Women, children and law

Crimes against women, Gender injustice and its various forms,

Women Commission. Empowerment of women: Constitutional and other legal provisions, Child labour, Adoption and related problems, Children and education.

UNIT- 4.Modernization and law

Modernisation as a value: Constitutional perspectives reflected in the fundamental duties, Democratic decentralisation and local self-government.

UNIT-5**.** Alternative approaches to law

The jurisprudence of Sarvodaya--- Gandhiji, Vinoba Bhave; Jayaprakash Narayan--- Surrender of dacoits; concept of grama nyayalayas.

Select Bibliography

- Marc Galanter (ed.), Law and Society in Modern India (1997) Oxford,
- Robert Lingat, The Classical Law of India (1998), Oxford
- U. Baxi, The Crisis of the Indian Legal System (1982). Vikas, New Delhi.
- U. Baxi (ed.), Law and Poverty Critical Essays (1988). Tripathi, Bombay.
- Duncan Derret, The State, Religion and Law in India (1999). Oxford University Press, New Delhi.
- H.M. Seervai, Constitutional Law of India (1996), Tripathi.
- D.D. Basu, Shorter Constitution of India (1996), Prentice - Hall of India (P) Ltd., New Delhi.

- Sunil Deshta and KiranDeshta, Law and Menace of Child Labour (2000) Armol Publications, Delhi

Expected Course Outcomes:

At the end it is expected that the student will be able to :

- Critically analyse the Law as an instrument of social change and product of tradition and culture
- Explore the nature and function of Law as an institution and process interlinked with the social and economical philosophy of education.
- Examine development of law from historical processes and how for the a touch of modernization and value can be added to legal system
- To analyse the different approaches of Law and Justice

COURSE-1.4 :INDIAN CONSTITUTIONAL LAW: THE NEW CHALLENGES.

Objectives of the Course:

The Constitution, a living document, is said to be always in the making. The judicial process of constitutional interpretation involves a technique of adapting the law to meet changing social mores. Constitution being the fundamental law, an insight into its new trends is essential for a meaningful understanding of the legal system and processes. The post graduate students in law who had the basic knowledge of Indian Constitutional Law at LL.B level, should be exposed to the new challenges and perspectives of constitutional development while they are allowed to choose an area of law for specialisation. Obviously, rubrics under this paper require modification and updating from time to time.

Syllabus:

UNIT-1. Federalism

Creation of new states, The inter-state disputes on resources, Centre's responsibility and internal disturbance within States, Federal Comity : Relationship of trust and faith between Centre and State, Special status of certain States, Tribal Areas, Scheduled Areas.

UNIT-2. "State" right to equality

Definition of state, Need for widening the definition in the wake of liberalization. Privatisation and its impact on affirmative Action, Relating to equality.

UNIT-3. Emerging regime of new rights and remedies

Reading Directive Principles and Fundamental Duties into Fundamental Rights Compensation jurisprudence Right to education, Commercialization of education and its impact, Brain drain by foreign education market, Right of minorities to establish and administer educational institutions and state control.

UNIT – 4. Separation of powers stresses and strain

Judicial activism and judicial restraint, PIL: implementation, Judicial independence, Appointment, transfer and removal of judges, Accountability:
executive and judiciary, Tribunals.

UNIT- 5. Democratic process

Nexus of politics with criminals and the business, Election, Election commission: status,

Electoral Reforms, Coalition government, 'stability, durability, corrupt practice' Grass root

democracy.

Select bibliography

No specific bibliography is suggested for this course since the course materials obviously depends upon the latest developments. These developments in the areas specified in the course can be gathered from the recent materials such as case law, changes and amendments of laws, critical comments, studies and reports, articles and research papers and lastly contemporary emerging ethos impacting on constitutional values.

Expected Course Outcomes:

At the end it is expected that the student will be able to :

- Understand and interpret Constitution to address the emerging complex issues;
- Explore the various functional theories, doctrine and Constitutional principles working in the backdrop and its interplay with the emerging issues; and
- Examine the boundaries, limitations, of Constitution from different perspectives and explore the possible approaches of interpretation and understanding from the perspective of Law and Justice.

II-SEMESTER

Course-2.1 :UNION-STATE FINANCIAL RELATIONS

Objectives of the course:

The Indian Constitution adopts federal government for various reasons. Power is divided between the Union and the States in such a way that matters of national importance are entrusted to the Centre and matters of local importance are left to the States. The Constitution departs from the model of classical federalism in many ways. This departure was made to suit the peculiar Indian circumstances. However, the constitutional provisions were in practice further distorted so as to make the states totally subservient to the Centre. Distribution of fiscal power is the nerve centre ofthe federal system. In this paper a student will be made conscious of various aspects of federal principle, and their working in the Indian context with a view to ultimately assessing the Indian experience critically. He must clearly understand various emerging forces such as regionalism, subnational loyalties and nationalism. He should be able to see the working of the constitutional process as a vital element of the political economy.

Syllabus:

UNIT – 1. Federalism – Essentials

Models of Federal government - U.S.A, Australia, Canada, Difference between Federation and Confederation Evaluation of federal government of India

UNIT – 2. Distribution of Legislative Power / Administrative Power / Physical power

Indian Constitution, Centre-State relations, Factors responsible for subordination of State Administrative relations, Scheme of Allocation of taxing power, Extent of union power of taxation, Residuary power – inclusion of physical power, Fundamental rights Inter-Government tax immunities Difference between tax and fee.

UNIT – 3. Distribution of tax Revenues and Borrowing Power of the state

Tax-sharing under the constitution finance commission – specific purpose grants (article 282), Borrowing by the government of India, Borrowing by the states.

UNIT – 4. Inter – State Trade and Commerce under the Indian constitution Freedom of Inter-State trade and commerce, restrictions on legislative power of the Union and States with regard to trade and commerce

UNIT – 5. planning and cooperative federalism

Planning commission, National Development Council, Plan grants, Full faith and credit, Inter-State Council, Zonal Councils.

Select Bibliography:

- H.M. Seervai, Constitutional Law of India (1991), Tripati, Bombay
- SudhaBatnagar, Union-State financial Relations and Finance Commissions, (1979)
- Ashok Chandra, Federalism in India, (1965)
- V.D. Sebastian, Indian Federalism :The Legislative Conflicts Chs. 6,7 & 8 (1980)
- Chandrapal, Center-State Relations and cooperative federalism. Chs.5 & 8 (1983)
- G.C.V SubbaRao, Legislative Powers in Indian Constitutional law, Chs 37,38 & 39 (1982)
- Richard M. Pious, the American Presidency, 293-331, Ch. 9 (1979)
- Daniel J. Elzar, American Federalism. Chs 3 & 4 (1984)
- K.P. Krishna Shetty, The law of Union-State Relations and the Indian Federalism Ch.(1981)
- Administrative Reforms commission on center-state relationship Ch.3 (1969)
- Constituent Assembly debates Vol. 9, 203, 240 and 302-349; Vol 10, 325-342
- Administrative reforms commission, Report of study Team o central-state relationship (1967) Vol. 1 Sections land 11 pp. IS-168
- L.M. Singhvi (ed), Union state Relations in India 124-154 (1969)Government of Tamilnadu report of the Center – State Relations Inquiry committee Ch. 5 (1971)
- D.T. Lakadwala, Union – State Financial Relations (1967)
- M.P. Jain "Indian Constitutional Law" (1994), Wadhwa
- K. SubbaRao, The Indian Federation (1969) 19.K.C. Wheare, Federal Government (1963)

Expected Course Outcomes:
At the end it is expected that the student will be able to :

- To understand India as development of complex federal structure (Quasi) federal and its strength and weaknesses;
- Explore the various functional theories, doctrine and Constitutional principles of federalism and its interplay under Indian Constitution; and
- To examine the area of conflicting interest between Union and State and primacy of Union over the State.

COURSE – 2.2 :CONSTITUTIONALISM, PLURALISM AND FEDERALISM

Objectives of the course:

Constitutionalism essentially means a limited government. Where government functions according to certain principles, it is said to be abiding by constitutionalism. Must it be a democracy or can it be an autocracy also. In ancient India, the king was supposed to act according to dharma. He was not absolute in the sense in which John Austin defined sovereignty. Constitutionalism may therefore be determined by a written constitution or by religion or tradition or by mere practice or convention as in England.

In a plural society, where different religious as well as linguistic groups have to live together, various rules of accommodation and mutual recognition are incorporated in the Constitution. Usually these are contained in the bills of rights which contain guarantees of individual liberty and equality against majoritarian rule. Constitutionalism does not merely imply majoritarian rule, it has to be a consensual rule. However, where there is not only such vertical pluralism but also horizontal pluralism reflected by subnations/regional loyalties, power is not only required to be

provide exposure to the students to various models of pluralism and forms of constitutional governments and federal structures.

Syllabus:

UNIT – 1. Constitutionalism

Authoritarianism – Dictatorship, Democracy – Communism, Limited Government conceptLimitations on government power, What is a Constitution? Development of a democratic government in England – Historical evolution of constitutional government. Conventions of constitutionalism – law and conventions Written constitutions: U.S.A, Canada, Australia and India, Separation of powers: Montesquieu, Rule of law: Concept and new horizons

UNIT – 2. Federalism

What is a federal government? Difference between confederation and federation, conditions requisite for federalism patterns of federal government – U.S.A, Australia, Canada, India Judicial review – for federal umpiring New trends in federalism: Co-operative federalism Dynamic of federalism.

UNIT – 3. Pluralism

What is a pluralistic society, Ethnic, linguistic, cultural, political pluralism individual rights – right to dissent, Freedom of speech and expression, Freedom of religion, Freedom of association, Rights of the religious and linguistic minorities.

UNIT – 4. Equality in plural society

Right to equality and reasonable classification, prohibition of discrimination on ground of religion, case, sex, language, compensatory discrimination for backward classes, Women-rights to equality and right to special protection, Abolition of untouchability, Secularism – constitutional principles, Scheduled Tribes, District Identity – protection against exploitation, Tribal Groupe and Equality.

UNIT – 5. Pluralism and International concern

International declaration of Human rights, Conventions against genocide. Protection of religious, ethnic and linguistic minorities, State intervention for protection of human rights, Right of self-determination. The role of judiciary in plural society.

Select Bibliography:

- Upendra Baxi, "Law, Democracy and Human Rights" – 5 Lokayan Bulletin 4 (1987)
- V.M. Dandekar "Unitary Elements in a Federal Constitution" 22 E.P.W 1965 (1988)
- Rajeev Dhanvan, "The Press and Constitutional Guarantee of Free Speech and Expression" 28 J.I.L.I 299 (1986)
- M.A. Fazal "Drafting an British Bill of Rights" 27, J.I.L.I 423(1985)
- M.P. Jain "Indian Constitutional Law" (1994), Wadhwa
- Jagat Narain "Judicial law making and the place of the Directive Principles in the Indian Constitution", J.I.L.I 198 (1985)
- Rhett Ludkwikowski, "Judicial Review in the socialist legal systems: Current Development" 37 I.C.I.D. 89-108 (1988)
- S.P.Sathe, Fundamental Rights and Amendment of Indian Constitution, (1968)
- H.M. Seervai, Constitutional Law of India (1993), Tripati, Bombay
- The Role of Judiciary in plural societies edited by Neale Tiruchuvam Radhika kumara swamy

Expected Course Outcomes:

At the end it is expected that the student will be able to :To explore the basic principles of Constitutionalism, different model of federalism and its interplay in the Indian legal system;

- To examine the adoption of, utility and justification of Constitutional model in India; and ¬
- To analyse India as pluralist society and suitability of various model, approaches in India in functional aspects of comparison with other legal system.

COURSE- 2.3: JUDICIAL PROCESS

Objectives of the course:

A lawyer, whether academic or professional, is expected to be competent to analyse and evaluate the legal process from a broader juristic perspective. Hence a compulsory paper on Judicial Process is essential in the LL.M curriculum. The objective of this paper is to study the nature of judicial process as an instrument of social ordering. It is intended to highlight the role of court as policy maker, participant in the power process and as an instrument of social change. This paper further intends to expose the intricacies of judicial creativity and the judicial tools and techniques employed in the process. Since the ultimate aim of any legal process or system is pursuit of justice, a systematic study of the concept of justice and its various theoretical foundations is required. This paper, therefore, intends to familiarise the students with various theories, different aspects and alternative ways, of attaining justice.

Syllabus:

Unit - 1. Nature of judicial process

Judicial process as an instrument of social ordering, Judicial process and creativity in law - common law model - Legal Reasoning and growth of law - change and stability. The tools and techniques of judicial creativity and precedent.

Unit - 2. Special Dimensions of Judicial Process in Constitutional Adjudications.

Notions of judicial review, ' Role' in constitutional adjudication - various theories of judicial role, Tools and techniques in policy-making and creativity in constitutional adjudication. Varieties of judicial and juristic activism Problems of accountability and judicial law-making.

Unit - 3. Judicial Process in India

Indian debate on the role of judges and on the notion of judicial review.The "independence" of judiciary and the "political" nature of judicial processJudicial activism and creativity of the Supreme Court - the tools and techniques ofcreativity.Judicial process in pursuit of constitutional goals and values - new dimensions ofjudicial activism andstructural challengesInstitutional liability of courts and judicial activism - scope and limits.

Unit - 4. The Concepts of Justice

The concept of justice or Dharma in Indian thought, Dharma as the foundation of legal ordering in Indian thought.The concept and various theories of justice in the western thought, Various theoretical bases of justice: the liberal contractual tradition, the liberalutilitarian tradition and the liberal moral tradition.

Unit - 5. Relation between Law and Justice

Equivalence Theories - Justice as nothing more than the positive law of the stronger class. Dependency theories - For its realisation justice depends on law, justice is not the same as law.

The independence of justice theories - means to end relationship of law and justice- The relationship in the context of the Indian constitutional ordering. Analysis of selected cases of the Supreme Court where the judicial process can be seen as influenced by theories of justice. Access to Justice – Locus standi : PIL, Legal Services authority

Select Bibliography

- Julius Store, The Province and Function of Law, Part II, Chs. 1. 8-16 (2000), Universal, New Delhi.
- Cardozo, The Nature of Judicial Process (1995) Universal, New Delhi
- Henry J.Abraham , The Judicial Process (1998), Oxford.
- J.Stone, Precedent and the Law: Dynamics of Common Law Growth (1985) Butterworths
- W.Friedmann, Legal Theory (1960), Stevens, London
- Bodenheimer, Jurispurdence - the Philosophy and Method of the Law (1997), Universal,Delhi
- U.Baxi, The Indian Supreme Court and Politics (1980), Eastern,Lucknow.
- Rajeev Dhavan, The Supreme Court of India - A Socio -Legal Critique of its Juristic
- Techniques(1977), Tripathi, Bombay.
- John Rawls, A Theory of Justice (2000), Universal, Delhi
- Edward H.Levi, An Introduction to Legal Reasoning (1970), University of Chicago

Expected Course Outcomes:

At the end it is expected that the student will be able to :

- Intended to highlight the role of court as policy maker, participant in the power process and as an instrument of social change.
- expose the intricacies of judicial creativity and the judicial tools and techniques employed in the process.
- Since the ultimate aim of any legal process or system is pursuit of justice, a systematic study of the concept of justice and its various theoretical foundations is required.
- Intends to familiarise the students with various theories, different aspects and alternative ways, of attaining justice.

COURSE – 2.4: LEGAL EDUCATION AND RESEARCH METHODOLOGY

Objectives of the course:

Post-graduate student of law should get an insight into the objectives of legal education. He should have an exposure to programmes like organisation of seminars, publication of law journals and holding of legal aid clinics.

Law is taught in different ways in different countries. The LL.M course, being intended also to produce lawyers with better competence and expertise, it is imperative that the student should familiarise himself with the different systems of legal education. The lecture method both at LL.B level and LL.M level has many demerits. The existing lacunae can be eliminated by following other methods of learning such as case methods, problem method, discussion method, seminar method and a combination of all these methods. The student has to be exposed to these methods so as to develop his skills

Syllabus:

Unit - 1. Objectives of Legal Education and methods of teaching

Lecture Method, Problem Method, Discussion method and Seminar Method, Merits and Demerits, student participation in law school programmes- Organisation of Seminars, publication of journal and assessment of teachers, Clinical legal education - legal aid, legal literacy, legal survey and law reforms.

Unit - 2. Research Methods

Socio Legal Research, Doctrinal and non-doctrinal, Relevance of empirical research, Induction and deduction

Unit - 3. Identification of Problem of research

What is a research problem? Survey of available literature and bibliographical research, Legislative materials including subordinate legislation, notification and policy statement, Decisional materials including foreign decisions; methods of discovering the "rule of the case" tracing the history of important cases and ensuring that these have not been over-ruled; discovering, judicial conflict in the area pertaining to the, research problem and the reasons thereof, Juristic writings - a survey of juristic literature relevant to select problems in India and foreign periodicals Compilation of list of reports or special studies, conducted relevant to the problem.

Unit - 4. Preparation of the Research Design

Formulation of the Research problem, Devising tools and techniques for collection of data, Methodology, Methods for the collection of statutory and case materials and juristic literature, Use of historical and comparative research materials, Use of observation studies, Use of questionnaires/interview/Schedule, Use of case studies Sampling procedures - design of sample, types of sampling to be adopted, Use of scaling techniques, Jurimetrics, Computerized Research - A study of legal research, programmes such as Lexisand West law coding and manupatra

Unit – 5. Analysis and report writing

Classification and tabulation of data, Explanation of tabulated data, Analysis of data and Report Writing.

Bibliography

- High Brayal, Nigel Dunean and Richard Crimes, Clinical Legal Education: ActiveLearning in your Law School, (1998) Blackstone Press Limited, London
- S.K.Agrawal (Ed.), Legal Education in India (1973), Tripathi, Bombay.N.R. MadhavaMenon, (ed) A Handbook of Clinical Legal Education, (1998) Eastern Book Company,Lucknow.
- M.O.Price, H.Bitner and Bysiewiez, Effective Legal Research (1978)
- Pauline V. Young, Scientific Social Survey and Research, (1962)
- William J. Grade and Paul K. Hatt, Methods in Social Research, McGraw-Hill Book Company,London
- H.M.Hyman, Interviewing in Social Research (1965)
- Payne, The Art of Asking Questions (1965)
- Erwin C. Surrency, B.Fielf and J. Crea, A Guide to Legal Research (1959) 10.Morris L.Cohan, Legal Research in Nutshell, (1996), West Publishing Co.
- Havard Law Review Association, Uniform System of Citations.
- ILI Publication, Legal Research and Methodology.

Expected Course Outcomes:

At the end it is expected that the student will be able to :

- Critically analyse the various research skill, especially in the field of law;
- To develop the skill of application of teaching methods in legal education
- To understand and analyse the various strength and weakness of teaching learning and research process for the field of law; and
- To develop the skill of utilising computer technology for Legal education and Legal research.

III-SEMESTER

COURSE-3.1 :HUMAN RIGHTS

Objectives of the course:

Human rights were conceived rather narrowly as mere freedom from arbitrary government in the past. It was realised later and much more so during last fifty years since the end of the Second World War that the threats to liberty, equality and justice did not emanate from the state alone. Many nations of Asia and Africa came to nationhood during this period. These nations had to bring about their development and they needed capital. Foreign aid and foreign investments were invited but these could very well lead to their second subjugation. Poverty, ignorance, exploitation had to be fought at the global level. Development had to come without the sacrifice of human values. A greater awareness of human rights, not only as negative restrictions on the state but as positive obligations for creating an environment in which man could live with dignity was necessary.

The focus of a course on human rights must be on the national problems with an international or global perspective. The world community's concerns about human rights have been expressed through various conventions. On the national levels, they are contained in constitutionalprovisions such as directive principles of state policy, fundamental rights, fundamental duties and judicial, legislative as well as administrative strategies of reconstruction. Human rights acquire much more comprehensive and wider meaning. It requires us to take up cudgels against poverty discriminations based on caste, colour or sex, make provisions for drinking water, population control, conservation and preservation of natural resources, ecological balance, protection of consumers against ruthless and profit seeking, traders or manufacturers, provisions against hazardous industries and so on and so forth. Human rights is an important parameter for a just society and future lawyers must be able to assess any programme of social transformation with reference to them.

Syllabus:

Unit - 1. Panoramic View of Human Rights

Human Rights in Non-western Thought, Awareness of Human rights during the nationalist movement, Universal Declaration of Human Rights, Constituent Assembly and Part III, drafting process, Subsequent developments in International Law and the Position in India (e.g. Convention of Social discrimination, torture, gender discrimination, environment and the two human rights covenants.)Fundamental Rights Jurisprudence as Incorporating Directive Principles. The Interaction between F.R and D.P.

Unit - 2. Freedom and judiciary

Free Press - Its role in protecting human rights, Right of association, Right to due process of law. Role of Judiciary in protecting Human Rights.

Unit - 3. Rights to development of Individuals and Nations

The UN Declaration on Right to Development, 1987.The need for constitutional and legal

Unit – 4: Right not be Subject to Torture, Inhuman or Cruel Treatment

Conceptions of torture, third degree methods, "Justifications" for it, Outlawry of torture at international and constitutional law level, Incidence of torture in India, Judicial attitudes, Law Reform - proposed and pending

Unit - 5. People's Participation in Protection and Promotion of Human Rights

Role of International and National NGOs, Amnesty International, International Bar Association, Law Asia. PUCL, PUDR, Citizens for Democracy, Contribution of these groups to protection and promotion of human rights in India. European Commission/Court of Human Rights, Minorities Rights Commission, Remedies Against Violation of Human Rights, Role of Legal Profession

Select bibliography

- M.J. Akbar, Riots After Riots (1988)
- U.Baxi (ed.), The Right to be Human (1986)
- U.Baxi, The Crisis of the Indian Legal System (1982), Vikas Publishing House, New Delhi.
- F.Kazmi, Human Rights (1987)
- L.Levin, Human Rights (1982)
- Madhavtirtha, Human Rights (1953)
- W.P. Gromley, Human Rights and Environment (1976)
- H. Beddard, Human Rights and Europe (1980)
- Nagendra Singh, Human Rights and International Co-operation (1969)
- S.C. Kashyap, Human Rights and Parliament (1978)
- S.C. Khare, Human Rights and United Nations (1977)Moskowitz, Human Rights and World Order (1958)
- J.A. Andrews, Human Rights in International Law (1986)
- Menon (ed.), Human Rights in International Law (1985)
- A.B. Robertson (ed), Human Rights in National and International Law (1970)
- UpendraBaxi, "Human Rights, Accountability and Development" Indian Journal of internationallaw 279 (1978)

Expected Course Outcomes:

At the end it is expected that the student will be able to :

- Acknowledge the social and economic rights of workers, forced labour, child labour, bonded labour, slavery, trade union, social security, right to health, standard of living, protection of families etc.
- To gain and acquire the knowledge about cultural rights of indigenous population.
- Understand the third-generation solidarity right of various populations.
- Acknowledge the ideas and knowledge about Human right Protection system of United
- Nations in the light of Covenant of Civil and Political rights.

COURSE -3.2

NATIONAL SECURITY, PUBLIC ORDER AND RULE OF LAW

Objectives of the course:

In every written constitution, provision is required to be made to equip the state to face grave threats to its existence arising from extra-ordinary circumstances created by war or external aggression or armed rebellion. Although "amidst the clash of arms, the laws are not silent" they do not speak the same language in war as in peace. Extra-ordinary circumstances warrant the invocation of extra-ordinary laws and such laws are known as emergency laws. They put greater fetters on individual liberty and also eclipse certain aspects of the due process. But in such circumstances, the democratic forces must assert that for survival of the State, the least possible liberty should be available. The students should be familiarized with different aspects of such emergency powers and scrutinizing intellectual attitude towards such powers.

Unit - 1. National Security, Public Orders and the Rule of Law

Emergency Detention in England - Civil Liberties, Subjective satisfaction or objective assessment? Pre-Independence law, Martial Law Provisions in English law and in the Indian Constitution.

Unit - 2. Preventive Detention and Indian Constitution

Article 22 of the Constitution, Preventive Detention and b feguards,Declaration of Emergencies, 1962, 1965 and 1970 Emergencies, 1975 Emergency

Unit - 3. Exceptional Legislation

COFEPOSA and other legislation to curb economic offenders, TADA& POTA : "the draconian law"-comments c NHRC, Special courts and tribunals, Due process and special legislation

Unit - 4. Civil Liberties and Emergency

Article 19, Meaning of "Security of State", Meaning of "Public Order", Suspension of Article 19 rights on declaration of emergency, President's Right to suspend right to move any court, Article 21 - special importance - its nonsuspendability, Suspendability -44th amendment

Unit - 5. Access to Courts and Emergency

Article 359: ups and downs of judicial review, Constitution (Forty-fourth), Amendment Act, 1978, Constitution (Fifty-ninth) Amendment Act,. 1988.

Select bibliography

- G.O. Koppell "The Emergency, The Courts and Indian Democracy" 8 J.I.L.I. 287 (1966)
- H.M. Seervai, The Emergency, Future Safeguards and the habeas Corpus: A Criticism (1978)
- International Commission of Jurists, Status of Emergency and Human Rights (1984)
- N.C. Chatterji and ParameshwarRao, Emergency and the Law (1966).

Expected Course Outcomes:

At the end it is expected that the student will be able to :

- Understand and interpret various provision and safeguards to protection national security;
- To explore the various approach of public order, importance of rule of law and different legislations;
- Balancing the civil liberties and power of state; and
- Explore the various functional institution like election commission, parliament and check and balance o national importance.

COURSE -3.3 :PRACTICAL TRAINING

The practical training shall be held in the Third semester on Research Methodology, Law Teaching and Clinical work. There shall be 25 marks each for doctrinal research and for non-doctrinal research and 25 marks each for law teaching and clinical work. How the components of practical shall be evaluated is left to individual faculties of law. They can formulate their own models of assessment. However, for making the practical training objective and meaningful, the following guidelines shall be adhered to.

1. Research Methodology

(i) Doctrinal research (25 marks)

Each student is assigned in advance a separate topic and asked to collect materials. A period of 5-7 days can be set apart for carrying out this assignment in the library. The materials indicated or collected during the assignment shall be evaluated by a group of faculty members.

(ii) Non-doctrinal research (25 marks) Here the students are asked to go out of the classroom and libra and make an empirical study of a problem, which has social, economic, moral or political dimension. Field dat can be collected through any model of data collection. The results are to be assessed by a team of faculty members.

2. Clinical work (25 marks)

The law school can evolve the modalities. One method is that the legal aid clinic of the law school can involve itself with other legal aid programmes in the area. Students are encouraged not only to work with the clinic but also to acquaint themselves with court proceedings, working of a business organization, tackling of labour disputes, drafting of business or other deeds and with public interest litigation. The faculty shall assess the initiative and potential of the student and the actual work turned out by him.

3. Law Teaching (25 marks)

A topic is assigned to the student in advance. He is required to handle a class for 25 to 30 minutes. Where LL.B. programme co-exists with LL.M programme, the students may be asked to teach the LL.B students. They can select any of the methods of teaching. In legal education practical, the LL.M students are evaluated internally.

PAPER – 3.4(a) :ENVIRONMENT PROTECTION AND THE LAW

Objective of the Course:-

The Concept of the Environmental Law is for the maintenance and improvement of environment.

Syllabus:-

Unit- 1. General Laws on Environmental Concern Code of Criminal Procedure: Public nuisance, Provisions in the India Penal code, Local bodies Law: an overview.

Unit-2. Environment (Protection) Act, 1986

'Necessary and proper clause': concentration of power on the Central Government, Delegated legislation: power to make rules, regulation and to issue Directions, Delegation of powers.

Unit-3. Coastal Zone Management

Sea erosion, CRZ Notification, Prohibitions and exemptions, Permissible activities, Classification of zones, Regulations of sea resorts, Eco-tourism, Coastal zone management plans, Aquaculture.

Unit-4. Biological Diversity Act, 2002

Unit -5. Emerging Legal Controls

Environmental audit, Environmental Impact Assessment, Public participation in environment decision making, Environment information, environmental education Incentives for pollution control.

Select Bibliography

- Leelakrishnan, (P et,. Al. 9eds,) Law and Environment (1990), Eastern, Lucknow
- Leelakrishnan, P, The Environment Law in India (1999), Butterworths, India.
- Department of Science and Technology, Government of India, Report of the Committee for recommending Legislative Measures and Administrative Machinery.
- For Ensuring Environmental Protection (1980) (Tiwari Committee Report).
- Indian law Institute, Environment Protection act: An Agenda for Implementation (1987)
- Indian Journal of public administration, special number on Environment &Administrative, July-September, 1988, Vol. XXXV, No.3
- Findley, P.W. and Farder, D.A. Environmental law
- David Hughes, Environmental law (1999), Butterworths, London
- Armin Rozencranz, et,al.(eds.), Environmental policy and law in India (2000), Oxford.
- Biological Diversity Act, 2002.

Expected Course Outcomes:
At the end it is expected that the student will be able to :

- Study the relationship between environment and climate change as well as the role of law, judiciary, resolution mechanisms but the alternate energy solutions and how people are dealing with climate changes, environmental laws and implementation of available solutions.

Paper – 3.4(b) INTELLECTUAL PROPERTY RIGHTS LAW

Objective of the Course:-

The main objective of the paper is to introduce to the students the basic concepts of IPR and their relationship with other subjects especially, economic law, and other technological aspects . Apart from the above, the paper covers the approaches of International Institutions and introduces the various aspects that are form part of the province of IPR

Unit -1. INTRODUCTION:

- Origin and Genesis of IPR
- The Ways and Means of Creation of IPR
- Sources of IPR-Custom, Treaties, Judicial Decision, Juristic Writings, General Principles of Law, Resolutions of International Organizations

Unit -2. Concept and Theoretical Perspectives

- Meaning and Definition or IPR
- Theories – Marxist – Western – Indian
- International Trade and IPR – GATT and UNCTAD – IMF – World Bank – WTO

Unit – 3. Economic and Technological Approaches

- International Economic Law and IPR
- Information and Technological perspectives
- Computers and Cyber Crimes – WIPO and Perspectives
- Bio-technology and IPR

Unit – 4. Approaches of International Institutions and IPR

- UN and IPR
- b) ECOSOC – UNESCO – WHO – FAO – ILO – WIPO – Human Rights Council

Unit – 5. SUBJECT PROVINCE OF IPR

- Patents – Basic aspects
- Trade Marks – Basic principles
- Copy Right – Basic Issues
- Industrial Designs and Geographical Indications

Suggested Readings:

- Peter Drahos: A Philosophy of Intellectual Property,1996
- CommonsJ.R.: International Economics,1934
- Narayan: Intellectual Property rights, 2007
- Gopalakrishnan.N.S, Cases And Materials On Intellectual Property Law : Along WithObjectives, Methodology, And Course Outline Bangalore : National Law School of
- India University, 1992International Legal Instruments, D.K. Agencies 1998
- Intellectual Property Rights CSIR Journal
- International Legal Materials.; Journal of the Indian Law Institute
- Journal of the Indian Society of International Law ; American Journal of International Law ; Apart from the above, the students may be informed about the other materials by the concerned teacher.

Expected Course Outcomes:
At the end it is expected that the student will be able to :

- To give philosophical underpinnings of traditional notion of property and IP
- To examine the link between Industrial development & IP protection
- To examine the conceptual development of IP concepts through judicial approach
- To examine the impact of IP on economy, health and daily activities
- To understand the basic principles enunciated in international agreements relating to IP

IV-SEMESTER

COURSE – 4.1 :DISSERTATION AND VIVA- VOCE

{Topic from optional group}

The Student has to submit a Dissertation on a topic choosing from optional group containing 150 to 200 pages by following research methodology.

For written part – 150 Marks
For Viva - 50 Marks

Credits: 1

This Course is designed to offer the students with following objectives:

- To have the practical exposure to the legal research writing;
- To apply the various stages of legal research, formulation of problem, literature review, data collection, tabulations, statistical analysis and report writing;
- To have the ability to defend the research undertaken; and
- To have the insight development of research writing, spotting out the problem and its exploration.

Expected Course Outcomes:

At the end it is expected that the student will be able to :

- Identify key research questions within the field of Demography on which you will carry out independent research.
- Manage your time effectively whilst working on your independent research.
- Demonstrate appropriate referencing and develop skills in other aspects of academic writing.
- Demonstrate knowledge and understanding of report writing.
- Apply the demographic/statistical research training acquired in the taught element of the programme by designing an appropriate research strategy and research methodology to carry out your research

Paper – 4.2a

LAW OF CONSUMER PROTECTION.

Unit – 1. Historical and Sociological Background of Consumer Law
Concept of
Consumer:

- Consumer in India.
- Consumer of goods and services.
- Professional services - Medical, legal, educational and welfare services.

Unit –2 Definitions: complainant, consumer dispute, defect, deficiency in service, service, unfairtrade practices, restrictive trade practices.Rights of Consumer under the Act, nature and characteristics.

Unit –3 Consumer Protection Councils, role, objects, and composition. Structure, composition,power and functions of District Forum, State Commission and National Commission.

Unit –4 Law of compensation, approach of Consumer Forum while awarding compensation.

Unit –5 Procedure to be followed by consumer redressal agencies, provisions regarding executionof the decision and Appeals. Landmark Judgments of Supreme Court and NCDRC.

Select bibliography

- Venkat Rao, Law of Consumer Protection, 1998. Asia Law House
- G.B. Reddys, Law of Consumer Protection, 1997, Gogia Law Agency
- V.K. Agrawal, Consumer Protection Law & Practice 1997, B.L.H. Publishers.
- D.N. Saraf, Law of Consumer Protection in India, (2nd Edn/1995).
- Consumer Protection Judgments (CPJ) and Consumer Protection Reports (CPR)
- Dr. Gurjit Singh, The Law of Consumer Protection in India, 1996 Deep and Deep Publications.
- R.S. Chaudhari, Doctor & Consumer Protection Act, 1994, Maharashtra Law Agency.
- R.M. Vats, Law Relating to Insurance, 1997, Universal Law Publishing Co. Pvt. Ltd.
- R.M. Vats, Law Relating to Telephone, 1996, Universal Law Publishing Co. Pvt. Ltd.

Expected Course Outcomes:
At the end it is expected that the student will be able to :

- Define provision under the Consumer Protection and Right to Information Act and apply them to situations accordingly
- Draft a consumer complaint with ease
- Confidently approach a Consumer Forum and get aware of the redressal mechanism
- To expose the students about Consumer Protection Laws;
- To develop the conceptual understanding of Consumer Protection regime.

Paper – 4.2b INTERNATIONAL HUMAN RIGHTS (MOOC / ONLINE COURSE)

This subject is MOOC / Online course only.
For more details and syllabus log on to www.mooc-list.com.

Expected Course Outcomes:
At the end it is expected that the student will be able to :

- Analyze and comment on key controversies surrounding the development of international human rights law
- Use conceptual tools to follow the developments of human rights law
- Be most effective in contributing to the enforcement of international human rights law

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S.V. UNIVERSITY, TIRUPATI:: SVU COLLEGE OF ARTS

CBCS Pattern (With effect from 2016-17)

(For Regular students studying in Dept. of Law, S.V. University & Affiliated Colleges, S.V. University) LL.M

(Common to all branches for all Affiliated colleges with maximum of 80 Marks)

MODEL QUESTION PAPER

LL.M DEGREE EXAMINATION

FIRST SEMESTER

PAPER: 1.1- MASS MEDIA LAW

(Short Questions)

Answer any five questions. Each question carries 5 marks

PART-A(5X4=20)

1. Ownership pattern of mass media
2. Non -visual Media
3. Freedom of Press
4. Newsprint Control Order
5. Freedom to telecast
6. Distinction between film and press
7. Constitutional restriction on radio
8. Commercial advertisement
9. Pre-censorship
10. Internal scrutiny of serials

PART-B (ESSAY QUESTIONS)

Answer any five questions. Each question carries 12 marks

(Marks: 5x12=60)

11 a) Define Mass Media. Explain different types of Mass Media functioning in India.

OR

b) Write a note on visual and non-visual media and impact of visual media on the minds of people.

12 a) Examine the scope of Freedom of Speech and Expression under Article19(1) (a) of Constitution with relevant case laws.

OR

b) Explain the grounds of restrictions that can be imposed on Freedom of Press. Comment on their Justiciability.

13 a) Write a note on the role of government department to regulate control on radio and television.

OR

b) What are the Discuss the principles laid down by the Supreme Court in Abbas Case.

14a) What are the grounds on which broadcasting of a programme on Television can be restricted? Explain with the help of decided case laws.

OR

b) What is the role of Right of access to information in the exercise of Freedom of Expression?

MODEL QUESTION PAPER
LL.M DEGREE EXAMINATION
SEMESTER -I
PAPER: 1.2- PUBLIC UTILITIES LAW
(Short Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1) Bank Nationalisation
2) Present status of railways
3) Quasi judicial authority
4) Deficiency of service
5) Government control of public utilities
6) Audi Alteram Partem
7) Consumer
8) Use of electricity
9) Rights of consumer
10) Minority rights

PART-B (ESSAY QUESTIONS)
Answer any five questions. Each question carries 12 marks
(Marks: 5x12=60)

11. (a) Elucidate the role of Road transport as means of public utilities

OR

(b)Discuss the growth and evolution of public utilities in India.

12 (a). Why the Government's control is predominant on public utilities ?

OR

13 a) Examine the liabilities and special privileges of public utilities relating to tort.

OR

b) Analyse the liabilities of public utilities under criminal law

14. a)Elucidate the rights guaranteed under Art. 16 of the constitution.

OR

b) Discuss the doctrine of equality under Part-III of the constitution.

15. a) Explain the circumstance and conditions under when which employee of public utilities are criminally liable. OR

b). Discuss the power conferred on parliament make laws excursing control over public utilities.

MODEL QUESTION PAPER
LL.M DEGREE
EXAMINATION FIRST
SEMESTER
PAPER: 1.3- LAW AND SOCIAL TRANSFORMATION IN INDIA (Short Questions)
Answer any five questions. Each question carries 5 marks
PART-
A(5X4=20)

1. Social upward mobility
2. Religious minorities
3. Sarvodaya movement
4. Panchayat raj system
5. Role of Macaulay in Indian Legal System
6. Begar
7. Law as an instrument of social chang
8. Interaction between law and social change
9. Law as a process of social transformation
10. Right to free and compulsory education

11. a .How has law contributed to social transformation in India?

OR

b. "Law is a product of tradition and culture". Discuss with the help of suitable examples.

12. a . What are the statutory provisions for reservation? Aslo discuss the concept of CreamyLayer in light of Mandal Case.

OR

13. a. It is generally presumed that the law is the mirror of the society, but in India, law is being used on a large scale as an instrument to change the society. Is it feasible- Discuss and illustrate by suitable examples.OR
b. What are the main issues involved is the controversy regarding relationship between law and morals- Hov far can the law be used to enforce morality- Comment.
14 a. "Acceptance of Caste is a factor to undo past injustices." Discuss this statement in the light of case law and recommendation made by various commissions.

OR

b. How the socialistic approach is influencing law and justice in India? Do you agree that the Directive Principles of the State Policy in Indian Constitution is influenced by thesocialistic approach? Critically analyze the legislativ approach in this regard.
15. a. Discuss the role of personal laws in the social transformation. What are the latest emerging judicial trends in this context?

OR

b. "Law is a tool to enforce morality." Discuss this statement in the light of relationship between law and morality.

MODEL QUESTION PAPER
LL.M DEGREE EXAMINATION
FIRST SEMESTER
PAPER: 1.4- INDIAN CONSTITUTIONAL LAW, THE NEW CHALLENGES
(Short Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1. Right to education
2. Privatization
3. Judicial Review
4. Right to work
5. Affirmative action
6. Fundamental duties
7. Brain drain
8. Minorities rights
9. Interstate water disputes
10. Laws on corruption

11. a) Explain Federalism

O
R

b) Critically discuss the scheme of distribution of legislative power between the union and states of India.

12. a) Is the country moving from police to welfare state and welfare to capitalist State in which theenforcement of rights becomes a difficulty. Comment.

O
R

b). Write a detailed note on commercialization of education

13. a) Explain the nature and scope of the right of freedom of speech and expression along with the newerrights that have been read into by the judiciary within its ambit.

O
R

14 . a) Write a critical note on the changing dimensions of the concept of equality as provided in the IndianConstitution. OR

b) Elaborate on electoral reforms in India.

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LL.M

(Common to all branches for all Affiliated colleges with maximum of 80 Marks)

MODEL QUESTION PAPER LL.M DEGREE EXAMINATION

SEMESTER-II

PAPER: 2.1- UNION-STATE FINANCIAL RELATIONS (Short Questions)

Answer any five questions. Each question carries 5 marks

PART-A(5X4=20)

1. Indian Federalism
2. Contingency fund
3. Difference between tax and fee
4. Revenue expenditure
5. Capital receipts
6. Concurrent list
7. Residuary power
8. Planning commission
9. Zonal commission
10. Financial commission

11.a) Define Federalism and explain the essential features of Indian Federalism.

OR

b)Explain the confederation evolution of feudal government of India make comparison of India

12.a) What is the legislative relation between the union and the states in India.

OR

b)Explain the extent of Union's Power of taxation

13 a) Evaluate the relevance of machinery provided for resolution of river water disputes.

OR

b) Explain the organization and role of Finance Commission

OR

14 a) Inter-relation between Art. 19(1)(g) and 301.

OR

b) Explain the distribution of tax revenues and borrowing power of the state.

15 a). Define Inter-State and Commerce under the Indian Constitution and explain the restrictions on legislative power of the union and state with regard to the trade & commerce.

MODEL QUESTION PAPER
LL.M DEGREE EXAMINATION
SEMESTER-II
PAPER: 2.2- CONSTITUTIONALISM, PLURALISM AND FEDERALISM
(Short Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1) Cooperative Federalism
2) Separation of powers
3) Communism
4) Written Constitution
5) Right against exploitation
6) Affirmative Action
7) Reasonable classification
8) Genocide
9) Right to self determination
10) Federal umpiring

PART-B
(ESSAY QUESTIONS)

Answer any five questions. Each question carries 12 marks
(Marks: 5x12=60)

11) a. Explain the difference between constitutionalism and constitution.

OR

b. Explain the role of in pluralistic society

12) a. Is the power of judicial Review of the Supreme Court unrestricted? Discussed in the light of relevant doctrines.

OR

b. Explain the concept of Rule of Law.

13) a. Explain the difference between confederation and federation

OR

b. Discuss the international norms pertinent to human rights

14). a. Explain the rights of linguistic minorities under the Indian Constitution.

OR

b. How can the right to equality be protected in a pluralistic society?

15). a. Explain the legal provisions which address the issues regarding the gender justice.

b. Explain parliamentary privileges with relevant case law.

OR

MODEL QUESTION PAPER
LL.M DEGREE EXAMINATION
SEMESTER-II
PAPER: 2.3- JUDICIAL PROCESS
(Short Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1. Social ordering
2. Judicial creativity
3. Political nature of judicial process
4. Accountability of judges
5. New dimension of judicial activism
6. Liberal moral tradition
7. Western thought and justice
8. Structure challenges
9. Dependence theories
10. Public Interest Litigation

PART-B

(ESSAY QUESTIONS)

OR

Answer any five questions. Each question carries 12 marks

(Marks: 5x12=60)

11. a) What do you understand by 'Justice according to Law'?

OR

b) Explain the meaning of 'Administration of Justice'? What is the role of Superior Courts in India in this regard?

12 a). Explain the 'Doctrine of Precedent.' Discuss its merits and value in Judicial rocess.

OR

b. What is 'Legislation'? Discuss various kinds of Legislations.

13 a. Discuss the scope and limits of institutional liability of courts and judges.

OR

b. What is the role of (a) Summon/Warrant, (b) Pleading (c) Proof, in the trial by Courts?

14 a. Write a Critical Note on: Indra Sawhney v. Union of India (AIR 1993 SC 477).

b. Examine the case of Maneka Gandhi v. Union of India (AIR 1978 SC 597). Also state the principle of law laid down in this case?

15 a. What is the meaning, scope and extent of Judicial Review of Administrative Actions by the Supreme Court of India under various Articles of the Constitution of India?

OR

b. State the Procedure for administrative Justice by the Courts.

MODEL QUESTION PAPER
LL.M DEGREE EXAMINATION
SEMESTER-II
PAPER: 2.4- LEGAL EDUCATION AND RESEARCH METHODOLOGY
(Short Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1. Discussion method
2. Socio -legal research
3. Legal aid
4. Subordinate legislation
5. Data collection
6. Case studies
7. Questionnaire
8. Observation
9. Impotence of schedule
10. Classification of data.

PART-B
(ESSAY QUESTIONS)

OR

Answer any five questions. Each question carries 12 marks

(Marks: 5x12=60)

11. a) Explain various Methods of Imparting Legal Education. The class-room or the lecturing method has its own limitations and cannot be followed exclusively. Discuss.

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b. "Clinical Legal Education is called as 'Learning by Doing'. It introduces students to the real world of law". Explain this statement with reference to trial advocacy, client counseling and ADR methods.

12. a. Describe relation between Theory and Fact as an important Component of Scientific Methodology of Research. Substantiate your answer with example of legal research.

O

R

b. Draw a clear distinction between Doctrinal and Non-doctrinal Research pointing out advantages and limitations of each.

13 a. Describe various Legal Research Models with appropriate illustrations and point out their contribution in scientific enquiry in the area of law.

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b. Explain the importance of the empirical methods of legal research?

14. a. What is meant by design and explain the importance of research design.?

O

R

b. Define the sampling and discuss various ways of sampling techniques?

15. a. Elucidate the necessary steps that are to be taken in research report writing.

b. Explain the necessity of computers in legal research?

OR

MODEL QUESTION PAPER
LL.M DEGREE EXAMINATION
SEMESTER -III
PAPER: 3.1- HUMAN RIGHTS
(Short Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1. UDHR
2. Due process of law
3. Magna Carta
4. Freedom of Press
5. Concept of Human Rights
6. Role of Minority Rights Commission
7. Role of NGOs in protecting human rights
8. Remedies against the human rights violation
9. Basic human rights of prisioners
10. Role of legal professionals in protection of human rights.

PART-B
(ESSAY QUESTIONS)
Answer any five questions. Each question carries 12 marks
(Marks: 5x12=60)

11. a) Critically evaluate the role of NGOs in the promotion and education about human rights.

OR

b. What role the Amnesty International is playing in protection and promotion of human rights.?

12. a. Nature of civil and political rights may be different but they are inter-related and inter-owned. Discuss in the light of classification of human rights.

OR

b. Child labour is one of the most primary social problems. Explain the role of Judiciary on its protection.

13. a) Discuss the role of legal professionals in promotion and protection of human rights

OR

b. The Convention on Civil and Political Rights 1956 contains the basic human rights required to every human being across the world. Discuss the scope and ambit of the International Law

14. a) Discuss the role of press in protection of human rights

OR

b. Universal Declaration of Human Rights is one of the most served and significant documents. Explain

15. a Examine the role of the National Human Rights Commission in the protection of Human Rights. OR

b. United Nations have adopted a number of conventions to present commission of certain acts which are inhuman and against the dignity and worth of human persons. Explainefforts taken by UN to tackle with the acts of Genocide.

OR

MODEL QUESTION PAPER
LL.M DEGREE EXAMINATION
SEMESTER - III
PAPER: 3.2- NATIONAL SECURITY, PUBLIC ORDER AND RULE OF LAW
(Short Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1. TADA & POTA –The draconian Law
2. Adult Suffrage
3. Doctrine of perspective overruling.
4. FEMA & Customs Act
5. Special Courts
6. Due process
7. Public order
8. Habeas corpus
9. Security of the state
10. Proceeds of the terrorism

PART-B
(ESSAY QUESTIONS)
Answer any five questions. Each question carries 12 marks
(Marks: 5x12=60)

11.a. Discuss the validity of pre-Independence laws under the Constitution of India.
OR
b. Explain the main provisions of the Protection of Human Rights Act, 1993
12.aElaborate the concept of Exceptional Legislation. Critically evaluate the role of COFEPOSA in curbing the economic offenders.
OR
b Discuss the modern concept of Rule of Law with special reference to Veena Seth Vs. State of Bihar (1982)2 SCC 583.

13. a. Explain the provisions of Art. 352 of the Indian Constitution in proclaiming national

OR

emergency and its impact on federal structure of India with the help of relevant case laws.

OR

b. Explain the meaning and significance of Public Order under the Indian Constitution.

14. a. Examine the salient features of TADA as an exceptional legislation

OR

b. Discuss the nature of civil rights guaranteed during the emergency in England.

15. a. What are the changes brought by the 44th Amendment to the Constitution of India

OR

b. Elucidate the Constitution of National Human Rights Commission and its functions.

OR

OR

MODEL QUESTION PAPER
LL.M DEGREE
EXAMINATION
SEMESTER- III
PAPER: 3.4(a)- ENVIRONMENT PROTECTION AND THE LAW (Short Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1. Kinds of courts
2. Classification of zone
3. National costal management authority
4. Regulation of REA RESORTS
5. Environment audit
6. Sustainable development
7. Polluter pay principle
8. CRZ
9. Biosphere reserve
10. Environmental impact assessment

PART-B

(ESSAY QUESTIONS)
Answer any five questions. Each question carries 12 marks
(Marks: 5x12=60)

11. a)What do you mean by 'Precautionary Principle'? Does precautionary principle shift the onus of proving environmental benign nature of the developmental activity from hose b)who challenge the developmental activity to the author of the developmental activity?
Discuss in the light of decided cases.

OR

b. "Sustainable Development" as a balancing concept between ecology and development has been accepted as a part of the Customary International Law though its salient features have yet to be finalised. Critically analyse the above statement with reference to the decided cases.

12. a. Role of Public Interest Litigation in environmental protection in India.

OR

b. Right to life is a fundamental right under Article 21 of the Constitution and it includes the right of enjoyment of pollution free water and air for full enjoyment of ife. Explain upon the above statement with reference to decided case law.

13 a Explain the concept of absolute liability of hazardous industries as reflected from judicial decisions.

OR

b. Emerging legal system on modern era of environmental laws has witnessed some emerging legal controls for the scenario of India.

OR

OR

15. a. What are the powers of the Central Government to protect and improve the environment under the Environment Protection Act, 1986?

OR

b. i) Convention on Climate Change, 1992.

(ii) Convention on Biological Diversity, 1992

OR

OR

MODEL QUESTION PAPER
LL.M DEGREE
EXAMINATION
SEMESTER- III
PAPER: 3.4(b)- INTELLECTUAL PROPERTY RIGHTS (Short Questions)
Answer any five questions. Each question carries 5 marks

PART-A(5X4=20)

1. TRIPs
2. Industrial Property
3. Patentable inventions
4. UNCTAD
5. Deceptive similarity
6. Compulsory license
7. Passing Off
8. Industrial Design
9. Trade Secrets
10. WIPO

PART-B

(ESSAY QUESTIONS)

Answer any five questions. Each question carries 12 marks

(Marks: 5x12=60)

11. a. "TRIPs is a binding global charter of IPRs". Explain.

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R

b. Explain the emerging dimensions of IPR system

12. a. Discuss the grounds on which the registration of a patent can be refused.

O
R

b. What are the legislations covering the IPR in India

13. a What is infringement? What action under the Trade Mark Act.1999 constitute the infringement of trademark?

O
R

b. What is Convention on Biological Diversity? Is India a member state to it and explain the approach adopted by India towards its?

14. a. There is no copyright in an idea. Explain.

O
R

b. Briefly explain the procedure relating to registration of copyright. Is registration of the work compulsory under the Copyright Act?

15. a. Explain the different types of Intellectual Property Rights in Software.

b. What is new and original design? Discuss the law relating to registrability and cancellation of design under the Design Act, 2000.

OR

OR

MODEL QUESTION PAPER
LL.M DEGREE
EXAMINATION SEMESTER-
III
PAPER: 3.5(a)- CYBER CRIMES AND LAW
(Short
Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1. Computer Sofware
2. Cyber stalking
3. What is domain name
4. Data protection in cyber space
5. Denial of service attacks
6. Cyber forensics
7. Internet service provider (ISP)
8. Defamation
9. Hacking with computer system
10. Cyber squatting

PART-
B
(ESSAY
QUESTIONS)
Answer any five questions. Each question carries 12 marks
(Marks:
5x12=60)

11. a. Sketch the development of Internet

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R

b. Critically examine cyber jurisdiction

12. a. Critically examine cybercrimes affecting individuals.

O
R

b. What is information? Discuss the use of information technology in the global era?

13. a How data is regulated and protected under the Information Technology law?

O
R

b. Freedom of speech and expression in Information Technology Act.

14. a. Case analysis;
    I. Maruthi Udyog Ltd vs. Maruti.com
    II. Sreya Singhal Vs. Union of India

O
R

b. Write an essay on the Legal Regulation of cyber terrorism.

15. a. Write a notes on:
    i. Hacking with computer system
    ii. Computer fraud and computer virus.

b. Explain the penalties and offences un the IT At.2000

OR

OR

MODEL QUESTION PAPER
LL.M DEGREE EXAMINATION
SEMESTER- III
PAPER: 3.5(b)- EVOLUTION AND CONCEPT OF ADR
(Short Questions)
Answer any five questions. Each question carries 5 marks
PART-A(5X4=20)

1. Statutory Arbitration
2. Model arbitration law
3. Lok Adalats
4. Conciliation
5. Vigilance Commission
6. Newyark Convention Awards
7. Legal service authority
8. Advisory system
9. Commission of Inquiry
10. Role of Nyaya Panchayats and dispute resolution.

PART-B
(ESSAY QUESTIONS)
Answer any five questions. Each question carries 12 marks
(Marks: 5x12=60)

11. a. Explain the need and importance of ADR in the modern day world.

OR

b. Write about the advantages of ADR over the traditional dispute resolution.

12. a What are the legal provisions and how are the International Arbitration Awards enforced in India? OR

b. Write a note Unicentral model on arbitration and conciliation.

13. a. "Existence of arbitration agreements mandatory for arbitrator to act upon and pass the award. The burden is on the party who relies on the agreements to prove its existence". Explain. OR

b. Explain how an arbitrator is appointed and what are his powers and duties under the arbitration and Conciliation Act.1996.

14 a Explain the legislative content of taking recourse against Arbitral Awards.

OR

OR

b. Critically discuss the various informal methods of settlement of disputes as part of ADR evolution.

15. a. What is an arbitration agreement and its effect and explain the advantages of settling the disputes through ADR. OR

b. Examine the main features of Arbitration and Conciliation Act and what are the recommendations of Law Commission of India in this regard?

EXAMINATION SEMESTER-III

PAPER: 4.2(b)- LAW OF CONSUMER PROTECTION (Short Questions)

Answer any five questions. Each question carries 5 marks

PART-A(5X4=20)

1. Unfair trade practice
2. Consumer and criminal law
3. Meaning of restraint of trade
4. Antitrust remedies
5. What was the liability for deficient services under Consumer Protection Act
6. Distinguish fraud and Mis-Representation
7. Consumer credit
8. Restrictive trade practice
9. Standard of packed commodities
10. What is deficiency in service? Refer to case law.

PART-B

(ESSAY QUESTIONS)

Answer any five questions. Each question carries 12 marks

(Marks: 5x12=60)

11. a Explain the consumerism and its social significance and effectiveness

O

R

b. Explain conditions and warranties.

12. a. Examine the salient features of Consumer Protection Act. 1986.

O

R

b. Write a note on Consumer Protection Council

13. a. Examine the development of consumer movement in U.K, USA, and India.

O

R

b. What are the remedies available to consumer under the Consumer Protection Act?

14. a. Essential Commodities Act. 1955.

O

R

b. Discuss the scope of rule of reason and per se rules in the antitrust measures.

15. a Write a note on Doctrine of Caveat Emptor and exemption.

O

R

b. Critically discuss the powers and functions of consumer disputes remedies underCOPRA. 1986.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF LIBRARY & INFORMATION SCIENCE



Course

M.L.I.Sc.,

Choice Based Credit System (CBCS)

Academic Year 2023-2024

About the department

The Department of Library and Information Science was established in the year 1974 with oneyear B.L.I.Sc. programme. Subsequently oneyear M.L.I.Sc. programme was started in 1985- and two-year integrated M.L.I.Sc. programme was started in 1996. The founders of the department, who got superannuated, were Sri. N. Sripathi Naidu,Prof. N. Guruswamy Naidu, and Prof. T. Rajagopal. Other four eminent professors, Dr.V. Pulla Reddy and Dr. D.Chandran, Dr.I.Chandraiah and Dr.K.Padmini superannuated from the department in 2012, 2013, 2018 and 2020 respectively. At present, one regular faculty member, Five Academic Consultants and One Guest Faculty are working in the department to teach the specializations of the course and the modern trends in information technology. All are well qualified and actively engaged in teaching and research. Around 60 papers were published in national and international conference proceedings and journals by the faculty members in the last five years. The department is providing practical knowledge on library housekeeping activities and conducting extension activities for students. Under this program the students visited SHAR, central library, Sriharikota, Oriental Research Institute, SVU, SVETA Library, SV agricultural university, Tirupati, Sanskrit Vidyapeetam Library and local public and engineering libraries.The department is also providing guidance to the students of the department who are appearing for UGC NET and SET examinations. So far 55 students are qualified in the UGC-NET SLET and SET exam. The department is also providing Psychological, Academic and Career counseling to the students. Many of the alumni are serving in the departments of Library and Information Science of various Universities as Teachers, Librarians, Information Officers/Documentation Officers/ Scientists in various educational, scientific and research institutions in the State and Central Government Organisations in public academic and special libraries, institutions and organizations. They have been providing support to the department in the form of guest lectures, presenting books, podium and scholarships to students.

Vision

- To impart quality education and research by revamping curriculum to suit the societal and industrial needs.
- To conduct Extension programmes in the academic libraries.

Mission

- To educate the students in the philosophy of librarianship, basic principles, fundamental laws and professional ethics.
- To train the students in the skills of information organization, processing and retrieval.
- To train the students in the management of Library and Information Centres.
- To provide the students thorough understanding of applications information and communication technology in library and information centres.

Programme Specific Outcomes

PS 01	Get the skills and knowledge on Competitive exams, National and State level eligibility tests and other equivalent competitive examinations in the field of Library and Information Science.
PS 02	Ability of getting employment as Librarian, Information Officer, Knowledge Manager, Digital Archivist, Trainer on ICT, Information Managers, and many more positions in Government, Inter Government, Private and Corporate Administration.
PS 03	Attain the complete professional skills and abilities for organizing information systems and services.

Programme Objectives

- To Provide intensive theoretical and practical instruction in respect of - Organization of universe of knowledge in libraries and proper methods of dissemination and communication of knowledge
- Advanced management and administration of different kinds of libraries
- To impart the Students with necessary skills to provide professional leadership in the context of scientific and technological changes
- To acquaint the students with problems of research in various branches of Library and Information Science and methods of research

Programme Outcomes (POS):

It represents the knowledge, skills and attitudes the students should have at the end of a course completion of their respective Library and Information Science program.

PO 1	Preparing the learners to acquire professional Skills, Information and Communication Technology Skills to get Job opportunities as teaching faculty in Library and Information Science departments and as Librarians in different types of libraries.
PO 2	Making the learners to identify, formulate, review research literature and analyse different problems to reach conclusions using principles of library management.
PO 3	Enabling the learners to design solutions for complex library problems in order to satisfy the various approaches of the users.
PO 4	Motivating the learners to conduct investigations of multifaceted problems by applying research-based knowledge and different types of research methods including conducting of user studies and case studies in libraries, analysis and interpretation of data and synthesis of the information to get right solutions to the problems
PO 5	Inspiring the learners to learn ICT skills, Retrieval of various Electronic Resources, Library Software
PO 6	Making the learners to understand role of libraries and librarians in the society by conducting extension programs
PO 7	Enabling the learners to understand the impact of libraries on society by conducting webinars on reading habit and its advantages for School children
PO 8	Motivating the learners by applying ethical principles to maintain ethics in library profession
PO 9	Making the learners as team members and leaders in discussion groups to discuss on various topics in the curriculum
P0 11	Motivating the learners to conduct user studies and case studies in libraries and users for their dissertations and projects in multidisciplinary environments
P0 12	Inspiring the learners to cultivate reading habit and enable them to increase their skills, Re-Skills and Upskills to become lifelong learners

Programme Educational Objectives

- To educate the students in the philosophy of librarianship, basic principles, fundamental laws and professional ethics.
- To train the students in the skills of information organization, processing and retrieval.
- To train the students in the management of Library and Information Centres.
- To provide the students thorough understanding of applications information and communication technology in library and information centres.

THE STUDY OF PROGRAMME AND

THE SCHEME OF EXAMINATIONS

SEMESTER –I

S. No	Components of Study		Title of the Paper	Credit Hrs/ Week	No. of Credit	IA Marks	Sem.End Exam Marks	Total
1	Core	101	Foundations of Library and Information Science	6	4	20	80	100
2		102	Knowledge Organization : Classification Theory	6	4	20	80	100
3		103	Knowledge Organization : Classification Practice	6	4	20	80	100
4		104	Knowledge Management	6	4	20	80	100
5	Compulsory Foundation	105 (A)	Introduction to Information Technology	6	4	20	80	100
		105 (B)	Electronic Information and Services	6	4	20	80	100
		105 (C)	Preservation and Conservation of Information Materials	6	4	80	80	100
6	Elective Foundation	106 (A)	Information and Communication	6	4	20	80	100
		106 (B)	Informetrics, Bibliometrics and Webometrics	6	4	20	80	100
Total				36	24	120	480	600
7	Audit Course	107	Human Values and Professional Ethics – I	0	0	100	-	-

SEMESTER –II

S. No	Components of Study		Title of the Paper	Credit Hrs/ Week	No. of Credit	IA Marks	Sem.End Exam Marks	Total
1	Core	201	Information Sources and Services	6	4	20	80	100
2		202	Knowledge Organization : Cataloguing Theory	6	4	20	80	100
3		203	Knowledge Organization : Cataloguing Practice	6	4	20	80	100
4		204	Meta Data Standards – Practice	6	4	20	80	100
5	Compulsory Foundation	205 (A)	Library Management	6	4	20	80	100
		205 (B)	Health Science Library and Information System	6	4	20	80	100
		205 (C)	Agricultural Sciences Library & Information System	6	4	20	80	100
6	Elective Foundation	206 (A)	Scholarly Communication	6	4	20	80	100
		206 (B)	Introduction to Networks on E-Resource Sharing	6	4	20	80	100
Total				36	24	120	480	600
7	Audit Course	207	Human Values and Professional Ethics – II	0	0	100	-	-

SEMESTER –III

S. No	Components of Study		Title of the Paper	Credit Hrs/ Week	No. of Credit	IA Marks	Sem.End Exam Marks	Total
1	Core	301	Information Processing and Retrieval Theory	6	4	20	80	100
2		302	Library Automation and Digital Library	6	4	20	80	100
3	Generic Elective	303 (A)	Internship	6	4	20	80	100
4		303 (B)	Academic Library System	6	4	20	80	100
		303 (C)	Special Library System	6	4	20	80	100
		303 (D)	Search and Search Strategies	6	4	20	80	100
5	Skill Oriented Course	304	Communication, Soft skills and Etiquette	6	4	20	80	100
6	Open Elective	305 (A)	Information Literacy	6	4	20	80	100
		305 (B)	User Studies					
Total				36	24	120	480	600

SEMESTER –IV

S. No	Components of Study		Title of the Paper	Credit Hrs/ Week	No. of Credit	IA Marks	Sem.End Exam Marks	Total
1	Core	401	Research Methodology	6	4	20	80	100
2		402	Software for Libraries - Practice	6	4	20	80	100
3	Generic Elective	403 (A)	Information Processing and Retrieval : UDC and Indexing Practice	6	4	20	80	100
4		403 (B)	Management of Information system	6	4	20	80	100
		403 (C)	Museums and Archives	6	4	20	80	100
5	Multidisciplinary Course/Project Work	404	Dissertation / Project Work	6	4	20	80	100
6	Open Elective	405 (A)	Technical Writing	6	4	20	80	100
		405 (B)	Information Systems and Programs	6	4	20	80	100
Total				36	24	120	480	600

LIBRARY AND INFORMATION SCIENCE

SEMESTER - I

LIS 101: FOUNDATIONS OF LIBRARY AND INFORMATION SCIENCE

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
1.	Foundations of Library and Information Science	101	20
	Objectives 1. To introduce social functions of the library, Role of library in modern society 2. To acquaint with Five laws of library science and legislation in India 3. To explain LIS education in India and various library associations in India Outcomes: 1.Know the various types of libraries and their role in the society 2. Learn the Professional ethics and library Legislation in India 3. Understand LIS education in India and various library associations in India		80 4

UNIT -I: Library as a social institution.

- Social functions of the library.
- Role of library in formal and informal education
- Library in modern society
- Different types of libraries - their distinguishing features and functions.
- Public libraries.
- Academic libraries – School, College and University libraries.
- Special libraries.

- National libraries: India

UNIT- II: Laws of Library Science

- Five laws of library science
- Implications of Five laws in Library and Information activities.

UNIT III: Library Development and Acts relating to Libraries.

- Development of libraries with special reference to India
- Library legislation – need and essential features.
- Library legislation in India: Detailed study of Andhra Pradesh Public Libraries Act.
- Press and registration Act and Delivery of Books(Public Library)
- Copyright Act.

UNIT IV: Library and Information Profession, Public relations and extension activities.

- Librarianship as a profession.
- Professional ethics.
- Library and Information Science education in India.
- Public relations and extension activities.

UNIT V: Library and Information Science professional Associations and organizations.

- National, Associations / organizations - Objectives, Structure and activities ILA, IASLIC, IATLIS, RRRLF.
- International associations, organizations - Objectives, structure and activities, UNESCO, IFLA, CLIP, ALA, SLA.

Recommended books

1. Shera, J.H. The foundation of education for librarianship . New york , 1972 .
2. Mc. Clovin . L.R. public library extension . Paris. Uneso, 1950
3. Kannna , J. K. Library and society , Kuruseshetra, 1987.
4. Ranganathan, S.R. five laws of Library Science . Delhi 1957

5. Ekbo te, Gopal Rao . Public Library system . Hyderabad , 1987

6. Sharma, Pandey, S.K. Development of public libraies in India .New Delhi.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M					M		M
CO2	H	H			M							
CO3	H				H			L				L

H=High, M=Middle, L=Low

LIS102: KNOWLEDGEORGANISATION: CLASSIFICATION THEORY

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
2	Knowledge Organisation: Classification Theory	102	20 80 4
	Objectives: 1.To impart knowledge on the basic concepts in classification 2. To get an idea on features of classification Schemes 3. to introduce the trends and developments in classification Outcomes: 1.. Understand the definition, need and purpose of classification 2. Learn the Fundamental Categories, Facet Analysis, types of Isolates in all schemes of classification 3. Understand the Notation, trends and developments in Classification		

UNIT I: Knowledge Classification and Library Classification.

Classification: Nature, purpose and definition

UNIT II: Notational system.

- Call Number: Class Number, Book number and Collection Number.
- Notation: Need, types and qualities.
- Hospitality in array and chain.

UNIT III: General theory of library classification.

- Canons
- Canon of Prepotence
- Postulates.
- Principles
- Principle of Osmosis
- Fundamental categories.
- Facet analysis.
- Phase analysis.
- Zone analysis.

- Systems and specials.

UNIT IV: Devices and Mnemonics.

- Devices.
- Mnemonics.

UNIT V: Isolates and planes of work and Species of Classification Schemes.

- Isolates: Common and Special.
- Planes of work: Idea plane, verbal plane and notational plane.
- Species of Classification Schemes: Enumerative, Almost Enumerative, Faceted Schemes, Analytico Synthetic Scheme of Classification
- Recent trends in classification, UDC, Webdewey
- Comparative study of CC & DDC.

Recommended books

1. Agarwal. DS. Lectures in Universe of knowledge . Delhi : Academic publishers. 1985
2. Krishna Kumar . Theory of Classification . Delhi: Vikas. 1991
3. Raju, AAN. . Universal Decimal Classification and Colon Classification .
4. Ranganathan, SR. Descriptive account of Colon Classification .Bombay. Asia publishing House . 1967
5. Ranganathan , S.R. Elementary Library Classification . 3RD ED. Bangalore. Sarada Ranganathan Endowment Trust , 1992
6. Rangandhan , SR. Prolegomena to library Classification . Bombay : Asia publishing House , 1965
7. Sayers, WCB . Manual of Classification for librarians . Rev. by Arthur Maltby. London : Andre Deutsch, 1967.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M					M	H	L
CO2	M	H			M							
CO3	H				H							M

H=High, M=Middle, L=Low

LIS 103: KNOWLEDGE ORGANISATION: CLASSIFICATION PRACTICE

(Dewey Decimal classification (22nd Edition)

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
3	Knowledge Organisation: Classification practice Objectives: 1.To impart practical knowledge in classification 2. To get an idea on how to assign class numbers 3. To provide knowledge on tables and schedules Outcomes 1.Learn the Dewey Decimal Classification Scheme 2. Get the skill regarding assigning the class numbers 3.Have knowledge on Tables and Schedules of DDC	103	20 80 4

UNIT I: Main Classes: Divisions, Sections, subsections etc.

UNIT II: Synthesis devices, Add, instructions, signs and auxiliary Tables;

Use of schedules and relative index.

UNIT III: Classification of Electronic reading devices

UNIT IV: Classification of Network based materials

UNIT V: Advanced classification

Recommended books

1. Ranganathan, SR. Colon Classification . 6th ed. Banglore: Sarada.
   Ranganathan Endoment for library Science , 1994.
2. Dewey, Melvil. Dewey Decimal Classification . 3 vols. 18th ed. New York: Lake placid , 1978.
3. Raju, AAN . Dewey Decimal Classification : Theory and practice . Madras : TR , 1995.
4. Stija, MP. Manual of practical Colon Classification . New Delhi, Sterling, 1984.
5. Batty, CD. An introduction to 20th edition of DDC . London : Clive Bingely.
6. Uppal, OP . Practical Procedure of Classification according to CC and DDC. Patiala : Madaan.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M					M	H	L
CO2	M	H			M							
CO3	H				H							M

H=High, M=Middle, L=Low

LIS: 104 KNOWLEDGE MANAGEMENT

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
4	Knowledge Management Objectives: 1.To provide the basic concepts of knowledge management 2. To impart ideas on knowledge creation models, knowledge transfer in E-world 3. To give an idea on neural network and datamining Outcomes 1.Get an idea on the concepts of knowledge management, types of knowledge 2.Understand the knowledge creation models, knowledge transfer in E-World 3.know the tools for knowledge management and neural network and datamining	104	20 80 4

UNIT I: Knowledge Management: Concept and Definition

- Need for Knowledge Management in the emerging and changing Business environment
- Understanding knowledge; Types of knowledge -explicit and tacit knowledge
- Knowledge works changing role of Library and Information professionals.

UNIT II: Knowledge creation and capturing Knowledge

- Process of Knowledge Creation -Creation, Storage, sharing, Application, Evaluation.
- Creation model
- Capturing tacit Knowledge, Externalization and Internalization
- Create a knowledge-sharing Culture
- Impact of New Knowledge Innovation, Integration of External& Internal knowledge, Acquisition of information and Networks

UNIT III: Knowledge Codification and organization: Knowledge base

- Knowledge Mapping
- Decision Trees
- Decision Tables Frames etc.

UNIT IV: Knowledge Transfer and Sharing Steps in Knowledge Transfer.

- Knowledge Transfer in E -World
- Role of Internet, E -Business, E- Commerce.

UNIT V: Knowledge Management-Principles, Tools, Components and Architecture.

- Neural network Data mining
- Legal and Ethical Issues in Knowledge Management

Recommended books

1.Abell Angela and Nigel Oxbrow, Competing with Knowledge: The Information Professional in the Knowledge Management Age. London: Facet Publishing, 2001.

2. Blaise Cronin. ed. Information Management: from strategies to action London Aslib,1985.

3. Bikowrtx W. R.: Knowledge Management Delhi PHI. 2000.

4. Chorafas D. N. Knowledge Revolution. 1968.

5. Crawford, Marshali Jean: Information Broking: a new career in information work, London: L.A. 1988.

6. Dhiman A.K.: Knowledge Management for Librarians. New Delhi: Ess Ess, 2009.

7. Galatin, Malcolm & Laiter, Robert D eds. Economics of Information London : Nijhoff ,1981.

8. Gurnsey, John and White Martin. Information Consultancy London Clive Binglev 1989.

9. Koenig Michael E.D. and Shrikantaiah (Ed): Knowledge Management: lessons learned what works and what doesn't, New Delhi: Ess Ess, 2008.

10. Koenig Michael E.D. and Shrikantaiah T.K.(Ed): Knowledge Management in Practice: connection & context, New Delhi: Ess Ess, 2008.

11. Kumar (PSG) A Student's Manual of Library &Information Science Delhi: BR Publishing .

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M					M	M	M
CO2	M	M			M							
CO3	H				H							M

LIS 105 (A): INTRODUCTION TO INFORMATION TECHNOLOGY

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
5(A).	Introduction to Information Technology Objectives: 1.To introduce the concepts of computer and network technologies 2.To provide information on Operating systems, programming languages and softwares 3.To enable to learn the Database Management Systems Outcomes: 1.Gain knowledge on the concepts of computer basics and Network technologies 2.Understand the concepts of Operating Systems, Programming Languages and types of softwares 3.Learn the Database Management systems, steps in development of databases and get an idea on different library software packages	105	20 80 4

UNIT- I: Overview of Information Technology

- Definition, Need, Scope and Objectives.
- Computer Technology: Character Presentation-ASCII, ISCII, Unicode.

UNIT- II: Computer Basics

- Generation of computers.
- Classification of computers.
- Computer Hardware, Storage Devices.

UNIT- III: Software

- Operating systems: MS Windows, LINEX.
- Types of Software: Application software, System software
- Programming languages: Object Oriented, Procedural, High level, Scripting, Web languages.

UNIT- IV: Network technologies

- Types of Network: LAN, MAN, WAN
- Network Topologies
- Telecommunication: Transmission Channels, Mode and Media, ISDN, PSDN, Multiplexing, Modulation.

UNIT- V: Database and Wireless Communication

- Data Base management systems.
- Types of Databases
- Media, Wi-fi, Li-fi, Satellite Communication, Mobile Communication.

Recommended books

01. Martin , Janes. Computer Networks and Distributed processing : Software , Techniques and Architecture.

02. Mantay Subash. DOS made simple . 1975 New Delhi: Galgotia pub. 1992.

03. New. P.G. Reprography for libraries . London: Clive Bingley, 1981.

04. Raman , S. Text books of Computer programming . Delhi: CBS, 1971.

05. Ravichandra Rao, IVK. Library Automation . Rev.ed. New Delhi: Wiley Eastern. 1983.

06. Rowley, J.E. Compupters for Libraries . 2nd ed. London: Clive Bingley, 1985.

07. Stern, KR and Stern, Nancy. Introduction to Computers and information Processing. New York : John Wiley, 1982 .

08. Teddy. Lucy. An Introduction to Computer based Library system . 2ND ed. New York : Wiley. 1984.

09. Zoorkoozy, Peter . Information Technology and Introduction . 2ND ed. London : Pettman, 1985.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			H			L		M	M	M
CO2	M	M			M							
CO3	H				H							M

LIS: 105(B) ELECTRONIC INFORMATION AND SERVICES

UNIT-1: E-Information

- Concept, structure, features

- Information industry.

- Role of librarian in information industry.

UNIT-II: E-Resources

-E-Journals, E-Books, E-theses, E-Newspapers, Blogs, Wikis.

- Free online Dictionaries, Non-Free online Dictionaries, Free Thesauri

- Encyclopedias, Subject Gateways and Portals.

UNIT-III: E-Databases

-Full Text, Numeric

- Citation Searching

-Open access Database-DOAJ, DOAR

UNIT-IV: Web Based Information Sources in LIS

- Online Repository: RCLIS

Abstracts: LISA, LISTA

-Info librarian

UNIT-V: Search engines

Definition, concept and Types

Search strategies.

Recommended books

1. Gary Shelly,Mark Frydenberg (2010): Web 2.0 Concepts and Applications

2. Dermot A. mcCormark (2002), Web 2.0. Aspatore books, 3. Jane Hosie-Bounar, Barbara m. Waxer (2010) Web 2.0 Making the Web Work for You

4. By David J, Brown Richard (2008) the impact of Elctronic Publishing : the Furyture for Publishers and Librarians

5. Tatiana-Helen, Synodinou, Sarantos Kapidakis, Loannis Igelezakis (2011).

6. Peter k. Ryan (2011) Socail Networking, The Rosen Publishing Group.

7. Guha,R. Documentation Bombay: Asia Publishing House,1999.

8. Balakrishnan,S Ed, al. Information Services in Libraries, Delhi.

9. Katz.W.A. Information of Information Services New Delhi Ess Ess Publication, 2000.

10.. Balakrishnan,S. Library and Information System and Services New Delhi: Ess Ess Publication,2000

11. Sharma and Groner, Reference Services and Sources Information, New Delhi Ess Ess Publication, 1999.

LIS: 105(C) PRESERVATION AND CONSERVATION OF INFORMATION RESOURCES

UNIT-I: Preservation and Conversation

- Introduction to concepts of archiving, Preservation and Conservation.
- Need and significance of Archiving,
- Preservation and Conservation of Information Resources.

UNIT-II: Evolution of Writing Materials

- Evolution of writing materials: Clay, Papyrus, Metallic plates, Skin, Parchment, Vellum, Palm leaves, etc.
- Their history, nature, use as writing materials and their preservation.
- History of paper making, Different types of paper and their nature.

UNIT-III: Preservation and Maintenance

- Different types of Library materials, their preservation and maintenance: Paper Based
- materials book and Non-Book materials, Library Binding, Binding Standards.
- Other Materials: AN records, Magnetic Plates, Tapes & Diskettes, Microforms, Optical
- media, Magneto Optical Discs, etc.

UNIT-IV: Hazards to Library materials and their preservation

- Hazards to Library materials and their preservation: Environmental hazards, Biological hazards and Human being as an enemy of Library materials.
- Disaster prevention and recovery.
- To study various National Archival Initiatives of different countries: NARA of US,
- Australian National initiatives, Public archives of Canada etc.

UNIT-V: Records Management

- Concepts and issues involved.
- Information Resource Management. (include Electronic Resource Management), Code of Ethics for Archivists. Digital Preservation

Recommended books

1.Balloffet, N., Hille, J., & Reed, J. A. (2005). Preservation and conservation for libraries and archives. Chicago: American Library Association.

2.Belicove, M. E., & Kraynak, J. (2007). Internet yellow pages: the fun, fast, and easy way to get productive online. Indianapolis, Ind.: Que.

3.Henderson, K. L. (1983). Conserving and preserving library materials. Urbana-Champaign, Ill.: University of Illinois, Graduate School of Library and Information Science.

4.Johnson, P. (2009). Fundamentals of collection development and management. 2nd Ed. Chicago: American Library Association.

5. Wynar, B. S., Strickland, S. D., & Graff, S. M. (1999). Library and information science annual. Englewood, Colo.: Libraries Unlimited.

LIS: 106(A) INFORMATION AND COMMUNICATION (ELECTIVE FOUNDATION)

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
5.	Information and Communication Objectives: 1.To introduce the concepts of communication 2.To provide information on Communication models and barriers 3.To enable to learn the wireless technologies Outcomes 1.Gain knowledge on the concepts of communication 2.Understand the concepts of communication models and barrriers 3.Learn the wireless technologies and National Knowledge communication	106(A)	20 80 4

UNIT I: Information and Communication.

- Information: Characteristics, Nature, value and use.

- Conceptual difference between Data, Information, Knowledge and Wisdom

- Electronic Communication: E-Mail, E-Commerce

UNIT II: Communication Models and Trends

- Communication channels, Types, Models and Barriers.

- Trends in Scholarly Communication, Virtual Reality, Telecommunication, Invention to Television, Wireless technology

UNIT III: Information Life Cycle

- Information Life Cycle- Generation, Collection, Storage and Dissemination
- Role of Information in Planning, Management, Socio-economic, Cultural, Educational and Technological Development.

UNIT IV: Library, Information and society.

- Information Science- Relationship with other subjects, Information Society and Knowledge Society.
- Information Technology Act, Right to information Act.
- International and National Programs and policies (NAPLIS)

UNIT V: National Knowledge Commission

- National Knowledge Commission- National Mission on Libraries.
- Information Industry-Generators, Providers and Intermediaries.
- IPR and Legal Issues- Categories, Conventions, Treaties, Laws.

Recommended books

1. Gragon, devis. J. Science and Technology and introduction to literature . 2nd ed 1976.
2. Martin, WJ. Communication , Knowledge and Librarian . London : Butterworths, 1974
3. Mc Garry , Devin, Communication, ,Knowledge and librarian . London : Clive Bingely, 1981.
4. Meadows, A. J. Communication in Science , London: Butterworth. 1974
5. Price, de Solla. Little Science and Big Science . New York: Columbia University press, 1986.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			H			L		M	M	M
CO2	M	M			M							
CO3	H				H							M

LIS:106(B) INFOMETRICS, BIBLIOMETRICS AND WEBOMETRICS

(ELECTIVE FOUNDATION)

UNIT -I: Infometrics, Bibliometrics And Webometrics

- Basic Concept of: Bibliometircs, Infometrics and Webometrics-Meaning, Definition, and Scope.
- Historical Development
- Study of Bibliographic organizations, ISI, NCB, NISTAD

UNIT- I: Theory and Laws

- Zipf's Law
- Lotka's Law
- Bradford's Law
- Price Theory, Circulation Theory-Applications

UNIT-III: Qualitative and Quantitative Techniques

- Qualitative and Quantitative Techniques: Meaning, definition and Types
- Multidimensional scaling
- Cluster Analysis
- Correspondence Analysis
- Co-Word Analysis

UNIT-IV- Citation Studies

- Citation Theory
- Citation Analysis
- Different Forms of Citation
- Citation Control
- Self-Citation

UNIT-V- Services

- Testing the Effective of Abstracting and Indexing Services.
- Citation Index-structure
- Use and methods of Compilation
- Advanced Research: Use of Information services: Dialog, Web of science, Scopus, Google scholar.

- Simple statistical methods of classifying, counting and comparing and preferences.

Recommended books

1. Abraham, R.H.(1996). Webometry: Measuring the complexity of the World Wide Web. Visual Math Institute, University of Claifornia at Santa Cruz
2. Ajiferuke et al, (1988). Collaborative coefficient: A single measure of the degree of collaboration in research. Scientometrics, 14(5), 421 - 433.
3. Ashraf, Uddin & Vivek Kumar, Singh (2014). Measuring research output and collaboration in South Asian countries, Current Science, 107(1)
4. Biradar, B.S. & Sampathkumar, B.T. (2003).Chemical Technology literature: An obsolescence study, Annals of Library and Information Studies, 50(4), 156-162.
5. Castellano, K.E. & Ho, A. D.(2013). A Practitioner's Guide to Growth Models.CCSSO, 19
6. Sangam, S.L. (2015). Scientometrics: Quantitative Methods for Library and Information science, Content Craft, Dharwad.

LIS 107: HUMAN VALUES AND PROFESSIONAL ETHICS - 1

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
7	Human Values and Professional Ethics - 1 Objectives 1.To enable to know the nature and importance of professional ethics 2. To impart knowledge on the nature of values, Ahimsa, Non-violence and purusharths 3.To learn the importance of Bhagavat Gita, Gandhian ethics and theories of punishments Outcomes 1.Know the definition and nature of ethics, importance of professional ethics 2.Understand the nature of values, Ahimsa, Non-violence and Purusharthas 3.Know the importance of Bhagavat Gita, Gandhian Ethics and various theories of punishments.	107	- 100

UNIT I: Definition and Nature of Ethics

Its relation to Religion, Politics, Business, Legal, Medical and environment.

Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

UNIT II: Nature of Values

Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.

UNIT III:Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy),

Asteya(Non possession) and Aparigraha(Non- stealing).

Purusharthas(Cardinal virtues)-Dharma (Righteousness)

Artha(Wealth), Kama(Fulfillment Bodily Desires)

Moksha (Liberation)

UNIT IV: Bhagavad Gita

(a) Niskama karma. (b) Buddhism

The Four NobleTruths

Arya astanga marga

(c) Jainism- mahavratas and anuvratas.

Values Embedded in Various Religions, Relirious Tolerance

Gandhian Ethics.

UNITV: Crime and Theories of punishment

(a) Reformative, Retributive and Deterrent.

(b) Views on manu and Yajnavalkya.

Recommended books

1. John S Mackenjie: A manual of ethics.

2. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.

3. “Management Ethics - integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.

4. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.

5. Harold H. Titus: Ethics for Today

6. Maitra, S.K: Hindu Ethics

7. William Lilly: Introduction to Ethics

8. Sinha: A Manual of Ethics

9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton

10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.

11. Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.

12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.

14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.

15. Text book for Intermediate logic, Ethics and Human Values , board of Intermediate Education&Telugu Academic Hyderabad 15. I.C Sharma Ethical Philosophy of India. Nagin&co Julundhar.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H			M			H		M	M	
CO2	M	M			L			M				
CO3	H				H			H				M

SEMESTER - II

LIS 201: INFORMATION SOURCES AND SERVICES

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
8	Information Sources and Services Objectives 1.To provide information on documentary and non-documentary sources. 2.To make them able to understand Indian and British National Bibliographies. 3. To impart knowledge on virtual reference service and translation services. Outcomes 1.Learn documentary and non-documentary sources and 1. different types of information sources. 2.Know about the Indian and British National Bibliographies, and Electronic Books. 3.Understand the virtual reference service and translation Services.	201	20 80 4

UNIT I: Reference and Information Sources

Documentary sources: Print, non – print.

Non-documentary: Human, Institutional.

Categories: Primary, Secondary and tertiary.

Nature, Characteristics, utility and evaluation of different types of information Sources: Encyclopedias, dictionaries, directories, almanacs, year books, Handbooks Manuals, geographical, biographical sources, indexes, and abstracts.

UNIT II: Reference Sources

Bibliography: Definition, need, and functions.

Types: systematic, historical, enumerative, critical, textual etc.

Indian National Bibliography.

British National Bibliography.

Compilation of Bibliography

UNIT III: Electronic Information Resources

E- Books, E-Journals.

Database-Bibliographic, Numeric, Full text, Multimedia, Open access Database.

Subject gateways, Web Portals, Bulletin Boards, Discussion Forums, Groups.

Web Resources.

UNIT IV: Reference Service

Concepts, definition, trend

Types, user orientation, short range and long range.

UNIT V: Information Service.

Concepts, definition, need and trends and reference service VS Information service.

Alert services: Need, Techniques and evaluation: CAS, SDI. Bibliographic, Referral, Document delivery and translation services.

Recommended books

1. Ranganathan SR. Reference services and bibliography, Bombay, 1960.
2. Foskett. AC. Information Services in libraries. London. 1958
3. Mukherjee, AK. Fundamentals of special libbrianship, Calcutta, 1969.
4. Sharp, JR. Some fundamentals of information retrieval. London, 1965.
5. Shores, Louis. Basic reference sources. Chicago, 1954.
6. Viswantham, CD. Elements of information science. New Delhi, 1971.
7. Katz, A. Introduction to reference work. 2 v. New York, 1992
8. Guha, B. Documentation and information. Calcutta, 1983
9. Krishan Kumar, Reference services. New Delhi, 1989.
10. Girija Kumar and Krishan Kumar, Bibliography, New Delhi.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L			H			L		M	M	
CO2	M	M			L			M	M			
CO3	H				H			L				L

LIS 202: KNOWLEDGE ORGANISATION: CATALOUGING THEORY

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
9	Knowledge Organisation : Cataloguing Theory Objectives 1.To explain the basic ideas on catalogue and forms of it 2.To discuss the canons, principles and laws of cataloguing 3.To impart knowledge on different types of subject headings, and methods of cataloguing Outcomes 1.Understand the basic ideas on catalogue, forms of the catalogue, Main Entry and added entries 2. Know the Canons, Principles and Laws of Cataloguing 3.Gain the knowledge on different types of subject headings, Cooperative and Centralized cataloguing	202	20 80 4

UNIT I: Library Catalogue.

Library catalogue: Need, purpose and functions.

Relationship of Library catalogue with other records of the library

Accession Register, Publishers catalogue, Bibliography and shelf list.

Impact of Information Technology on Cataloguing.

UNIT II: Types of Catalogue and Filing of Entries.

Types of Catalogues - outer forms and inner forms.

OPAC. Web based Cataloguing

Filing of entries.

Library Cataloguing Codes: CCC and AACR-II.

UNIT III: Normative Principles.

Normative Principles

Canons of cataloguing.

UNIT IV: Subject Cataloguing.

Subject Heading lists.

Library Cataloguing Code,

CCC and AACR-II,SLSH,LCSH.

UNIT V: Methods of Cataloguing and Standardization.

Prenatal, Cooperative and Centralized Cataloguing.

Standardization of Bibliographic activities.

ISBD, CCF, RDA, FRBR, Bibframe.

Standards- IS0 2709, Z39.50, Z39.71.

Recommended books

1.Girija Kumar and Krishna Kumar. Theory of Ctaloguing . New Delhi. Vikas. 1986.

2. Krishna Kumar. An Introducation for Cataloguing Practice . New Delhi Vikas . 1981.

3. Ranganathan. SR. Classified Catalogue Code with additional rules for Dictionary

Catalogue code. 5th ed. . Bombay : Asias Publishing House , 1969.

4. Sears. ME. Sears List of Subjects Headings. New York : H.W. Wilson.1977.
5. Sharp , Henry. A. Cataloguing Practice . Bombay . Asia. 1974.
6. Sengupta . B. Cataloguing . Calcutta. Word Press, 1974.
7. Viswanthan, CG., Cataloguing : Theory and practice . New Delhi :
   Today tomorrow, 1970.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M		L	H			L		M	M	
CO2	M	M			L			M	M			
CO3	H				H			L				M

LIS 203: KNOWLEDGE ORGANISATION: CATALOGUING PRACTICE

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
10	Knowledge Organization : Cataloguing Practice Objectives 1.To explain Anglo American Cataloguing Rules 2.To create interest on the preparation of Main entry and added entries for monographs and serial publications 3.To provide skills on preparation of entries on cartographic materials, manuscripts and sound recordings Outcomes 1.Gain knowledge on Anglo American Cataloguing Rules 2.Learn the preparation of Main entry and added entries for monographs and serial publications 3. Gain the skills on preparation of entries on cartographic materials, manuscripts and sound recordings.	203	20 80 4

UNIT I: Cataloguing of monographs according to AACR – 2

UNIT II: Cataloguing of serial publications according to AACR – 2

UNIT III: Motion picture, Video- recordings and Micro forms according to

AACR – 2. Cataloguing of Cartographic materials, Manuscripts, Sound Recordings,

UNIT IV: Advanced Cataloguing

UNIT V: Subject Cataloguing: Assigning subject headings using Sear's list of subject headings.

Recommended books

1. Anglo – American Cataloguing Rules. 2nd . rev.ed. London Library Association , 1988.
2. Hunter, Erie. J. Examples Illustrating AACR-2 . (1988) revised . London,1989.
3. Krishan Kumar. An introduction to AACR – 2, New Delhi: Vikas , 1990.

4. Ranganathan , S.R. Classified Catalogue Code. Bombay: Asia Publishing House, 1961.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		L	H			L		M	M	
CO2	M	M						M	M			
CO3	H	H			H			L				H

LIS: 204 METADATA STANDARDS - PRACTICE

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
11	Metadata Standards: Practice Objectives 1.To provide knowledge on Metadata and its types and Standards 2.To impart skills on KOHA Software 3.To acquire skills on MARC 21 and Dublin core Outcomes 1.Know the Metadata and its types, standards 2. Learn the skills on KOHA Software 3.Learn the skills on MARC 21 and Dublin core	204	20 80 4

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UNIT I: - Introduction to Meta data and Digital Curation

Description of Meta Standards

Additional Resources. e GMS

ISO 19115: 2003(E). PREMIS

UNIT II: - Introduction to MARC 21, Tags.

Introductors and Sub-fields

UNIT III: - Creating MARC 21 Records for Print Documents

Electronic Resources and Complex Documents

Prints and Resources

UNIT IV: - Introduction to Dublin core

Preparing Simple and Qualified Core Records in HTML

UNIT –V:- Preparing Simple and Qualified Dublin Core Records in XML

Preparing Simple and Qualified Dublin Core Records in RDF

Standards- METS, MODES, EAD

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		L	H					M	M	
CO2	M	M							M			
CO3	H	M			H			L				H

LIS 205: LIBRARY MANAGEMENT

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
12	Library Management Objectives 1.To explain organizational structures of library 2. To identify the factors behind selection, procurement and accessioning documents 3. To provide knowledge on various sections of a library Outcomes 1.Gain knowledge on meaning and purpose of management, Organizational Structures 2.Able to identify the factors behind selection, procurement and accessioning of documents 3.Gain knowledge on a circulation system suitable for a library, different budgetary methods and its standards, norms and principles	205(A)	20 80 4

UNIT I: Introduction to Management.

Concept definition and scope.

Management schools of thought

Functions and principles of scientific Management.

Organization Structures

UNIT II: Books selection, Acquisition and Technical Treatment.

Different Sections of the library.

Books selection: Need and purpose, Principles and theories, Policy and Programs, Book selection tools.

Acquisition

Technical treatment: Processing - Classification and cataloguing.

UNIT III: Serials Control, circulation control and maintenance.

Serials control, Selection, Maintenance and record of receipts.

Circulation control: Registration of members, charging and discharging methods.

Maintenance: Shelving methods, shelf rectification, stock verification, Binding and preservation; Archives

UNIT IV: Library authority, personnel and finance:

Library authority: Library committee, need, functions and types

Library personnel: Categories - staff formula.

Library Finance: Sources of finance, Budget and Budgeting.

UNIT V: Library building, rules and reporting.

Library building: Planning, furniture and equipment

Library rules and regulations

Annual report.

Library statistics.

Recommended books

1. Evans, G. Edward.. Management techniques for librarians . 2nd ed . New york : Academic Press, 1983.
2. Katz, W.A. Collection development , the selection of materials for libraries . New york . Holt, Rinohart and Winston, 1980.
3. Krishan Kumar : Library Administration and Management . New Delhi : Vikas , 1987.
4. Lock, R.N. Library administration . 3rd ed. New York : Philosophical Library . 1965.
5. Mittal, RL Library Administration : Theory and Practice . 5th ed. Delhi . Metropolton , 1984.
6. Narayana , G.J. Library and Information Management , New Delhi PHI 1991.
7. Ranganathan , S.R. : Library administration . 2nd ed. Bombay : Asia , 1059.
8. Sharma , J.S. Library Organization . New Delhi : Vikas, 1978.
9. Seetharama, S. Guide lines for planning of libraries and Information Centres Culcutta: IASLIC, 1990.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M			H					M	M	
CO2	M	M			M				M			
CO3	H	M			H			L				H

LIS 205(B): HEALTH SCIENCE LIBRARY AND INFORMATION SYSTEM

UNIT–I: Health Science Libraries and their Development

Objectives and Functions

History and Development of Libraries with Special Reference to India

Role of Medical Libraries

Information Policies in Health and Family Welfare Agencies and their Role in the Promotion and Development of Medical Libraries in India

UNIT–II: Collection Development and Management

Periodicals, Conference Literature, Grey Literature, Patents, Standards, Specifications and Government Publications

Non-Book Materials

Electronic Resources and Online Databases

UNIT–III: Library Organization and Administration

Organizational Structure

Staff Manual, Library Surveys, Statistics and Standards etc.

UNIT–IV: Information Services

CAS, SDI, Abstracting and Indexing Services

Library Bulletin, Newspaper Clipping Services

Computerized Services

Resource Sharing and Networking

Information Literacy Programmes

UNIT–V: Financial and Human Resource Management

Determination of Finance, Sources of Finance

Types of Budget

Nature, Size, Selection, Recruitment, Qualification and Training

Responsibilities and Duties

Competency Development

.

LIS 205(C): AGRICULTURAL SCIENCES LIBRARY& INFORMATION SYSTEM

UNIT–I: Agricultural Science Libraries and their Development

Objectives and Functions

History and Development of Libraries with Special Reference to India

Role of ICAR, Committees and Other Agencies in the Development of

Agricultural Libraries in India

UNIT–II: Collection Development and Management

Periodicals, Conference Literature, Grey Literature, Patents, Standards, Specifications and Government Publications etc.

Non-Book Materials

Electronic Resources and Online Databases

UNIT–III: Library Organization and Administration

Organizational Structure

Staff Manual, Library Surveys, Statistics and Standards etc.

***U*NIT–IV: Information Services**

CAS, SDI, Abstracting and Indexing Services

Library Bulletin, Newspaper Clipping Services

Computerized Services

Resource Sharing and Networking: AGRIS, INAGRIS, CABI, etc.

Information Literacy Programmes

UNIT–V: Financial and Human Resource Management

Determination of Finance, Sources of Finance

Types of Budget

Nature, Size, Selection, Recruitment, Qualification and Training

Responsibilities and Duties

Competency Development

Recommended books

1. BHATT (V S): Information resources in agricultural research in 40years of agricultural research in India (1989) ICAR, New Delhi.

2. CHOTEY LAL (C): Agricultural libraries and information systems: a hand book for users (1998) R K Techno Science Agency, New Delhi.

3. DAYMATH (Y) and RUTTAN (V W): Agricultural development: an international perspective (1979) John Hopkins, Baltimore.

4. DESHMUKH (P P): Standardization of library and information services with special reference to scientific and agricultural libraries (1990) ABC, New Delhi.
5. SHARMA (R D): The agricultural information network for India (1989) Society for Information Science, New Delhi.
6. SUBBAIHA (R): Agricultural librarianship in India: an overview (1988) Metropolitan, New Delhi.
7. SWAMINATHAN (M S): Report of the working group on agricultural research and education for the formulation of the eighth plan (1989) Planning Commission, ICAR, New Delhi.

LIS206(A): SCHOLARLY COMMUNICATION

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
12	Scholarly Communication Objectives 1.To explain definition , origin and history 2. To prepare writing for scholarly journals 3. To provide knowledge on various citation styles Outcomes 1.Gain knowledge on definition, origin and history 2.Able to prepare writing for scholarly journals 3.Gain knowledge on various citation styles	206(A)	20 80 4

Unit - I Scholarly Communication - Basics

Introduction, Concept & Definition, Origin & History

Process of Scholarly Communication

Components of Scholarly Communication

Channels of Scholarly Communication

Communicating through Scholarly Journals

Electronic Journals & Databases

Unit-II Writing for Scholarly Journals

Preparing the article for Publication

Finding the right journal

Understanding Copyright, Copyright Issues, Licencing Issues

Monitor the impact, usage and influence factors

Unit-III Information Consolidation

Abstracts, Research Proposal (Synopsis)

Reviews, Trend Reports, State of the Art Reports

Importance of Scientific and Professional Societies in Journal Publishing

Unit-IV Referencing and Citation Styles

Need , Purpose and Concepts related to References

Citation Style Guides(MLA, APA, Chicago Style, Vancouver)

Reference Management Software

Digital Object Identifier

Unit-V Trends in Scholarly Communication

Copyright, Fair use & Plagiarism

Open Access Meaning, Definition & History

Open Access Initiatives and Open Licencing

Role of Library in Scholarly Communication

Impact of Technology Traditional Libraries

Implication of Technological Changes on Library Services

Role of Librarian in Changing Scenario

Current Trends & Future of Scholarly Communication

Future of Scholarly Communication

Recommended books

1. Harley D (2013). Scholarly Communication: Cultural Contests, Evolving Models. *Science.*342:80-82
2. UNESCO (2015). Scholarly Communications .Retrieved from http://unesdoc.unesco.org/images/0023/002319/231938e.pdf
3. Evens D. et al. (2014). How to write better thesis. Springer ISBN 978-3-319-04285-5
4. Greetham, Bryan (2001). How to Write Better Essays. (Palgrave Study Guides) Macmillan. ISBN 0-333-94715-0
5. Guha, B. (1983) Documentation and Information: Services, Techniques and systems. 2nd ed, Calcutta: World Press
6. Seetharama, S (1997). Information Consolidation and Repacaging-Framework, Methodology and Planning. NewDelhi; Ess Ess Publications
7. http://www.plos.org
8. Jesson, Jill K et al. (2011) Doing Your Literature Review: Traditional and Systematic techniques. Sage ISBN 978-1-84860-153-6
9. Derricourt, R.(1996) An Authors Guide to Scholorly Publishing, Princeton,N.J
10. Anderson, D.L (2004) Digital Scholorship in the tenure, Promotion and Review Process. Armonk, N.Y. : M.E Sharpe

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M			H					M	M	
CO2	M	M			M				M			
CO3	H	M			H			L				H

LIS206(B): INTRODUCTION TO NETWORKS AND RESOURCE SHARING

Unit-I Network Technology

OSI Model

Internet

Virtual Private Network (V.P.N)

Emerging Network Technologies

Future of Networking

Unit-II Data Networks

Introduction

Signalling

X.25

Integrated Services Digital Network (ISDN)

Digital Subscriber Line (DSL)

Frame Relay

Asynchronous Transfer Mode (ATM)

Unit-III Network Softwares

Client Server(Two-Tier) Architecture

Three-Tier Architecture

Network Operating Systems(NOS)

Domain Name Systems(DNS)

Electronic Mail

Useful TCP/IP Commands

Network Management System and Intranet

Unit-IV Resource Sharing

Introduction, Definition & Objectives

Resource Sharing Concept, Need and Areas

Pre-requisites and Barriers for Resource Sharing

Resource Sharing Case Studies

National Information Policy on Library and Information Systems

Unit-V Resource Sharing Technology

Introduction, Definition

Role of Library Networks in Resource Sharing

Resource Sharing Networks – A Model

Document Delivery

Inter Library Loan Standards

Copy Right Issues for Resource Sharing

IFLA Guidelines for Resource Sharing

References:

1. Andrew S. Tanenbaum(1996). Computer Networks. New Delhi: Prentice Hall.
2. William Stallings (1997) "Data and Computer Communications", New Delhi: Prentice Hall
3. HaBlack, U. (1992). TCP/IP and Related Protocols. New York: NY: McGraw-Hill, Inc
4. Mitesh Tolia ,The Basics of VPNs, LAN Magazine, February,1999 .
5. Andrew S. Tanenbaum(1996). Computer Networks. New Delhi: Prentice Hall.
6. ISDN and Broadband ISDN, Second Edition, by William Stallings, Macmillan, Englewood Cliffs, NJ, ISBN 0-02-415475-X
7. Network Security: Private Communication in a Public World, by Charlie Kaufman, Radia.
8. Optimizing Web Performance, Express Computer, December 9, 1996
9. Raina Roshan(1997) Library Resource sharing and Networking : An approach among management schools of India, Vikas Publishing House Pvt Limited.
10. Indiana Library Resource Sharing Manual(1997) Approved by the Indiana State Library Advisory Council on October 17, 1997
11. Wurman, R. S. (1989), Information Anxiety. New York : Doubleday International Federation
12. Library Associations and Institutions (IFLA) www.ifla.org
13. Oppenheim, Charles. Intellectual property: legal and other issues, Information studies 3(1); 1997 pp. 5-22

LIS: 207: HUMAN VALUES AND PROFESSIONAL ETHICS – PAPER II

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
14	Human Values and Professional Ethics -II Objectives 1.To explain importance of value education, family values and status of women in family and society 2.To discuss ethics in various fields like Medical, Business, Environmental and social Outcomes 1.Understand about Value Education, Family Values and Status of Women in Family and Society 2.Know the ethics in Medical, Business fields 3.Learn the ethics on Environmental issues and social aspects.	207	-- 100

I. Value Education – Definition relevance to, present day - Concept of Human Values – Self introspection – Selfesteem. Family values-Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society Caring for needy and elderly - Time allotment for sharing ideas and concerts.

II. Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare profession3!s. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and Patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

III. Business ethics- Ethical standards of business-Immoral and illegal practices are their solutions. Characterics of ethical problems in management, ethical theories, causes of unethical. behavior, ethical buses and work ethics.

IV. Environmentalethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

V. Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethic of media- Imp2ct of Newspapers, Television, 'Movies and Internet.

Books for study

1. John S Mackenjic: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi
4. "Ethics in Management"by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titas: Ethics for Today.
6. Maitra, S.K: Hindu Ethics.
7. William Lilly: Introduction to Ethics.
8. Sinha: A Manual of Ethics.
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.CHaughton.
10. Susruta Samhira: Tr.Kaviraj Kunjanlal, Kunia!al Brishagratha, Chowkamba Sanskrt series, Vol T,M and ill, Varnasi. VoiIOO, 16-20,21-32 and 74-77 only.
11. Caraka Sambita :Tr. Dr.Ram Karari Sarma and Vaidya Bhagavcn Dash; Chowkambha Sanskrit Series office. Varanasi 1. 11, Il! Vol 1 PP 153-191.
12. Ethics, Theory and Contemporary issues.. Barbara Mackinnon. Wadsworth/Thomson Learning. 2001.
13. Analyzing Moral Issues, Judith A'. Boss, Mayfield Publishin5 Company, 1999.
14. An Introduction, to Applied Ethics (Ed.) John H.Piet and Ayodhya 'Prasad, Cosmo Publications.
15. Text Book for Intermediate First \'ear Ethics and Human Values, Board of Intermediate 'Education-Telugu Akademi. Hyderabad.
16. I.C Sharma Ethical Phitosoph.' of India. Nagin &co Julundhar.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M			H			H		M	M	
CO2	M	M			M			H	M			
CO3	H	M			H			M				

SEMESTER – III

LIS 301: INFORMATION PROCESSING AND RETRIEVAL THEORY

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
15	Information Processing and Retrieval Theory Objectives 1.To provide knowledge on the basic concepts of IPR and various schemes of classification 2.To impart skills on learning systems and techniques and their evaluation criteria and studies 3.To explain Web based information retrieval systems Outcomes 1.Understand the basic concepts on Information procession and Retrieval and various schemes on classification 2.Learn the Indexing Systems and Techniques and their Evaluation Criteria and Studies 3.Gain knowledge on Web based Information Retrieval Systems.	301	20 80 4

UNIT I: Information Processing and retrieval.

Information processing and retrieval: Basic concepts and role in information transfer.

UNIT II: Indexing Languages.

Schemes of classification: DDC, CC and UDC.

BSO

Vocabulary control : Thesaurus

Design of indexing languages.

UNIT III : Indexing systems and techniques

Pre coordinate indexing: PRECIS, POPSI, Uniterm etc.

Post coordinate indexing: KWIC, KWOC etc.

Citation indexing.

UNIT IV : Evaluation of Indexing System.

Criteria for Evaluation.

Aslib, crane field studies.

Search strategy. Subject Guides, case studies.

UNIT V: Web based Information retrieval system

Web indexing system,

Web cataloguing, Metadata and MARC 21

Recommended books

1. Anderson, D. Universal Bibliographic control . 1976.
2. Aichinson, J. and Chilchrist, A. Thesaurus contstruction: A practical manual. 1972.
3. Austin , Derek. PRECIS: A Manual of concept analysis and subject indexing.London : The British library , 1984/
4. Browm A. G. Introduction to indexing and Abstracting . London : Libraries Unlimited , 1983.
5. Kochen , M. Ed. Principals of information Retrieval . 1974.
6. Lancaster, FW. Information Retrieval Systems , Characteristics , Testing and Evaluation , 1968.
7. Salton, G. Introduction to Modern Information Retrieval . 1983.
8. Sehgal, D. Indexing Languages and Theasauri Construction and Maintenance. 1974.
9. UNESCO . Common Communication Format . Paris. Unesco , 1988.
10. Vickery, BC. Techniques of Information Retrieval. 1970.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M			H			H		M	M	
CO2	M	M			M			H	M		M	
CO3	H	M			H			M				M

LIS 302: LIBRARY AUTOMATION AND DIGITAL LIBRARY

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
16	Library Automation and Digital Library Objectives 1.To acquire knowledge on basics of library automation and digital libraries 2. To explain network and communication devices, digitization and metadata Outcomes 1.Learn the basics of Library Automation, various modules of library automation software packages and their features 2.Gain knowledge on basic concepts and characteristics of digital libraries 3.Know about network and communication devices, digitization and metadata	302	20 80 4

UNIT I: Library Automation

Meaning – Definition – Infrastructure Facilities – In house operations

Introduction to Digital libraries-Characteristics, Types.

Digital Library Architecture, Standards, Formats, DOI.

UNIT II: Digitization

Digitization -Planning, Selection of Material

Software, Process, Issues.

Digital Preservation- Need and Purpose, Methods and Techniques, Projects- National and International.

UNIT III: World Wide Web and Internet protocols

Web browser, E-mail, Search engines, Meta and entity Search engines.

Internet Protocols and Standards- HTTP, SHTTP, FTP, SMTP, TCP/IP, URL, URI.

UNIT IV: Creating Web documents

Mark Up Languages- SGML, HTML and XML

Creating documents in HTML.

Hypermedia, Multimedia, Video conferencing.

Virtual Reality, Augmented Technologies.

UNIT V: Open Access Movement

Institutional Repositories- Need, Purpose, Types and Tools.

Institutional Repositories in India-ROAR, DOAR, SHARP, ROMIO.

Vidyanidhi.

Recommended books:

1. Computerization of Indian Libraries, P.S.G.Kumar, B.R.Publishing Corprn., 1987, Delhi
2. Manual of Computer Applications Training in Library Science, R.L.Sehgal & D.K.Behl, ESS ESS Publn., New Delhi, 1996.
3. Electronic Libraries, V.C.Malaviya, ESS ESS Publns., New Delhi, 1996.
4. Automation in Libraries, Richard T.Kimber, Pergamon Press, New York, 1970.
5. The Use of Computer in Compiling National Bibliograpies, Koster, K., Libri,Vol.16, No.4 (1966)

CO-PO Mapping

.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M			H			H		M	M	
CO2	M	M			M			H	M		M	
CO3	H	M			H			M				M

LIS 303(A): INTERNSHIP (GENERIC ELECTIVE)

Internship is compulsory to the students of third semester.

Duration: 45 Days

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
16	Internship Objectives 1.To explain the different sections of library 2.To provide information on OPAC, catalogue, classification 3.To impart skills on various digital library softwares Outcomes 1.Gain Knowledge on different sections of the library 2.Learn about OPAC, catalogue and classification 3.Get the skills on digital library softwares	404	- 100 4

CO-PO Mapping

.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M			H			H		M	M	
CO2	M	M			M			H	M		M	
CO3	H	M			H			M				M

LIS 303 (B): ACADEMIC LIBRARY SYSTEM (GENERIC ELECTIVE)

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
17	Academic Library System Objectives 1.To infer the basic objectives, growth and development of academic libraries in India, UK and USA 2.. To analyze the overview of higher education in India, UGC its powers and functions and the role in the development of academic libraries 3.To identify the organisation of library and information services needed by distance and special users Outcomes 1.Know the basic objectives, growth and development of Academic Libraries in India, UK and USA 2.Learn about an overview of higher education in India, UGC, its powers and functions and its role in the development of academic libraries 3.Understand the total design of the building, techniques of financial management, and know the organization of library and information services needed by distance learners and special users	303(B)	20 80 4

UNIT I: Introduction to Academic libraries.

Academic Library concept and functions.

Types of Academic libraries.

Role of Academic Library in Education.

UNIT II: Development of Academic Libraries.

Development of Academic Libraries in USA, UK and India.

Education Policy and Academic Libraries in India.

Role of UGC in promoting College and University Libraries.

Norms and standards of Academic libraries.

UNIT III: Academic Library building and authority.

Academic Library Authority, Policies and Programs.

UNIT IV: Library Finance, Personnel Management and Collection Development.

Financial Control

Personnel Management

Collection Development and maintenance.

UNIT V: Academic Library Services, automation and networks.

Academic Library information services.

Planning and organization of Academic Library services.

User studies and User education programs.

Resource sharing : Concept , Objectives and programs

Academic Library Networks : INFLIBNET

Computerization of Academic Libraries.

Recommended books

1. Cowley. John. Libraries in higher education: The user approach to service London: Clive Bingley, 1975.
2. Hamlin, A. T. The University library in the US: Its origin and development Philadelphia : University Philadelphia, 1981.
3. Thompson , James, An Introduction to University library administration 3rd ed. London : Clive Bingley, 1987.
4. Wilson , LB. And Tauber , MR. The University library . New York : Columbia University Press, 1956.
5. Gupta , OP . Development of University Libraries in India after independence . New Delhi Concept . 1992.
6. Thompson , James . University Library history : An international review London: Clive Bingley . 1980.
7. University Grants Commission (India) . Committee on University and College libraries Report . New Delhi.: UGC ., 1965.
8. Academic libraries : Role in the national development / edited by Dorathy Issac. Madras: TR Publications . 1993.

9. Shukla, K. University libraries in India . Jaipur : RBSA Publishers , 1994.
10. Rogers, R utiefford D. University library administration . New York: H.W. Wilson. 1971
11. Mc Donald, Joseph and Micikon, Basney. Academic Librarian: The dimension of their effectiveness . Green Wood Press . 1994.
12. Trehan, GL AND Malhan, IV. School library Management . New Delhi : Sterling, 1980.
13. Davies, Ruth Ann. The School Library : A force for educational excellence. New York R. R. Bowker, 1969.
14. Gelfand, M.A. University libraries for developing countries . Delhi : UniversaL l Book Company , 1974.

LIS: 303C: SPECIAL LIBRARY SYSTEM (Generic Elective)

UNIT I: Introduction to special libraries.

Special Library – Definition, Characteristics and functions.

Special Libraries and Information systems / Centers.

UNIT II: Special libraries and Information Centers in India.

Libraries of R& D organizations.

Libraries of Government Departments.

Libraries for business. Trade and Management.

Social economic Development Research Institutions.

Training institutions.

UNIT III: Special library buildings, finance and services.

Special library buildings and furniture.

Special library fiancés.

User Needs survey.

Planning and Organization of special library services.

Searching online and CD- ROM databases.

Information products.

Resource sharing and networking.

UNIT IV: Special Library personnel and Collection Development

Special library Personnel.

Special library collection development: Books and NBM.

Special library Collection development: Reference sources.

UNIT V: Organizations promoting special libraries.

Organizations promoting special libraries and information centers in India

Role of professional bodies in the promotion of special libraries and information Centers: FID, SL, ASLIB, IASLIC.

Education and Training in special librarianship.

Recommended books

1. Ashworth, W. Special librarianship . London: Clive Bingley, 1979.

2. Silva, M. Special libraries . London : Andre Deutsch. 1970

3. Strauss. L. j. et al. Scientific and technical libraries. 2nd ed. New York: Wiley, 1972.

4 . Struble, EG. Special libraries guide for management , New York: Special library Association . 1966.

5. Atherton, PAULINE. Hand book for information systems and services. Paris. Unesco,1977.

LIS 303(D): SEARCH AND SEARCH STRATEGIES (GENERIC ELECTIVE)

UNIT- I: Introduction to search and retrieval- Concept of file, database

Types of databases
Structure of records in databases and on the web
Structure of indexes and files
Vocabularies-free and controlled- Search models-Boolean (exact match), and ranking (best match) , web search engines.

Meta search Engines.

UNIT-II: Tools of Internet Search;

Local search-vertical search- Search engine optimization-Search oriented architecture – selection –based search.
Social search-document retrieval – Text mining- web crawler
Multi search-Federated search-search aggregator.

UNIT-III: Index/Web Indexing

Focused crawler-spider trap-robots exclusion standard
Distributed web crawling-web archiving- website mirroring software
Web search query-voice search-Natural language search engines
Web query classification- Image search-video search engine- Semantic search.

UNIT-IV: Protocols and Standards: Z39.50

Search /retrieval web service-search /retrieval via URL.
Open search-representational state transfer-website parse template.
Wide Area Information servers. OAI/PMH.

UNIT-V: Practical Component

Searching of databases, catalogues.
Searching in general search engines and meta search engines
Studying the searching features- of the search engines-searching Pro-quest-Pubmed- Emerald-EBSCO-JCCC.

LIS30: COMMUNICATION, SOFT SKILLS AND ETIQUETTE

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
17	Communication, soft skills and Etiquette Objectives 1.To infer the types of soft skills 2.. To enable to learn Interpersonal softskills 3.To identify the employability skills Outcomes 1.Know the basic soft skills 2.Learn interpersonal softskills 3.Make the students to learn the employability skills	304	20 80 4

Unit – 1: Types of Soft Skills& Intrapersonal Skills

Definition of soft skills – Types of Soft skills: Intrapersonal Skills -: Self-Confidence, Self-awareness, Adaptability & Flexibility, Attitude, Assertiveness, SWOC, Resilience

Unit- II: Interpersonal Soft Skills

Active Listening Skills - Goal setting – Negotiation & Persuasion skills - Time Management - Stress Management - Problem Solving and Decision-Making Skills - Leadership Skills – Conflict Resolution

Unit – III: Oral Communication Skills

Presentation skills –JAM - Role Plays, Public Speaking skills

GD Participation and co -ordination.

Unit – IV: Written Communication Skills

Essay Writing

E mails

Report Writing

Memos.

Unit- V: Employability Skills

Body Language - E-mail etiquette- Telephone etiquette - Dining etiquette

Grooming

Resume writing

Interview Skills.

Recommended books

1. Meenakshi Raman and Sangeeta Sharma (2015), Technical Communication: Principles and Practice, 3rd Edition, New Delhi: Oxford University Press.
2. Ashraf Rizvi, M. (2017), Effective Technical Communication, 2nd Edition, New Delhi: Tata McGraw Hill.
3. Hewing, Martin (1999), Advanced English Grammar: A Self-study Reference and practice Book for South Asian Students, Reprint 2003, New DelhI: Cambridge University Press.
4. Minippally, Methukutty. M. (2001), Business Communication Strategies, 11th Reprint, New Delhi: Tata McGraw – Hill.
5. Sasi Kumar. V and P.V. Dharmija (1993), Spoken English: A Self-Learning Guide Conversation Practice, 34th reprint, New Delhi: Tata McGraw – Hill.
6. John, Seely (1988), The Oxford Guide to Writing and Speaking, Delhi: Oxford University Press.
7. Peter, Francis (2012), Soft Skills and Professional Communication. New Delhi: Tata McGraw Hill.
8. Print Singh, Prakash and Raman, Meenakshi (2006), Business Communication, New Delhi: Oxford University Press.
9. British Council online resources.

   Wren& Martin (2019), High School English Grammar & Composition Regular Edition, New Delhi, S. Chand & Company Pvt. Ltd

CO-PO Mapping

.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M			H			H		M	M	
CO2	M	M			M			H	M		M	
CO3	H	M			H			M				M

LIS: 305 A: INFORMATION LITERACY (Open Elective)

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
20	Information Literacy Objectives 1.To introduce the concepts of Information Literacy and sources of print and electronic information 2.To provide skills on information access through INFLIBNET Network 3.To examine the Internet and its search techniques and Intellectual Property Right Outcomes 1.Learn the concepts of Information Literacy and sources of Print and Electronic Information 2.Get the skills on information access through INFLIBNET Network 3.Able to understand the Internet and its search techniques and Intellectual Property Right	305(B)	20 80 4

UNIT I: Information and Information Literacy:

Information – Concept, Characteristics and use.

Information explosion.

Organization of information.

Flow of information.

Information Literacy:

Definition & need.

Methods to end user training.

Standards for evaluation of Information literacy.

UNIT II: Sources of Information:

Documentary: Print, Non-print(including electronic)

Non-Documentary: Human, Institutional.

Categories: Primary, Secondary, Tertiary.

Sources: Encyclopedias, Dictionaries, Directories, Year books, Geographical, biographical, Bibliographies, Indexes, Abstracts etc.

Evaluation.

UNIT III: Information and Communication Technology:

Introduction to Information Technology

Network types & Topologies: LAN, WAN, MAN, Bus, Star, Ring etc.

Information Access through networks: INFLIBNET, DELNET etc.

UNIT IV: Internet:

History and Characteristics

Uses of Internet

Search techniques

Web resources

Evaluating internet information.

UNIT V: Issues of the information age:

Evolution: Agriculture- Industrial- Information age.

Preservation of the record of human knowledge.

Intellectual property: Concept, Act etc.

Information policy & Privacy.

Right to information.

Recommended books

1. Kawatra, P.S. Text Book of information Science. A.P.H. Publishing Corporation, New Delhi.2000.
2. Guha, B. Documentation and Information: services, Techniques and Systems. The world press Pvt.Ltd. Kolkatta.1983.
3. Krishan kumar: Reference service. New Delhi, 1989.
4. Shores, Louies: Basic reference sources. Chicago. 1954.

CO-PO Mapping

.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M			H			H		M	M	
CO2	M	M			M			H	M		M	
CO3	H	M			H			M				M

LIS 305(B): USER STUDIES
(OPEN ELECTIVE)

UNIT- I Information seeking and use

Need for a conceptual framework

Need for a theory of information seeking

Integrating theories of. information seeking with broader theories and framework

UNIT: - II Information need

Definitional and conceptual problems. Distinction between needs,

wants, demands and requirements; Levels of information need
Taylor's model, Lancaster's four levels,
Cronin's three levels;

Koikela's two levels of information need;

UNIT: III. User: - Understanding the psychology of information user

categorization of user

Identifying users and potential users; users by professional Groups - industrial, commercial etc.,

UNIT: IV. Information use & user studies:

Origin, development and evolution of user studies; the renaissance of user studies, the two generations of user studies: The first generation studies- their characteristics, contributions and limitations; The second generation user studies: Their characteristics and contributions, Landmark and bench mark studies.

UNIT: V. Methodology of user studies:

Study of various methods and tools: Quantitative and Qualitative and survey methods and experimental approach; Questionnaire, interview and other traditional tools /methods: Participant observation, Diasy method, time-line series method of Dervin and others; use of psychometric methods; the promise of quantitative methods and psychometric methods.

LIS 401: RESEARCH METHODOLOGY

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
21	Research Methodology Objectives 1.To infer the need and purpose of various research methods 2.To memorize the knowledge on Research design, techniques and tools 3.To enumerate the skills on data analysis and interpretation of Data in SPSS Outcomes 1.Understand the definition, need and purpose of various research methods 2.Get the knowledge on Research design, techniques and tools 3.Gain the skills on Data analysis and Interpretation of Data in SPSS	401	20 80 4

. **UNIT I**: Research.

Definition need, functions and purpose of research.

Types of research: Fundamental and applied, Interdisciplinary,

Multidisciplinary.

Research and development of scholarship.

Library and Information Science research at national and International level

UNIT II: Research Design.

Conceptualization and Operationalization

Types of research design.

Identification and formulation of research problem.

Hypothesis: Definition, formulation and types: Descriptive, relational and explanatory, Null hypothesis, Verification.

Designing Research proposal.

UNIT III: Research Methods.

Scientific method, Historical method, Descriptive method.

Survey method and case study method

Experimental method and Delphi method.

Metric Studies in LIS- Scientometric, Bibliometrics, Webometrics, Altimetric.

UNIT IV: Research techniques and tools.

Methods of data collection: Primary and secondary.
Primary data – Questionnaire, interview and observation.
Secondary data – Historical / recorded.
Scales and checklists.
Sampling Techniques – random and non – random sampling

UNIT V: Data analysis and Interpretation.

Descriptive statistics – Measures of central tendency
Graphical presentation of data - Bar, Pie diagrams, graphs, histograms etc.
Inferential statistics- Z– T test. Correlation- Regression: Linear and Nonlinear – Chi square test.
Statistical packages – SPSS, Spread sheet, Bibexel, 'R' Statistics.
Plagiarism- Concept and types, software's.Urkund and Turnitin.
Research Report Writing and citation tools- structure, style and contents – Guide lines for Research reporting – Style Manuals: Chicago, MLA, APA, etc. Online citation Tools, Reference Style Management Tools and Method of research evaluation.
Impact Factors- Journal, Institutional and Authors, h-Index, g-Index, i10- Index

Recommended books

1. Charles. H Busha and Stephen, P. Harter . Research Methods in librarianship.

   Techniques and interpretation . New York : Academic Press. 1980.

2. Maurice. B line . Library surveys. 2ND ED. London : Bingley , 1982

3. Nickmoore and Martin Hesp. The Basics of writing reports etcetera. London Bingley , 1985.

4. Goode, William and Hatt, Paul K. methods in social research. New York: Mc Graw – Hail Book Company , Inc, 1952.5.

5. Gopal , MH . An introduction to research procedure in social sciences, New Delhi : Vikas , 1992.

CO-PO Mapping

.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M			H			H		M	M	
CO2	M	M			M			H	M		M	
CO3	H	M			H			M				M

LIS: 402: SOFTWARE FOR LIBRARIES: PRACTICE

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
22	Software for Libraries: Practice Objectives 1.To get knowledge on D Space, Greenstone digital library softwares 2.To explain koha library management software, E-resources, Directory of open access journals 3.To provide an idea on designing of Web page and Data Mining Outcomes 1.Attain knowledge on D Space, GreenstoneDigital Library Softwares 2.Learn about Koha : Library Management Software, E-Resources, Directory of Open Access Journals, 3.Get an idea on designing of Web Page and Data Mining	402	20 80 4

UNIT I : Digital Library Packages, Dspace, and Greenstone

UNIT II : Library software packages SOUL, Koha

UNIT III: Internet and Databases searching

- Open Access Database: DOAJ, DOAR

UNIT IV : Library and Information Centre Web page design and creation using MARKUP language and on-line support.

UNIT V: Data Security, Network Security, Firewalls, Cryptographic Techniques, Anti-virus Software, Anti-spywave, Instrusion Detenction system.

CO-PO Mapping

.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M			H					M	M	
CO2	M	M			M				M		M	
CO3	H	M			M							M

LIS 403 (A): INFORMATION PROCESSING AND RETRIEVAL: UDC AND INDEXING

PRACTICE - (GENERIC ELECTIVE)

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
23	Information Processing and Retrieval: UDC and Indexing Practice Objectives 1.To impart knowledge on Universal Decimal Classification 2.To learn different Indexing systems 3.To explain the design and development of thesaurus Outcomes 1.Gain knowledge on Universal Decimal Classification 2.Learn different Indexing systems 3.Understand the design and development of thesaurus	404©	20

PART – A : Universal Decimal Classification.

- Classifying complex subject titles including periodical titles
- According to Universal Decimal classification.
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PART - B: **Indexing practice**.

- Assigned Indexing practice.
- Derived indexing practice.
- Design and development of IR the saurus

CO-PO Mapping

.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M			H					M	M	
CO2	M	M			H			M	M		M	
CO3	H	M			M							M

LIS: 403(B): MANAGEMENT OF INFORMATION SYSTEM (Generic Elective)

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
24	Management of Information System Objectives 1.To provide an idea on basic concepts of Management 2.To explain budgeting techniques and methods and policies and procedures 3.To acquire knowledge on system analysis, PERT/CPM Outcomes 1.Know the basic concepts in Management, and various methods of decision-making and its application to Library and Information Centers 2.Understand the budgeting techniques and methods and policies and procedures 3.Gain knowledge on system analysis, PERT/CPM	403(B)	20 80 4

UNIT I : Human Resource Management

- Concept and Definition and scope

- Delegation, communication and participation

- Job description and analysis: Job Evaluation

- Inter-personal relations

-Recruitment procedures, Motivation: group dynamics

- Training and development, Disciplines and grievances

- Performance appraisal

UNIT II: Financial Management

- Resource mobilization

- Budgeting techniques and methods: PPBS,ZBB

- Budgetary Control

UNIT III: System analysis

- Project Management-SWOT, PEST, PERT/CPM

- Policies and procedures, MBO

- Change Management, DRUPAL, JOOMLA

-Disaster Management, Crisis Management.

UNIT IV : Total Quality Management (TQM)

- Concepts, Principles and Techniques, Six Sigma;

- Evaluation of Services of Libraries and Information Centers

UNIT V : Marketing of Library Products and Services

- Plan, Research, Strategies, Mix, Segmentation,

- Pricing and Advertising; Management Consultancy.

Recommended books

1. Allen,Louis A. Organisation and Management, New York:Allen and Unwin, 1978.

2.Bernard, Chester I. The Functions of the Executive. Cambridge, Mass:Harvard University,1938.

3. Cowley, J. Personnel Management in Libraries.1982.

4. Dawar, RS. Management Process. New Delhi:Mittal

5. Drucker,Peter. Management

6.Evans,Edward. Management technique for libraries. 2nd ed. New York:Academic Press, 1983.

7.Koontz, Herald and O Donnel. Management:Systems approach. 8th ed. New York. Mc Graw Hill, 1982.

10. Bank, John (1996). The Essence of Total Quality Management. London: Prentice,Hall International (UK) Limited.

11. Bryson, Jo (1990). Effective Library and Information Centre Management. Hampshire: Gower Publishing Ltd. Clair,

12. Guy St (1997). Total Quality Management in Library Services. London: Bowker-Saur.

13. Booms, B. H and Bitner, M. J (1981). " Marketing strategies and organization structure for service firms" in

14. Donnelly, J. H and George, W. R (eds). The marketing of services, American Marketing Association, Chicago, pp. 47-51.

15. Dewhurst, Charlotte. How marketing can help increase the value of e-resource investments : five key findings. Library Connect Newsletter. 2008, 6(1), pp. 1.

16. Gupta, D. K. and Jambhekar, A (eds.) (2003). An integrated approach to services marketing : A book of readings in marketing of library and information services, Allied Publishers, Mumbai.

17. Cronin, Blaise. (1981) The Marketing of Library and Information Services. London: ASLIB.

18. Kotler, Philip and Keller, Kevin L. Marketing Management, 12th ed. New Delhi: Prentice- Hall of India, 2007.

LIS 403(C): MUSEUMS AND ARCHIVES – (GENERIC ELECTIVE)

UNIT-I

Memory institutions and their role in preserving the culture and heritage – Understanding the scope of historical and cultural preservation- Historical monuments and museum collections- Protected structures rare professional knowledge- Film and photography and other cultural expression and manifestations including rural heritage.

UNIT-II

Industrial and technical ideas- modern architectural achievements- Essentials of records and knowledge management in diverse organizational principles- Methodologies and practical administration of archives- Records and other information sources form print to oral encompassing. Archives theory and management balancing access and preservation archives administration.

UNIT-III

Archival appraisal- advanced analysis of the basic theories, principles, techniques and methods that archivists and records managers need to use for identifying and appraising records - provide historical theoretical and practical orientation to access, advocacy, and ethical matters and orientation to the ways of providing access to archives holdings.

UNIT-IV

Archival representation and metadata: introduction to the theoretical foundations, history principles and research with references to the representation of archival materials-institute of Museum and Libraries Services(IMLS) framework metadata standards for archival materials-AGLS metadata sets including Australian Government Recordkeeping Metadata Standards and implementation manuals Dublin Core MODS and METS standards.

UNIT-V

Museum archives: evolution of the purpose of museum; history and development of museum record-keeping systems, with emphasis on changes from paper based to electronic records –use of functional analysis to identify principle functions of museums and to guide - the appraisal of records and artifacts-moving image archives: importance of moving image media in memory institutions as well as basic procedures to preserve these works-motion picture film will be of primary focus, other moving image media.

Recommended books

1. Digital preservation for libraries and museums, Edward M. Corrado, published by Rowman and Littlefield.
2. Best of Both Worlds; museums, libraries, and archives in a Digital age, G. Wayne clough, published by Smithsonian institution.

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LIS: 404() MARKETING OF INFORMATION PRODUCTS AND SERVICES (GENERIC ELECTIVE)

UNITI: Foundations of Marketing.

- Economic analysis models and their application to the information industry.
- Information as a commodity, and as a resource.
- Barriers to information access.

UNIT II: Techniques and tools of marketing analysis.

- Market Research
- Collection of data and its analysis.
- Forecasting and positioning

UNIT III: Market segmentation

- segmenting a market
- Market targeting
- Market positioning

UNIT IV : Designing products.

- Planning, designing products and services.
- New product development and diversification.
- Product promotion stratégies.

UNIT V: National and International Commercial information.

-Services.

-Dialog, BLAISE, INFORMATICS etc.

Recommended books

1. The Marketing of Library and Information Science Service. London, Aslib, 1981.
2. Economics of Information edited by Malcolm Galatin and Robert D. Laiter. London : Nijihoff, 1981
3. Costing and the economics of Library and Information Services / edited by Sephen' A Roberts. London: Aslib, 1984.
4. Marketing of information services/ edited by Brayan Yates. Canberra: National Library of Australia In association with the Australian Commission for Unesco, 1983

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404: DISSERTATION/PROJECT WORK

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
25	Dissertation/Project Work Objectives 1.To explain how to select the theme for their work 2.To provide guidance on writing styles, preparation of questionnaire, data analysis and interpretation of data and citation styles 3.To impart skills on findings and conclusion of the work Outcomes 1.Gain Knowledge on how to select the theme for their work 2.Learn the writing styles, preparation of questionnaire, data analysis and interpretation and Citation styles 3.Get the skills on findings and conclusion in dissertation	404	- 100 4

CO-PO Mapping

.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M			H					M	M	
CO2	M	M			H			M	M		M	
CO3	H	M			M							M

LIS: 405(A) TECHNICAL WRITING (Open Elective)

Sl.No.	Name of the Course Objectives and Outcomes	Course Code	Internal Marks External Marks Credits
26	Technical Writing Objectives 1.To explain the definition and types of technical writing 2.To discuss about technical writing process and styles 3.To provide the skills on technical writing techniques, use of MS-Office Outcomes 1.Know the definition and types of technical writing 2.Attain the idea on technical writing process and styles 3.Get the skills on technical writing techniques, use of MS-Office for preparation and presentation of technical writing	405 (A)	20 80 4

UNIT I: Technical Writing basics

Definitions, Purposes, Characteristics

Types, Business and Academic

Functions, Target groups and their requirements

UNIT II : -Technical Writing Process

Planning, drafting, editing, finishing and producing the document.

Use of editorial tools viz. Print and Electronic Dictionaries

Style Manuals. APA, MLA, Chicago

UNIT III: Technical Writing Style

Language and technical skills, Styles

Semantics,Syntax, Diction, Sentence Structure, Readability

UNIT IV: Technical Writing Technique

Information Searching and gathering skills,

Internet – Search Strategy

Summarizing. Designing pages: Tables, Line Graphs, BarGraphs, -

Pie Charts, Charts and Illustrations, footnotes and end notes

UNIT V : Technical Communications

- Structure and format of journal articles, seminars/conference papers,

-Review articles, technical reports, research proposals,monographs,

-Dissertations/theses. Use of Page Maker and Ms-Office for the

Preparation, production and Presentation.

Recommended books:

1. Anderson, Paul V and Brockamn, R John and Miller, Carolyn(ed). New essays in Technical and scienfic communication: Research, theory and practice. Farmingdate:NY, Baywood, 1997.
2. Day, Robert A. Writing scientific papers in English. Ed 2. Philadelphia:ISI, 1989
3. Joshi, Yateendra, Communicating in style. New Delhi: TERI, 2003
4. Staples, Catherrine and Ornatowski, Cezar (Ed). Foundations for teaching technical Communications
5. Society for Technical Communication. Code for communicators. Washington D C. STC.1998.

CO-PO Mapping

.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M			H					M	M	
CO2	M	M			H			M	M		M	
CO3	H	M			M							M

LIS 405(B): INFORMATION SYSTEMS AND PROGRAMS

(OPEN ELECTIVE)

UNIT I : Introduction to information systems.

- Information system: concept and characteristics.
- Kinds of Information systems.
- Planning and designing: Standards of Information Systems

UNIT II: Global Information systems and programs.

- UN and its specialized agencies – based information systems and programs.
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UNIT III: National information systems.

- National Information systems in USA, UK, Russia and Japan.
- Information systems, programs and Networks in India.

UNIT IV: Organizations promoting information systems and Programs.

- Organizations promoting Information systems and programs at the international level.
- Organizations promoting Information systems and programs in India.

UNIT V: Information Providers (venders) International: DIALOG, STN, Data Star,

UMI, Silver Platter, BLDSc, ISI.

- National providers: INFONET, INFLIBNET, J-Gate

Recommended books

1. Atherton, Pauline. Hand book of information systems and services. Paris. UNESCO, 1977.
2. Champman E.A. Library Systems . Analysis Gidelines , 1970.
3. Weisman. HM . Information sytems . Services and Centres. New York: Beekar and Hayness, 1972.

SRI VENKATESWARA UNIVERSITY

TIRUPATI

DEPARTMENT OF PERFORMING ARTS







REVISED SYLLABUS - 2023 - 2024

About the Department:

The Department of Performing Arts was established in the year 1989.

Objectives:

- To guide music students and scholars on various aspects of music learning, teaching, research and performance
- To inculcate the nuances of classical music to the students
- To give individual attention to mould the students and make them professional performers
- to undertake serious research in Music and extend the same to interdisciplinary and collaborative levels

Courses:

M.A. in Performing Arts (Music)

This course enables a student to get advanced training in Carnatic Classical music. Any student possessing an undergraduate degree in Music or any UG degree with an additional qualification of music like title/certificate/diploma is eligible to join the course. Importance is given to both *kalpita* (pre-composed) and *manodharma* (Improvisation) aspects of music training and the course aims at preparing a student to shine both as a performer and a researcher.Consists of Theory and Practical papers in a ratio of 1:4

Ph.D. in Performing Arts (Music)

A student with a PG degree in music can register for the research degree programmes. Some of the areas of Research are Study of Musicological texts, Music Manuscripts, Compositional Analysis, Ritual Music and Stylistic studies. Interdisciplinary research has also been a key area with studies relating to Music and Veterinary Science (milk yield), Music and Education, Music and Information technology, and so on. In this NAAC Assessment period i.e after (2017-18) , 9 (NINE) Research Scholars submitted Theses out of which 7 (SEVEN) are awarded Ph.D. degree till now. 4 (Four) Research Scholars are pursuing Ph.D. in the department currently.

Vision:

- To introduce Online courses in Music
- To collaborate with AIR/FM/ Doordarshan/ TV Channels for music teaching and performances
- To take Music to grass root level of the society through 'Outreach activities'
- To give online consultation on Music learning and Research
- To create a hub for music research to coordinate with other Institutions, globally
- To organize National & International Seminars and Conferences on music
- To train scholars in research methods and promote quality research at par with International standards

Mission:

- To serve as a traditional and authentic institution of music and supporting other institutions in this region with vide music knowledge and system as a beacon of light.
- Supporting the community and guide them to enjoy good music for betterment
- Supporting Teaching evaluating and research activities with excellence
- Take music to the grass root level and create musical awareness in the young minds of the region
- Encourage and support interdisciplinary research in music arena.
- To stand as a torch bearing traditional institution with full of innovative ideas and promoting interdisciplinary research

Choice Based Credit System (CBCS):

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable

potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed.

Program Specific Outcomes:

- Help Students to obtain All India Radio grades in Classical, Devotional and Light music categories and T.V. Programs

- Able to perform various roles like music performance anchoring announcing in various Medias and Provide Knowledge and skill to establish audio recording theatres.

- Helpful to get job opportunity as Music Teachers in Government and government aided Schools Lecturers in Government/ Aided Colleges and also Teachers in Central Government Schools.
- Help students to achieve higher ranking in music performing arena.

Program Objectives:

- To guide music students and scholars on various aspects of music learning, teaching, research and performance
- To inculcate the nuances of classical music to the students
- To give individual attention to mould the students and make them professional performers
- to undertake serious research in Music and extend the same to interdisciplinary and collaborative levels

Program Outcomes (POs):

PO 1	This Program will guide students and scholars on various aspects of learning, teaching, research and performance in music field.
PO 2	This program will guide them to create self employment opportunity
PO 3	Guide them to establish him and perform as a Musician and supporting Artist
PO 4	Guide the students to establish him and perform as a Musician and supporting Artist
PO 5	Help the students to achieve good marks in competitive exams like SET and NET
PO 6	Motivate them to undertake research in Music
PO 7	Help them to extend Music research to interdisciplinary and collaborative programs
PO 8	This Program will make student's as professional performers
PO 9	To give support for the students to become successful music teachers
PO 10	Help the students to become Entrepreneurs in the field of Music.
PO 11	Obtain capability to direct and compose Music for Drama, Dance,etc..
PO 12	Empower them to establish coaching centers for music as a self employment program

Program Educational Objectives:

- To train and Educate the students about the recent trends and developments occurring in the music field.
- Educate and train the students to attend successfully all the competitive exams related with music job opportunities.
- Train and Educate students to overcome stage fear and perform musical concerts successfully.
- To Educate and Train the students to become good Teacher, Performer and Researcher in the field of Music.

SEMESTER- I

S.No	Components of Study	Title of the Course		Credit Hrs/Week	No of Credits	IA Marks	Sem End Exam Marks	Total
1	Core Mandatory	1	Theory of Music (T)	6	4	20	80	100
2		2	SuddhaMadhyama Raga-s (P)	6	4	20	80	100
3		3	ShadavaAudava Ragas (P)	6	4	20	80	100
4		4	PancaratnaKrti-s of Tyagaraja (P)	6	4	20	80	100
5	Compulsory Foundation Opt- any one	5a	AbhyasaGana -1	6	4	20	80	100
		5b	Abhyasa Gana-2	6	4	20	80	100
		5c	Abhyasa Gana-3	6	4	20	80	100
6	Elective Foundation	6a	Bhajans-1	6	4	20	80	100
		6b	Applied Theory	6	4	20	80	100
Total				36	24	120	480	600
7	Audit Course		Human Values &Professional Ethics-1	0	0	100	-	-

SEMESTER- II

S.No	Components of Study	Title of the Course		Credit Hrs/Week	No of Credits	IA Marks	Sem End Exam Marks	Total
1	Core Mandatory	1	History of Music (T)	6	4	20	80	100
2		2	PrathiMadhyama Raga-s (P)	6	4	20	80	100
3		3	Bhashanga Ragas (P)	6	4	20	80	100
4		4	Rare raga-s(P)	6	4	20	80	100
5	Compulsory Foundation Opt- any one	5a	AbhyasaGana -4	6	4	20	80	100
		5b	Abhyasa Gana-5	6	4	20	80	100
		5c	Abhyasa Gana-6	6	4	20	80	100
6	Elective Foundation	6a	Geyanataka (P)	6	4	20	80	100
		6b	Swarajati of Syamasastry (P)	6	4	20	80	100
Total				36	24	120	480	600
7	Audit Course		Human Values and Professional Ethics-2	---	-	100	-	-

SEMESTER -III

S.No	Components of Study	Title of the Course		Credit Hrs/ Week	No of Credits	IA Marks	Sem End Exam Marks	Total
1	Core	1	VilambakalaKritis (P)	6	4	20	80	100
2		2	Group Kritis (P)	6	4	20	80	100
3	Generic Elective	3a	Vakra raga-s(P)	6	4	20	80	100
		3b	Manodharma Sangeetham (P)	6	4	20	80	100
		3c	Study of LakshanaGrantha-S (T)	6	4	20	80	100
		3d	Post Trinity Compositions	6	4	20	80	100
4	Skill Oriented Course	4	Communication and Soft skills	6	4	20	80	100
5	Open Elective	5a	Devotional Songs -1	6	4	20	80	100
		5b	Patriotic / Folk songs	6	4	20	80	100

SEMESTER -IV

S.No	Components of Study	Title of the Course		Credit Hrs/Week	No of Credits	IA Marks	Sem End Exam Marks	Total
1	Core	1	Advanced Theory (T)	6	4	20	80	100
2		2	Concert (P)	6	4	20	80	100
3	Generic Elective	3a	RagamTanamPallavi (P)	6	4	20	80	100
		3 b	Dance Repertoire	6	4	20	80	100
		3c	Post trinity composers- 20th century and beyond (P) (P)	6	4	20	80	100
		3 d	Ragamalika	6	4	20	80	100
4	Project work (Mandatory)	4	Project Work (T)	6	4	20	80	100
5	Open Elective	5a	Devotional Songs -2	6	4	20	80	100
		5 b	Annamayya Songs	6	4	20	80	100

SRI VENKATESWARA UNIVERSITY: TIRUPATI
DEPARTMENT OF PERFORMING ARTS
M.A. Performing Arts (Music) Syllabus (NEP-2021-22)

SEMESTER-I

Core1 - PA-M 101 – Theory of Music (T)

Objectives:

1. To assess nuances of raga and the musical forms figuring in Carnatic classical music
2. To gain knowledge on composers and compositions of Post trinity period

Unit -1	Structural and Melodic organization of the following musical forms – Gitam, Varna, Svarajati, Krti, Kirtana,Ragamalika, Padam, Javali&Thillana.
Unit -2	Study of the Rhetorical Beauties in musical compositions - Prasa, yati, antyaprasa, anuprasa, yamaka, svarakshara and padaccheda. Various Mudra-s figuring in music compositions.
Unit -3	Lakshana-s of the following raga-s - Todi, Sankarabharanam, Kalyani, Anandabhairavi, Dhanyasi, Bhairavi, Kambhoji, Purvikalyani
Unit -4	Study of the Pancadasagamaka-s, dasavidhagamaka-s and Gamaka signs used in SangitaSampradayaPradarsini
Unit -5	Contribution of the following composers to Music - VinaKuppayyar,PatnamSubrahmaniaIyer, Mysore Vasudevachar, Papanasam Sivan, HarikesanallurMuttayyaBhagavata and

Reference Books

Book	Author
SangitaSampradayaPradarshini	SubbaramaDikshitar
Andhra Vaggeyakkaracaritralu	B.RajinikanthaRao
History of Indian Music	P.Sambamurthy
Great Composers- Book 1&2	P.Sambamurthy
History of music	RangaramanujaIyengar

Tanjore as a Seat of Music	S Seetha
South Indian Music Books Vol 1 to 6	P.Sambamurthy
An historical study of Indian Music	Swami Prajnanananda
A Dictionary of South Indian Music and Musicians (All volumes)	P Sambamurthy
SangitasastraSaramu	S.R.Janakiraman
Raga at a glance	S.R.Janakiraman
SangitasastraSudharnavamu	NookalaCinnaSatyanarayana

Articles In Music Journals

Articles Downloadable from the Website- www.musicresearch.in

Outcome:

1. The student will gain complete knowledge in the nuances of raga-s and its grammar figuring in Carnatic music and understand the literary and melodic aspects of the musical forms.
2. The student will aware of the compositions in various styles of different regions of the country in various vernacular languages of post trinity period composers which is to extending his knowledge on musical composition and the composers.

CO-PO MAPPING:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	3	2	3	-	-	2	-	-	-
Co 2	2	-	1	3	2	-	-	-	1	-	-	-

Core 2: **PA-M-102SuddhaMadhyama Raga-s (P)**

Objectives:

1. To provide elaborate acquaintance in popular rakthi ragas with suddhaMadhyama of Carnatic music
2. To provide additional knowledge on the musical compositions composed in main rakthi raga-s of carnatic music in suddhamadhyama of Carnatic music

Ability to sing/play any Five Compositions from the following raga-s

Shankarbharanam, Kharaharapriya, Todi, Bilahari, Saveri, Kiravani, Dhanyasi, Kaanada, Mayamalavagaula, Harikambhoji, Sahana, Gowrimanohari, Charukesi, Nata, and Ritigaula.

Out come:

1. To plan and perform carnatic music concerts successfully by acquiring proficiency onsuddhamadhyama ragas
3. This paper helps to prepare the list of songs to attend gradation test from AIR

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	2	3	-	3	3	3	1	-
Co 2	2	-	2	-	2	-	-	3	3	3	1	-

Core:3PA-M 103 -Shadava Audava Raga-S (P)

Objective:

1. To assist the student to render pentatonic and hexatone scales in Carnatic music by learning different musical compositions in these raga-s
2. To gain wide knowledge on variety of shadavaaudava ragas popularly prevailingin present music platforms.

Ability to sing/play any Five Compositions from the following raga-s

Madyamavati, Mohanam, Vasantha, Hindolam, Sriranjani, Amruthavarshini, Hamsanandhi, Arabhi, Abheri, Malayamarutham, Abohi, Valaji, Revathi, Sivaranjani, Bhopalam, Bowli, SuddhaSaveri and SuddhaDhanyasi.

Outcome:

1. Ability to perform or compose songs in various shadavaaudava of carnatic music.
2. Ability to understand and appreciate pentatonic hexatone scales of global music Platform

CO PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	2	3	-	3	3	3	2	-
CO 2	2	-	2	-	2	-	-	3	3	3	2	-

Core 4 PA-M 104 –PancharathnaKritisof Tyagaraja(P)

Objective:

1.It is mandatory for a music performer to acquire proficiency on five Gem compositions of Tyagaraja in Carnatic music.

2. To help the student to acquire knowledge on Pancharathna, this helps to perform in variousTyagarajaAradhana music festivals all over the world.

Core –4 PA-M 104- PancaratnaKrti-s of Tyagaraja (P)

To sing/play any **two**PancaratnaKrti-s of Tyagaraja out of the raga-s,

Nata, gaula, Arabhi, Varali and Sri.

Outcome:

1. Ability to participate and perform in TyagarajaAradhana festival by various Organizations.

2. Ability to perform in the congregational singing/playing in the iconic musical festivalof India and in TyagarajaAradhana conducted in Global platforms.

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	2	3	-	3	3	3	2	2
CO 2	2	-	2	-	2	-	-	3	3	3	2	2

Compulsory foundation

PA-M 105 a. Abhyasa Gana-1 (P)

Objectives:

1. To remind and refresh the preliminary exercises on tonal aspect to make the student to understand the accuracy of musical notes
2. To make the student to render accurate musical note

Compulsory foundation

PA-M -5a. Abhyasa Gana-1 (P)

Ability to sing/play Akaram for Swaravali,Janta, Thaatu and Sthayi exercises in three speeds in Sankarabharanam, Karaharapriya, Kalyani, Todi, Shanmukhapriya

Outcome:

1. Ability to render musical notes with accurate frequency
2. Ability to produce different swara variety figuring apart from basic scales

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	2	3	-	3	3	3	2	2
CO 2	2	-	2	-	2	-	-	3	3	3	2	2

Compulsory foundation

PA-M 105(b)-Abhyasa Gana-2

Objectives:

1. It helps to bridge the gap between Abhyasagana and Sabha gana
2. It helps to learn ragabhava and ragaranchakaprayogas and all sort of possible phrases

Compulsory foundationPA-M 105(b)-Abhyasa Gana-2

Ability to render two -Tana Varna-s in AdiTalam in 3 speeds with Akarasadakam

Out come :

1. Ability to develop improvisation the raga alapana aspect of Carnatic music
2. Ability todevelopimprovisationthe Kalpanaswara aspect of Carnatic music.

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	2	3	-	3	3	3	2	2
CO 2	2	-	2	-	2	-	-	3	3	3	2	2

Compulsory foundation

PA-M 105 (C)-Abhyasa Ghana-3

Objectives:

1. To make the student familiar with raga ranchakaprayogasof main ragas of carnatic music.
2. To make him understand 16 swaranames based on 12 semitones

Compulsory foundationPA-M 105 (C)-Abhyasa Ghana-3

- Ability to sing/play raga ranchaka, ragachayaprayoga-s for 5 main raga-s learnt in the practical paper
- Ability to sing/play six mela-s (Scales) of any one chakra from the 72 Melakartha

Outcome:

1. Help the student to obtain the basic knowledge on rendering raga alapana
2. Help to understand and produce vivadiswaras and Vivadi ragas figuring in 72 Melakartha of carnaticMusic.

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	2	3	-	3	3	3	2	2
CO 2	2	-	2	-	2	-	-	3	3	3	2	2

Elective Foundation

PA-M 106 (a) .Bhajans (P)

Objectives:

1. To make the student familiar with different language musical compositions
2. To make the student learn the techniques of congregational singing/playing

Elective Foundation PA-M 106 (a) .Bhajans (P)

Ability to sing/play any five of the following Bhajan-s

KabeerdasBhajan, MeeraBhajan, SurdasBhajan, TulsidasBhajan ,Abhang, TarangamAshtapadi, TodayaMangalam, Tirupugazh, Tevaram, Tiruppavai,

Outcome:

1. Help the student to obtain knowledge on musical compositions in vernacular languages
2. Help to develop teamwork skills and reduce stress

Elective Foundation PA-M 106 (b). Applied Theory (T)

Objectives:

1. To encourage the students to learn other music genres like Hindusthani, western, folk and Operas
2. To encourage the research in comparing carnatic music with other genres.

Elective Foundation PA-M 106 (b).Applied Theory (T)

Unit -1	Outline knowledge of Hindustani Music - the raga classification system (Thats); knowledge of the basic tala-s. Structure of Dhrupad, Khyal and Thumri. Outline knowledge of the different gharana-s
Unit -2	Western Music: Melody, Harmony, Polyphone, Consonance, Dissonance, Harmonics, and Staff Notation. Ability to write in Western notation the following - Arohana and avarohana of Todi, Kalyani, Mayamalavagaula, Sankarabharana and Kharaharapriya scales; "varavina" Gita in Mohana raga.
Unit -3	Folk music of South India - various kinds, tunes or melodies figuring in them - tala-s found - instruments used.
Unit -4	Knowledge of the forms used in bhajana tradition - kirtan-s, bhajan-s, Utsavasampradayakirtana-s and DivyanamaSankirtana-s of Sri Tyagaraja, Ashtapadi, Tarangam, Divyaprabandham and Tiruppugazh.- Contribution of Bhajana Trinity – SridharaVenkatesaAyyaval, BodhendraSadguru Swami – MarudanallurSadguruSwamigal.
Unit -5	Opera of South India - general characteristics - different forms used in geyanataka-s; detailed knowledge of the geyanataka-s of Sri Tyagaraja namely, Naukacaritramu and Prahladabhaktavijayam, Nandanaracaritramof Gopalakrishnabharati and Ramanatakam of Arunacalakavirayar.

Book	Author
HarikathaVagmayaCharithra	V.Seetharamanjaneya
Kathakalakshepa – a study	PremeelaGurumurthy
Naukacaritramu of Tyagaraja	S Bagavathy
PrahladabhaktaVijayamu of Tyagaraja	Ed. T S Parthasarathy
Nandanarcaritra of Gopalakrishnabharati	Ed. S Ramanathan
Folk Music of Andhra Pradesh	VinjamuriSeethadevi
Folk, Faith and Feudalism	Singhi
Telugu HarikathaSaraswamu	T.Donappa
Bharathanatya – a criticalstudy	R.Satyanarayana
South Indian Music Books Vol 1 to 6	P.Sambamurthy
The Opera in South India	S.A.K. Durga
Traditional Indian Theatre (Multiple Streams)	KapilaVatsyayan

ARTICLES IN MUSIC JOURNALS

ARTICLES DOWNLOADABLE FROM THE WEBSITE- www. musicresearch.in

Out Come:

1. Ability to write about other genres music and its relationship with carnatic Music .

2. Ability to develop the musicological knowledge of the student.

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	2	3	-	3	3	3	2	2
CO 2	2	-	2	-	2	-	-	3	3	3	2	2

Course Code	Components of Study	Title of the Course	Contact hours	No. of Credits	IA Marks	End SEM Exam Marks	Total
7	Audit Course Self Study	Human Values and Professional Ethics -1			100		100

II- SEMESTER

Core 1 -PA-M 201 History of Music (T)

Objectives:

1. To provide knowledge on musical cultural heritage of India through centuriesand its importance in the musical history.

2. To evaluate the ethnicity of music through various milestones in the history of music and understand its nobility

Core 1 -PA-M 201 History of Music (T)

Unit -1	Knowledge on the work about names of the works with authors and period; Detailed knowledge of the following lakshanagrantha-s Bharatha , Bruhaddesi and SangitaRatnakara emphasizing the following technical terms Nada, Sruti, Svara, Grama, Murcchana, Jati, Tana, Kuta-tana etc.
Unit -2	Sources that provide materials to know the history of music – Temples, Inscriptions, paintings, sculptures, and manuscripts.
Unit -3	Music of the Ancient Tamils – Outline knowledge of musical references found in Silappadikaram -Palai and Pann system; Knowledge about Musical forms – Tevaram,Tiruvachakam, Diyaprabhandam,Tiruppugazh, Tiruvarutpa and KavdiChindu.
Unit -4	Concept of Mela and the classification of raga-s under mela-s as described in the following works: - Svaramelakalanidhi of Ramamatya, Caturdandiprakasika of Venkatamakhi and its anubandha and the SangrahaCudamani of Govinda.
Unit -5	Music patronised in the courts of Tanjavur, Tiruvananthapuram, Mysore, Vijayanagaramand Madras (Chennai)

Facets of notation in South Indian Music	**SaradaGopalam**
Ragalakshanasangraha	**HemaRamanathan**
Ragas at a glance	**S R Janakiraman**
Raga lakhanasangrahamu (Pt.1-3)	**NookalaCinnaSatyanarayana**
RagamTanamPallavi	**M B Vedavalli**
Essays on Tala and Laya	**N Ramanathan**
Tala sangraha	**B M Sundaram**

Ragalakshanasangraha **HemaRamanathan**

Outcomes:

1. To enable the student to prepare for competitive exams like NET / SET/ DSC..etc
2. To involve the student in developing research skills in music arena.

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3	3	3	3	-	-	2	-	3	1
CO 2	1	1	2	3	3	3	-	-	2	-	3	2

Core 2- PA-M-202 – PratiMadhyama Raga-s

Objective:

1. To provide elaborate acquaintance in popular rakthi ragas with PrathiMadhyama of Carnatic
music
2. To provide additional knowledge on the musical compositions composed in main rakthi ragas
ofcarnatic music in Prathimadhyama scales.

Core 2- PA-M-202 – PratiMadhyama Raga-s

Ability to sing /play any **Five** Compositions from the following raga-s:
Kalyani, Vachaspathi, Latangi, Pantuvarali, Purvikalyani, Shanmukhapriya, Simhendramadhyamam, Dharmavati, Hamsanandi, Ranjani, Ramapriya, Varali,YamunaKalyani, Subhapantuvarali

Outcomes:

1. To plan and perform carnatic music concerts successfully by acquiring proficiency on Prathimadhyama ragas
2. This paper helps to prepare the list of songs under the Pratimadhyama category to Attend gradation test from AIR

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3		1	-	-	3	3	-	3	1
CO 2	2	1	2		2	1	-	3	3	-	3	2

Core 3 PA-M 203 - Bhashanga raga-s (P)

Objectives:

1. To educate theStudent on the special aspects of Bhashanga ragas and the technique behind the rendering of Bhashanga Raga-s

2. To facilitate to learn on various historical changes occurred through centuries on various raga-s.

Core 3 PA-M 203 - Bhashanga raga-s (P)

To sing/play any **Five**kirtana-s in the following Bhashanga raga-s

Anandabhairavi, Kapi, Athana, Saranga, Khamas, Mukhari, Useni, Asaveri, Behag, Desh, Hamirkalyani, Sourastram, Nilambari, Rudrapriya, Sindhubhairavi, Brindavanasaranga.

Out Comes:

1. Attracting audience by rendering musical compositions in Bhashanga ragas in musical concerts

2. This paper helps to prepare the list of songs under the Bhashanga Raga category to Attendgradation test from AIR

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3		1	-	-	3	3	-	3	1
CO 2	2	1	2		2	1	-	3	3	-	3	2

Core4- PA-M 204 - Compositions in Rare Raga-s (P)

Objectives:

1. To educate the learner about rare ragas which, are not commonly performed in concerts.

2. To educate the newly invented ragas also through compositions

Core4- PA-M 204 - Compositions in Rare Raga-s (P)

To sing/play any **Five** Compositions in the following Rare raga-s

Cintamani, Jayantasri, Jayamanohari, Madhavamanohari, Salanganata, Sarasvatimanohari, Candrajyoti, Vivardhini, Ganavaridhi, Kalanidhi, Kathanakutuhalam, Vasanthabhairavi, Vijayanagari, Niroshta, Karnaranjani, Malavasri, Kalanidhi, Umabharanam.

Outcomes:

1. Ability to perform rare and uncommon ragas to show his wide knowledge in the subject

2.Able to update the knowledge about newly invented ragas and uncommon ragas.

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	3	-	-	-	3	2	-	3	1
CO 2	3	1	2	3	-	-	-	3	2	-	3	2

Compulsory foundation PA-M 205a.Abhyasagana -4

Objective:

1. Ability to develop grip over different degrees of speeds in ‘Suladi tala’ aspect
2. Ability to learn different commencements of thecompositions

Compulsory foundation PA-M 205a.Abhyasagana -4

1.Ability to render/play SaptatalaAlankara in Three speeds in following raga-s
Karaharapriya, Mohana, Madhyamavati, Sankarabharana ,Shanmukhapriya
2. Graha exercise in Swaravali -s

Out comes:

1. Helps student in better understanding of Suladi tala system
2. .Helps the student to render different variety of compositions/Pallavi-s with different graha-s

Compulsory Foundation PA-M 205 (b). Abhyasagana-5

Objectives:

1. To provide advance level of training to make the student to perform music at concertlevel
2. Advance level foundation course will help the student to achieve perfectness in Tala / rhythmic rendering

Compulsory Foundation PA-M 205 (b). Abhyasagana-5

Ability to render two Tana Varna-s in Kandajathi Ata Talam in 3 speeds with Akarasadakam

Outcomes:

1. Capable of rendering lengthy composition in 3 speeds
2. It helps to student to command over difficult tala.

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1		1	-	-	3	3	-	-	-
CO 2	2	2	1		-	-	-	2	2	-	-	-

Compulsory Foundation PA-M 205 c. Abhyasagana-6

Objective:

1. Ability to develop manodharma skills by singing/playing kalpanaswara in different tala-s
2. Ability to develop rhythmic skill (layagnana) aspect in singing/playing

Compulsory Foundation PA-M 205 c. Abhyasagana-6

Ability to sing/play simple swara phrases and Mukthayi-s set to the following tala-s

Adi, Rupaka, Kanda Chapu and Misrachapu

Out come:

1. Capable of exploring Manodharma aspect of KalpanaSwara.
2. Helps a student like a stepping stone for developing Manodharma skill

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1		1	-	-	3	3	-	-	-
CO 2	2	2	1		-	-	-	2	2	-	-	-

Elective Foundation

PA-M 206(a).COMPOSITIONS OF GEYANATAKA

Objective:

1. To understand the interrelationship between text , theme of the song and music
2. To know about application of music applied to other related art forms (Opera)

Elective foundation PA-M 206 (a) -Compositions from GeyaNataka-s (P)

Any **Four** compositions from any one of the following GeyaNataka-s

PrahladhaBhakthiVijayam -Nandanarcharitram,

NaukaCharitram -Rama Natakam

Out comes:

1. Knowledge in application of music in other art fields like theatre, opera etc
2. Knowledge to select and utilize ragas according to the theme and text.

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1		1	-	-	3	3	-	-	-
CO 2	2	2	1		-	-	-	2	2	-	-	-

Elective foundation PA-M 206.(b): Generic Electives -Svarajati-s of SyamaSastri (P)

Objective :

1. To inculcate advance rhythmic and melodic compositions like swarajathi of Syamasastri help to improve student's knowledge in laya and raga aspects of Music.

2. To educate the student to understand the exploration of raga bhava and rhythmic Intricacies of Swarajathi-s of SyamaSastri

Elective foundation PA-M 206.(b): Generic Electives -Svarajati-s of SyamaSastri (P)

To sing/play any two Svarajati-s of SyamaSastri in the raga-s Bhairavi, Yadukulakambhoji and Todi

Outcome:

1. It will help the student to improve the perfect rendering of Swarasahitya in a flawless rhythmical way.

2. It will help to exhibit his dexterity in presenting scholarly compositions.

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1		1	-	-	3	3	-	-	-
CO 2	2	2	1		-	-	-	2	2	-	-	-

Course Code	**Components of Study**	**Title of the Course**	**Contact hours**	**No. of Credits**	**IA Marks**	**End SEM Exam Marks**	**Total**
7	Audit Course (Self Study)	Human Values and Professional Ethics -2			100		100

III - SEMESTER

Core-1-PA-M-301-VilambakalaKrti-s (P)

Objective:

1.	To get grip over slow tempo rhythm
2.	To learn and command over on the different tempo of the raga phrases

Core-1-PA-M-301-VilambakalaKrti-s (P)

Ability to sing/play any Four Compositions in Vilambakala composed by any of the following Composers:

Tyagaraja, MuttuswamyDikshita, SyamaSastri, Swati Tirunal, Mysore Vasudevachar, HarikesanallurMuttayyaBhagavatar, RamanadSrinivasaAyyangar, Papanasam Sivan, SubbarayaSastri, SubbaramaDikshitar, VeenaiKuppaiyer

Out come:

1. Scope to Perform as a main item in Carnatic music concert,
2. To give scope to emphasize the skills in Manodharma component in the concert platform

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3	3	3	3	-	-	2	-	3	1
CO 2	1	1	2	3	3	3	-	-	2	-	3	2

Core 2-PA-M 302 - Group Krti-s (P)

Objectives:

1. To provide detailed knowledge about music and its relationship with Indianculture and music festivals
2. Group kritis are important to learn to understand the depth of musical andliterary aspects.

Core 2-PA-M 302 - Group Krti-s (P)

Ability to sing /play Five Composition from any of the following Group Krti-s

1. Panchalingasthalakrti of MuttuswamyDikshita
2. KamalambaNavavarnakrti of MuttuswamyDikshita
3. NavagrahaKrti of MuttuswamyDikshita
4. Navaratnamalika of SyamaSastri
5. NavaratriKrti of Swati Tirunal
6. Venkatesapancaratna of VeenaKuppaya
7. KalahastisaPancaratna of VeenaKuppaya
8. ThiruvotriyurPancharathnam

Out come:

1. Ability to perform mastery pieces of carnatic music in learned audience
2. Ability to perform in various music festivals

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1		1	-	-	3	3	-	-	-
CO 2	2	2	1		-	-	-	2	2	-	-	-

Generic Elective PA-M 303(a) –Vakra raga-s (P)

Objectives:

1. To provide detailed knowledge about the zig zag movement of the swaras in a raga
2. Learning will improve the standard of rendering musical notes with perfection

Generic Elective PA-M 303(a) –Vakra raga-s (P)

Ability to sing/play 5 compositions in following raga

kadanakuthuhalam ,Begada, Reethigowla, Anandhabhairavi,Sahana, Devamanohari, Nalinakanthi, Nattakurinchi, Sri raga, Poornachandrika

Out come:

1. Able to produce the zig zag movement of melody in a raga
2. Able to perform a different genre of raga

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3	3	3	3	-	-	-	3	3
CO 2	2	-	-	3	3	2	2	-	-	-	2	3

Generic Elective PA-M 303 (b)-MANODHARMA SANGEETHAM (p)

Objectives:

1. To enrich the knowledge of innovative music
2. To educate the student to sing/play raga alapananeraval and Kalpanaswara which are the crucial Sections of creative music.

Generic Elective PA-M 303 (b) - ManodharmaSangitam(P)

1. Ability to sing/play**Ragaalapana for any Five raga-**among those prescribed under the Core papers, 102, 103, 202

2. Ability to sing/play **Neravu for any Two compositions** set in the raga-s among those prescribed underthe Core papers, 102, 103, 202

3. Ability to sing/play **SvaraKalpana for any Five compositions** set in the raga-s among those prescribed underthe Core papers, 102, 103, 202

Outcome:

1. This will help the students to get mastery over rendering raga alapana Neraval and kalpanaswara.
2. This will help to rendering concerts successfully.

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3	3	3	3	-	-	-	3	3
CO 2	2	-	-	3	3	2	2	-	-	-	2	3

Generic Elective PA-M 303.(C)- STUDY OF LAKSHANA GRANDHAS

Objective:

1. To attain complete knowledge about musical history
2. To well verse on Lakshanagrantas of music

Generic Elective PA-M 303(c) - Study of LakshanaGrantha-s (T)

Unit -1	Outline Knowledge of the chapters of Natyasastra and detailed note on the concepts of music described in the Chapters 28 – 32
unit -2	Study of DattilamofDattila, Brhaddesi of Matanga and NaradiyaSiksha
Unit -3	Outline Knowledge of the chapters of Sangitaratnakara of Sarngadeva and the contents
unit -4	Detailed study of the raga classification system in the desi period - raganga, upanga, kriyanga and bhashanga; Uttama-Madhyama-Adhama raga-s; Ghana-Naya-Desi raga-s. Raga - ragini system, raga dhyana , raga and rasa in Indian music
Unit-5	Detailed study of the Svaramelakalanidhi of Ramamatya and Caturdandiprakashika of Venkatamakhi.

Reference Books

Book	**Author**
Natyasastra of Bharata (vol. 4)	**Ed. M. R. Kavi**
Dattilam of Dattilamuni	**Ed. K SambasivaSastri**
Dattilam – a compendium of Ancient Indian Music	**EmmieteNijenhuis**
Brhaddesi of Matanga (Text &translation)	**Ed. PremLata Sharma**

Sangitaratnakara (vols. 1-4)	**Ed. Pt. SubrahmanyaSastri**
Sangitaratnakara of Sarangadeva (eng. Transl.)	**Premlata Sharma & R K Shringy**
Sangitaratnakara of Sarangadeva (tel. transl.)	**GandhamSriramamurthy**
Svaramelakalanidhi of Ramamatya	**Ed. M S RamasvamiIyer**
Caturdandiprakasika of Venkatamakhi	**Published by Madras Music Akademi**
LakshanaGranthas in music	**S.Bhagyalekshmy**
SangitasastraSaramu	**S.R.Janakiraman**

Outcome

1. This will help to create interest on historical music research
2. This will help to prepare for NET/SET/DSC competitive examinations.

Generic Elective PA-M 303 (d) - POST TRINITY COMPOSITIONS (P)

Objectives:

1. To educate the student about the recent past composition of carnatic music
2. To gain knowledge about the composers of modern period of Carnatic music

Generic Elective PA-M 303 (d)-Generic Electives –Post Trinity compositions (P)

Any **Five** Compositions of the following composers:

1. AnnasvamiSastri
2. CeyyurCengalvarayaSastri
3. HarikesanallurMuttayyaBhagavata
4. JayacamarajaWodeyar
5. KoteeswaraIyer
6. MahaVaidyanathaIyer
7. Mysore Vasudevachari
8. Neelakanta Sivan
9. Papanasam Sivan
10. PatnamSubrahmaniaIyer
11. RamanathapuramSrinivasaIyengar
12. Ramasvami Sivan
13. SubbarayaSastri
14. Tanjore Quartet
15. TiruvottriyurTyagaraja
16. VeenaKuppayyar
17. WalajapetVenkataramanaBhagavata

Out come:

1. Updated music repertoire to be established in the competitive music platform
2. This will help for Extended Knowledge about various composers

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3	3	3	3	-	-	-	3	3
CO 2	2	-	-	3	3	2	2	-	-	-	2	3

Skill oriented course PA-M 304.: COMMUNICATION & SOFT SKILLS

Objectives:

1. To promote soft skills among the students so as to develop attributes that could enhance interactions, earning power and job performance.
2. To face the interviews with confidence, to secure a productive job and to sustain it with confidence and enhanced productivity.

Skill oriented course PA-M 304.: Communication & Soft Skills (T)

Unit – 1: ***Types of Soft Skills& Intrapersonal Skills****:* Definition of soft skills – Types of Soft skills: **Intrapersonal Skills**– : Self-Confidence, Self-awareness, Adaptability & Flexibility, Attitude, Assertiveness, SWOC, Resilience

Unit- II: InterpersonalSoftSkills:Active Listening Skills - Goal setting – Negotiation& Persuasion skills - Time Management - Stress Management - Problem Solving and Decision-Making Skills - Leadership Skills – Conflict Resolution

Unit – III: ***Oral Communication Skills:*** Presentation skills –JAM - Role Plays, Public Speaking skills - GD Participation and co ordination.

Unit – IV: ***Written Communication Skills:***EssayWriting - E mails- Report Writing – Memos.

Unit- V:***Employability Skills*****:** Body Language - E-mail etiquette- Telephone etiquette - Dining etiquette– Grooming -Resume writing - Interview Skills.

References:

1. Meenakshi Raman and Sangeeta Sharma (2015), ***Technical Communication: Principles and Practice, 3rd Edition,*** New Delhi: Oxford University Press.

2. Ashraf Rizvi, M. (2017), ***Effective Technical Communication,*** 2nd Edition, New Delhi: Tata McGraw Hill.

3. Hewing, Martin (1999), ***Advanced English Grammar: A Self-study Reference and practice Book for South Asian Students,*** Reprint 2003, New DelhI: Cambridge University Press.

4. Minippally, Methukutty. M. (2001), ***Business Communication Strategies***, 11th Reprint, New Delhi: Tata McGraw – Hill.

5. Sasi Kumar. V and P.V. Dharmija (1993), ***Spoken English: A Self-Learning Guide Conversation Practice,*** 34th reprint, New Delhi: Tata McGraw – Hill.

6. John, Seely (1988), ***The Oxford Guide to Writing and Speaking,*** Delhi: Oxford University Press.

7. Peter, Francis (2012), ***Soft Skills and Professional Communication.*** New Delhi: Tata McGraw Hill.

8. Print Singh, Prakash and Raman, Meenakshi (2006), ***Business Communication***, New Delhi: Oxford University Press.

9. British Council online resources.

Wren& Martin (2019), High School English Grammar & Composition Regular Edition, New Delhi, **S. Chand & Company Pvt. Ltd**

Outcomes :1. Understanding soft skills, types of soft skills and intrapersonal skills

2. Developing employability skills

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3	3	3	1	-	-	2	-	3	1
CO 2	1	1	2	3	3	2	-	-	2	-	3	2

Open elective -PA-M 305 (a) - Patriotic /Folk Songs (P)

Objectives:

1. Meant for other disciplinary students to opt as an open elective subject
2. To inculcate students about patriotism and to educate about the music of the land

Open Elective PA-M 305 A - Patriotic / Folk Songs -1 (P)

Ability to sing/play any **4 Patriotic songs** and **2 folk** songs.

Outcomes:

1.This will help the student to reduce student's stress caused by routine workload

2.This will help the students to exhibit their talent in singing/playing in National festivals, Youth festivals and various occasions

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	3	3	3	2	3	3	-	2	-
CO 2	2	-	-	3	3	3	2	3	3	-	2	-

Open elective PA-M-305 (b). Devotional Songs -1 (P)

Objectives:

1. Meant for other disciplinary students to opt as an open elective subject
2. To encourage the spiritual consciousness among the students

Open Elective PA-M305 (b)- Devotional Songs -1 (P)

Six compositions from the following forms:

Tevaram, Tiruppavai, Ashtapadi of Jayadeva, Krishna Lila Tarangini of NarayanaTeertha, Bhajan , DasarPadam

Outcomes:

1.This will help the student to reduce his stress by

2. Participating in congregational singing/playing will help to improve their confidence level

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	3	3	3	2	3	3	-	2	-
CO 2	2	-	-	3	3	3	2	3	3	-	2	-

IV SEMESTER

Core- PA-M 401- Advanced Theory (T)

Objectives

1. To develop knowledge on analyzing music of trinity of Carnatic Music
2. To develop knowledge on recent trends and developments occurred in the field of music

Core- PA-M 401- Advanced Theory (T)

Unit -1	Trinity style - Comparative study of the compositions of trinity - types of compositions, raga-s and tala-s handled structure of the compositions, melodic construction of the compositions.
Unit -2	ManodharmaSangeeta - ManodharmaSangita - Knowledge of different forms in ManodharmaSangita - Raga alapana, Tanam, Pallavi, Neravu (Niraval) &Kalpanasvara. Various Stages in Pallavisinging/playing; Types of Pallavi-s.
Unit -3	Recent trends and development in music – publications of books & journals, musical instruments, music education, concerts, media.
Unit -4	Outline Knowledge of margatala-s, desitala-s – Taladasaprana, suladitala-s, caputala-s, desadimadhyaditala-s.
Unit -5	Contribution of Modern scholars to Indian Music – Bhatkhande, V D Paluskar, OmkarnathTakur, Raghavan, Sambamurthi, Premlata Sharma. Contribution of Western Scholars like William Jones, C R Day, Fox Strangways, H A Popley, Harold Powers, Clements.

Plunges

Facets of notation in South Indian Music	**SaradaGopalam**
Manodharmasangitam	**Dr. S. Pinakapani**
Ragas at a glance	**S R Janakiraman**
Raga lakhanasangrahamu (Pt.1-3)	**NookalaCinnaSatyanarayana**
RagamTanamPallavi	**M B Vedavalli**

SangitasiddhantaSopanalu Part 1& 2	**Dr. Kovela Santa**
Essays on Tala and Laya	**N Ramanathan**
Talasangraha	**B M Sundaram**
Music research perspectives and prospects	**R.C.Metha**
Thesis and Project Work	**C J Parsons**
Ethno Musicology of India	**S.A.K.Durga**
South Indian Music Books Vol 1 to 6	**P.Sambamurthy**
Music research perspectives and prospects	**R.C.Metha**
Thesis and Project Work	**C J Parsons**
Ethno Musicology of India	**S.A.K.Durga**

Outcomes:

1. It will helpful in knowing about the modern trend and contribution of Modern Indian scholars and Western scholars on Indian Music

2 . It will help to evaluate earlier compositions and performance and update about recent, trends and developments in music field.

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	3	3	3	3	-	-	-	-	-
CO 2	1	-	-	3	3	2	2	-	-	-	-	-

Core PA-M 402 - Concert (P)

Objectives:

1. To introduce students for performing in the concert platform
2. To opt by choosing as a music performer – self employment motivation

Core PA-M 402 - Concert (P)

A candidate should perform a concert with accompaniments for Duration of 60 minutes.

Outcomes:

1. Ability to plan and execute a successful Carnatic concert in any platform
2. Ability to create self employment opportunity

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3	3	3	3	-	-	-	3	3
CO 2	2	-	-	3	3	2	2	-	-	-	2	3

Generic Elective-PA-M 403(a)- RAGAM TANAM PALLAVI

Objectives:

1. To inculcate the most creative part of Carnatic Music
2. To encourage and help him to shape out the creative rendering style of the student

Generic Elective-PA-M 403(a) -RagamTanamPallavi (P)

The following pallavi-s are to be rendered in trikalam (Anuloma, Viloma, Tisra) along with Raga-alapana, tanam, neraval and kalpanasvara. The pallavi-s should be of the following types-

2 kalaipallavi – 1, Nadaipallavi – 1.

Outcomes:

1. It will help to establish his mastery over the art in concerts
2. It will helpful in Enriching the creative talent of the student in music.

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		-	-		3	3	3	1	-	-	-	-
CO 2		-	-		2	2	2	1	-	-	-	-

Generic Elective PA-M 403(b) –COMPOSITIONS OF DANCE REPERTOIRE

Objective:

1. To understand the interrelationship between text , Classical music and Classical Dance
2. To know about application of music in dance according to sequence of the dance Performances .

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		-	-		3	3	3	1	-	-	-	-
CO 2		-	-		2	2	2	1	-	-	-	-

Generic Elective PA-M 403(b) -Compositions of Dance repertoire (P)

Ability to sing/play the following compositions from the Dance repertoire

Jathiswaram -1, Padavarna, -1, Padam, -1, Javali-1, Tillana-1

Out comes:

1. Felicitate the student to opt another field of music -vocal support for live dance Performances

2. Ability to select and perform dance musical forms.

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		-	-		3	3	3	1	-	-	-	-
CO 2		-	-		2	2	2	1	-	-	-	-

Course Code	Components of Study	Title of the Course	Contact hours	No. of Credits	IA Marks	End SEM Exam Marks	Total
3c.	Generic Elective	Post trinity composers- 20th century and beyond (P)	6	4	20	80	100

Generic Elective PA-M 403 (c) Post trinity composers- 20th century and beyond (P)

Objectives:

1. To make the student aware about the musical forms of recentpersonalities of Carnatic music
2. To acquire knowledge about the recent period composers of south India of Carnaticmusic

Generic Elective PA-M 403 (c) Post trinity composers- 20th century and beyond (P)

Any five compositions of the following composers:

1. Tirupati Narayanaswamy 2. Ogirala Veera raghavasharma 3.LalgudiJayaraman 4.GalipenchalaNarasimha Rao 5. M.D. Ramanathan 6 Dr.Nagavalli Nagaraj 7.R.K. Padmanabha 8.BellariVenkatesa Achar.9.Noorani ParamaeswaranRamaswamy 10.Thulaseevanam M. Ramakrishna Pillai 11.BalamuraliKrishna.

Out comes:

1. Help the student to explore the compositions of variety of composers gives wider range for Performances
2. It will help to update with present musical trend.

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		-	-		3	3	3	1	-	-	-	-
CO 2		-	-		2	2	2	1	-	-	-	-

Generic elective PA-M 403(d)-Ragamalika

Objective:

1.To Acquire Knowledge on different ragas used in a composition

2. To familiarize more ragas within a composition

Generic elective PA-M 403(d)-Ragamalika

Ability to sing/play any two Ragamalika-s

Out comes:

1. Capable to render different ragas consecutively

2. Developing skill in rendering variety of ragas in a quick manner by learning ragamalika

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		-	-		3	3	3	1	-	-	-	-
CO 2		-	-		2	2	2	1	-	-	-	-

Mandatory Paper PA-M 404 – PROJECT WORK

Objective:

1. To introduce the methodology of doing research in music
2. To introduce data collection, analysis etc and train up him to look into the facts basedonevidences

Mandatory Paper PA-M 404. - Project work (P)

A Dissertation not exceeding 80 pages should be submitted following the under mentioned norms:

- Could be in the nature of 'Data Collection' and 'Documentation' type.
- Carried out under the guidance of the teacher
- To be written in English/Telugu

Out comes:

1. This will help to analyze and enhance his knowledge on music
2. This will help to understand the methods of research

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	3	-	-	-	3	3	-	3	-
CO 2	3	1	3	3	-	-	-	3	3	-	3	-

Open Elective -PA-M 405 –A DEVOTIONAL SONGS -2 (P)

Objectives:

1. Meant for other disciplinary students to opt as an open elective subject
2. To give an opportunity to learn more number of Devotional songs.

Open Elective -PA-M 405-A: Open Elective – Devotional Songs -2 (P)

Ability to sing/play the following compositions (one from each group)

1. Tiruppavai
2. Ashtapadi of Jayadeva
3. Krishna Lila Tarangini of NarayanaTeertha
4. Bhajan
5. DasarPadam

Outcomes:

1.This will help the student to reduce his stress by learning and performing more songs.

2. Participating in festivals by taking part in congregational singing/playing.

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-		-	-	-	1	3	-	-	-
CO 2	1	-	-		-	-	-	1	3	-	-	-

Open elective

PA-M 405 (b)- COMPOSITIONS OF ANNAMACHARYA

Objectives:

1. Meant for other disciplinary students to opt as an open elective subject
2. To educate students about devotional music of Tirupati deity and the composer.

Open Elective PA-M 405 (b):– Compositions of Annamacharya (P)

Ability to sing/play**any 6**Compositions of Annamacharya.

Out comes:

1. This will help the student to reduce his agony and mental stress by learning and Singing/playing songs belong to bhakthi cult of this region
2. Participating in congregational singing/playing will help to relax and improve theirConfidence level

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-		-	-	-	1	3	-	-	-
CO 2	1	-	-		-	-	-	1	3	-	-	-

SRI VENKATESWARA UNIVERSITY: TIRUPATI
S.V.U. COLLEGE OF ARTS
DEPARTMENT OF PHILOSOPHY



Course
M.A. PHILOSOPHY

Choice Based Credit System (CBCS)
Academic Year 2023-2024
Amended as per NEP-2020

About the Department:

The Department of Philosophy, Sri Venkateswara University is one of the oldest Department Established in 1954 along with the inception of the University . The Department has been maintain quality both is teaching and Research . It has been serving the cause of Philosophy offering course both in Indian and Western thought teaching to post – Graduate and Research Degrees like M.A. , M.Phil., Ph.D. The Admissions in to the course are being made through an entrance test conducted by the University. Tirupati. Departmental Library All up-dated text books related syllabus, department of Library 1800 books related Indian and Western Philosophy well equipped with faculty computers.

Faculty members published 16 Articles 02 books

Vision:

To be a lead Department of Philosophy imparting Quality and Value embedded higher Education and Research in Producing Post Graduates and Doctorates. Top Priority is Freedom of learning and practice in Philosophy.

Mission:

Transforming to students into full-fledged Professionals in Philosophy and to become leaders in Modern dynamic Environment for survival and success in Life. Promoting in depth in Philosophy Research and create centre of Excellence in thrust Philosophy areas.

Choice Based Credit System (CBCS):

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations

Program Specific Outcomes (PSOs)

- The Student achieved the Problem solving skills of Life.
- The Student developed high level of knowledge relating to Human Life.
- The Student has won Junior Research Fellowship Examination.
- The Student has got Debate and Discussion ability to become Lecturer
- The Student has become a person of Excellence in Philosophy
- The Student has become Eminent Scholar in Philosophy

Department Objectives:

The Department is having the following objectives:

- To expose students to updated curricula and to recent advances in the subject and enable the students to face NET, SET and other competitive examinations successfully.
- To create awareness among students about the Indian Philosopher and western Philosophers and including advanced subjects.
- To Know Student the contents of Indian and western Logic and Epistemology
- To Understand student the Philosophy of Indian and western Ethics
- To Analyse Student the Knowledge of Human values and Professional Ethics
- To Apply the Student the Nature of Classical Indian Philosophy
- To Use the Student the Principles of Vedanta for Liberation and important of Gita for life
  and sri venkateswara studies.
- To prepare students to attract and develop applied ethics

Program Outcomes (POS)

- The Student has known the contents of Logic and Epistemology of Indian
  and western Philosophy.
- The Student Understood the Ethics of western and Indian Philosophy
- The Student should acquired the knowledge of Ethics and values and it's important to life
- The Student has known the nature of classical Indian Philosophy.

- The student has utilized the principles of Vedanta to get Mukti or liberation
- The Student has explained the issues of Existentialism and Phenomenology

Semester - I

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1.	101	Core Mandatory	Classical Indian Philosophy	6	4	20	80	100
2.	102	Core Mandatory	Epistemology Indian	6	4	20	80	100
3.	103	Core Mandatory	Logic Indian and Western	6	4	20	80	100
4.	104	Core Mandatory	Western Philosophy-Greek and Medieval	6	4	20	80	100
5	105-A	Compulsory Foundation Opt - I	Problems in Metaphysics	6	4	20	80	100
	105-B		Epistemology Western	6	4	20	80	100
	105-C		Philosophy of Human Rights	6	4	20	80	100
6.	106-A	Elective Foundation Opt - I	Introduction to Philosophy	6	4	20	80	100
	106-B		Philosophy of Mind	6	4	20	80	100
Total				**36**	**24**	**120**	**480**	**600**
7	107	Audit Course	HVPE - I	0	0	100	0	0

***** All CORE papers are Mandatory

* Compulsory Foundation – choose one paper

* Elective Foundation - Choose one paper

* Audit course- 100 Marks (Internal) –Zero Credits under Self Study

* Interested Students may register for MOOC with the approval of the concerned DDC But it will be considered for the award of the grade as open elective only giving extra Credits

Semester - II

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1.	201	Core Mandatory	Modern Indian Thought	6	4	20	80	100
2.	202	Core Mandatory	Ethics-Indian	6	4	20	80	100
3.	203	Core Mandatory	Ethics – Western	6	4	20	80	100
4.	204	Core Mandatory	Modern Western Philosophy	6	4	20	80	100
5	205-A	Compulsory Foundation Opt - I	Philosophy of Education	6	4	20	80	100
	205-B		Philosophy of Kant	6	4	20	80	100
	205-C		Nyaya Sutras	6	4	20	80	100
6.	206-A	Elective Foundation Opt - I	Indian Axiology	6	4	20	80	100
	206-B		Eco-Philosophy	6	4	20	80	100
Total				**36**	**24**	**120**	**480**	**600**
7	207	Audit Course	HVPE- II	0	0	100	0	0

***All CORE papers are Mandatory**

*** Compulsory Foundation – choose one paper**

*** Elective Foundation - Choose one paper**

*** Audit course- 100 Marks (Internal) –Zero Credits under Self Study**

*** Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**

Semester - III

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1.	301	Core Mandatory	Social and Political Philosophy	6	4	20	80	100
2.	302		Philosophy of Vedanta	6	4	20	80	100
3.	303-A	Generic Elective Opt - 2	Philosophical Approach to Gandhi	6	4	20	80	100
	303-B		Philosophy of B.R.Ambedkar	6	4	20	80	100
	303-C		Philosophy of Religion	6	4	20	80	100
	303-D		Samkhya-Yoga	6	4	20	80	100
4.	304	Skill Oriented Course Mandatory	Skills Development of Yoga and Tantra	6	4	20	80	100
5	305-A	Open Elective Opt - I	Philosophy of Value Education	6	4	20	80	100
	305-B		Sri Venkateswara Studies	6	4	20	80	100
	Total			**36**	**2**	**120**	**480**	**600**

***All CORE papers are Mandatory**

*** Genereric elective – choose two papers**

*** Skill oriented Course is mandatory**

*** Open Electives are for the Students of other Departments. Minimum one paper should Be opted. Extra Credits may be earned by**

opted for more number of open electives depending on the interest of the student through Self-Study

*** Interested Students may register for MOOC with the approval of the concerned DDC.**

Semester - IV

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1.	401	Core Mandatory	Phenomenology and Existentialism	6	4	20	80	100
2.	402		Comparative Religion	6	4	20	80	100
3.	403-A	Generic Elective Opt - 2	Philosophy of Jiddu Krishnamurti	6	4	20	80	100
	403-B		Analytical Philosophy	6	4	20	80	100
	403-C		Sri Vaishnavism	6	4	20	80	100
	403-D		Research Methodology and Computer Applications	6	4	20	80	100
4.	404	Multidisciplinary Course	Philosophy	6	4	20	80	100

		Mandatory	of Peace					
5	405-A	Open Elective Opt - I	Philosophy of Yoga	6	4	20	80	100
	405-B		Japanese Philosophy	6	4	20	80	100
	Total			**36**	**2**	**120**	**480**	**600**

*** All CORE papers are Mandatory**

*** Generic elective – choose two papers**

*** Multidisciplinary Course is mandatory**

*** Open Electives are for the Students of other Departments. Minimum one paper should be opted. Extra Credits may be earned by**

opted for more number of open electives depending on the interest of the student through Self-Study

*** Interested Students may register for MOOC with the approval of the concerned DDC**

SRI VENKATESWARA UNIVERSITY

M.A. DEGREE COURSE SYLLABUS IN PHILOSOPHY

NEP AND CBCS PATTERN SYLLABUS

(With effect from the academic year 2021-2022)

CORE-1: CODE-101: CLASSICAL INDIAN PHILOSOPHY

Objectives

1. **To apply Student the knowledge of the classical Indian Philosophy**
2. **To analyze the student the principles of classical Indian Philosophy**

UNIT – I INTRODUCTION

(a) Vedas - Concepts of Sat, Pursusa and Yajna

(b) Upanisads - Atman and Brahman

(c) Sriyas and Preyas

(d) Theories of Causation

UNIT – II HETERODOX SYSTEMS

(a) Caravaka - Epistemology and Materialism

(b) Buddhism - Nairatmya, Ksanika and Pratitysamatpada

(c) Jainism - Jiva, Ajiva, Anekantavada, Syadvada and Nayavada

(d) Buddhism - Suffering

UNIT – III NYAYA -VAISESIKA

(a) Nyaya Concepts of Prama and Aprama

(b) Pramanas

(c) Nyaya Concept of God and Arguments for the Existence of God

(d) Vaisesika Concept of Padarthas and Theory of Causation

UNIT – IV SAMKHYA-YOGA

(a) Purusa and Prakrti

(b) Satkaryavada

(c) Citta and Citta -vrttis

(d) Eight-fold Path

UNIT – V MIMAMSA & VEDANTA

(a) Pura-Mimamsa Concepts –Veda, Self, Dharma, Adharma and Apurva

(b) Advaita - Nirguna Brahman

(c) Visistadvaita-God

(d) Dvaita- Concept of Difference

Reference books

1. Datta & Chatterjee : Introduction to Indian Philosophy
2. C. D. Sharma Critical Survey of Indian Philosophy
3. S. Radhakrishnan : Indian Philosophy
4. S. N. Das Gupta : History of Indian Philosophy
5. M. Hiriyanna : Outlines of Indian Philosophy
6. M. Hiriyanna : Essentials of Indian Philosoph

Course outcomes:

1. The Student has applied the knowledge of classical Indian Philosophy.
2. The Student has analyzed the principles of classical Indian Philosophy

CORE-2: CODE -102: EPISTEMOLOGY – INDIAN

Objectives

1. **To Know Student the contents of Epistemology Indian**
2. **To understand the student the Pramanas of Indian Philosophy**

UNIT – I INTRODUCTION

(a) Definition of Epistemology
(b) Definition and Nature of Cognition
(c) Division of Cognition - Valid (Prama) and Invalid (Aprama)
(d) Memory (Smrti)

UNIT – II ELEMENTS OF KNOWLEDGE

(a) Instruments of Cognition
(b) Kinds of Aprama: Doubt (Samsaya), Error (Viparyaya)
(c) Hypothetical Argument (Tarka)
(d) Validity of Knowledge – Svatah and Paratah Pramanya Vada

UNIT – III STUDY OF PRAMANAS

(a) Perception (Pratyaksa)
(b) Inference (Anumana)
(c) Comparison (Upamana)
(d) Verbal Testimony (Sabda)

UNIT – IV STUDY OF PRAMANAS

(a) Word-Meaning and its Relation – Indian Point of View
(b) Non-existence (Abhava)
(c) Presumption (Arthapatti)
(d) Non-cognition (Anupalabdhi)

UNIT – V THEORIES OF INVALID PERCEPTUAL COGNITION (KHYATIVADAS)

(a) Akhyati, Viparitakhyati
(b) Anyatakhyati
(c) Satkhyati, Asatkhyati and Atmakhyati
(d) Anirvacaniyakhyati

Reference books

1. Debarata Sen : The Concept of Knowledge
2. Swami Satprakasananda : Methods of Knowledge
3. D. M. Datta : The Six Ways of Knowing
4. Govardhan P. Bhatt : Epistemology of the Bhatta School of Purva
5. S.C. Chatterjee : Nyaya Theory of Knowledge

Course outcomes:

1. The Student has known the Indian Epistemology
2. The Student has understood the Pramanas in Indian Philosophy

CORE-3: CODE -103: LOGIC - INDIAN AND WESTERN

Objectives

1. To Know Student the aspects of Logic Indian Philosophy
2. To understand the student the contents of Western Logic

UNIT – I INTRODUCTION TO INDIAN LOGIC

(a) Nature of Logic

(b) The Relationship of logic to Epistemology and Metaphysics

(c) Prama and Brahma

(d) Prameya, Pramiti and Pramana

UNIT – II ANUMANA AND INDUCTIVE ELEMENTS

(a) Definition, Constituents and Vyapti of Anumana

(b) Types of Anumana

(c) Concepts of Vyaptigrahopaya

(d) Hetvabhasas

UNIT – III INTRODUCTION TO WESTERN LOGIC

(a) Nature, Scope and Uses of Logic

(b) Proposition and Sentence

(c) Classification of Propositions: Traditional and Modern

(d) Distribution of Terms and Euler Circles

UNIT – IV SYLLOGISM

(a) Immediate and Mediate Inference

(b) Kinds of Syllogism

(c) Rules, Figures and Moods of Syllogism

(d) Relation between Deduction and Induction

UNIT – V INTRODUCTION TO SYMBOLIC LOGIC

(a) The difference between Symbolic Logic and Classical Logic

(b) The Use of Symbols and Logical Forms

(c) Basic Tools of Propositional Calculus: Variables, Constants and Grouping Symbols

(d) Construction of Truth-Tables

Reference books

1.	Annambhatta	:	Tarkasangraha
2.	Datta, D.M.	:	The Six Ways of Knowing
3.	Satischandra Chatterjee	:	The Nyaya Theory of Knowledge
4.	Barlingay, S.S.	:	A Modern Introduction to Indian Logic

5.	Guha, D.C.	:	Navya Nyaya System of Logic
6.	Nandita Bandopadyay	:	The Concept of Logical Fallacies
7.	F.Ter. Stcherbatsky	:	Buddhist Logic Vol. I & II
8.	D. M. Datta and S. C. Chatterjee	:	Introduction to Indian Philosophy
9.	L.S. Stebbing	:A Modern Introduction to Logic	
10.	Ernest Nagel, Mr.Cohen	:	An introduction to logic and Scientific Method
11.	Harold R. Smart	:	An Introduction to Logic
12.	Irving M. Copi	:	Symbolic logic
13.	A.H. Bassan and D.J.O. Conner	:	Introduction to Symbolic Logic
14.	P. Balasubramaniam	:An Invitation to Symbolic Logic	

Course outcomes:

3. The Student has known the aspects of Indian Logic.
4. The Student has understood the Contents of western Logic.

CORE- 4: CODE- 104: WESTERN PHILOSOPHY : GREEK AND MEDIEVAL

Objectives

1. **To know the Student the aspects of Western philosophy**
2. **To Understand the student Principles of Greeck and Medieval Philosophy**

UNIT – I PRE-SOCRATIC PHILOSOPHY, SOCRATES

(a) Problem of Substance and Change in Pre-Socratic Philosophy – Heraclitus and Parmenides
(b) Age of Sophists
(c) Socrates- Problem and Method
(d) Ethics of Socrates

UNIT – II PLATO

(a) Theory of Ideas
(b) Theory of Knowledge
(c) Soul
(d) Proofs for Immortality of Soul

UNIT – III ARISTOTLE

(a) Categories
(b) Criticism of Plato's Theory of Ideas
(c) Theory of Causation
(d) God

UNIT – IV St. AUGUSTINE

(a) Theory of Knowledge
(b) Theology
(c) The Problem of Evil
(d) Freedom of the Will

UNIT – V St. ANSELM OF CANTERBURY, St. THOMAS AQUINAS

(a) Ontological Argument (St. Anselm of Canterbury)
(b) Philosophy of Theology (St. Thomas Aquinas)

(c) Theory of Knowledge-(St. Thomas Aquinas)

(d) Metaphysics and Ethics (St. Thomas Aquinas)

Reference books

1. E. Zeller : Outlines of the History of Greek Philosophy
2. John Burnet : History of Greek Philosophy
3. R.B. Appleton : The Elements of Greek Philosophy from Thales to Aristotle
4. Plato : The Republic
5. A.E. Tylor : Plato: The Man and his Work
6. F. Coplestar : A History of Philosophy Vols. 1 & 2
7. W.T. Stace : History of Greek Philosophy

Course outcomes:

1. The Student has known the important issues of Western Philosophy
2. The Student has understood the Principles of greeck and medieval Philosophy.

COMPULSORY FOUNDATION

CODE- 105-A : PROBLEMS IN METAPHYSICS

Objectives

1. **To know the Student the Problems of Metaphysics**
2. **To Understand the student the principles of Metaphysics**

UNIT – I

Sat as eternal reality-Vedanta and Samkhya, Sat as both eternal and non-eternal : Jainism,Sat as non-eternal, momentary : Buddhism,

Vaisesika View on the nature and classification of Padarthas.

The status of universals in general and that of existence in particular in the above perspectives would also be discussed.

UNIT – II

Atman, Mind and Person Perspectives of the following systems.

Nyaya Vaisesika- Samkhya, Yoga - Advaita – Vedanta ,Buddhism- Carvaka

The relevance of the above conceptions in the respective systems to the problem of bondage, rebirth and emancipation should be discussed.

UNIT – III

Advaita Vedanta view of Physical World as Vyavaharika Sat :.

Samkhya – view of World as the manifestation/evolution of Prakrti

Ramanuja's view of World as an aspect of God :

The Nyaya-Vaisesika view of World as a product of atoms and as produced by God

UNIT – IV

The Vaisesika definition and classification of cause

Satkaryavada of Samkhya.

Asatkaryavada and Arambhavada of Vaisesikas.

UNIT – V

Pratityasamutpada : The Buddhist doctrine.

The Advaita Vedanta doctrines of Vivartavada, Abhasavada, Pratibimbavada, Avacchedavada.

Reference books

Dasgupta, S.N., History of Indian Philosophy , Cambridge University Press, London, 1940

(Relevant volumes and chapters) Hirianna, M; Outlines of Indian Philosophy, George Allen and Unwin, London 1918.

Mohanty J.N. : Reason and Tradition in Indian Thought, Clearendon Press, Oxford 1992.

(Relevant sections only) Athalye V.Y. and Bodas M.R. (Trans and Ed.) Tarka Samgraha of Annambhatta (Relevant Sections) BORI, Pune 1963.

Dravid, R.R. : The Problem of Universals in Indian Philosophy, Motilal Banaridass, Delhi, 1972.

Murti, T.R.V. : The Central Philosophy of Buddhism, George Allen and Unwin, London 1955.

JJC Ninian Smart : Doctrine and Arguments in Indian Philosophy, George Allen and Unwin, London, 1964

Course outcomes:

1. The Student has known the Problems of Metaphysics
2. The Student has understood the Principles of Metaphysics

COMPULSORY FOUNDATION

CODE-105 – B: EPISTEMOLOGY-WESTERN

Unit - I THE NATURE AND SCOPE OF EPISTEMOLOGY

(a) The Definition of Epistemology

(b) The Possibility of Knowledge

(c) Knowledge and Skepticism

(d) The Relation of Epistemology with Metaphysics and logic

Unit - II DIFFERENT SCHOOLS OF REALISM ND IDEALISM

(a) Neo-Realism

(b) Critical Realism

(c) Subjective idealism

(d) Objective Idealism

Unit – III KANTIAN EPISTEMOLOGY

(a) Apriority Knowledge

(b) Analytic and Synthetic

(c) Necessary and Contigent

(d) Synthetic Apriority

Unit – IV CONTEMPORARY THEORIES REGARDING JUSTIFICATION

(a) Foundationalism

(b) Coherentism

(c) Casual Theory

(d) Reliabilism

Unit - V: THEORIES OF TRUTH AND ERROR

(a) Correspondence Theory

(b) Coherence Theory

(c) Pragmatism

(d) Semantic Theory

Reference books

1. K. Lehrer : Knowledge
2. A.j.Ayer : The Problem of knowledge
3. N. Reseher : Coherence theory of Truth
4. J.L.Pollock : Knowledge and Justification

5. N. Malcolm. : Knowledge and certainity
6. Wittagenstein : On Certainty
7. Kant Immanuel : Critique of Pure Reason
8. Kant Immanuel : Critique of Practical Reason
9. Kant Immanuel : Critique of Judgment

CODE-105-C : PHILOSOPHY OF HUMAN RIGHTS

Unit – I Philosophical Foundations of Human Rights

Human Dignity and the basis of Human Rights, Nature of Human Rights, Sources of Human Rights, Categories of Human Rights, International Human Rights Law, Humanitarian Law & International Humanitarian Law

Unit–II Human Rights in India

Historical, Social, Political Perspectives of Human Rights in India, Fundamental Rights and Indian Constitution, Education and Human Rights, Human Rights Institutions in India.

Unit-III Modern Human Rights Discourses Minority Rights, Women's Rights, Children's Rights, Prisoner's Rights, Refugees' Rights, Intellectual Property ,

Rights, Media and Human Rights, Environmental Rights, Globalization

Life and Human Rights

Unit -IV New Paradigms of Human Rights Philosophy Contemporary Democratic Theories and Human Rights, Philosophical Critique of Human Rights Discourse, Philosophy of Cultural Dialogue: Multicultural and Intercultural Perspectives and the Future of Human Rights.

Unit- V Human Rights: Visual Culture, Literature and Social Freedom Cinema, Internet/Social Media, Print Media, Television-Radio, Art and Literature.

Referencebooks

1. Finnis, John (1980) Natural Law and Natural Rights, Oxford, Clarendon Press
2. Gaetc, Rolando (1993), Human Rights and the limits of Critical Reason, Aldershot, Dartmonth Publishing Company
3. Sumnev, L.W. (1987) The Moral Foundation of Rights, Oxford, Oxford University Press PG Syllabus - Revised Page 23
4. Davison, James Dale and Rees- Mogg (1997) The Sovereign Individual, Touchstone Books
5. Muzaffar, Chandra (1993) Human Rights and the New World Order, Pernang: Just World Trust
6. Peffer, R. J. (1990) Marxism, Morality and Social Justice, Princeton, Princeton University Press
7. Stone Julius (1965) Human Law and Human Justice, Sydney, Maitland
8. Tenson, Fernando, (1985) "International Human Rights and Cultural Relativism", 25, Virginia Journal of International law
9. Young, Avis Marion (1990) Justice and the Politics of Difference, Princeton, Princeton University Press.
10. Agnes, Flavia (1999) Law and Gender Inequality: The Politics of Women's Rights in India, Delhi, Oxford University Press.
12. Nirmal J. Chiramjivi, (2000) Human Rights in India, Delhi, Oxford University

Press.
13. Baxi, Upendra, (2002) The Future of Human Rights, Delhi Oxford University Press.
14. The Constitution of India .

ELECTIVE FOUNDATION

CODE:106-A: INTRODUCTION TO PHILOSOPHY

Unit – I Philosophy Meaning – Definition - Nature and scope – Problems of Relation to other Sciences – Branches

Unit – II Epistemology

Meaning – Sources of knowledge and pramanas - Divisions – Materialism, Idealism, Realism, Empiricism & Rationalism – Pragmatism – Existentialism- Post Modernism.

Unit – III Metaphysics

Meaning – Divisions – Philosophy of Self - Ontology, Cosmology, Theology, Teleology, Cosmogony & Eschatology

Unit – IV Axiology

Meaning – Types of Values – Intrinisic and Extrinsic values

Ethics : Purusharthas: Dharma, Artha, Kama and Moksha

Unit – V Other Branches

Logic, Aesthetics, Politics, Environmental Philosophy

Reference books:

1. Ghose M.N., The Essence of General Philosophy, Bharatiya Kala Prakashan, New Delhi, 2007.
2. Chakravarti Sibapada, An Introduction to General Philosophy, Kamala Book Depot, Calcutta, 1967.
3. Banerjee N.N. & Singh K., Western Philosophy, Prakashan Kendra, Lucknow, 198
4. Kulpe Oswald, Introduction to Philosophy, Bharatiya Kala Prakashan, New Delhi, 2007.
5. Paulsen Friedrich, Introduction to Philosophy, Anmol Publications Pvt. Ltd., New Delhi, 1999.
6. Amaladass Anand, Introduction to Philosophy, Satyam Nilayam . Publications, Chennai, 2001.
7. Randal J.H & Buchler Justus JR., Philosophy An Introduction, Barnes & Noble, Inc., New York, 195

CODE – 106-B: PHILOSOPHY OF MIND

UNIT – 1

Philosophy of Mind: Philosophy and Philosophy of Mind, Nature, Scope, Consciousness: The third person account, the first person account.

UNIT – 1I

Theories concerning consciousness and the body – Parallelism, Epiphenomenalism, Interactionism. Behaviorism: Methodological and Philosophical behaviorism, explanatory, Philosophical behaviorism, explanatory inadequacy, cognitivism in Philosophy.

UNIT – III

Materialism: Mind-Brain identity theory, Problem of materialism, the problem Of Phenomental consciousness.

Gilbert Ryles' conception of 'Knowing How' and 'Knowing That' (2nd chapter from Gilbert Ryle's Concept of Mind')

UNIT – IV

Psychoanalysis: The Unconscious, psychic determinism, Id, ego, and superego as part of the psyche.

UNIT – V

Theories of Actions: Mental events as a causes of actions, the theory of agency, a per Formative theory

1) Jerome A. Shaffer: Philosophy of Mind, Prentice-Hall of India Pvt. Ltd, New Delhi, 1988.
2) Sidney Hook(Ed): Dimension of Mind.
3) Hampshire, Stuart(Ed): Philosophy of Mind, New York, Harper and Row Publishers, 1966.
4) E. J. Lowe: An Introduction to the Philosophy of Mind.
5) David Armstrong: A materialist theory of mind.
6) Paul M. Charchland: Matter and Consciousness: A Contemporary Introduction to Philosophy of Mind.
7) Jerome A. Shaffer: Philosophy of Mind.
8) Gilbert Ryle: Concept of Mind.
9) Robert S. Woodworth: Contemporary Schools of Psychology, London, Methuen & co. Ltd., eight editions, 1951.

AUDIT COURSE

C0DE -107: HUMAN VALUES AND PROFESSIONAL ETHICS – I

UNIT – 1 Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions

.

UNIT – II Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral, concepts- right, ought, duty, obligation, justice responsibility and freedom, Good behavior and respect for elders.

UNIT– III Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).

UNIT - IV Bhagavad Gita- (a) Niskama karma.(b) Buddhism- The Four Noble Truths – Arya astanga marga (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious, Tolerance, Gandhian Ethics.

UNIT- V Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study:

1. R. Subramanian, Professional Ethics, Oxford University press,New Delhi,2013.
2. John S Mackenjie: A manual of ethics.
3. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
4. “Management Ethics - integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
5. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
6. Harold H. Titus: Ethics for Today
7. Maitra, S.K: Hindu Ethics
8. William Lilly : Introduction to Ethics
9. Sinha: A Manual of Ethics
10. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
11. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
12. Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
13. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
14. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 199

SEMESTER – II

CORE-1: CODE – 201- A: MODERN INDIAN THOUGHT

UNIT – I INTRODUCTION AND SWAMI VIVEKANANDA

(a) Characteristics of Modern Indian Philosophy
(b) Swami Vivekananda's Conception of Religion and its Nature
(c) Religion as a Necessary Aspect of Life
(d) Nature of Universal Religion

UNIT – II RABINDRANATH TAGORE

(a) Nature of Man - Self as Finite-Infinite
(b) Way of Realization
(c) Realization of Beauty (Aesthetic Mysticism)
(d) Tagore's Humanism

UNIT – III MAHATMA GANDHI

(a) Sarvadharma Samabhava
(b) Ends and Means
(c) Trusteeship
(d) Ideal of Sarvodaya

UNIT – IV SRI AUROBINDO AND K.C. BHATTACHARYA

(a) Concept of Evolution (Aurobindo)
(b) Integral Yoga (Aurobindo)
(c) Concept of Philosophy (K.C. Bhattacharya)
(d) Subject as Freedom (K.C. Bhattacharya)

UNI – V M.N. ROY, Dr. S. RADHAKRISHNAN, J. KRISHNAMURTI AND OSHO

(a) Radical Humanism (M.N. Roy)
(b) Concepts of Peace and Intellect (Dr. S.Radhakrishnan)
(c) Human Destiny and Intuition (Dr. S. Radhakrishnan)
(d) Freedom and Bondage (J. KrishnaMurti)
(e) Meditation and Love (Osho)

Reference books

1.Basant Kumar Lal :Contemporary Indian Philosophy Collected Works of Swami Vivekananda

2.R.K. Prabhu & U.R. Rao :The Mind of Mahatma Gandhi

3.T.M.P. Mahadevan & Saroja : Contemporary Indian Philosophy

4.V.S. Naravane Modern Indian Thought

5.R.S. Srivastava :Contemporary Indian Philosophy

6. Osho : Meditation and Love

CORE-2 : CODE - 202: ETHICS – INDIAN

Objectives

1. **To know the Student the Ethics in Indian Philosophy**
2. **To Understand the student the various ethical Values in Indian Ethics.**

UNIT – I INTRODUCTION

(a) Meaning, Nature and Scope of Ethics
(b) Nature of Indian Ethics
(c) Concept of rta
(d) Concept of rna

UNIT – II DHARMA

(a) Nature of Dharma
(b) Sadharana Dharma
(c) Varnasrama Dharma
(d) Purpose of Dharma

UNIT – III SCRIPTURES, JAINISM, BUDDHISM AND YOGA

(a) Purusharthas (Scriptures)
(b) Triratnas (Jainism)
(c) Four Noble Truths (Buddhism)
(d) Eight-fold Means (Yoga)

UNIT – IV BHAGAVADGEETA

(a) Law of Karma
(b) Nishkama Karma
(c) Sthithaprajna
(d) Lokasamgraha

UNIT – V VIDURA, KAUTILYA, GANDHI AND NEHRU

(a) Viduraniti
(b) Rajaniti (Kautilya)
(c) Means and Ends (Gandhi)
(d) Panchasila (Nehru)

Reference books

1.	R.N. Vyas	:	Ethical Philosophy of Nuclear Age
2.	S.K. Maitra	:	The Ethics of the Hindus
3.	T.C. Sharma	:	Ethical Philosophies of India
4.	Saral Jhingran	:	Aspects of Hindu Morality
5.	M. Hiriyanna	:	The Indian Conception of Values
6.	P.H. Prabhu	:	The Quest After Perfection Hindu Social Organisation
7.	Swami Ranganadhananda	:	Eternal Values for Changing Society

Course outcomes:

1. The Student has known the Ethics in Indian Philosophy
2. The Student has understood the various Ethical Principles in Indian Ethics.

CORE-3 CODE - 203: ETHICS – WESTERN

Objectives

1. **To know the Student the Ethics in Western Philosophy**
2. **To Understand the student the Ethical theories in western Philosophy.**

UNIT – I INTRODUCTION

(a) Kantian Ethics
(b) Moral Purism
(c) Deontological Ethics
(d) Good Will
(e) Duty for Duty's Sake

UNIT – II UTILITARIANISM (J. Bentham and J.S. Mills)

(a) Hedonism
(b) Teleological Ethics
(c) Utilitarian Calculus
(d) The Greatest Good of the Greatest Number

UNIT – III EMOTIVE THEORY OF ETHICS (A.J. Ayer and C.L. Stevenson)

(a) Normative Ethics and Meta Ethics
(b) Fact and Value – Ethical Cognitivism and Non-Cognitivisim
(c) Moral Terms and Expressions of Emotions
(d) Prescriptivism (R.M. Hare)

UNIT – IV EXISTENTIALIST ETHICS (Kierkegaard)

(a) Three Stages of Human Existence
(b) Subjectivity as Truth (Jean Paul Sartre)
(c) Freedom and Responsibility
(d) Bad Faith

UNIT – V META ETHICS

(a) Moral Skepticism – For and Against
(b) Kantianism – For and Against
(c) Utilitarianism – For and Against
(d) Virtue Ethics

Reference books

1. Mackenzie : A Manual of Ethics
2. Harold Titus : Ethics for Today

3.	Immanuel Kant	:	The Ground Work of the Metaphysics of Morals. Critique of Practical Reason
4.	J. Bentham	:	An Introduction to the Principles of Morals and Legislation
5.	J.S. Mill	:	Utilitarianism
6.	A.J. Ayer	:	Language, Truth and Logic
7.	C.L. Stevenson	:	Ethics and Language
8.	R.M. Hare	:	Essays in Ethical Theory the Language of Morals
9.	Roger Hanock	:	Twentieth Century
10.	W.D. Hudson	:	Modern Moral Philosophy
11.	Mary Warnock	:	Ethics since 1900 Existentialist Ethics
12.	J.P. Sartre	:	Existentialism and Humanism

Course outcomes:

1. The Student has known the Ethics in Western Philosophy
2. The Student has understood the Ethical theories of Western Philosophy

CORE-4 CODE-204: MODERN WESTERN PHILOSOPHY

Objectives

1. **To know the Student the problems of Modern Western Thought.**
2. **To Understand the student the thoughts of Modern Western Philosophers.**

UNIT – I DESCARTES

(a) Growth & Development of Modern Philosophy
(b) Renaissance & Modern Philosophy
(c) Method
(d) Body-Mind Problem -Interactionism

UNIT – II SPINOZA

(a) Substance
(b) Attributes and Modes
(c) Body-Mind Problem – Psycho-physical Parallelism
(d) Pantheism

UNIT – III LEIBNITZ

(a) Monads
(b) Doctrine of Pre-established Harmony
(c) Doctrine of Immaterialism
(d) Refutation of Abstract Ideas

UNIT – IV LOCKE, BERKELEY & HUME

(a) Representative Theory of Perception, Concept of Matter (Locke)
(b) Refutation of Innate Ideas, Basic Tenets of Empiricism (Locke)
(c) To Be is to Be Perceived (Berkeley)
(d) Theory of Knowledge, Causality (Hume)

UNIT – V KANT & HEGEL

(a) Transcendental Method, A priori and A posteriori (Kant)
(b) Synthetic and Analytical Judgments (Kant)
(c) Dialectical Method (Hegel)

(d) Absolute Idealism(Hegel)

Reference books

1.	Fuller B.A.G.	:	A History of Philosophy
2.	Joad C.E.M	:	Introduction to Modern Philosophy
3.	John W.T.	:	A History of Western Philosophy
4.	Russell Bertrand	:	A History of Western Philosophy
5.	Frank Thilly	:	History of Western Philosophy
6.	Yakub Masih	:	History of Modern Philosophy

Course outcomes:

1. The Student has known the Problems of Modern Western Philosophy
2. The Student has understood the thoughts of Modern Western Philosophers.

COMPULSORY FOUNDATION

CODE-205-A : PHILOSOPHY OF EDUCATION

Objectives

1. **To know the Student the Contents of Philosophy of Education.**
2. **To Understand the student the Educational aspects of Philosophy of Education.**

UNIT – I INTRODUCTION

(a) Meaning and Function of Education
(b) Education and Philosophy
(c) Meaning and Nature of Philosophy of Education
(d) Functions of Philosophy of Education

UNIT – II AIMS, CURRICULUM & METHOD OF TEACHING

(a) In Vedic Education
(b) In Epic Education
(c) In Buddhist Education
(d) In Muslim Education

UNIT – III PLACE OF TEACHER

(a) In Ancient India
(b) In Modern India
(c) In Tagorean Education
(d) In Gandhian Education

UNIT – IV SCHOOLS OF EDUCATION

(a) Naturalism
(b) Idealism
(c) Realism
(d) Pragmatism

UNIT – V VALUES AND EDUCATION

(a) Value Crisis and Peace Education

(b) Liberation and Education

(c) Education for Citizenship

(d) Education for Democracy

Reference books

1. Christopher J. Lucas :What is Philosophy of Education
2. Dr. Veda Mitra :Education in Ancient India
3. Radha Kumnd Kukeji :Ancient India Education
4. NCERT :Education in Values
5. Mansoor A. Quarishi :Some Aspects of Muslim Education
6. V.R. Taneja : Education – Thought and Practice

Course outcomes:

1. The Student has known the Contents of Philosophy of Education.
2. The Student has understood the Educational aspects of Philosophy of Education.

CODE -205 –B: PHILOSOPHY OF IMMANUEL KANT

UNIT – I

(a) Kant's project of critical philosophy,

(b) Kant's philosophical anthropology

(c) The statement and formation of the problem of knowledge.

UNIT - II

(a) Nature and classification of judgments – apriori, a posteriori, synthetic a priori.

(b) Space and time

(c) Categories of understanding

(d) Synthetic unity of apperception

UNIT - III

(a) Transcendental deduction

(b) Imagination,

(c) Schematism

(d) Phenomena and Naumena

UNIT - IV

(a) Rational knowledge of morality. Three postulates of morality

(b) Critique of judgment – Judgment as a faculty,

(c) Analytic of the beautiful and sublime, Concept of teleology

(d) "Religion within the bounds of reason alone"

Reference books

1. Pragmatic Anthropology (Relevant section)
2. The Critique of Pure Reason (Upto the Transcendental Logic – First Division).
3. The Critique of Practical Reason (Fundamental Principles of Morals.)
4. Critique of Judgment (Up to First Part, First Book.)
5. Religion within the bounds of reason alone
6. Kant I., The Critique of Pure Reason, (Tr.,) Smith N.K. Mac Millan, London, 1970.
7. Kant I., The Critique of Practical Reason, Tr. by Abbott T.K., Longmans, London, 1973.
8. Kant I., The Critique of Judgment (Tr.) Bernard J.H., Oxford, London, 1973.
9. Strawson P.F., The Bounds of sense, Methwen, London, 1966.
10. Bennett J., Kant's Analytic, Cambridge University Press, London, 1966.
11. Bennett J., Kant's Dialectic, Cambridge University Press, London, 1974.

12. Smith, Kemp N.A., A Commentary on Kant's Critique of Pune reason, Mac Millan, London, 1929. Cassirer E., Kant's First Critique, Allen and Unwin, London, 1954.
13. .Bird, G., Kant's Theory of Knowledge, D. Reidel Dordrecht, 1974.
Wolf K..P., (ed) Kant : Critical Studies, Mac Millan, London, 1968

CODE – 205-C : NYAYA SUTRAS

UNIT-1

The importance of the Nyaya Sutra in the history of Indian Philosophy.

16 categories and their nature.

Nyaya conception of pain (Dukkha) and its removal.

UNIT- II

The four pramanas - Pratyaksha. Anumana. Upamana and Sabda.

The Five membered syllogism of Nyaya.

Nyaya theory of discussion. (vada).

UNIT-III

The five fallacies (Hetvabhasa).

Examination of the view that Pratyaksha is only Anumana.

UNIT- IV

Nyaya theory of whole (avayavin) as a distinct entity of over and above its parts (avayavas).

Examination of the view that Anumana is not a right means of knowledge.

UNIT-V

Examination of the view that Sabda is only Anumana.

Relation between word and its meaning.

Examination of the view that a name stands for individual (vyakti). Form (Akrti) and universal (Jati).

TEXTS:-

1. The Nyaya –Sutra of Goutama: Tr. By MM.Satish Chandra Vidyabushan Revised and Ed. Nandalal Sinha Motilal Banarsidas, New Delhi.
2. Sri K.P. bahadur: The wisdom of Nyaya Books I & Ii sterling publishers private Limted, New Delhi.

Books for grneral study:-

3. Radhakrishan : Indian philosophy Vol.II (Chapter – II Logical realism of Nyaya only) Mac Millan & Company, London.
4. Datta and Chatterjee :An Introduction to Indian Philosophy chapter on Nyaya. University, Calcutta.

ELECTIVE FOUNDATION

CODE-206-A: INDIAN AXIOLOGY

Unit - I

1. The Influence of Islam on Indian Culture
2. The Western Impact on Indian Culture - Awakening

Unit - II

3. Raja Rammohan Roy - Brahma Samaj
4. Swami Dayananda Saraswati - Arya Samaj

Unit - III

5. Sri Aurobindo: Interpretation of Indian Culture and Values
6. K.M. Panikkar: Misconceptions About Indian Culture and Values

Unit - V

7. The Natya Sastra of Bharata: Bharata Natyam, Kathakali, Odessi, Kathak, Manipuri and Kuchipudi
8. Indian Music: Tumbura, Karnatic Music, Tyagaraja and Hindustani Music

Unit - V

9. Indian Temples: South and North India
10. Holy Places of India; and Festivals of India

Books for Study

1. Sri Aurobindo, The Foundations of Indian Culture, (Chapter I only)
2. S. Radhakrishnan and others (ed.), The Cultural Heritage of India, Vol. I, Chapters I, III, X, XII, XIII and XXIII, Volume II, Chapters I, II, III, V and X
3. K.M. Panikkar, The Essential Features of Indian Culture, I & II
4. R. Srinivasan, The Facts of Indian Culture, Part II, Indian Classical Dance; Part I, Karnataka Music - An Analysis, Part I, Sri Tyagaraja - The Mystic

Books for Reference

1. Swami Vivekananda, Caste, Culture and Socialism
2. G.C. Pande, Foundations of Indian Culture, Vol. I and II
3. S. Radhakrishnan, The Hindu View of Life
4. K. Satchidananda Murty, The Indian Spirit
5. S.K. Ganguly and A.S. Ghose, Relevance of Our Cultural Heritage to Modern Ind

CODE -206 - B: ECO - PHILOSOPHY

UNIT - I

1. **Eco-cosmology as a new point of departure**
   (a) One cosmology or many cosmologies
   (b) The legacy of the mechanistic cosmology
   (c) The structure of eco-cosmology

UNIT - II

2. **Eco-philosophy vis-à-vis contemporary philosophy**
   (a) Background
   (b) The debacle of contemporary philosophy
   (c) The characteristics of eco-philosophy
   (d) Environmental Predicament

UNIT - III

Knowledge and values

(a) Background
(b) The eclipse of values
(c) Information, knowledge and wisdom
(d) Ecological Imbalance

UNIT - IV

Arrogant humanism to ecological humanism

(a) Background
(b) The scientific cosmology
(c) The three alternatives: Kant, Marx and Schweitzer
(d) Rabindranadh Tagore on Nature

UNIT - V

3. **The Ecological person**
   (a) The short-comings of the western philosophies of man
   (b) The ecological person
   (c) Life as a form of knowledge
   (d) Jiddu Krishnamurti on your are the world

Reference books

HenrykSkolimowski : *Living Philosophy: Eco-Philosophy as Tree of Life* (Hormondsworth: Arkana, 1992).

Jiddu Krishnamurti : You are the world, Krishnamurti Foundation,1986.

Jiddu Krishnamurti : Letters to the Schools, Krishnamurti Foundation,1982.

Rabindranadh Tagore : Gitanjali, Viswabharathi publishers, 1980

AUDIT COURSE

CODE -207 - HUMAN VALUES AND PROFESSIONAL ETHICS- II

Objectives

1. **To know the Student the essence Contents of Human Values.**
2. **To Understand Student the Principles of Professional Ethics.**

UNIT-1

Value Education- Definition - relevance to present day - Concept of Human Values - self introspection -Self esteem. Family values-Components, structure and responsibilities of family- Neutralization of anger – Adjustability Threats of family life -Status of women in family and society - Caring for needy and elderly Time allotment for sharing ideas and concerns.

UNIT-II

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical ractitioners. Code of ethics for medical and healthcare . Euthanasia, Ethical obligation to animals, Ethical issues in relation to health Care professionals professionals and patients. Social justice in health care, by human cloning, problems of abortion. Ethical issues in genetic engineering Ethical issues raised new biological technology or knowledge.

UNIT-IIi

Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions. Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

UNIT- IV

Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

UNIT- V

Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

Books for study:

1. R. Subramanian, Professional Ethics, Oxford University press,New Delhi,2013.

2. John S Mackenjie: A manual of ethics.
3. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
4. “Management Ethics-integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
5. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
6. Harold H. Titus: Ethics for Today
7. Maitra, S.K: Hindu Ethics
8. William Lilly : Introduction to Ethics
9. Sinha: A Manual of Ethics
10. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haug

Course outcomes:

1. The Student has known the essence contents of human values.
2. The Student has understood the Professional Ethics..

SEMESTER- III

CORE-I CODE - 301: SOCIAL AND POLITICAL PHILOSOPHY

Objectives

1. **To know the Student the contents of Social Philosophy.**
2. **To Understand the Student the Principles of Political Philosophy.**

UNIT – I

(a) Nature, Scope and Definition of Political Philosophy

(b) Classical and Modern Political Philosophy -Issues and Solutions

(c) Political Philosophy and History

(d) Political Philosophy and Ethics

UNIT – II

(a) Plato's Political Philosophy : The Question of Justice – Classification of Society – The Philosopher King

(b) St. Augustine's Theory of Society and Political Realism

(c) A Critical Study of Social Contract Theories of Hobbes, Locke and Rousseau

(d) Individualism–Mill and Spencer

UNIT – III

(a) Socialism – A Critical Estimate

(b) Marxism– Its Logic, Ethics, Politics and Philosophy of History

(c) Fascism–Development of Fascist Doctrine–Social and Political Philosophy of Fascism

(d) Concept of Rights – Origin and Evaluation of Natural Rights – Legal Rights – Liberty and Equality – Duties

UNIT – IV

(a) Problem of Justification of Punishment – Theories of Punishment–Foundations of Democracy–A Critical Analysis of Democratic Ideal

(b) Origin of Society and State: A Study of Social Contract Theories with special reference to Ancient Indian Texts

(c) Monarchy : Types of Monarchy as Classified in the Ancient Indian Texts – Qualifications of the King –Duties of the King

(d) Political Thoughts of Kautilya, Manu, Yajnavalkya, Gandhi, Nehru and Ambedkar

Reference books

1. M.K. Gandhi : Socialism of My Conception Ananda Hingorani (Ed.)
2. Leo Stranss : What is Political Philosophy?

3.	Whitakar T. Deininger	:	Problems in Social and Political Thought
4.	William Ehestein	:	Modern Political Thought
5.	Donald Eugene Smith	:	India as a Secular State
6.	Pool Peinberg	:	Social Philosophy
7.	Ved Prakash Luthera	:	The Concept of Secular State in India
8.	R.G. Gottell	:	History of Political Thought
9.	Sabine	:	History of Political Thought
10.	Marxey	:	Political Philosophies
11.	Sir Ernest Barker	:	Essays on Government
12.	John M. Spellman	:	Political Theory of Ancient India
13.	R.P. Kangle	:	The Kautilya Arthasastra Part-III – A Study
14.	Gloshal, U.N.	:	A History of Indian Political Ideas
15.	Ghanles Drekemier	:	Kingship and Community in Early India

Course outcomes:

1. The Student has known the contents of social Philosophy.
2. The Student has understood the Principles of Political Philosophy.

CORE-2 CODE – 302 : PHILOSOPHY OF VEDANTA

Objectives

1. **To know the Student the aspects of Philosophy of Vedanta.**
2. **To Understand the Student the Philosophical Doctrines of Vedanta.**

UNIT – I THE DOCTRINE OF GOD

(a) Historical Growth and Development of Vedanta
(b) Advaita Doctrine of Nirguna Brahman
(c) Visistadvaita Doctrine of Saguna Brahman
(d) Dvaita Doctrine of Saguna Brahman

UNIT – II DOCTRINE OF WORLD

(a) Sankara's Doctrine of Maya
(b) Ramanuja's Criticism of Maya
(c) Madhva's Criticism of Maya
(d) Brahma Vivartavada and Brahma Parinamavada

UNIT – III DOCTRINE OF SELF

(a) Advaita Doctrine of Atman
(b) Relation of Self and God in Visistadvaita
(c) Doctrine of Difference in Dvaita
(d) Interpretation of Mahavakyas

UNIT – IV DOCTRINE OF LIBERATION

(a) Nature of Liberation in Advaita, Visistadvaita and Dvaita
(b) Jivan-mukti
(c) Videha-mukti
(d) Krama-mukti

UNIT – V MEANS OF LIBERATION

(a) Karma Yoga
(b) Jnana Yoga
(c) Bhakti Yoga
(d) Saranagati

Reference books

1. T.M.P. Mahadevan :The Philosophy of Advaita
2. Govind Chandra Pande :Life and thought of Sankjaracarya
3 P.N. Srinivasa Chari :Philosophy of Visistadvaita
4. S.M. Srinivasa Chari :Advaita and Visistadavaita
5. B.N.K. Sarma :A History of Dvaita School of Vedanta and its literature, Vols. I & II
6. M.K.V. Iyer :Advaita Vedanta
7. V.N. Sheshagiri Rao :Vacaspati's Contribution to Advaita
8. T.P. Ramachandran :Dvaita Vedanta
9. G. Srinivasan :Essentials of Vedanta

Course outcomes:

1. The Student has known the Philosophy of Vedanta.
2. The Student has understood the Philosophical Doctrines of Vedanta…

GENERIC ELECTIVE

CODE -303 (A): PHILOSOPHICAL APPROACH TO GANDHI

Objectives

1. **To know the Student the contents of Philosophy of Gandhi.**
2. **To Understand the Student the Philosophical aspects of Gandhi**

UNIT – I THE INFLUENCE OF INDIAN TRADITION ON GANDHI

(a) His Family Background

(b) Hinduism

(c) Jainism

(d) Buddhism

UNIT – II INFLUENCE OF WESTERN THINKERS ON GANDHI

(a) Jesus Christ

(b) David Thoreau

(c) Leo-Tolstoy

(d) John Ruskin

UNIT – III THE METAPHYSICAL OUTLOOK IN GANDHI

(a) Self

(b) World

(c) Truth

(d) God

UNIT – IV THE ETHICAL PROBLEMS IN GANDHI

(a) Cardinal Virtues

(b) Means and Ends

(c) Satyagraha

(d) Sarvodaya

UNIT – V POST-GANDHIAN ERA

(a) Vinoba Bhave

(b) Jawaharlal Nehru

(c) Jayaprakash Narayan

(d) Shriman Narayan

Reference books

1. Gandhi, M.K., :Hindu Dharma

2. Gandhi, M.K., : An Auto Biography

3. Gandhi, M.K., :Hind Swaraj
4. Gandhi, M.K., :My Religion
5. Gandhi, M.K., :My Non-violence
6. Gandhi, M.K., :Satyagraha
7. Gandhi, M.K., :God is truth
8. Gandhi, M.K., :Sarvodaya
9. Thoreau David :Civil Disobedience
10. Ruskin, John :Unto This Last
11. Narayan, Jasyaprakash:Socialism, Sarvodaya and Democracy
12. Shriman Narayan :Vinoba-His Life and Work
13. Shriman Narayan :The Relevance of Gandhian Economics
14. Nehru, Jawaharlal :The Discovery of India
15. Nehru, Jawaharlal :Voice of Freedo

Course outcomes:

1. The Student has known the metaphysical issues of Gandhi.
2. The Student has understood the Gandhian Philosophy .

CODE -303 - B: PHILOSOPHY OF B.R. AMBEDKAR

Objectives

1. **To Analyze the Student the contents of Philosophy Ambedkar**
2. **To apply the Student the Philosophical aspects of Ambedkar**

UNIT - I

Ambedkar's analysis of caste system. The ways of abolishing caste. 30

Controversy between Ambedkar and Gandhi on Varna and Jati.

UNIT -II

Concept of Ideal Society. The notion of ideal social order in the context of Liberty, Equality and Fraternity.

Philosophy of religion; The idea of ideal religion; Religion, Dhamma and Morality.

UNIT -III

Critique of Hinduism.

Ambedkar's understanding of Buddhism- interpretation of four noble truth, ahimsÁ, role of Bhikkhu in the society

UNIT -IV

Concept of Democracy.

Concept of social justice.

Philosophical background of constitution of India.

UNIT - V

Gandhi Ambedkar controversy on i.) Varna and Jati. ii.) Special constituencies for reserve categories.

Karl Marx and Ambedkar.

Ambedkar and John Dewey.

Books for Study

1. Ambedkar, B.R., Annihilation of Caste, Bheem Patrika Publication, Jullundur , 1975.
2. Ambedkar B.R. The Buddha and his Dhamma, Siddharth Prakashan, Bombay 1974.
3. Ahir D.C., Dr. Ambedkar on Buddhism, Siddhharth Publication, Bombay 1982.
4. Gokhale, Pradeep (Ed.) The Philosophy of Dr. B.R. Ambdekar, Sugava Prakashan IPQ Publication, Pune 2008.
5. Jaffrelot, Christopher, Dr. Ambedkar and Untouchability : Analyzing and Fighting caste, Permanent Black, Delhi, 2005.
6. Dr. Babasahed Ambedkar Writings and Speeches , Education Deptt. Govt. Of Maharashtra Bombay, Vol. III, 1987.
7. Keer D.; Dr. Ambedkar-Life and Mission, Popular Prakashan, Bombay,1962.

Books for References

1. Dr. Babasahed Ambedkar Writings and Speeches, Education Department, Govt. of

Maharashtra, Bombay 1979-92 (Relevant sections only.) 31
2. Jondhale, Surendra and Beltz, Johanes (ed.) : Reconstructing the world : B.R. Ambedkar and Buddhism in India, Oxford University Press, New Delhi, 2004.
3. Kasbe, Raosaheb, Ambedkar Ani Marx, Sugava Prakashan, Pune, 1985. Omvedt, Gail: Buddhism in India: Challenging Brahmanism and Caste, Sage Publications, New Delhi, 2003.
4. Pawar Daya, Meshram Keshav and Others (ed.) Dr. Babasahed Ambedkar Gaurata Grantha, Maharashtra Rajya Sahitya Ani Samskriti Mandal, Mumbai

Course outcomes :

1. The Student has analyzed the Philosophy of Ambedkar..
2. The Student has applied the Philosophical aspects of Ambedkar.

CODE -303-C: PHILOSOPHY OF RELIGION

UNIT – I

Religion and Philosophy of Religion, Classification of religions, Religion as a social projection, Social and non-social dimensions of religious life, Universal and prophetic dimensions in religion. Inter-relationship between religious faith and reason.

UNIT – I I

Methods in scientific and religious inquiry – Pervasive and persuasive characteristics of paradigms, Objectivity and involvement – observer involvement in religion and science. Scientific and religious logic – Causes and meanings, Differing kinds of logic,

UNIT – III

Nature, Structure and dynamics of religious Experience. (mysticism) Freudian analysis of religious experience. Inter-relationship between religion and morality.Bhakti, Faith, Prayer, Worship, Miracle.

Incarnation: Avatarvada.Verification, falsification, and religion.

UNIT – IV

Arguments for the existence of God-- Teleological, Ontological, Cosmological. Problem of Evil. Inter religious dialogue.

UNIT – V

Concept of Divine Grace. Doctrine of Karma and fatalism. Marxian critique of religion.

Books for Reading

1) Hick John, Philosophy of Religion, Prentice Hall, 1963.
2) Cahn S.M. and Shatz David ed., Contemporary Philosophy of Religion, Oxford University Press.
3) Rolston Holmes III, Science and Religion A Critical Survey, Harcourt Brace Custom Publishers.1997
4) Freud S., Future of an Illusion, tr by W.D. Robson-Scott, Hoqarth Press Ltd. London, 1949 .

Books for Reference

1) Paul Edwards, Encyclopedia of Philosophy, Macmillan and Co, The Free Press, New York, 1967
2) James William, Varieties of Religious Experience :A Study in Human Nature, Longmans Green, London 1928

3) Hubert John Richards, The Philosophy of Religion, Heinemann Publication 1998
4) Wainwright William ed., The Oxford handbook of Philosophy of Religion, Oxford University Press.
5) Matilal, B. K., Logical and Ethical Issues in Religious Belief, Oxford University Press PH 109 : Samkhya

CODE - 303-D : SAMKHYA YOGA

Unit - I INTRODUCTION

(a) Historical background of Samkhya

(b) Historical background of Yoga

(c). Definition and Meaning of Samkhya

(d) Definition and Meaning of Yoga

Unit - II METAPHYSICS

(a) Prakrti

(b) Purusa

(c) Gunas

(d) Satkarya

Unit – III COSMOLOGY AND COSMIC ATTAINMENTS

(a) Relation between Purusa and Prakrti

(b) Evolution of prakrti

(c) Eight Siddhis

(d) Five forms of Error

Unit – IV PSYCHOLOGY AND ETHICS

(a)Citta-Vrttis

(b) Citta-klesas and Citta-Bhumis

(c) Astangamarga

(d) Two kinds of Samadhi

Unit - V: SAMKHYA AND YOGA

(a) Nirisvavarada

(b) Sesvaravada

(c) The close link between Samkhya and Yoga

(d) The need of yoga and the Modern Man

Reference books

1. Sri Aurobindo Ghose : The Synthesis of yoga
2. Dvivedi, M.N.(Tr) : Patanjali's Yoga -Sutra
3. Larson,G.J,& B.Acharya : Samkhya (Encyclopedia of Indian Philosophy vol.IV)
4. Sen Gupta, Anima : Classical Samkhya: A critical Study
5. Suryanarayana sastri,S.S. : THE Samkhya karik of Isvara krsna
6. Pulinblihari : Origin and Development of Samkhya system of Thought

SKILL ORIENTED COURSE

CODE - 304 : SKILLS DEVELOPMENT OF YOGA AND TANTRA

Unit - I

(a) Jnana Yoga

(b) karma yoga

(c). Bhakti yoga

(d) Kundali yoga

Unit - II

(a) Yamas

(b) Niyamas

(c) Skill of Asanas

(d) Skill of pranayamas

Unit – III

(a) Skill of Pratyahara

(b) Skill of Concentration

(c) Skill of Dhayana

(d) Skill of Samadhi

Unit – IV

(a) Skill of Mudras

(b) skill of Bhandas

(c) Skill of kriyas

(d) Skill of Tantra Moksa

Unit - V:

(a) Vijnana Bhairava Tantra

(b) Skills of Breath watching Meditation

(c) Skills of Body and Mind watching Meditation

(d) Skills of Vijnana Bhairava Tantra Meditations

Reference books

1. B.K.S Ayangar :Light on yoga

2 Bhairava :Tantra

3 Osho :Vijnana Bhairava Tantra

4 Osho : The Book of Secrets

5 Patanjali : Yoga Sutras

6 Sri Krishna : Bhagavit Gita

7 Vethtri Maharishi Simplified :Kundalini Yoga.

OPEN ELECTIVE

CODE – 305-A: PHILOSOPHY OF VALUE EDUCATION

Objectives

1. **To know the Student the contents of Philosophy of Value Education.**
2. **To Understand the Student the Philosophical aspects of Value Education**

UNIT – 1

The concept of 'education' and 'value',
values as the foundation of the very process of education,
dangers of weakening or delinking the connection
between education and values.

UNIT – 2

Concept of Virtue – definition, types and role of virtue in human life, Concept Of True Education: true education as constituting the development of caring for others as the foundation of social virtue. individual as well as special virtues, the pursuit of excellence as the foundation of individual virtues

UNIT – 3

The universality of concept of good life
Analysis of how any form of proper education leads
to the development of a proper conception of good life.

UNIT – 4

The notion of good life among ancient Greeks,
the close connection in the between the concept of
good life and the concept of virtue, The notion of
good life classical India, the close connection between
the concept of good life and the concept of virtue.

UNIT – 5

The pursuit of excellence and caring for others as the constituent
element of a good life, education as the means to achieve good life,
The hierarchy of values as found in the scheme of Purusharthas.

Reference books:

1) . Ralf B. Perry: General Theory of Value.
2). Risieri Frondizi: What is Value?
3). M. Hiriyanna: The Indian Conception Value.
4). C. Seshadri (ed.): Education in Values: A source book.Books:
5). Ralf B. Perry: General Theory of Value.
6). Risieri Frondizi: What is Value?

7). M. Hiriyanna: The Indian Conception Value.
8). C. Seshadri (ed.): Education in Values: A source book.

Course outcomes

1.The Student has known the importance of Education…
2. The Student has understood the Philosophical values for life.

CODE – 305-B: SRI VENKATESWARA STUDIES

UNIT – I POETIC AND LITERARY CONTRIBUTIONS OF LORD VENKATESWARA

(a) Philosophical and Historical Antecedents to Lord Venkateswara
(b) Alvars' and Haridasas Poetic Contributions to Lord Venkateswara
(c) Life, Works and Literacy Contributions of Annamayya to Lord Venkateswara
(d) Life, Works and Literary Contributions of Tarigonda Venkamamba to Lord Venkateswara

UNIT – II SERVICES (KAINKARYAS) RENDERED TO LORD VENKATESWARA

(c) Thondamanchakravarthi's Services to Lord Venkateswara
(d) Life-time Water Fetching Services of Tirumalanambi to Lord Venkateswara
(e) Life-time Daily Flower Services of Tirumalai Ananthalvar to Lord Venkateswara
(f) Services of Jeers, Ekangi and Sannidhigolla to Lord Venkateswara

UNIT – III WEALTH ACCUMULATION AND LORD VENKATESWARA

(a) Greatness of Sri Hathiramji Bavaji
(b) Wealth Accumulation by Mahantus to Lord Venkateswara
(c) Wealth Contributions to Lord Venkateswara with special reference to Sri Krishnadevaraya
(d) Historical Spots inside the Temple of Lord Venkateswara

UNIT – IV POOJAS AND SEVAS (RITUALS) TO LORD VENKATESWARA

(a) Daily rituals (Nityotsavas) to Lord Venkateswara
(b) Weekly rituals (Varotsavas) to Lord Venkateswara
(c) Fortnightly and monthly (Paksotsavas and Masotsavas) to Lord Venkateswara
(d) Brahmotsavas and Mellotsavas other Important Festivals

Reference books

1. Tirumala Ozhugu
2. Sri Venaktachala Mahatyam
3. Tirumala Samayacharamulu
4. Tirumala Itihasamala
5. N. Ramesan: Tirumala
6. M. Ramesh : 108 Divya Desas; Vol. VIi

SEMESTER- IV

CORE-1: CODE - 401 : PHENOMENOLOGY AND EXISTENTIALISM

Objectives

1. **To Analyze the Student the contents of Phenomenology**
2. **To apply the Student the Philosophical Principles of Existentialism.**

UNIT – I EDMUND HUSSERL

(a) Phenomenology as a Radical, Presuppositionless and Rigorous Science

(b) Phenomenological Reduction and its Stages

(c) Consciousness and Intentionality

(d) Noema and Noesis

UNIT – II MARTIN HEIDEGGER

(a) Phenomenological Method of Investigation

(b) Question of Being

(c) Dasein

(d) Care

UNIT – III MERLEAU PONTY

(a) Philosophy as Phenomenology

(b) Structure of Behaviour

(c) Truth

(d) Freedom

UNIT – IV SOREN KIERKEGAARD

(a) Kierkegaard as the Father of Existentialism

(b) Reason and Individual Human Existence

(c) Three Stages of Human Existence

(d) Subjectivity as Truth

UNIT – V JEAN PAUL SARTRE

(a) Existence Precedes Essence

(b) Being-in-itself and Being-for-itself

(c) Freedom and Responsibility

(d) Bad Faith

Reference books

1. Herbert Spiegelberg : The Phenomenological Movement Vol. I&II
The Hague: Martinus Nijhoff

2.	Edmund Husserl	:	Ideas – A General Introduction to Pure Phenomenology
3.	Marvin Farber	:	The Aims of Phenomenology
4.	J.J. Kockelmans	:	A First Introduction to Husserl's Phenomenology
5.	M.K. Bhadra	:	A Critical Survey of Phenomenology and Existentialism
6.	Paul Ricoeur	:	Husserl:An Analysis of his Phenomenology G. Ballard & Lester Embree (Trans)
7.	Martin Heidegger	:	Being and Time, John Macquarie & Edward (Trans)
8.	G. Srinivasan	:	Essentialist Concepts and Hindu Philosophical Systems

Course outcomes

1. The Student has analyzed the contents of Phenomenology..
2. The Student has applied the Philosophical Principles of Existentialism.

CORE-2 CODE - 402 : COMPARATIVE RELIGION

Objectives

1. **To Analyze the Student the aspects of Comparative Religion**
2. **To apply the Student the Philosophical Principles of different Religion.**

UNIT – I INTRODUCTION

(a) Necessity of Comparative Study
(b) Nature of Comparative Study
(c) Aims and Objectives
(d) Confrontation of Religions

UNIT – II HINDUISM

(a) Basic Features of Hinduism as a Religion
(b) God, World and Man
(c) Ways of Prayer and Rituals
(d) Problem of Evil and Suffering

UNIT – III BUDDHISM

(a) Basic Features of Buddhism
(b) God, World and Man
(c) Buddhistic Discipline : Noble Eight-fold Path
(d) Evil and Suffering

UNIT – IV CHRISTIANITY

(a) Basic Features of Christianity
(b) Trinity
(c) Evil and Suffering
(d) Doctrine of Immorality of Souls

UNIT – V ISLAM

(a) Five Pillars of Islam
(b) Man in Islam
(c) Ethics of Islam
(d) Sufism

Reference books

1.	Keder Nath Tiwari	:	Comparative Religion
2.	Masih, Y.	:	A Comparative Study of Religious
3.	Geottrey Parrinder	:	Comparative Religion
4.	Archie J. Bahm	:	Metaphysics – An Introduction

Course outcomes

a. The Student has analyzed the aspects of Comparative Religion..

b. The Student has applied the Philosophical Principles of different Religions.

GENERIC ELECTIVE

CODE- 403 – A : PHILOSOPHY OF JIDDU KRISHNAMURTI

Objectives

1. **To know the Student the Philosophy of Jiddu krishnamurti.**
2. **To Understand the Student the Philosophical insights of Jiddu Krishnamurti**

UNIT – I JIDDU KRISHNAMURTI AND LIFE

(a) Real Life and The Art of Living

(b) The Art of Dying and The Art of Seeing

(c) The Art of Loving and The Art of Listening

(d) The Conditioned Life and the Unconditioned Life

UNIT – II JIDDU KRISH NAMURTI AND HUMAN PREDICAMENT

(a) Social Predicament

(b) Psychological Predicament

(c) Religious Predicament

(d) Educational Predicament

(e) Environmental Predicament

UNIT – III JIDDU KRISHNAMURTI AND HUMAN MIND

(a) Thought and Fear

(b) Desire and Time

(c) Ambition and Authority

(d) Attachment and Religious Mind

(e) Comparison and Conflict

UNIT – IV JIDDU KRISHNAMURTI AND LIBERATION

(a) Intelligence and Freedom

(b) Insight and Love

(c) Meditation and Maturity

(d) Choiceless Awareness

(e) Wisdom and Right action

UNIT – V JIDDU KRISHNAMURTI AND WORLD

(a) Relationship and Understanding

(b) Self knowledge and Order

(c) Attention and Perception

(d) Right Thinking and Right Education

(e) Radical Psychological Revolution and World Peace

Reference books

1. Jiddu Krishnamurti : The Urgency of Change
2. Jiddu Krishnamurti : The Network of Thought
3. Jiddu Krishnamurti : The World of Peace
4. Jiddu Krishnamurti : The Awakening of Intelligence
5. Jiddu Krishnamurti : Meditations

Course outcomes

1.The Student has known the Philosophy of Jiddu Krishnamurti…

2. The Student has understood the Philosophical insights and of jiddu Krishnamurti

CODE- 403-B : ANALYTICAL PHILOSOPHY

Objectives

1. **To know the Student the aspects of Anlytical Philosophy.**
2. **To Understand the Student the Philosophers of Analytical Philosophy.**

UNIT – I INTRODUCTION

(a) The Linguistic Turn and the Conception of Philosophy
(b) Descriptions and Incomplete Symbols (Bertrand Russell)
(c) Defence of Commonsense and Proof of External World (G.E. Moore)

UNIT – II WITTGENSTEIN

(a) Conception of Function of Language
(b) Picture Theory of Meaning
(c) Use Theory of Meaning and Language Games

UNIT – III A.J. AYER

(a) The Elimination of Metaphysics
(b) Principle of Verification
(c) The Nature of Philosophical Analysis

UNIT – IV GILBERT RYLE

(a) Descartes Myth
(b) Category Mistake
(c) Systematically Misleading Expressions

UNIT – V QUINE, STRAWSON & AUSTIN

(a) Two Dogmas of Empiricism (W.V.O. Quine)
(b) On Referring (P.F. Strawson)
(c) Performative Utterances (J.L. Austin)

Reference books

1. Ammerman Robert R (Ed) : Classics of Analytic Philosophy
2. Bertrand Russell : Logic and Knowledge
3. A.J. Ayer : Language, Truth and Logic

4.	J.L. Austin	:	Philosophical Papers
5.	R.C. Pradhan		Recent Developments in Analytic Philosophy

Course outcomes:

1. The Student has known the contents of Anaytical Philosophy.
2. The Student has understood the Philosophy of Philosophers of Analytical Philosophy..

CODE – 403-C : SRI VAISHNAVISM

Objectives

1. **To Analyze the Student the issues of Sri Vaishnavism**

To apply the Student the Philosophical aspects of Sri vaishnavism.

UNIT – I HISTORY OF SRI VAISHNAVISM

(a) Roots of Sri Vaishnavism
(b) Sri Vaishnavism in the Vedic period
(c) Sri Vaishnavism in Itihasas
(d) Sri Vaishnavism in Puranas

UNIT – II PHILOSOPHY OF ALVARS

(a) Life and works of Alvars
(b) Mysticism of Alvars
(c) Spiritual quest in Nammalvar's Tiruveonmobi
(d) Philosophy of Kulasekhara Alvar

UNIT – III LIFE AND WORKS OF ACHARYAS FROM NATHAMUNIGAL TO RAMANUJA

(a) Nathamunigal Yamunacharya
(b) Ramanuja
(c) Periya Tirumala Nambi

UNIT – IV DEVELOPMENT OF SRI VAISHNAVISM THROUGH ACHARYAS

(a) Tirumalai Ananthalvan
(b) Periyavachen Pillai
(c) Pillai Lokacharya
(d) Vedanta Desika

UNIT – V OTHER ACHARYAS' CONTRIBUTION TO SRI VAISHNAVISM

(a) Annamacharya
(b) Purandara Dasa
(c) Saint Thyagaraja
(d) Saint Ramadasa

Reference books

1.Profile of Sri Vaishnava Acharyas : M. Varadarajan, S.V. University

2.History of Indian Philosophy,III Vol.I : S. Dasgupta

3.Philosophy of Visistadvaita : P.N. Srinivasachari

4.Holy Lives of the Alvars : A. Gonvindacharya

5.Life of Ramanuja : A. Gonvindacharya

6.Contribution of Yamuna to Visistadvaita : Narasimhacharya

7.The Voice of Alvars and Acharyas : M. Varadarajan

8.Vaishavism : S.M.S. Chari

9.Nammalvar : Premananda Kumar

10.Kulasekhara Alvar : V. Varadachari

11.Two Great Acharyas : V. Varadachari

12.The Philosophy of Sadhana in : N.S. Anantarangachar Visistadvaiata

COURSE OUTCOMES

1.The Student has analyzed the aspects of SriVaishnavism..

2. The Student has applied the Philosophical Principles of .SriVaishvaism

CODE – 403-D: RESEARCH METHODOLOGY AND COMPUTER APPLICATIONS

SECTION – I

Objectives

1. **To Analyze the Student the issues of Research Methodology**
2. **To apply the Student the technical aspects of Computer Applications**

UNIT – I

(a) The Term Research and the Methodology of Research
(b) Steps in Choosing a Topic
(c) Sources of Material
(d) Need for a Working Bibliography

UNIT – II

(a) Utility of Preliminary Synopsis
(b) Kinds of Synopsis Required in Research
(c) Contents, Abbreviations, Introduction, Chapters, Bibliography, References & Notes, Quotations & Transliterations
(d) Place of Critical Edition in Philosophical Research

Reference books

1. Ramachandran, T.P. : The Methodology of Research in Philosophy

SECTION – II

COMPUTER APPLICATIONS

1. The Origin and Development of Computers
2. Philosophy Through Computers
3. Basics of M.S. Word, Windows and Internet
4. The Use of Compute

Reference books

1. Computer Application, Wipro solutions, 2017
2. Computer Education, Microsoft, 2019
3. Computer Basics, Apple solutions/2020

Course outcomes

1.The Student has analyzed the principles of Research Methodology..

2. The Student has applied the computer operating and applying principles

MULTIDISCIPLINARY COURSE

CODE- 404 : PHILOSOPHY OF PEACE

UNIT – I INTRODUCTION

(a) Nature, Scope and Definition of Peace Problems

(b) Peace and Compassion

(c) Peace and Justice

(d) Peace and Development

UNIT – II GANDHIJI'S CONTRIBUTION TO PEACE

(a) Peace at the Individual level

(b) Peace at the National Level

(c) Peace at the Global Level

(d) Gandhiji's Methods of Peace

UNIT – III RELATION BETWEEN PEACE STUDIES AND THE PROBLEM OF CONFLICT

(a) Nature and Scope of Conflicts

(b) Relation between Peace Problems and the Conflict Problems

(c) Methods of Resolving the Conflicts

(d) Creative Alternatives to Conflicts

UNIT – IV PROBLEMS OF PEACE EDUCATION

(a) Recent Peace Movements in India

(b) Recent Peace movements in the World

(c) Development of Peace Research

(d) Role of UNO for Establishment of Peace

UNIT – V SOCIOLOGICAL AND PSYCHOLOGICAL DIMENSIONS OF VIOLENCE AND PEACE

(a) Causes and Forms of Violence

(b) Sociological Approach to Prevent Violence

(c) Psychological Approach to Prevent Violence

(d) Political Approach to Prevent Violence

Reference books

1. Steve Marks : Peace, Development and Human rights Education
2. Calbung Johan: Violence and Peace Research
3. Magnus Haavelsred: Peace Education
4. K.S. Murthy : The Quest for Peace
5. Kenneth Boulding : Stable Peace

6. Thomas Weber : Conflict Resolution and Gandhian Ethics
7. Paul Wehr : Conflict Regulation
8. Ashley Montagu : Learning Non-Aggression
9. John Bondurant : Conquest of Violence
10. Bhoodward : Peace research and Peace Action
11. Theodore Lenz : Towards a Science of Peace
12. Vinoba Bhave : Shanti Sena
13. Thomas Merton : The Non-Violent Alternative
14. Gene Sharp : Politics of Non-Violent Action

OPEN ELECTIVE

CODE - 405-A : PHILOSOPHY OF YOGA

Objectives

1. **To Analyze the Student the contents of Philosophy of Yoga**
2. **To apply the Student the Philosophical aspects of Yoga.**

UNIT – I CITTAVRTTIS – MENTAL MODIFICATIONS

(a) Yoga as cittavrttinirodha

(b) Vrttis

(c) Pramana Viparyaya Vikalpa Nidra Smrti

(d) Their control through abhyasa and vairagya

UNIT – II TWO TYPES OF SAMADHI (SAMPRAJNATA AND ASAMPRAJNATA) AND THEIR CHARACTERISTIES

(a) Attainment of Samadhi through meditating on Isvara (God)

(b) Nature of Isvara

(c) Cittaviksepas and the manner of Overeoming them

(d) Sabija and Nirbija Samadhi

UNIT – III FIVE KLESAS AND THEIR NATURE

(a) Conjunction of drasta and drsya as the root cause of Ignorance

(b) Kaivalya Results from removal of avidya

(c) The Eight-Fold Path Lesding to Kaivalya

(d) Yama Niyama Asana Pranayama Pratyahara Dhyana Dharana Samadhi

(e) The Varieties and /or Characteristics of Each One of the above Eight Elements.

UNIT – IV CONCENTRATION OF CITTA ON VARIOUS RNTITIES AND THE RESULTING CONSEQUENCES

(a) Eight Siddhis Resulting from Contro Over Citta and Their Description

(b) Kaivalya as Resulting Only When the Siddhis are Transcended

UNIT – V THE NATURE OF NIRMANACITTA

(a) Kinds of Karmas and Vasanas Produced by it

(b) Ending of Beginningless Vasanas

(c) Dharmameghasamadhi

(d) Nature of Kaivalya

Suggested readings

1. M.N. Dvivedi (Tr) : Patanjali`s Yogasutra, Adyar. 1947

2. Ganganatha Jha (Tr): Patanjali`s Yogasutra with Vyasa`s Bhasya. Vijnanabhiksu`s Yougavarttika

and Notes from Vacaspati Misra`s Tattvavaisaradi Bombay. 1907

3. J. H. Woods (Tr) : Patanjali`s Yogasutra with Vyasa`s Bhasya and Vacaspati Misra`s Tattvavaisaradi Delhi -1966

4. Surendranath Dasgupta The Study of Patanjali Caleutta. 1920.

5. Mirces Eliade : Yoga: Immortality and Freedom (Tr. From French by Willard R. Trask) Princetion. 1970

6. Sri Aurobindo : The Synthesis of Yoga

7.T.S.Rukmani : Yogavarttika of Vijnanabhiksu. Vols. ! to IV. Delhi. 1985.

Course outcomes

1. The Student has analyzed the contents of Philosophy of Yoga..
2. The Student has applied the Practical aspects of Philosophy of Yoga

CODE – 405-B: JAPANESH PHILOSOPHY

Unit - I

Philosophical Thought in Japan

Japanese Spirit

Japanesh philosophy

Japanesh Culture

Unit - II

Aesthetic Morals and Religion ;

Ascetic - Aesthetic Philosophy

Radical Empiricism - Bushido:

"Essence of Japanese Ethical Tradition"

Unit - III

Shinto: Beliefs, Insights and

Schools of Shinto Philosophy

Shinto: The Concepts of Kami,

Kannugara, Jinno and Mono no aware

Unit - IV

Shotoku: Dialectic,

and the Conception of the Absolute

Moral Philosophy

Japanesh values

Unit - V

Zen Buddhism: Dogen;

Buddha - Nature

. Meditational Technique and

Enlightenment

Reference books

1. Satchidananda Murty, Far Eastern Philosophies
2. Yuho Yokoi, Master Dozen: An Introduction to the Selected Writings
3. Nakamura, Hajime, A Story of the Development of Japanese Thought

Books for Study

1. C.A. Moore, The Japanese Mind
2. Nakamura, Hajime, A Story of the Development of Japanese Thought
3. Wim Barrett, Zen Buddhism: Selected Writings of D.T. Suzuki

4. H. Dumoulin, A History of Zen Buddhism
5. Yuho Yokoi, Master Dozen: An Introduction to the Selected Writings
6. K. Satchidananda Murty, Far Eastern Philosophies
7. George T. Moore, History of Religions, Vol.

S.V.U. COLLEGE OF ARTS : TIRUPATI
DEPARTMENT OF PHYSICAL EDUCATION



CURRICULUM SCHEME AND SYLLABUS OF
BACHELOR OF PHYSICAL EDUCATION (BPED)
(Credit Based Semester Pattern)

Program Code: BPED

Introduced from the Session2014-2015

About the Department

The Department of Physical Education was started in the year 1955, The very next year after the Sri Venkateswara University was founded. Dr. L.K. Govindarajulu was the Founder Director of the Department of Physical Education. The department was started with the following objectives to encourages the participation of students belonging to Rayalaseema Districts.

- Conduct annual Sports Board meetings deciding the university SPORTS CALENDAR and approving the Annual Budget.
- Conduct Annual Inter Collegiate GAMES & ATHLETIC MEETS for all the affiliated colleges for men & women students.
- Conduct selections for university teams in 32 DISCIPLINES for men & women players.
- Conduct COACHING CAMPS for all the university teams at the university.
- Organize Inter-university tournaments under the aegis of the ASSOCIATION OF INDIAN UNIVERSITIES (AIU) New Delhi.
- Organize INTERNATIONAL NATIONAL SEMINARS, workshops and Clinics on the themes of latest trends in Physical Education & Sports.
- organize REFRESHER COURSE in Physical Education under the aegis of SVU HRDC centre



Vision

- To provide opportunity to the students of Regular participation in sports and physical activity, Improve physical fitness help with weight management, promote good health and improve self -discipline & self-confidence that leads to achievement of total wellness and results in a longer and healthier life.



Mission

- To develop quality in performance of sports and games activities participation.
- To prepare players and good athletes to be selected for university sports.
- To prepare the students to achieve State, National, All India Inter University and International medals winners.
- To learn how to make healthy choices as they relate to the total health of one's own body.

- Physical education should expose students to a variety of physical activities participation and also improves academic achievements.
- To conduct Intramurals, Inter-Collegiate and Inter University tournaments and other tournaments to develop their sports performance.
- To participate in sports competitions to develop their sportsman spirit and social life.

The CBCS System:

All Programmes shall run on Choice Based Credit System (CBCS). It is an instructional package developed to suit the needs of students, to keep pace with the developments in higher education and the quality assurance expected of it in the light of liberalization and globalization in higher education.

Programme Specific Outcome:-

May be the Department of Physical Education is the only one which brings out all the qualities hidden in the student to excel his own self for a better person.

This program provides to make student teacher to teach and train a total personality of Physically fit, mentally alert, Mentally strong, emotionally balanced, spiritually devine and socially sound. So the specific out course is the people of total personality of prolonged healthy and fit living. This provides an opportunity to faster and pedagogy based an all round development of personality with critical though and action to lether oves own self.

Program Objectives:-

The programme in the department has a unique objective of providing opportunity to the students who are enthusiastic towards research and invention to quench this thirst as well as to encourage research on par with the advancing countries.

Programme Outcomes :-

The Department of Physical Education provides an opportunity to the teacher, students to learn how to teach skills of all games along with fitness while making them Physically fit, mentally alert, socially sound, emotionally balanced and spiritually divine.

Thus unlike regular academics Physical Education provides a ideal society to the nation which can produce sound & worthy human-resource.

1. P.E.T (Physical Education Trainees) with diploma.
2. P.D (Physical Directors) with Bachelor of Physical Education.
3. Lecturer in Physical Education (Asst. Prof.) with Master Degree
4. Associate Professor with M.Phil and Ph.D.,
5. 'Sports Manager' with Diploma in Sports
6. Health & Fitness Trainers with certificate course.
7. Sports Coach with certificate course.
8. Yoga Trainers with certificate course.
9. Gym Trainer with certificate course.
10. Sports officiating with Referees umpire and scorer tests.
11. Search sports opportunity for Teaching trainees through Sports Quota in Andhra Pradesh.
12. Preparing trainees for Indian Army, Indian Air-force, Indian Navy, BSF and Police as well as Income commercial tax, Indian Railways and Postal Department.
13. The programmes also enables student-teachers to get through competitive and qualifying exams like National Eligibility Test, State level eligibility test D.S.C and other tests.

The programmes beyond Masters Degree i.e., M.Phil and Ph.D. Provides an opportunity for plenty of Research.

Programme – Ph.D in Physical Education and Sports Sciences

In general the Department of Physical Education provides an opportunity to improve the quality of life which sustains longer with vigour and vitality, where as the programme of Ph.D. provide an unique opportunity for research in innumerable ways. Since there are different games as well as different variables which influence performance the scope for research and intensions is wide-open.the teacher, students to learn how to teach skills of all games along with fitness while making them Physically fit, mentally alert, socially sound, emotionally balanced and spiritually divine.

Programme Outcomes :-

The programme of “Doctor of Philosophy” basis has created a rare opportunity for Research to improve standards of human excellence. This programme has a very high selection for opportunity to find highly talented individuals for research to scientific the society through their inventions.

Now days the inventions found in sports have been extended to medicine as well as health sciences so this course has a great opportunity to shape the future of the mankind.

Semester – I

Theory Courses

CC-101 HISTORY, PRINCIPLES AND FOUNDATIONS OF PHYSICAL EDUCATION

Unit-1 Introduction

Meaning, Definition and Scope of Physical Education, Aims and Objectives of Physical Education, Importance of Physical Education in present era, Concepts and misconceptions about Physical Education, Relationship of Physical Education with General Education, Physical Education as Arts and Science.

Unit-2 Historical Development of Physica1 Education

Indus Valley Civilization Period. (3250 BC - 2500 BC), Vedic Period (2500 BC - 600 BC), Early Hindu Period (600 BC - 320 AD) and Later Hindu Period (320 AD - 1000 AD) , Medieval Period (1000 AD - 1757 AD), British Period (Before 1947), Physical Education in India (After 1947), Physical Education in Greece, Germany, Sweden Contribution of Akhadas and Vyayamsalas, H.V.P.Mandals, Institutions / Bodies in Physical Educations and Sports: YMCA, LNIPE, NSNIS, IOA, AIU, SAI,SAF, SGF, PYKKA, RGKA, SAAP, Physical Education & Sports Universities.

Unit-3 Foundations of Physical Education

Philosophical foundation: Idealism, Pragmatism, Naturalism, Realism, Humanism, Existentialism and Indian Philosophy and Culture. Fitness and wellness movement in the contemporary perspectives, Sports for all and its role in the maintenance and promotion of fitness.

Unit-4 Principles of Physical Education

Biological : Growth and development, Gender Difference: Physical, Physiological & Anthropometric (Sheldon and Kretchmer). **Psychological:** Types of Learning, learning curve, Laws and principles of learning, Attitude, interest, cognition, emotions and sentiments. **Sociological :** Society and culture, Social acceptance and recognition, Leadership, Social integration and cohesiveness.

References:

1) Bucher, C.A. (n.d.) ***Foundation of Physical Education***. St. Louis: The C.V. Mosby Co.

2) Deshpande, S. H. (2014). ***Physical Education in Ancient India***. Amravati: Degree college of Physical education.
3) Mohan, V. M. (1969). ***Principles of physical education***. Delhi: Metropolitan Book Dep.
4) Nixon, E. E. & Cozen, F.W. (1969). ***An introduction to Physical Education***. Philadelphia: W.B. Saunders Co.
5) Obertuffer, (1970). ***Delbert Physical Education***. New York: Harper & Brothers Publisher.
6) Sharman, J.R. (1964). ***Introduction to Physical Education***. New York:
7) A.S. Barnes & Co. William, J F. (1964). ***The principles of Physical Education***. Philadelphia: W.B. Saunders Co.

Course Outcome :-

- To provide an opportunity to know the history and evolution of Sports and Physical Education as per history-time-line
- To study sports through historical periodical perceptive in India
- To know the different schools of thoughts
- To analyse Indian Philosophy
- To be confident of the knowledge of Sports events happened in the past to understand present and estimate future

CC-102 ANATOMY AND PHYSIOLOGY

Unit-1 Meaning and Definition of Anatomy, Physiology and their importance in Physical Education. Structure, function and division of cell. **Tissues:** Functions and types. **Skeletal System :** Axial and Appendicular Skeletal system, Types of Bones and Joints.

Unit-2 ***Blood and circulatory system:*** Constituents of blood and their functions, Blood groups, structure of the heart, circulation of blood: Pulmonary, Systemic and General circulation. Blood pressure. ***Respiratory system:*** Structure of respiratory system – Mechanism of Respiration (Internal and External). **Digestive system:** structure and functions of the digestive system, Process of Digestion. **Nervous system:** Organs of Nervous System, Structure and functions of Brain and Spinal cord.

Unit-3 Structure, properties and functions of skeletal muscles. Role of Oxygen in Physical Training, Oxygen Debt, Second wind, Lung capacity, Vital capacity, Tidal Volume, Residual volume. **Endocrine system:** Functions of glands, Pituitary, Thyroid, Parathyroid, Adrenal and Pancreas.

Unit-4 Effects of training on cardiovascular system, Effects of training on respiratory system, Effects of training on muscular system, Fatigue and performance in sports.

References:

1) Gupta, A.P. (2010). ***Anatomy and Physiology***. Agra: Sumit Prakashan.
2) Gupta, M. and Gupta, M. C. (198o). ***Body and Anatomical Science***. Delhi: Swaran Printing Press.
3) Guyton, A.C. (1996). ***Textbook of Medical Physiology***, 9th edition. Philadelphia: W.B. Saunders.
4) Karpovich, P.Y. (n.d.). ***Philosophy of muscular activity***. London: W.B. Saunders Co.
5) Lamb, G.S. (1982). ***Essentials of exercise physiology***. Delhi: Surjeet Publication.
6) Moorthy, A. M. (2014). ***Anatomy physiology*** *and health education.* Karaikudi: Madalayam
7) Publications.
8) Morehouse, L.E. & Miller, J. (1967). ***Physiology of exercise***. St. Louis: The c.y. Mosby Co.
9) Pearce, E.C. (1962). ***Anatomy and physiology for nurses***. London: Faber & Faber Ltd.

10) Sharma, R.D. (1979). ***Health and Physical Education,*** Gupta Prakashan.
11) Singh, S. (1979). ***Anatomy of physiology and Health Education***. Ropar: Jeet Publications.

Course Outcome :-

- To add the knowledge of Anatomical structure of the human body
- To add the knowledge of function of the body during and after the exercise
- To understand the out come of moderate intensive and high intensive work outs effect on human Anatomy and function.
- To know the structural alignment of human body
- This branch of subject presents to avoid harm to the during activities through good understanding of structure and function

CC-103 EDUCATIONAL TECHNOLOGY AND METHODS OF TEACHING IN PHYSICAL EDUCATION

Unit-1 Introduction

Meaning and Definition of Education, Technology and Educational Technology, Objectives of Educational Technology and importance of Educational technology. Types of Education:- Formal, Informal and Non-Formal education, Educative Process, Devices and their importance in Teaching.

Unit-2 Teaching Techniques and teaching aids

Teaching Technique, Lecture method, Command method, Demonstration method, Imitation method, part method, whole method and whole part - whole method. Presentation Technique: Personal and technical preparation. Command: Meaning of command, types of command : Rhythmic and response command, uses of command in different situations. **Teaching Aids :** Meaning and Importance of teaching aids. Types of Teaching aids:- Audio, Visual, Audio - visual aids, Chalk board, Digital boards, Pin boards, Charts, Model, Slide projector, Motion picture. Team Teaching: Meaning, Principles and advantage of team teaching.

Unit-3 Tournaments:

Meaning of tournament and types of tournaments – Knock-out (Elimination), League (Round Robin), Knock-out cum league, League cum knock-out, Double league, Double knockout, Challenge. Method of drawing Fixtures: Seeding, Special Seeding. Rotation Method, Stair case method. Intramural and Extramural and their importance, Sports Day/ Play Day

Unit-4 Lesson Planning and Teaching Innovations

Lesson Planning: Meaning, Type, principles and lesson plan. General, particular / specific and coaching lesson plan. Micro Teaching: Meaning, Types and steps of micro teaching. Simulation Teaching: Meaning, Types and steps of simulation teaching.

References:

1) Bhardwaj, A. (2003). ***New media of Educational Planning.*** *New* Delhi: Sarup of Sons. Bhatia,& Bhatia (1959).
2) ***The principles and methods of teaching***. New Delhi: Doaba House. Kochar, S.K. (1982).
3) ***Methods and techniques of teaching***. New Delhi: Sterling Publishers Pvt. Ltd.

4) Sampath, K.,Pannirselvam, A. & Santhanam, S. (1981). ***Introduction to educational technology***. New Delhi: Sterling Publishers Pvt. Ltd.
5) Walia, J.S. (I 999). ***Principles and methods of education***. Jullandhar: Paul Publishers.
6) N.R.Swaroop Saxena, Dr.S.C. Oberoie, ***Technology of teaching***, R.L. Book Depo, Meerut

Course Outcome :-

- This subject helps to utilize the modern technology to use for the benefit of students
- This helps to find out innovative methods to be useful in learning and understanding
- Provides a platform to adopt technology to the old methods by teaching
- Every day a new method of technology is coming up in sports around the world which could be adopted for the classroom teaching and training of sports.

EC-112 OLYMPIC MOVEMENT (ELECTIVE)

Unit-1 Origin of Olympic Movement

Aims of Olympic movement, The early history of the Olympic movement, The significant stages in the development of the modern Olympic movement, Educational and cultural values of Olympic movement.

Unit-2 Modern Olympic Games

Significance of Olympic Ideals, Olympic Rings, Olympic Flag, Olympic Protocol for member countries, Olympic Code of Ethics, Olympism in action, Sports for all.

Unit-3 Different Olympic Games

Para Olympic Games, Summer Olympics, Winter Olympics, Youth Olympic Games.

Unit-4 Committees of Olympic Games

International Olympic Committee - Structure and Functions, National Olympic committees and their role in Olympic movement, Olympic commission and their functions, Olympic medal winners of India.

References:

1) Osborne, M.P. (2004). ***Magictree house fact tracker: ancient greece and the olympics: a non-fiction companion to magic tree house: hour of the Olympics***. *New York:* Random House Books for Young Readers.
2) Burbank, J.M., Andranovich, G.D. & Heying Boulder, C.H. (2001). ***Olympic dreams: the impact of mega-events on local politics***: Lynne Rienner
3) ***The Olympic Movement,*** IOC, Lauranne, Switzerland

   Sports Administration Manual – 2001 IOC – Editor in Chief Roger Jackson 2001 IOC – University Calgary

Course Outcome :-

- To understand the evolution of tournaments from present Olympics to modern Olympics.
- To be familiar with the spirit of sport motto and principles of solidarity, brotherhood and universal spirit of sport

Semester – II

Theory Courses

CC-201 KINESIOLOGY AND BIOMECHANICS

Unit-1 Introduction to Kinesiology and Sports Biomechanics

Meaning and Definition of Kinesiology and Sports Biomechanics, Importance of Kinesiology and Sports Biomechanics in Physical Education and Sports, , Terminology of Fundamental Movements, Planes and Axes , Gravity, Base, Centre of Gravity, Equilibrium, Line of Gravity.

Unit-2 Fundamentals Concept of Anatomy and Physiology

Definition of Joints, Structure and functional classification of joints and muscles. Types of Muscle Contractions, Posture: Meaning, Types and Importance of good posture. Fundamental concepts: Angle of Pull, All or None Law, Reciprocal Innervations.

Unit-3 Mechanical Concepts

Force: Meaning, definition, types and its application in sports. Lever: Meaning, definition, types and its application in sports. Newton's Laws of Motion and their application in sports. Projectile: Factors influencing projectile trajectory.

Unit-4 Kinematics and Kinetics of Human Movement

Linear Kinematics: Distance and Displacement, speed and velocity, Acceleration. **Angular kinematics:** Angular Distance and Displacement, Angular Speed and velocity, Angular Acceleration. **Linear Kinetics**: Inertia, Mass, Momentum, Friction. **Angular Kinetics**: Moment of Inertia, Couple, Stability.

References:

1) Bunn, J.W. (1972). ***Scientific principles of coaching***. Englewood Cliffs, N.J.: Prentice Hall Inc.
2) Hay, J.G. & Reid, J.*G.* (1982). ***The anatomical and mechanical basis of human motion.*** Englewood Cliffs, N.J.: Prentice Hall Inc.
3) Hay, J.G. & Reid, J. G. (1988). ***Anatomy, mechanics and human motion***. Englewood Cliffs, N.J.: Prentice Hall Inc.
4) Hay, J.G. (1970).***The Biomechanics of Sports Techniques***. Englewood Cliffs, N.J.: Prentice

5) Hall, Inc.Simonian, C. (1911). ***Fundamentals of sport biomechanics***. Englewood Cliffs, N.J.: PrenticeHall Inc.
6) Geofray ***Mechanics in Sports***.

Course Outcome :-

- To enable students to analys movement to understand what happens in the action
- To apply physics on the movement analysis to understand underneath happenings
- To understand forces and its yields of results as per physical laws of universe
- To understand actions and the forces applied for

CC-202 HEALTH EDUCATION AND ENVIRONMENTAL STUDIES

Unit-1 Health Education

Definition of Health, Health Education. Aims, objectives and Principles of Health Education. Concepts of health: Biomedical , ecological and holistic concepts. Dimensions of Health: physical, mental and social dimensions. Factors effecting Health, School Health Programme : Health Instructions, Health Supervision, Health Service. Balanced diet, constituents of balanced diet.

Unit-2 Health Problems in India

Communicable diseases: Chickenpox, Measles, Mumps, Influenza, Whooping cough, Typhoid, Malaria, Aids. **Non-Communicable Diseases**: Obesity, Hypertension, Stroke, Diabetes. Malnutrition. **Other problems:** Explosive Population, Personal and Environmental Hygiene for schools, Nutritional service, Health appraisal, Health record, Healthful school environment, first-aid and emergency care.

Unit-3 Environmental Science

Definition, Scope, Need and Importance of environmental studies, Concept of environmental education, Historical background of environmental education, Celebration of various days in relation with environment, Pollution of Plastic bags / covers, Role of school in environmental conservation and sustainable development.

Unit-4 Natural Resources and related environmental issues:

Water resources, food resources and Land resources, Definition, effects and control measures of Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Role of pollution control board.

References:

1) Agrawal, K.C. (2001). ***Environmental Biology***. *Bikaner:* Nidhi publishers Ltd.Frank,
2) H. & Walter, H., (1976). ***Turners School Health Education.*** Saint Louis: The C.Y. Mosby Company.
3) Nemir, A. (n.d.). ***The school health education***. New York: Harber and Brothers.
4) Odum, E.P. (1971). ***Fundamental of ecology***. U.S.A.: W.B. Saunders Co.
5) Park.k., (2003), Preventive & social medicine. Benarsidas banot, India.

Course Outcome :-

- To Helps to understand Health
- It throws light over healthy way of living
- It adds and trains student – Teachers to first-aid before the arrival of professional Doctors
- The prevention of injuries are taught
- The importance of rehabilitation.

CC-203 MEASUREMENT AND EVALUATION IN PHYSICAL EDUCATION

Unit-1 Introduction to Test, Measurement Evaluation

Meaning of Test, Measurement & Evaluation in Physical Education, Need & Importance of Test, Measurement & Evaluation in Physical Education, Principles of Evaluation, Criteria of good Test.

Unit-2 Classification and Administration of test

Classification of Tests, Administration of test: Pre, During and post test, Methods of Scoring test.

Unit-3 Physical Fitness Tests

AAHPER youth fitness test, JCR test, Cooper's 12 minute run/ walk test, Harward Step test, Indiana Motor Fitness Test, Barrow motor ability test.

Unit-4 Sports Skill Tests

Lockhart and McPherson badminton test, Johnson basketball test, McDonald soccer test, Russell - Lange Volleyball test, Schmithals French Field Hockey test

References:

1) Bangsbo. J. (1994). ***Fitness training in football: A Scientific Approach***. Bagsvaerd, Denmark: Ho+Storm.
2) Barron, H.M., & Mchee, R. (1997). ***A practical approach to measurement in physical education***. Philadelphia: Lea and Febiger.
3) Barron, H.M. & Mchee, R. (1997). ***A Practical approach to measurement in physical education***. Philadelphia: Lea and Febiger.
4) Kansal, O.K. (1996). ***Test and measurement in sports and physical education***. New Delhi: D.V.S. Publications.
5) Mahtews, D.K. (1973). ***Measurement in Physical Education***, Philadelphia: W .B. Sounders Company.
6) Pheasant, S. (1996). *Body space**: anthropometry, ergonomics and design of work***. Taylor & Francis, New York.
7) Phillips, O.A., & Homak, J.E. (1979). ***Measurement and evaluation in Physical Education.*** New York: John Willey and Sons.

8) Sodhi, H.S., & Sidhu, L.S. (1984). ***Physique and selection of sports- a kinanthropometric study***. Patiala: Punjab Publishing House.
9) Harison.H Clarke : ***Application of Measurements to health & Physical Education***
10) Donald Mathews : ***Measurements Programme*** *in Physical Education*

Course Outcome :-

- To enable student teachers to measure different variables and parameters of Physiological
- To measure different training methods impact on the results
- To know the difference in performance due to different training methods through evaluation.

EC-212 RECREATION AND LEISURE MANAGEMENT (ELECTIVE)

Unit-1 Basics of Recreation

Meaning, Definition of Recreation and Leisure Management, Importance, Values of

Recreation, Principles of Recreation. Fundamental modes of Recreation, qualities and qualifications of Recreation Leader.

Unit-2 Recreation and Play

Theories of Recreation, Theories of Play, Therapeutic Recreation, Therapeutic use of activity, Recreation for the life, Role of recreation and leisure on the human development.

Unit-3 Programme and Methods

Factors that determine the programme, Types of recreational activities: Indoor, Outdoor games, Music, Dance, Picnic and Excursions.

Unit-4 Recreational Agencies

Organisation and Administration of Recreational agencies, Individual and Home agencies, Government Agencies, Voluntary Agencies, Private Agencies, Commercial Agencies, Modern trends in recreation and Leisure Management, Issues related to Recreation and Leisure Management.

References:

1) Mull. R.Bayless, K. ***Recreational Sports Management***. Champaign : Human Kinetics.
2) Hoffman, R. & Collingwood, T. **Fit for duty**. Champaign: Human Kinetics.
3) Leith, L.M. ***Exercise your way to better mental health.*** New Delhi: Friends Publication.
4) Bucher, & Wuest. ***Foundations of Physical Education & Sports***. B.I. Publications.
5) Smith, R. & Austin, D. ***Inclusive & Special recreation: Opportunities for persons with disabilities***, Champaign: Human Kinetics.
6) Russel, R. ***Leadership in recreation***. Mc Graw hill.
7) Butmer, G.D. ***Introduction to Community recreation***
8) Jacks .L.P. ***Education through Recreation***
9) Nash, J.B. ***Philosophy of Recreation***

*10)*Pitzgerald –***Community Organisation for Recreation***

Course Outcome :-

- To make the leisure time worthy and healthy by proper use
- To enable student, teachers to teach without stress of long hours of learning
- To avoid monotony of work load in order to avoid fatigue

Semester –III

Theory Courses

CC-301 SPORTS TRAINING

Unit-1 Introduction to Sports Training

Meaning and Definition of Sports Training, Aims and Objective of Sports Training, Principles of Sports Training. **Methods of Sports Training:** Continuous training, Interval training, Repetition training, Fartlek training, Resistance training, Circuit training, Plyometric training. Warm-up and warm-down, **Athletic diet:** Pre competition, during competition and post competition.

Unit-2 Training Components

Strength: Meaning and Definition, Methods of Strength Development. **Speed:** Meaning and Definition, Methods of Speed Development. **Endurance:** Meaning and Definition, Methods of Endurance Development. **Coordination:** Meaning and Definition, Methods of coordination Development. **Flexibility:** Meaning and Definition, Methods of Flexibility Development.

Unit-3 Training Process

Load: Definition and Types of Load. Principles of Intensity and Volume of stimulus. Technical Training: Meaning and Methods of Technical Training. Tactical Training: Meaning and Methods of Tactical Training

Unit-4 Training program and planning

Periodization: Meaning and types of Periodization. Aims and Content of Periods: Preparatory, Competition, Transitional. **Planning:** Training session, Talent Identification and Development

References:

1) Dick, W. F. (198o). ***Sports training principles***. London: Lepus Books.
2) Harre, D.(1982). ***Principles of sports training***. Berlin: Sporulated.
3) Jensen, R.C..& Fisher, A.G. (1979). ***Scientific basis of athletic conditioning***. Philadelphia: Lea and Fibiger, 2ndEdn.
4) Srinivas M.V. & K.R.S. Reddy, (2014) Science of sports training, Swasthik Publication, New Delhi.
5) Matvyew, L.P. (1981). ***Fundamental of sports training***. Moscow: Progress Publishers.
6) Singh, H. (1984). ***Sports Training, General Theory****", and methods. Patiala:* NSNIS.

7) Uppal, A.K. (1999*). **Sports Training**. New* Delhi, Friends Publication.

Course Outcome :-

- It provide the knowledge of training and how the betntiufic training helps
- To know the different finesses required for different activities
- It provides an opportunity to utilize modern gadgets in training methods
- Orientation of different methods training methods for different events.

CC-302 CONCEPTS OF WELLNESS MANAGEMENT

Unit-1 WELLNESS

Definition and scope of wellness- Wellness continuum and health - Dimensions of wellness - Physical Wellness - Emotional Wellness - Social Wellness - Spiritual wellness - Intellectual wellness and Environmental wellness.

Unit-2 EXERCISE AND WELLNESS

Physical wellness, exercise and functional physical health of different systems of human body, lifestyle diseases in relation to inactivity, Nutrition and exercise to physical wellness.

Unit-3 STRESS MANAGEMENT

Stress : Definition of Stress, Stress and Emotional health, Stress and physical health- Mechanism of stress and related degenerative diseases- Inter dependence of Spiritual wellness, Social wellness and Emotional wellness- Stress management techniques.

Unit-4 FITNESS AND BODY COMPOSITION

Health fitness components, body composition, muscular endurance, strength, Cardio vascular fitness and flexibility, importance of cardio respiratory endurance .Obesity and health risk factors, childhood obesity and problems. Body composition indicators and measurements

References:

1) ***Wellness Workbook:*** How to achieve enduring health and vitality, John W Travis and Regina S Ryan, Crown publishing, New York.
2) ***The Soul of Wellness:*** 12 holistic principles for achieving a healthy body, mind, heart and spirit, Rajiv Parti, Select book incorporation, New York.
3) ***Wellness coaching for lasting Lifestyle change***, Michael Arloski, Whole person associates, Duluth, USA.
4) ***Staying Healthy with Nutrition***: The complete guide to Diet and Nutritional medicine, Elson M Has,.
5) Charles B.Corbin etal: ***concept of fitness and wellness*** megraw hills.inc St lauis Bangkok 3rd 2000 U.S.A

Course Outcome :-

- The subject has an out come of deep understanding of fitness and its importance
- This subject provides the holistic health through fitness which ultimately results in wellness.
- To provide the importance of different programme designed for different professionals and different age groups.
- This subject provides a nation of fit people which lightens the burden of budget on health care to the country in general

CC-303 SPORTS PSYCHOLOGY AND SOCIOLOGY

Unit-1 Introduction

Meaning, Definition, Importance and scope of Sports Psychology. Characteristics of Various Stages of growth and development. Individual differences. Heredity and environment. Dynamics of Human behaviour, Play and theories of Play.

Unit-2 Learning , Personality, Motivation,

Learning: Theories of learning, Transfer of Learning. **Personality:** Meaning and definition of personality, characteristics of personality, Dimension of personality, Personality and Sports performance. **Motivation:** Meaning, Definition and importance of Motivation. Types of Motivation : Intrinsic & Extrinsic, Motivation techniques and their impact on sports performance. Aggression, Anxiety and their effects on Sports performance. Mental Preparation Strategies: Attention, focus, Self- talk, Relaxation, Imaginary.

Unit-3 Relation between Social Sciences & Physical Education

Meaning, Definition and Importance of Sociology, Orthodoxy, customs, Tradition and Physical Education. Festivals and Physical Education, Socialization through Physical Education, Social group, Primary group and Remote group.

Unit-4 Culture

Meaning and Importance of culture, features of culture, effects of culture on people life style. Different methods of studying : Observation / Inspection method, Questionnaire method and Interview method.

References:

1) Ball, D. W. & Loy, J.W. (l975). ***Sport and social order; Contribution to the sociology of sport***. London: Addison Wesley Publishing Co., Inc.
2) Blair, J.& Simpson, R.(1962). ***Educational Psychology,*** New York: McMillan Co.
3) Cratty, B.J.(1968). ***Psychology and Physical Activity***. Eaglewood Cliffs. Prentice Hall.
4) Kamlesh, M.L. (1998). ***Psychology In physical Education*** *and Sport.* New Delhi: Metropolitan Book Co.
5) Loy, J.W., Kenyon, G.S. & McPherson, B.D. (1978). ***Sport and social system***. London: Addison Wesley Publishing Company Inc.

6) Loy, J.W., Kenyon, G. S. & McPherson, B. D. (1981). ***Sports culture and society***. Philadelphia: Lea & Febigero
7) Mathur, S.S. (1962). ***Educational Psychology. Agra***. *Vinod Pustak Mandir.*
8) Skinnner, C.E, (1984). ***Education Psychology***. New Delhi: Prentice Hall of India.
9) William, F.O. & Meyer, F.N. (1979). ***A handbook of sociology***. New Delhi: Eurasia Publishing House Pvt Ltd.
10) R.Jain : ***Sports Sociology*** – Khel Sahitya Kendra, Delhi.

Course Outcome :-

- To understand the importance and use of implementation of Psychological concepts for all positive results.
- To understand the Psychological instructions and self limitations of students and to break the Psychological barriers for excellence in performance.
- To develop in understanding of the intelligence creativity for the benefit of students to fare well.

EC-311 SPORTS MEDICINE, PHYSIOTHERAPY AND REHABILITATION

(ELECTIVE)

Unit-1 Sports Medicine

Meaning, Definition, and Importance of Sports Medicine. Role of Physical Education Teachers and Coaches in Athletes Care and Rehabilitation. Common sports injuries and their prevention. **First Aid**: Definition of First Aid, **DRABC** formula (Danger, Response, Airways, Breathing and Circulation), **Artificial respiration technique**: Mouth to mouth, Mouth to nose respiration, CPR (Cardio Pulmonary Resuscitation). **Treatments:** Laceration, Blisters, Contusion, Strain, Sprain, Fracture, Dislocation and Cramps. **Bandages :** Types of Bandages, Taping and supports.

Unit-2 Physiotherapy

Definition: Guiding principles of physiotherapy, Importance of physiotherapy.

Treatment Modalities: Electrotherapy, infrared rays, Ultraviolet rays, short wave diathermy, ultra sound.

Unit-3 Hydrotherapy and Massage

Hydrotherapy: Meaning and Methods, Cryotherapy, Thermo therapy, Contrast Bath, Whirlpool Bath, Steam Bath, Sauna Bath, Hot Water Fomentation.

Massage: Meaning and importance of massage, Indications and contraindications of massage. Types of Manipulation, Physiological effects of Massage.

Unit-4 Therapeutic Exercise

Definition, Principles and Importance of Therapeutic Exercises. **Classification of Therapeutic exercise:** Passive Movements (Relaxed, Forced and passive stretching). active movements (concentric, Eccentric and static). Free Mobility Exercise for Shoulder, Wrist, Fingers, Hip, Ankle, Foot joints and Neck exercises.

References:

1) Christine, M.D., (1999). ***Physiology of sports and Exercise***. *USA:* Human Kinetics.
2) Conley, M. (2000). ***Bioenergetics of exercise training***. In T.R. Baechle, & R.W. Earle, (Eds.),
3) ***Essentials of Strength Training and Conditioning*** (pp. 73-9o). Champaign, IL: Human Kinetics.

4) David, R.M. (2005). ***Drugs in sports,*** (4th Ed). Routledge Taylor and Francis Group.
5) Hunter, M. D. (1979). **A *dictionary for Physical Educators***. In H. M. Borrow & R. McGee, (Eds.),
6) ***A Practical approach to measurement in Physical Education*** (pp.573-74). Philadelphia: Lea & Febiger.
7) Jeyaprakash, C. S., ***Sports Medicine***, J.P. Brothers Pub., New Delhi, 2oo3.
8) Khanna, G.L., (1990). ***Exercise physiology & sports medicine***. Delhi: Lucky Enterprises. Mathew, D.K. & Fox,
9) E.L, (1971). **Physiological basis of physical education and athletics.** Philadelphia: W.B. Saunders Co.
10) Pandey, P.K. (1987). ***Outline of Sports Medicine,*** New Delhi: J.P. Brothers Pub.
11) Williams, J.G.P. (1962). ***Sports medicine***. London: Edward Arnold Ltd.
12) Gareth Jones, Edwillson, Markers Hardy, (2010) U.K. ***The BMA Guide to Sports Injuries***, Dorling Kindersley Limited, London WCZR ORL
13) William E. Garret Jr Donald T.Kirkendall Debarah 10 Squire "***Principles of Practice of Primary care Sports Medicine***" – Williams of Wilking Publishers.

Course Outcome :-

- To understand the nature of injuries and rehabilitation
- To avoid injuries the subject of physiology and sports medicine are the basis for the student-teachers.
- To understand the importance of rehabilitation.

Semester –

IV Theory

Courses

EC-401 SPORTS MANAGEMENT

Unit-1 Concept of Management

Meaning, Definition, Scope, concept and importance of Sports Management. **Functions of management**: Planning, organising, staffing, directing and controlling.

Unit-2 Leadership

Meaning , Definition & Elements of Good leadership. Leadership styles, methods. **Forms of Leadership:** Autocratic, Laissez-faire, Democratic, Benevolent and Dictator. Qualities of administrative leader, Preparation of administrative leader & Effects of Good Leadership on Organizational performance.

Unit-3 Financial Management

Financial management in Physical Education & sports in schools, Colleges and Universities. Criteria of good budget, Steps of Budget making. Model budget for a school. Procedures for purchases and constructions. Records and Registers.

Unit-4 Sports Management

Sports Management in Schools, colleges and Universities. Planning, Directing and Controlling school, college and university sports programmes. Factors effecting the planning. Developing performance standards, Establishing a reporting system, Evaluation, reward and punishment system. **Event management:** Organisation of major sports event.

References:

1) Ashton, D. ***Administration of Physical Education for women***. *New* York: The Ronald Press CI. (1968).
2) Bucher, C.A. ***Administration of physical education and athletic programme***. 7th Edition, St. Louis: The C.V. Mosby Co.

3) Daughtrey, G. & Woods, J.B. ***Physical education and intramural programmes, organisation and administration***. Philadelphia U.S.A. : W.B. Sounders Cp. (1976).
4) Earl, F.Z, & Gary, W.B.. ***Management Competency Development in Sports and Physical Education***. Philadelphia: W. Lea and Febiger. (1963)

Course Outcome :-

- To know how to manage events of sports as well as any event
- To know management skills of trains & competition
- The importance of planning and execution.
- It provides opportunity to know the good leadership and successful planning
- It explain how to plan budget for all the activities

CC-402 CONCEPTS OF YOGA

Unit-1 Introduction

Meaning , Definition & Scope of Yoga, Aims, Objectives and functions of Yoga, Yoga practices in Upanishads and yoga sutra, Modern Trends in Yoga, Place and importance of Yoga in Physical Education and Sports.

Unit-2 Early Yoga Practices

Astanga Yoga: Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana and Samadhi. Streams of Yoga Practices: Hatha Yoga, Karma Yoga, Bhakti Yoga, Raja Yoga, Jnana Yoga.

Unit-3 Basic Yogic Methods

Asana: Classification of Asanas, Sitting, Standing, Lying, Inverted asanas. Benefits of Asanas : Effects of Asanas on general health. Pranayama: Importance & impact on Muscular, Cardio Respiratory and Nervous System. Relaxation and meditation: Importance & impact on body at work and body at rest.. Bandhas: Jalandhara, Mula, Udyana. Mudras: Chin,Yoga,Aswini, Anjali, Brahma Mudra. Kriyas: Neti ,Nauli, Kapalabhati, Trataka, Dhauthi, Bhastrika.

Unit-4 Yoga Education

Yoga Education for Youth Empowerment and human resource development. Difference between yogic practices and physical exercises, Yoga education centers in India and abroad, Competitions in Yoga asanas.

References:

1) Brown, F.Y.(2000). ***How to use yoga***. Delhi: Sports Publication.
2) Gharote, M. L. & Ganguly, H. (1988). ***Teaching methods for yogic*** **practices**. Lonawala: Kaixydahmoe.
3) Rajjan, S.M. (1985). ***Yoga strengthening of relaxation for sports man***. New Delhi: Allied Publishers.
4) Shankar,G. (1998). ***Holistic approach of yoga***. New Delhi: Aditya Publishers.
5) Shekar, K.C. (2003). ***Yoga for health***. Delhi: Khel Sahitya Kendra.
6) Satya Murty.K, ***Elements of Yoga***, Vedadri Brahma Gnana Kendra, Pedakakani, Guntur, India,(2015)

Course Outcome :-

- To throw sores light over the basics of ‘Yoga’
- To create awreness of hour our east while Rishies tought principles of life through all time great “Upanishads”
- To be familiar with the hidden knowledge of Yoga-sutras, Astanga-Yoga, Hatayoga
- To realize the importance of practice of Yoga life Asanas, Pranayama etc., which are the need of the hour to the today’s world.

CC-403 OFFICIATING AND COACHING

Unit-1 Introduction of Officiating and coaching

Definition of officiating and coaching, Importance and principles of officiating, Relationship of official and coach with management, players and spectators, Measures of improving the standards of officiating and coaching.

Unit-2 Coach as a Mentor

Duties of coach in general, pre, during and post game. Philosophy of coaching, responsibilities of a coach on and off the field, Psychology of coach in competition and coaching.

Unit-3 Duties of Official

Duties of official in general, pre, during and post game in (Hockey, Football, Handball, Volleyball, Basketball, Table Tennis, Kabaddi, Kho-Kho, Throwball, Tennis, Badminton, Ball Badminton, Cricket, Softball and Tennikoit). Philosophy of officiating, Mechanism of officiating, position, Signals and movement, Ethics of officiating.

Unit-4 Qualities and Qualifications of Coach and Official

Qualities and qualifications of good coach and good official, Layout of courts / fields and Rules of games, Layout of standard Track & Field and Rules, Eligibility rules of intercollegiate and inter-university tournaments.

References:

1) Bunn, J.W. (1968). ***The art of officiating sports.*** Englewood cliffs N.J. Prentice Hall.
2) Bunn, J.W. (1972). ***Scientific principles of coaching***. Englewood cliffs N.J. Prentice Hall.
3) Dyson, G.H. (1963). ***The mechanics of athletics***. London: University of London Press Ltd.
   Dyson, G.H. (1963). *The mechanics of Athletics.* London: University of London Press Ltd.
4) Lawther, J.D. (1965). ***Psychology of coaching***. New York: Pre. Hall.
5) Singer. R.N. (1972). ***Coaching, athletic & psychology***. *New* York: M.C. GrawHill.

Course Outcome :-

- It provides an opportunity to analyse rules and train sports persons accordingly
- It provides knowledge of rules as well as coaching
- To coach a team as per the opponents standards needs the knowledge of rules to export them for the benefit of performance.

EC-412 RESEARCH AND STATISTICS IN PHYSICAL EDUCATION (ELECTIVE)

Unit-1 Introduction to Research

Definition of Research, Need and importance of Research in Physical Education and Sports. Classification of Research, Meaning of Research Problem, Location and criteria of Selection of Problem, Formulation of a Research Problem, Limitations and Delimitations.

Unit-2 Methods of Research

Various methods of Research, Need for surveying related literature, Literature Sources, Research Proposal.

Unit-3 Basics in Statistics

Statistics: Meaning, Definition, Nature, Importance and its Types. Raw Score: Grouped Data, Un Grouped Data. Grouped Data: Discrete and Continuous Series. Construction of frequency Table: Class Intervals, Class Distribution. Normal Probability curve, Skewnes and kurtosis. Graphical Presentation: Histogram, Bar Diagram, Frequency Polygon, O'give curve, Pie Diagram.

Unit-4 Statistical Methods in Physical Education and Sports

Measures of Central Tendency: Mean, Median and Mode-Meaning, Definition, Importance, Advantages, Disadvantages and Calculation from Group and Ungrouped data. **Measures of Variability**: Meaning, importance. Computing Range, Mean Deviation, Quartile Deviation, Deciles, Percentile and Standard Deviation. **Co-relation**: Computing Karl Pearson Product Moment Co-relation and Karl Spearman Rank Order co-relation.

References:

1) Best, J.W. (1963). ***Research in Education***. U.S.A.: Prentice Hall.
2) Bompa, T.O. & Haff, G.G. (2009). ***Periodization: theory and methodology of training***. *5th ed.* Champaign, IL: Human Kinetics.
3) Brown, L.E., & Ferrigno, V.A. (2005). ***Training for speed, agility and quickness***, 2nd ed. Champaign, IL: Human Kinetics.
4) Brown, L.E. & Miller, J., (2005). ***How the training work***. In: Training Speed, Agility, and Quickness. Brown, L.E. & Ferrigno, V.A & Ferrigno, V.A., eds. Champaign, IL: Human Kinetics.

5) Carl, E. K., & Daniel, D.A. (1969). ***Modern principles of athletes training***. St. Louis: St. Louis's Mosby Company.
6) Clark, H. H., & Clark, D.H. (1975). ***Resear4h process in Physical Education***. Englewood cliffs, New Jersey: Prentice Hall, Inc.
7) Garrett, H.E. (1981). ***Statistics in psychology and Education.*** New York: Vakils Feffer and Simon Ltd.
8) Oyster, C. K., Hanten, W. P., & Llorens, L. (1987). ***Introduction to research: A guide for the Health Science Professional.*** London: .B. Lippincott Company.
9) Thomas, J.R., & Nelson J.K. (2oo5). ***Research method In Physical Activity***. U.S.A: Champaign, IL: Human Kinetics Books.
10) Thomas, J.R., Nelson, J.K. & Silverman, S.J. (2011). ***Research method in physical activity***. U.S.A: Champaign, IL: Human Kinetics Books.
11) Uppal, A.K. (1990). ***Physical fitness: how to develop***. New Delhi: Friends Publication
12) Verma, J.P. (2000). ***A text book on sports statistics***. Gwalior: Venus Publications.

Course Outcome :-

- To analyze the facts and figures of results through research
- To analyze the aspects of all the factors andinvolved in sports we need scientific approach Research is the base for finding facts.
- The tools of Statistics are the basic tools for finding facts in that.

Objectivities of the course

1. To enable the society to provide with best possible teachers.
2. The course fulfills the need of good Physical Education teachers in this part of the country.

Semester - I

CC – 101:- To Throw light on the History nd Philosophies of the world and ethical values.

CC – 102:- To know the in and out of the human body's formation and its Physiological systems.

CC – 103:- How to make us of the modern gadgets and latest technology in Pedagogy.

EC – 112:- The total picture of Olympic movement after gaps of 2000 years and the spirit behind it.

Semester - II

CC – 201:- To know the formation any reciprocating joints and muscles involving human motion and objects. Bio-mechanics is explained throw the forces applied and its results involved in human motion thoroughly .

CC – 202:- The objectives of the subject health education provides waste are about communicable diseases, habits hygiene and all aspects. The Environmental education covers large extent Technological sustainability and the discus approaches for preservation .

CC – 203:- The objective of this unit to explain how to use the measurements to evaluate & research the events.

EC – 212:- The objective of the subject to make use of worthy leisure time.

Semester - III

CC – 301:- The objective of the sports training is to teach how to train the budding talent to competitive various levels .

CC – 302:- The objectives of the subject is to create awareness about the concepts of wellness and how to manage wellness .

CC – 303:- The subject has an object to verify the Psychological obstructions in performing to the maximum ability to realize the potential hidden also create sociological awareness.

EC – 311:- The objective of sports medicine is to enable student teachers about injury management and rehabilitation as well as Physiotherapy .

Semester - IV

CC – 401:- The objective of the sports management is to train the pupils to know the management skills .

CC – 402:- Objectives of 'Yoga' is to teach basics of Yoga which are to be taught at different levels.

CC – 403:- Objectives of this subject is to enable student, teach to learn hour to officiate and coaching.

EC – 412:- Objectives of this subject is to know different Research methods and making use of statistics for research.

Semester - I

劑ƭƀt-A : Theoretical Course						
Course Code	Title of the Papers	Total Hours	Credit	Internal Marks	External Marks	Total Marks
Core Course						
CC-101	History, Principles and foundations of Physical Education	4	4	20	80	100
CC-102	Anatomy and Physiology	4	4	20	80	100
CC-103	Educational Technology and Methods of Teaching in Physical Education	4	4	20	80	100
Elective Course (Anyone)						
EC-111	Communication & Soft skills	4	4	20	80	100
EC-112	Olympic Movement					
Part-B : Practical Course						
PC-121	Track and Field (Running Events), *Gymnastics/*Swimming (* Any one)	**6**	**4**	20	80	100
PC-122	Football, Tennis, Throwball	**6**	**4**	20	80	100
PC-123	Badminton, Kho-Kho, Shooting	**6**	**4**	20	80	100
PC-124	**Mass Demonstration Activities:** Flag Hoisting, March past, Calisthenics, Lezium Dumb-bells, Kolatam, Aerobics Wands, Hoops, Pole Drill, Folk Songs & Patriotic Songs	**6**	**4**	20	80	100
	Total	40	32	160	640	800

Note: Total Number of hours required to earn 4 credits for each Theory Course are 68-80 hours per semester whereas 102-120 hours for each Practicum Course.

Semester-II

Part-A : Theoretical Course						
Course Code	xitle of the Papers	Total Hours	Credit	Internal Marks	External Marks	Total Marks
Core Course						
CC-201	Kinesiology and Biomechanics	4	4	20	80	100
CC-202	Health Education and Environmental Sudies	4	4	20	80	100
CC-203	Measurement and Evaluation in Physical Education	4	4	20	80	100
Elective Course (Anyone)						
EC-211	Computer Applications in Physical Education	4	4	20	80	100
EC-212	Recreation and Leisure Management					
Part-B : Practical Course						
PC-221	Track and Field (Jumping Events) * Gymnastics/*Swimming (* Any one)	**6**	**4**	20	80	100
PC-222	Yoga, Ball Badminton, Kabaddi	**6**	**4**	20	80	100
PC-223	Hockey, Handball, Cricket	**6**	**4**	20	80	100
Part-C Teaching Practices						
TP-231	Teaching Practice (Class room and Outdoor) (4 internal and 1 External in class room and outdoor)	**6**	**4**	20	80	100
	Total	40	32	160	640	800

Note: Total Number of hours required to earn 4 credits for each Theory Course are 68-80 hours per semester whereas 102-120 hours for each Practicum Course.

Semester-III

Part-A : Theoretical Courses						
Course Code	Title of the Papers	Total Hours	Credit	Internal Marks	External Marks	Total Marks
Core Course						
CC-301	Sports Training	4	4	20	80	100
CC-302	Concepts of Wellness Management	4	4	20	80	100
CC-303	Sports Psychology and Sociology	4	4	20	80	100
Elective Course (Anyone)						
EC-311	Sports Medicine, Physiotherapy and Rehabilitation	4	4	20	80	100
EC-312	Curriculum Design					
Part-B : Practical Course						
PC-321	Track and Field (Throwing Events) * Gymnastics/*Swimming (* Any one)	**6**	**4**	20	80	100
PC-322	Karate / Judo / Fencing/ Tennikoit, Softball, Basketball	**6**	**4**	20	80	100
PC-323	Wrestling, Taekwondo, Boxing, Table Tennis, Volleyball	**6**	**4**	20	80	100
Part-C Teaching Practices						
TP-331	Teaching practice: Particular Lesson Plans for Racket Sport/ Team Games/ Indigenous Sports.	**6**	**4**	20	80	100

	(out of 10 lessons 5 at practicing school & 4 internal and 1 external).					
	Total	40	32	160	640	800

<u>Note</u>: Total Number of hours required to earn 4 credits for each Theory Course are 68-80 hours per semester whereas 102-120 hours for each Practicum Course.

Semester-IV

␗□Ĥ 誓-A : Theoretical Course						
Course Code	Title of the Papers	Total Hours	Credit	Internal Marks	External Marks	Total Marks
Core Course						
CC-401	Sports Management	4	4	20	80	100
CC-402	Concepts of Yoga	4	4	20	80	100
CC-403	Officiating and Coaching	4	4	20	80	100
Elective Course (Anyone)						
EC-411	Fitness Assessment and exercise prescription	4	4	20	80	100
EC-412	Research and Statistics in Physical Education					
Part-B : Practical Course						
PC-421	Athletics Specialization	**6**	**4**	20	80	100
PC-422	Game of Specialization: Football, Kabaddi, Badminton, Cricket, Hockey, Handball, Kho-Kho, Ball Badminton, Basketball, Volleyball, Softball, Tennis, Table Tennis (Any one of these)	**6**	**4**	20	80	100
Part-C Teaching Practices						
TP-431	Teaching Practice in Sports Specialization: coaching lesson Plan in Track and Field / Swimming /Gymnastics (Any one of these)	**6**	**4**	20	80	100
TP-432	Teaching practice in Game of specialization: Coaching lessons: Kabaddi/ Kho-kho/	**6**	**4**	20	80	100

	Baseball/ Cricket/ Football/ Hockey/ softball/ Volleyball/ Handball/ Basketball/ Netball/ Badminton/ Table-tennis/ Squash/ Tennis (Any one of the above games). Out of 10 lessons, 5 lessons at school and 4 internal and 1 external . (both particular and coaching lessons have to be included in the program. Each lesson is of 45 minutes duration.					
	Total	40	32	160	640	800
	Total for four semesters	**160**	**128**	**640**	**2560**	**3200**

<u>Note</u>: Total Number of hours required to earn 4 credits for each Theory Course are 68-80 hours per semester whereas 102-120 hours for each Practicum Course.

Sri Venkateswara University : Tirupati
DEPARTMENT OF PHYSICAL EDUCATION

Prof. M.SIVASANKAR REDDY, Ph.D., Ph: 0877 – 2289455 (O)
DIRECTOR OF PHYSICAL EDUCATION i/c. 9441296125 (M)
SECRETARY, S.V.U.SPORTS BOARD. Fax No.: 0877-2248008/2289555
NAAC "A+" Grade
CO-ORDINATOR, B.P.ED., COURSE Mail: mssr1962@gmail.com
CHAIRMAN B.O.S. (PHYSICAL EDUCATION)

PE.11/2020-21/IQAC . Dt.27-07-2021.

To
The Director,
IQAC,
S.V.University,
Tirupati.

THROUGH THE PROPER CHANNEL

Sir,

Sub:- Information of the Department of Physical Education – IQAC 2020-21 – POs, PSOs and COs for NAAC purpose information – Regarding.

Ref:- Your mail Lr No. Nil, dated 15-07-2021.

* * *

With reference to your letter cited above I am herewith enclosing the information with regard to the Department of Physical Education for the POs, PSOs and COs for NAAC purpose information.

Yours faithfully,

(Prof. M.SIVASANKAR REDDY)
DIRECTOR OF PHYSICAL
EDUCATION i/c.
CO-ORDINATOR, B.P.Ed., COURSE

SRI VENKATESWARA UNIVERSITY : TIRUPATI

S.V.U COLLEGE OF ARTS

DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

Course

POLITICAL SCIENCE & PUBLIC ADMINISTRATION

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

SRI VENKATESWARA UNIVERSITY: TIRUPATI
SVU COLLEGE OF ARTS
DEPARTMENT OFPOLITICAL SCIENCE AND PUBLICADMINISTRATION

About the Department

The Dept. of Political Science and Public Administration became a reality with the introduction of a Post-Graduate Course – M.A., in Political Science in the year 1970 in the University under the administrative control of the Dept. of Economics. The Department of Political Science was given an independent status in February 1971 by the Vice-Chancellor Dr. D. J. Reddy. Highlighting the importance of the discipline of Political Science, Dr. D.J. Reddy made a classic statement – A University without a Department of Political Science is a primitive University and Sri Venkateswara University will no longer carry that tag". The Department started its innings with Prof. K. Kamalanathan, as the founder Professor and Head of the Department with two more Lecturers – Dr. M.V. Subbha Rao and Dr. N.H. Starama Sarma and a Tutor Mr. C. Venganna joining the Department in 1971. During the selections of 1976 Dr. V.Chandhra Mouliswara Rao, and Dr. A. Balaramaiah, Joined as Lecturers.

During the birth centernary celebrations of Dr. Tanguturi Prakasam Panthulu, a P.G. Diploma in Local Self Government was started in the Dept in 1972. Dr. M.R Acharya (1972) and Mr. C.Krishna Reddy (1977) were appointed to handle the said Diploma during the V Plan academic expansion an M.A., Degree course in Public Administration with specialization in Local Self-Government was started with effect from 1986-87 onwards. Dr. S.Srikrishna and Dr.C. Venkata Subba Reddy Joined as Lectures in March 1985. Consequent to retirement of Prof. K.Kamlnathan in December 1983, Prof. K.V. Narayana Rao Joined as Professor in March 1985. During the 1989 selections Dr. M.A. Hussain (SVU PG Centre Kadapa 1979), joined the Dept. as a Reader against the Local self-Government-specialization where as Dr. B.V.Muralidhar Joined as Lecture in November 1989.Subsequently due to retirements etc. in the Dept. Prof. A. Reddeppa Reddy, Dr. Y.Gurappa Naidu, Prof.B.Venkatachalapathy, were transferred to the Dept. from the SVU PG Centre Kadapa, at different intervals between 2001 – 2008. Dr. C.Sheela Reddy, was selected and appointed as Asst. Professor in July 2007. Dr. B. Rajini Joined the Dept. as a UGC Research Scientists in the year 1991.

Vision

- The Motto of the Department is to train students into Leadership roles for becoming change agents of the Society.
- The Department aims at integration of skills and knowledge with human face.
- Make good citizens and not just professions is the slogan of our department.

Mission

- To provide instructions to M.A. Post Graduate Students in Political Science and Public Administration at Masters Standards.
- To prepare students acquire well developed personality and emerge as the Model Citizens/Civil Servants/Political Leaders.
- To achieve and sustain excellence as a Centre of Training, Research and Extension Activities.

Programme Specific Objectives

- To inculcate theory and practical knowledge together.
- To include Scientific Zeal and enable them for Sociological enquiry.
- Conjecture of Science and Social Science Research Aptitude.
- To mould them with Trans –disciplinary understanding for Lifelong Learning.

Program Objectives

- PO1 - Knowledge
- PO2 - Analysis
- PO3 – Design
- PO4 – Development
- PO5 - Modern tools
- PO6 – Society
- PO7 - Environment
- PO8 - Ethic
- PO9 - Team work
- PO10 – Commutation
- PO11 - Programme Management
- PO12 - Lifelong Learning

Programme Outcomes

- Understanding of government institutions, electoral processes, and policies in a variety of countries around the world and the ability to compare the effectiveness or impact of various Political, Administrative arrangements across countries.
- Knowledge of some of the philosophical underpinnings of modern politics and government and the legal principles by which Political, Administrative disputes are often settled.
- Understand the changes in patterns of Political and Administrative behaviour, ideas and structures.
- Assess how global, national and regional developments, public services and governance affect polity and society.
- Develop the ability to make logical inferences about social and political, Administrative issues on the basis of comparative and historical knowledge.
- Knowledge of key theories and concepts, historical developments, organizations, and modern issues in international relations.

(Revised Scheme of Instruction and Examination, Syllabus etc.,
under CBCS Regulations -2016 is Amended as per NEP-2020)

(With effect from the batch admitted in the academic year 2021-22)

M.A. POLITICAL SCIENCE AND PUBLIC ADMINISTRATION

SEMESTER-I

(Common for both Political Science and Public Administration)

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	PSPA 101	Constitution Making - Indian Experience	6	4	Core-Theory	20	80	100
2	PSPA 102	Western Political Thought	6	4		20	80	100
3	PSPA 103	Modern Political Analysis	6	4		20	80	100
4	PSPA 104	Principles of Public Administration	6	4		20	80	100
5	PSPA 105	A Political Sociology	6	4	CF	20	80	100
		B Indian Political Thought						
		C Public Relations& Mass Communication						
6	PSPA 106	A Dynamics of Public Administration	6	4	EF	20	80	100
		B Globalization and Indian Political Economy						
Total			**36**	**24**		**120**	**480**	**600**
7	PSPA 107	Human Values and Professional Ethics - I	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core Papers are Mandatory**
- **Compulsory Foundation- Choose ONE Paper**
- **Elective Foundation – Choose ONE paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under Self Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.**

M.A. POLITICAL SCIENCE AND PUBLIC ADMINISTRATION

SEMESTER-II

(Common for both Political Science and Public Administration)

S. No	Code	Title of the Course	Credit Hrs/Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	PSPA 201	Administrative Theories	6	4	Core-Theory	20	80	100
2	PSPA 202	Research Methodology	6	4		20	80	100
3	PSPA 203	Indian Government and Politics	6	4		20	80	100
4	PSPA 204	Public Policy	6	4		20	80	100
5	PSPA 205	A Indian National Movement	6	4	CF	20	80	100
		B Public Enterprises in India						
		C Administrative Techniques						
6	PSPA 206	A Comparative Politics	6	4	EF	20	80	100
		B International Administration						
Total			**36**	**24**		**120**	**480**	**600**
7	PSPA 207	Human Values and Professional Ethics - II	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core Papers are Mandatory**
- **Compulsory Foundation- Choose ONE Paper**
- **Elective Foundation – Choose ONE paper.**
- **Audit Course – 100 Marks (Internal) – Zero Credits under Self Study.**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.**

POLITICAL SCIENCE

SEMESTER-III

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	PS 301	International Relations	6	4	Core-Theory	20	80	100
2	PS 302	Indian Political System	6	4		20	80	100
3	PS 303	A Good Governance and Information Technology	6	4	Generic Elective	20	80	100
		B Local Government in India						
		C State Government and Politics of Andhra Pradesh	6	4		20	80	100
		D American Government and Politics						
4	PS 304	Personality Development and Employability	6	4	Skill Oriented	20	80	100
6	PS 305	A Social Movements in India	6	4	Open Elective	20	80	100
		B Human Rights and Indian Constitution						
Total			**36**	**24**		**120**	**480**	**600**

- **All Core Papers are Mandatory**
- **Generic Elective - Choose TWO Papers**
- **Skill Oriented Course is Mandatory.**
- **Open Electives are for the students of other Departments, Minimum One Paper should be opted, Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study.**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.**

PUBLIC ADMINSTRATION

SEMESTER-III

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	PA 301	Public Personnel Administration	6	4	Core-Theory	20	80	100
2	PA 302	State Administration in Andhra Pradesh	6	4		20	80	100
3	PA 303	A Good Governance and Information Technology	6	4	Generic Elective	20	80	100
		B Issues in Indian Administration						
		C Local Governments in AP	6	4		20	80	100
		D Political Dynamics						
4	PA 304	Personality Development and Employability	6	4	Skill Oriented	20	80	100
6	PA 305	A Industrial Relations and Personnel Management	6	4	Open Elective	20	80	100
		B Indian Polity and Governance						
Total			**36**	**24**		**120**	**480**	**600**

- **All Core Papers are Mandatory**
- **Generic Elective - Choose TWO Papers**
- **Skill Oriented Course is Mandatory.**
- **Open Electives are for the students of other Departments, Minimum One Paper should be opted, Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study.**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.**

POLITICAL SCIENCE

SEMESTER-IV

S. No	Code		Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	PS 401		India's Foreign Policy-Continuity, Changes and Emerging Challenges	6	4	Core-Theory	20	80	100
2	PS 402		Center-State Relations in India	6	4		20	80	100
3	PS 403	A	Comparative Governments: U.K, U.S.A, Switzerland	6	4	Generic Elective	20	80	100
		B	E-Governance						
		C	Indian Political Process	6	4		20	80	100
		D	South Asia in World Politics						
4	PS 404		Project Work	6	4	*PW	80 20	-	100
6	PS 405	A	Introduction to India's Foreign Policy	6	4	Open Elective	20	80	100
		B	Women and Politics						
Total				**36**	**24**		**120**	**480**	**600**

- **All Core Papers are Mandatory**
- **Generic Elective - Choose TWO Papers**
- ***Multidisciplinary Course/ Project work is Mandatory.**
- **Open Electives are for the students of other Departments, Minimum One Paper should be opted, Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study.**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.**

PUBLIC ADMINSTRATION

SEMESTER-IV

S. No	Code		Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	PA 401	Human Resource Management		6	4	Core-Theory	20	80	100
2	PA 402	Financial Administration		6	4		20	80	100
3	PA 403	A	Social Welfare Administration	6	4	Generic Elective	20	80	100
		B	Development Administration						
		C	Disaster Management	6	4		20	80	100
		D	Office Management						
4	PA 404	Project Work		6	4	*PW	80 20	-	100
6	PA 405	A	Indian Constitution	6	4	Open Elective	20	80	100
		B	Banking Management						
Total				**36**	**24**		**120**	**480**	**600**

- **All Core Papers are Mandatory**
- **Generic Elective - Choose TWO Papers**
- ***Multidisciplinary Course / Project work is Mandatory.**
- **Open Electives are for the students of other Departments, Minimum One Paper should be opted, Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study.**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.**

Core course:

There may be a Core course in every semester. This is the course which is to be compulsorily studied.

Elective course:

Elective Course is a course which can be chosen from a pool of papers. It may be

- Supportive to the discipline of study
- Provide an expanded scope
- Enable an exposure to some other discipline / domain
- Nature of student's proficiency / skill

An elective may be "**Generic Elective**" focusing on those courses which add generic proficiency to the students. These electives shall be "Discipline Centric". Three or Four Papers may be offered, of which **TWO** may be chosen.

Skill Oriented Course and Multidisciplinary Course / Project are introduced as per Action Plan of National Education Policy – NEP- 2020.

An elective may be **"Open Elective**" and shall be offered for other Disciplines only. At least **ONE** Paper must be chosen for study as **MANDATORY**. More than one paper may be studied through self-study.

Foundation course:

The Foundation Courses may be of two kinds: Compulsory Foundation and Elective Foundation.

Compulsory Foundation courses are the courses based upon the content that leads to knowledge enhancement. They are mandatory for all discipline.

Elective Foundation courses are value-based and are aimed at Man-Making education.

Scheme of instruction

The Board of Studies (BOS) of each specialization shall formulate the scheme of instruction and detailed syllabi. For every course learning objectives and learning outcomes should be defined. While formulating the scheme of instruction, the BOS shall facilitate to offer the minimum number of credits for the entire Programme. The syllabi of theory courses shall be organized into **FIVE** units of equal weight.

PART- A

Part A contains 20 marks with two short questions from Each Unit out of which the student has to answer **FIVE** questions with each question carrying 4 marks with a total of **20**marks.

PART-B

Examination in theory shall consist of **FIVE UNITS** in each paper, Two questions from each unit of syllabus out of which a student shall answer one question carrying 12 marks for each question with a total of 60 marks. Total of Part A and Part B will be of 80 marks.

PROJECT WORK

The work shall be carried out in the concerned department of the student or in any recognized Educational Institutions of Higher learning/ Universities /Industry/Organization as approved by the DDC. The student shall submit the outcome of the project work in the form of a report.

The Project Work shall be evaluated at the end of the IV Semester with **80** marks for the report and **20** marks for the Viva Voce with a maximum of **100** marks.

SEMESTER - I

PSPA 101: CONSTITUTION MAKING – INDIAN EXPERIENCE

Core Paper

Objectives

1. To provide knowledge and understanding of the Indian Constitution among the students.
2. To provide awareness about the Fundamental Rights, Fundamental Duties and Constitutional Amendment types and procedures of Indian Constitution.
3. To provide knowledge about Union Government, Judiciary and Election Commission.

Syllabus

Unit - I

a) National Movement – Historical Background

b) Working of the Constituent Assembly – Role of Dr. B.R.Ambedkar, Sardar Vallabhai Patel.

Unit – II

a) Salient features of Indian Constitution.

b) Parliamentary Form of Government Vs Presidential Form of Government.

Unit – III

a) Preamble, Fundamental Rights, Directive Principles of State Policy, Fundamental Duties.

b) Constitution as an Instrument of Socio-Economic Change.

Unit - IV

a) Union Government - Legislature – Lok Sabha, Rajya Sabha, Executive - President, Vice-President, Prime Minister, Council of Ministers, Speaker.

b) Judiciary -Supreme Court, Judicial Review and Judicial Activism, Public Interest Litigation.

Unit - V

a) Constitutional Amendments - Types and Procedures. Constitutional Bodies - Comptroller and Auditor General of India – Attorney General.

b) Election Commission - Union Public Service Commission-Finance Commission and National Human Rights Commission.

Suggested Readings

1. Government of India, The Constitution of India Bare Act with Amendments, Educreation Publishing, New Delhi, 2021.
2. Basu D D, Shorter Constitution of India, Lexis Nexis Publishers, New Delhi, 2021.
3. Bakshi P M, Constitution of India, Lexis Nexis Publishers, New Delhi,2021.
4. Mahendra Pal Singh, V. N. Shukla's Constitution of India, Eastern Book Company Publishers, New Delhi, 2021.
5. Dr. P.K. Agarwal & Dr. K.N. Chaturvedi, Commentary on the Constitution of India, Prabhat Prakashan Publishers, New Delhi, 2020
6. Sharma L P, Indian National Movement and Constitutional Development, Lakshmi Narain Agarwal Publishers, New Delhi, 2020.
7. Basu D D, An Introduction to Indian Constitution, Lexis Nexis Publishers, New Delhi, 2021.
8. Sharma L P, Indian National Movement, Lakshmi Narain Agarwal, Delhi, 2020.
9. Fadia B.L, Kuldeep Fadia, Indian Government and Politics, Sahitya Bhawan Publishers, New Delhi, 2020.
10. Dr. B.R. Ambedkar, The Constitution of India, Educreation Publishing, New Delhi, 2020.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	3	2	3	2	3	2	2	2	3
CO 2	3	3	2	3	2	3	2	3	2	2	2	3
CO 3	3	3	2	3	2	3	2	3	2	2	2	3

*1- Low, 2. Medium, 3. -Strong

PSPA 102: WESTERN POLITICAL THOUGHT

Core Paper

Objectives

1. To provide the views on Human Nature and Morality and Religion, Hobbes, Locke and Rousseau's social contract theories.
2. To provide the main features of Utilitarianism, Idealism, Scientific Socialism of Bentham, J.S.Mill, Hegel, Green and Marx.
3. To understand the concepts of Utilitarianism, Idealism and Scientific socialism in different aspects.

Syllabus

Unit-I: Renaissance Political Theory

a) Machiavelli and The Prince.

b) Modernism in Machiavelli's Political Thought.

Unit-II: Social Contract Theory

a) Thomas Hobbe's views on Nature of State – Theory of Social Contract.

b) John Locke's Views on Human Nature and State of Nature - Theory of Social Contract and Rousseau's views on Social Contract and General Will.

Unit-III: Utilitarianism

a) Jermy Bentham and his Contribution to Political Ideas.

b) J.S.Mill views on Liberty, Representative Government.

Unit-IV: Idealism

a) Hegel's Theory of State

b) T.H. Green's Theory of State.

Unit-V: Scientific Socialism

a) Utopian Socialism

b) Karl Marx Theory of Socialism.

Suggested Readings

1. Selected Heed Editorial Board, Western and Indian Political Thinkers, Heed Publication Pvt. Ltd, New Delhi, 2021.
2. S.K. Sharma Urmila Sharma, Western Political Thought: From Plato to Burke (Volume1), Atlantic Publishers and Distributors (P) Ltd, New Delhi, 2021.
3. Gauba, Western Political Thought 4th Edition, Mayoor Publishers, New Delhi, 2021.
4. Subrata Mukherjee & Sushila Ramaswamy, A History of Political Thought - Plato to Marx, Jain Hook Agency Publishers, New Delhi, 2021
5. S.K. Sharma Urmila Sharma, Western Political Thought: From Plato to Burke, Atlantic; Latest edition, New Delhi, 2021.
6. Sharma Urmila, Western Political Thought from Plato to Burke, Atlantic Publishers & Distributors Pvt. Ltd, New Delhi, 2021.
7. Archna Chaturvedi, Western Political Thought, Nation Press, New Delhi, 2021.
8. R.C.Gupta, Western Political Thought, Lakshmi Narain Agarwal, New Delhi, 2021.
9. Amal Kumar Mukhopadhyay, Western Political Thought From Ancient Greeks to Modern Political Scientists, Sage Publication, Delhi, 2020.
10. Gauba O.P., Western Political Thought, National Paperbacks Publishers, New Delhi, 2019.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Life long Learning
CO 1	3	3	1	2	2	3	3	3	2	1	1	3
CO 2	3	3	1	2	2	3	3	3	2	1	2	3
CO 3	3	3	2	2	2	3	3	3	2	2	1	3

*1- Low, 2. Medium, 3.-Strong

PSPA 103: MODERN POLITICAL ANALYSIS

Core Paper

Objectives

1. To provide knowledge about the Behaviouralism, Post-Behaviouralism, Game theory and Communication theories.
2. To bring awareness about the major political concepts like Power, Authority, Political Development and the Modern Political Ideologies of Mahatma Gandhi and Dr. B.R. Ambedkar.
3. To explain the Nature, Scope and significance and Approaches to the study of Modern Political Analysis.

Syllabus

Unit-I: Political Analysis

a) Meaning, Nature, Scope, Significance and Approaches to the study of Modern Political Analysis.

b) Fact - Value Dichotomy.

Unit-II: Political Systems

a) Behaviouralism / Features/Limitations

b) Post - Behaviouralism

Unit-III: Decision-Making Theories

a) Input-Output Theory

b) Game Theory, Communication Theory

Unit-IV: Major Concepts

a) Power, Authority and Legitimacy

b) Political Development

Unit-V: Ideology

a) Mahatma Gandhi – His Philosophy

b) Dr. B. R. Ambedkar – His Philosophy

Suggested Readings

1. Jayapalan N, Modern Political Analysis, Atlantic Publishers and Distributors (P) Ltd, New Delhi, 2021.
2. John Staddon, The New Behaviorism Foundations of Behavioral Science, Routledge Publishers, United Kingdom, 2021.
3. Robert A. Dahl and Bruce Stinebrickner, Modern Political Analysis, 6th edition, Pearson Publishers, New Delhi,2020.
4. R.P. Sahani, Ambedkar Political Philosophy, Global Vision Publishing House, New Delhi, 2019.
5. P. B. Rathod, Modern Political Analysis, A B D Publishers, New Delhi, 2012.
6. Easton, David, The Political System, Scientific Book Agency, Calcutta, 2000.
7. Venkata Subbaiah C & Muralidhar B.V., Modern Political Theory, S.V. University, Distance Mode Publication, Tirupati, 1990.
8. S.P. Varma, Modern Political Theory, S Chand Publications, New Delhi, 2018.
9. N.Jayapalan, Comprehensive Modern Political Analysis, Atlantic Publishers & Distributors Pvt. Ltd, New Delhi, 2020.
10. Colin Hay, Political Analysis: A Critical Introduction, Palgrave Macmillan Publishers, London, United Kingdom, 2002.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Life long Learning
CO 1	3	3	2	2	2	3	2	3	2	3	1	3
CO 2	2	3	1	2	2	3	3	3	2	1	1	3
CO 3	3	3	2	2	2	3	3	3	2	1	1	3

*1- Low, 2. Medium, 3. -Strong

PSPA 104: PRINCIPLES OF PUBLIC ADMINISTRATION

Core Paper

Objectives

1. To provide awareness about the classical approach of Henry Fayol, Luther Gullick and Urwick.
2. To give indepth knowledge about the principles of organization, new Public Administration in the era of Globalization.
3. To define Meaning, Nature and Importance of Public Administration in Developing Societies.

Syllabus:

Unit-I

a) Meaning, Nature, Scope and Importance of Public Administration.

b) Evolution of Public Administration.

Unit-II

a) Woodrow Wilson - Politics and Administrative Dichotomy.

b) Classical Approach-Henry Fayol, Luther Gullick and Urwick

Unit-III

a) Organization – Types of Formal and Informal Organization.

b) Principles of Organization- Hierarchy, Unity of Command, Span of Control, Delegation, Centralization, and Decentralization, Division of Work, Co-ordination and Motivation,

Unit-IV

a) Leadership –Qualities, Styles.

b) Communication –Types and Principles.

Unit-V

a) New Public Administration, Minnowbrooke Conferences

b) Public Administration and Globalization.

Suggested Readings

1) Spectrum Authors, Public Administration Theories and Principles, Spectrum Books Pvt. Ltd, New Delhi, 2021

2) Fadia B.L, Public Administration in India, v Publishers, New Delhi, 2021.

3) Naidu S P, Public Administration: Concepts and Theories, Second edition, New Age International Private Limited, New Delhi, 2021.

4) Myneni S R, Principles of Public Administration, Alahabad Law Agency, New Delhi, 2016.

5) Avasthi and Maheswari, Public Administration, Lakshminarayan Agarwal, Agra, New Delhi, 2020.

6) Laxmikanth M, Public Administration, McGraw Hill Education (India) Private Limited, Noida, 2020.

7) Donald Menzel and Harvey White (eds), The State of Public Administration: Issues, Challenges and Opportunities, New York, ME. Sharpe, 2011.

8) Battacharya, Mohit, New Horizons of Public Administration, Jawahar Publishers, New Delhi, 2013.

9) Ravindra Prasad, D.Prasad V.S Prasad, Satyanarayana P. and Y.Parthasaradhi (eds.), Administrative Thinkers, Sterling, New Delhi, 2013.

10) Jan-Erik Lane, New Public Management: An Introduction, Routledge Publishers, London, 2000.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	3	2	2	3	2	2	2	2	1	2	2
CO 2	3	3	2	2	3	3	2	2	2	1	2	2
CO 3	3	3	2	2	3	3	2	2	2	1	2	2

*1- Low, 2. Medium, 3.-Strong

PSPA 105(A): POLITICAL SOCIOLOGY

Compulsory Foundation Paper

Objectives

1. To provide knowledge about the Approaches to the study and Weber's contribution to the Political Sociology.
2. It introduces the awareness about the Political Development, Modernization, Leadership, Communication and Political Culture and Socialization to the students.
3. To give Specific Information about the Nature, Scope and Significance of "Political Sociology" and other social sciences.

Syllabus

Unit-I:

a) Political Sociology – its Nature, Scope and Significance.

b) Political Sociology and other Social Sciences.

Unit-II:

a) Approaches to the Study of Political Sociology.

b) Max Weber's Contribution to Political Sociology.

Unit-III:

a) Political Development.

b) Political Modernization.

Unit-IV:

a) Political Leadership.

b) Political Communication.

Unit-V:

a) Political Culture.

b) Political Socialization – Agents.

Suggested Readings

1. Neeraj, Political Sociology, Neeraj Publications, New Delhi, 2021.
2. Chakraborty Satyabrata, Political Sociology, Trinity Publishers, New Delhi, 2021.
3. Pukhraj Jain, Dr. B.L. Fadia, Political Sociology, Sahitya Bhawan Publishers,New Delhi, 2017.
4. Mishra, S.K., Political Sociology, Sri Durga Pustak Bhandar Publishers, Sambalpur, 1989
5. Gajanafar Alam, Political Sociology, K.K. Publications, New Delhi, 2014.
6. Palekar, S.A., Political Sociology, Mangalam Publications, Delhi, 2010.
7. Pradip Basu, Political Sociology, Setu Prakhashani Publishers, New Delhi, 2015
8. Janowitz, M., Political Sociology in Encyclopedia of Social Sciences, Free Press, McMillan, 1961.
9. Venkata Subbaiah. C & Muralidhar B.V, Modern Political Theory, S.V. University, Distance Mode Publication, Tirupati, 1990.
10. Sushil Kumar Saxena and Satish Mittal, Political Sociology, Arjun Publishing House, Delhi, 2012.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	1	2	1	2	2	2	1	2	2
CO 2	3	3	2	2	3	2	2	2	2	3	2	2
CO 3	3	2	2	1	2	1	2	2	2	2	2	2

*1- Low, 2. Medium, 3.-Strong

PSPA 105(B): INDIAN POLITICAL THOUGHT

Compulsory Foundation Paper

Objectives

1. To provide knowledge about the Ancient Indian thought it includes the concept of Dharma and Danda, Rajadharma, Manu Social Laws and the Koutilya's theory of State.
2. It also provides the knowledge to the students about the theory of Kingship, Ideal polity and Monarchy.
3. To provide knowledge about the Swami Vivekananda Ideal Societies, Pandita Ramabai about the gender, Mahatma Gandhi Swaraj and Dr. B.R. Ambedkar Social Justice, Nehru's Secularism, Ram Manohar Lohia's Socialism.

Syllabus

Unit-I:

a) Ancient Indian Thought - Sources; The Concept of Dharma and Danda.

b) Nature of State in ancient India.

Unit-II:

a) Veda Vyasa (Shantiparva) - Rajadharma, Manu -Social Laws.

b) Kautilya – Theory of State.

Unit-III:

a) Agganna Sutta (DighaNikaya) – Theory of Kingship

b) Ziauddin Barani – Ideal Polity, Abul Fazal- Monarchy

Unit-IV:

a) Raja Ram Mohan Roy – Rights, Pandita Ramabai – Gender.

b) Swami Vivekananda – Ideal Society.

Unit-V:

a) Mahatma Gandhi – Swaraj, Dr. B. R. Ambedkar – Social Justice.

b) Vinayak Damodar Savarkar – Hindutva, Jawaharlal Nehru – Securalism, Ram Manohar Lohia – Socialism.

Suggested Readings

1. Gauba O. P, Indian Political Thought, National Paperbacks Publishers, New Delhi, 2021.
2. Urmila Sharma, Indian Political Thought, Atlantic Publishers, New Delhi, 2020
3. Himanshu Roy and M P. Singh, Indian Political Thought: Themes and Thinkers, Third Edition, Pearson Education Publishers, New Delhi, 2020.
4. Bhikhu Parekh, Gandhi's Political Philosophy, London: Macmillan Press, 1989.
5. Bhikhu Parekh, Colonialism, Tradition and Reform: An Analysis of Gandhi's Political Discourse, Sage Publications, New Delhi, 1989.
6. Bhikhu, Parekh and Thomas Pantham (eds.), Political Discourse: Explorations in Indian and Western Political Thought, Sage Publication, New Delhi, 1987.
7. Bidyut Chakrabarty and Rajendra Kumar Pandey, Modern Indian Political Thought: Text and Context, Sage Publication, New Delhi, 2009.
8. Partha Chatterjee, Nation and its Fragments, Oxford University Press, New Delhi, 1994.
9. Partha Chatterjee, Nationalist Thought and the Colonial World: A Derivative Discourse? Zed Books, London, 1986.
10. V. R. Mehta and Thomas Pantham (ed.), Political Ideas in Modern India: Thematic Explorations, Sage Publications, Delhi, 2006.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	3	2	2	2	1	2	2	2	2	2	2
CO 2	3	3	2	2	2	2	2	2	2	2	2	2
CO 3	3	2	2	2	2	3	2	2	2	2	1	2

*1- Low, 2. Medium, 3. -Strong

PSPA 105(C): PUBLIC RELATIONS& MASS COMMUNICATION

Compulsory Foundation Paper

Objectives

1. It provide knowledge about the essentials, principles, characteristics, scope of Public relations and the powers and functions of Ministry of Information and Broadcasting.
2. To provide the knowledge about the theories of mass communication and corporate Public Relations.
3. To provide the knowledge about the Employees and Stake holders, education and committees relations, Public Relations and Social Responsibilities, Right to information and Intellectual Properties Rights.

Syllabus

UNIT – I

a) Public Relations: Evolution, Essentials and Principles.

b) Ministry of Information and Broadcasting - Organizations, Functions.

UNIT – II

a) Mass Communication: Characteristics, Scope, Mass Communication and Mass Culture.

b) Functions of Mass Communication: Persuade, Inform, Educate and Entertain: Impact & Influence of Mass Media.

UNIT – III

a) Theories of Mass Communication- Cognitive Theory, Authoritarian Theory, Libertarian Theory.

b) Corporate Public Relations: Process elements and Management of Corporate Public Relations.

UNIT - IV

a) Employee and Stake holder Relations.

b) Education and Community Relations.

UNIT - V

a) Professional Code: Meaning, Principles and Code of Ethics (International, IPRA)

b) Public Relations and Social Responsibility, Right to information, Intellectual Property Rights.

Suggested Readings

1. Karen Freberg, Discovering Public Relations An Introduction to Creative and Strategic Practices, Sage Publications, New Delhi, 2020

2. D.S. Mehta, Handbook of Public Relations in India, Allied Publishers Ltd, New Delhi, 1998.

3. Diwaker Sharma, Public Relations: An Emerging Specialized Profession, Deep& Deep Publication Pvt. Ltd. New Delhi, 2004.

4. Frazier Moore, Frank B. Kalup, Public Relations: Principles, Cases, and Problems, Richard Irwin Publishers, New York, 2002.

5. U.K. Singh & B. Narayan, Public Relations Management, Anmol Publications Pvt. Ltd., New Delhi, 1999.

6. Sumit Narula, Mass Communication: Theory and Practice, Regal Publications, New Delhi, 2011.

7. Reddi C.V.N, Effective Public Relations and Media Strategy, Prentice Hall India Learning Private Limited, New Delhi, 2013.

8. Iqbal Sachdeva, Public Relations: Principles and Practices, Oxford University Press, New Delhi, 2009.

9. Jaishri Jethwaney and Sarkar N. N, Public Relations Management, Sterling Publishers, New Delhi, 2015.

10. Seema Hasan, Mass Communication, CBS Publishers and Distributors, New Delhi, 2021.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	3	2	2	2	2	2	2
CO 2	3	2	2	1	2	1	2	2	2	3	3	2
CO 3	2	2	2	2	2	1	2	2	2	2	2	2

*1- Low, 2. Medium, 3.-Strong

PSPA 106(A): DYNAMICS OF PUBLIC ADMINISTRATION

Elective Foundation Paper

Objectives

1. To provide knowledge about the meaning, concept, and models of Development Administration.
2. To provide information about the New Public Management, New Public Service and Public Governance.
3. To familiarize the students with Evolution and Models of Digital Governance, Citizen Empowerment models of Digital Governance, Citizen Empowerment and also Millennium and Sustainable Development Goals.

Syllabus

Unit-I

a) Comparative Public Administration - Concepts and Approaches

b) Development Administration – Meaning, Concept and Models.

Unit-II

a) New Public Management

b) Public Choice Approach

Unit-III

a) New Public Service

b) Public Governance

Unit-IV

a) Millennium and Sustainable Development Goals

b) Citizen Empowerment and Development

Unit-V

a) Digital Governance – Evolution and Models

b) Digital India.

Suggested Readings

1) Michael E. Milakovich, Digital Governance Applying Advanced Technologies to Improve Public Service, Routledge Publishers, United Kingdom, 2021.

2) Abul Kashem Mozumder, Dynamics of Public Administration and Management, A H Development Publishing House, New Delhi, 2018

3) Rajeev Sijariya, Rahul Sharma, Digital India A Socio Economic Transformation, Bharti Publications, New Delhi, 2017.

4) Myneni S R, Principles of Public Administration, Allahabad Law Agency, New Delhi, 2016.

5) Avastashi and Maheswari, Public Administration, Lakshminarayan Agarwal Agra, 2012.

6) Battacharya, Mohit, New Horizons of Public Administration, Jawahar Publishers, New Delhi, 2013.

7) Ravindra Prasad, D. Prasad V.S Prasad, Satyanarayana P. and Y. Parthasaradhi (eds.), Administrative Thinkers, Sterling, New Delhi, 2013.

8) Jan-Erik Lane, New Public Management: An Introduction, Routledge Publishers, United Kingdom, 2000.

9) Baker, R.J.S., Administrative Theory and Public Administration, Hutchinson University Library, London, 1972.

10) Denhardt, Robert B. and Joseph W. Grubbs, Public Administration: An action Orientation, Fourth Edition, Thomson (Wadsworth), Canada, 2003.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communication	PO11 Programme Management	PO12 Life long Learning
CO 1	2	2	2	3	2	1	2	2	2	2	2	2
CO 2	3	3	2	2	3	2	2	2	2	2	2	2
CO 3	3	3	2	2	2	2	2	2	2	2	2	3

*1- Low, 2. Medium, 3.-Strong

PSPA 106(B): GLOBALIZATION AND INDIAN POLITICAL ECONOMY

Elective Foundation Paper

Objectives

1. To familiarize the students with the different theoretical approaches.
2. To give a brief overview of the history of the evolution of the modern capitalist world.
3. To highlight the important contemporary problems, issues and debates on how these should be addressed.

Syllabus

Unit - 1

a) Concept of Globalization, Political Economy - Nature, Scope and Significance

b) Evolution of States in India-Planning, Redistribution.

Unit-II

a) Impact of Colonial Rule on Indian Economy

b) Land Reforms and Green Revolution- Their Impact

Unit –III

a) Indian Economy— Salient Features

b) Political Parties and their Approach to Economic Development: Congress, BJP and Left Parties.

Unit - IV

a) Economic Reforms in India – Rajiv Gandhi and Post 1991

b) Regions in Politics- Uneven development, Regional Inequality

Unit - V

a) World Bank and International Monetary Fund

b) World Trade Organization

Suggested Readings

1. A Panel of Authors, Indian Economy : Performance and Policies 21st Edition 2020-2021, Academic Foundation Publishers, New Delhi, 2020.

2. Yadav R, Globalisation & the Indian Economy, New Century Publications, New Delhi, 2009.

3. Ramesh Chandra,Globalisation, Liberalisation, Privatisation and Indian (Industry), Vol.3,Disha Books Orient Longman Publishers, New Delhi,2020

4. Douglas Hurt, The Green Revolution in the Global South: Science, Politics, and Unintended Consequences (NEXUS),The University of Alabama Press, USA,2020.

5. Brass, Paul R, The Politics of India since Independence, Cambridge University Press, Cambridge, 1992.

6. Terence, J. (Ed), The State and Development Planning in India, Oxford University Press, Delhi, 1994.

7. Chatterjee, Partha, A Possible India: Essays in Political Criticism, Oxford University Press, Delhi, 1997.

8. Rahul Mukherji, Political Economy of Reforms in India, Oxford Press, New York, USA, 2014.

9. Datt & Sundharam, Indian Economy, S Chand Publishers, New Delhi, 2016.

10. Dinesh Aggarwal and A.K. Mohapatra, Globalization &The Indian Economy, Prateeksha Publications, New Delhi, 2011.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	1	2	2	2	2	2	2
CO 2	2	2	2	2	2	1	1	1	2	2	2	2
CO 3	3	2	2	1	2	1	2	2	2	2	2	2

*1- Low, 2. Medium, 3.-Strong

PSPA 107: HUMAN VALUES AND PROFESSIONAL ETHICS-I

Audit Course

Objectives

1. To provide Human Values and Ethics relating to Religion, Politics, Business, Law, Medicine and Environment.
2. It also gives indepth knowledge about the Moral and Ethical values to interpretation in their day to day activities of life.
3. To provide specific knowledge about the Nature of Values, Individual and society, crime and theories of punishment.

Syllabus:

Unit-I:

a) Definition and Nature of Ethics- Its Relation to Religion, Politics, Business, Law, Medicine and Environment.

b) Need and Importance of Professional Ethics - Goals - Ethical Values in Various Professions.

Unit-II:

a) Nature of Values-Good and Bad, Ends and Means, Actual and Potential Values, Objective and Subjective Values, Analysis of Basic Moral Concepts-Right, ought, duty, obligation, justice.

b) Responsibility and Freedom, Good Behavior and Respect for Elders. Character and Conduct.

Unit-III:

a) Individual and Society: Ahimsa (Non-violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha (Non- stealing).

b) Purusharthas (Cardinal virtues) Dharma (Righteousness), Artha (Wealth), Kama (fulfillment bodily desires), Moksha (Liberation).

Unit-IV:

a) Bhagavad Gita- (a) Niskama Karma. (b) Buddhism- The Four Noble Truths - Arya Astanga Marga. (c) Jainism-Mahavratas and Anuvratas.

b) Values Embedded in Various Religions, Relirious tolerance, Gandhian ethics.

Unit-V:

a) Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent.

b) Views on Manu and Yajnavalkya.

Suggested Readings

1. Saroj Kumar and Sheenu Nayyer, Universal Human Values and Professional Ethics,Thakur Publication Pvt Ltd , Lucknow, Uttar Pradesh ,2020
2. Naagarazan R S, A Textbook on Professional Ethics and Human Values , New Age International Publishers, 2017.
3. Singh and Dhanpat Rai, Human Values & Professional Ethics, Dhanpat Rai Publishers, New Delhi, 2016.
4. Yogendra, Human Values & Professional Ethics, AITBS Publishers, New Delhi,2010
5. John S Mackenjie: A Manual of Ethics, Cosmo Publishers, USA, 2020.
6. Purushottama Bilimoria, Indian Ethics: Classical Traditions and Contemporary Challenges: Volume I, Routledge Publishers, Delhi, 2007.
7. S.A. Sherlekar, Ethics in Management, Himalaya Publishing House, New Delhi, 2005.
8. Hindu Ethics: A Philosophical Study, University of Hawaiì Press, Publishers, Honolulu, USA, 1998.
9. John Deigh, An Introduction to Ethics, Cambridge Publishers, 2015.
10. John Murdoch, The Laws of Manu: or Manava Dharma-Sastra, Forgotten Books Publishers, London, United Kingdom, 2018.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	3	1	3	3	3	2	2	2	2
CO 2	3	2	2	3	2	1	2	3	2	2	2	2
CO 3	3	2	2	3	2	2	2	2	2	2	2	3

*1- Low, 2. Medium, 3. Strong

SEMESTER-II

PSPA 201: ADMINISTRATIVE THEORIES

Core Paper

Objectives

1. To provide knowledge about the various types of Administrative theories like Management theories and Science of Administration.
2. This course also enriches the students to have indepth information about the Bureaucratic, Decision Making, Needs of Hierarchies and Human Relations theories.
3. To enrich the students by providing Nature, Evolution and Emerging trends in Administrative theories.

Syllabus:

Unit-I

a) Meaning, Nature and Importance of Theory.

b) Evolution and Emerging Trends in Administrative Theory.

Unit-II

a) Henry Fayol –Principles of Management and F.W. Taylor - Scientific Management.

b) Luther Gulick and Lyndall Urwick – Science of Administration.

Unit-III

a) Max Weber – Concept of Bureaucracy.

b) Herbert Simon – Decision-Making Theory.

Unit-IV

a) Abraham Maslow – Motivation Theory

b) Doughlas McGregor – Theory X and Theory Y

Unit-V

a) Elton Mayo – Human Relations Theory.

b) F.W Riggs Ecology of Public Administration.

Suggested Readings

1) Sanjay Kumar, Aniket Shonak, Administrative Theory, Straight Forward Publishers Pvt. Ltd, Delhi, 2021.

2) Vijay Aggarwal, Administrative Thinkers, Teenage Publishers, New Delhi, 2021.

3) Ravindra Prasad, D. and P. Satyanarayana and Others (ed.), Administrative Thinkers, Sterling, New Delhi, 2013.

4) Rakesh Hooja, Administrative Theories : Approaches, Concepts and Thinkers in Public Administration, Rawat Publications, Jaipur, 2007.

5) Team Spectrum Books, Public Administration Theories and Principles, Spectrum Publishers, Delhi, 2021.

6) Sapru R K, Administrative Theories And Management Thought, PHI Learning Publishers, Delhi,2021

7) Naidu S P, Public Administration: Concepts and Theories, New Age International Private Limited Publishers, Delhi, 2021.

8) Sanjay Kumar, Aniket Shonak, Administrative Theory, Straight Forward Publishers Pvt. Ltd., Delhi, 2021.

9) Kumar Anil, Administrative Theory & Thought, Ancient Publishing House, Delhi,2021.

10) Gollybaba, Administrative Theory, Gullybaba Publishing House Pvt. Ltd, New Delhi, 2020.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Life long Learning
CO 1	3	3	2	2	2	2	2	2	2	2	2	3
CO 2	3	2	3	2	3	3	3	2	3	2	2	3
CO 3	3	2	2	1	2	1	2	2	2	2	2	2

*1- Low, 2. Medium, 3. -Strong

PSPA 202: RESEARCH METHODOLOGY

Core Paper

Objectives

1. To provide Basic Knowledge about the Research Methods, Technologies and Research Design in Social Sciences.
2. To inculcate knowledge about sampling types, Data Collection tools techniques, Report writing and use of computers in Social Science Research.
3. To explain the significance of Social Science Research in various types and techniques.

Syllabus

Unit-I

a) Social Science Research - Meaning, Nature, Scope and Importance.

b) Methods of Research and Techniques

Unit-II

a) Hypothesis – Meaning – Types – Sources

b) Formulation of Research Design.

Unit-III

a) Sampling- Types of Sampling in Social Science Research.

b) Case Study Method – Characteristics – Limitations.

Unit-IV

a) Data collection – Tools and Techniques.

b) Data Processing and Analysis.

Unit- V

a) Report Writing.

b) Use of Computers in Social Science Research.

Suggested Readings

1. David E. McNabb, Research Methods For Political Science Quantitative Qualitative and Mixed Method Approaches, Taylor & Francis Ltd, Abingdon, United Kingdom, 2021.
2. Ashutosh Kumar, Research Methodology and Techniques in Political Science, ABD Publishers, New Delhi, 2021.
3. Sandra van Thiel, Research Methods in Public Administration and Public Management: An Introduction, Routledge Publishers, New Delhi, 2021.
4. Rajat Acharyya, Nandan Bhattacharya, Research Methodology for Social Sciences, Routledge Publishers, New Delhi, 2020.
5. Kevin S, Research Methodology for Social Sciences, ANE Books Publishers, New Delhi, 2019.
6. Kothari C R , Gaurav Garg, Research Methodology : Methods And Techniques, New Age International Publishers Fourth edition, New Delhi, 2019.
7. Arunangshu Giri, Debasish Biswas, Research Methodology for Social Sciences ,Sage Publishers, Delhi, 2019.
8. Mukesh H. Khatik, Research Methodology in Political Science ,JTS Publications , Delhi, 2018.
9. Arunangshu Giri, Debasish Biswas, Research Methodology for Social Sciences, SAGE Publications India Pvt. Ltd, New Delhi, 2018
10. John W. Creswell and Cheryl N. Poth, Qualitative Inquiry and Research Design, Sage Publishers, USA, 2017.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	3	2	2	2	2	2	1	2	2	2	3
CO 2	3	3	2	2	2	3	2	1	3	3	3	3
CO 3	2	2	2	2	2	2	2	1	2	2	2	3

*1- Low, 2. Medium, 3.-Strong

PSPA 203: INDIAN GOVERNMENT AND POLITICS

Core Paper

Objectives

1. To provide knowledge about the making of Indian constitution, the appointment, process and functions of Indian President and Prime Minister.
2. It also explains the information about the Indian Union Legislature's structure, process, functions and the role of Bureaucracy, NITI AYOG and the structure process and functions of Indian Judicial System and process.
3. It gives knowledge about Indian National Movement, Constitutional Development and coalition politics in India.

Syllabus

Unit- I

a) Indian National Movement

b) Constitutional Development - Framing of The Indian Constitution

Unit- II

a) Indian President - Election, Powers and Role

b) Prime Minister – Appointment, Functions and Role.

Unit- III

a) Indian Parliament – Lok Sabha and Rajya Sabha - Organization, Powers and Role.

b) Lok Sabha Speaker, Rajya Sabha – Chairman, Deputy Chairman

Unit- IV

a) Role of Civil Services in Democracy

b) Five Year Plans, NITI AAYOG

Unit- V

a) Indian Judiciary - Structure, Judicial Activism

b) Coalition Politics in India.

Suggested Readings

1) Ghosh, Peu, Indian Government and Politics, PHI Learning Pvt. Ltd., New Delhi, 2021.

2) Bidyut Chakrabarty and Rajendra Kumar Pandey, Indian Government and Politics, Sage Publications, 2021.

3) Preetam V. Jain, Constitutional Government & Democracy in India, Mahaveer Publications, Delhi, 2021.

4) Avasthi A P, Indian Government and Politics, Lakshmi Narayan Agarwal Publications, Delhi, 2020.

5) Sangeeta Yellappa, Coalition Governments in India, Manglam Publications, Delhi, 2020.

6) Sharma L P, Indian National Movement, Lakshmi Narain Agarwal, Delhi, 2020.

7) Fadia B.L, Kuldeep Fadia, Indian Government and Politics, Sahitya Bhawan Publishers, New Delhi, 2020.

8) Sharma L P, Indian National Movement and Constitutional Development, Lakshmi Narain Agarwal Publishers, New Delhi, 2020.

9) Bhambhri C P, Understanding Indian Politics, Shipra Publications, New Delhi, 2018.

10) Singhvi L M, Evolution of Indian Judiciary, Prabhat Prakashan, New Delhi, 2016.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	3	2	2	1	2	2	2	2	3
CO 2	3	2	2	3	2	2	1	2	2	2	2	3
CO 3	2	2	2	1	2	1	3	2	3	3	2	3

*1- Low, 2. Medium, 3.-Strong

PSPA 204: PUBLIC POLICY

Core Paper

Objectives

1. It will provide Basic knowledge about the various types of theories, Technologies and process relating to policy formulation in Government organizations.
2. This course also enriches the Students knowledge about the involvement of Bureaucrats, Political Parties and NGO's in Policy formulation and implementation.
3. To provide Specific knowledge about Public Policy and Policy making Techniques in the form of System's theory and Elite Theory.

Syllabus

Unit-I

a) Meaning, Nature, Scope and Importance of Public Policy.

b) The Policy -Making Process.

Unit-II

a) System's Theory.

b) Elite Theory.

Unit-III

a) Policy Formulation and Implementation.

b) Role of Political Parties in Policy Formulation.

Unit-IV

a) Role of Bureaucracy in Public Policy Making.

b) Non-Governmental Organizations in Policy Making.

Unit-V

a) Good-governance and Public Policy Making.

b) Role of Information Technology in Public Policy Process.

Suggested Readings

1. Ram Chandrashekharan, Public Policy and Administration in India, Academic Aspirations Publishers, New Delhi, 2021.
2. Furqan Ahmad, Public Policy in India, Adroit Publishers, New Delhi, 2021.
3. Kuldee Mathur, Public Policy and Politics in India- How Institutions Matter, Oxford University Press, New Delhi, 2020.
4. Sapru R K and Y. Sapru, Public Policy: Formulation, Implementation and Evaluation, Sterling Publications Private Limited, 2020.
5. Radhakrishan Sapru, Public Policy: A Contemporary Perspective, Sage Publications India Private Limited, New Delhi, 2017.
6. Thomas R. Dye, Understanding Public Policy: Books a La Carte, 15th edition, Pearson College Publishers, London, United Kingdom, 2017.
7. Wilson, Carter, Public Policy: Continuity and Change. Illinois: Waveland Press, 2006.
8. Anderson, J, Public Policy-Making: An introduction (revised 6th edition), Houghton Miffl in, Boston, 2005.
9. Araral Jr. Fritzen Michael Howlett, M Ramesh and Xun Wu, Routledge Handbook of Public Policy, Routledge, New York, 2013.
10. Fischer, F., Reframing Public Policy: Discursive Politics and Deliberative Practices, Oxford University Press, USA, 2003.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	3	2	2	2	1	2	2	2	2	2	3
CO 2	2	2	2	2	2	3	2	2	2	2	2	3
CO 3	2	3	2	2	2	1	2	2	2	2	2	2

*1- Low, 2. Medium, 3.-Strong

PSPA 205(A): INDIAN NATIONAL MOVEMENT

Compulsory Foundation Paper

Objectives

1. To provide knowledge about the Swadeshi Movement, Morley-Minto Act, 1909, Home Rule Movement 1916 and Mahatma Gandhi's Satyagrahas.
2. To Provide Knowledge about the Montagu Chelmsford Act, 1919, Khilafat and Non Cooperation Movement.
3. To provide knowledge about the Revolution Terrorism in 1920s, Simon Commission, Civil Disobedience Movement, Govt. of India Act, 1935, Crips Mission, Wavell Plan Mountbatten Plan and also Quit India Movement.

Syllabus

Unit-I

a) Background of Indian National Movement – 1857 uprising.

b) Swadeshi Movement.

Unit-II

a) Morley-Minto Act, 1909, Home Rule Movement 1916.

b) Emergence of Mahatma Gandhi – Champaran Satyagraha, Kheda Satyagraha, Satyagraha against Rowlatt Act.

Unit-III

a) Montagu Chelmsford Act, 1919.

b) Khilafat and Non Cooperation Movement, Swaraj Party.

Unit-IV

a) Revolutionary Terrorism in 1920s, Simon Commission and Nehru Report.

b) Civil Disobedience Movement, Government of India Act, 1935.

Unit-V

a) August Offer, Crips Mission, Wavell Plan, Mountbatten Plan.

b) Quit India Movement.

Suggested Readings

1. Gazal Bharadwaj, The Making of Modern India, Oak Bridge Publishing, New Delhi, 2021.
2. Vikas Divyakirti, History of India and Indian National Movement, VDK Publications PVT Ltd, New Delhi, 2021.
3. Sharma L P, Avasthi & Avasthi, Indian National Movement and Constitution of India, Lakshmi Narain Agarwal, Educational Publishers, New Delhi, 2020.
4. Amarkant Singh, Indian Freedom Struggle, R.K. Publsiher & Distributors, New Delhi, 2019.
5. Bipan Chandra (ed.), Freedom Struggle, India Penguin Publishers, Delhi, 2017.
6. Tara Chand, History of The Freedom Movement In India Volume Two, Publication Division, New Delhi, 2016.
7. Sekhar Bandyopadhyay, From Plassey to Partition: A History of Modern India Oriental Longman, Hyderabad, 2004.
8. Irfan Habib: The National Movement, The First Phase, till 1918, Tulika Books, New Delhi, 2017.
9. Gullybaba, Indian National Movement, Gullybaba Publishing House Pvt. Ltd, New Delhi 2021.
10. Aggarwal R.C, Constitutional Development and National Movement of India, S Chand & Company, 2005.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	1	3	2	2	2	2	2	3
CO 2	2	2	2	2	2	2	1	2	2	2	2	3
CO 3	3	3	2	2	2	1	3	2	3	3	2	3

*1- Low, 2. Medium, 3. -Strong

PSPA 205(B): PUBLIC ENTERPRISES IN INDIA

Compulsory Foundation Paper

Objectives

1. To provide knowledge about the Forms of organization, its advantages, disadvantages, their powers and functions.
2. It also provides Personnel Management process like Recruitment process procedure, training and Employer-Employee Relations and Financial Management in the organization.
3. It provides in-depth knowledge about the Parliamentary Committees on Public Enterprises, Administrative Reforms Commission Recommendations in relation to the Audit and Accounts.

Syllabus

Unit - I

a) Nature, Scope, and Importance of Public Enterprises in India

b) Origin and Growth of PEIs.

Unit-II

a) Forms of Organization – Departmental, Company and Corporation - Advantages and Disadvantages.

b) Governing Boards and Mixed Boards: Composition, Powers and Functions

Unit –III

a) Recruitment and Selection Procedure, Training, Employer – Employee Relations and Labour Welfare Programmes.

b) Financial Management: Pricing Policy in Public Enterprises, ARC Recommendations, Administrative Problems- ARC and Study Teams recommendations on Material Management.

Unit - IV

a) Parliamentary Committee on Public Enterprises – History, Constitution, Powers and Functions, Committee on Public Enterprises and Bureau of Public Enterprises.

b) Audit Boards and their Constitution and Functions. ARC Recommendations in relation to the Audit.

Unit -V

a) Accountability of Public Enterprises to Parliament, Autonomy and Accountability.

b) Comptroller and Auditor General of India –Role and Powers.

Suggested Readings

1. Madhusudana H. S, Disinvestment and Privatization of Public Sector Enterprises PSEs in India, New Century Publications, New Delhi.2021.
2. A. H. Hanson, Public Enterprise and Economic Development (Routledge Library Editions: Public Enterprise and Privatization), Routledge Publishers, New Delhi, 2021.
3. Govind Bhattacharjee, Public Sector Enterprises in India: Evolution, Privatisation and Reforms, Sage Publications Pvt. Ltd, New Delhi, 2020.
4. K.R.Sudhaman, Public Sector, Har-Anand Publications Pvt Ltd, New Delhi, 2020.
5. P. K. Jain, Public Sector Enterprises in India: The Impact of Disinvestment and Self Obligation on Financial Performance, Springer India Publishers, New Delhi, 2016.
6. K.R. Gupta, Public Enterprises: Economics and Management: Vol.1, Atlantic Publishers, New Delhi, 2011.
7. Tarun Mandal, Public Sector Enterprises in India: Reforms & Restructures, Serial Publications, New Delhi, 2012.
8. R.K. Mishra J. Kirmani, State Level Public Enterprises in India, Gyan Publishing House, New Delhi, 2007.
9. Rao Nageshwar Shukla Mata Badal Prakash Jagdish, Administration of Public Enterprises in India, Himalaya Publishing House, New Delhi, 2007.
10. Vibha Mathur, Disinvestment of Public Sector Enterprises in India, New Century Publications, New Delhi, 2004.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	3	2	2	2	2	2	3
CO 2	3	2	2	3	2	2	1	2	2	2	2	3
CO 3	3	3	2	2	2	2	3	2	2	2	2	3

*1- Low, 2. Medium, 3.-Strong

PSPA 205(C): ADMINISTRATIVE TECHNIQUES

Compulsory Foundation Paper

Objectives

1. To provide knowledge about the various techniques of Work Measurement, Time Management and Stress Management.
2. To familiarize the students On Total Quality Management, Management Information System and O & M, approach.
3. To provide acknowledge about An Administrative Reforms, Ethical and Moral Techniques in Administration.

Syllabus

Unit - I

a) Work Measurement: Meaning, Objectives, Essentials and Techniques of Work measurement.

b) Time Management: Techniques, Strategies for effective Time Management.

Unit-II

a) Stress Management: concept of Stress, Causes of Stress, Effect of Stress, Coping Strategies for Stress.

b) Total Quality Management.; The concept, objectives, components, Significance & implementation of Total quality Management in India.

Unit-III

a) Management Information System its Objectives, Essentials of good information system, Functions, Role of MIS in Planning and control.

b) O & M Approach. Objectives, functions of O & M, Functions, essentials of O&M Units.

Unit - IV

a) Ethical and Moral Techniques: Encouraging morality through ethics and moral techniques in administration.

b) Administrative Reforms in Indian Administration: Strategies and policies in administrative improvement.

Unit -V

a) Management by Objective: Pre- requisites, Process, Benefits, Problems and limitations of MBO, its application in Public Administration.

b) O.D. Techniques in Public Administration: Definition, Characteristics, objectives, process, OD interventions.

Suggested Readings

1. Muthuswamy, Brinda, Sanjeev, Swamy's Manual on Establishment and Administration, Swamy Publishers, New Delhi, 2020.
2. Alok Chakrawal and Pratibha Goyal, Stress Management, Studera Publishers, New Delhi, 2016.
3. Janak Singh Meena, Administrative Reforms and Good Governance, Aavishkar Publishers, Jaipur, 2016.
4. Pratibha Goyal Alok Chakrawal, Stress Management, Studera Press, New Delhi, 2016.
5. Darpan Verma, Skills and Techniques in Administrative office Management, Anmol Publications Pvt. Ltd, New Delhi, 2015.
6. Monoranjan Sarkar, Modern Administrative Techniques, Dominant Publishers, New Delhi, 2013.
7. Ramesh K. Arora, Indian Public Administration: Institutions And Issues, NEW AGE Publishers, New Delhi, 2012.
8. Gupta C. B, Human Resource Management, Sultan Chand & Sons, New Delhi, 2005.
9. S R Maheshwari, Administrative Reforms in India, Macmillan Publishers, New Delhi, 2000.
10. Goel, S.L., Modern Management Techniques, Deep & Deep Publications Pvt. Ltd. 2000.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Team work	PO10 Communication	PO11 Programme Management	PO12 Life long Learning
CO 1	3	3	2	3	2	2	1	2	2	2	2	3
CO 2	3	2	2	3	3	2	1	2	2	2	2	3
CO 3	3	2	2	1	2	1	3	3	3	3	2	3

*1- Low, 2. Medium, 3.-Strong

PS 206(A): COMPARATIVE POLITICS

Elective Foundation Paper

Objectives

1. To provide Various Approaches to students over Comparative Politics.
2. It also inculcates the role of Religion, caste and Ethnic groups in Indian Political Process. It also gives the information about the Political Participation of Pressure Groups, Political Parties and its impact on Indian Political Process.
3. To explain the concepts of Comparative Politics, Political Institutionalization and Modernization and also Political Participation defined by various Political Scientists.

Syllabus

Unit-I

a) Nature, Scope and Importance of Comparative Politics.

b) Different Approaches to the Study of Comparative Politics.

Unit-II

a) Social Infrastructure: Religion, Caste and Ethnic Groups.

b) Political Culture, Political Communication and Political Participation

Unit-III

a) Political Institutionalization and Modernization.

b) Almond's Theory of Structural and Functionalism.

Unit-IV

a) Elections and Voting Behaviour.

b) Public Opinion and Pressure Groups.

Unit-V

a) Role of Political Parties in India.

b) Political Parties: National Parties and Regional Parties.

Suggested Readings

1. Vidya Bhushan, Comparative Politics, Atlantic Publication, New Delhi, 2021.
2. Chakraborty Satyabrata, Political Sociology, Trinity Publishers, New Delhi, 2021.
3. Tapan Biswal, Comparative Politics, Laxmi Publications, New Delhi, 2020.
4. A.C. Johari, Comparative Politics, Sterling Publishers Pvt. Ltd., New Delhi, 2020.
5. Rekha Diwakar, Party System in India, OUP India Publishers, New Delhi, 2017.
6. Almond, Comparative Politics Today: A world, Pearson India Publishers, New Delhi, 2011.
7. Aravind K. Roy, Comparative Politics and Political Government, Mahaveer and Sons, Delhi, 2011.
8. Rajani Kothari, Politics in India – Caste in Indian Politics: Rethinking Democracy, Orient Blackswan Private Limited, Jaipur, 2009.
9. Pradip Basu, Political Sociology, Setu Prakhashani Publishers, New Delhi, 2015.
10. Dasarathi Bhuyan, Role of Regional Political Parties in India, Mittal Publications, New Delhi, 2007.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	2	2	2	2	2	1	2	1	2	2	2
CO 2	3	3	2	3	2	2	1	3	3	2	2	3
CO 3	3	2	2	1	2	1	3	2	2	3	2	3

*1- Low, 2. Medium, 3.-Strong

PSPA 206(B): INTERNATIONAL ADMINISTRATION

Elective Foundation Paper

Objectives

1. To provide knowledge about various organs of UNO and their functions.
2. To provide knowledge about various conventions of UNO on various aspects.
3. It also provides the knowledge about the World Bank, IMF, International Court of Justice, SAARC, ASEAN and BIMSTEC their role and functions.

Syllabus

Unit-I

a) International Administration: Origin, Objectives and role with special reference to the League of Nations till World War Second.

b) UNO – Functions, Principal Organs of the United Nations.

Unit-II

a) United Nations Specialized Agencies - UNESCO and UNICEF, ILO, WHO

b) UN Agencies and Organisations - UNICEF,UNDP,UNU,UNHCR

Unit-III

a) UN Conventions - Kyoto Protocol, Rio Summit (UNCED), UNCRC, UNCLOS

b) India and the UN

Unit-IV

a) World Bank and IMF: Functions and role.

b) International Court of Justice

Unit-V

a) SAARC and ASEAN, BIMSTEC

b) Comprehensive Nuclear-Test-Ban Treaty, G7

Suggested Readings

1. Fadia, International Organizations, Sahitya Bhawan Publishers, New Delhi, 2021.
2. HO Agarwal, International Organisations, Central Law Publications, New Delhi, 2021.
3. Kerstin Martens, Dennis Niemann, Alexandra Kaasch, International Organizations in Global Social Governance, 2021.
4. Rumki Basu, The United Nations Structure & Functions of An International Organisation, Sterling Publications Private Limited, New Delhi, 2019.
5. Spectrum Editorial Team, International Organisations, Conferences and Treaties, Spectrum Publishers, New Delhi, 2019.
6. V. Rajyalakshmi, International Relations and Organisations, Eastern Book Company, New Delhi, 2017.
7. Margaret P. Karns Karen A. Mingst Kendall W. Stiles, International Organizations, VIVA Books Private Limited, New Delhi, 2016.
8. Jussi M. Hanhimäki, The United Nations: A Very Short Introduction, Oxford University Press, USA, 2015.
9. A K Tripathi,U.N.O. International Organisation, MurariLal & Sons Publishers, New Delhi,2008.
10. Michael D.V. Davies, The Administration of International Organizations, Routledge Publishers, New York, 2002.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	2	3	2	3	1	2	2	2	2	3
CO2	3	1	2	3	2	2	1	2	2	2	2	2
CO3	3	1	2	1	2	3	3	2	3	3	2	3

*1- Low, 2. Medium, 3.-Strong

PSPA 207: HUMAN VALUES AND PROFESSIONAL ETHICS-II

Audit Course

Objectives

1. To provide knowledge about the value oriented education, medical ethics. In this they know family values, ethics and moral code of Indian society.
2. It highlights the Business ethics, Environmental and social ethics followed and practiced in Indian society.
3. To provide specific knowledge about Human Values and Ethics in various professions.

Syllabus

Unit-I:

a) Value Education- Definition - Relevance to present day - Concept of Human Values - Self Introspection - Self Esteem.

b) Family Values-Components, Structure and Responsibilities of Family- Neutralization of Anger - Adjustability - Threats of Family Life - Status of Women in Family and Society - Caring for Needy and Elderly - Time Allotment for Sharing Ideas and Concerns.

Unit-II:

a) Medical Ethics - Views of Charaka, Sushruta and Hippocratus on Moral Responsibility of Medical Practitioners.

b) Code of Ethics for Medical and Healthcare Professionals. Euthanasia, Ethical Obligation to Animals, Ethical Issues in Relation to Health Care Professionals and Patients. Social Justice in Health Care, Human Cloning, Problems of Abortion. Ethical Issues in Genetic Engineering and Ethical Issues Raised by New biological technology or knowledge.

Unit-III:

a) Business Ethics- Ethical Standards of Business-Immoral and Illegal practices and their Solutions.

b) Characteristics of Ethical problems in Management, Ethical Theories, Causes of Unethical Behavior, Ethical Abuses Causes and work ethics.

Unit-IV:

a) Environmental Ethics- Ethical Theory, Man and Nature - Ecological Crisis, Pest control, Pollution and waste.

b) Climate change, Energy and population, Justice and Environmental Health.

Unit-V:

a) Social Ethics- Organ Trade, Human Trafficking, Human Rights Violation and Social Disparities, Feminist Ethics. Surrogacy / pregnancy.

b) Ethics of Media - Impact of Newspapers, Television, Movies and Internet.

Suggested Readings

1. R.S. Naagarazan, a Textbook on Professional Ethics and Human Values, New Age International Private Limited, New India, 2020.
2. Wilkinson D, Medical Ethics and Law, Elsevier Publishers, Amsterdam, Netherlands, 2020.
3. Neeru Vasishth, Business Ethics and Values, Taxmann Publishers, Chennai, Tamil Nadu, 2020.
4. Singh, Dhanpat Rai, Human Values & Professional Ethics, Dhanpat Rai Publishers, New Delhi, 2016.
5. Kiruba Charles and V. Arul Selvi, Value Education, Neelkamal Publishers, New Delhi, 2016.
6. Ranjit Kumar Barman, Human Values and Environment: A Study for Sustainable Existence, Neha Publishers, New Delhi, 2015.
7. Arpana Dhar Das, Modern Environmental Ethics A critical Survey, Kunal Books, New Delhi, 2013.

8. M.L. Sharma, Human Values and Professional Ethics, Khanna Publishers, New Delhi, 2021.

9. Thomas C Carroll, Social Ethics: Classical and Applied, Hunt Publishing, New Delhi, 2006.

10. K.R.Govindan, S.Senthil Kumar, Professional Ethics and Human Values, Khanna Publishers, New Delhi, 2012.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	3	2	3	2	2	1	3	2	2	2	3
CO 2	3	2	3	3	2	2	1	3	2	2	2	3
CO 3	2	2	2	1	2	1	3	3	3	3	2	3

*1- Low, 2. Medium, 3.-Strong

POLITICAL SCIENCE

SEMESTER-III

PS 301: INTERNATIONAL RELATIONS

Core Paper

Objectives

1. In the present paper the student can have detail study about the concept of International relations.
2. This paper was intended to make the student familiar with the International Organizations and highlights about the aspect of History of Cold War and changing trends in International relations.
3. To provide specific Information about the Approaches to the study of International Relations and changing Trends in International Relations.

Syllabus

Unit-I: Meaning, Nature, Scope and Growth of International Relations

a) Idealistic Approach

b) Realistic Approach

Unit-II: International Organizations

a) The League of Nations and U.N.O

b) The Four Great Debates

Unit-III: Instruments of International Relations

a) Foreign Policy

b) Diplomacy- Impact of Public Opinion in International Relations

Unit-IV: Cold War

a) Nature, Growth and Issues during Cold War

b) Détente-Its features - New Cold War-Its features

Unit-V: Changing Trends in International Relations

a) Post-Cold War International Relations, 9/11 Events.

b) International Relations in Covid & Post –Covid Scenario.

Suggested Readings

1. Deepanshu Singh, International Relations - Interests & Challenges, Disha Publication, New Delhi, 2021.
2. Pavneet Singh, International Relations for General Studies Preliminary and Main Examination, Fourth Edition, McGraw Hill Publishers, Noida, 2021.
3. Pushpesh Pant, International Relations for Civil Services Examination, Wisdom Tree Publishers, New Delhi, 2021.
4. Amb. Surendra Kumar, India's Foreign Policy in the Post-Covid World: International Relations through the Eyes of Indian Diplomats, Wisdom Tree Publishers, New Delhi, 2021.
5. Hana Alhashimi et al, The Future of Diplomacy After COVID-19, Multilateralism and the Global Pandemic, Routledge Publishers, New York, USA, 2021.
6. Gian Luca Gardini, The World before and after Covid-19 Intellectual reflections on Politics, Diplomacy and International Relations, European Institute of International Studies Press, Salmanca Stockholm, Sweden, 2021.
7. V.N. Khanna and Leslie K Kumar, International Relations, Vikas Publishing, New Delhi, 2020.
8. Tim Dunne et al, International Relations Theories Discipline and Diversity, OUP Oxford, England, 2020.
9. C.Venkata Subbaiah & B.V. Muralidhar, International Relations, SVU Distance Mode Publication, Tirupati, 1991.

10. Richard K. Betts, Conflict After the Cold War Arguments on Causes of War and Peace, Routledge Publishers, New York, USA, 2021.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	1	2	1	2	2	2	2	2	2	3
CO 2	3	3	2	3	2	2	2	2	2	2	2	3
CO 3	2	2	2	1	2	1	3	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PS 302: INDIAN POLITICAL SYSTEM

Core Paper

Objectives

1. This paper offers an opportunity to study in detail about different approaches that are formulated for the study of Indian political system.
2. The main focus of this paper is an evolution of Indian constitution, Federalism in India, Nature and working of Political institutions.
3. To provide the students the comprehensively given information about nature of party system, electoral process and challenges in India.

Syllabus

Unit-I: Introduction

(a) Making of Indian Constitution – Constituent Assembly-Alternative Models – Basic Philosophy and Goals of Indian Constitution.

(b) Approaches to the study of Indian Politics- Liberal and Marxist.

Unit-II: Federation

(a) Indian Federalism

(b) Centre- State Relations- Emerging Trends

Unit-III: Nature and Working of Political Institutions

(a) President, Prime Minister, Parliament and Working of Coalition Governments.

(b) Judiciary – Judicial Review and Judicial Activism.

Unit-IV: Party System and Electoral System

(a) Nature of Party System – Policies and Programmes of National and Regional Parties.

(b) Politics of Defection – Anti – Defection Act, Electoral System and Process, Electoral Reforms.

Unit-V: Political Process and Challenges

(a) Interest and Pressure Groups, Role and Participation of Women in Politics.

(b) Impact of Regional Movements in Indian Politics, Problems of National Integration, Problems of Economic Development, Liberalization and New Economic Policy.

Suggested Readings

1. Roy Himanshu, Indian Political System, Pearson Education India, Noida, 2021.
2. Johari and Gupta, Political Processes and Institutions in Comparative Perspectives, Vishal Publishing Company, Jalandhar, 2021.
3. A.P Avashti, Indian Political System, Lakshmi Narain Agarwal Publishers, Agra, 2020.
4. Anjana Banerjee, Dipali Saha, Global Vision Publishing House, New Delhi, 2018.
5. Imotemsu Ao, Indian Political System, Jnanda Prakashan, Darya Ganj, New Delhi, 2014.
6. Rajendra Dayal, Introduction to Political Processes in India, Book Age Publication, North Carolina, USA, 2015.
7. Mokbul Ali Laskar, Dynamics of Indian Federalism: A Comprehensive Historical Review, Notion Press, Chennai, 2015.
8. Narendra Singh, Indian Political System, Omega Publication, New Delhi, 2009.
9. Louise Tillin, Indian Federalism, Oxford University Press, New Delhi, 2019.
10. Francine Frankel, Zoya Hasan, Rajeev Bhargava, Balveer Arora (eds.), Transforming India, Oxford University Press, New Delhi, 2000.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	1	2	3	2	2	1	2	1	2	1	3
CO 2	2	2	2	3	3	2	2	2	2	1	2	2
CO 3	3	2	2	2	2	2	2	1	2	2	1	3

*1- Low 2. Medium, 3. -Strong

PS 303(A): GOOD GOVERNANCE AND INFORMATION TECHNOLOGY

General Elective

Objectives

1. To define the concept of Good Governance and its importance through Indian Ideas of Good Governance and Good Governance Initiatives.
2. To understand the importance of Information Technology and Good Governance by Explaining e-Governance, e-Tools and its Evaluation.
3. To explain the concept of Good Governance and Information Technology and its Evaluation and Significance.

Syllabus

Unit-I : (Common for both Political Science and Public Administration)

(a) Governance: Meaning, Definitions, Characteristics and Functions.

(b) Dimensions and Type of Governance.

Unit-II

a) Good Governance: Meaning, Characteristics and Concept.

b) Good Governance Challenges and Needs.

Unit-III

a) Information Technology: Meaning, Concept, Advantages and Disadvantages.

b) Information Technology Act 2000: Meaning, Aims, Objectives, Features, Applicability and Non- Applicability

Unit-IV

a) Information Technology Governance: Meaning, Principles and Importance.

b) Responsibilities and Effectiveness of ITG.

Unit-V

a) Role of Information Technology in Good Governance.

b) Covid -19 and its impact on Governance.

Suggested Readings

1. Elsa Estevez, and et al, Smart Cities and Smart Governance: Towards the 22nd Century Sustainable City: 37 (Public Administration and Information Technology) , Springer Publishers, India, 2021.
2. Vasundhara Mohan, Scaria Pannackal, Concept Publishing Company Pvt. Ltd, New 2019.
3. CSR, Prabhu, E-Governance – Concepts and Case Studies, PHI learning Private Limited, New Delhi, 2009.
4. Goel, S.I., Good Governance – An Integral Approach, Deep and Deep Publications Pvt. Ltd., New Delhi, 2007.
5. Suresh, R., Right to Information and Good Governance, Global Research Publications, New Delhi, 2013.
6. Rajiv Sharma and Nandini Sharma, Good Governance – Press Perspectives, Aalekh Publishers, Jaipur, 2013.
7. Barthwal, CP, Good Governance in India, Deep and Deep Publications Pvt.Ltd., New Delhi, 2010.
8. Parthasaradhi, Y, E-Governance and Indian Society: An Impact of Study, Kaniskha, New Delhi, 2009.
9. Gerardus Blokdyk, Information Technology Governance A Complete Guide, 5 STARCooks Publishers, New Delhi, 2020
10. Ali Hussain, M., Good Governance through E-Governance: Reflections from Andhra Pradesh and Kerala, VL Media Solutions, New Delhi, 2013.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	2	2	3	2	2	1	2	2	2	2	3
CO 2	3	2	3	3	3	3	1	2	2	2	2	3
CO 3	3	2	2	2	3	3	3	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PS 303(B): LOCAL GOVERNMENT IN INDIA

General Elective

Objectives

1. To provide detailed study about the Nature, Scope, importance and Evolution of local Governments in India.
2. To discuss about composition, Powers, Functions of local Government bodies both Rural and Urban areas.
3. Intended to make the students familiar with the constitutional Amendments that brought radical changes in the local governance and also financial sources, control and supervision over Local Governments.

Syllabus

Unit-I

a) Nature Importance and Scope of Local Governments.

b) Evolution of Local Governments in India.

Unit-II

a) Composition, Powers and Functions of Gram Sabha and Gram Panchayat.

b) Composition, Powers and Functions of Panchayati Samithi (Mandal Parishad), Zilla Parishad.

Unit-III

a) Municipal Corporations – Structure and Functions

b) Municipalities – Townships – Cantonment Boards

Unit-IV

a) Main Features of 73rd Constitutional Amendment Act.

b) Main Features of 74th Constitutional Amendment Act.

Unit-V

a) Role of Political Parties in Local Governments.

b) Redressal Mechanism – Citizen Charter and Role of PRIs in Covid-19

Suggested Readings

1. Rakesh Kumar Singh, Souvik Dhar, Local Self Government - Including Panchayat Administration - A Textbook on Local Send Government, Lexworth Publishers, New Delhi, 2021.
2. Babu Jacob, Governing Locally: Institutions, Policies and Implementation in Indian Cities, Cambridge University Press, New Delhi, 2021.
3. S.R Myneni, Local Self Government, Allahabad Law Agency, Allahabad, 2016.
4. Venkatesu E, Local Governance in India, Kalpaz Publications, New Delhi, 2016.
5. Sreeramulu. N, Rural Development Administration in India, Serials Publications, New Delhi, 2011.
6. Sriram Maheswari, Local Government in India, Lakshmi Narain Agarwal, Agra, 2010.
7. Goel, S.L. and Shalini Rajneesh, Panchayati Raj in India, Deep and Deep Publications, New Delhi, 2009.
8. Jawaharlal Gupta, Local Administration in India, RBSA Publishers, Delhi, 2012.
9. Durga P and Chhetri, Decentralised Governance and Development in India, Mittal Publications, New Delhi, 2012.
10. Bhuvanesh Gupta, Urban Local Government, Wisdom Press, New Delhi, 2014.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	1	1	2	1	2	2	3
CO 2	3	2	3	3	3	3	1	2	2	2	2	3
CO 3	3	2	2	2	3	3	3	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PS 303(C): STATE GOVERNMENT AND POLITICS OF ANDHRA PRADESH

General Elective

Objectives

1. This paper gives information about the historical background of formation of Andhra Pradesh state and different approaches that are formulated for the study of Sate politics.
2. The aim of this paper is to know about the powers and functions of high dignitaries, committees and commissions of the state government.
3. To provide knowledge about the study on the regionalism, regional parties in Andhra Pradesh was covered. To define the concepts of State Legislature, State Election Commission and causes for Bifurcation of Andhra Pradesh.

Syllabus

Unit-I

a) Historical Background for the formation of Andhra State

b) Approaches to the Study of State Politics

Unit-II

a) Governor – Appointment, Powers, Functions and Role, Relationship with Chief Minister

b) Chief Minister – Powers, Functions and Council of Ministers.

Unit-III

a) State Legislature – Composition, Powers, Functions, and Committees

b) Speaker and Role in State Legislature.

Unit-IV

a) State Election Commission - Electoral Reforms –Voting Behaviour

b) Regionalism and Sub- Regionalism and its Impact on State Politics

Unit-V

a) Regional Parties in Andhra Pradesh: YSRCP, TDP and Jana Sena.

b) Bifurcation of Andhra Pradesh and its Consequences.

Suggested Readings

1) U. B. Singh, State Administration in India, Kalpaz Publishers, Delhi, 2021

2) Inukonda Thirumali, Telangana - Andhra: Castes, Regions and Politics in Andhra Pradesh, Aakar Books, Delhi, 2021.

3) Nanda Namita, Nationalism and Regionalism in India, Kalpaz Publications, Delhi, 2021.

4) Raghunadha Rao P, History and Culture of Andhra Pradesh from the Earliest Times to 2019, Sterling Publishers Pvt. Ltd, New Delhi, 2021.

5) Mansoor Husain, Andhra Pradesh Bifurcation - Problem, Wisdom Publications, Chennai, 2019.

6) B. Pakem, Regionalism in India, Haranand Publications, Delhi, 2017

7) Upadhyaya. A.S., Electoral Reforms in India, Concept Publishers, New Delhi, 2005.

8) Jewell, Malcolm and McCally, State Politics, Parties, and Policy. Littlefield Publishers, New York, 2002.

9) Malsawmliana & Lalsangzela Pachuau, Politics of Regionalism in North-East India, Mittal Publications, Madhura, 2014.

10) Dasarathi Bhuyan, Role of Regional Political Parties in India, Mittal Publications, Mathura, 2010.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	2	2	2	1	3	2	2	2	2	2	3
CO 2	3	2	2	2	2	3	2	2	2	2	2	2
CO 3	2	2	2	2	2	3	3	3	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PS 303(D): AMERICAN GOVERNMENT AND POLITICS

General Elective

Objectives

1. The focus on American Government and Politics in this paper which concentrates an evolution, features of the American constitution.
2. This paper highlights the structure, composition, power and functions of both the Senate and House of Lords of America.
3. This paper aims at study on role of political parties, policies and programmes of the Republican and Democratic Party in USA.

Syllabus

Unit-I

a) Evolution of American Constitution – The Colonial Origin.

b) Basic Features of the American Constitution.

Unit-II

a) American Federalism – Its Salient Features.

b) President – Election, Powers, Functions and Impeachment.

Unit-III

a) American Congress – Senate and House of Representatives – Powers and Functions.

b) The Senate – its Unique Role.

Unit-IV

a) The Supreme Court of USA – Powers and Functions.

b) Independence of Judiciary – Judicial Review.

Unit-V

a) The Role of Political parties in USA.

b) Local Government in the American System.

Suggested Readings

1. Cal Jillson, American Government: Political Development and Institutional Change, Routledge Publishers, Oxfords hire, England, UK, 2021.
2. Openstax, American Government 3e, Chump Change Publishers, USA, 2021.
3. Rodgir L Cohen, Political Science Basics: An Introduction to American Government, Humanities Academic Publishers, USA, 2021.
4. Gary Lee Malecha, The Congress (Student Guides to American Government and Politics), Greenwood Publishing Group India, New Delhi, 2021.
5. Sterling Education, American Government and Politics: Everything You Always Wanted to Know About, Sterling Test Prep, USA, 2018.
6. Franco Scardino, U.S. Government and Politics, 2nd Edition, Alpha Publishers, USA, 2016.
7. Neil MacNeil, Richard. A. Barker, et. al., The American Senate: An Insider's History, Oxford University Press, USA, 2013.
8. Charles, C. Turner et al., Introduction to American Government, BVT Publishers, USA, 2011.
9. James, Q. Wilson, American Government: Institutions and Policies: The Essentials, Cengage Learning Publishers, USA, 2012.
10. Kathryn Moore, The American President: A Complete History, Sterling Publishers, USA, 2013.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	2	2	2	2	2	1	2	1	2	2	2
CO 2	3	2	3	2	2	3	2	2	2	2	2	3
CO 3	2	3	3	2	2	2	2	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PS 304: PERSONALITY DEVELOPMENT AND EMPLOYABILITY

Skilled Oriented Course

Objectives

1. To provide knowledge about the concept, Dimensions, Significance of Personality Development also Attitude and Motivation related to Personality Development.
2. To familiarize the students about the Self-esteems and inter personal relationships.
3. To create awareness about the aspects of Personality Development and Employability Quotient.

Syllabus

UNIT-I: Introduction to Personality Development

a) The concept of Personality - Dimensions of Personality

b) Significance of Personality Development. - Hurdles in achieving success.

UNIT-II: Attitude& Motivation

a) Attitude - Concept - Significance - Factors affecting Attitudes - Positive Attitude — Negative Attitude.

b) Concept of Motivation - Significance – Internal and External motives - Importance of self- motivation- Factors leading to de-motivation

UNIT-III: Self-esteem

a) Self-esteem - Low self-esteem.

b) Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviours – Lateral thinking.

UNIT-IV: Aspects of Personality Development

a) Body Language – Conflict and Stress Management - Decision-making Skills.

b) Leadership – Character Building -Team-work – Time Management - Work ethics

UNIT-V: Employability Quotient

a) Resume Building – Facing the Personal (HR & Technical) Interview.

b) Mock Interview Sessions.

Suggested Readings

1. Sabina Pillai, Soft Skills and Employability Skills, Cambridge University Press, Delhi, 2017.
2. Barun Mitra, Personality Development and Soft Skills, Oxford University Press, New Delhi, 2016.
3. Vijay Agrawal, Personality Development for Students, Benten Books Publishers, New Delhi, 2014.
4. Hurlock, E.B, Personality Development, 28th Reprint, Tata McGraw Hill, New Delhi, 2006.
5. Stephen P. Robbins and Timothy A. Judge, Organizational Behavior 16th Edition: Prentice Hall, New Jersey, 2014.
6. Andrews, Sudhir, How to Succeed at Interviews. 21st (rep.) New Delhi, Tata McGraw-Hill 1988.
7. Heller, Robert, Effective leadership. Essential Manager Series. Dk Publishing, 2002.
8. Lucas, Stephen, Art of Public Speaking. Tata - Mc-Graw Hill, New Delhi, 2001.
9. Mile, D.J, Power of positive thinking, Rohan Book Company, New Delhi, 2004.
10. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House, 2005.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	1	2	2	2	1	1	2	1	2	2	3
CO 2	2	3	3	2	2	2	2	2	2	3	2	3
CO 3	3	3	2	2	2	2	2	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PS 305(A): SOCIAL MOVEMENTS IN INDIA

Open Elective

Objectives

1. To provide specific knowledge about Social Movements in Pre-Independent India and their issues.
2. Detailed account of various movements like Rampa, Jharkhand, Telangana and Samaikyandra movements.
3. To explain women's, Forest Based Movements and impact of Globalization on Social Movements.

Syllabus

Unit-I

(a) Movements - Meaning, Concepts and Issues.

(b) Social Movements in Pre-Independent India – Arya Samaj Movement, Dravidian (Self Respect) Movement.

Unit-II

(a) Peasant and Left wing in India

(b) Telangana Armed Struggle

Unit-III

(a) Social Struggle of Dr. B. R. Ambedkar, Dalit Panthers Movement

(b) Bahujan Samaj Movement and Samaikyandra Movement.

Unit-IV

(a) Women's Movement, Historical Overview, Ideology of Indian Women Movement.

(b) Women in India's Freedom Struggle

Unit-V

(a) Forest Based Movements- Movements Against Big Dams

(b) Different Acts for Protection of Environment and Impact of Globalization on Social Movements and Political Implications.

Suggested Readings

1. Ghanshyam Shah, Social Movements in India, Sage Publishers, New Delhi, 2021.
2. Biswajit Ghosh, Social Movements, Sage Publishers, New Delhi, 2020.
3. Krishna Menon Ranjana Subberwal, Social Movements In Contemporary India, Sage Publishers, New Delhi, 2019.
4. Savyasaachi, Ravi Kumar, Social Movements Transformative Shifts and Turning Points, Routledge India Publishers, Delhi, 2019.
5. Rao M. S. A, Social Movements in India, Manohar Publishers and Distributors, New Delhi, 2016.
6. S. G. Devgaonkar, Social Movements in India and Abroad, Shree Sainath Prakashan Publishers, Nagapur, 2016.
7. Navaneeta Rath and Gautam Majumdar, Women in Indian Politics–Traditions, Transitions and Transformations, Mittal Publications,Mathura,2016.
8. Raka Ray, Social Movements in India: Poverty, Power, and Politics, Rowman & Littlefield Publishers, New Delhi, 2005
9. Jayal, Niraja Gopal, Democracy in India, OUP Publishers, New Delhi, 2001.
10. Krishna Mallick, Environmental Movements of India Chipko, Narmada Bachao Andolan, Navdanya, Amsterdam University Press, USA, 2021.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	3	2	2	2	2	2	3	2	2	3
CO 2	3	2	2	3	2	3	2	3	2	2	2	2
CO 3	2	3	3	2	3	3	3	3	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PS 305(B): HUMAN RIGHTS AND INDIAN CONSTITUTION

Open Elective

Objectives

1. This paper aims to familiarize students with emerging concerns of Human Rights with focus on legal and Institutional mechanisms.
2. Keeping in mind the basic concepts and issues that students were introduced at undergraduate level this paper takes them one step ahead by focusing on study of Human Rights through comparative perspective.
3. To provide specific knowledge about Fundamental Rights and Indian Constitution.

Syllabus

UNIT-I

a) Meaning, Nature and Evolution of Human Rights.

b) Significance of Human Rights

UNIT-II

a) The Internationalization of Human Rights

b) Human Rights and the United Nations: Charter Provisions

UNIT-III

a) Universal Declaration of Human Rights.

b) International Protection of Human Rights: Civil, Political, Social and Economic Rights.

UNIT-IV

a) Fundamental Rights and Indian Constitution.

b) Human Rights and Duties in India: Law, Politics and Society.

UNIT-V

a) Enforcement of Human Rights in India: National and State Human Rights Commissions.

b) Safeguards to protect Human Rights.

Suggested Readings

1. Debarati Halder, Advancement of Human Rights in India, Contemporary and Emerging Challenges, Sage Publishers, New Delhi, 2021.
2. Debarati Halder and Shrut S. Brahmbhatt, Advancement of Human Rights in India: Contemporary and Emerging Challenges, SAGE Publications Pvt. Ltd, New Delhi,2021.
3. Satvinder Juss, Human Rights in India, Routledge Publishers, United Kingdom, 2020.
4. K.S. Pavithran, Human Rights in India: Discourses and Contestations, Gyan Publishing House, New Delhi, 2018.
5. Andrews, J.A , Human Rights in Criminal Procedure, A Comparative Study, Cambridge University Press, United Kingdom, 2017.
6. Sanjay Kumar Baranwal, Nalnish Chandr Singh, Human Rights in India: Contemporary Issues and Challenges - Contemporary Issues and Challenges, ABS Books, Mannarkkad, Kerala, 2016.
7. Gopal Sharma, Human Rights in India: Issues and Concerns, Abhijeet Publications, New Delhi, 2015.
8. Alok Kumar Meena, Human Rights in India - Concepts and Concerns, Pointer Publishers, Jaipur, 2014.
9. Alfredson, G. et.al (eds),The Universal Declaration of Human Rights – A Commentary, Scandinavian University Press, New York, 2002.
10. Dr. B.R Ambedkar, The Constitution of India, Sudhir Prakashan Publishers, New Delhi, 2020.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	3	2	3	2	2	2	2	2	2	3	2
CO 2	3	3	3	3	3	2	2	2	2	2	2	2
CO 3	3	2	2	3	2	2	2	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PUBLIC ADMINISTRATION

SEMESTER-III

PA 301: PUBLIC PERSONNEL ADMINISTRATION

Core Paper

Objectives

1. To explain the nature and Importance of Public Personnel Administration by providing structure, Recruitment and Training of Civil Services.
2. To provide knowledge about Ethical Values, Employees Welfare and Relations, promotion and Emerging problems in Personnel Administration.
3. To define Central and State Services, second Administrative Reforms Commission and Civil Services Unionism.

Syllabus

Unit-I

a) Public Personnel Administration – Meaning, Nature, Scope and Importance.

b) Structure of Civil Services – All India Services – Central and State Services, Position Classification.

Unit-II

a) Civil Services – Recruitment, Training and Accountability.

b) Second Administrative Reforms Commission.

Unit-III

a) Higher Civil Services – Ethical Values and Retirement Benefits.

b) Discipline – Morale and Motivation.

Unit-IV

a) Employer – Employee Relations.

b) Civil Services Unionism – Right to Strike.

Unit-V

a) Promotion – Principles and Importance.

b) Emerging Problems in Personal Administration.

Suggested Readings

1. S.A. Palekar, Public Personnel Administration, ABD Publishers. Jaipur, 2020.
2. Felix Nigro and et al, The new Public Personnel Administration, Wordsworth Publishing, Georgia, 2020.
3. Expert Panel of Gullybaba, GNOU EPA-4 Personnel Administration, Gullybaba Publishers, New Delhi, 2021.
4. Sushant Kumar, Public Personal Administration, Kunal Books Publishers, New Delhi, 2018.
5. Norma M. Riccucci, Public Personnel Management Current Concerns, Future Challenges, Routledge Publishers, New Delhi, 2017.
6. Avasthi & Maheswari, Public Administration, Lakshmi Narayana Agarwal, Agra, 2010.
7. Dennis D. Riley, Public Personnel Administration, Pearson Publishers, 2nd edition, New York, 2001.
8. Arun Monappa, Personnel Management, McGraw Hill Education; 2nd edition, New Delhi, 2001.
9. Goel, S.L., Public Personnel Administration, Sterling Publishers, New Delhi, 1984.
10. Steven W. Hays, Richard C. Kearney, Public Personnel Administration: Problems and Prospects, Prentice Hall Publishers, Hoboken, New Jersey, 2001.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	2	2	2	2	2	1	2	1	2	2	2
CO 2	2	2	3	3	3	3	2	3	2	2	2	2
CO 3	3	3	2	2	2	3	2	2	2	2	2	3

*1- Low, 2. Medium, 3. -Strong

PA 302: STATE ADMINISTRATION IN ANDHRA PRADESH

Core Paper

Objectives

1. To understand Administration in Andhra Pradesh by describing organization, structure of state secretariat and the role played by the Governor, Chief Minister and A.P. State Planning Board.
2. To interpret existing knowledge by explaining Administrative affairs of various fields like Revenue Judicial Administration and emerging problems in State Administration.
3. To provide Information about Ministry of Home Affairs, APPSC and the role of ICT in State Administration.

Syllabus

Unit-I

a) Evolution of State Administration.

b) The State Governor, Chief Minister – Their Powers and Functions.

Unit-II

a) Organization and Structure of State Secretariat.

b) Chief Secretary – his Role in State Administration, State Planning Board.

Unit-III

a) Ministry of Home Affairs – Powers and Functions.

b) Revenue Department – Powers and Functions, Judicial Administration.

Unit-IV

a) Andhra Pradesh State Public Service Commission – Structure and Functions.

b) Role of Collector in District Administration.

Unit-V

a) Emerging Problems in State Administration.

b) Role of ICT in State Administration.

Suggested Readings

1. Nripendra Kumar Dutt, State Administration in India: Emerging Issues and Challenges, Kalpaz Publications, New Delhi, 2021.
2. Singh U.B., State Administration in India: Emerging Issues and Challenges, Kalpaz Publications, New Delhi, 2021.
3. Sathya Kalaivani Chandru and Mohana Priya Sundar, Administration of Union and States with Special Reference to Tamil Nadu,Tamizhi Books Publishers, Chennai, 2021.
4. Ministry of Information, District Administration: Theory and Practice, Broadcasting Government of India Publication, New Delhi, 2006.
5. Fadia B.L, Indian Administration, Sahitya Bhawan, Publications, Agra, 2005.
6. Puri. K.K., Indian Administration, Bharat Publishers, Jalandhar, 2005.
7. Maheshwari. S.R, State Governments in India, Macmillan India Ltd., New Delhi, 2000.
8. Mishra.S, Changing Pattern of District Administration, Mittal Publications, New Delhi, 1996.
9. Khera S.S, District Administration in India, National Publishing House, New Delhi, 1979.
10. Bhuvanesh Gupta, State Administration in India, RBSA Publishers, New Delhi, 2012.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	1	2	2	2	2	1	2	1	2	2	2
CO 2	2	2	2	3	3	3	2	3	2	2	2	2
CO 3	3	2	2	2	2	2	2	2	2	2	2	3

*1- Low, 2. Medium, 3.-Strong

PA 303(A): GOOD GOVERNANCE AND INFORMATION TECHNOLOGY

Generic Elective

Objectives

1. To provide knowledge about the Governance and Good Governance their characteristics, Functions and Challenges faced now a days.
2. To create awareness about the Information Technology and its advantages and disadvantages, and also information technology Act 2000 and its objectives, features and Applicability.
3. To focus on the Role of Information Technologies in good governance and Covid-19 impact on governance.

Syllabus

Unit-I:

a) Governance: Meaning, Definitions, Characteristics and Functions.

b) Dimensions and Type of Governance.

Unit-II

a) Good Governance: Meaning, Characteristics and Concept.

b) Good Governance Challenges and Needs.

Unit-III

a) Information Technology: Meaning, Concept, Advantages and Disadvantages.

b) Information Technology Act 2000: Meaning, Aims, Objectives, Features, Applicability and Non- Applicability.

Unit-IV

a) Information Technology Governance: Meaning, Principles and Importance.

b) Responsibilities and Effectiveness of ITG.

Unit-V

a) Role of Information Technology in Good Governance.

b) Covid -19 and its impact on Governance.

Suggested Readings

1. Elsa Estevez, and et al, Smart Cities and Smart Governance: Towards the 22nd Century Sustainable City: 37 (Public Administration and Information Technology), Springer Publishers, India, 2021.
2. Vasundhara Mohan, Scaria Pannackal, Good Governance in India: Prospects and Challenges, Concept Publishing Company Pvt. Ltd, New Delhi, 2019.
3. CSR, Prabhu, E-Governance – Concepts and Case Studies, PHI learning Private Limited, New Delhi, 2009.
4. Goel, S.I., Good Governance – An Integral Approach, Deep and Deep Publications Pvt. Ltd., New Delhi, 2007.
5. Suresh, R., Right to Information and Good Governance, Global Research Publications, New Delhi, 2013.
6. Rajiv Sharma and Nandini Sharma, Good Governance – Press Perspectives, Aalekh Publishers, Jaipur, 2013.
7. Barthwal, CP, Good Governance in India, Deep and Deep Publications Pvt. Ltd., New Delhi, 2010.
8. Parthasaradhi, Y, E-Governance and Indian Society: An Impact of Study, Kaniskha, New Delhi, 2009.
9. Gerardus Blokdyk, Information Technology Governance A Complete Guide, 5 STARCooks Publishers, New Delhi, 2020

10. Ali Hussain, M., Good Governance through E-Governance: Reflections from Andhra Pradesh and Kerala, VL Media Solutions, New Delhi, 2013.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	2	2	3	2	2	1	2	2	2	2	3
CO 2	3	2	3	3	3	3	1	2	2	2	2	3
CO 3	3	2	2	2	3	3	3	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PA-303 (b): ISSUES IN INDIAN ADMINISTRATION

Generic Elective

Objectives

1. To provide knowledge about Indian Administration issues by defining Neutrality, Bureaucracy, Tribunals and Electoral system in India.
2. This course provides the students to have in-depth information about Generalists vs Specialists, Legal Aid and Public Interest Litigation (PIL), National Integration and Civil Service Reforms in India.
3. To provide in-depth knowledge about the concepts of State – Re-organisation, Anti-Defection Law, Redressal of Citizen grievances and Right to Information Act.

Syllabus

Unit-I

a) State Re- Organization – Need for Small States.

b) Neutrality and Anonymity of Civil Service: The Concept of Neutrality, Rationale of Neutrality.

Unit-II:

a) Tribunals.

b) Anti-Defection Law.

Unit-III:

a) Generalists vs. Specialists: The Controversy

b) Relationship between Political and Permanent Executives.

Unit-IV:

a) Legal Aid and Public Interest Litigation (PIL).

b) Redressal of Citizen Grievances – Lokpal and Lokayukta.

Unit-V:

a) Right to Information Act.

b) Civil Service Reforms in India.

Suggested Readings

1. Work Hubert and Merium, The Problem of Indian Administration: Summary of Findings and Recommendations, Hassell Street Press, USA, 2021.
2. P.M Bakshi, Whytes & Co's Public Interest Litigation, Aggarwal Law House, New Delhi, 2021.
3. Avasthi, And A. Avasthi, Indian Administration, Lakshmi Narain Agarwal Publisher, New Delhi, 2017.
4. Kashyap Subhash C, Anti-Defection Law and Parliamentary Privileges, Universal Law Publishing - An imprint of LexisNexis; Third edition, New Delhi, 2011.
5. Government of India, The Right to Information Act 2005 Bare Act, Educreation Publishing, New Delhi, 2020.
6. Narayana P.S, Commentary on the Lokpal and Lokayuktas Act, Universal Law Publishing - An imprint of LexisNexis, New Delhi, 2016.
7. S.K. Das, The Civil Services In India, Oxford Publishers, New Delhi, 2013.
8. Justice (Society), The Citizen and the Administration; the Redress of Grievances; a Report, Hassell Street Press, USA, 2021.
9. Ramesh K. Arora and RajiniGoyal, Indian Public Administration, Vishwa Prakashan, New Delhi, 2012.
10. Lakxmikanth, M., Indian Polity, Tata McGraw-Hill Publishing Company, New Delhi, 2021.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	3	2	2	2	2	1	3
CO 2	3	2	3	2	3	3	1	2	2	1	2	3
CO 3	3	2	2	3	3	3	3	3	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PA 303(C): LOCAL GOVERNMENT IN ANDHRA PRADESH

Generic Elective

Objectives

1. To provide the concept of Local Government in Andhra Pradesh especially by describing 73rd and 74th constitutional Amendment Acts. (Rural and Urban Local Government)
2. To understand 73rd and 74th C.A.A by explaining committee system, Bureaucracy in Local Government and People's participation and state control over it.
3. To explain the Nature, Scope, Importance and the Evolution of Local Government in Andhra Pradesh.

Syllabus

Unit-I: Introduction

(a) Meaning, Nature, Scope and Importance of Local Government.

(b) Evolution of Local Governments in Andhra Pradesh.

Unit-II: Amendments

(a) Salient Features of 73rd Constitutional Amendment Act.

(b) Salient Features of 74th Constitutional Amendment Act.

Unit-III: Organization / Composition

(a) Urban Local Government in A.P. – Composition, Powers and Functions after 74th Constitutional Amendment Act.

(b) Rural Local Government in A.P. – Composition, Powers and Functions after 73rd Constitutional Amendment Act – Grama Sachivalaya System.

Unit-IV: Committee System

(a) Committee System in India: BalwanthRai Mehta Committee, Ashok Mehta Committee and C. Narasimhan Committee 1971.

(b) Bureaucracy in Urban and Rural Local Governments in A.P.

Unit-V : People's Participation and State Control

(a) People's Participation in Developmental Programmes : Janmabhoomi Programme, Navarathnalu.

(b) State Control and Supervision over Local Governments.

Suggested Readings

1. Rakesh Kumar Singh, Souvik Dhar,Local Self Government - Including Panchayat Administration - A Textbook on Local Send Government, Lexworth Publishers, New Delhi, 2021.
2. S.R. Maheshwari, Local Government In India, Lakshmi Narain Agarwal, Agra, 2020.
3. Pradeep Sachdeva, Local Government in India, Pearson Education India Publishers, Noida, 2011.
4. E.A. Narayana, Panchayati Raj In Action, Gyan Publishing House, New Delhi, India, 2008
5. Ram Narayan Prasad , Urban Local Self Government in India, Mittal Publications, New Delhi, India, 2006.
6. N.Sreeramulu, Rural Development Administration in India, Serial Publications, New Delhi, India, 2011.
7. Ganesh Babu, NGOs and Rural Development Programmes, Discovery Publishing Pvt.Ltd., New Delhi, 2012.
8. KondaSingha, Rural Development in India, Concept Publishing Company Pvt. Ltd., New Delhi, 2011.
9. Venkatamallu, Thabedafoina, E-Governance and Rural Development, B.R. Publishing Corporation, Delhi, 2013.
10. I.S.Kishore Mathew Arnold, Co-operatives and Rural Development, Scholars Press, Germany.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	3	2	2	1	1	2	2	2	3
CO 2	2	2	2	3	2	3	2	1	2	2	2	3
CO 3	3	2	2	2	3	3	3	1	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PA 303(D): POLITICAL DYNAMICS

Generic Elective

Objectives

1. To provide enormous knowledge over Political Dynamics by explaining Anti –defection Law and political parties that may leads to recognition of National and Regional parties.
2. To explain the nature of Elections by defining Electoral System and Electoral Reforms. This course also provides clear information about nature, role and importance of Pressure Groups.
3. To enshrine the student by describing meaning, nature and importance of National Integration.

Syllabus

Unit-I: Anti Defection Law

(a) Provisions of the Act.

(b) Evolution of the Act.

Unit-II: Political Parties

(a) Party System in India.

(b) Recognition of National and Regional Party

Unit-III: Elections

(a) Electoral System

(b) Electoral Reforms

Unit-IV: Pressure Groups

(a) Pressure Groups and Interest Groups.

(b) Pressure Groups and Interest Groups in India- Role and Working

Unit-V: National Integration

(a) Meaning and Importance of National Integration

(b) National Integration Council.

Suggested Readings

1. Sandeep Shastri, Ashutosh Kumar, Yatindra Singh Sisodia, Electoral Dynamics in the States of India,Routledge India Publishers, New Delhi, 2021.
2. Manoj Agrawal, Electoral Reforms - A Step Towards Good Governance, Prabhat Prakashan Publishers, New Delhi, 2021.
3. Kashyap Subhash C, Anti-Defection Law and Parliamentary Privileges, Universal Law Publishing - An imprint of LexisNexis; Third edition, New Delhi, 2011.
4. Raj Pal Singh, and Surander Singh, Dynamics of Democracy and Electoral Reforms, Raj Publications, New Delhi, 2019.
5. A.S. Narang, Indian Government and Politics, Gitanjali Publications, New Delhi, 2000.
6. Mirza Asmer Beg,Perspectives on National Integration, Viva Books Publishers, Bangalore, 2013.
7. Shashi Prakash, Problem of National Integration, Chaukhambha Sanskrit Bhawan Publishers, 2009.
8. Ram Ayodhya Singh, Political Parties, Pressure Groups and Social Movements, K.K. Publications, Chennai, 2021.
9. B.L. Fadia, Kuldeep Fadia,Indian Government and Politics, Sahitya Bhawan Publishers, Agra, 2021.
10. Rekha Diwakar, Party System in India, OUP India Publishers, New Delhi, 2017.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	3	2	2	2	1	2	3
CO 2	3	2	2	3	2	3	2	2	2	2	2	3
CO 3	3	2	2	2	3	3	3	3	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PA 304: PERSONALITY DEVELOPMENT AND EMPLOYABILITY

Skilled Oriented Course

Objectives

1. To provide knowledge about the concept, Dimensions, Significance of Personality Development also Attitude and motivation related to personality development.
2. To familiarize the students about the Self-esteem and inter personal relationships.
3. To create awareness about the aspects of personality development and employability quotient.

Syllabus

UNIT-I: Introduction to Personality Development

a) The concept of Personality - Dimensions of Personality

b) Significance of Personality Development. - Hurdles in achieving success.

UNIT-II: Attitude& Motivation

a) Attitude - Concept - Significance - Factors affecting Attitudes - Positive Attitude — Negative Attitude.

b) Concept of Motivation - Significance – Internal and External motives - Importance of self- motivation- Factors leading to de-motivation

UNIT-III: Self-esteem

a) Self-esteem - Low self-esteem.

b) Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviours – Lateral thinking.

UNIT-IV: Aspects of Personality Development

a) Body language –- Conflict and Stress Management - Decision-making Skills.

b) Leadership–Character Building -Team-work – Time Management - Work ethics

UNIT-V: Employability Quotient

a) Resume building - Facing the Personal (HR & Technical) Interview.

b) Mock Interview Sessions.

Suggested Readings

1. Barun Mitra, Personality Development and Soft Skills, Oxford University Press, New Delhi, 2016.
2. Hurlock, E.B, Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill, 2006.
3. Stephen P. Robbins and Timothy A. Judge, Organizational Behavior 16th Edition: Prentice Hall, New Jersey, 2014.
4. Andrews, Sudhir, How to Succeed at Interviews. 21st (rep.) New Delhi, Tata McGraw-Hill 1988.
5. Heller, Robert, Effective leadership. Essential Manager Series. Dk Publishing, 2002.
6. Hindle, Tim. Reducing Stress. Essential Manager Series. Dk Publishing House, New Delhi, 2003.
7. Lucas, Stephen, Art of Public Speaking. Tata - Mc-Graw Hill, New Delhi, 2001.
8. Mile, D.J, Power of positive thinking, Rohan Book Company, New Delhi, 2004.
9. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House. 2005.
10. Vijay Agrawal, Personality Development for Students, Benten Books Publishers, New Delhi, 2014.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	1	2	2	2	1	1	2	1	2	2	3
CO 2	2	3	3	2	2	2	2	2	2	3	2	3
CO 3	3	3	2	2	2	2	2	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PA 305(A): INDUSTRIAL RELATIONS AND PERSONNEL MANAGEMENT

Open Elective

Objectives

1. To provide Specific Information about the Nature and Importance of Industrial Relations and Personnel Management and its Growth and Development.
2. To inculcate knowledge about Recruitment and Performance Appraisal, Industrial Conflict settlements and collective Bargaining Importance and suggestions for its improvement.
3. To Study the Approaches and the Role of Trade unions in Industrial Relations.

Syllabus

Unit-I

a) Personnel Management- Meaning, Nature, Scope.

b) Importance of Personnel Management.

Unit-II

a) Evolution of Industrial Relations

b) Objectives and Importance of Industrial Relations.

Unit-III

a) Constitutional and Legal Framework of Industrial Relations.

b) New Economic Policy, State Policy on Industrial Relations.

Unit-IV

a) Industrial Conflict: Causes, Manifestations and Effects.

b) The Role of Trade Unions in IR; Structure of Trade Union.

Unit-V

a) Collective Bargaining Process, The Labour Movement, Union and Law, Grievances.

b) International Industrial Relations.

Suggested Readings

1. Tripathi P.C. Gupta C.B., Kapoor N.D, Industrial Relations and Labour Laws,Sultan Chand and Sons Publishers, New Delhi,2020.
2. T.N. Chhabra, R.K. Suri, Industrial Relations Concepts and Issues, Dhanpat Rai Publishers, New Delhi, 2020.
3. R. Sharma, Narain's Personnel Management and Industrial Relations, Lakshmi Narain Agarwal, Agra, 2020
4. P.R.N. Sinha and Sinha Indu Bala, Industrial Relations, Trade Unions and Labour Legislation, Third Edition, Pearson Education Publishers, Noida, 2017
5. P.C. Tripathi, Personnel Management and Industrial Relations, Sultan Chand & Sons, New Delhi, 2013.
6. C.S. Venkataratnam, Industrial Relations, Oxford India Publishers, New Delhi, 2013.
7. K. Uday Kumar, Industrial Relation, Omega Publications, New Delhi, 2012.
8. Ratnasen, Industrial Relations, Macmillan Publishers, New Delhi, 2009.
9. J.H. Richardson, An Introduction to the Study of Industrial Relations, Taylor Francis Group, London, 2010.
10. RS Davar, Personnel Management and Industrial Relations, Vikas Publication House, New Delhi, 2016.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	3	2	3	2	2	1	2	2	3
CO 2	3	3	2	2	2	3	2	2	2	3	2	2
CO 3	3	2	2	2	2	3	2	2	3	2	2	2

*1- Low, 2. Medium, 3.-Strong

PA-305(B): INDIAN POLITY AND GOVERNANCE

Open Elective

Objectives

(a) To provide knowledge about the union and the State Governments Structure, Powers and Functions.

(b) To familiarize students about the Structure, Powers and Functions of Indian Judiciary.

(c) To create awareness about the Developmental Programmes, Policies, Process of Indian Government.

Syllabus

Unit-I

(a) Functions and Duties of the Indian Union and the State Government

(b) Distribution of Powers between the Union and States.

Unit-II

(a) Structure and Powers and Functions of Parliament and State Legislatures.

(b) Local Governance post 73rd and 74th CAA.

Unit-III

(a) Judiciary – Structure and Functions

(b) Judicial Activism, Judicial Review and PIL

Unit-IV

(a) Government Policies and Programmes for Development

(b) Development Process, the role of Civil Societies and NGO's

Unit-V

(a) SMART Governance

(b) Citizen Charter, RTI.

Suggested Readings

1. Fadia, B.L., Indian Government and Politics, Sahitya Bhawan Publications, Agra, 2008.
2. Maheswari, S.R., Local Government in India, Lakshmi Narain Agarwal, Agra, 2003.
3. Jawaharlal Gupta, Local Administration in India, RBSA Publishers, Jaipur, 2012.
4. Lakxmikanth, M., Indian Polity, Tata McGraw-Hill Publishing Company, New Delhi, 2007.
5. Ramesh K. Arora and Rajini Goyal, Indian Public Administration, Vishwa Prakashan, New Delhi, 2002.
6. Puri.K.K., Indian Administration, Bharat Publishers, Jalandhar, 2005.
7. Justice D.M. Dharmadhikari and Siddharth Sharma,Restructuring Indian Judiciary - A Comparative Study, Thomson Reuters Publishers, Toronto, Canada,2021.
8. Devendra Upadyay, The Handbook of Centre-State Relations In India, General Publishers, New Delhi, 2018.
9. Alois Paulin, Smart City Governance (Smart Cities), ElsevierPublishers,Amsterdam, Netherlands, 2018.
10. Team Prabhat Prakashan, Government Schemes, Missions, Campaigns And Programmes in India, Prabhat Prakashan Publishers, Delhi, 2018.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	1	2	2	2	1	1	2	1	2	2	3
CO 2	2	2	2	2	2	2	2	2	2	3	2	3
CO 3	3	2	2	2	2	2	2	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

SEMESTER-IV

PS-401: INDIA'S FOREIGN POLICY-CONTINUITY, CHANGES AND EMERGING CHALLENGES

Core Paper

Objectives

1. To interpret existing knowledge by explaining the nature, evolution, principles, structure and functions of India's Foreign Policy.
2. To provide specific information about relations between India and her neighbouring countries and also India's relations with super powers – USA and Russia.
3. To explain the concepts in between India and Common Wealth, India and UNO and Post-cold War challengers to India's Foreign Policy.

Syllabus

Unit-I:

a) Nature, Scope, Evolution, Influences Factors, Principles and Analysis of India's Foreign Policy.

b) Ministry of External Affairs (MEA) – Structure and Functions.

Unit-II:

a) India and her neighbors (India-Pak, India-Sri Lanka, India-China, India-Bangladesh).

b) India's Relations with Super Powers USA and Soviet Union/Russia.

Unit-III:

a) India and Non-alignment

b) India and UNO

Unit-IV:

a) India's Foreign Economic Policy

b) India’s Nuclear Policy

Unit-V:

a) Post-Cold War Challenges to India’s Foreign Policy

b) India’s Foreign Policy in the Post Covid Scenario.

Suggested Readings

1. S. C. Singhal, Foreign Policy of India, Lakshmi Narain Agarwal Publishers, Agra, 2021.
2. Amb. Surendra Kumar, India's Foreign Policy in the Post-Covid World: International Relations through the Eyes of Indian Diplomats, Wisdom Tree Publishers, New Delhi, 2021.
3. V.N. Khanna and Leslie Kumar, Foreign Policy of India, Vikas Publishing House, Chennai, 2018.
4. V.P. Dutt, India's Foreign Policy: Since Independence, National Book Trust Publishers, Chennai, 2011.
5. Vatsala Shukla, India's Foreign Policy in the New Millennium, Atlantic Publishers, Chennai, 2014.
6. Muralidhar, B.V. & C. Sekhar (ed.), Indian-Bangladesh Relations – Past Perfect, Present Tense, Lap-Lambert Publishers, Germany, 2013.
7. C.Venkata Subbaiah & B.V.Muralidhar, India’s Foreign Policy, SVU Distance Mode Publication, Tirupati, 1991.
8. Srinivasulu, K. & Muralidhar, B.V. (ed), India and Disarmament with reference to CTBT, Lap-Lambert Publishers, Germany, 2014.
9. Seshu, A, & Muralidhar, B.V.(ed)., Recent Trends in India- Srilanka relations, Scholar Press, Germany, 2016.
10. Yadav R.S. & Suresh Dhanda, India Foreign Policy: Contemporary Trends, Shipra Publications, New Delhi, 2009.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	3	1	2	1	2	2	3
CO 2	2	2	3	2	2	3	2	2	2	2	2	3
CO 3	3	3	2	3	2	3	2	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PS-402: CENTER-STATE RELATIONS IN INDIA

Core Paper

Objectives

1. To explain the nature of Indian federations and the features of government of India Act 1935, the role of Governor in Centre-State relations and the importance of article 356.
2. To provide Centre-State (Legislative, Administrative, Financial) relations and the impact of Centre-State relations on Coalition Governments.
3. To explain the concepts of Rajamannar Committee and Sarkaria Commission on Centre-State relations.

Syllabus

Unit-I

a) Nature of the Indian Federalism. Government of India Act 1935 – Main Features.

b) Co-operative Federalism: Inter-State Council, Zonal Councils.

Unit-II

a) Article 356- Use and Misuse.

b) Role of Governor in Centre-State Relations.

Unit-III

a) Centre-State Legislative Relations

b) Centre-State Administrative and Financial Relations.

Unit-IV

a) Demand for State Autonomy.

b) Impact of Centre – State Relations on Coalition Governments.

Unit-V

a) Recommendations of Rajamannar Committee, Sarkaria Committee, Punchhi Commission.

b) Centre-State Relations-Issues and Challenges.

Suggested Readings

1) D D Basu, Introduction to the Constitution of India, Lexis Nexis Publishers, New Delhi, 2021.

2) Dr. Madhav,India- A Federal Union of States,Konark Publishers Pvt.Ltd,New Delhi,2021.

3) B. P. Singh Sehgal, Centre-State Relations Under Indian Constitution, Universal Academic Books Publishers, Chennai, 2020.

4) Devendra Upadyay, The Handbook of Centre-State Relations In India, General Publishers, New Delhi, 2018.

5) Dr. M.S. Khalsa, Dynamics of Centre-State Relations in India : Eroding or Strengthening? Rawat Prakashan, Jaipur, 2015.

6) Dr. S. K. Jain, Indian Federalism, Kalpaz Publications, New Delhi, 2017.

7) Ara Zeenat, Changing Dynamics of Indian Federalism, Abhijeet Publications, New Delhi, 2015.

8) B. P. Singh Sehgal,Dynamics Of Indian Federalism - A Comprehensive Historical Review, Notion Press,2015.

9) Suryaprasad, Article 356 of the Constitution of India Promise and Performance, Synergy Books India, New Delhi, 2012.

10) K Chaubey, Federalism Autonomy and Centre-State Relations, Satyam Books Publishers, New Delhi, 2007.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	2	1	2	1	1	3	2
CO 2	3	3	2	2	2	3	2	2	2	1	2	2
CO 3	3	3	2	2	2	2	2	2	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PS-403 (A): COMPARATIVE GOVERNMENTS: U.K, U.S.A, SWITZERLAND

Generic Elective

Objectives :

1. To provide concept of Comparative Governments and role of the Governments in modern state.
2. To explain intended to study comparatively on the Administrative system in USA,UK
3. To explain Government system in Britain and Switzerland.

Syllabus

Unit-I

a) Nature, Scope and Importance of Comparative – Governments.

b) The Nation, National Integration, State and Government. The Role of Government in Modern State.

Unit-II

a) Salient Features of American Constitution - Powers and Functions of American President.

b) The Senate and House of Representatives in USA.

Unit-III

a) The Salient Features of British Constitution

b) The Crown, The Prime Minister and The Parliament

Unit-IV

a) Salient Features of Swiss Constitution

b) Direct Democracy and The Plural Executive

Unit-V

a) A Comparative Study of the Administrative System in USA, Britain and Switzerland.

b) A Comparative Study of the Judicial System and Party System in USA, Britain and Switzerland.

Suggested Readings

1. Jonathan Cox, AP Comparative Government and Politics Study Guide 2021-2022: Comprehensive Review with Practice, Accepted Publishers, New Delhi, 2020.
2. Chanchal Kumar, Comparative Governments and Politics, New Century Publications, New Delhi, 2015.
3. Jonathan Cox, AP Comparative Government and Politics Study Guide 2021-2022: Comprehensive Review with Practice, Accepted Publishers, New Delhi, 2020. J.C. Johari, New Comparative Government, Lotus Press, New Delhi, 2007.
4. Alexander, Herbert, E., Comparative Political Finance in the 1980s, Cambridge University Press, Cambridge, 1989.
5. Almond G. and G. Powell., Comparative Politics Today: A Worldview, Chicago, Foresman, 1988.
6. O'Neil Patrick, Essentials of Comparative Politics, New York, W.W.Norton and Co, 2004.
7. Gregory S. Mahler, Comparative Politics, an Institutional and Gross, National Approach, 2008.
8. DuchacekD.Ivo, Comparative Federalism. The Territorial Dimension of Politics, Lesley Frost Ballantine, Printed in the United States of America, 1970.
9. Robertweissberg, Understanding American Government, Holt, Rinchart and Winston, Printed in the U.S.A., Chicago, 1980.
10. Andreas Ladner, Swiss Public Administration Making the State Work Successfully, Palgrave Macmillan Publishers, Switzerland, 2019.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	1	1	2	1	3	2	3
CO 2	2	3	2	2	2	2	2	2	2	3	2	3
CO 3	3	2	2	2	2	2	2	2	3	3	2	3

*1- Low, 2. Medium, 3. -Strong

PS-403 (B): E-GOVERNANCE

Generic Elective

Objectives

1) To enhance the students by explaining scope, evolution and importance of E-Governance. This course provides theories and models of E-Governance and its development.

2) To understand the application of E-Governance by describing its role in rural and urban Development.

3) To provide comprehension by explaining its functions, projects and E-Governance issues and challenges.

Syllabus

Unit- I

(a) E- Governance: Meaning, Definition, Scope and Importance

(b) Evolution of E – Governance, Computer and Internet

Unit-II:

(a) Perspectives and Theories of E- Governance

(b) Models, Issues and Challenges of E- Governance

Unit-III:

(a) National E –Governance Plan – e-Kranti.

(b) Digital India and its Pillars.

Unit-IV:

(a) Initiatives of E- Governance.

(b) E-Readiness and Digital Divide.

Unit-V:

(a) E-Governance in Rural Development.

(b) E-Governance in Urban Development.

Suggested Readings

1. Sangita Dhal, E-governance and Citizen Engagement: New Directions in Public Administration, SAGE Publications Pvt. Ltd, New Delhi, 2021.
2. Dr. R.K. Dubey, E Governance, R.K. Publishers, Vellore, 2019.
3. Vayunandan Etakula, Good Governance: Initiatives In India, PHI Learning Publishers, New Delhi, 2021.
4. Vasundhara Mohan, Scaria Pannackal, Good Governance in India: Prospects and Challenges, Concept Publishing Company Pvt. Ltd, New Delhi, 2019.
5. M. Deshpande R. Kumar, Electronic Governance, Pacific Books International, New Delhi, 2012.
6. Agarwal, Ashok (ed), E-Governance, Universities Press, Hyderabad, 2007.
7. Bhatngar, Subhash, Unlocking E-Governance Potential Concepts, Case and Practical Insights, sage, New Delhi, 2009.
8. Government of India, Second Administrative Reforms Commission, Promoting e-Governance. The Smart Way Forward, 2008.
9. Gupta, D.N., e-Governance A Comprehensive Framework, New Century, New Delhi, 2008.
10. Madon, Shirin, e-Governance for Development: A Focus on Rural India, Palgrave Macmillan, Hound mills 2009.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	3	1	1	2	1	2	2	3
CO 2	3	2	3	2	3	2	2	2	2	3	2	3
CO 3	3	2	2	2	3	2	2	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PS-403 (C): INDIAN POLITICAL PROCESS

Generic Elective

Objectives

1. To make comprehensive study on the political and administrative structure of parliamentary system in India. To enshrine the student by explaining the salient features of the Indian constitution and its implications in a perfect way and also to provide knowledge over national and regional parties in India.
2. To understand election commission of India by describing about voting behavior and electoral reforms in India that effect next trends in Indian Polity.
3. To interpret existing knowledge by explaining women politics and development globalized scams, corruption in India that tends to changes in Indian Polity.

Syllabus

Unit-I

a) Salient Features of the Indian Constitution.

b) Party System in India and its importance.

Unit-II

a) Election Commission of India.

b) Elections, Political Participation and Voting Behaviour.

Unit-III

a) The Legislature: Parliament, The Executive: President, Prime Minister, The Cabinet and Speaker.

b) State Legislature: Governor, Chief Minister and the Cabinet and Speaker.

Unit-IV

a) Demand for New States and its Consequences.

b) New Trends in India Polity.

Unit-V

a) Women in Politics and Development.

b) National Integration and Problems in Nation Building.

Suggested Readings

1. Dr. Ashutosh Kumar, Political Process in India, Shivalik Prakashan Publishers, New Delhi, 2021.
2. Johari and Gupta, Political Process in India, Vishal Publishing Co, Jalandhar, 2020.
3. Gullybaba.com Panel, BPSC-104 Political Process In India, Gullybaba Publishing House Pvt. Ltd., New Delhi, 2020.
4. Sanjeev Kumar HM, Dev N Pathak (Eds.), Political Process in India ,Pinnacle Learning Publishers,Chennai,2020.
5. Biju, M.R., Democratic Political Process, Krishna Mittal,New Delhi. 2009.
6. Rajendra Dayal, Introduction to Political Processes in India, Book Age Publication, Charlotte, North Carolina, 2015.
7. Avasthi, A.P., Indian Government and Politics, Lakshmi Narayan Agarwal, 2009.
8. Peter Ronald De Souza E. Sridharan, India's Political Parties, Sage Publications, New Delhi, 2011.
9. Jawaharlal Gupta, Union Govt. and Administration India, Dominant Publishers, New Delhi, 2012.
10. Satpal Swan, Indian Administration, RBSA & Publishers, Jaipur, India, 2013.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	1	1	2	1	2	2	3
CO 2	2	3	3	1	2	2	2	2	2	2	2	3
CO 3	3	3	2	2	1	2	2	2	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PS-403 (D): SOUTH ASIA IN WORLD POLITICS

Generic Elective

Objectives

1. To examine various aspects on South Asia and World Politics like Nationalism, Coldwar, Security issues.
2. To explain Refugees Problem, economic, ecological, ethnicity and Regional Co-operation.
3. To give overall idea on the South Asia and world politics for better understanding of students.

Syllabus

Unit-I

a) South Asia as a Region - Historical Background during Colonial Period

b) Regional Environment - Nationalism.

Unit-II

b) South Asia in the cold war era – Pakistan, Afghanistan, Nepal, Sri Lanka

c) Role of External Powers in South Asia: USA, Russia, China – the Dragon

Unit-III

a) Security Issues in South Asia: Nuclear Proliferation, Terrorism,

b) Refugees Problem and Narcotics.

Unit-IV

a) Economic and Ecological Issues.

b) Ethnicity and Human Security Issues.

Unit-V

a) Regional Co-operation – Imperatives and Obstacles

b) South Asia's role in World Politics.

Suggested Readings

1. Herbert G., Hagerty, Contributions by Craig Baxter, Maryland, USA, Rowman & Littlefield Publishers, Maryland, USA, 2021
2. Devint Hagerty (ed.), South Asia in World Politics, Oxford University Press, Oxford, 2006.
3. John Stone, The Wiley Blackwell Companion to Race, Ethnicity, and Nationalism, Wiley-Blackwell Publishers, Hoboken, New Jersey, 2020.
4. Gopal Singh and Ramesh Chauhan (eds.), South Asia Today, Deep & Deep Publications, New Delhi, 2005.
5. Rajesh M. Basrur (ed.), Security in the New Millennium: Views from South Asia, India Research Press, New Delhi, 2001.
6. P. Bidwai and A. Vanaik, South Asia on a Short Fuse: Nuclear Politics and Future of Global Disarmament, Oxford University Press, New Delhi, 2001.
7. Cohen, Stephen, India: Emerging Power, Brookings Institution, Washington D.C., 2001.
8. M. Chadda, Building Democracy in South Asia: India, Nepal, Pakistan, Boulder Colorado, Lynne Rienner, 2000.
9. V.D. Chopra (ed.), Religious Fundamentalism in Asia, Gyan Publishers, Delhi, 1994.
10. Mohd. Shahzad, Problems of Refugee in South Asia: A Study of Afghan and Sri Lankan Tamil Refugees in India, Manak Publications Pvt. Ltd, New Delhi,2020.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	2	2	2	2	3	1	2	1	2	2	3
CO 2	2	2	3	2	2	3	2	2	2	3	2	3
CO 3	3	2	2	2	2	2	2	2	2	2	2	3

*1- Low, 2. Medium, 3.-Strong

PS-404: PROJECT WORK

Project Work

Objectives

1. This paper aims at exposing students in analyzing the data
2. To understand the different variations in viva-voce
3. To understand the recent patterns in Practice

The aim of this course is to provide the M.A, Students of Political Science with the basic Methodology for undertaking future Research in their subject area.

1. The students have to carry out the studies on areas relating to Political and Administration issues and such other related Topics as per their Course Content.
2. Students well submit a Report of the work done by the start of 4th semester end examinations.
3. Marks distribution
    a) Project Work –**80 Marks** (to be valued independently both by Internal and External Examiners).
    b) Viva –Voce – **20 Marks** (to be conducted in the Department with the Chairperson BOS, (Chairman), and Head of the Department and Internal Examiner as members. The quorum for the Viva – Voce Board is two).

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	3	2	3	1	2	3	2	2	3
CO 2	3	2	3	3	2	3	2	2	3	3	2	3
CO 3	3	2	3	3	2	3	2	2	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PS-405 (A): INTRODUCTION TO INDIA'S FOREIGN POLICY

Open Elective

Objectives

(a) To provide knowledge about the Evolution of Indian Foreign policy and India's relations with UNO and Common wealth.

(b) To create awareness about the Nehru, Indira Gandhi, Gujral, Vajpyee and Modi's role in Indian Foreign Policy.

(c) It also provides the knowledge about the Indian Foreign Policy during the Post – Cold War Period and Covid and Post Covid Challenges to Indian Foreign Policy.

Syllabus

Unit-I:

(a) Meaning, Definition, Nature and Scope of Indian Foreign Policy

(b) Evolution of Indian Foreign Policy

Unit-II:

(a) Indian and Common Wealth

(b) India and U.N.O

Unit-III:

(a) India and Disarmament

(b) India's Nuclear Policy

Unit-IV:

(a) Nehru and Indira Gandhi's role in India's Foreign Policy

(b) Gujral, Vajpayee and Modi's impact on Indian Foreign Policy

Unit-V:

(a) Post-Cold War Indian Foreign Policy

(b) Covid and Post Covid Challenges to Indian Foreign Policy.

Suggested Readings

1) S. Jaishankar, The India Way: Strategies for an Uncertain World, Harper Collins India Publishers, Noida, 2020.

2) Arvind Gupta and Anil Wadhwa, India's Foreign Policy: Surviving in a Turbulent World, Sage Publications Pvt. Ltd New Delhi, 2020.

3) S. C. Singhal, Foreign Policy of India, Lakshmi Narain Agarwal Publishers, Agra, 2021.

4) Amb. Surendra Kumar, India's Foreign Policy in the Post-Covid World: International Relations through the Eyes of Indian Diplomats, Wisdom Tree Publishers, New Delhi, 2021.

5) V. N. Khanna and Leslie Kumar, Foreign Policy Of India, Vikas Publishing House, Chennai, 2018.

6) Vatsala Shukla, India's Foreign Policy in the New Millennium, Atlantic Publishers, Chennai, 2014.

7) Muralidhar, B.V. & C.Sekhar (ed.)., Indian-Bangladesh Relations – Past Perfect, Present Tense, Lap-Lambert Publishers, Germany, 2013.

8) C. Venkata Subbaiah & B.V.Muralidhar, India's Foreign Policy, SVU Distance Mode Publication, Tirupati, 1991.

9) Srinivasulu, K. & Muralidhar, B.V. (ed)., India and Disarmament with reference to CTBT, Lap-Lambert Publishers, Germany, 2014.

10) Seshu, A, & Muralidhar, B.V. (ed)., Recent Trends in India- Srilanka relations, Scholar Press, Germany, 2016.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	2	2	2	2	2	2	2	2	2	3
CO2	2	2	3	2	2	3	2	2	2	3	2	2
CO3	3	2	2	2	2	3	2	2	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PS-405 (B): WOMEN AND POLITICS

Open Elective

Objectives

1. To study on the concept of women participation in politics.
2. To discuss various problems facing by women in political participation including women movements.
3. To explain women representation and involvement in political parties.

Syllabus

Unit-I: Introduction

(a) Meaning, Nature and Scope of Women in Politics

(b) Role of Women in Indian Politics.

Unit-II: Problems in Political Participation

(a) Reasons for Low Participation of Women in Indian politics

(b) Problems of Women in Political Participation

Unit-III: Women Movements

(a) Women Movements for Political Participation before Independence in India

(b) Women Movements for Political Participation after Independence in India

Unit-IV: Women and Political Parties

(a) Role of Women in National Politics Savitribai Phule and Indira Gandhi.

(b) Role of Women in Regional Politics - Jayalalitha, Mamatha Benarji and Mayavathi.

Unit-V: Women Representation

(a) Women Representation in Local Bodies (73rd and 74th Constitutional Amendment Acts)

(b) Women Reservation Bill for Upper Bodies; Present Scenario.

Suggested Readings

1. Julie Dolan, Melissa M, Women and Politics Paths to Power and Political Influence, Rowman & Littlefield Publishers, Lanham, Maryland, United Kingdom,2021.
2. Savita Mishra and Krittibas Datta, Women in Indian Politics, ABS Books Publishers, Kolkata, 2021.
3. Ajaypal Kaur, Gender and Politics: Perception and Participation (Role of Women in Punjab Politics), Rawat Publications, 2020.
4. Saxena Kiran, Women and Politics, Gyan Publishing House, New Delhi, 2020.
5. Kanta Kataria and Mahesh Parihar, Women's Political Participation in India, Books Treasure Publishers, New Delhi, 2019.
6. Navaneeta Rath and Gautam Majumdar, Women in Indian Politics–Traditions, Transitions and Transformations, Mittal Publications, New Delhi, 2016.
7. Mariz Tadros (ed.), Women in Politics: Gender, Power and Development, Zed Books Publishers, Canada, 2015.
8. S. Lal, Women in Indian Politics , New Central Book Agency Pvt. Ltd, Kolkata,2010
9. B. Jharta, Women and Politics in India, Deep & Deep Publications, New Delhi, 2002.
10. S.N Ambedkar, Women Empowerment and Panchayati Raj, ABD Publishers, Jaipur, 2005.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	1	2	2	2	1	1	2	1	1	2	3
CO 2	2	3	2	2	2	2	2	2	2	1	2	3
CO 3	3	3	2	2	2	2	1	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

SEMESTER-IV

PA-401: HUMAN RESOURCE MANAGEMENT

Core Paper

Objectives

1. To provide knowledge about the Human Resource Planning, Job Analysis, Job Environment and Enlargement.
2. To provide Traditional and Modern Methods of Evaluation of Performance Appraisal System and Workers Participation in Management.
3. To provide proper knowledge about the Compensation Management, HRM and Industrial Relations, challenges faced by HRM in the era of Globalization.

Syllabus

Unit-I

a) Human Resource Management: Evolution, Scope and Objectives.

b) Importance, Concept of Meritocracy – Public Service: Concept and Role in Modern State.

Unit-II

a) Human Resource Planning- Concept, Importance

b) Job Analysis, Job Environment and Job Enlargement.

Unit-III

a) Performance Evaluation – Traditional and Modern Methods.

b) Process and Methods of Performance Appraisal- Performance Appraisal System, Workers Participation in Management.

Unit-IV

a) Compensation Management

b) Team Development – Discipline.

Unit-V

a) Human Resource Management and Industrial Relations.

b) Globalization and Challenges to HRM.

Suggested Readings

1. Ashok Khurana and Hira Lal Sharma, Human Resource Management, VK Global Publications Pvt. Ltd; 2021st edition, Faridabad, Haryana, 2021.
2. Monika s Chhabra TN Chhabra, Human Resources Management, Sun India Publishers, New Delhi, 2014.
3. Subba Rao, Personnel and Human Resource Management, Himalaya Publishing House; Fifth Edition, Mumbai, 2015
4. Arati Oturkar Dr. Shalaka Parker, Viral S. Ahire, Dr. Ashutosh Zunjur, Human Resource Management, Nirali Prakashan Publishers, Pune, 2020.
5. K. Aswathappa, Human Resource Management, McGraw Hill Education, New Delhi, 2017.
6. Rajesh Komshik, Upendra Kaushik, Sakshi Arora, Human Resource Management, Aavishkar Publishers, Jaipur, 2010.
7. Sharma, R, Human Resource Management, Lakshmi Narain Agarwal, Agra, 2011.
8. Ajihiesh, K.B and Nagaraj, D.R (ed.), Human Resource Management, Indian Perspectives, Willey Eastern Ltd, New Delhi, 2002.
9. S. P. S. Bedi, Human Resource Management - Text & Cases, Bharti Publications. New Delhi, 2012.
10. R.S. Dwivedi,A Textbook of Human Resource Management, Vikas Publishers, New Delhi,2009.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	3	2	2	2	2	1	1	2	2	3
CO 2	2	3	2	2	3	3	2	2	3	1	3	3
CO 3	3	2	2	3	2	2	2	2	2	2	2	3

*1- Low, 2. Medium, 3. –Strong

PA-402: FINANCIAL ADMINISTRATION

Core Paper

Objectives

1. To provide the information relating to Budget, principles and process in Indian Financial Administration.
2. It also provides the knowledge about the Formulation, Enactment, Execution and types of Budget in India.
3. To provide the basic knowledge to the students about role of finance commission and Tax administration in India and To provide in depth knowledge about the CAG Audit and Accounting in India, various Parliamentary Committees, and the role of Finance Ministry in Indian Financial Administration.

Syllabus

Unit-I: Introduction

a) Meaning, Scope and Significance of Financial Administration,

b) Evolution of Financial Administration.

Unit-II: Budgetary Process

a) Budget- Meaning - Principles, Types of Budget - Zero Based; Performance, Deficit and Surplus.

b) Budget-Formulation – Enactment- Execution

Unit-III Fiscal Federalism

a) Fiscal Policy – Role of Finance Commission in India.

b) Tax Administration in India.

Unit-IV: Parliamentary Control over Finance

a) Public Accounts Committee, Estimates Committee, Committee on Public Undertakings, Parliamentary Standing Committees.

b) Finance Ministry – Organization and Functions.

Unit-V: Accounting and Audit System:

a) Accounting System in India, Management Accounting, Auditing System in India, Types of Audit.

b) Role of Comptroller and Auditor General of India.

Suggested Readings

1. Sanjeev Kumar Mahajan, Financial Administration in India, PHI Learning Publishers, New Delhi, 2021.
2. Pundrik Ojha & Kiran Sharma, Financial Administration (With Special Reference to India), Raj Publications, New Delhi, 2021.
3. Sahib Singh, Financial Administration, Fortune Publishers, New Delhi, 2021.
4. Sanjeev Kumar Mahajan et.al, Financial Administration in India, PHI Learning Private Limited Publishers, New Delhi, 2014.
5. Saini, P.K., Financial Administration in India: Changing contours and Emerging Challenges, Deep and Deep Publications, New Delhi, 2007.
6. Goel, S.LO, Public Financial Administration, New Delhi, Deep & Deep Publications, 2004.
7. Dr. Shimla,Parliamentary Standing Committees in India ,Viva Books, New Delhi, 2015.
8. Devender Singh, The Indian Parliament - Beyond The Seal And Signature Of Indian Democracy, Universal Law Publishers, New Delhi, 2016.
9. Verma, V.P, Financial Administration- Concept and Issues, Alfa Publication, New Delhi, 2008.
10. Ganguly, S.P, Control over Public Finance in India. Concept Publishing Company, New Delhi, 2017.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	1	1	2	1	1	2	2
CO 2	3	3	2	2	2	2	2	2	2	2	2	3
CO 3	3	3	3	2	2	2	2	2	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PA-403 (A): SOCIAL WELFARE ADMINISTRATION

Generic Elective

Objectives

1. To provide knowledge about the welfare schemes and programmes for women, SCs and STs and Backward Communities.
2. To provide the knowledge about the Constitutional provisions, Social Welfare Policy of the Union and State Governments.
3. To provide complete knowledge about the Central and State Social Welfare Boards powers and functions and the role of NGO's in implementation of Social welfare Programmes.

Syllabus

Unit-I:

a) Social Welfare – Concept and Philosophy

b) History of Welfare and Development, Welfare Schemes and Programmes for Women.

Unit-II:

a) Welfare Schemes and Programmes for Children

b) Programmes Relating to SC, STs, Backward Communities.

Unit-III:

a) Social Welfare - Constitutional Provisions, Social Welfare Policy of the Unions, the State Government.

b) People's Participatory Approach (PPA) – Critical Evaluation.

Unit-IV:

a) Central Social Welfare Board: Composition and Functions.

b) State Social Welfare Advisory Board: Composition, Powers and Functions.

Unit-V:

a) Role of Non-Governmental Organizations in Socio-Economic Development.

b) Problems in Implementation of Social Welfare Programmes.

Suggested Readings

1) Sachdeva, D.R. (2004). Social Welfare Administration (English and Hindi), Kitab Mahal, Allahabad.

2) Davis C.March. (1965). An Introduction to Social Administration, Routledge and Kegan Paul, London.

3) Kulkarni, P.D. (1961). Centre Social Welfare Board, Asia Publishing House, New Delhi.

4) Jaganadhan, V. (1966). Social Welfare Organisation, IIPA, New Delhi.

5) Paul Chowdary, D. (1979). Social Welfare Administration, Atma Ram & Sons, New Delhi.

6) Goel, S.L. and R.K.Jain (1988). Social Welfare Administrational, Deep & Deep, New Delhi.

7) Chaturvedi, T.N. and S.K.Chandra (1980). Social Administration Development and Change, IIPA, New Delhi.

8) Chowdhary, D.P. (1992). Social Welfare Administration, Atma Ram & Sons, Delhi.

9) Mohinder Singh (ed) (1996). Social Policy and Administration in India, M.D. Publications Pvt.Ltd., New Delhi.

10) Surendra Kataria (2002). Social Administration, RBSA Publishers, SMS High Way, Jhaipur.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	3	2	2	1	1	2	3
CO 2	2	3	2	2	2	2	2	2	2	1	2	3
CO 3	3	3	2	2	2	2	1	2	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PA-403 (B): DEVELOPMENT ADMINISTRATION

Generic Elective

Objectives

1. To provide Basic knowledge about the Development Administration, various Approaches to the study of Development Administration Planning at Union, State and District level for the Development Administration.
2. To provide detailed knowledge about the Decentralized and Development administration in India according to 73rd and 74th Constitutional amendments.
3. To give indepth knowledge about the Developmental Programmes, Policies, Projects and People's Participation in Indian Administration.

Syllabus

Unit-I: Introduction

(a) Development Administration – Meaning and Significance

(b) Comparison Between Traditional Administration and Development Administration

Unit-II: Approaches to Development Administration

(a) Structural – Functional Approach

(b) Gandhian and Marxist Approach

Unit-III: Development Planning in India

(a) Planning at the Central, State and District Levels

(b) Main features of Development Administration.

Unit-IV: Decentralization and Development in India

(a) 73rd CA Act and Rural Local Government in India.

(b) 74th CA Act and Urban Local Government in India.

Unit-V: Development Administration in India

(a) Administration of Development Projects / Programmes.

(b) Peoples Participation in Development Administration.

Suggested Readings

1. R.K. Sapru, Development Administration: Trend towards Development Management, Sterling Publishers Private Limited, New Delhi, 2021.
2. Sahib Singh, Development Administration in India, Fortune Publishers, New Delhi, 2021.
3. Gully Baba, Development Administration, Gully Baba Publishers, New Delhi, 2021.
4. Dr. Rakesh Kumar Singh, Souvik Dhar, Local Self Government - Including Panchayat Administration - A Textbook on Local Send Government, Lexworth Publishers, New Delhi, 2021.
5. Anupama Puri Mahajan, Development Administration in India, SAGE Publications India Pvt Ltd, New Delhi, 2019.
6. S.R. Myneni, Local Self Government" Allahabad Law Agency Publishers, Faridabad, 2016.
7. Mohit Bhattacharya, Social Theory and Development Administration Jawahar Publications, New Delhi, 2011.
8. Sapru R.K, Development Administration, Sterling Publishers Private Limited, New Delhi, 2008.
9. Ashutosh Kumar, Development Administration, Centrum Press Publishers, New Delhi, 2012.
10. N.Sreeramulu, Rural Development Administration in India Serials Publications, New Delhi, 2011.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	2	3	2	2	1	2	1	2	2	3
CO2	3	3	2	3	2	2	2	2	2	2	2	3
CO3	3	3	3	3	2	3	1	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PA-403 (C): DISASTER MANAGEMENT

Generic Elective

Objectives

1. To provide Basic Knowledge about the Disaster Management various types of disasters like Natural, Man-Made disasters, tools, techniques for Rehabilitation, Reconstruction Methods for the victims.
2. To provide indepth knowledge about the role of Red cross Society, Armed forces, Panchayati Raj Institutions, NGO's and ICT in Disaster Risk Reduction in India.
3. To give the detailed information about the resource mobilization and people's participation for the Effective Disaster Management.

Syllabus

Unit-I

a) Meaning, Nature and Importance of Disaster Management

b) Basic concepts: Disaster, Hazard, Disaster Damage, Vulnerability, Exposure, Capacity, Risk.

Unit-II

a) Types of Natural Disasters - Floods, Cyclones, Drought, Earthquakes, Landslides, Volcanic eruptions.

b) Tools, Techniques and Mechanisms of Disaster Management

Unit-III

a) Types of Manmade Disasters – Chemical, Biological, Air Pollution, Water Pollution, Deforestation, Road Accidents, Rail Accidents, Air Accidents, Fire Accidents.

b) Bhopal Gas Tragedy.

Unit-IV

a) Risk Management, Causality Management, Role of Armed Forces.

b) Decentralized Administration, Resource Mobilization for Effective Disaster Management.

Unit-V

a) Role of Panchayat Raj, NGO's, Para Military Forces and Red Cross Society in Disaster Management.

b) Peoples Participation in Disaster Management.

Suggested Readings

1. A.K. Srivastava, Text book of Disaster Management, Scientific Publishers, New Delhi, 2021.
2. P Kumar, Disaster Management, Oak Bridge Publications, Gurugram, Haryana, 2021.
3. S Vaidyanathan, An Introduction to Disaster Management: Natural Disasters and Man Made Hazards, Anitha Books Publishers, Chennai, 2020.
4. Mohan Kanda, Disaster Management in India, BSP Books Pvt. Ltd., Hyderabad, 2019.
5. R. Subramanian, Disaster Management, Vikas Publishing House, Mumbai, 2018.
6. Ruthra, Disaster Management, Lakshmi Publications, Chennai, 2017.
7. Sunil R Hegde, Disaster management in India, Notion Press Publishers, Chennai, 2021.
8. Sulphey M. M, Disaster Management, PHI Learning Private Limited, New Delhi, 2016.
9. Prof. S. Padmaja et. al, Natural Disaster Management, Telugu Academy, Hyderabad, 2014.
10. Dhawan, Disaster Management and Preparedness, CBS Publication, New Delhi, 2012.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	2	2	2	2	2	1	2	2	3
CO 2	2	2	2	2	2	3	2	2	2	1	2	3
CO 3	3	2	2	2	2	2	2	3	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PA-403 (D): OFFICE MANAGEMENT

Generic Elective

Objectives

1. To provide knowledge about the basic principles of Organisation, Planning and layout of Office Management.
2. To provide knowledge about the Filing System and Record Management.
3. To provide complete understanding of Training and Staff Welfare, Work study work Measurement and work simplification.

Syllabus

Unit-I:

(d) Introduction: Nature, Scope and Importance.

(e) Basic Principles of Office Organization

Unit-II:

(a) Office Planning and Lay Out of Office Management.

(b) Office Equipment and Office Services

Unit-III:

(a) Filing System and Record Management

(b) Office Communication and Correspondence

Unit-IV:

(a) Office Supervision and Office Stationary

(b) Training and Staff Welfare

Unit-V:

(a) O & M –Work Study, Work simplification and Work Measurement.

(b) Office Management in Government- Some Issues.

Suggested Readings

1. Prof. R. C. Agarwal, Dr. Piyush Shalya, Office Management , SBPD Publishing House, Agra, 2021.
2. Dr. Siddalingappa, Prof. Gourish Dixit, Office Organisation And Management, Thakur Publication Pvt. Ltd., Lucknow, Uttar Pradesh, 2021.
3. Pillai R. S. N, Office Management, S Chand & Co Ltd Publishers, New Delhi, 2021.
4. Chopra R.K, Office Management, Himalaya Publishing House, Kolkata, 2015.
5. R C Bhatia, Modern Office Management & Commercial Correspondence, Sterling Publishers, 2015.
6. I.M. Sahai, Office Management & Secretarial, Sahitya Bhawan Publications, New Delhi, 2019.
7. Neetu Sharma, Office Organization and Management, Gullybaba Publishing House, 2020.
8. G. K. Gupta R. Nangia, Office Management, Crescent Publishing House, Kozhikode, Kerala, 2018.
9. N.Kumar, Office Management, Anmol Publications Pvt Ltd, New Delhi, 2006.
10. S. Sachdev, Office Management, Lakshmi Narain Agarwal, New Delhi, 2021.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	2	2	2	2	2	2	1	2	1	1	2	3
CO 2	2	3	2	2	2	2	2	2	2	1	2	3
CO 3	3	2	2	2	2	2	1	2	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PA-404: PROJECT WORK

Project Work

Objectives

1. This paper aims at exposing students in analyzing the data
2. To understand the different variations in viva-voce
3. To understand the recent patterns in Practice

The aim of this course is to provide the M.A, Students of Public Administration with the basic Methodology for undertaking future Research in their subject area.

1. The students have to carry out the studies on areas relating to Political and Administration issues and such other related Topics as per their Course Content.
2. Students well submit a Report of the work done by the start of 4th semester end examinations.
3. Marks distribution
    a) Project Work –**80 Marks** (to be valued independently both by Internal and External Examiners).
    b) Viva –Voce – **20 Marks** (to be conducted in the Department with the Chairperson BOS, (Chairman), and Head of the Department and Internal Examiner as members. The quorum for the Viva – Voce Board is two).

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	3	2	3	1	2	3	2	2	3
CO 2	3	2	3	3	2	3	2	2	3	3	2	3
CO 3	3	2	3	3	2	3	2	2	3	2	2	3

*1- Low, 2. Medium, 3. -Strong

PA-405 (A) : INDIAN CONSTITUTION

Open Elective

Objectives

1. To provide knowledge about the Evolution, Salient features, preamble, sources of Indian Constitution.
2. To familarise the student about the powers, functions and Election of Indian President Prime Minister and Speaker of Loksabha.
3. To create awareness about the Role of Governor, Chief Minister in State Administration. The role of Judiciary, Election Commission, C & AG and NITI Aayog in India.

Syllabus

Unit-I:

(a) Indian Constitution- Historical Background and Evolution

(b) Salient features of Indian Constitution

Unit-II:

(a) Preamble and Sources of Indian Constitution

(b) Constitutional Amendment and its Procedure

Unit-III:

(a) Indian President – Election and Removal System, Powers and Functions

(b) Prime Minister, Speaker

Unit-IV:

(a) The role of Governor in State Government

(b) Chief Minister – Powers and Functions – His Relationship with Governor

Unit-V:

(a) Judiciary - Judicial Review and Judicial Activism

(b) Election Commission, Comptroller and Auditor General of India, NITI Aayog.

Suggested Readings

1. Durga Das Basu, Commentary on the Constitution of India, Aggarwal Law House E-Solutions, New Delhi, 2021.
2. D.D. Basu, An Introduction to Indian Constitution, Prentice Hall, New Delhi, 2005.
3. Prof (Dr.) Mahendra Pal Singh, V.N. Shukla's Constitution of India, Eastern Book Company, New Delhi, 2021.
4. Vijay Hansaria, The Chronicles of Indian Constitution, Mohan Law House, New Delhi, 2019.
5. Mahendra Pal Singh , Constitution of India, Generic Publishers, New Delhi, 2020,
6. Government of India, The Constitution of India Bare Act with Amendments, Educreation Publishing, New Delhi, 2021.
7. G B Singh, The Constitution of India Simplified, Sovereign Star Publishing , Canada, 2019
8. Fadia B.L, Kuldeep Fadia, Indian Government and Politics, Sahitya Bhawan Publishers, New Delhi, 2020.
9. Dr. P.K. Agrawal & Dr. K.N. Chaturvedi, Commentary on the Constitution of India, Prabhat Prakashan Publishers, New Delhi, 2020
10. Sharma L P, Indian National Movement and Constitutional Development, Lakshmi Narain Agarwal Publishers, New Delhi, 2020.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	2	3	3	2	2	2	1	2	2	3
CO 2	2	3	2	2	2	2	2	2	2	1	2	3
CO 3	3	3	2	2	2	2	1	2	3	2	2	3

*1- Low, 2. Medium, 3.-Strong

PA-405 (B): BANKING MANAGEMENT

Open Elective

Objectives

1. To provide knowledge about the process of Decision making in Banks, Role of Bank Manager, RBI origin, Structure and RBI Governor's role, Banking regulations Act- 1949.
2. To provide the in-depth information about the Techniques of control, Management Information System, Computerized Banking and Net Banking.
3. To provide the knowledge to the Students on Manpower planning in Banking, Role of IT in HRD, Recruitment process, Grievance Redressal system in Banking and other issues and problems in Banking Management.

Syllabus

Unit-I:

(a) Management Principles and Functions-

(b) Organizational Planning-Resource Planning – Profit Planning.

Unit-II:

(a) Origin and Structure of Banks

(b) Types of Banks, Functions of Commercial Banks

Unit-III:

(a) Process of Bank Management

(b) Role of Reserve Bank of India in Indian Economy

Unit-IV:

(a) Techniques of Control – Management Information System

(b) Computerized Banking System – Net Banking.

Unit-V:

(a) Manpower Planning in Banks-Role of IT in HRD- Recruitment and Training

(b) Grievance Redressal System-Trade Unionism- Issues in Banking Management.

Suggested Readings

1. N K Gupta, Banking Awareness, IBC Academy Publications, 4th Revised Edition, Bamgalore, 2021.
2. Johannes Wernz, Bank Management and Control, Springer Publishers, New Delhi, 2020.
3. Radhakrishnan, Bank Management – S. Arunajatesan & S, Margham Publication, Chennai, 2015.
4. D. Muraleedharan, Modern Banking : Theory And Practice, PHI Learning Publishers, New Delhi, 2014.
5. Suresh Padmalatha and Paul Justin, Management of Banking and Financial Services, Pearson Education Publishers, Fourth edition , New Delhi, 2017.
6. Dr. V. C. Sinha, Indian Banking System, SBPD Publishing House, Agra, 2020.
7. Rajib Mallik, Suman Kalyan Chaudhury, Indian Banking System: Growth, Challenges and Government Initiatives, Kalpaz Publications, New Delhi, 2018.
8. S. Natarajan, R. Parameswaran, Indian Banking, S.Chand Company, New Delhi, 2020.
9. N.T. Somashekar, Banking, New Age International Private Limited, New Delhi, 2021.
10. K. Srinivasa Rao, Changing Dimensions of Banking in India, Notion Press, New Delhi, 2021.

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	3	2	3	3	2	2	2	2	1	1	2	3
CO 2	3	3	2	3	3	3	2	2	2	2	2	3
CO 3	3	2	2	2	2	3	3	2	3	2	3	3

*1- Low, 2. Medium, 3. -Strong

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF POPULATION STUDIES



Course

M.A. POPULATION STUDIES

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

About the Department:

- The department of Population Studies came into existence in the year 1973 with generous funding of Family planning Association of India. The department now occupies premier position in the field of Population in India. The department conducts Teaching, Research, Outreach programmes and Training.

Vision

- The department of Population Studies came into existence 1973 with generous funding of Family Planning Association of India. The department now occupies premier positions in the field of Population and it is the 1st Department which started M.A. Population Studies in India. The Department conducts Teaching, Research, Out-reach programmes. The Department of Population Studies intends to be a resource centre for knowledge generation and training point for demographic & family welfare aspects. The department is an asset to **anti-spate** skill fall social work professionals for social welfare and community development

Mission

- The Department of Population Studies is dynamic body for empowering, encouraging the young as employable manpower of overall constructive and sustainable development of themselves and the society through its Teaching, Research, Out-reach (extension) and Training-campers community activities consistently.
- The department of Population Studies came into existence in the year 1973 with generous funding of Family planning Association of India. The department now occupies premier position in the field of Population in India. The department conducts Teaching, Research, Outreach programmes and Training.

II. Programme Specific Outcomes (PSOs)

At the end of the programme, the student will be able to:

PSO1: Familiarize the concepts of basic demography, theories, policies and programmes and its effect on size, growth, components and structure of population.

PSO2: Demonstrate an understanding of multidisciplinary aspects of population studies focusing on sociology, psychology, statistics, economics, community health, geography and gerontology.

PSO3: Acquire skills in conducting independent surveys and techniques to collect, compile, analyze and report on population related aspects.

PSO4: Critically analyze the population issues in relation to development and giving scientific solution to the problems

PSO5: Involve and get trained in organising extension programmes by conducting various awareness programmes on small family norm, gender issues, environment, health, population education and human trafficking

PSO6 Acquire knowledge on field work, team work and NGO management.

Programme Objectives:

- To study and analyze the concepts in Population studies inclusive growth of marginalized and deprived groups of the population.
- Increasing the use of ICT in the investigation of population issues.
- To help students develop knowledge, skills, attitudes and values appropriate to the practices of Population Studies;
- To promote incorporation of theory and practice in the fields of Population Studies and
- To assist academic and policy-oriented research on population and reproductive health, Population and environment, Gender Issues, family planning and population ageing etc.

Programme Outcomes (POs)

After successful completion of two year degree programme in Population Studies, student should be able to:

PO1: **(KB) Knowledge based**

Examine the levels and trends in population situation at regional and global levels and assess its impact on demographic, socio-economic and health aspects

PO2: **(PA) Problem analysis**

Able to analyze the population situation for sustainable growth in the present scenario of India.

PO3: **(Inv) Investigation**

Ability to critically analyze the qualitative and quantitative data on contemporary population issues by conducting surveys and research, and thus providing scientific solutions.

PO4: **(Des) Design and Development**

Acquire skills in designing and conducting surveys at Micro to Macro level

PO5: **(Tools) Use of Tools**

Demonstrate to apply different statistical tools and techniques for conducting independent research and surveys.

PO6: **(Team) Individual Team Work**

Acquire knowledge as a team member by participating in extension and outreach programmes in the community as the department oganises large number of extension programmes.

PO7: **(Comm) Communication skills**

Able to acquire communication skills and interview techniques and present affectively on the issues of health, population education and Family Planning among the people.

PO8: **(Prof) Professionalism**

Demonstrate professionalism in conducting independent research and surveys and gain experience by working with NGO's

PO9: **(Impact) Impacts of course on society and environment**

Able to understand the consequences of population growth on environment and demonstrate on sensitive/complex issues prevailing in the society. (Gender equality,

Health, Small Family Size, Maternal and Child Health, Immunization, Nutrition etc with special reference to Pandemic COVID-19).

PO10: **(Ethics) Ethics and Equities**

Up hold ethical standards, responsibility in maintaining norms and confidentialitys.

PO11: **(LLL) Life Long Learning**

Apply learning skills and techniques acquired through theory and practical field experience to resolve contemporary issues.

PO12: **Physicist & Society**

To assess and solve the problems related to societal, health and safety issues using the professional skill learned

M.A. Population Studies Programme Educational objectives

- Provide high level of understanding of population sciences including an in-depth knowledge of the linkages between population and various socio-economic, health and environmental factors.
- Provide necessary skill to evaluate the impact and consequence of population growth on society.
- To provide the knowledge of causes of population growth and government's efforts to check it and develop awareness on the population dynamics.
- To known the causes of urbanization and its related problems and causes of deforestation and ecological imbalance.

To provide foundation to Post-Graduate students in population studies/demographic issues and provides a comprehensive idea to conduct future research in various aspects related to population.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

SVU COLLEGE OF ARTS

DEPARTMENT OF POPULATION STUDIES

(Revised Scheme of Instruction and Examination, Syllabus etc., under CBCS Regulations -2016 is Amended as per NEP-2020)

(With effect from the batch admitted in the academic year 2021-22)

POPULATION STUDIES

SEMESTER - I

S. No	Code	Title of the Course		Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	PSC 101	Population Characteristics and Theories		6	4	Core-Theory	20	80	100
2	PSC 102	Fertility		6	4		20	80	100
3	PSC 103	Mortality		6	4		20	80	100
4	PSC 104	Sources, Evaluation and Adjustment of Data		6	4		20	80	100
5	PSC 105	A	Population Education and Extension	6	4	CF	20	100	80
		B	Public Health, Nutrition and Health Education						
		C	Health Planning and Policy						
6	PSC 106	A	Population and Development Planning	6	4	EF	20	100	80
		B	Population and						

			Environment						
Total				**36**	**24**		**120**	**480**	**600**
7	PSC 107		Human Values and Professional Ethics - 1	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core papers are Mandatory**
- **Compulsory Foundation – choose one paper**
- **Elective Foundation - Choose one paper**
- **Audit course- 100 Marks (Internal) –Zero Credits under Self Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra Credits**

SEMESTER – II

S. No	Code	Title of the Course		Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	PSC 201	Migration and Multi Regional Demography		6	4	Core-Theory	20	80	100
2	PSC 202	N.G.O Management		6	4		20	80	100
3	PSC 203	Statistical Methods		6	4		20	80	100
4	PSC 204	Population Sociology		6	4		20	80	100
5	PSC 205	A	Population and Sustainable Development	6	4	CF	20	80	100
		B	Population Economics						
		C	Disaster Management						
6	PSC 206	A	Community Health	6	4	EF	20	80	100
		B	Demographic Data Management						
	Total			**36**	**24**		**120**	**480**	**600**
7	PSC 207	Human Values and Professional Ethics – II		**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core papers are Mandatory**
- **Compulsory Foundation – choose one paper**
- **Elective Foundation - Choose one paper**
- **Audit course- 100 Marks (Internal) –Zero Credits under Self Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra Credits**

SEMESTER – III

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	PSC 301	Population Geography	**6**	**4**	Core-Theory	**20**	**80**	**100**
2.	PSC 302	Research Methodology	**6**	**4**		**20**	**80**	**100**
3.	PSC 303	A Population Psychology	**6**	**4**	Generic Elective	**20**	**80**	**100**
		B Population Policies and Programmes						
		C Gerontology						
		D Population Ecology, Urbanization and Migration	**6**	**4**		**20**	**80**	
4.	PSC 304	Soft and Employability Skills	**6**	**4**	Skill Oriented	**20**	**80**	**100**
5.	PSC 305	A Principles of Population Studies	**6**	**4**	Open Elective	**20**	**80**	**100**
		B Population, Society and Environment						
Total			**36**	**24**		**120**	**480**	**600**

- **All Core papers are Mandatory**
- **Generic elective – choose two papers**
- **Skill oriented Course is mandatory**
- **Open Electives are for the Students of other Departments. Minimum one paper should be opted. extra Credits may be earned by opted for more number of open electives depending on the interest of the student through Self-Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC.**

SEMESTER - IV

S. No	Code	Title of the Course		Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	PSC 401	Communication for Family Welfare Programmes		**6**	**4**	Core-Theory	**20**	**80**	**100**
2.	PSC 402	Reproductive Health and Adolescent Issues		**6**	**4**		**20**	**80**	**100**
3.	PSC 403	A	Population Growth and Development	**6**	**4**	Generic Elective	**20**	**80**	**100**
		B	Health Economics						
		C	Demography of Andhra Pradesh	**6**	**4**		**20**	**80**	
		D	Demographic Techniques						
4.	PSC 404	Dissertation/ Project Work		**6**	**4**	*MDC	**20**	**80**	**100**
5.	PSC 405	A	Rural, Urban, Tribal Development	**6**	**4**	Open Elective	**20**	**80**	**100**
		B	Social policies and planning						
Total				**36**	**24**		**120**	**480**	**600**

- **All Core papers are Mandatory**
- **Generic elective – choose two papers**
- **Multidisciplinary Course is mandatory (MDC)**
- **Open Electives are for the Students of other Departments. Minimum one paper should be opted. Extra Credits may be earned by opted for more number of open electives depending on the interest of the student through Self-Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC**

SEMESTER – 1

CORE: PSC - 101: POPULATION CHARACTERISTICS AND THEORIES

Course Objectives

1. To understand the concepts of population change, age and sex, structure aging and trends in population in India and world.
2. Assess the basic population theirs: Malthusian theory from demographic theory and its applicability.
3. Asses the population composition marital status educational, economic and religious composition, trends in aging and problems if elderly.
4. Relayed theories of population economic theirs in relevance to current population situation.

UNIT - I

Definition, Nature and scope of population studies, Components of Population change. Population structure: Need for the study of Age and Sex structure, their determinants, population pyramids. Trends in size and growth of population of world, developed and developing Nations; Population Size, growth and age sex structure in India.

UNIT - II

Population composition in India: Marital Status, Educational, Economic and Religious composition

UNIT - III

Ageing: Concept, Trends in aged population in developed and developing countries with special reference to India; Problems of the elderly and their adjustment; Support systems for elderly

UNIT - IV

a) Malthusian Theory: Its relevance and criticism,

b) Demographic transition theory, stages and causal mechanism, applicability to developing countries.

UNIT - V

Becker's and Leibenstein's theories of fertility - Spencer’s Biological Theory, Cultural Theories, Economic Theories

Reference

1. Bhende, Asha A, and Kanitkar, Tara. 1993. Principles of Population Studies, Bombay:Himalaya, Publishing House.
2. United Nations, 1982. Population of India, Country Monograph, Series No.10, Bangkok.. Economic and Social Commission for Asia and the Pacific.
3. Bhatia, H.S. 1983. Aging and Society, Udaipur: The Arya's Book Centre Publishers
4. Krishnan, P and Mahadevan, K. 199 1. Elderly Population Today: Policies, Problems and Perspectives, Delhi: B.R.Publishing House.
5. Mishra, B.D., 1980. An Introduction to the study of Population. Madras: South Asian Publishers

Course Outcome

1. Identify basic demographic concepts and definitions in Population studies
2. Impart knowledge on Population trends in size and growth of population at regional, national and global level.
3. Discover the implications of different theories on past and present population components with special reference to Malthusian theory

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1								1	
CO 2	3	2	2	2			2			1		2
CO 3	3		2			2			1		2	

CORE: PSC - 102: FERTILITY

Course Objectives

1. Know the concepts of fertility, fecundity, live births, still births sterility, menarche and menopause.
2. Relate measures of fertility: Child women ratio, Child birth ratio Gross fertility rate, Net reproduction rate and its measurements.
3. Assess and relate theirs of fertility, determents.

UNIT - I

Definition of basic concepts fertility period and cohort, fecundity, sub fecundity, conception, pregnancy roaster, pregnancy rate, parity, order, parity progression ratio, birth interval open and closed birth intervals, live birth, still birth, menarche, sterility, menopause. Intrinsic birth and death rates, Stable population

b) Measures of Fertility. Child Woman Ratio, CBR, GFR, ASFR & TFR, Measures of Reproduction: Gross Reproduction Rate and Net Reproduction Rate; Replacement levels of fertility

UNIT - II

a) Levels, trends and differentials in fertility in developed and developing countries with special reference to India.

b) Factors associated with high fertility in developing countries, factors responsible for the decline of fertility in developed and developing countries.

UNIT - III

Nuptiality: Mean Age at marriage and widowhood by cohort method; Factors affecting female age at marriage in India.

UNIT - IV

Determinants of fertility: Age at marriage; Contraception, breast feeding and abortion, socio economic, demographic and cultural factors.

UNIT - V

Theoretical issues and conceptual models relating to fertility Davis and Blake "Intermediate variables framework", Bongaart's "Proximate Determinants of fertility"

Reference

1. Becker, Gary, S. 1969: An economic analysis of fertility in demographic and economic change in developed countries, Princeton University Press.
2. Freedman, Ronald Sociology of Human Fertility: A Trend Report and Bibliography in Current Sociology, 10/11
3. Mahadevan, K. 1986: Fertility and Mortality: Theory, Methodology and Empirical Issues, New Delhi, SAGE publications.
4. Leibenstein, Harvey, 1957: Economic Backwardness and Economic Growth, New York, John Willey & Sons, Inc., pp. 159 175.
5. United Nations, 1982: Multilingual Demographic Dictionary, New York, Dept. of Economic and Social Affairs.
6. United Nations, 1975: The Population Debate. Dimensions and Perspectives, Vol. 11, pp.207 - 219, New York.
7. United Nations, 1973: The Determinants and Consequences of Population Trends, Vol. 1, New York, pp.64 95.
8. John Bongaart's and Robert G. Potter, Fertility, Biology and Behaviour.. An Analysis of the Proximate Determinants, New York. Academic Press, 1983
9. Bhende Asha A, and Kanitkar, Tara. 1994. Principles of Population Studies, Bombay. Himalaya Publishing House.
10. Audinarayana, N. 1990. Socio cultural dimensions of marriage in Rural India, New Delhi: Mittal Publishers.
11. Coale, A.J. 1965. Factors associated with the development of low fertility: A historic summary In. United Nations, World Population Conference, pp.205 209.
12. Mahadevan, K: Sociology of Fertility, New Delhi. Sterling Publishers
13. Mahadevan, K. and Sumangala, S. 1989. Social Development, cultural change and fertility decline, New Delhi. SAGE Publications.
14. Nam, Charles, B (Ed) 1968. Population and Society, Boston, Houghton: Mifflin Company, pp.215 247.
15. Population Reports, 1979: Age at marriage and fertility, Maryland, John Hopkins University, Series M No.4.
16. Shryock, Henry, S. et al., 1971: The methods and materials of demography, Vol.2, U.S. Bureau of Census, Chapt. 16 -17 and 18.

Course Outcome

1. Examine the basic concepts and measurements of fertility
2. Assess, compare and contrast trends in fertility and its determinants
3. Familiarize the concepts of nuptiality and factors affecting nuptiality
4. Examine theories related to fertility and its applications in different situations

CO-PO Mapping

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2			3				2	
CO 2	3	3	3		2						1	
CO 3	3			2	1		3			2	2	

CORE: PSC - 103: MORTALITY

Course Objectives

1. Know the basic concepts of motility, its measurements and determents.
2. Relate the facts affecting fetal perinatal, infant and child hood mortality, relationship between infant mortality and fertility.
3. Understand the concept of life table, types, methods of constructing life tables, and use of models life tables, in demographic analysis.

UNIT - I

Definition and basic concepts of Mortality: Measures of Mortality: Crude death rate, Age and sex specific death rates, infant mortality rate: child mortality rate, cause specific mortality rate; maternal mortality rate; Need and methods of standardization of death rate.

UNIT - II

a) Levels and trends of mortality in developed and developing countries with special reference to India. Factors responsible for declining mortality in developed and developing countries, special reference to India

UNIT - III

Differentials in Mortality by age, sex, region, cause and marital status, residence and socio-economic Characteristics in developed and developing countries, with special reference India;

UNIT - IV

Factors affecting foetal, perinatal, infant and childhood mortality; Inter-relationship between infant mortality and fertility: Integrated Child Development Scheme (ICDS).

UNIT - V

Life Tables concepts and definitions; Types and forms of life tables; Methods of constructing life tables from age specific death rates, Uses of Model Life tables in demographic analysis for countries having limited data.

Reference

1. Shryock, Henry, S. et al., 1971: The methods and materials of demography, Vol.2, U.S. Bureau of Census, pp.389 462.
2. Bhende, Asha A, and Kanitkar, Tara. 1994. Principles of Population Studies, Bombay: Himalaya Publishing House.
3. Srinivasan, K. 1998: Basic Demographic Techniques and Applications, New Delhi, Sage Publications, p.86 107.
4. Mahadevan, K. (ed) 1986. Fertility and Mortality: Theory, Methodology and Empirical Issues. Sage Publications.
5. Park, J.E. and K.Park, 1998. Text Book Preventive and Social Medicine, Jabalpur: Banarsidas Bhanot Publishers.
6. United Nations, 1973: Determinants and Consequences of Population Trends.
7. Mosley, W.H. and L.C. Chen, 1984: Child Survival Strategies, Supplement 10 to Population and Development Review, New York: Population Council, pp.25 48, 49 57
8. United Nations, 1983: Manual X Indirect Techniques for Demographic Estimation, New York. United Nations, p. 12 20, p. 73 96.
9. Bogue, Donald J., E.E.Arriaga and D.L.Anderson, Readings in Population Research Methodology, Vol. 2, Mortality Research, United Nations Population Fund, Chicago, 1993, pp. 7 1 to 7 10; 7 59 to 7 74; 7 8 to 7 83.
10. Mahadevan, K.(ed) 1991: Health Education for Quality of Life, Delhi, BR. Publications. Registrar General, 1989: Causes of Death (Rural).

Course Outcome

1. Identify the various concepts and measures of mortality
2. Examine the global levels and trends in mortality and its determinants
3. Acquire knowledge on techniques of life tables, constructions of multiple-decrement life table and computational aspects for demographical analysis

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	3								2	1
CO 2	3	3		3	2			2	2			2
CO 3				3	3	3	3	3				

CORE: PSC - 104: SOURCES, EVALUATION AND ADJUSTMENT OF DATA

Course Objectives

1. Understand censes, survey and vital registration: its trends in India.
2. Relate and measure different methods of population projects.
3. Examine the evaluation and measurement of errors in age reporting: whippel's index, Myer's index and UN secretariat methods.

UNIT - I

Sources of population data, Census, Surveys and Vital Registration New trends and development in Indian censuses National and international sources of data

UNIT - II

Evaluation of data on Demographic statistics, Errors of coverage and errors of content, general methods for detecting errors: comparison of individual data, re enumeration surveys.

UNIT - III

a) Factors affecting completeness of census: Balancing equation: definition and limitations use of the balancing equation.

b) Factors affecting the completeness of birth and death registration

Appraisal of birth and death statistics by means of a balancing equation, Direct Checks on completeness of vital statistics registration, Chandra-Deming formula

UNIT - IV

a) Evaluation and measurement of errors in age reportingWhipple's index; Myer's index and United Nations Secretariat Method; Uses and

limitations

UNIT - V

Methods of Population Projections, Mathematical Methods, Component Method, Methods of Sub national Population Projections.

Reference

1. Bhende Asha, A. and Tara kanitkar, 1994. Principles of Population Studies, Mumbai: Himalya Publishing House.
2. ESCAP, 1982, Population of India, Country Monograph Series No. 10, Yew York: United Nations, pp 379 413.
3. Prakasam C.P., G, Rama Rao and R.B. Upadhyay, 1987, Basic Mathematics in Population Studies, Mumbai: Gemini Publishers. Chapter VI, VI 11, IX.
4. Srinivasan K. 1998. Basic Demographic Techniques and Applications, New Delhi: Sage Publications India Pvt. Ltd.,
5. United Nations, Manual 11, 1955. Methods of Appraisal of Quality of basic data for population estimates, ST/SOPA/Series, A/23, New York. Chapters i to Ill.
6. Pathak, K.B and F.Ram, 1992. Techniques of Demographic Analysis, Mumbai: Himalaya Publishing House.
7. Registrar General of India, 1997. Civil Registration System in India.
8. Registrar General of India, 1998. Sample Registration System, Statistical Report
9. Registrar General of India, 1999. Registration of Births and Deaths in India.
10. Shryock Henry S., Jacob S. Siegel and Associates, 1980. The Methods and Materials of Demography, Vol. 1 & II, Washington, D.C. U.S. Bureau of the Census.
11. United Nations, 1998, Handbook on Civil Registration and Vital Statistics Systems, Management, Operation and Maintenance, New York.
12. United Nations Population Fund, 1993, Readings in Population Research Methodology, Vol. 1, Basic Tools, Illinois, USA: Social Development Centre.

Course Outcome

1. Examine and compare merits and demerits of various sources of population data
2. Understand the evaluation of data, factors affecting completeness of data
3. Reproduce knowledge on population projections, calculations and applications

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3				2	3					2
CO 2	3				3	3				2	1	
CO 3	3			2	2					1	2	

CF: PSC – 105 (A): POPULATION EDUCATION AND EXTENSION

Course Objectives

1.Understand the concepts method objects and components of population education, training, and programmers and methods of training population education.

2. Examine and relate extension programmers in population education and to organize the population education programs at schools, colleges and non-formal education levels.

3. Relate population education programs at present in India, Thailand and USA and also beyond family planning measure.

UNIT - I

a) Population Education concept, need, objectives and components of Population Education.

b) Training Programmes in Population Education General Procedure for developing a training programme and alternative models of training in Population Education.

UNIT - II

a) Extension Programmes in Population Education Concept, Processes and methods of extension education.

b) Population Education Programmes at School, College and Non formal education levels.

UNIT - III

Role of Non-governmental organizations and Universities in the promotion of population education programmes.

UNIT – IV

Population Education programmes in India, Thailand and USA - Merits and Limitations for population education programmes - Elementary and Secondary level teachers.

UNIT - V

Beyond Family planning measures Concept and Importance, Some case studies a) China's planned Birth programme and it's transferability b) Indian Mass Vasectomy Camp c) Incentives and disincentives in Family Planning Programme in India.

Reference

1. Adivi Reddy, A, 1971: Extension Education, Bapatla: Sree Lakshmi Press.Dept. of Population Studies, 1991 Readings in Population Education, Tirupati, S.V. University
2. East West Centre, 1975: The Role of Communication in Programmes that extend beyond family planning, Module text, Hawaii, East West Communication Institute.
3. FAO, 1979: Summary Report of the FAO/UNFPA Workshop, Introduction of Population Education in the Programmes of Rural Development Agencies in Caribbean, Rome
4. Population Education Resource Centre, 1987: Population Education and Approach to Formulation of Curricula, Ahmedabad, Gujarat Vidyapeeth.
5. UNESCO, 1975: Population Education Document Reprint Series, No.3, Bangkok, UNESCO Regional Office for Education in Asia and Pacific
6. UNESCO, 1981. Population Education in Non Formal Education and Development Programmes, Bangkok, UNESCO Population Education Programme Service.
7. UNESCO, 1982: Population Education in Asia and Pacific Bulletin of the UNESCO Regional Office for Education in Asia and Pacific, Bangkok
8. UNESCO, 1974: Report of the UNESCO Seminar on the Role of Universities, Faculties, Colleges of Education in Population Education.
9. UNESCO, 1980: Syllabi and Course Content Outlines Integrating Population Education into Non formal Development Programmes, Bangkok, UNESCO Regional Office for Education in Asia and Pacific.
10. PRA Research Institute, 1999. Some notes on PRA, USA.
11. Sharma, R.C, 1975: Population Trends Resources and Environment: Handbook on Population Education, Jallundar, Dhanpat Rai & Sons.
12. UNESCO, 1978: Future Directions of Population Education, Bangkok,
13. UNESCO Regional Office for Education in Asia and Pacific.
14. Population Studies Centre, 1974: National Seminar on Population Education, Tirupati, S.V. University.

Course Outcome

1. Examine the components of population education and create awareness on population education among the students and youth
2. Acquire skills to organize Extension Programmes in population education at school, college and Non formal educational levels
3. demonstrate training on population education methods and techniques in order to create awareness on population education

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2			1			1		2	2
CO 2		3					2	3				
CO 3			2	2			2					

CF: PSC – 105 (B): PUBLIC HEALTH, NUTRITION AND HEALTH EDUCATION

Course Objectives

1. Know the concept of public health, personal hygiene and its importance with curative, primitive and preventive aspects of health.
2. Relative Environment and health sanitation water supply and health hazards.
3. Understand the concept of Nutrition, balanced diet, nutrition policies and programs: health education methods, developments and agencies involved in the health education.

UNIT – 1

Public Health - Concepts, Definition, Importance of Public Health; personal hygiene; various health aspects: curative, Primitive and Preventive; Indicators of Health.

UNIT –II

Environment and Health - Sanitation, Water Supply and Public Hygiene: Household, Community, Industrial; Occupational

Health Hazards - physical, Chemical, Biological, Mechanical and Psycho-social.

UNIT –III

Nutrition - Food and its classification; concept of nutrition, process, Concepts, Nutrients, Functions and Sources; Balanced Diet; Nutritional requirements of special groups, pregnant and lactating women and Infant and children

UNIT –IV

Nutritional Policies and Programmes - Factors, Nutritional Deficiency Diseases; Recommended Nutrition Standards; Supplementary Nutritional Programs: Applied Nutrition Programmes; Nutritional feeding Programmes etc.

UNIT – V

Health Education - Concepts, definitions, objectives, scope, principles and contents; Health

Education Methods; Role of Health Educator; Development of Health Education Programmes;

Evaluation of Health Education Programmes; Agencies involved in the Health Education.

References

1. R.P Devadas, Nutrition in Tamil Nadu,(Madras: Sangam Publishers, 1972)
2. S.Davidson, R.Passmore and J.F Brode Truswel, Human Nutrition and Dietetics (Livingston: The English Language Book Society and Churchill, 1975)
3. C.Gopalan, S.C Balasubramanian and B.V Ramasastri, Diet Atlas of India (New Delhi: ICMR 1972)
4. C.Gopalan, B.V Ramasastri and S.C Balasubramanian, the Nutrition Value of Indian Foods (New Delhi: ICMR 1978)
5. C,Gopalan and K,Vijayaragavan, Nutrition Atlas of India (New Delhi: 1971)
6. R.Gosh, A Treatise on Hygiene and Public Health (Calcutta: Scientific Publishing Company Inc. 1950)
7. M.Swaminathan, Essentials of Nutrition - Vol. I and II (Madras: The Ganesh and Co., 1974)
8. J.E Park and K.park, Preventive and Social Medicine (India: Bannersidas Bhanot and Company Limited, 1976)
9. P.S Venkatachalam and L.M Revello, Nutrition for Mother and Child, Special Report Series No.40 Nutrition Research Laboratories, 1962)

Course Outcome

1. Import knowledge on the importance of public health various health aspects, like curative, preventive and preventive aspects of public health.
2. Discover the indicators of health, food and its classification, Nutrition and balanced diet.
3. Imports knowledge n Nutritional policies and programmes, health education programmes and agencies involved in the health education.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	2								2	
CO 2	3	2	3	3		2		2			1	
CO 3	3		3		3		2				2	

CF: PSC – 105 (C): HEALTH PLANNING AND POLICY

Course Objectives

1. Know the availability of health services in India and understand the indicate of health morbidity and mortality: health care services for mother ads and aged population.
2. Understand the health planning process, health organization, its design and structure, training, placement and evolution.
3. Relate the different National health programs and its implementation: National and International agencies involved health programs.

UNIT – I

Health Services in India, Indicators of Health Morbidity & Mortality, and Health in the context of development and Five Year Plan. Health Care Service - Preventive, promotive and curative services Health care services for Mother, adults and aged population & Children, industrial workers.

UNIT – II

Health planning process: Decision making, qualitative and quantitative decisions, Policies Strategies, budget: Health planning in India, National Health Policy, goals, objectives and target setting, assessment of Health situation, Resource analysis, priorities, design of programme.

UNIT – III

Health Organization - Design, Structure, Principles, formal/informal types, Coordination within and outside. Span of control, centralization and decentralization, Staffing, job description, outlining role and responsibilities, Training, Placement and Evaluation.

UNIT – IV

National Health Programmes Malaria, Filaria, Prevention of Blindness, STD, National Rural Health Mission.

UNIT – V

International health agencies – UNICEF, WHO, USAID, Rock Feller & Ford Foundation

Non-Governmental organization - Indian Red Cross, DANIDA Tuberculosis Association in India

References:

1. Dutt P.R., rural Health Service in India, Primary Health Services (H.E.P, 1965).
2. Ghosh B.N. Hygiene and public Health, Scientific Publishing Company, 1972.
3. Park J.E., Park K, Preventive and Social Medicine (Jabalpur Bannersidas Bhanot and Company Ltd., 1995).
4. Ashok shan et.al., Community Participation In Health and Family Welfare Programme,
5. Innovative Experience in India, Indian Society of Health Administrators, Bangalore, 1990.
6. Freeman R.B. and Holmes E.M, Administration of Public Health Services, W.B. Sanuders Company, 1960.
7. National Institute of Health and Family Welfare Management Training Modules for District level Health officers, New Delhi, 1990

Course Outcome

1. Understanding the Health services, indicators of health morbidity and mortality, structure and organization of health in India
2. Acquired knowledge on national and international agencies, NGO's involved in health programmes
3. Experiment skills in health planning process, decision making, budgeting and target setting in health programmes

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		3	3		3					3	2
CO 2	3								3			2
CO 3		3	3	3				2		2		

EF: PSC – 106 (A): POPULATION AND DEVELOPMENT PLANNING

Course Objectives

1. Understand the concept and indicates of economic development: the innovative concepts like social aspects, quality of life PQLI, human development index and modernization.
2. Relate population growth to per-capita income distribution, capital formation, industrialization and labor in concept of socio-economic changes
3. Know the situation of food security, food requirement and production, poverty and mall-nutrition agricultural development in relation to population growth.

UNIT – I

Concept and indicators of economic development, Approaches to development; changing Concept-emphasis of distributive aspect, social aspects, quality of life, PQLI, Human Development Index and modernization

UNIT – II

Consequences of population growth on total and per capita income, Income distribution, Capital formation, Rate of investment, allocation of resources, size of the labour force, Industrialization, Demographic Behaviour in the context of socio-economic changes

UNIT – III

Concept of planning, approaches, choice of a suitable strategy, population planning as an Integral part of overall development planning, demographic considerations in planning for different sectors.

UNIT – IV

Population and Food security; Food requirements and production, poverty and malnutrition; Agricultural development; Health services: Primary health care, preventive, promotive and curative services, delivery system, access to health care, Reproductive and Child Health components

UNIT – V

Planning for education, employment and manpower, Housing needs, rural development, Urbanization, environmental aspects

Reference

1. Asha A. Bhenda and Tara kanitkar, Principles of Population Studies, (Bombay: Himalaya Publishing House, 1978)
2. Charles P. Kindilberger and Bruce Herrice, Economic Development (London: Mc Graw Hill Ltd.,1977)
3. C.H. Hanumanta Rao and P.C. Joshi, Reflection on Economic Development and Social change (New Delhi: Allied Publishers Pvt. Ltd. 1980)
4. Higgins, Benjamin, Economic Development (Delhi: UBS, 1976)
5. S. Manzoor Alane and G. Ram Reddy, Socio-Economic development Problems in South East Asia (Bombay: Popular Prakashan, 1978)
6. K.N. Prasad, Problems of Indian Economic Development National and Regional Dimensions (New Delhi: Sterling Publishers Private. Limited, 1983)
7. Rudder Dutt and K.P.M Sundaram, Indian Economics (New Delhi: Sultan Chand and Co., (P) Ltd., 1998)
8. M.L Seth, Priciples of Economics (Agra: Lakshmi Narai Agarwal, 1982)
9. United Nations, The determinants and Consequences of Population Trends (New York: Department of Economic and Social Affairs, 1975)

Course Outcome

1. Import knowledge on indicators of economic development, quality of life, human development index and modernization.
2. Discover the consequences population growths on economic development with special reference to demographic behavior, behaviour in the context of socio economic changes.
3. Identify food requirements and production, food security in relation to population growth

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2			2			3		3	
CO 2		2		2			2			1	1	1
CO 3			2			2				1	2	2

EF: PSC – 106 (B): POPULATION AND ENVIRONMENT

Course Objectives

1. Understand the ecology and education system in relation to population studies: Residence and social environment elements of social environment.
2. Know the concepts of global warming, green effect, El-Nino effect, soil erosion, deforestation and desertification in relation to life style.
3. Examine and relative environmental crisis and land use in relation to environment.

UNIT – I

Ecology and Ecosystem; Human Geography and its relevance to Population Studies; Residential and Social Environment: Elements of Social Environment; Patterns of Social contact, Examination of the relationship among these factors. Human Ecology and its relevance to population studies

UNIT – II

Special distribution of population: Importance of the study, measures of density, factors affecting special distribution. Population distribution in India and in the World

UNIT – III

Land use: Changing patterns, conservation and management of resources. Policies and Programmes for better management

UNIT – IV

Environmental crisis; Air-pollution, water pollution and Noise pollution depletion of biotic resources, ecological imbalances etc

UNIT – V

Global warming, Green house effect, El-nino effect, Soil erosion, Deforestation Desertification, Salinity and water logging, Man's Perception and adjustment to ecological imbalances

References:

1. Demko et.al: 1970. Population Geography: A Reader, New York: McGraw Hill.
2. Sharma, R.C., Population Trends, Resources and Environment, Hand Book on Population Education. Delhi: Dhampet Rai & Sons.

3. United Nations, 1983. Population Resources, Environment and development: Proceedings of the expert group on Population and Resources, Environment and development Geneva.
4. Population Reports, Series M, No. 15, Special Topics on Population and Environment: The Global Challenge, Feb. 2001.
5. Charles Kendigh, S., Ecology with special reference to Animals and Man (New Delhi: Prentice Hall of India pvt. Limited, 1980)
6. Ehrlich, Paul R., et al. Ecoscience, Population Resources, Environment (San Francisco: W.N Freeman and Company, 1977).
7. Murdock, William, Environmental, Resources, Pollution and Society, (New York: 1974)

Course Outcome

1. Examine the human geography and its relevant to population studies with reference to ecology and eco-system.
2. Identify Environmental issue population global warming green house effect, EL-NINO effect etc.,
3. Examine the changing patterns conservations and management of land and policies, programme better management.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	3		2			2		1	1	2
CO 2	3			2		2			3		2	
CO 3	3		2		2	3		2		2	1	1

AUDIT COURSE: PSC: HUMAN VALUES AND PROFESSIONAL ETHICS – I

Course Objectives

1. Understand the nature of ethics and its relation to religion policies, legal, medical and environment: Need and importance of professional ethics and values.
2. Relate and understand crime and theories of punishment in relation to socio economic and technological changes.
3. Know the concepts of Ahimsa-Sathya, Bramhacharya, Darma, Artha, Moksha etc., and the importance of Bagavdgeetha in the present scenario.

UNIT - I

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment, Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions

UNIT – II

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.

UNIT – III

Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non- stealing) Purusharthas (Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).

UNIT – IV

Bhagavad Gita- (a) Niskama karma (b) Buddhism- The Four Noble Truths - Arya astanga marga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, and Gandhian Ethics.

UNIT – V

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent (b) Views on manu and Yajnavalkya

Reference

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values , board of Intermediate Education& Telugu Academic Hyderabad
16. I.C Sharma Ethical Philosophy of India. Nagin&co Julundhar.

Course Outcomes

1. Acquire and gain knowledge on different concepts of human values and behavioural changes.
2. Recognizing the medical ethics and views of Charaka, Sushruta and Hippocratus on moral ethics of medical and health care professionals.

3. Acquire skills on environmental ethics and its relation to Health
4. Discover the Social ethics, human trafficking, human rights, and media ethics

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1			2			3		3	
CO 2	3	2	2	2	1		3				2	
CO 3	3		2		2	3				3		

SEMESTER II

CORE: PSC - 201: MIGRATION AND MULTI-REGIONAL DEMOGRAPHY

Course Objectives

1. Understanding the basic concepts in migration at the National and regional level.

2. Impart knowledge on measures of internal migration through District and indirect method.

3. Acquire knowledge on migration policies in developed and developing countries

UNIT I

Concept of Mobility and Migration Sources and quality of data; Types of migration; Types of migration in India, Multi- regional demography: Meaning and development, uses and limitations – conventional Vs multidimensional demography.

UNIT II

a) Internal Migration: Patterns and characteristics of migration/migrants in developing countries with special emphasis on India.

b) Determinants of Internal migration: demographic, economic, social, and political. Consequences of migration at household and individual level

UNIT III

Migration Theories and models: Ravenstein's Laws of migration, Everett Lee's Theory of migration and Todaro's Model of Rural Urban Migration.

UNIT IV

a) Measures of Internal Migration: Methods of estimation.

Direct Methods: Estimation of Lifetime and intercensal migration from place of birth data. Estimation of migration from data on duration of residence, place of last residence and residence at a fixed prior date, Advantages and limitations

b) Measures of Internal Migration, Indirect Methods: Estimation of net internal migration by national growth rate method, vital statistics method, and survival ratio methods (census & Life Table). Methods of estimating international migration

UNIT V

Migration policies in Developed and Developing Countries - migrants' rights, institutional capacity, regional and international cooperation, socioeconomic well-being of migrants, mobility dimensions of crises, and safe and orderly migration.

Reference

1. Bhende Asha, A. and Tara kanitkar, 1994, Principles of Population Studies, Mumbai: Himalya Publishing House. Chapter X.
2. Pathak, K.B and F.Ram, 1992. Techniques of Demographic Analysis, Mumbai: Himalaya Publishing House.
3. Rogers, A, 1975, Introduction to Multiregional Mathematical Demography, New York: John Willey, Chapter. l& 2.
4. Shryock Henry S,Jacob S. Siegel and Associates,1973. The Methods and Materials of Demography, Vol. II Washington, D.C: U.S. Bureau of the Census.
5. United Nations, 1973. Determinants and Consequences of Population Trends, Vol. 1, New York. Chapter VI & VIII
6. Willekens, F, and Andrei Rogers, 1978. Spatial Population Analysis Methods and Computer Programmes, Research Report No. RR 78 18, international Institute for Applied System Analysis, Luxemburg, Austria, Chapter, 1 & 2
7. United Nations, 1970, Methods of Measuring International Migration, Manual VI, New York.

Course Outcome

1. Explore the different types and trends in migration
2. Apply skills in measurement, causes and consequences of different migrations in different regions
3. Explore the theories and recommend suitable policies of migration

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	2				2		2	1	1
CO 2		3	2			3						
CO 3				3	1		3	2	1	3		

CORE: PSC - 202: N.G.O MANAGEMENT

Course Objectives

1. Know the concept and structure of NGO's and its related Act's and Laws.

2. Understand the organizational management of NGO and Source of funding for the management of NGO's.

3. Acquire knowledge on Human resource management training and development.

UNIT – I

NGO: Concept and Structure; Registration of NGO, Process, Constitution, by-laws / Memorandum of Association and registration.Related Acts and Laws: Societies registration Act of 1860, A.P. Societies registration Act of 2001.

UNIT – II

Organizational Management of NGO: Guidelines for project formulations, programme planning, Monitoring, Evaluation, and financial management. Sources of funding for the management of NGO: National and International, Government and non-governmental agencies.

UNIT – III

Sources of funding for the management of NGO: National and International, Government and non-governmental agencies.

UNIT – IV

Role of NGO in Social and Economic development - Protection, Prevention, Promotion, Transformation

UNIT – V

Human resource management: Planning, Recruitment, Selection, Performance, Appraisal, Training and Development, Motivation, Grievances

Reference

1. Rajeeb Misra 2008-Voluntary Sector and Rural Development. Concept, Practice and a New approach To Remove Rural Poverty. Rawat Publications.
2. I.S.Subhedar 2001 – Field Work Training In Social Work, Rawat Publications.
3. Societies Registration Act ,1860.
4. A.P Societies Registration Act, 2001.
5. Family Planning Association of India –Family Planning Counselling Guide, Population Reports Service Series.
6. Fisher W F -1997 – Towards Sustainable Development, Rawat Publications, New Delhi.
7. Prasad R.K – Population Planning, Policy and Programmes, New Delhi, Deep & Deep Publications.
8. Seshadri and Pandey – Population – Education- A Natural Source Book, New Delhi, NCERT.
9. Rich Mond, M.E, 1972 – What is Social Case Work; An Introduction Description, New York, Ressel, Sage Publications.
10. Trcker, J.Herleiger B L 1970 – Social Group Work, Principles and Practice Association Press, New York.
11. Neil Brach (ED) 1990-Health Promotion at Community Level, Sage Publications, New Delhi, London.

Course Outcome

1. Understand the role, importance and establishing of NGO's
2. Explore the sources of funding of NGO's at national and international level
3. Explore demographic data by working with individuals, groups and communities

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	1			1	3		2	1	1
CO 2				3	3	1		3		1	1	1
CO 3		3	2				3			1	1	

CORE: PSC - 203: STATISTICAL METHODS

Course Objectives

1. Understand the basic methods of statistics and its application.

2. Acquire knowledge on the concept of statistical hypothesis and the level of significances.

3. Impart knowledge on ANOVA correlation and regressions

UNIT - I

Introduction: Use of statistical methods, description of data, Statistical inference Types of measurement: Nominal, Ordinal, Interval and Ratio scales. Frequency distributions: Raw data, frequency distributions, histograms and cumulative frequency distributions.

UNIT - II

a) Descriptive Statistics: Measures of Central tendency: Arithmetic means, weighted mean, median, mode; Measures from grouped data, empirical relation between mean, median and mode;

b) Measures of dispersion; mean deviation, quartile deviation, standard deviation, variance, computation of these measures from ungrouped and grouped, data .

UNIT - III

Tests of Hypotheses: Concept of statistical hypothesis, critical region, level of significance, Type 1 and Type 11 errors, Large and small sample tests for means and proportions, parametric tests t - test, Chi- square test

UNIT - IV

ANOVA one-way and two-way, Factor AnalysisCorrelation: Correlation Association between attributes, linear correlation, rank correlation,

UNIT - V

Regressions - Linear Regression, Logistic Regression, Polynomial Regression Multiple regressions – ordinary least squares (OLS) and generalized least squares (GLS)

Reference

1. Blalock Hubert, 1984. Social Statistics, 2 nd Edition., New York: Mc Graw Hill Book Company.
2. Cochran, W.C., 1963: Sampling Techniques, (second edition), New York: John Wiley and Sons.
3. Gupta, S.C and Kapoor, V.K. 1986. Fundamental of Mathematical Statistics, Delhi: Sultan Chand and sons Publishers.
4. Snedecor, George W and William G. Cochren, 1967. Statistical Methods, 6th Edition, New Delhi.. Oxford & IBH Publishing Company.
5. lhance, D.N. 1971. Fundamentals of Statistics, Allahabad: Kitab Mahal.
6. Goor A.M., M.K. Gupta and D. Das Gupta, 1966. Basic Statistics, World Press.
7. Goon, A.M., Gupta, M.K and Dasgupta, B., 1985. An Outline of Statistical Theory, Vol. I&II, Calcutta: The World Press Private Ltd,.
8. Gopal K. Kanji, 1993, 100 Statistical Tests,New Delhi: Sage Publications.
9. Gowri, K. Bhattacharya and Richard A. Johnson, 1977. Statistical Concepts and Methods, New York: John Wiley & Sons.
10. Gupta, S.Q 1987. Fundamental of Statistics, Bombay. Himalaya Publishing House.

Course Outcome

1. Familiarize the basic statistical methods and its applications to demographic data
2. Demonstrate knowledge on methods and techniques of sampling
3. Acquire skills in processing of data with computer
4. Demonstrate the testing of hypotheses, t-tests, Chi-square tests, correlation and regression

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		3	3	3			2		1		
CO 2	3		3	3	2				1		1	1
CO 3		2	1	2	2		3				2	

CORE: PSC - 204: POPULATION SOCIOLOGY

Course Objectives

1. Understand the basic elements of sociology and its relation to population studies.

2. Acquire knowledge on different social institutions and its relation to social change.

3. Identify the sociological theirs in relation to socio-economic and technological development in the society.

UNIT - I

a) Sociology: Definition, Nature and scope, relationship with population studies.

b) Social institutions: Family, marriage and their Influence on Population.

UNIT - II

a) Social stratification, Social mobility and Population change.

b) Culture and Society, Cultural pattern and its Influence on Mortality and contraceptive behaviour.

UNIT - III

Modernization: Definition, concept, characteristics, Dimensions, theories of Modernization, Impact of social change and its influence on contraception and fertility.

UNIT - IV

Sociological theories of fertility, Social Capillarity theory,Theory of change and response,Theory of diffusion and cultural lag.

UNIT - V

a) Social change, Factors of Social change – Technology and Social change.

b) Status of Women: Concept, Factors affecting the status of women.

Reference

1. Desai, A.R. 1992. Rural Sociology in India. Popular Books.
2. UGC Report of the curriculum development centre Social work education published by UGC, 1990.
3. Singh, K. , 1978.Rural Sociology. Lucknow: Prakash Kendra,

4. Veena Das et al., (eds.), Contributions to Indian Sociology. New Delhi: Sage Publication.
5. Bhende, A. and Kanitkar, T. , 1994. Principles of Population Studies.Bombay: Himalya Publishing House
6. Shankar Rao C.N. 1995. Sociology. New Delhi: S. Chand and Company Ltd.
7. United Nations, 1973. The Determinants and Consequences of Population Trends. New York: UN.
8. Sharma R.K. 1996. Fundamentals of Sociology. New Delhi. Atlantic Publishers.

Course Outcome

1. Examine the basic sociological concepts, and evaluate the relationship of sociology to other social sciences
2. Identify the social institutions, social change and socialization and explore the sociological theories of fertility and its application in contemporary society
3. Explore the present society and its relationship to individual

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	1	3				1		2	
CO 2	3	2		3				1			1	
CO 3		2							2	3	1	

CF: PSC - 205 (A): Population and Sustainable Development

Course Objectives

1. Understand the occupational and theoretical aspect of sustainable development.

2. Identify the linkage between population and environment.

3. Expose the relationship between population and quality of life.

UNIT-I

Sustainable development: Conceptual and Theoretical issues Importance of Studying Sustainable development; Meaning, Concepts and Definitions

UNIT-II

Innovations for Sustainable Development Conventional perspectives on development; Critics of Conventional Development perspectives

UNIT-III

Population-environment linkages - Ecological and environmental dimensions of sustainable development

UNIT-IV

Population and Quality of Life

Quality of life: definition and measurement; Resource creation, management and distribution of water, air, housing, etc;

UNIT-V

Environmental Degradation and PovertySustainable livelihoods; Population and common property resources; Population,poverty and vulnerability; gender dimensions; Population and resources; Humanversus land 'carrying capacity'; 'Population stabilization' to 'Population balance';Critiques of sustainable development perspectives

Reference

1. R. Campbell and Jerry L. Wade, (Eds), Society and Environment: The Coming Collision. Allyn and Bacon, Inc: Boston, MA, pp. 1243-1248.

2. Harris, J.M. (2004) Basic Principles for Sustainable Development, Global Development and Environment Institute, working paper 00-04 (Available http://ase.tufts.edu/gdae/publications/Working_Papers/Sustainable% 20 Development.PDF)
3. Holdren, J. P., and P. R. Ehrlich.(1974). Human population and the global environment. Am. Sci. 62: 282-292.
4. Kem, R., Parto, S. and Gibson, R.B.(2005). Governance for Sustainable Development: Moving from theory to practice, The International Journal of Sustainable Development, 8(1/2), 12-30.
5. Keyfitz, N. (1991). Population and development within the ecosphere: one view of the literature. Population Index, 57: 5-22.
6. Lafferty.W. (ed.) (2004). Governance for Sustainable Development. The Challenge of Adapting form of Functions, Cheltenham: Edward Elgar, (chapter 1 and 11).
7. Lutz, Wolfgang, A.Prskawetz and W.C.Sanderson (eds.) (2002). Population and Environment:
8. Methods of Analysis. Supplement to Population and Development Review. New York, Population Council.
9. McNicoll, Goefferey.(2005). Population and Sustainability. Working paper No.205. New York, Population Council.
10. Pebley, Anne R. (1998): “Demography and the Environment.” Demography. Vol. 35, No. 4; pp. 377-389.
11. Pimental, David, et al. (1999). Will limits of the Earth's resources control human numbers? Environment, Development and Sustainability 1: 19-39.
12. Preston, Samuel H. (1994). Population and Environment: From Rio to Cairo. Liège: International

Course Outcome

1. Examine the concepts and theoretical issues relating to sustainable development and sustainable goals
2. Assess and measure the quality of life, resource creation, and management and distribution
3. Critically think of the relationship between population, environment, poverty and population sustainable growth

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	.3	3	3		2		2		3		2	2
CO 2		3	3	3				2	2		1	3
CO 3			3		3	3	2		2		2	

CF: PSC – 205 (B): POPULATION ECONOMICS

Course Objectives

1. Know the basic elements of economic and its relation to population.

2. Explore the relation between population employments with special reference to India.

3. Understand the demography aspects of man power and population growth.

UNIT – I

Economics: Meaning, definitions, scope and subject matter; its relation to Population Studies; Concepts: Economic goods, wants; wealth, welfare and utility; Consumption; Law of Diminishing marginal utility; consumer's surplus; Law of Substitution; Engel's Law of Consumption; factors of production; laws of returns

UNIT – II

Meaning; GDP, GNP, NNP, Human Development Index; Types of Income: Personal, Disposable, Money Income and Purchasing power parity; Methods of national income measurement in India; Income distribution in India; causes and consequences of inequalities in Income; Incidence of poverty, its causes and consequences.

UNIT – III

Population and land: Availability and utilization, Pressure of population and resources depletion in India; Agricultural transformation and rural development; Green Revolution and Agricultural Development

UNIT – IV

Demographic Aspects of manpower; Concepts, definition and measures;

Sex, age pattern of labour force: Demographic and economic factors in labour force, Occupational and Industrial composition of labour force; changing occupational structure in the process of economic development.

UNIT – V

Population and employment: concepts, definition and measures of employment and under employment; Levels and trends; causes and incidence of under employment and

unemployment in India; programmes and policies for employment opportunities; population growth and growing unemployment situation in India.

Reference

1. Alfred W. Stonier and Doughlas C. Hague, A Text Book Economics Theory (London: Longman group Limited, 1980)
2. Ansely J. Coale and E.M Hoover, Population and Economic Development in Low - income Countries (New Jersey: Princeton University Press, 1958)
3. Asha A. Bhenda and Tara Kanitkar, Principles of Population Studies, (Bombay: Himalaya Publishing House, 1978)
4. George Lealand Bach, Economics: An Introduction to Analysis and Policy (New Delhi: Prentice Hall of India Ltd., 1982)
5. K. N. Prasad, Problems of Indian Economic Development National and Regional Dimensions (New Delhi: Sterling Publishers Private Limited,1983)
6. Robert A.Leon, Basic Economic Principle (New Delhi: McGraw Hill International Book Company, 1981)
7. Rudder Dutt and K.P.M Sundaram, Indian Economics (New Delhi: Sultan Chand and Co., (P) Ltd., 1982)
8. M.L Seth, Principles of Economics (Agra: Lakshmi Narai Agarwal, 1982) K.V. Sundaram, Indin Economics.
9. United Nations, the Determinants and Consequences of Population Trends (New York: Department of Economic and Social Affairs, 1975)

Course Outcome

1. Gained knowledge on concepts of basic concepts of economics and its relation to population change
2. Acquired knowledge on measurements of national income, income distribution causes and consequences of inequalities in income.
3. Relate the population growth in relation to levels and trends, causes and policies of employment.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3							2		2	2
CO 2	3				3				3			3
CO 3	3	3							3			

CF: PSC – 205 (C): CF: DISASTER MANAGEMENT

Course Objectives

1. Acquire knowledge on elements of deserter and its management.

2. Explore the deserter management cycle and growth issues of deserter and management.

3. Identify the administrative setup and role of central and state Governments in deserter management

UNIT - I

Disaster: Meaning - Concept of Hazard, Risk, Vulnerability and Disaster, Impact of disasters: Physical, economic, political, psychosocial, ecological, and others;

UNIT II

Disaster Management Cycle: Mitigation and prevention, Preparedness, Prediction and Early warning, Rescue and Relief, Impact assessment, Response, Recovery, Reconstruction; Disaster Risk Reduction; Community Based Disaster Management (CBDRM);

UNIT III

Global issues and initiatives- World Conference on Disaster Reduction (2005), Hyogo Framework for Action (2005-15), Sphere Standards – 2012, Disaster Management Act 2005; National Disaster Management Policy 2009;

UNIT IV

Role of the Central and the State Governments, Local bodies, Community, Media, International and National Non-Governmental Organizations, Charitable trusts, Educational Institutions, Voluntary Organizations, Community Based Organizations, Youth groups, Others Administrative and institutional structure f or disaster management; Techno-legal framework

UNIT V:

Impact on the individual, family and society, mental health consequences of Disaster: grief reactions, post-traumatic stress disorders Impact of disasters: Physical, economic, political, psychosocial, ecological, and others; Role of social worker

REFERENCES

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management. (2004). Field Practitioner's Handbook, ADPC, Bangkok, Asian Disaster Preparedness Center Bangkok.
2. Anderson M and Woodrow P. (1998). Rising from the Ashes: Development Strategies in Times of Disaster. London: ITDG Publishing, www.itdgpublishing.org.uk .
3. B.K.Khanna. (2005). Disasters: All You Wanted to Know About, Delhi: New India Publishing Agency, Delhi.
4. Blaikie P, Cannon T, Davis I and Wisner B. (2004). At risk: Natural hazards, people's Vulnerability and Disaster. London: Routledge.
5. Maheswari, Sudha Disaster damage estimation models: Data needs vs. ground reality: By Sudha Maheshwari, Rutgers The State University of New Jersey – New Brunswick.
6. Disaster Management Act. (2005). Ministry of Home Affairs, Delhi: Government of India.
7. Hyogo Framework for Action 2005 – 2015: building the resilience of nations and communities to disasters http://www.unisdr.org/we/coordinate/hfa
8. Kapur, A. (2005). Disasters in India: Studies of Grim Reality, Jaipur: Rawat Publications.
9. Manual on Natural Disaster Management in India. (2001). New Delhi: NCDM.
10. Narayana R.L., Srinivasa Murthy, R., Daz P. (2003). Disaster mental health in India: Monograph. New Delhi: American Red Cross. Indian Red Cross.

Course Outcomes

1. Summarize and understand the disasters and Disaster Management
2. Acquire a critical perspective of the policy framework, Institutional Structures and programmes for Disaster Management in India
3. Explore Mental health consequences and able to provide Psychosocial care in Disaster Management

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	3	2	2	3		2		2	1	2
CO 2	3		3		2		3	3		3	2	2
CO 3		3		2	3	1		2		3	1	

EF: PSC – 206 (A): COMMUNITY HEALTH

Course Objectives

1. Understand the basic concepts of community health and factors influencing health.

2. Acquire knowledge on principles of epidemiology and its measures.

3. Impart knowledge on health and nutrition and its national policies and programmers

UNIT - I

Basic concepts in Community health, Health Definition, Factors influencing health, Indicators of Health, Concept of Disease Agent, Host and Environment, concepts of disease prevention primary, secondary and tertiary.

UNIT - II

Definition of Epidemiology, Nature and Scope, Aims, Uses, Principles of Epidemiology and Measures of Epidemiology

UNIT - III

a) Communicable diseases and their control: 1) Water borne diseases, 2) Air borne diseases, 3) Insect borne diseases

b) Environment and Health Sanitation

UNIT - IV

Health and Nutrition, Balanced diet, Nutritional Deficiency Diseases, Nutritional requirements of special groups, pregnant and lactating women and Infant and children Nutritional Policies and Programmes, Supplementary Nutritional Programs, Applied Nutrition Programmes, Nutritional feeding Programmes etc

UNIT – V

National Health Programmes – National leprosy eradication programme, National Tuberculosis Control Programme, National Malaria Eradication Programme,Universal Immunization Programme, National Programme for control and prevention of blindness, National programme for prevention of AIDS, National Filariasis Control Programme, STD control Programmes. National programme for control of Iodine Deficiency Diseases, National Family Welfare Programme.

REFERENCE

1. Park JE and K.Park 2000 Text book of Preventive and Social Medicine, Jabalpur: Banarsidas Bhanot Publishers.
2. Emery AEH 1974. Elements of Medical Genetics. London: Livingston.
3. Ministry of Health and Family Welfare 2005: National Rural Health Mission (2005-2012), Mission Document.

Course Outcome

1. Discover comprehensive knowledge on concepts of community health, illness, disease prevention
2. Critical thinking on epidemiology, communicable diseases and its prevention
3. Understand and appreciate the concepts of health, nutrition, balance diet, nutrition deficiency diseases and National Health Programmes

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		3	3	3		1		2	1		
CO 2		2	2		1	1		2		3	3	2
CO 3		3		2		1		2		2	3	

EF: PSC – 206 (B): DEMOGRAPHIC DATA MANAGEMENT

Course Objectives1.

1. Acquire knowledge on source of demographic data and its management.

2. Impart knowledge on large scale demographic surveys and its trends.

3. Familiarize the adjustment of data, interpolation and its methods evaluation of censes data.

UNIT – I

Census: Concept; Definition and Utility; Scope and Features of Census; History of Census - taking-World and India: Evolution of Indian Censuses; Census Organization; Census Questions: Meaning, definition, and their changes over Census periods; Method of data collection; post-enumeration check and Census Tabulation; Census Publications.

UNIT – II

Concepts, objectives and utility of vital Statistics; UN Recommendations; History of Civil Registration System – World and India ; Organizational set up and details covered; Limitations; Sample Registration Scheme in India: objectives, advantages and limitations; Model Registration Scheme in India: objectives, coverage, uses and limitations; Population Registers.

UNIT – III

Large Scale demographic Surveys: National Sample surveys and other Sample Surveys, Advantages and Limitations; Mysore Population Study, National Family Health Survey, Service Statistics; International Surveys, World Fertility Surveys; Demographic Year Book, Annual Reports, Statistical Year Books, Monthly Bulletins of statistics, Journals, etc.

UNIT – IV

Evaluation of census Data: errors in Census; Coverage and content Errors; Measurement techniques; Types of errors in age data; Measurement of errors: Inspection of data, Comparison with Expected Configuration, Analysis of ratios computed from data, and Measurement of age accuracy by means of an Index: Whipplls Index, Myer's Index and U.N Secretariat Method; Errors in Registration System and Vital statistics: Coverage errors; Content errors in time, place, accuracy of definition adopted and characteristics recorded in the certificates; Measurement of errors: Internal consistency of Vital Statistics,

Balancing Equation, Direct check on Completeness of Vital Statistics and Chandrasekhar and Deming Method.

UNIT – V

Adjustment of Data; Interpolation: Meaning and Uses and Method: Newton`s Forward and Backward Formula, Use of Model life table in adjustment, Sex-Age Adjusted Birth Rate (SAABR); Graduation; of Data; Meaning: Need for graduation; Methods: Newton`s formula, Karup-Kings, Formula, Greville`s formula, U.N. Secretariat formula.

REFERENCE

1. Bhende, Asha A. and Tara Kanitkar, Principles of Population Studies, 5th Ed., (Bombay: Himalaya Publishing House, 1994).
2. Registrar General of India, Civil Registration System in India – A Perspective, census of India, 1971, Census Centenary Monograph No.4 (New Delhi: office of the Registrar General.
3. Padmanabha, P. `Organisation of Civil Registration and Vital Statostics System in India" Registrar General`s Newsletter, vol. Ix No.1 January 1991.
4. Prakasam, C.P.et.al., Basic Mathematics in Population Studies, (Bombay: Gemini Publishers, 1987)
5. Shryock, Henry`s et.al., The Methods and Materials of demography, New York: U.S Department of Commerce, Bureau of Census, 1980.
6. Srinivasan, K. Basic Demographic Techniques and Applications, (New Delhi: Sage 1998).
7. Srivastava. S.C., Indian Census in Perspective (Third Edition), Centenary Monograph No.1 of 1971. (New Delhi office of the Registrar General, 1977.
8. Swamy V.S., "Sources of Demographic Data, in Population of India, Country Monograph Series No.10, (New York: United Nations, ESCAP, 1982).
9. ……., Handbook of Population Census Methods, Vol.1, Studies in Methods, Series F.No.5 New York: United Nations, 1958.
10. ……., Asian and pacific Recommendations for the 1980 Population and Housing Censuses, (Bangkok: U.N 1978).
11. …….. Demographic Year Books (various years)

Course Outcomes

1. Import knowledge on census evaluation of Indian census and census organizations.
2. Identity the SRS system in India, Model registration scheme, population registers.
3. Discover the evaluation of census data, management techniques and errors in census, coverage and content errors.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		3		2		1	2	2
CO 2		3	3		2		1		2		2	
CO 3		3		3		2		2		1	1	

AUDIT COURSE: PSC: HUMAN VALUES AND PROFESSIONAL ETHICS – II

Course Objectives

1. Understand the basic components of human values and its present day reagents
2. Impart knowledge on medical ethics and business ethics.
3. Acquire knowledge on environmental ethic, ethical theories and social ethoics.

UNIT-I

Value Education- Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem. Family values-Components, structure and responsibilities of family- Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-II

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals, Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients, Social justice in health care, human cloning, problems of abortion, Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT-III

Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions, Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics

UNIT-IV

Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

UNIT-V

Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

Reference

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Education-Telugu Akademi, Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin&co Julundhar

Course Outcomes

1. Acquire and gain knowledge on different concepts of human values and behavioural changes.
2. Recognizing the medical ethics and views of Charaka, Sushruta and Hippocratus on moral ethics of medical and health care professionals.

3. Acquire skills on environmental ethics and its relation to Health
4. Discover the Social ethics, human trafficking, human rights, and media ethics

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		3	2		2		2		1	2	2
CO 2		3		3			3		3	2	1	
CO 3			2		3	2	3		3		2	

SEMESTER III

CORE: PSC - 301: POPULATION GEOGRAPHY

Course Objectives

1. Understand the basic elements of population geography and socioeconomic aspects of population distribution.
2. Acquire knowledge on basic concepts of urbanization and measure of urbanization.
3. Impart knowledge on research urban policies in developing countries with special reference to India.

UNIT I

a) Nature and scope of population Geography. Factors affecting the distribution of population Physical and socio economic aspects

b) Measures of Population Distribution: 1) Mapping devices or cartographic methods: Dot method, choropleth method, pie diagram 2) Statistical methods: Percentage distribution, Density and Rank size 3) Categorical methods: rural-urban distribution, Community size distribution.

UNIT II

a) Human Ecology. Population growth and Ecological imbalance, Global warming, Greenhouse effect,

b) Changing pattern of land use. Need for conservation and management of resources, policies and programs for better Environmental management.

UNIT III

a) Basic concepts and definition of urban, definitional and conceptual problems of urban in Indian Census. Process of urbanization in India, growth of mega cities in India,

b) Measures of urbanization. Degree of Urbanization, Percentage distribution, Ratio of Rural and Urban population, Tempo of urbanization

UNIT IV

Salient features of urbanization In the developed and developing countries, Rural Urban growth differentials. Urban problems in developing countries with focus on India

UNIT V

Urban policies in developing countries with particular reference to IndiaAtal Mission for Rejuvenation and Urban Transformation (AMRUT); Pradhan Mantri Awas Yojana (PMAY) – Housing for All (Urban);Smart Cities Mission (SCM); Swatch Bharat Mission (SBM);Heritage City Development and Augmentation Yojana (HRIDAY) Deen Dayal Antodaya Yojana - National Urban Livelihoods Mission (DAY – NULM)

Reference

1. Bose, Ashish,1978. India's Urbanisation: 1901 2001. New Delhi: Tata McGraw Hill Publishing Co., Ltd.
2. Demko et at: 1970. Population Geography: A Reader, New York: McGraw Hill.
3. Edward Arriger: Some selected measures of Urbanization. In: Measurement of Urbanisation and Projection of Urban population, Sydney Goldstein and David Shy (eds).
4. Oberai A.S. 1989. Problems of Urbanisation and growth of large cities in developing countries, ILO: Geneva Working Paper # 169.
5. Revand Betrand: 1981. National Urbanization Policies in developing countries. London: Oxford University Press.
6. R.C.Sharma: Population Trends, Resources and Environment, Hand book on Population Education. Delhi: Dhampet Rai & Sons.
7. Shryock, Harry S_ Siegal., Jacob, S and Associates, 1975. The Methods and Materials of Demography, Vol. 1, U.S.Dept. of Commerce, Bureau of Census.
8. United Nations. 1998. World Urbanization Prospects: The 1996 Revision, New York (Sales No.E.98 XIII.6)
9. United Nations, 1993. Readings in Population Research Methodology, Vol 8, Environment and Economy.
10. Millennium project2005: child health and maternal health, Earth scan, London
11. Carter. 198 1. The study of Urban Geography. Edwind Arnold 3rd Ed.
12. Lampard E.E., 1970. Historical Aspects of Urbanisation. Chapter 14, In (1965). The study of Urbanisation, P.M.Hauser and L. F. Schnore (eds) New York
13. United Nations, 1983. The Determinants and Consequences of Population Trends Vol. 1, New York Chapter – VI

14. United Nations, 1984. Population Resources, Environment and development: proceedings of the expert group on Population and resources, environment and development. Geneva.
15. Population reports, Series M, No. 15, Special Topics on Population and Environment: The Global Challenge, Feb. 2001,

Course Outcome

1. Enumerate the geographical factors affecting the distribution of population
2. Awareness and understanding of trends in urbanization and its impact on ecological imbalance, global warming, greenhouse effects.
3. Able to assess changing pattern of land use, conservation of resources and critical thinking of policies, programmes for better management of environment
4.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		3		2		1	2	2
CO 2		3	3		2		1		2		2	
CO 3		3		3		2		2		1	2	

CORE: PSC – 302: RESEARCH METHODOLOGY

Course Objectives

1. Impart knowledge on objectives, scope and problems of social science research in India.

2. Understand the knowledge on research design and type of research design.

3. know the knowledge on the research proposal preparation and its types.

UNIT - I

a) Introduction and meaning of research, aim, objectives, scope and problems of social science research in India.

b) Steps in research Selection of a problem, Formulation of research project, objectives, Theoretical frame, formulation of hypotheses, and other steps in research process.

UNIT - II

Research design need for Research Design, features of a good Research Design, concepts relating to Research Design, developing a research plan, types of Research Designs Exploratory, Descriptive, Experimental and Formative designs, and Case control studies.

UNIT - III

Methods of data collection: a) Methods of Data Collection: Types of data Primary and secondary, Data collection methods Observation, Interview.

b) Tools of Data Collection: Schedule and Questionnaire, construction of schedule and questionnaire, qualities of a good schedule and questionnaire.

UNIT - IV

Data Analysis and report writing: a) Nature and propose of analysis tabulation, Editing and Coding, Statistical analysis and inferences.

b) Report Writing: Purpose, structure, and writing style of a research report.

UNIT - V

Preparation of Research Proposal: Definition, Importance -Types - Qualities and Content of a research proposal, Budget, Staff and Training.

Reference

1. Blalock, James A and Champion Dean, J, 1976. Methods and Issues in Social Research, London, John Willey, Chapters 1,2,3,4,5,7,9, 10 and 11.
2. Mahadevan, K. 1993. Methodology for Population Studies and Development, New Delhi, SAGE Publishers.
3. Sharma, B.A.V. and Others. 1984: Research Methods in Social Sciences, New Delhi, Sterling Publishers.
4. Solitz, C.E., Jahoda, M.Leutech, M. and Cook, S.W.1960: Research Methods in Social Relations, N.Y.Holt Reineheart and Winstion, Chapters 1,2,3,4,6,7,11 and 12.
5. Young, P. 1986: Scientific Social Surveys and Research, Prentice Hall, Chapters 1,5,6,7,8,9, 10 and 15.
6. Jerry Honeycutt, 1998. Windows 98 Administrators Bible. New Delhi: Comdex Computer Publishing.
7. Geode, W.J. and Hatt, P.K. 1952: Methods in Social Research, New York, McGraw Hill, Chapters 2,5,6,7,10,11,13 and 20.
8. Thakur, Devendra, 1993, Research Methodology in Social Sciences. New Delhi: Deep& & Deep Publications.
9. Norman, K. Denzin & Yvonna S. Lincoln (eds), 1994. Handbook of Qualitative Research, London: SAGE Publications.
10. Hubert, M.Blalock, 1972. Social Statistics, New Delhi: McGraw Hill, Kogakusha, Chapters 4,45,6,7,11, 13, 17 and 2 1.
11. Kerlinger, F.M., 1983, Foundation of Behavioural Research. New Delhi: Surjeet Publications.

Course Outcome

1. Demonstrate in conducting population research and surveys
2. Prepare research design and apply sampling techniques
3. Discover skills in methods and tools of data collection, data analysis, interpretation, and report writing.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2	3		2	2		1	2	2
CO 2		2		3	2	3			3	1	1	
CO 3		2	3		3		2		2	1	2	

GE: PSC -303 (A): POPULATION PSYCHOLOGY

Course Objectives

1. Acquire knowledge on basic concepts on the elements of psychology and its relationship with population studies.
2. Impart knowledge on mechanism of cognition and theories of learning.
3. Familiarized the theories of motivation and its relation to contraceptive behavior

UNIT - I

Definition, Nature and Scope of Psychology, Relationship with Population Studies, value of children and fertility

UNIT - II

a) Family size and personality development in children.

b) Juvenile delinquency. Role of family in juvenile delinquency and remedial measures

UNIT - III

a) Mechanism of cognition. Cognitive consonance theory, cognitive dissonance theory, and balance theory. Selective perception and its influence on fertility and contraceptive behaviour

b) Theories of learning: Theory of connectionism, theory of contiguous conditioning, and theory of operant conditioning. Application of learning theories in promoting family planning behaviour

UNIT - IV

Theories of Motivation: Maslow's theory and Theory of Achievement Motivation. Linkage of these theories to fertility and contraceptive behaviour

UNIT - V

a) Nature and formation of attitudes. Measurement of attitudes: Thurston, Likert, Bogardus. Techniques of attitude change and behavioural modification with special reference to acceptance of contraception and small family norm

b) Definition and categories of Leadership. Characteristics of Leaders, functions of leaders Role of leaders in promoting family, planning behaviour

Reference

1. Arnold, F. et al., 1975. The value of children: A cross national study (Vol.1). Hawaii: East West Institute, pp. 1 14, 40 98, 130 158.
2. Coleman, James, C. 1970. Abnormal Psychology and Modem Life. Bombay: B.R.Taraporevala Sons & co., Chapt.9, p.369 378.
3. David Krech, et al., 1962. Individual in Society, McGraw Hill, Kogakusha Ltd., International student edition, pp. 137 272. 422 453.
4. Festinger, L. 1967. The theory of cognitive dissonance. In: Communication. Madras: Higginbothams (P) Ltd., pp. 14 23.
5. Hurlock, Elizebeth, B. 1974. Personality Development. New Delhi: Tata McGraw Hi 11 Pub. Pp. 3 5 1 3 3 80.
6. Khan, M.E. et al., 1979. People's perception about family planning. New Delhi.. Operations Research Group.
7. Morris, C. 1973. Psychology: An Introduction. New York. Applenton Century Crafts, pp.32 354.

Course Outcome

1. Appreciate the scope of psychology and the relationship between value of children and fertility
2. Familiarize and comprehend the significant psychological theories relevant to fertility and contraceptive behavior
3. Demonstrate leadership and effective communication skills in promoting health and family planning

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2		2	1		2		2	
CO 2		3	2	3		2		1		2	1	2
CO 3	3			3	2	3		2	2		2	

GF: PSC – 303 (B): POPULATION POLICY AND PROGRAMMES

Course Objectives

1. Able to know the population policies and its genesis.

2. Impart knowledge on the development on family welfare program in India.

3. Familiarized the administrative setup of family welfare programs at the national, state, district and PHC levels with special reference to Andhra Pradesh.

UNIT - I

(a) Population policies: Definition, policies influencing fertility, mortality and migration. Genesis and development of Population policy in India

(b) Acts relating to Medical Termination of Pregnancy (MTP) Age at Marriage, Registration of births and deaths.

UNIT - II

Historical development of family welfare programme in India. Contraceptives: a) Spacing temporary methods including safe period, MTP and breast feeding b) Terminal Tubectomy, Vasectomy and Laparoscopy. Target free approach- Causes for slow progress of family welfare programme in India.

UNIT - III

World Population Conferences held in Bucharest, 1974, International Conference on Women held in Beijing, 1998. Cairo – Conference (ICPD) – 1994.

UNIT - IV

Strategies for promoting family welfare programme: Involvement of satisfied adopters, community leaders and dais, community participation, NGO's, Incentives and disincentives, IEC programmes and social marketing of contraceptives.

UNIT - V

a. Administrative set up of family welfare programme at the National, State, district and PHC levels.

b. Success of family welfare programme in Andhra Pradesh and National Rural Health Mission.

Reference

1. Bhende, Asha A, and Kanitkar, Tara. 1993. Principles of Population Studies, Bombay: Himalaya Publi shing House.
2. Mahadevan, K. 1989: Fertility Policies of Asian Countries, New Delhi, SAGE Publications.
3. Mahadevan. K. et.al; 1994. Differential Development and Demographic Dilemma: Perspectives from china and India, Delhi: B.R.Publishers.
4. Chandrasekhar, S., 1976: Population and Law in India, New Delhi: Blackie & Sons (India) Ltd.
5. Kohli Santha Chandra, 1987. Family Planning Programme in India. Delhi, Mittal Publications.
6. Mahadevan, K. 1984: Strategies for Population Control. Tirupati: SV University.
7. Rogers, E.M. 1971. Incentives in the diffusion of Family Planning Innovations. In: Studies in Family Planning, Vol.2 No. 12, pp.241 247.
8. Srinivasan, K. 1995. Case Studies of Three Successful Fertility Transition
9. States: Goa, Kerala and Tamil Nadu. In: Regulating Reproduction in India's Population: Efforts, Results and Recommendations, New Delhi, Sage Publications, pp.221 263.
10. Govt. of India, National Population Policy, 2000, New Delhi: Dept. of Health & Family Welfare, Ministry of Health & Family Welfare.
11. Govt. of A.P., Population Policy of Andhra, Pradesh.
12. Mahadevan, K. et al. 1994. Differential Development and Demographic Dilemma: Perspectives from China and India. Delhi: BR. Publishers.
13. Ministry of Health and Family Welfare 2005: National Rural Health Mission (2005-2012), Mission Document.
14. Millennium project2005: child health and maternal health, Earth scan, London.

Course Outcome

1. Explore population policies related to fertility, mortality and migration
2. Acquire the knowledge on methods of family planning and acts relating to medical termination of pregnancy, age at marriage and also registration of vital events
3. Apply best practices and strategies for promoting family welfare programme.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	3		2			2		2	1	
CO 2	3		2	2		2			3		2	2
CO 3	3	2			2	3		2		2	1	

GF: PSC - 303 (C): GERONTOLOGY

Course Objectives

1. Understand the characteristics of elder and its demography dimensions in *I*ndia,
2. Explore the problems needs and magnitude of elderly population.
3. Familiarize the policies and programs for older and innervations to deal elder issues.

UNIT-I

Gerontology: Definition, Characteristics of elders

Demographic dimensions of the elders in India and other countries

UNIT-II

Changes in the status of elderly health: Functional changes in the biological system of the aged, Physical challenges

Psychological functions: Attention, Perception, memory, Learning, Psychomotor functions and Loneliness, Death, Anxiety

UNIT-III

Problems & Needs of the elderly: Magnitude and Dimensions of the problems

Older persons and Livelihood:

Work participation of old persons in organized and un- organized sectors

Intervention needs or special needs:

Retirement planning, Promoting Savings, Investments, Making Will, Training and Opportunities for income generation and Employment Sponsorship and adoption programs

UNIT-IV

Policies and Programmers for the older persons: National Council for Older Persons National Policy for Older Persons -1999, Schemes for the welfare of the aged:Institutional and Non-institutional Services by Governmental and Non-governmental Organizations for the older persons

UNIT-V

Intervention to deal Elderly issues like Neglect, Abuse, Violence and Abandonment Care giver roles and responsibilities, Care giver stress, Needs of Counseling to Elderly People.

References:

1. A.K Kapoor & Satwanti Kapoor, Indian's elderly, A Mittal Publications
2. Desai, M and Siva Raju, 2000, Gerontological social work in India: Some issues and perspectives, Delhi B.R Publications
3. Irudy Rajan .S. Mishra U.S and Sarma, P.S 1997, Indian elderly : Asset or Liablity, New Delhi Sage Publications.
4. Krishanan , p and Mahavadevan, k(cds)1992, The elderly population in the Developed world polices, problems and perspectives, Delhi B.R Publishing
5. Sebastian Irudaya Rajan &Pheabe Liebig 2003, An aging India perspectives, prospects and polices-Haworth
6. Paul chaudhar D,1985, Profile of social welfare and development in India ,M.N. Publishers and Distributors, New Delhi
7. Douglas C.Kimmel, 1990, Adulthood and Aging, John Wiely & Sons, New York , Singapore
8. Bajapi. P.K (1998), Generation Gap: Implication on the Aged, Social work perspective on health, Rawat Publications, New Delhi
9. Editor: M.Lakshmipati RT.Raju,1999, Family Counselling Perspective and Practices "Dept..of Social Work, SPMVVC ,Tirupati

Course Outcomes

1. Understand the scope of gerontology and demographic dimensions of the elderly

2. Critically explore and analyze changes in status of elderly health, problems and needs of elderly
3. Acquire skills in dealing elderly issues like neglect, abuse, violence and abandonment caregivers stress and elderly neglect

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		3		2	1		2	
CO 2		3	2		3		3		2		2	3
CO 3		2			3	3		2		2	1	

GE: PSC – 303 (D): POPULATION ECOLOGY, URBANIZATION AND MIGRATION

Course Objectives

1. Explore the linkage between population and environment and types of pollution,

2. Examine the determents and consequent on population distribution urbanization and migration.

3. Relate the migration theories effecting present emigrational characteristics

UNIT-I

Population and Environment - Human Geography and its importance; Ecology and eco-system; Population growth and environmental deterioration; Water pollution, Air pollution, noise pollution etc.,

UNIT-II

Population Distribution - Importance of study; Measures; Factors affecting the spatial distribution of Population and temporal changes, Population distribution in India; Determinants and Consequences.

UNIT-III

Urbanization - Meaning, definition, Determinants of urbanization; process of urbanization; Levels and Trends of Urbanization in India; Urban-rural growth differentials; Problems of urbanization and over-urbanization; Policies and Programmes affecting urbanization.

UNIT-IV

Migration: concepts, definitions, Importance of study;

Types of Migration; Factors influencing Migration; Trends and differentials and pattern of internal migration in India; Characteristics of migrants; International migration

UNIT-V

Migration Theories: Push and Pull Factors, Everett Lee`s theory of migration,

Revenstien`s laws of migration; Hypotheses related to volume of migration, streams and counter streams and characteristics of migrants.

REFERENCE

1. Behende, Asha A and Tara Kanitkar, Principles of Population Studies, (Fifth edition), (Bombay: Himalaya Publishing House, 1994).
2. Bogue, Donald J., Principles of Demography (New Delhi: John Wiley Sons, 1981)
3. Charles Kendigh, S., Ecology with special reference to Animals and Man (New Delhi: Prentice Hall of India Pvt. Limited, 1980) Bose, Ashish, India1s Urbanization 1901-2001 (New Delhi: Tata McGraw Hill Publishing Company Ltd. 1980).
4. Ehrlich, paul R., et al. Conscience, Population Resources, Environment (San Francisco: WN Freeman and Company, 1977).
5. Goldstein, S and A Goldetein, Survey of Migration in developing Countries A

Methodological Review, (Honolulu: East-West Center, 1981).,
6. Misra B.D an Introduction to the Study of Population, Second Edition, (New Delhi: South Asian Publishers Pvt. Ltd., 1995).
7. Murdock, William, Environmental, Resources, Pollution and Society, (New York: 1974)
8. Shryock Henry et al., Methods and Materials of Demography Vol. II (Washington D.C: U.S, Bureau of Census, 1973).
9. Thompson, Warren S. and Davis Lewis, Population Problems, (New York, McGraw Hill Book Co., 1953).
10. United Nations, Manual IV. Methods of Measuring Internal Migration
11. United Nations, The Determinants and Consequences of Population Trends, Vol. I (New York: Dept. of Economic and Social Affairs, 1973).
12. Hartshorne, the Nature of Geography (Rawat Publications, New Delhi).

Course Outcomes

1. Import knowledge on population policies influencing fertility, mortality and migration.
2. Discover the world population conferences and India conference on population policies programmes
3. Examine the Administrative setups of family welfare programmes at the National, state, district and PHCs levels

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	2		3		2		2	1	
CO 2		3	3		2		3		2		1	1
CO 3		1		2		2	2	3	3		3	

SOC: PSC -304 (A): SOFT AND EMPLOYABILITY SKILLS

Course Objectives

1. Illustrate the scope need of soft skills and listing.
2. Acquire knowledge on communication skills – verbal and written communication.
3. Import knowledge on inter personal skills employability skills and professional skills

UNIT-I

Soft Skills and Listening

Soft Skills: Meaning and Importance - Hard Skills versus Soft Skills - Self Concept: Self - Awareness, Self Development and Self Realization – Power of Positive Attitude – Etiquette and Manners.

Listening: Types of Listening, Effective Listening and Barriers to Listening – Assertive Communication

UNIT-II

Communication Skills

Verbal or Oral Communication: Forms, Types of Speeches and Public Speaking – Presentation: Elements of Effective Presentation and Use of Visual Aids in Presentation.

Written Communication: Strategies of Writing – Business Letters: Form, Structure and Formats –Types of Business Letters – Memos – Agenda and Minutes.

Non-verbal Communication: Body Language and Proxemics.

UNIT-III

Interpersonal Skills: Relationship Development and Maintenance and Transactional Analysis. Conflict Resolution Skills: Levels of Conflict and Handling Conflict - Persuasion -Empathy - Managing Emotions – Negotiation: Types, Stages and Skills.

UNIT –IV

Employability Skills

Goal Setting, Career Planning, Corporate Skills, Group Discussion, Interview Skills, Types of Interview, Email Writing, Job Application, Cover Letter, Resume Preparation.

UNIT-V

Professional Skills

Decision Making Skills – Problem Solving – Emotional Intelligence – Team Building Skills – Team Spirit – Time Management

Stress Management: Resolving Techniques.

REFERENCE

1. Ghosh, B.N. Managing Soft Skills for Personality Development. (Ed). New Delhi: Tata
2. McGraw Hill Education Pvt. Ltd., 2012.
3. Krishna Mohan and Meera Banerji. Developing Communication Skills. (2nd Edition). New Delhi: MacMillan Publishers India Ltd., 2009.
4. Neera Jain and Shoma Mukherji. Effective Business Communication. New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2012.
5. Rao, M.S. Soft Skills - Enhancing Employability: Connecting Campus with Cororate. New Delhi:I.K International Publishing House Pvt. Ltd., 2011.
6. Ashraf Rizwi, M. Effective Technical Communication. New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2010.
7. Bretag Tracey, Crossman Joanna and Bordia Sarbari. Communication Skills. New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2012.

Course Outcomes

1. Expose to soft skills and listening and its employability, types of listening, effective listening and barriers to listening.
2. Import knowledge on communication skill and inter personal skills, types and stages.
3. Expose to employability skill and its stages, professonal skill, decision making skills and stress management.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2			2		2		1	
CO 2			3		2			2		3	3	
CO 3	3		2		2	2	3		2		1	

O.E. PSC – 305 (A): PRINCIPLES OF POPULATION STUDIES

Course Objectives

1. Academic basic knowledge on basic concepts in pollution studies and components of population change.

2. Understand the basic concepts of fertility motility and its measurements.

3. Impacts knowledge on the concepts of mobility and migration and its measurements

UNIT - I

Definition, Nature and scope of population studies, Components of Population change. Population structure: Need for the study of Age and Sex structure, their determinants, population pyramids. Trends in size and growth of population of world, developed and developing Nations; Population Size, growth and age sex structure in India.

UNIT - II

Definition of basic concepts fertility period and cohort, fecundity, sub fecundity, conception, pregnancy roaster, pregnancy rate, parity, order, parity progression ratio, birth interval open and closed birth intervals, live birth, still birth, menarche, sterility, menopause. Intrinsic birth and death rates, Stable population

UNIT - III

Definition and basic concepts of Mortality: Measures of Mortality: Crude death rate, Age and sex specific death rates, infant mortality rate: child mortality rate, cause specific mortality rate; maternal mortality rate.

UNIT - IV

Measures of Internal Migration (Direct Methods): Places of birth, Duration of residence, Place of last residence, and Place of residence

Methods of estimation (Indirect methods): National Growth Rate Method, and Residual Method

UNIT - V

Concept of Mobility and Migration:. Sources and quality of data; Types of migration; Types of migration in India . Multi regional demography: Meaning and development, uses and limitations – conventional Vs multidimensional demography.

Reference

1. Bhende, Asha A, and Kanitkar, Tara. 1993. Principles of Population Studies, Bombay:Himalaya, Publishing House.
2. United Nations, 1982. Population of India, Country Monograph, Series No.10, Bangkok.. Economic and Social Commission for Asia and the Pacific.
3. Bhatia, H.S. 1983. Aging and Society, Udaipur: The Arya's Book Centre Publishers
4. Krishnan, P and Mahadevan, K. 199 1. Elderly Population Today: Policies, Problems and Perspectives, Delhi: B.R.Publishing House.
5. Mishra, B.D., 1980. An Introduction to the study of Population. Madras: South Asian Publishers

Course Outcomes

1. Explore the components of population change, trends in size and growth of population
2. Discover the concepts of fertility, mortality and migration
3. Acquire skills in exploring the sources and quality of data on fertility, mortality and migration

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		3		3		3		2	2	
CO 2	3	2	2		2		2		3		2	2
CO 3		3		2		3	3	2		2	1	

O.E. PSC – 305 (B): POPULATION, SOCIETY AND ENVIRONMENT

Course Objectives

1. Acquire knowledge on the basic concepts of fertility mortality and its data sources.

2. Explore the linkage between population growth and socio Economic changes.

3. Understand the relationship between man and environment in relation to population growth.

UNIT-I

Components of population change, fertility and mortality, concepts, definitions and data sources.

UNIT-II

Social consequences and implication of Demographic changes in fertility, mortality and migration

UNIT-III

Population and Socio-economic changes-social consequences of demographic changes, beggary, dowry, poverty, unemployment etc

UNIT-IV

Ecology and Environment, Definition and meaning importance a relationship between man and environment, over population, environment detraction

UNIT-V

Sustainable development: concepts and meaning, Areas of sustainable development: Climate change, Biodiversity, Disaster risk reduction, Sustainable consumption and production

Reference

1. Nam, Charles, Population and society Bostan Houton, Mifin co 1968
2. Bogue, Donald J, principles of demography New York 1969

Course Outcomes

1. Import knowledge on components of population changes and its social changes.
2. Discover the population and socio-economic changes and its consequences of demography and social problems.
3. Expose to ecology and Environment sustainable development in relation to population growth.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2	1		3	2		2	2	1
CO 2		3	3		1	2		1		3	2	2
CO 3		2		3		2	2			2	3	

SEMESTER – IV

CORE: PSC - 401: COMMUNICATION FOR FAMILY WELFARE PROGRAMMES

Course Objectives

1. Understand the elements process problems and channels of Communication.

2. Acquire knowledge on different approach the communication and models of mass communication.

3. Femi arise the role of husband and wife commination and mass media in promoting family planning.

UNIT - I

Communication: Meaning and main elements in the communication process, Communication Problems. Channels of communication: Types, merits and limitations. Homophily and Heterophily in Communication

UNIT - II

a) Different approaches to communication: Information transmission approach, Persuasion approach and Dialogue approach.

b) Innovation Decision process: Meaning and stages in innovation decision process, role of mass media, peer groups and opinion leaders in innovation decision process.

UNIT - III

a) Models of Mass communication flow of ideas: a) Hypodermic Needle Model b) Two step flow model and c) Multi step flow model

b) Communication and Social change. Barriers to Communication in Family Planning,

UNIT - IV

Husband wife communication in Family planning: Linkage to contraception and fertility. Factors influencing husband wife communication, Demographic, socio economic, cultural, familial and psychological.

UNIT - V

Mass media in Family Planning Communication: Studies on media reach and effectiveness in promotion of Family Planning in India.

Reference

1. Bogue, Donald J. 1975. Twenty five communication obstacles to the success of F.P.Programme, Media Monograph, University of Chicago, Community and Family Study Centre.
2. East West Communication Institute, 1975: Module Fundamentals of Human Communication, Honolulu, pp.99 178.

3. Population Reports, Media Communication in Population/family Planning Programmes: A Review, Maryland, Johns Hopkins University, No. 16.
4. Rogers, E.M. Communication of innovations Free Press, pp.6 14, 98 191, 199 209, 251 252.
5. Rogers, Everett, M. 1973. Communication strategies for family Planning, Free Press, 1973, pp.43 70, 369 380.
6. United Nations, Husband wife communication and Practice of family Planning, Asia Population Studies series, No. 16.
7. Mahadevan, K. 1977 Communicating through satisfied adopters of female sterilization Studies in Family Planning, Vol.8, No.8, New York: The Population Council.
8. Kabir, M. and M.A.Islam, 2002. Mass Media FP Programmes on Current Use of Contraception in Bangladesh. Communication, Modernization and Social Development. (Eds.) Mahadevan K, et al., Delhi: B.R. Publications pp.495-519
9. Mahadevan K. 1984 Decision Making and Diffusion in Family Planning Tirupati: S.V. University pp.15-33
10. Syed Sabota H. 1979 Communication Channels and Family Planning in Pakistan Studies In Family Planning Volume 10 No.2 pp.53-60
11. Kakar V.N.1987 Communication in Family Planning: India's Experience. New Delhi: National Institute of Health and Family Welfare
12. IIPS 2000. National Family Health Survey, India 1997 98.

Course Outcomes

1. Examine the elements in communication process
2. Understand and apply different approaches to communication
3. Critically analyse and apply factors influencing a various communication methods to promote family planning

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	2	2		2		2		3	2	2
CO 2		3	2		2	1		2	1	2	1	1

CO 3		3		2		2	3		3		2	

CORE: PSC - 402: REPRODUCTIVE HEALTH AND ADOLESCENT ISSUES

Course Objectives

1. Acquire basic knowledge on anatomy and physiology human reproduction concepts and pregnancy.
2. Explore the female and reproductive problems.
3. Examine the adolescent issues and policies to protect reproductive health.

UNIT - I

Reproductive Health-Scope, Concepts- Anatomy and Physiology of Human Reproduction, conception and pregnancy, Reproductive problems of women and men including adolescents

UNIT - II

a) Female reproductive health problems: Gynecological-Menstrual problems, reproductive tract infections (RTI), Obstetrical problems: prenatal, intra natal and post natal problems.

b) Male reproductive problems: nocturnal ejaculations, burning urination, discharge from urethra, impotence, infertility.

UNIT - III

Sexually transmitted diseases (STD), HIV/AIDS transmission-heterosexual and homosexual, mother to child transmissions, injections, and tattooing.

UNIT - IV

Adolescent issues: Social Problems-Drugs, alcohol, violence, abuse, prostitution, psychological depressions.

UNIT - V

a) HIV/AIDS prevention programmes of Government and Non-government agencies Sustainable Development Goals

b) Reproductive and Child Health Programme in India

Reference:

1. Mahadevan, K et al 1998. Reproductive Health, AIDS Prevention and Development of Women. Delhi B.R.Publishers
2. Padbidri V.G, and S.N. Daftary, 1999. Shaw's Text book of Gynaecology. New Delhi: B. I.Churchill Livingstone pp.33 45, 214 239,351 360.
3. Krishna Menon, M.K. and B.Palaniappan 1988. Clinical Obstetrics. Chennai: Orient Longman, pp.8 23,127 192.
4. United Nations, 1975. Chapter 16 Human Reproduction Student's study guide on Biology of Population. New York: United Nations. Pp.357 379.
5. Park K and J E Park 2006 Text Book of Preventive and Social Medicine. Jabalpur: Banarsidas Bhanot
6. UNFPA 2000. Adolescents in India: A Profile. Un System in India, New Delhi
7. Sharma 1999. Understanding Adolescence. New Delhi: National Book Trust.
8. UNFPA 2000. Adolescent Fertility in India: An Analysis based on NFHS Data. New Delhi: Jawaharlal Nehru University: Center for the Study of Regional Development.
9. Mahadevan K. and others 2000. Reproductive Health of Humankind in Asia and Africa: A Global Perspective. Delhi: B.R. Publishers 19, 21-23
10. Ministry of Health and Family Welfare 2005: National Rural Health Mission (2005-2012), Mission Document.
11. Millennium project2005: child health and maternal health, Earth scan, London.

Course Outcomes

1. Examine the anatomy and physiology of human reproduction, conception and pregnancy
2. Describe the male and female reproductive health problems
3. Assess and examine various adolescent issues

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2		3	1		2		3	2	
CO 2	3	2		2		2		2	2	1	1	3
CO 3	2	3			3		3		2		2	

GE: PSC – 403 (A): POPULATION GROWTH AND DEVELOPMENT

Course Objectives

1. Understand the linkage between population growth and Economic development.

2. Acquire knowledge on the concepts of Economic inequality and causes of inequality in India.

3. Femi arise the concepts of self-help group and understand the linkage between women and development.

UNIT - I

Economic Development: Indicators of Development; Population growth and Development in India

UNIT - II

a) Economic inequalities and causes of inequalities in India, Incidence of Poverty, Poverty Alleviation Programmes

b) Population and Employment: Economically active Population, unemployment, and types of unemployment

UNIT - III

Women and Development: Self-Help Group, empowerment of women and demographic consequences of women empowerment and development in India

UNIT - IV

a) Programmes of Rural Development in India: Barriers in the implementation of rural development programme.

b) Role of NGO's in Rural Development

UNIT - V

Role of Science and Technology; Rural Industrialization and Information education and communication in rural development

Reference:

1. Meir, G.M and Baldwin, R.E. Economic Development: Theory, History and Policy. New York: John Wiley and Sons
2. Jhingan M.L. The Economics of Development and Planning. Konark Publishers Ltd. 1997
3. Chowdhury Paul D. Women Welfare and Development, New Delhi: Inter-India Publications 1992.
4. Mahadevan K Holostic Model of Development for Third World Countries. In: Methodology for Population Studies and Development (eds.) Mahadevan K and P. Krishnan New Delhi: Sage Publications 1992
5. Sharma S.K and S.L. Malhotra. Integrated Rural Development: Approach, Strategy and Perspectives. New Delhi: Heritage
6. National Institute of Rural Development Journal of Rural Development
7. Singh Katar Rural Development Principles, Policies and Management. New Delhi: Sage Publications. 1986
8. Millennium project2005: child health and maternal health, Earth scan, London.

Course Outcomes

1. Understand the indicators of development with special reference to population growth and development.
2. Discover the concepts of economic inequality and its causes
3. Examine the status of women and development and demographic consequence of women empowerment

CO-PO Mapping

Course Out	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12

come												
CO 1	3	2	2		3	2		2		2	1	
CO 2	3		2		2	2		2	2		3	2
CO 3	3	2	3	3	2		2		1		2	1

GE: PSC – 403 (B): HEALTH ECONOMICS

Course Objectives

1. Acquire the knowledge on basic concepts of health economics and its relation to population dynamic.

2. Understand the concepts of Economic evaluation, type of economic evaluation and costing in health economic.

3. Impact knowledge on measuring health outcomes general health status and quality of life.

UNIT-I

Introduction to Health Economics: Basic concepts in Economics with special reference to health. Health Economics and Population Dynamics - Demographic aging, obesity, disability and malnutrition.

UNIT-II

Costing and Health Economics: The importance of costing in Health Economics, Alternative definitions of cost.

UNIT-III

Economic Evaluation– What is economic evaluation? Various types of economic evaluation used in health care, measuring outcome, Cost effectiveness analysis (CEA),

UNIT-IV

Economic Evaluation – Importance of Measures of General health status and quality of life, Measuring Health Outcomes, Assigning monetary values to health outcomes. Health – Economic evaluate on of prevention programs (include ADL and IADL for aged)

UNIT-V

Efficiency and Equity in Health: An overview of the normative economics of the health sector,

Health Care and Welfare State, Private versus public health care, Public and Private Partnership in Health Care

Reference

1. Rexford E. Snterre and Stephen P. Neun, Health Economics: Theories, Insights and Industry Studies, Thompson South – Western, 3rd Edition (614, San/Hea, 073226) Note: 4th Edition is out in 2007 (ISBN: 032432068X; ISBN13: 9780324320688)
2. Zweifel and Breyer, 1997, Health Economics, Oxford University Press)
3. Drummond MF, Sculpher MJ, Torrance GW, O'Brien B, Stoddart GL, eds. Methods for economic evaluation of health care programmes, Third Edition, Oxford University Press, 2005.
4. Health economics: 3rd Edition by Phelps
5. The economics of health and health care, 2nd edition by Folland, Goodman and Stono (FGS)
6. Gold Marthe R, Joanna E Siegel, Lousie B russel, and Milton C Weinstein, 1996, Cost effectiveness in health and medicine, new York: Oxford University Press.
7. Handbook of Health Economics (Anthony J. Culyer and Joseph P Newhouse eds., Elsevier Science, 2000: Available online at: http://www.sciencedirect.com/science/handbooks/15740064
8. Culyer A J and J P Newhouse, 2000, The state and scope of health economics, Handbook of Health Economics, Volume 1A, Eds. Culyer and Newhouse, Elsevier, 2000, pages 1-7.
9. David Wonderling, Reinhold Gruen & Nick Black, 2005, Introduction to health economics, Chapters 10- 11, 127-152.
10. Manton and Gu 2001, changes in the prevalence of chronic disability in the United States black and non-black population above age 65 from 1982 to 1999. Proceedings of the National Academy of Sciences, 98: 6354-6359

11. Manton, Corder and Stallard 1997, Chronic disability trends in the elderly United States populations: 1982 -1994. Proceedings of the National Academy of Sciences, 94: 2593-2598
12. Gold Marthe R, Joanna E Siegel, Lousie B russel, and Milton C Weinstein, 1996, Cost effectiveness in health and medicine, New York: Oxford University Press., Ch. 6, pp. 176-213.
13. Frinkler S., 1982, The distinction between cost and charges, Annals of Internal medicine, Vol. 96, pp. 102-109.
14. Detsky, Allan S, 1996, evidence of effectiveness: evaluating its quality, Chapter 2 inValuing health care: cost, Benefits and effectiveness of pharmaceuticals and other medical technologies, Frank A Solan ed. Cambridge: Cambridge University Press, pp. 15-
15. McDowell, Ian and Claire Newell, 1996, Measuring health: A guide to rating scales and questionnaires, 2nd edition, New York: Oxford, General Health status and quality of life, chapter 9, pp. 380-492.
16. Pauly Mark V, 1995, Valuing health care benefits in money terms, in Frank Solan, editor, Valuing health care, New York: Cambridge University Press, pp. 99-124.
17. Gravelle, Hugh and Dave Smith, 2001, Discounting for health effects in Cost Benefit and Cost effective Analysis, Health Economics, vol. 10, no. 7, pp. 587-599

Course Outcomes

1. Explore the concepts in economics in relation to health and population dynamics
2. Acquire skills in assessing costing and health economics
3. Critically analyze and evaluate general health status and quality of life and also measurement of health outcomes

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	3	1					2		2	
CO 2	3	3		3	3		1		2		2	2
CO 3		2	3	3	2	3		3	2	2	2	

GE: PSC – 403 (C): DEMOGRAPHY OF ANDHRA PRADESH

Course Objectives

1. Explore the trends on population growth age and sex composition, distribution of Population in Andhra Pradesh.

2. Familiarize population process and programmers, Nutritional programs.

3. Understand the concepts of migration and Urbanization, and its level of Andhra Pradesh

UNIT - I

Demographic Profile of Andhra Pradesh: Trends in Population Growth, Age and Sex Composition, Distribution of Population

UNIT - II

Fertility: Fertility levels, Trends and Differentials in AP. Factors Responsible for the Recent Decline in Birth Rates, Women Empowerment and Family Welfare Programmes.

UNIT - III

Mortality: Mortality levels and Trends, Infant Mortality: levels and trends, causes of death, maternal Mortality.

UNIT - IV

Migration and Urbanization: Inter and Intra – State Migration, Migration Factors, and Urbanization in AP: levels and trends, Problems of Slums and Related Policies.

UNIT - V

Population Policy and Programmes of Andhra Pradesh: Trends in Population Policies and Programmes, Programmes on Literacy and Education, Nutritional Status, Noon Meal Programme

Reference

1. Registrar General of India Census Publications of 1961,1971, 1981, 1991, and 2001
2. National Family Health Surveys 1991 and 1999. Mumbai: IIPS Andhra Pradesh
3. Reproductive and Child Health Surveys (RCH) 1998 and 1999. Mumabi: IIPS District-wise reports
4. Bhende, Asha A, and Kanitkar, Tara. 1994. Principles of Population Studies, Bombay. Himalaya Publishing House.

Course Outcomes

1. Acquire knowledge on basic trends and changes in population growth in Andhra Pradesh
2. Examine the migration and urbanization, problems of slums and related policies with special reference to Andhra Pradesh
3. Explore the population policies and programmes in Andhra Pradesh

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3			2	3	3		2		2	2
CO 2	3	3	2		2		2		2		2	
CO 3		3	3	2		2		3	1	2	1	

GE: PSC – 403 (D): DEMOGRAPHIC TECHNIQUES

Course Objectives

1. Acquire knowledge and life table and its applications.

2. Analyze the Technics and method of measurements of migration and its application,

3. Understand the methods of population projection and evaluation of projection.

UNIT – I

Life table: Model life table, U.N Model Life Tables, Coale and Demeny Regional model life Tables: Multiple decrement life table and their importance; Indirect Techniques of Mortality estimates: overall survival ratio method; Differencing method; Census survival ratio method; Stable population Analysis method , Mortality estimate from Children Ever Born and Children Surviving;

UNIT – II

Stable Population Theory: Concepts, Definitions, Assumptions, Derivations; Intrinsic rate of natural increases and Stable age distribution; Fertility Models: Estimation of Vital rates through stable population technique, Quasi-stable and Stationary population Models; Ansley Coale, Brass, Bourgeois-pichat; Reverse Survival Method; Own Children Method, Fertility estimate from survey data on birth and children ever born,; Current fertility estimate from pregnancy histories.

UNIT – III

Measurement of Migration: Direct and Indirect methods: Place of Birth Approach, Place of Last Residence Approach; Duration of Stay at the Place of Residence; their advantages and Limitations; Indirect techniques of estimating Net Internal Migration: National Growth Rate Method, Vital Statistical Method, and Survival Ratio Method: advantages and limitations.

UNIT – IV

Digit preference indexes, U.N. Age sex Accuracy index, Balancing equation, Population growth Rates: Linear, Geometric and Exponential; Doubling time, Location of events in time; Lexis diagram and its uses. Population Estimate: Nature, uses, types, methods of estimates for statistically undeveloped areas; Tools of estimation: Model Life table technique, Stable Population models and methods based on the data from censuses and surveys;

UNIT – V

Interpolation smoothing of age data & Graduation techniques, Methods of Population Projection; Mathematical methods: Assumptions, types; Component methods; Assumptions,Projections of Fertility, Mortality and Migration; Ratio Method; Evaluation of Projection: Specific Projections;

REFERENCE

1. Barclay, G.W., Techniques of Population Analysis, (London: John Wiley & Sons, 1966).
2. Coale, A.J and Demeny, P., Regional Model Life Table and stable Populations 2nd Ed. (New York: Academic Press, 1983).
3. Pathak K.B and Fauzdar Ram. Techniques of Demographic Analysis , (Bombay: Himalaya Publishing House, 1992).
4. Srinivasan K. Basic Demographic Techniques and Applications, (New Delhi: Sage, 1998)
5. United Nations, Manual II: Methods for Population Projection Sex and Age, (New York: United Nations, 1956).
6. Shryock Henry et al., Methods and Materials of Demography Vol. II (Washington D.C: U.S, Bureau of Census, 1973).
7. United Nations, Manual IV. Methods of Measuring Internal Migration ST\SOA\SERA\47 Population Studies No.47 New York: U.N 1970
8. United Nations, The Determinants and Consequences of Population Trends, Vol.I (New York: Dept. of Economic and Social
9. _____, Methods of Estimating Basic Demographic Measure from Incomplete Data ST\SOA\, Series A,42
10. Demographic Year Books (Various Years)

Course Outcomes

1. Import knowledge on demographic techniques - life table, UN model life table, coale and demeny regional model life table.
2. Discover the stable population theory and its concept, measurement of migration and vital statistic methods.
3. Identity the interpolation smoothing of Age data and graduation techniques, projection of fertility, mortality and migration, Evaluation of projection.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	2			2	1		2	2	2	
CO 2		3	2	2		1		2	2		2	2
CO 3		2			2		3	3	2		2	1

MC/PW: PSC – 404: DISERTATION / PROJECT WORK

Course Objectives

1. Get the awareness on various demographic aspects and technics
2. Apply the demographic measures in the field surveys
3 . Frame the population policies based on the knowledge gain in field work / surveys

- **Dissertation/Project Work**

Course Outcomes

1. Develop in-depth knowledge of field work and community surveys
2. Acquire the skills to present and discuss the findings through seminars
3. Explore the skills in preparation and presentation of research findings

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3			2	3	3		2		2	1	
CO 2		3		2	3	2	3		3		2	2
CO 3		2		2	2		3		2	2	1	

O.E: PSC -405 (A): RURAL, URBAN AND TRIBAL COMMUNITY DEVELOPMENT

Course Objectives

1. Know the characteristics and changes of rural urban and tribal communication.
2. Explore the issues reacted to communication and programs for community development
3. Understand community development approaches by the using participatory technics.

Unit-I

Rural community-Definition, Characteristics of Rural Communities, Changes in Rural Communities Urban Community: Definition, Urbanization, Characteristics of Urban CommunitiesTribal community: Definition, and Characteristics of Tribal communities Differences between Rural, Urban and Tribal Communities

Unit-II

Community development: Definition, Community development experiment and projects in Rural areas: Srinikatan Marthandom, Gurgon, Boroda, Firka, Nilokhere and Earth wah projects Urban areas: Delhi pilot project, Baroda pilot project, Ahmadabad pilot project Tribal areas: Hill area development programs

Unit-III

Issues related to communitiesGeneral issues: Poverty, Indebtedness, Unemployment, Sanitation, Health and Nutrition Specific issues: Problems of Women, Children, Youth and Elderly Rural specific issues: Agriculture, Land and Land related problemsUrban specific issues: Migration Slums, Urban, Industrial Related problems, Issues related to settlement understanding the issues of the community development .Tribal specific issues: Employment, Economic aspects.

Unit-IV

Programmes for community development:

Rural:

IRDP (Integrated Rural Development Programme),

DWCRA (Development of Women and Children in Rural Areas),

(Swarnajayanti Gram Swarazgar Yojana),

REGS (Rural Employment Guarantee Schemes) National and State level,

Indira Kranthi patham

Urban:

SJSRY (Swarnajayanti Shehari Rojgar Yojana),

DWCUA (Development of Women and Children in Urban Areas),

Slum clearance projects

Tribal:

ITDA (Integrated Tribal Development Agency),

GDC (Girijan Development Corporation),

Constitutional provisions for Scheduled Tribes

Social workers Response: Creating awareness Work for effective Implementation of the programmes.

Unit-V

Community development approachesTarget approach: Welfare programmes, Developing Relationships, Demonstrating the purpose, providing knowledge, Empowering the Target Group, Providing Direction, Support, Networking, using Participatory Techniques

References:

1. Encyclopedia of social work, Government of India, Vol. I to IV Guidelines and Reports of various Rural Development Initiatives
2. Gabgrade, K.D.1971, Community Organizations in India, Popular Prakasan Bombay
3. Memoria, C.R Tripathi 1980, Agricultural problems in India, Kitab Mahal, New Delhi
4. Madan , M.R. India's Developing Villages, Hyderbad, Jaico Book House
5. N.I.R.D, 1984, Rural development Statics, N.I.R.D Hyderbad
6. Pandy, K K 1990-91, Rural Development in Continuity and change, New Delhi Publishing
7. Ross Murray, G 1955, Community Organisation, Theory and Practice, New York, Harper and Row
8. Singh Katar, 1986, Rural development Principles, Polices and Management, New Delhi,
9. Sage Publishing

10. Vasant Desai, 1986, Rural development, vol. I to IV New Delhi, Himalaya, Publishing House Nagpur
11. Venkata Reddy. K 1988, Rural development in India (Poverty & Development), Himalaya Publishing House Nagpur
12. Annual Report 2005, Department of Rural Development, Government of Andhra Pradesh
13. Clinard, Marshall .B, Slums and Community Development: The press New Delhi
14. D.Souza, Alfred, Urban Growth and Urban Planning, New Delhi, Indian Social Institute
15. Gopal Bhargava (1981), Urban Problems and Policy Perspectives in India . Shakthi Malik, Abinay Publications, E-37.Hauz Khas , New Delhi
16. Jacob Z.Thudipaur(1993), Urban community Development, Rawat Publications New Delhi
17. Sharma ,K.C .1994, Poverty, Un-employment and Inequalities in Tribal India Reliance Publishing House .New Delhi
18. Satyanarayana, 1990, Tribal development in India, Inter India Publications , New Delhi
19. Verma Y.M, 1986, Problems of Tribals India

Course Outcomes

1. Explore the characteristics of rural, urban and tribal community
2. Discover community development and experiment projects in rural, urban and tribal areas
3. Critically examine and understand the issues related to rural, urban and tribal areas and approaches to community development

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	2	2			2		2		2	3
CO 2		3		3	3	3				3	2	
CO 3		2	2		2	3	2	2		3	2	

O.E: PSC -405 (B): SOCIAL POLICY AND PLANNING

Course Objectives

1. Know the nature and approaches of social policy
2. Differentiate the social welfare polices implemented for women, children, education, health and environment
3. Understand the role of social workers in formulation, planning and implementation o policies

UNIT-I

Social Policy: Definition, Objectives, Social policies and social development, Social policy in relation to Indian Constitution, Fundamental rights, Directive principles of state policy.

UNIT-II

Approaches to social policy:

- Unified , Integrated and Sectoral
- Formulation and Implementation of social policy, Process, Role of government and NGO's etc
- Family Related Polices

UNIT-III

Social welfare policies and their implementation:Education, Health, Women, Youth, Children, Urban, Rural, and Tribal development policies, Environment

UNIT –IV

Social and developmental planning: concept, approaches to social planning, Linkage between Social Policy and Planning.Planning process in India Planning Commission – Center and State and its Functions

UNIT-V

Decentralization: Need for Decentralization of planning, plan implementation, monitoring, budget and financial management, personnel management, academic management, and provision of infrastructure including procurement. Participatory planning

References

1. Rajeeb Mishar, 2008, Voluntary Sector and Rural Development, Rawat Publications Jaipur & New Delhi
2. Goel, SL and R.K. Jain 1988, Social Administration in India. New Delhi :Deep and Deep Publications
3. Paul Chowdhary.D.1979, Social Administration in India, New Delhi: Atma Ram
4. Sachdeva,D.R . Social Administration in India, Kitab Mahal , Allahabad
5. Skidmore,1983, Social Work Administration , Prentice Hall,New Jersey.
6. Kulkarni, 1965, Social Policy and Social Development in India ,ASSWI, India
7. Kulkarni,P.D.,1985, Social Policy in India ,TISS,Mumbai.
8. Jacob K.K. Social Policy in India, Asia Publishing House, New Delhi
9. Societies Registration Act, 1860
10. AP Societies Registration Act, 2001

Course Outcomes

1. Discover social policies in relation to Indian constitution.
2. Examine the approaches to social policy
3. Demonstrate and analyze various social policies and their implementation

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	3		2		2		2		2	1
CO 2		3	3	3	2	3		2		2	2	1
CO 3	3		3	2	2		2	3		2	1s	

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF POPULATION STUDIES



Course

M.A. MASTERS IN SOCIAL WORK (M.S.W)

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

About the department

- The department of Population Studies came into existence in 1973 with generous funding of Family Planning Association of India. The department now occupies premier position in the field of population in India. The department conducts Teaching, Research, Outreach programmes and Training.

Vision

- The department of Population Studies came into existence 1973 with generous funding of Family Planning Association of India. The department now occupies premier positions in the field of Population and it is the 1st Department which started M.A. Population Studies in India. The Department conducts Teaching, Research, Out-reach programmes.
- The Department of Population Studies intends to be a resource centre for knowledge generation and training point for demographic & family welfare aspects. The department is an asset to **anti-spate** skill fall social work professionals for social welfare and community development.

Mission

- The Department of Population Studies is dynamic body for empowering, encouraging the young as employable manpower of overall constructive and sustainable development of themselves and the society through its Teaching, Research, Out-reach (extension) and Training-campers community activities consistently.

program Specific Outcome

At the end of the MSW program, the student will be able to:

- Discover the knowledge on Social Work Theories and Practices and, demonstrate its methods with Individuals, Families, Communities, Community Organization and Social Welfare administration
- Develop skills to demonstrate values and ethics of Professional Social Work practice by working with diverse and vulnerable population
- Carryout evidence based research on contemporary issues and applies suitable interventions to solve the problems of the people

- Identify various Laws, Legislations, Policies and programmes at State, National and International levels related to welfare and recommend future policies for implementation
- Obtain knowledge on specialized fields like Counseling, Medical and Psychiatric Social Work, Gerontology, Human Resource Management and Industrial relations that provides an employment opportunity in various fields
- Acquire professional skills and abilities that train them challenges to tackle in their own life and career
- Capability of conducting independent research on burning social issues, with relevant interventional programmes so as to give scientific solutions to the problem.

Program Objectives

1. To assist with students' development of understanding and integration of social work theories and practice.
2. To develop student's professional social work values and ethics.
3. To apply systems concepts to practice across the micro and macro continuum.
4. To allow students to demonstrate an understanding of social work concepts based in systems theory.
5. Expose students to the history, current realities, and future implications of social welfare system with regard to the local and global continuum.

Programme Outcomes (POs)

- After successful completion of two year degree programme in Population Studies, student should be able to:
- **PO1: (KB) Knowledge Based**
- Ability to demonstrate comprehensive knowledge and understanding the professional social work, social problems, social action and, social legislations in the context of social development
- **PO2: (PA)Problem analysis**
- Illustrate the theory in to practice through social work methods in solving various problems and challenges of individual, group and community.
- **PO3: (Inv)Investigation**
- Equip Knowledge to investigate on contemporary burning issues and problems of the community in a scientific way

- **PO4: (Des) Design**
- Develop skills and scientific attitude in identification of problems, develop research design, carryout research, conduct case and interventional studies and prepare report by applying appropriate software.
- **PO5: (Tools) Use of Tools**
- Experiment different skills in conducting scientific studies, apply its finding into practice, if necessary with suitable interventional strategies.
- **PO6: (Team) Individual Team Work**
- Capability to involve effectively in diverse teams as a group and team member (Observation visits, Concurrent field work, Rural Camp, Study tour and Block Field work) will facilitate cooperative and coordinated efforts working together in the interest of common issues.
- **PO7: (Comm) Communication skills**
- Critically analyze and express thoughts and ideas and present clear and precise information through verbal and nonverbal communication and presentation. Acquire skills to use ICT& IEC in different situations, demonstrate ability to access, evaluate and use of different information sources as applicable to professional needs.
- **PO8: (Prof) Professionalism**
- Understand and discover the knowledge on organizational services and its aims acquire practical knowledge and experience by working with people and examine policy ideas and priority of the community through research and theoretical ideas by safeguarding ethics and values of social work profession. Demonstrate to work in a thoughtful and systematic way, justify methods of working with a meaningful intervention, and apply skills by combine thinking using the senses.
- **PO9: (Impact) Impacts of course on society and environment**
- Demonstrate immense impact on communities through awareness and empowerment programmes by applying relevant social work methods. Help people in solving personal, familial and societal problems through adjustment and adaptation by way of social justice. Able to organize various environments related programs sensitize the people on environmental issues in order to maintain public eco-friendly relations.
- **PO10: (Ethics) Ethics and Equities**
- Illustrate the professional principles of ethics and values like confidentiality, non-judgmental attitude, acceptance etc., and develop self-esteem levels in conducting one's-life. Capable of

demonstrating the ability to identify ethical issues and values in all aspects of social work profession

- **PO11: (LLL) Life Long Learning**
- Associate in self-discipline and self-directed continues learning by involving in national and international professional organizations and thereby aims to improve the personal and professional development in social work methods.
- **PO12: Physicist & Society**
- To assess and solve the problems related to societal, health and safety issues using the professional skill learned

Program Educational Objectives

- Apply critical thinking within the context of professional social work practice.
- Understand the value base of the profession and its ethical standards and principles, and practice accordingly.
- Practice without discrimination and with respect, knowledge, and skills related to a client's age, class, color, culture, disability, ethnicity, family structure, gender, marital status, national origin, race, religion, sex, and sexual orientation.
- Understand and interpret the history of the social work profession and its contemporary structures and issues.
- Use theoretical frameworks supported by empirical evidence to understand individual development and behavior across the life span and the interactions among individuals, and between individuals and families, groups, organizations, and communities.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

SVU COLLEGE OF ARTS

DEPARTMENT OF POPULATION STUDIES

(Revised Scheme of Instruction and Examination, Syllabus etc., under CBCS Regulations -2016 is Amended as per NEP-2020)

(With effect from the batch admitted in the academic year 2021-22)

MASTER OF SOCIAL WORK

(Self Study Course)

SEMESTER-I

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	MSW 101	Sociology for Social Work	6	4	Core-Theory	20	80	100
2	MSW 102	Human growth and Personality Development	6	4		20	80	100
3	MSW 103	Social Work Profession and Field Work Orientation-1	6	4		20	80	100
4	MSW 104	Social Work practice with Individuals and Groups	6	4		20	80	100
5	MSW 105	A Social Work Practicum-I B Issues and Concerns in Occupational Social Work C Social Work Practice and Information Communication and Technology	6	4	CF	-	100	100
6	MSW 106	A Social Work in Industry and Human Resource Management B Corporate Social Responsibility and Social Entrepreneurship and Social Work	6	4	EF	20	100	100
Total			**36**	**24**		**100**	**500**	**600**
7	MSW 107	Human Values and Professional Ethics - I	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All core papers are Mandatory**
- **Compulsory foundation – Choose any one**
- **Elective Foundation - Choose any one Paper**
- **Audit course – 100 Marks (Internal) – Zero Credit under self study**

- **** Interested student may register for MOOCS with the approval of DDC**

SEMESTER-II

S. No	Code	Title of the Course		Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	MSW 201	Social Work Profession and Field Work Orientation-II		6	4	Core-Theory	20	80	100
2	MSW 202	Social Work Practice with Communities		6	4		20	80	100
3	MSW 203	Social Action and Social Legislation for Social Work Practice		6	4		20	80	100
4	MSW 204	Social work Research		6	4		20	80	100
5	MSW 205	A	Social Work Practicum-II	6	4	CF	-	100	100
		B	Social Work Practice with Differently Abled						
		C	Social Work and Disaster Management						
6	MSW 206	A	Counseling in Social Work Practice	6	4	EF	20	100	100
		B	Social Welfare Project Formulation and Management						
Total				**36**	**24**		**100**	**500**	**600**
7	MSW 207	Human Values and Professional Ethics - II		**0**	**0**	Audit Course	**100**	**0**	**0**

- **All core papers are Mandatory**
- **Compulsory foundation – Choose any one**
- **Elective Foundation - Choose any one Paper**
- **Audit course – 100 Marks (Internal) – Zero Credit under self study**
    - **** Interested student may register for MOOCS with the approval of DDC**

SEMESTER-III

S. No	Code	Title of the Course		Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	MSW 301	Social Work Intervention With Families		6	4	Core-Theory	20	80	100
2	MSW 302	Social Work in the Field of Health		6	4		20	80	100
3	MSW 303	A	Criminal Justice and Social Work Practice	6	4	Generic Elective	20	80	100
		B	Social Work Practicum-III						
		C	Social Policy and Planning	6	4		-	100	100
		D	Gerontological Social Work						
4	MSW 304	Soft and Employability Skills		6	4	Skill Oriented	20	80	100
6	MSW 305	A	Fundamentals of Social Work	6	4	Open Elective	20	100	100
		B	Human Rights and Social Legislation						
Total				**36**	**24**		**100**	**500**	**600**

- **All core papers are Mandatory**
- **Generic Elective – Student has to choose any one Paper**
- **Skill oriented Course is mandatory**
- **Open Elective are for the students of other Departments, Minimum one paper should be opted, extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study**
- **** Interested student may register for MOOCS with the approval of DDC**

SEMESTER-IV

S. No	Code	Title of the Course		Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1	MSW 401	Social Work Intervention With Children		6	4	Core-Theory	20	80	100
2	MSW 402	Rural, Urban, Tribal Development and Empowerment		6	4		20	80	100
3	MSW 403	A	Social Work in the Field of Mental Health	6	4	Generic Elective	20	80	100
		B	Social Work Practicum-IV and Block Field work	6	4		-	100	100
		C	Environment and Social Work						
		D	Diversity and Inclusiveness						
4	MSW 404	Social Work Project		6	4	*MDC	-	100	100
6	MSW 405	A	NGO Management	6	4	Open Elective	20	100	100
		B	Health Education						
Total				**36**	**24**		**80**	**520**	**600**

- **All core papers are Mandatory**
- **Generic Elective – Student has to choose any one Paper**
- **Multidisciplinary Course/ Project work is Mandatory**
- **Open Elective are for the students of other Departments, Minimum one paper should be opted, extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study**
- **** Interested student may register for MOOCS with the approval of DDC**

SEMESTER-I

CORE: MSW-101: SOCIOLOGY FOR SOCIAL WORK

Course Objectives

1. Know the basic concepts relating to society and relation between individual and society.

2. Describe socialization, social institutions and social groups

3. Disseminate knowledge regarding social stratification, social deviance, social change and social problems

UNIT-I

Sociology: Definition and Scope, Relation of Social Work to other Social Sciences.Applied Sociology: concept, definition, Difference between Academic and Applied Sociology Society: Definition, Characteristics, Structure and Functions of society, Relationship between Individuals and society.

UNIT-II

Socialization: Process and Mechanisms of Socializations Social Institutions: Marriage, Family, Religion, Social groups: Definition, Characteristics and Classification of Social Groups. Primary, Secondary and Reference Groups

UNIT-III

Social Stratification: Social Stratification in India – Class and Caste stratificationSocial Deviance and Social Control: Definition, Process and Mechanisms of Social Control

UNIT-IV

Social change: Concept, Definition and Factors leading to Social Change, Globalization and Society

UNIT-V

Social problems: Suicide Domestic Violence, Alcoholism, Trafficking, Juvenile Delinquency, Agrarian Crisis, Farmer Suicide

References:

1. Iran Robertson (1980), Sociology Worth publishers Inc, New Delhi
2. Mclver, R.M & Page (1985), Society: An Introductory Analysis, O.C.H. Madras: Mac Millan India Ltd
3. Matrin Devis (1991), The Sociology of Social Work, London: Rutledge publications
4. Ram Ahuja (1997), Social Problems in India, New Delhi: Rawat Publications
5. Ram Ahuja (1999), Society in India concepts, Theories and Changing Trends, Rawat Publications, Jaipur, New Delhi
6. Vidya Bhushan D.R. Sachdev An introduction to Sociology [8th, Edition 2020]

Course Outcome

1. Discover basic concepts in Sociology and examine the relation between individual and society.
2. Distinguish between Socialization, Social institutions and Social groups
3. Critically demonstrate , Social Stratification, Social Deviance, Social Change and Social Problems

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		1			2		1	2		
CO 2		3	2		2			1			2	2
CO 3		3	2	2		1			1	2		
CO 4												

CORE: MSW - 102: HUMAN GROWTH AND PERSONALITY DEVELOPMENT

Course Objectives

1. Know the various stages of human growth and development

2. Explain different concepts of human behavior like motivation, perception, learning and attitudes

3. Assess the client in solving their psycho social problems through personality development and adjustment

UNIT - I

Life-span Approach to Human Growth and Development; Principles of growth and Development in a life- span, Role of Heredity and Environment in Human Growth and Development

UNIT-II

Motivation: Concept, Definition, Types of Motives, Theories of Motivation, Social Motives.

Perception: Definition, Process of Perceptions, Factors Influencing Perception.

UNIT-III

Learning: Meaning & Definition, Principles of Classical Conditioning, Operant Conditioning and Cognitive Learning

UNIT- IV

Attitudes: Definitions, Formation of Attitudes and attitudes change in Individuals and Groups, and Measurement of attitudes.

Personality development: Definition, Theories of Personality: Psychodynamic, and Behavior theories.

UNIT-V

Adjustment: Concept of Adjustment and Maladjustment, Factors Influencing stress, coping with stress.

References:

1. Morgan, King and Schopler, Introduction to Psychology, Mc.Graw Hill Inc.,USA
2. Irvin G. Sarson, Abnormal Psychology
3. Barbabara R.Sarason (1989), Prentice Hall, Engle woods Cliffs N.J
4. Elizabeth B. Hurlock (1974), Personality Development, Tata Mc Graw Hill Publishers Ltd. New Delhi
5. J.E.Park & K. Park (1989), Social and Preventive Medicine ,M/s. Banasidas Bhanot
6. Linda L. Davidoff (1987), Introduction to Psychology

Course Outcome

1. Memorize various stages of Human Growth and Development
2. Identify different concepts of Human Behavior like Motivation, Perception, Learning and Attitudes
3. Discover experience in assisting the person in Solving their Psycho social problems through personality development and adjustment

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2				2		1	1	1
CO 2		3		2		2			1		1	
CO 3			2			3	2			1		

CORE: MSW – 103: SOCIAL WORK PROFESSION AND FIELD WORK ORIENTION

Course Objective

1. Able to understand the concepts like Social Service, Social welfare, Social Development and Social Work

2. Acquire knowledge about Ethical Values of Professional Social Work.

3. Understand the challenges and prospects of social work profession and Field work orientation.

Unit-I

The concepts of Social Service, Social welfare, Social Development and Social Work

Religious Roots of Charity and Philanthropy, its relevance to Professional Social Work in UK, USA and in India

Unit-II

Social Work Profession: Definition, Goals, Principles, Ethical Values of Professional Social Worker.

Unit-III

Current Trends in professionals Social Work, Ecological Social Work, International Social Work, Human Rights and social justice.

Unit-IV

Field work in Social Work:

Objectives, Nature of Field Work.

Components of Field Work, Objectives and Guide lines for Observation

Visits and Concurrent Field Work in Social Work

Unit-V

Professional development; Knowledge, Skills required by Social Work trainees for:

Identification of needs

Planning interventions

Involving the client in problem solving process

References

1. Walter A. Friedlander, (1958), Concepts and Methods of Social Work, Prentice Hall, UK/USA
2. Wadia, A.R,(1961), History and Philosophy of Social Work in India, Allied Publications Pvt.Ltd., Mumbai
3. UGC, (2001), UGC Model Curriculum, UGC ,New Delhi
4. David Cox and Manohar (2006), International Social Work, Vistaar Publication
5. UNDP-(2003), Human Development Report, Millennium Development Goals- Sage Publications
6. I.S.Subedar, (2001), Field Work Training in Social Work, Rawat Publications, New Delhi
7. Hans, Naugpaul, Culture, Education and Social Welfare, S. Chand & Co., New Delhi
8. T.K. Nair .(1961) Social Work Education and Social Work Practice in India, ASSWI Publications(1961),New Delhi ,Madras,
9. R R. Sing, Field Work in social work Education Concept, Publishing company, New Delhi

Course Outcome

1. Recall various concepts like Social Service, Social Welfare, Social Development and Social Work
2. Experiment on Ethical Values of Professional Social Work and analyze current trends in Social Work
3. Design field work in Social Work and acquire skills to involve the client in problem solving process

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		1	1		2	1	1	3
CO 2		3	2		2		2		1	2		
CO 3			3	2		2		1			2	1
CO 4												

CORE: MSW-104 SOCIAL WORK PRACTICE WITH INDIVIDUALS AND GROUPS

Course Objective

1. Familiarize with the basics concepts, techniques and skills of case work
2. Able to apply approaches of Case work and Group work methods.
3. Learn the application of Social Case Work and Group Work at various settings like Schools, Hospitals, and Correctional institutions.

Unit-I

Social Case work: Definition, Purpose, Historical development of Social Case Work, Scope, Values, Components and Principles of Social Case Work, Social case work process.

Unit-II

Techniques and skills of social case work: Interviewing Techniques, Observation and Home Visits Recording in Social Case Work – Contents of Recording, Principles of Recording Types of Records

Unit-III

Approaches to Case Work:

- Psycho- Social approach
- Behavioral modification theory.
- Crisis intervention
- Empowering approach
- Eclectic approach

Unit-IV

Definition of Social Group Work, Scope, Objectives and Purpose of Group Work

- Historical development of Group Work.
- Principles of Group Work.
- Group Work process
- Types of groups, Skills of group workers.
- Propramme planning in group work.
- Recording in group work.

Unit-V

Assessment in Case Work – Genogram, Ecomap and Support net work map

Assessment in Group Work – Sociogram, Sociometry

Approaches in Group Work: Transactional Analysis, Role Play, Buzz Group, Brain Storming.

Application of Social Case Work and Group Work at various settings – Schools, Hospitals, Correctional Settings and in Communities

Reference:

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9. JJ Grawin C (1987), Contemporary Group Work, New York: Prentice Hall,Inc
10. Tom Douglas, (1979), Group Process in Social Work: A Theoretical Synthesis, New York

Course Outcome

1. Recognize the basics Concepts , Techniques and Skills of case work
2. Apply different approaches of Case Work, Group Work and
3. Evaluate the application of Social Case Work and Group Work at various settings like Schools, Hospitals, and Correctional Settings and in Communities.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		2		3			2		1		3
CO 2				3	2	2			2		2	
CO 3		3	2		2		2			2		

C. F: MSW 105 (A): SOCIAL WORK PRACTICUM-I

Course Objective

1.Understand the significance of social work

2.Assess the application of social work methods in different agencies

3. 3. Develop understanding of the assumptions, principles and phases of social work methods in different fields.

- Observation Visits and Concurrent Field work reports
- Concurrent Field Work Seminar
- Concurrent Field Work Vivo - Voce

Course Objective

1. Recognize the significance of Social Work in various settings
2. Illustrate the application of Social Work Methods in the agencies during their field practicum
3. Examine the applications of Social Work Principles and Skills in the functions of different organizational systems

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		1		1	2			1	2	
CO 2	3	2	1	2		2		1	2	3	1	2
CO 3	2	3	2	1	2	2	2	1	1	2	1	1

C.F: MSW -105 (B): ISSUES AND CONCERNS IN OCCUPATIONAL SOCIAL WORK

Course Objectives

1.Know the work,workers and working organizations

2.assess the unique opportunities of the profession to affect the decisions and provisions of management and labour

3.Identify the leverage to Provide expert service and to become agents of social change

UNIT - I

Occupational social work: Concepts and Scope

- Occupational social work-history, scope, components, principles and methods
- Changing profile of work, workers and work place organizations
- Indian workers: Needs, Issues and Problems affecting work life and organizational life
- Changes in the labour policy-Implications for the work force, Decent work, ILO initiatives and Indian realities

UNIT - II

Workers in organized sector: Issues and challenges

- Contemporary issues for factory workers: employment nature and security, wages and social security,
- Industrial relations: determinants and reflectors, legislations, Industrial Employment Standing orders
- Trade unionism- historical development, legal environment and changing scenario
- Labour welfare in a welfare state, Labour Welfare Officer: duties, issues, challenges;
- Welfare to Wellbeing of workers: Concept, needs and programmes

UNIT - III

Working Conditions and Conditions of Work

- Physical and mechanical environment-provisions of Factories Act; Working conditions and problems at workplace

- Conditions of work: Wages, dearness allowances, perks and incentives, leave, holidays, Code on Wages
- Social security for organized sector: measures, issues and challenges

UNIT - IV

Workers in Unorganized Sector

- Unorganized sector workforce-issues, and concerns, statutory and non –statutory initiatives
- Issues and concerns of Building and construction workers and agricultural workers,
- Child workers in India in different occupation, Rescue and rehabilitation; Domestic Workers;
- Women workers/employees in different occupations: Needs problems and issues, Specific issues and concerns o f persons with disability and employees on contract basis.

UNIT - V

Emerging Issues and Concerns for Occupational Social work

- Mental health issues at workplace; Work life balance
- Employee Assistance programmes- nature, scope, philosophy, models, services,
- Corporate social responsibility–policies, programmes and practices
- Occupational Social work : emerging issues and concerns
- Select case studies on work place interventions

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19. Papola, T . S., & S harma, A. N. (1999). Gender and employment in India. New Delhi: Vikas Publishing House
20. Saini, D. S., & Khan, S. S. (2000). Human resource management perfective for the new era. New Delhi: Response Books.

Course Outcome

1. Identify needs issues and problems effecting work life and organization life of Indian occupational workers.

2. Discover the issues and challenges of factory workers and industrial relations.
3. Identify working conditions and conditions of work in the workers in organized and unorganized sectors.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2			2		1	2		1	1	1
CO 2		2	2			1			1		2	
CO 3	3	2	2		1		2		2	1		1

C.F: MSW -105 (C): SOCIAL WORK PRACTICE AND INFORMATION COMMUNICATION AND TECHNOLOGY

Course Objective

1. Know the influence of ICTS in the careers of social workers and the clients they serve.
2. Describe the need to incorporate ICTs into training social workers, delivering social work services, and the conduct of social work research
3. Relate the opportunity to transform the social work profession to be ready to respond to and leverage any technology that becomes available

UNIT – I

Importance and scope of ICT in Social Work

Concept and meaning of Information, communication and technology

Applications and functions in Social Change contexts

Applications of different technological devices and social networking: Apps, Mobile, G IS, Community Radio, Face book, what's app, twitter etc.

UNIT - II

Technology for Change: Legislations and Policies

IT Act, Cyber Crime, Ethical hacking, surveillance and right to privacy

ICT for fund raising and Advocacy

Understand the social and ethical behaviour in cyberspace.

UNIT - III

ICT for empowerment of vulnerable groups:

Rural communities, Gender, Elderly and Disability

Use of social networking sites for empowering vulnerable communities

UNIT - IV

ICT in human relations: impact on human relations, community participation, social dynamics of ICT

ICT in social development: Technology to mobilize communities, disseminate information, and constituents in mezzo and macro interventions, Developments and Applications in Social Development, ICT and Social inclusion

UNIT - V

ICT and Social Work Practice:

Practicing social and life skills through effective use of ICT

Designing: writing blogs, making apps, websites, creating social media groups, community map, GIS, community radio for social work practice, ICT influence on rural social work practice

Reference

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Warschauer, M. (2004). Technology and social inclusion: Rethinking the digital divide. MIT press

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http://unctad.org/en/Pages/DTL/STI_and_ICTs/ICT4D.aspx [Information and Communication Technology for Development]

https://www.tandfonline.com/doi/full/10.1080/09718524.2017.1385312

https://www.ncbi.nlm.nih.gov/pubmed/24918455

Course Outcome

1. Examine ICT application functions and Significance in the present context of social change
2. Able to analyze different technological devises and apps social networking sites.
3. Acquire skills in conducting and practicing ICT and Social work practices
4. Demonstrating professionalism in designing community map, community radio and developing documentaries and evidence building ICT use in social work practices

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	2		1	3	2	1		2	1
CO 2		3	2		2		3		2		2	
CO 3		2		2		3	3	2		2		2

E.F. MSW – 106 (A): SOCIAL WORK IN INDUSTRY AND HUMAN RESOURCE MANAGEMENT

Course Objective

1.Know the scope of social work practice in Industry

2. Familiar with the key components and concepts of human resource management and the related terms and concepts

3. Able to understand the principles and practices for staff recruitment, selection, compensation, performance evaluation, retention, separations and the interlocking nature of these activities

UNIT-I

Management: Concept, Principles and Functions of Management, Approaches to management

Personal management: Definition, Functions, Principles of personal management and its importance

UNIT –II

Human resource management: Planning, Recruitment, Selection, Performance, Appraisal, Training and Development, Motivation, Grievances

UNIT-III

Understanding Organization Behaviour: Definition, Organization Structure, organization groups needs/ purpose leadership – functions and importance of Effective communication

Conflicts, sources of conflict, Management of conflicts

Organization of Development Interventions – role of social workers

UNIT-IV

Industrial relations: concept, definitions, different approaches to deal with human problems in industry and Limitations.

Welfare social security and related legislation for industrial worker:

- Industrial Disputes Act-1947,
- Factories Act, 1948,
- The Work Man Compensation Act 1923,
- The Employees State Insurance Act 1948,

- Minimum Role of Labour Officer

UNIT-V

Industrial Social Work: Concept, Objectives, Scope of Industrial Social Work, Functions, Skills and Task of Social Worker in the Industry Social Responsibilities of Industry: Importance of social, Community projects by Industry, Role of Social Worker and Corporate Social Responsibility (CSR)

References:

1. Agnibotri, V, Industrial Relation in India, (Delhi: Atma Ram and Sons)
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3. Govt. of India, Report of the study Group on Worker Participation in management (Delhi: Publications Division)
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12. Pareekh Udai 1998, Organizational Behaviour & Process Rawat Publications, Jaipur
13. Robbins, Stephen 1994, Essentials of Organizational Behaviour Prentice-Hall of India Ltd., New Delhi.

Course Outcome

1. Enrich knowledge on HRM, Personnel management, HR planning and management systems
2. Appraise organizational behavior, conflict Resolution Strategies and Legislation related to industrial relations
3. Develop skills in Industrial Social Work Practice and the role and significance of Corporate Social Responsibility

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	2					2			1	1
CO 2	3	2			1			1	1	2		
CO 3	3	2	3	2	1		3	2			2	1

E.F: MSW – 106 (B): CORPORATE SOCIAL RESPONSIBILITY, SOCIAL ENTREPRENEURSHIP AND SOCIAL WORK

Course Objective

1.Know the phenomena of corporate social responsibility from the perspective of social work

2.Describe the concepts such as social issues, economic inequality and social inequality

3. recognize the interdependence of Corporate Social Responsibility and social work

UNIT I

Corporate Social Responsibility: Concept, factors and Evolution

Models and perspectives on CSR

Stakeholders in CSR, Legal obligations, Compliances and reporting in CSR

UNIT II

Corporate Social Responsibility:

Skills for Planning, implementing, monitoring and evaluation of CSR activities

Identifying implementing partners

Sustainability and CSR

Ethics and governance

Case Studies and best practices

UNIT III

Social entrepreneurship:

The history, concept, and theories on Social entrepreneurship

Social entrepreneurship and the socio-economic context

Social enterprises; Models and types of Social Enterprises

UNIT IV

Theories of Change, Social Return on Investment

The motivation of a Social Entrepreneur

Skills and competencies of a social entrepreneur-financial Management and Fund Raising; Sustainability of social enterprises

Case Studies and best practices

Unit – V

Role and importance of Social Worker in CSR - Assisting individual workers, advocating on behalf of employees, developing philanthropic and community development programmes, implementing diversity programmes in workplace and corporate campaign.

Reference

1. Blowfield, M., & Murray, A. (2014). Corporate responsibility, Third Edition. OUP: U.K
2. Bornstein, D. (2007). How to change the world: Social entrepreneurs and the power of new ideas (Updated Edition). New York: Oxford University Press Inc.
3. Borzaga, C., & D efourny, J. (2001). The emergence of social enterprise. New York: Routledge.
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23. Yunus, M. (1998). Banker to the poor: The autobiography of Muhammad Yunus, founder of the Grameen Bank. London: Aurum.Yunus, M. (2010). Building social business. New York, USA: Public Affairs

Course Outcome

1. Understanding concept, context and evaluation, models and perspectives of CSR.
2. Impart knowledge on the concept and context of social entrepreneurship in relation to socio-economic development.
3. Acquiring the knowledge skill and competencies of a social e entrepreneurship, financial management and fund rising.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	3	1	2			1		1	1	1
CO 2	3		2	1		2		2	1			
CO 3		1	1			2	1	2	2	1	2	2

AUDIT COURSE: MSW - 107: HUMAN VALUES AND PROFESSIONAL ETHICS – I

Course Objectives

CO1: Gain knowledge on the concepts of ethics and its relation to religion, politics and environment.

CO2: Able to gain knowledge on different aspect of values

CO3: Acquaint with basic information about crime and theories of punishment as stated by Manu and Yajnavalkya.

Unit – I

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment, Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

Unit- II

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.

Unit III

Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non- stealing), Purusharthas (Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).

Unit IV

Bhagavad Gita- (a) Niskama karma (b) Buddhism- The Four Noble Truths - Arya astanga marga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, and Gandhian Ethics.

Unit V

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent

(b) Views on manu and Yajnavalkya.

Reference

1. John S Mackenjie: A manual of ethics.
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
3. “Management Ethics - integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
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6. Maitra, S.K: Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
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12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
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15. Text book for Intermediate logic, Ethics and Human Values , board of Intermediate Education& Telugu Academic Hyderabad
16. I.C Sharma Ethical Philosophy of India. Nagin&co Julundhar.

Course Outcome

1. Familiarize the concepts of ethics and its relation to Religion, Politics and Environment etc.
2. Able to gain knowledge on different aspect of Values and Interpret the best Skills in understanding the merits of value related aspects
3. Discover to interpret Crime and Theories of Punishment with special reference to Manu and Yajnavalkya

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	3	1	2			1		1	1	1
CO 2	3		2	1		2		2	1			
CO 3		1	1			2	1	2	2	1	2	2

CORE: MSW-201: SOCIAL WORK PROFESSION AND FIELD WORK ORIENTION

Course Objective

1.Describe the scope and significance for social work practice in various fields

2.Know the importance of field work in social work profession

3. Asess the scope of training and awareness programmes in field work settings.

UNIT-I:

Fields of Social Work:

Scope and significance for social work practice in various fields –

- Family and Child Welfare
- Medical and Psychiatric social work,
- Human Resource Management
- Criminology and Correctional administration.
- Community Development
- Gerontological social work

UNIT- II

Field work in Social Work Profession: Objectives and Guide - lines for Concurrent Field Work, Rural Camps, Summer Block Field Work in Social Work Profession.

UNIT-III

Knowledge and Skills Essentials for Working with Groups:

Significance of Working with Groups

Use of relevant Model in group work practice

Understanding group dynamics

Use of principles, skills and appropriate program media during field work

UNIT-IV

Knowledge and Skills Essentials for Working with Communities:

- Identification of Issues for Intervention among Clients Involved in Difficult Situations.
- Using Appropriate Interventions
- Effective Communication at Individual, Group and Mass level interventions.

UNIT-V

Social work practice: Role of Government and Non government Organizations in the Social Development.

Understanding of the functioning of government organizations at Panchayat, Mandal and District level

Importance of Capacity Building and organizing, training and awareness programmes in the Field Work Settings.

References:

1. Perlman,H.H.,(1957), Social Case Work : A problem solving Process, University of Chicago Press.
2. Trecker, J. Herleigh ,B.(1970), Social Group Work Principles and Practice, Association Press,
3. Richmond, M.E., (1972), What is a Social Case Work : An Introduction & Description, New York :Russel, Sage Publication
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Course Outcome

1. Recognize the Scope, Importance and Significance of Social Work Practice in different fields
2. Acquire Knowledge and Skills Essentials for Working with Groups and Communities
3. Formulate Capacity Building by organizing training and awareness programmes in the Field Work Settings

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	3			2		2		2	2
CO 2			3	3		2		2		2	1	
CO 3		2		2		3	2		3			

CORE: MSW-202: SOCIAL WORK PRACTICE WITH COMMUNITIES

Course Objectives

1. Develop an understanding of the centrality of community in the experience of society, and the significance of community mobilizing and organizing.

2. Equip students with the knowledge base, skills and techniques for becoming an effective community organizer.

3. Understand to apply PRA Techniques for promoting Community Participation

UNIT-1

Community Organization and Social Work Practice: Definition and Types of CommunitiesConcept of Human Rights, Power, Empowerment and Relevance to Community WorkCommunity Organization; Definition, History, Process and Principles of Community Organization, Role of a Community Organizer

UNIT-II

Approaches of Community organization:

Directive and Non directive, Marshalls - Means and Goals, Cornhouser's theory on Accessibility of Elites and Availability of Masses, Indigenous approaches to community work

Models of community organization:

Rothman model: Locality development, social planning and social action.

Neil Bracht model for community for work and health

Weil and Gamble's eight models of Community Practice

UNIT-III

Current issues in community organization:

Community conflict – Definition, Nature, Extent, Causes, Impact on development, Conflict Resolution and Management

Disaster – Definition, Types of disasters, Impact of disasters, Pre-disaster prevention, Preparedness, Restoration and resource mobilization.

UNIT-IV

Community participation: Definition, Objectives, Need, Importance and Advantages, Obstacles to Community Participation.

RRA and PRA: Origin and Emergence, Sources, Principles of PRA, Features of PRA

UNIT-V

Community participation – using PRA methods:

Purpose, Process and Limitation for Different PRA methods

Space related methods: Social map, Resource map etc

Time related methods: Time line, Trend analysis and seasonal diagram.

Relation related methods: Venn diagram, Force field analysis, Livelihood analysis.

Tools for designing community interventions: Community Profiling, PLA, LFA, Problem Analysis, Stakeholder Analysis and Strategic Planning

References:

1. Gangrade,K.P.,(1971), Community Organization in India , Popular Prakasan, Bombay
2. Neil Bracht(Ed.), (1990), Health Promotion at the Community Level , Sage Publications ,New Delhi, London
3. Ross Murray, G., (1954), Community Organization: Theory, Principles and Practies ,New York. Harper and Row
4. Somesh Kumar –(2002), Method for community participation. A complete guide for practitioner's vistaars, Publications New Delhi
5. David Cox & Manohar Powar-(2006), International Social Work, Issues, Strategies and programmes, vistaar publications New Delhi
6. Jainendra Kumar Jha, (2002), Encyclopedia of Social Work Series
7. Social Work and Community Development
8. Institute for Sustainable Development Lucknow & Anmol Publications Pvt.Ltd. New Delhi
9. Ross, M. G. (1955). Community Organization: Theory and Principles. New York: Harper and Row Pub.
10. Christopher, A.J, & William, A.T. (2009). Community Organization and Social Action.
11. New Delhi: Himalaya publishing.
12. Rothman, J. (2001). Strategies of Community Interventions and Macro Practices (6th Ed.). Illinois: Peacock Publications.

Course Outcome

1. Acquainted with advanced level of knowledge in Community organization and Social Work practice
2. Appraise various approaches in Community Organization and Current issues in Community Organisation
3. Organize community participation using PRA methods and techniques

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2		1	2		2	1
CO 2		2	2		2		2		1		1	
CO 3			1		3		2	2		2		

CORE: MSW-203: SOCIAL ACTION AND SOCIAL LEGISLATION FOR SOCIAL WORK PRATICE

Course Objectives

1. Know the concept of Social Action and understand the process of Social Action
2. Disseminate social legislations and connect with Social work Practice
3. Able to empower the community with regard to laws related to women, children and aged.

UNIT-I

Social action, Definition, Principles, Strategies, Models and Process of Social Action,

UNIT-II

Social legislation: Definition, and use of Social Legislation in Social Work Practice.

UNIT-III

Laws pertaining to Women and Social Work Practice;

Legal provisions related to Women

Law related to Trafficking of women

Sexual Harassment at workplace Act

Indecent Representation of Women Act

UNIT-IV

Laws pertaining to children and Aged and Social Work Practice;

i. Juvenile Justice Act, 2000 (2015).
ii. Child labour Act,
iii. Right to Education Act 2009,
iv. Maintenance and welfare of parents and senior citizens act, 2007 (Amd. 2017)
v. The Protection of Children from Sexual Offences Act (POCSO Act) 2012
vi. Probation Offenders Act,

UNIT-V

Laws in General:

i. Right to Information Act, 2005
ii. Domestic Violence Act, 2005
iii. Protection of Human Right Act, 1993
iv. Disability Act, 1995
v. Public Interest Litigation (PIL)

References

1. Murthy .M.V.(1996), Social Action: Asian Publication House, Bombay
2. Siddiqui.H.Y. Social Work and Social Action, Harnam publications
3. Gangrade .K.D. Social legislation in India Planing commission Relevant Bare Acts, Delhi Law House 77 Gokhale Market , opp.New courts.Delhi-110054
4. Prakash Talwar, (2006), Human Rights, ISHA Books, Delhi
5. Janarnath Mohanty , 92003), Human Rights education:Deep & Deep publications

Course Outcome

1. Distinguish the elements of Social action, Models and Process of Social Action
2. Connect the Social Legislations with Social Work Practice
3. Appraise Laws pertaining to Women, children and Aged in Social work practice

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		2	2		1	2		2			
CO 2		3	2		2		2			2	2	
CO 3				3	2			2	2			

CORE: MSW - 204: SOCIAL WORK RESEARCH

Course Objectives

1. Know about Social work Research and Basic Statistics
2. Understand various Research designs and their application in Social work Research
3. Describe the methods of sampling, data collection, data analysis and suitability of statistical methods and report writing.

UNIT - I

Introduction – Meaning of Research, Aim, Objectives, Scope and Limitations of Social Science Research and Social Work Research

Social Work Research Process: Identification of problem, Need assessment, Selection of social work Research design, Intervention, Assessment of Intervention Effects

UNIT-II

Single –Subject Research Designs: Types, AB, ABAB, ABCD use of Single Subject Designs in Social Work Practice

Evaluation research designs: Concept, Purpose, Models, and Types of Evaluation Research.

Evaluation research designs, Cost benefit and Cost Effective Analysis, use of Evaluation Research, Program Evaluation and Contents of Evaluation Report

UNIT-III

Research Designs: Concept and Need of Research design. Types of Research Designs, Exploratory, Descriptive, Experimental and Formative Designs

Sampling: Concept, Purpose of Sampling, Types of Sampling.

Probability: Simple Random Sampling, Stratified, Sampling, Cluster Sampling.

Non probability sampling: Availability sampling, Purpose sampling, Quota sampling, Snow Ball sampling.

UNIT-IV

Methods of Data Collection: Types of Data- Primary and Secondary Data; Data Collection, methods – Observation, Interview, Questionnaire.

Tools of Data Collection: Schedule and Questionnaire, Construction, and Qualities of a Good schedule and questionnaire

Data analysis: Nature and Purpose of Analysis, Tabulation, Categorization, Editing and Coding, Statistical Analysis and Inferences

UNIT-V

Importance of Statistics in Social Research: Measures of central tendency, Measures of Dispersion, T-test, Chi-Square test, Correlation and Regression Report writing: Purpose, Structure, Writing Style of a Research Report

Refrences:

1. Goode J. & Hatt P.K, Methods in social Research, Delhi :Surjeet Publications
2. Lal Das D.K.2000, Practice of Social Research, Jaipur Rawat Publications
3. Schman, B.A., 1967 Evaluate Research : Principles and practice in Public Service and Social Action Programmes, New York: Rusell sage Publications.
4. Verma R.K, Research Methodology
5. Gopal Verma 1989, New Delhi: Common Wealth publishers
6. Wilknson & Bhandakar, Methodology & Techniques of Social Research, Bombay, Himalaya Publishing House.
7. Young P.V. & Schmid, Scientific Social Surveys and Research New York :Prentice Hall, Rubin and Allen
8. Lal Das D.K(2005), Designs of Social Research, Jaipur , Rawat Publishers
9. Hans Raj 1992, Theory and practice and Social Research, Delhi: Surjeet Publications

Course Outcome

1. Acquainted with advanced level of knowledge in Social Work Research process and Statistics
2. Illustrate single subject and evaluation Research Designs along with various Research designs
3. Facilitate methods of Sampling, Data Collection, Analysis, Statistical-Applications and Report Writing

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2		2	2		1	1
CO 2		3	2		2		2			2		
CO 3			3		3			2		2	2	

C.F.: MSW – 205 A: SOCIAL WORK PRACTICUM –II

Course Objectives

Know the role of Agency in social work practice

2. understands the ethics and limitations of the agency

3. Apply the social work skills and techniques through Supervisor

Course Outcome

1. Examine the Nature, Scope and Functions of the different Government and non-profit organizations agency at ground level
2. Trained to assist their supervisor with in the limitations of the agency
3. Equipped with Professional Skills and Techniques through practical exposure

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		1		2	1			
CO 2		3	2	2			2		1			
CO 3				3	2		2		1			

C.F: MSW – 205 B: SOCIAL WORK PRACTICE WITH DIFFERENTLY ABLED

Course Objectives

1.Understand the relevance of social work practice with differently abled people

2. Know to work in partnership with families, carers, staff and service providers to identify needs, provide emotional and empower to enhance their quality of life.

3. Address the issue of grief, loss and bereavement associated with physical and mental disability

UNIT - I

Disability: Concept, Definitions and Nature

Definitions: Impairment, Handicap and Disability; Types/Categories of Disability.

Model of Managing Disability: The Charity Model, the Medical Model (individual), Social Model, Rights Based Model

Disability in India: History, Trends and Current situation

UNIT - II

Disability Issues, Problems and Responses

Societal attitude toward Persons with Disability (PWD): Stigma, Discrimination, oppression and social exclusion

Issues of access to education, employment, health, technology; safety and accessibility; marginalization and psychosocial challenges

Integration and Inclusion of the persons with disability: prospects and challenges

Responses: Special Provisions; Inclusive Education and Employment; Mainstreaming.

UNIT - III

Policy, Legal Framework, Services and Programmes

United Nations Convention on Rights of Person with Disabilities

Various legislations (RCI Act, RPD Act & National Trust Act)

Services and programmes for Persons with Disabilities: Role of government and civil society

Disability Counseling: Components and Approaches

Gendered aspects of disability

UNIT - IV

Rehabilitation of Persons with Disability

Rehabilitation services for the PWD (Educational, vocational, economic & social)

Community based rehabilitation: Philosophy approaches and programmes

Roles and functions of Social Worker with disabilities

Theoretical Perspectives and their Application to Disability Rehabilitation in Social Work

UNIT - V

Assistive Technology and Disability

Introduction to Assistive Technology

Cognitive assistance, including computer and electrical assistive devices

Infrastructural assistance Devices for effective communication

Reference

1. Albrecht, G . L, Seelman, K. D., & Bury, M. (2001). Handbook of disability studies. California: Sage Publications.
2. Banerjee, G. (2001). Legal rights of person with disability. New Delhi: RCI.
3. Fleischer, D. Z., & Zames, F. (2001). The disability rights movement: from charity to confrontation. New Jersey: Temple University Press.
4. ILO (2014). World social protection report 2014/15: building economic recovery, inclusive development and social justice.
5. Karna, G. N. (2001). Disability Studies in India: Retrospect and prospects. New Delhi: Gyan Publishing House.
6. Mitra, S., Posarac, A., & Vick, B. (2013). Disability and poverty in developing countries: multidimensional study. World Development, 41, 1-18.
7. Puri, M ., & A braham, G . (2004). Handbook of inclusive education for educators, administrators and planners: within walls, without boundaries. New De lhi: S age Publications.
8. Rothman, J. C. (2003). Social work practice across disability. Boston: Allyn & Bacon.
9. World Bank (2007). Disability in India: From commitments to outcomes. W orking Paper, 2007, Washington DC.
10. World Health Organization (2 011). World report on disability. World Health Organization Supplementary Readings

11. Barnes, C., Oliver, M., & Barton, L. (eds). (2002). Disability studies today. Cambridge: Polity Press in Association with Blackwell Publisher Ltd.
12. Batra, S. (ed.) (2004). Rehabilitation of the disabled: Involvement of social work professionals. New Delhi: RCI.
13. Hegarty, S., & A lur, M. (2002). Education and children with special needs from segregation to inclusion. New Delhi: Sage Publications.
14. Hinchcliffe, A. (2003). Children with cerebral palsy: A manual for therapist, parents and community workers. New Delhi: Vistaar Publication.
15. Lyons, R. F., Sullivon, M. J. L., & Ritvo, P. G. (2005). Relationships in chronic illness and disability. California: Sage Publications Inc.
16. May, G ., & R aske, M . (2005). Ending disability discrimination: strategies for social workers. boston: Allyn & Bacon.
17. Sen, A . (1988). Psycho-social integration of the handicapped: A challenge to society. New Delhi: Mittal Publishers.
18. Simpson, L . R . (2004). Autism spectrum disorders: Interventions and treatment for children and youth. New Delhi: Vistaar Publication.
19. Swain, J., French, S., & Thomas, C. C. (2004). Disabling barrier, enabling environments. New Delhi: Sage Publications.
20. Tilstone, C ., F lorian, L ., & B everidge, S . (eds) (1998). Promoting inclusive practice. London: Routledge Falmer.
21. Venkatesan, S . (2005). Children with developmental disabilities: A training guide for parents, teachers and caregivers. New Delhi: Sage Publications

Course Outcome

1. Import knowledge on concept, Nature and models of disability and understanding trends and current situation of disability.
2. Import knowledge on disability issues, problems and responses of disability.
3. Understanding policies, rehabilitation of persons with disability, services for the PWD.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2	1		2		1			
CO 2	3	2	2		2			2		1	2	2
CO 3		2		3	2		2		2		2	

C.F: MSW – 205 C: SOCIAL WORK AND DISASTER MANAGEMENT

Course Objectives

1. Understand the Disaster Management and its importance.
2. Describe the environmental hazards and its techniques of prevention.
3. sensitize students about the environmental issues and motivate to work for environmental Conservation

UNIT - I

Disaster: Meaning - Concept of Hazard, Risk, Vulnerability and Disaster, Impact of disasters: Physical, economic, political, psychosocial, ecological, and others;

UNIT II

Disaster Management Cycle: Mitigation and prevention, Preparedness, Prediction and Early warning, Rescue and Relief, Impact assessment, Response, Recovery, Reconstruction; Disaster Risk Reduction; Community Based Disaster Management (CBDRM);

UNIT III

Global issues and initiatives- World Conference on Disaster Reduction (2005),

Hyogo Framework for Action (2005-15), Sphere Standards – 2012, Disaster Management Act 2005; National Disaster Management Policy 2009;

UNIT IV

Role of the Central and the State Governments, Local bodies, Community, Media,

International and National Non-Governmental Organizations, Charitable trusts, Educational Institutions, Voluntary Organizations, Community Based Organizations, Youth groups, Others

Administrative and institutional structure f or disaster management; Techno-legal framework

UNIT V:

Impact on the individual, family and society, mental health consequences of

Disaster: grief reactions, post-traumatic stress disorders

Role of social worker in disaster management

References

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management. (2004). Field Practitioner's Handbook, ADPC, Bangkok, Asian Disaster Preparedness Center Bangkok.
2. Anderson M and Woodrow P. (1998). Rising from the Ashes: Development Strategies in Times of Disaster. London: ITDG Publishing, www.itdgpublishing.org.uk .
3. B.K.Khanna. (2005). Disasters: All You Wanted to Know About, Delhi: New India Publishing Agency, Delhi.
4. Blaikie P, Cannon T, Davis I and Wisner B. (2004). At risk: Natural hazards, people's Vulnerability and Disaster. London: Routledge.
5. Maheswari, Sudha Disaster damage estimation models: Data needs vs. ground reality: By Sudha Maheshwari, Rutgers The State University of New Jersey - New Brunswick.
6. Disaster Management Act. (2005). Ministry of Home Affairs, Delhi: Government of India.
7. Hyogo Framework for Action 2005 – 2015: building the resilience of nations and communities to disasters http://www.unisdr.org/we/coordinate/hfa
8. Kapur, A. (2005). Disasters in India: Studies of Grim Reality, Jaipur: Rawat Publications.
9. Manual on Natural Disaster Management in India. (2001). New Delhi: NCDM.
10. Narayana R.L., Srinivasa Murthy, R., Daz P. (2003). Disaster mental health in India: Monograph. New Delhi: American Red Cross. Indian Red Cross.

Course Outcome

1. Summarize and understand the disasters and Disaster Management
2. Acquire a critical perspective of the policy framework, Institutional Structures and programmes for Disaster Management in India
3. Explore Mental health consequences and able to provide Psychosocial care in Disaster Management

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2		1	2		2	2
CO 2		3	2		2	2				2	2	2
CO 3		3	2		2		3		2		1	

E.F: MSW – 206 (A): COUNSELLING IN SOCIAL WORK PRATICE

Course Objectives

1. Know about the what, why and how of counselling services;
2. Provide both academic learning and professional education and training in counselling,
3. Describe the role of counselor in families, family courts, correctional settings,
   Schools, health setting, rehabilitation and De - addiction centers

UNIT-I

Counseling: Concept, Goal and ethics of counseling, Historical development of counseling, types of Counseling, Principles of Counseling

UNIT-II

Approaches to counseling and Techniques of Counseling:

Client –centered Counseling,

Psychoanalytic Counseling,

Behavioral Counseling

Development of counseling strategies in Social Work Profession in India

UNIT - III

Roles and characteristics of a counselor,

Counseling: skills, competencies and therapeutic relationship

The counseling relationship: Relationship as the medium of facilitating change

UNIT- IV

Phases of counseling; Termination of counseling: Indications and contraindication, and counseling Process

UNIT - V

Counseling in different field and legal issues:

Health counseling:

School counseling:

Crisis counseling: theory, methods and techniques of crisis intervention

Marriage and Family counseling: Techniques and process

Alcoholism Counseling: Motivational Intervention for sobriety

Counseling of children: developmental needs and age-related issues; Special problems of physical and sexual abuse, and substance abuse, Special Population Counseling

References:

1. Gerald Corey 1996, Theory and Practice and psychotherapy, Brooks Cole publishing company
2. Ellen Noonan 1993, Counseling Young People Methuen , London & New York
3. Dr.B.G. Barki, Guidance and counseling
4. Dr. B.Mukhopady 1989, A Manual, Sterling publishers, private Limited, Banglore
5. Richard Pearson 1990, Counseling and Social support Perspectives and practice. Sage publications . London, New Delhi
6. Micheal Carroll 1996, Counseling Supervision Theory, Skills & practice. Sage publications, London , New Delhi
7. S.Narayana Rao By S.V. University, Counseling and Guidance Tata Mc.Graw-Hill published company limited New Delhi
8. J.William Worden 1983, Grief counseling & Grief therapy, Tavistock, publications London and New York
9. Gerald Corey 2001, Theory & Practice of Group Counseling Brooks/Cole Australia, United States
10. Phillip Burnard 2004, Counseling Skills, A source book of activities, Viva Books Private limited, New Delhi
11. Premilla D'Cruz 2004, Family care in HIV/AIDS, Exploring Lived, Experience, Sage publications, New Delhi, Thousand Oaks. London
12. Binod K.Sahu 2004, AIDS and Population Education, Sterling Publishers Private Limited New Delhi
13. Thomas Gracious, AIDS and Population Education, Rawat Publications Jaipur & New Delhi
14. Willo Pequeguant Jose Szapocznik 2000, Working with Families in the era of HIV/AIDS Sage Publications, Inc Thousand Oaks, London , New Delhi

Course Outcome

1. Understanding the basics of Counseling and Approaches of Counseling
2. Develop ability to apply appropriate Counseling Techniques with Special Group
3. Demonstrate to apply Counselling Skills while working with clients in various settings like Health , Family and School Settings

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	1	2		1	1	1	2	1	1
CO 2	2	2				2	2	3	2	1	2	
CO 3	2	1	3	1	1	3	2	2	3	2	1	

E.F: MSW 206 (B): SOCIAL WELFARE PROJECT FORMULATION AND MANGEMENT

Course Objectives

1. Understand the concepts in social welfare project formulation and management
2. Know the application of skills, tools and techniques to project activities
3. Describe the project management frame work and project life cycle

UNIT-I

Social welfare – Development and Administration:

Definition, Nature, Scope, Principles of Social Welfare Administration

Administration process: Planning, Organization, Staffing, Direction, Co-ordination, Reporting and Budgeting

UNIT-II

Registration of an organization: Process, Constitution, By Laws/Memorandum of Association and Registration.

Related Acts and laws: Societies Registration Act 1860, Andhra Pradesh Societies Registration Act -2001

UNIT-III

Organizational management:

Guide lines for Project Formulation, Programme Planning, Monitoring and Evaluation

Organizational management: Governance, Financial aspects

UNIT-IV

Social welfare, Governmental agencies:

Autonomous boards: Central Social Welfare Boards (CSWB) , AP State Welfare Board (APSSWB) Understanding Functioning of Union Level Departments and Ministries of welfare and Development.

Role of local bodies in the welfare and development

UNIT-V

Social Welfare – Non Governmental Organizations: Concept , Types and Functions of Non Governmental Organizations, NGO's role in development.

Reference

1. Rajeeb Mishar ,2008, Voluntary Sector and Rural Development, Rawat Publications Jaipur & New Delhi
2. Goel,SL & R.K Jain 1988, Social Administration in India, New Delhi :Deep and Deep Publications
3. Paul Chowdhary.D.1979, Social Administration in India, New Delhi: Atma Ram
4. Sachdeva,D.R, Social Administration in India, Kitab Mahal , Allahabad
5. Skidmore,1983, Social Work Administration , Prentice Hall, New Jersey.
6. Kulkarni, 1965, Social Policy and Social Development in India, ASSWI, India
7. Kulkarni,P.D.,1985, Social Policy in India ,TISS, Mumbai.
8. Jacob. K.K., Social Policy in India ,Asia Publishing, House, New Delhi
9. Societies Registration Act, 1860
10. AP Societies Registration Act, 2001

Course Outcome

1. **Understand the principles of social welfare admiration and process, aware of social welfare governmental agencies involved in social welfare.**
2. **Ability to start and run N.G.Os and carryout welfare activity independently.**
3. **Experiment skills in project formulation, programmer planning monitoring and evaluation.**

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3			3		3	2				2	2
CO 2		3	2		3	2				1	1	2
CO 3				3		3		3			2	

AUDIT COURSE: 207 - HUMAN VALUES AND PROFESSIONAL ETHICS - II

Course Objectives

1. Know different concepts of human values and behavior

2. Discuss the medical and moral ethics of medical and health care professionals

3. Understand the relation between Environment and Health

1.UNIT-I

Value Education- Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem. Family values-Components, structure and responsibilities of family- Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-II

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals, Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients, Social justice in health care, human cloning, problems of abortion, Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT-III

Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions, Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics

UNIT-IV

Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

UNIT-V

Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

Reference

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
14. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Education-Telugu Akademi, Hyderabad.
15. I.C Sharma Ethical Philosophy of India. Nagin &co Julundhar

Course Outcome

1. Summarize different concepts of Human Values and Behavioural changes required for adjustment in Family and Society
2. Demonstrates Medical ethics and views of Charaka, Sushruta and Hippocratus on moral ethics in Medical and Health care professionals.
3. Acquire Skills on Environmental ethics and the Environment and Health
4. Appraise Social Ethics, Human Trafficking, Human Rights, and Media Ethics

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2		1		1	2	
CO 2			3		2		2	3		3	2	
CO 3		2			3	2			3		1	1

CORE: MSW - 301: SOCIAL WORK INTERVEATION WITH FAMILEIES

Course Objectives

1. Outlines the principles underpinning the assessment of families and children in need.
2. Address the core principles of social work such as working in partnership with parents, working with children in care including fostering and adoption issues.
3. Discuss the procedural intervention in child protection and Family assessment.

UNIT-I

Family System in India: Definition, The changing pattern of family in India

Conceptual frame work to understand family

Family Centered Practice as a Model of social work practice – Ecological and System Theory.

UNIT-II

Family Life Management, Family life cycle, Developmental tasks of each phase of family life and development crisis

Family dynamics: Problems in the family. Abuse and Violence in families, alcoholism etc

UNIT-III

Assessment of family: Family assessment needs and Importance.

- Inter Assessment tools of family : Interviewing , Ecological assessment – Eco map , Generation assessment- Genogram
- Inner family assessment– Triangle
- Family Sculpture ,Family Mapping etc

UNIT-IV

Social work practice with Families:

Need and importance of family welfare programme, Sex Education (F.P methods)

Family advocacy: Role of Family Counseling Center, Family courts, Lokadalath's, Police Protection Cells etc

Counseling intervention –Holistic counseling, Pre-marital, Marital counseling, Crisis Counseling

UNIT-V

Social work therapeutic Intervention: Psycho dynamic Family Therapy, Behavioural Family therapy, Group Therapy, Extended Family System Therapy.

Reference

1. Ann Hartman and Jam faid Family centered social work practice
2. Aranha.T, Social Advocacy- Perspectives of Social Work Bombay
3. Fouseca Habel, Counselling for Mental Happiness
4. Jordon William, The Social Worker in Family Situations
5. Levent R.F., Family Therapy: a comprehensive over view.
6. Mamta Selgal, Nirmala Sheging , Martial disputes and counseling, Diagnostic Techniques, 3 volumes
7. Murali Desai, Family and Intervention. (a course compendium)
8. Philip Barker, Basic Family Therapy
9. Robin Skynmer, Exploitation with Families: Group analysis and Family Therapy, Unit for Family studies, Tata Institute
10. Of Social Sciences, Enhancing the role of the Family as an agency for Social and economic Development

Course Outcome

1. Discover the Family Centered Practice as a Model of Social Work practice and understand Family life management and Family Dynamics
2. Demonstrate Family Assessment and Application of Tools : Interviewing , Ecological assessment – Eco map , Generation assessment- Genogram, Triangle,Family Sculpture and Family Mapping
3. Integrate social work practice with Families and Social Work Therapeutic Interventions wherever appropriate

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		2	2		2		1	1	2	2	2
CO 2		3	2		2		2		1		2	
CO 3				2	3		3		2		2	1

CORE: MSW - 302: SOCIAL WORK IN THE FIELD OF HELATH

Course Objectives

1. Know the concepts of health and factors affecting health
2. Assess the Primary Health Care system in India
3. Understands the scope of social work in different health care settings.

UNIT-I

Health: Definition, Concept, Factors influencing health, Indicators of Health.

Epidemiology: Concept, Definition, Aims and Uses and Measurements in Epidemiology

UNIT-II

Primary health care system in India

Community health: Concept and Importance, Importance of community participation in community health promotion

Major health problems:

Communicable diseases: Tuberculosis, Typhoid, Malaria, Dengue, Chickengunya, Measles etc

Chronic health problems: Diabetes, Stroke, Hyper tension, Cancer, HIV/AIDS

Nutrition: Concept of nutrition and mal nutrition, nutritional problems.

Public health: Environmental sanitation

Role of Social Workers in Prevention and Health Promotion

UNIT - III

Health Education: Concept, Principles, Models and Methods of Health Education, Health Communication, Importance and Polices of health education in India.

Formulation and Developing Health Education Models (SMART indicators)

Capacity building and training programmes in the field of health

Health Administration at National, State and at grass- root level.

UNIT-IV

- Nation Health Policy of India
- Persons with Disabilities act, 1995.
- Medical Termination Of pregnancy act
- Nation Rural Health Mission
- Health Insurance, Role and Importance in promoting health

UNIT-V

Social work practice in the Field of Health:

Evaluation of social work practice in the field of health

Medical social work: Concept, Definition and function of Medical Social Workers

Importance of Team Approach in a Hospital Setting

Social work practice in different wards Preditric S.T.D ward, Oncology ward etc.

Importance and functions of Social Worker in health settings

Reference

1. Turner J. Francis, Differential Diagnosis and Treatment in Social Work , Free Press , New York
2. Turner J. Francis, Adult Psychopathology, Free Press, New York .
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6. Herbert S.Stream , 1978, Clinical Social Work: Theory and Practice, the Free Press London
7. Lynn Ilubschman, 1983, Hospital Social Work Practice, Prager Publishers ,USA
8. Mathew .Henk, 1989, Social Work in Primary Care, Sage publications New Delhi
9. Kathleen Ell Helen Northern 1990: Families in health care. Psycologiacal Practice. Aldine de Gruyter, New York
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11. K.Park 2000, Social and Preventive Mediccine: M/S Banarsids Bhanot, Jabalpur
12. William Doherty & Thomas L. Campbell 1988, Clinical Social Work Beyond Generalist Practice with Individuals, Groups and Families Brooks/Cole U.S.A
13. Sujatha Rao & Rachel Chatterjee 2003, India Health Report. Oxford University, Press New Delhi
14. Lyno Hubchman 1983, Hospital Social Work Practice praegar U.S.A

Course Outcome

1. Examine the concept of Health, factors affecting health and Indicators of Health.
2. Evaluate Primary and Community healthcare services with special references to communicable and Non-communicable diseases
3. Assess the relevance, domains and nature of Social Work Intervention in different Health settings

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2		1		2		
CO 2	2	3		2		2		1	2		1	2
CO 3				2	3		3		2		2	1

G.E. MSW 303 (A): CRIMINAL JUSTICE AND SOCIAL WORK PRACTICE

Course Objectives

1. Know about the principles of criminology.

2. Explores the different ways in which crime is explained

3 .Develop knowledge of the main perspectives in criminology

UNIT I

Crime: concept, causation and its relation to social problems, Theories of crime and punishment, changing dimensions of crime, Cyber and digital crime

Victimology: Study of victims of crime, victim compensation, and victim support services;

Restorative Justice; Human Rights Perspective and early diversion approach to prevention of crime

UNIT II

Social Defense: Concept, Philosophy and changing dimensions in Social Defense

Correctional services: concept, philosophy and changing perspectives

Persons in need of care and protection: children, street and working children, older persons, homeless and women.

Alcoholism, drug abuse and response of de-addiction centers and civil society organizations, Community based initiatives and correction programmes: Institutional and non-institutional services, after care, intensive after care, reintegration and follow up

UNIT III

Criminal Justice System: Police, Prosecution, Judiciary and Correctional institutions, Components, Processes and Perspectives

UNIT IV

Legislation for Criminal Justice

Indian Penal Code and Civil Procedure Codes

Criminal Procedure Code and Indian Evidence Act

Prisons Act, Prisoners Act, Probation and parole

UNIT V

Juvenile Justice (Care and Protection of Children) Act 2000, POCSO Act,
Immoral Traffic Prevention Act 1986,
Probation of Offenders Act, 1958, Beggary Prevention Acts,
Narcotic Drugs and Psychotropic Substances Act 1986,
Cyber laws

Reference

1. Alder, F., Mueller., & Laufer, W. (2007). Criminology. New York: McGraw Hill
2. Callen, F. T., & Agrew, R. (eds.) (2005). Criminological theories, past to present. Los Angeles: Roxbury Publishing.
3. Chong, M . D., & Francis, A . P . (2016). Demystifying criminal Justice Social Work in India. Sage Publications Pvt. Ltd.
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5. Devasia, V . V. (1992). Criminology, victimology and corrections. New Delhi: Ashish Publishing House.
6. Gaur, K. D. (2002). Criminal law, criminology and criminal administration. New Delhi: Deep and Deep Publications.
7. Holtzhausen, L. (2012). Criminal justice social work. Claremont, South Africa: Juta
8. Kostoic, M. (2010). Victimology: A contemporary theoretical approach to crime and its victim. Law and Politics Vol.8, No. 1, pp.65-78
9. Kumari, V. (2004). Juvenile justice in India: From welfare to rights. New Delhi: Oxford University Press.
10. Molloch, M., & McIvor, G. (2012). Women, punishment and social justice: Human rights and penal practices. Oxon: Routledge
11. Singh, S. (ed.) (2013). Social work and social development. OUP
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17. United N ations (1985). Alternatives to imprisonment and measures for the social resettlement of prisoners. New York: United Nations.
18. Valier, C. (2001). Theories of crime and punishment. Essex: Longman.

Course Outcomes

1. Acquiring knowledge on the concept, causation of crime, Theories of crime and punishment and its relations to social problems.
2. Understanding the concept of social difference and correctional services and also community based incentives with correction programmes.
3. Examine the juvenile Justice Act, Immoral Trafficking prevention Act, Narcotic drugs and Psychotropic substance Act etc.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2		1		2	1	1
CO 2	3		3		2		2		1	1		2
CO 3		3		3		2		1		2		

G.E. MSW 303 (B): SOCIAL WORK PRACTICUM - III

Course Objectives

1.Know the concept of Community and Community Organization

2. Discuss the skills needed to organize community development Programs

3. Develop the interventional strategies for the welfare and sustainability the community.

- Rural Camp and Concurrent Field Work Reports
- Concurrent Field Work Seminar
- Concurrent Field Work Vivo-Voce

Course Outcomes

1. Analysis the role of Community and dramatize the Community Organisation in field work practice
2. Develop skills and expertise their Field Work exposure to organize community programmes
3. Examine the new Intervention programs in the area of their specialization to bring a solutions to the problems in different community

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2	3		2		2	1	1	
CO 2	3					2		3		2	2	2
CO 3		2			3		2		3		1	1

G.E. MSW - 303 (C): SOCIAL POLICY AND PLANNING

Course Objectives

1.Know the nature and approaches of Social Policy

2. Differentiate the social welfare policies implemented for women, children, Education, health and environment.

3. Understand the role of social workers in formulation, planning and implementation of policies

UNIT-I

Social Policy : Definition, Objectives, Social policies and social development, Social policy in relation to Indian Constitution, Fundamental rights, Directive principles of state policy.

UNIT-II

Approaches to social policy:

Unified, Integrated and Sectoral

Formulation and Implementation of social policy, Process, Role of government and NGO's etc

Family Related Polices

UNIT-III

Social welfare policies and their implementation:

Education, Health, Women, Youth, elderly, Children Urban, Rural, and Tribal development policies, Environment

UNIT –IV

Social and developmental planning: concept, approaches to social planning, Linkage between Social Policy and Planning.

i. Planning process in India
ii. Planning Commission – Center and State and its Functions

UNIT-V

Decentralization: Need for Decentralization of planning, Participatory planning

Role of social workers in Formulating of policy, Planning and Implementation

Refrences

1. Rajeeb Mishar, (2008), Voluntary Sector and Rural Development, Rawat Publications Jaipur & New Delhi
2. Goel, SL and R.K. Jain (1988), Social Administration in India, New Delhi : Deep and Deep Publications
3. Paul Chowdhary.D. (1979), Social Administration in India, New Delhi: Atma Ram
4. Sachdeva,D.R , Social Administration in India, Kitab Mahal , Allahabad
5. Skidmore, (1983), Social Work Administration, Prentice Hall,New Jersey.
6. Kulkarni, (1965) Social Policy and Social Development in India ,ASSWI, India
7. Kulkarni,P.D.,(1985), Social Policy in India ,TISS, Mumbai.
8. Jacob,K.K., Social Policy in India ,Asia Publishing House, New Delhi
9. Societies Registration Act, 1860
10. AP Societies Registration Act, 2001

Course Outcomes

1. Examine the nature and Approaches of Social Policy in the Socio-economic and political context
2. Assess the implementation of Social Welfare Policies in Education, Health, Women, Children and Environment
3. Examine the Role of Social Workers in Formulating , Planning and Implementation of Social Policies

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		3	2		2		1	2		1	
CO 2		2		1		3		3	2			1
CO 3			2		2		3		2		2	

G.E. MSW 303 (D): GERONTOLOGICAL SOCIAL WORK

Course Objectives

1. Know the scope of social work practice in Gerontology

2. Assess the status of heath, problems and needs of elderly people

3. Describe the interventional strategies for elderly and care givers,

UNIT-I

Gerontology: Definition, Characteristics of elders

Scope of Social Work in the field of Gerontology

Demographic dimensions of the elders in India and other countries

UNIT-II

Changes in the status of elderly health: Functional changes in the biological system of the aged, Physical challenges

Psychological functions: Attention, Perception, memory, Learning, Psychomotor functions and Loneliness, Death, Anxiety

UNIT-III

Problems and Needs of the elderly: Magnitude and Dimensions of the problems

Older persons and Livelihood:

Work participation of old persons in organized and un- organized sectors

Intervention needs or special needs:

- Retirement planning
- Promoting Savings, Investments
- Making Will
- Training and Opportunities for income generation and Employment
- Sponsorship and adoption programs

UNIT-IV

Policies and Programmers for the older persons: National Council for Older Persons, National Policy for Older Persons -1999, Constitutional safeguards, Rights of the elderly, International and national resolutions, conventions, policies including Active Ageing, framework

Schemes for the welfare of the aged: Institutional and Non-institutional Services by Governmental and Non- governmental Organizations for the older persons

UNIT-V

Social Work Intervention to deal Elderly issues like Neglect, Abuse, Violence and Abandonment, Care giver roles and responsibilities, Care giver stress

Needs of Counseling to Elderly People

References:

1. A.K Kapoor & Satwanti Kapoor, Indian's elderly A Mittal Publications
2. Desai, M and Siva Raju,2000, Gerontological social work in India : Some issues and perspectives, Delhi B.R Publications
3. Irudy Rajan .S. Mishra U.S and Sarma: Indian elderly: Asset or Liablity New Delhi Sage Publications.
4. P.S 1997 Krishanan , p and Mahavadevan, k(cds)1992, The elderly population in the Developed world polices, problems and perspectives, Delhi B.R Publishing
5. Sebastian Irudaya Rajan & Pheabe Liebig 2003, An aging India perspective prospects and polices-Haworth
6. Paul chaudhar D,1985, Profile of social welfare and development in India ,M.N. Publishers and Distributors, New Delhi
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8. Bajapi ,P.K(1998) Generation Gap: Implication on the Aged, Social work perspective on health, Rawat Publications, New Delhi
9. Editor: M.Lakshmipati RT.Raju,1999, Family Counselling Perspective and Practices "Dept.of Social Work SPMVVC ,Tirupati

Journals	:	Indian Journal of Geronotology
	:	Aging and Society
	:	Journal of Gerotologiacal Social Work
	:	Journal of Elder Abuse and neglect

Course Outcomes

1. Identify the Scope of Social Work in the field of Gerontology
2. Illustrate Changes in the status of Elderly, Health problems and needs of Elderly
3. Experiment the social work interventional strategies to Elderly ,Care givers and Counseling

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	1		2		2			2	
CO 2	2	3	2			2			1			1
CO 3	3	2	3			1		1	2	1		

S.O.C: MSW – 304: SOFT AND EMPLOYABILITY SKILLS

Course Objectives

1. Know the soft skills and importance of listening in communication
2. Describe the communication skills and Interpersonal skills
3. Examine the Employability skills and Professional skills.

UNIT-I

Soft Skills and Listening

Soft Skills: Meaning and Importance - Hard Skills versus Soft Skills - Self Concept: Self - Awareness, Self Development and Self Realization – Power of Positive Attitude – Etiquette and Manners.

Listening: Types of Listening, Effective Listening and Barriers to Listening Assertive Communication

UNIT-II

Communication Skills

Verbal or Oral Communication: Forms, Types of Speeches and Public Speaking – Presentation: Elements of Effective Presentation and Use of Visual Aids in Presentation.

Written Communication: Strategies of Writing – Business Letters: Form, Structure and Formats –Types of Business Letters – Memos – Agenda and Minutes.

Non-verbal Communication: Body Language and Proxemics.

UNIT-III

Interpersonal Skills: Relationship Development and Maintenance and Transactional Analysis.

Conflict Resolution Skills: Levels of Conflict and Handling Conflict - Persuasion - Empathy - Managing Emotions – Negotiation: Types, Stages and Skills.

UNIT –IV

Employability Skills

Goal Setting, Career Planning, Persuasion, Group Discussion, Interview Skills, Types of Interview, Email Writing, Job Application, Cover Letter, Resume Preparation.

UNIT-V

Professional Skills

Decision Making Skills – Problem Solving – Emotional Intelligence – Team Building Skills – Team Spirit – Time Management

Stress Management: Resolving Techniques.

Reference

1. Ghosh, B.N. Managing Soft Skills for Personality Development. (Ed). New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Krishna Mohan and Meera Banerji. Developing Communication Skills. (2nd Edition). New Delhi: MacMillan Publishers India Ltd., 2009.
3. Neera Jain and Shoma Mukherji. Effective Business Communication. New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2012.
4. Rao, M.S. Soft Skills - Enhancing Employability: Connecting Campus with Cororate. New Delhi:I.K International Publishing House Pvt. Ltd., 2011.
5. Ashraf Rizwi, M. Effective Technical Communication. New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2010.
6. Bretag Tracey, Crossman Joanna and Bordia Sarbari. Communication Skills. New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2012.

Course Outcomes

1. Expose to soft skills and listening and its employability, types of listening, effective listening and barriers to listening.
2. Import knowledge on communication skill and inter personal skills, types and stages.
3. Expose to employability skill and its stages, professonal skill, decision making skills and stress management.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		2		1		1	2	1	2	1	1
CO 2	2	2	1		1	2		1	1		1	
CO 3	2	1	3			1	1			2	2	

O.E: MSW - 305 (A): FUNDAMENTALS OF SOCIAL WORK

Course Objectives

1. Know the basic concepts in Social Work
2. Address the values, principles and code of Ethics of Social Work
3. Assess the social work Education and Professional associations of Social Work in India

UNIT-I

Basic Concepts of Social Work - Concept, definition, goals, scope and functions of professional social work - Social service, social welfare, social reform, social development, social justice and social security.

UNIT –II

Profession of Social Work - Nature and characteristics of a profession - basic values and Principles of professional social work - Code of ethics for social workers

UNIT – III

Methods of Social Work - Primary Methods of Social work

Secondary methods of Social work

UNIT- IV

Fields of Social Work - Family and child welfare

- Medical and Psychiatric social work
- Criminology & Correctional administration
- Community Development
- School Social Work

UNIT –V

Social Work Education in India – Evolution, Nature and content of social work education – Fieldwork – Nature and objectives – Importance of field work supervision Professional Associations of social work – Problems of professionalization in India - Networks in Social Work

References

1. Surendra Singh (Chief Editor): Encyclopedia of Social work in India: New Royal Book Company, Lucknow,2012)
2. Sanjay Bhatacharya: Introduction to Social Work(Deep and Deep Publications, New Delhi-2008)
3. Desai M: Curriculum Development on History of Ideologies for Social Change and Social Work, TISS Mumbai-2002)
4. Banks, S: Ethics and Values in Social Work(Macmillan Press Ltd, London-1995)
5. Hepworth, Dean H. (2010). Direct social work practice-Theory and skills (8th edition). New York: Brooks/Cole

Course Outcomes

1. Examine basic concepts, Principles and Methods of Social Work
2. Defend values and Principles of Professional Social Work and Code of ethics for Social Workers
3. Evaluate Social Work Education in India, Professional Associations, Problems of Professionalization and Networks in Social Work

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		3		2		1		
CO 2		3	2		2		2		1	2	1	1
CO 3		2		3		3		2		1	2	

O.E: MSW - 305 (B): HUMAN RIGHTS AND SOCIAL LEGISLATION

Course Objectives

1. Describes the concept and importance of Human Rights
2. Know the various legislations with regarding women and children
3. Enrich to create awareness on various legislations in the community.

UNIT - I

Human Rights: Concept, Scope – Classification of Human rights – Universal Declaration of Human Rights – International Covenant on Economic, Social and Cultural Rights – International Covenant on Civil and Political Rights – Human Rights in the Constitution of India

UNIT - II

Contemporary Issues: Rights of Children, Women, Dalits, Refugees, and People living with HIV/AIDS – Prisoners, Refugees, and People with alternate sexuality – Persons with Disability

UNIT - III

Social Legislation: Meaning and Scope. Family Courts, Lok Adalats, the Legal Aid, Public Interest Litigation - Right to Information Act (2005) Right to Education (RTE) - The National Food Security Act, 2013

UNIT - IV

Social Legislation relating to Women and Children: Adoption and Maintenance Act (1986), the Juvenile Justice (Care and Protection of Children) Act, (2006) Child Labour Prohibition and Regulation Act (1986), Prevention of Immoral Traffic Act (1986)

UNIT V

Protection of Civil Rights Act (1955) – Protection of Consumer Act (1986) – Transplant of Human Organ Act (1994) – 2013, Bonded Labor Abolition Act (1976).

References

1. Aish Kumar Das. 2004. Human Rights in India. Sarup and Sons. New Delhi.
2. Basu Durga das. 1994. Human rights in Constitutional Law. Princeton Hall. London
3. Baxi.U. 2007. Human Rights in a Post Human World. Cambridge University Press. New Delhi.
4. Biswal.T. 2006. Human Rights – Gender and Environment. Vira Publications. New Delhi.
5. Chiranjivi J. 2002. Human Rights in India. Oxford University Press. New Delhi.
6. Das A.K. 2004. Human Rights in India. Sarup and Sons. New Delhi.
7. Das B.D. 1994. Human rights in Constitutional Law. Princeton Hall. London
8. Dossier. 1994. Human Rights Commission, Legal Resources for Social Action, Chennai.
9. Kohli A.S. 2004. Human Rights and Social Work Issues. Society for Community Organisation. Madurai.
10. Lobo G V. 1994. Human Rights in Indian Studies. Commission for Justice. New Delhi.

Course Outcomes

1. Acquainted with advanced level of knowledge in Human rights
2. Distinguish various Social Legislations and Legislations related to Women and Children
3. Nurture the Social Work Professionals by creating awareness on various current issues and related Legislations

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2	2		2	1	2		1	
CO 2		3	2		2	2		1	1	2	1	2
CO 3		1	1		2		3	2		3		

CORE: MSW 401: SOCIAL WORK INTERVENTION WITH CHILDREN

Course Objectives

1. Know the child Welfare Services in India
2. Discuss the various Institutional services and Non-Institutional services in India
3. Examine the scope of Social work intervention for children in Difficult situations.

UNIT-I

Child welfare: Concept, Objectives, Significance and Development of Child Welfare Services in India, Demographic characteristics of children

UNIT-II

- UN charter of child rights
- National Policy for Children. 1974 and Recent Polices
- Child Health Services, ICDS, School Health Services
- School social work: Concepts, Objectives, Functions and Role of school social worker.

UNIT-III

Theoretical approaches

- Freud's Psycho – Analytical theory
- Erick son's Psycho- Social theory
- Jean Piaget's Cognitive theory

UNIT-IV

Welfare services for children: Institutional, Non-institutional services, special Institutional Services: Foster care, SOS children's villages, adoption, Sponsorship Programme, National and International programme, Agencies in India working for children

UNIT-V

Social Work Intervention with children in difficult situations : Street Children , Child Abuse, Juvenile Delinquents etc, Role of social worker in the welfare of children

Vulnerable children: policy and social work response

Children in difficult circumstances: caste, disability, poverty, migration, orphaned, trafficked, in prostitution, abuse

Legislative measures and programmes for child protection

Social work role and response to children in need of care and protection

Child centric counseling, therapy, skills and techniques in working with children

References:

1. Chowdary, D.Paul 1983 New Delhi, Child welfare and Development, Atma Ram & Sons.
2. Durgananda sinha Socialization of the Indian child,1998 New Delhi. Concept publishers
3. Elizabeth Hurlock 1988, Child Development USA: McGraw Hill
4. Anjali Gandhi, School Social Work
5. Gokhale S.D, Child welfare policy and planning, Bombay: Popular Prakasam
6. Nair, H.W., Three theories of child Development, Harper and Row Publishers: New York
7. S.V. Kale, Early childhood education

Course Outcomes

1. Examine the Significance and Development of Child Welfare Services with special
2. reference to Child Rights
3. Appraise various Institutional and Non-Institutional services for children in need
4. Create Professional Knowledge on Social Work Intervention with children in difficult situations

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2	3		2		1			
CO 2	3		2		2		1	1		2	1	2
CO 3		2	2	1		3		2		2	3	

CORE: MSW - 402- RURAL, URBAN AND TRIBAL COMMUNITY DEVELOPMENT AND EMPOWERMENT

Course Objectives

1. Recognize the rural, urban and Tribal Development Projects in India
2. Train to work with rural, urban and tribal communities.
3. Know the role of social worker in empowering the Self-help groups and in making communities self-reliant

UNIT-I

Rural community-Definition, Characteristics of Rural Communities, Changes in Rural Communities

Urban Community: Definition, Urbanization, Characteristics of Urban Communities

Tribal community: Definition, and Characteristics of Tribal communities

Differences between Rural, Urban and Tribal Communities

UNIT-II

Community development:

Definition, Community development experiment and projects in

Rural areas: Sriniketan Marthandom, Gurgon, Boroda, Firka, Nilokhere and Earthwah projects

Urban areas: Delhi pilot project, Baroda pilot project, Ahmadabad pilot project

Tribal areas: Hill area development programs

UNIT-III

Issues related to communities

General issues: Poverty, Indebtedness, Unemployment, Sanitation, Health and Nutrition

Specific issues: Problems of Women, Children, Youth and Elderly

Rural specific issues: Agriculture, Land and Land related problems

Urban specific issues: Migration Slums, Urban, Industrial Related problems, Issues related to settlement understanding the issues of the community development and scope for social work intervention

Tribal specific issues: Employment, Economic aspects.

UNIT-IV

Programmes for community development:

Rural:

IRDP (Integrated Rural Development Programme),

DWCRA (Development of Women and Children in Rural Areas),

(Swarnajayanti Gram Swarazgar Yojana),

REGS (Rural Employment Guarantee Schemes) National and State level,

Indira Kranthi patham

Urban:

SJSRY (Swarnajayanti Shehari Rojgar Yojana)

DWCUA (Development of Women and Children in Urban Areas), Slum clearance projects

Tribal:

ITDA (Integrated Tribal Development Agency),

GDC (Girijan Development Corporation),

Constitutional provisions for Scheduled Tribes

Social workers Response: Creating awareness Work for effective Implementation of the programmes.

UNIT-V

Community development approaches and scope of social work practice.

Target approach: Welfare programmes, Role of social worker, Developing Relationships, Demonstrating the purpose, providing knowledge, Empowering the Target Group, Providing Direction, Support, Networking, using Participatory Techniques

Role of social worker: conducting awareness camps, strengthening self-help groups, facilitating Empowerment in the communities, sensitizing the government functionaries

References:

1. Encylopeadia of social work
2. Government of India of various Rural Development Initiatives, Vol. I to IV Guidelines and Reports
3. Gabgrade, K.D.1971, Community Organisations in India, Popular Prakasan Bombay
4. Memoria, C.R Tripathi 1980, Agricultural problems in India, Kitab Mahal, New Delhi
5. Madan , M.R., India's Developing Villages, Hyderabad, Jaico Book House
6. N.I.R.D ,1984, Rural development Statics, N.I.R.D, Hyderabad

7. Pandy, K K 1990-91, Rural Development in Continuity and change , New Delhi Publishing
8. Ross Murray, G 1955, Community Organisation, Theory and Practice, New York, Harper and Row
9. Singh Katar, 1986, Rural development Principles, Polices and Management, New Delhi, Sage Publishing
10. Vasant Desai, 1986, Rural development, vol. I to IV New Delhi, Hiamalaya, Publishing House Nagpur
11. Venkata Reddy. K 1988, Rural development in India (Poverty & Development), Hiamalaya Publishing House Nagpur
12. Annual Report 2005, Department of Rural Development, Government of Andhra Pradesh
13. Clinard, Marshall .B, Slums and Community Development:The press New Delhi
14. D.Souza, Alfred, Urban Growth and Urban Planning, New Delhi, Indian Social Institute
15. Gopal Bhargava (1981), Urban Problems and Policy Perspectives in India . Shakthi Malik, Abinay Publications, E-37.Hauz Khas, New Delhi
16. Jacob Z.Thudipaur (1993), Urban community Development, Rawat Publications New Delhi
17. Sharma ,K.C .1994, Poverty, Un-employment and Inequalities in Tribal India Reliance Publishing House .New Delhi
18. Satyanarayana,1990, Tribal development in India, Inter India Publications, New Delhi
19. Verma Y.M,1986, Problems of Tribal's India

Course Outcomes

1. Will nurture the Social Work Professionals to become effective Social Worker and contribute to community by conducting awareness camps, strengthening Self-Help Groups and Facilitating Empowerment in the communities.
2. Acquainted with advanced level of knowledge in rural Urban and Tribal community and Community Development Projects across the country
3. Trained to meet the challenges specifically related to Rural, Urban and Tribal communities

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		3	2		2		1	2		1	
CO 2		3	2		3		3			2		2
CO 3			2	1		3		3		2	2	

G.E: MSW - 403 (A): SOCIAL WORK PRACTICE IN THE FIELD OF MENTAL HEALTH

Course Objectives

1. Know the concept of mental health and Psychiatric Social Work
2. Examine the Psychiatric Disorders and scope of therapies in Psychiatric illness
3. Address the scope of Psychiatric Rehabilitation to assist Mental illness

UNIT-I

Mental Health: Concept, Definition, Mental health Act (1987 & 2017)-salient features, Objectives Mental Health act

UNIT-II

Psychiatric Social work-Concept, Definition, Need and Importance-Historical Development of Psychiatric Social Work in India and Abroad, Functions of psychiatric social worker

UNIT-III

Clinical Picture and Treatment of Psychiatric Disorder such as; Schizophrenia, Paranoia, Mood Disorders, Anxiety Disorders, and Stress related Disorders.

Alcoholism: Clinical Picture and Treatment-Social Work intervention with Alcoholics and their families

Mental Retardation: Nature, Levels and types

Child Guidance: Clinic-Nature and functions-Mental health problems of Children

UNIT-IV

Therapeutic Intervention in Psychiatric Illness: Cognitive Therapy, Group Psychotherapy, Family Therapy, Behaviour therapy, ECT, Chemotherapy and Occupational Therapy (Purpose and Concept).

UNIT-V

Psychiatric Rehabilitation-Concept: Importance and Development of Rehabilitation Programs in India

References:

1. Albert E. Bredworth, Health for Human Effectiveness
2. Robert C. Carson 1990, Abnormal Psychology
3. Martha UffordDickuson 1981, Social Work Practice with Mentally Retarded, Free Press, New York
4. MalavikaKapur 1995, Mental Health of Indian Children, Sage Publication, New Delhi.
5. Ratna Verma 1991, Psychiatric Social Work in India, Sage Publications, New Delhi
6. Purnima Mane 1992, Mental Health in India-Issues and Concerns, TISS, Bombay
7. R. Srinivas Murthy 2000, Mental health in India (1950-2000)
8. Robert C. Carson James N. Batcher, Abnormal Psychology and Modern Life
9. Park & Park, Social & Preventive Medicine

Course Outcomes

1. Understand the concept and importance of Mental Health and Psychiatric Social Work
2. Distinguish Psychiatric disorders and application of Therapeutic Interventions in Psychiatric Illness
3. Plan to provide Psychiatric Rehabilitation to assist Mentally Ill patients

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	3		2		3		2		2	
CO 2	3		2		2			3		2		1
CO 3			3	2		3		2		1	2	

G.E: MSW – 403 (B): SOCIAL WORK PRACTICUM-IV

Course Objectives

1. Develop ability to narrate the learning experiences, assessment of services & resources and participate in service delivery.
2. Assess to plan, organize and implement the activities within agency and/or community framework.
3. Block Placement (Internship) provides an opportunity to experience day-to-day work in a social work setting.

- Concurrent Field Work Reports
- Concurrent Field Work Seminar
- Concurrent Field Work Vivo-voce
- Block Field Work (Internship of 45 days in reputed organizations)

Course Outcomes

1. Acquires training in the organization as social worker and develop sound
2. knowledge on social work which will motivate them to start an NGO
3. Evaluate projects and organize programmes for fund raising
4. Hypothesize research in their area of specialization through which they can suggest recommendations to agencies for improving quality.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2		1	2		2	
CO 2	3		2		2		2			3		
CO 3			3		3			3	2		1	

G.E: MSW – 403 (C): ENVIRONMENT AND SOCIAL WORK

Course Objectives

1. Understands human beings in light of environmental contexts.

2. Describes environmental change and their associated social impacts such as poverty, migration/displacement, famine etc so as to consider environmental sustainability

3. outlines Ecological Social Work at the center of its education and practice with a view to ensure the sustainability of natural resources for the long term.

UNIT – I

Environment: Definition and components

Differential impact o f environmental decimation on marginalized groups -women, poor, indigenous populations.

Environmental Social Work: context, significance and scope

UNIT – II

Interface between environment and development

Environmental sustainability: Implications for food security, livelihood security, energy security and community well being

Sustainable Development: Concept, potentialities and challenges

UNIT – III

Global and National environmental issues and concerns - environmental problems

Climate change: Social implications and consequences (such as disasters; food shortages; migration; conflict); climate change adaptation

UNIT – IV

Constitutional provisions, policies, legislative framework and programmes pertaining to environment and environmental conservation

UNIT –V

Approaches to environmental conservation- Deep Ecology, Eco-feminism, Eco-Socialism and community based natural resource management

Environmental movements: Typology and ideologies

Role of civil society organizations in environmental issues

Reference:

1. Dominelli, L. (2012). Green social work –From environmental crises to environmental justice. Cambridge: Polity Press.
2. Grey, M., Coates, J., & Hetherington, T. (2013). Environmental social work. New York: Routledge.
3. Rogers, P ., J alal, K ., & B oyd, J . (2008). An introduction to sustainable development. London: Earthscan.
4. Agarwal, B . (2015). Gender and green governance: the political economy of women's presence within and beyond community forestry. Oxford: Oxford University Press.
5. Carter, N. (2007). The politics of the environment: Ideas, activism, policies (2nd edition). London: Cambridge University Press.
6. Roser, D., & Seidel, C. (2017). Climate justice: An introduction. New York: Routledge.
7. Mies, M., & Shiva, V. (2010). Ecofeminism. Jaipur: Rawat Publications.
8. Sessions, G. (1995). Deep ecology for the 21st century: Readings on the philosophy and practice of the new environmentalism. Boston: Shambhala Publications.
9. Guha, R., & Alier, J. (1997). Varieties of environmentalism: essays north and south. New York: Routledge.
10. Rangarajan, M. (2006). Environmental issues in India. New Delhi: Pearsons
11. Jalais, A. (2010). Forest of tigers: people, politics and environment in the Sundarbans. New Delhi: Routledge.
12. Dominelli, L. (Eds.) (2018). Handbook of green social work. London: Routledge
13. Robbins, P. (2004). Political ecology: A critical introduction. Wiley Blackwell.
14. Calvert, P., & Calvert, S. (1999). The south, the north and the environment. Jaipur: Rawat Publications
15. Gadgil, M., & Guha, R. (1992). This fissured land: an ecological history of India. New Delhi: Oxford University Press.
16. Shabuddin, G. (2010). Conservation at the crossroads: science, society and the future of India's wildlife. New Delhi: Permanent Black.
17. Peet, R., & Watts, M. (2002). Liberation ecologies: environment, development and social movements. London: Routledge.
18. Baindur, M . (2015). Nature in Indian philosophy and cultural traditions. Ne w De lhi: Springer.

19. Blaikie, P. (2016). Land degradation and society. New York: Routledge.
20. Cronon, W. (1995). The trouble with wilderness; or, getting back to the wrong nature. In
21. W. Cronon, Uncommon ground: rethinking the human place in nature (pp. 69-90). New York: W.W. Norton and Co.
22. Somayaji, S ., & Talwar, S. (2011). Development induced displacement, rehabilitation and resettlement in India: current issues and challenges. London: Routledge.
23. Gadgil, M., & Guha, R. (1995). Ecology and Equity: The Use and Abuse of Nature in Contemporary India. London: Routledge.

Course Outcomes

1. Import knowledge environment and social work leakages, Environmental Justice and climate and Justice with reference to social work.
2. Discover deferential impact of Environmental with reference to managerial groups of women, poor and indigenous populations.
3. Discover the measures for Environmental conservation and identify the approaches, movements and action for Environmental conservation.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3		1	3	2				3		1	1
CO 2	3	3	2	3	2		2	3	3	2		
CO 3	2	1	2	3			2		3	1		

G.E: MSW – 403 (D): DIVERSITY AND INCLUSIVENESS

Course Objectives

1. Know that diversity and inclusion are the inner part of social justice mission of social work

2. Assess to value all religions, Genders, identity expression and sexual orientation, age and disability

3. Discuss the status and challenges of Scheduled Tribes and minorities.

UNIT – I

Concepts: Diversity and InclusivenessForms of social exclusion: Groups at the risk of being excluded- religious, racial, caste, gender, ethnic, class, regional, cultural, language, disabled, migrant and refugee

UNIT – II

Politics of caste: Caste in Indian democracy and identity politics, social movements for anti-casteismStatus of Dalits in India: Inequalities in access (Literacy, Health, Employment, Population, Sex Ratio), Contemporary Dalit MovementsConstitutional Safeguards, Schemes for the Welfare/Development of Scheduled Castes in India: State sponsored schemes and Central Sponsored Schemes

UNIT – III

Issues of Schedule Tribes in India: Marginalization, Displacement, Constitutional Safeguards, and Schemes for the Welfare/Development of Scheduled Tribes: State sponsored schemes and Central Sponsored SchemesStatus of Tribal's in India: Inequalities in access (Literacy, Health, Employment, Population, and Sex Ratio)Contemporary Approaches to Tribal Empowerment, Role of Civil Society Organizations

UNIT – IV

Minority-definitions and forms Type and composition of minorities- religious, gender, caste and linguisticReligious and ethnic Minorities: Regional Concentration of minoritiesMinorities in India: Political Mobilization, Participation in Public and Private Sectors, Diversity of the Minorities: Causes and Impact

UNIT - V

Poverty incidence of minorities: Poverty elimination programmes for MinoritiesGender, Disability: Issues of exclusion and inclusion Inequalities in access Safeguards for Women and disabled

Reference

1. Byrne, David (2009), Social Exclusion Rawat Publications
2. Grusky. D. B. (2014), Social Stratification: Class, Race And Gender In Sociological Perspective Westview Press
3. Kannan, P. (2008), Scheduled Caste Welfare APH Publishing Corporation
4. Kothari, R. (2014), Politics In India Orient Blackswan Private Limited
5. Lal, V. (2013), Modern Indian society Oxford university press
6. Pandey, R. (1997), Minorities in India protection and welfare, APH publishing corporation
7. Rajan, I. S. (2011), Migration, identity and conflict Routledge publication
8. Sharma, K.L. (2011), Social Inequality In India Rawat Publication
9. Tandon, R. (2007), Citizen Participation and Democratic Governance: In our Hands Concept Publishing Company

Course Outcomes

1. Acquire knowledge on the concepts of diversity, inclusiveness and forms of social excuser
2. Ability to relate the politics of castes, status of dilits and constitutional safe guards in India.
3. Acquire knowledge on the concept of minority, types and composition of minorities and their poverty.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3				1	1				3	
CO 2		3	3			3			2			2
CO 3	3		3		3			1		1		1

MCP: MSW – 404: SOCIAL WORK PRACTICUM-V

Course Objectives

- 1, Trains to prepare and submit social work research report
- 2. Describes problem formulation, review of literature related to the study, preparing the research proposal, choosing an appropriate research strategy
- 3. Assess to develop instruments of data collection, collecting the data, processing, analyzing and interpreting the data and preparing the research report.Project Work and Viva-Voce

Course Outcomes

1. Learn Skills and able to apply Principles during the Internship in Block Placement
2. Explore research studies at Micro levels and submit reports as Mini Project Work

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		1	2		2	1	1	
CO 2	3			2		3		2		1		
CO 3			3		2		3		3		2	

O.E: 405 - (A): N.G.O MANAGEMENT

Course Objectives

1. Know about the concept, Structure, registration and By laws of NGOs
2. Discuss Organisational Management and source of funding of NGOs
3. Outlines the Human resource management in NGOs

UNIT – I

NGO's: Concept and Structure; Registration of NGO, Process, Constitution, by-laws / Memorandum of Association and registration.

UNIT – II

Organizational Management of NGO: Guidelines for project formulations, programme planning, Monitoring, Evaluation, and financial management.

UNIT – III

Sources of funding for the management of NGO's: National and International, Government and non-governmental agencies.

UNIT – IV

Role of NGO's in Social and Economic development – Protection, Prevention, Promotion, Transformation

UNIT – V

Human resource management: Planning, Recruitment, Selection, Performance, Appraisal, Training and Development, Motivation, Grievances

Suggested readings

1. Rajeeb Misra 2008-Voluntary Sector and Rural Development. Concept , Practice and a New approach To Remove Rural Poverty . Rawat Publications.
2. I.S.Subhedar 2001 – Field Work Training in Social Work, Rawat Publications.
3. Societies Registration Act, 1860.
4. A.P Societies Registration Act, 2001.
5. Family Planning Association of India –Family Planning Counseling Guide, Population Reports Service Series.
6. Fisher W F -1997 – Towards Sustainable Development, Rawat Publications, New Delhi.
7. Prasad R.K – Population Planning, Policy and Programmes, New Delhi, Deep & Deep Publications.

8. Seshadri and Pandey – Population – Education- A Natural Source Book, New Delhi, NCERT.
9. Rich Mond, M.E, 1972 – What is Social Case Work; An Introduction Description, New York, Ressel, Sage Publications.
10. Trcker, J.Herleiger B L 1970 – Social Group Work, Principles and Practice Association Press, New York.
11. Neil Brach (ED) 1990-Health Promotion at Community Level, Sage Publications, New Delhi, London.

Course Outcomes

1. Distinguish the Concept, Structure, Registration and By laws of NGOs
2. Demonstrate Organisational Management and source of funding of NGOs
3. Familiarize to organize Human Resource Management in NGOs

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		3		3		2		3	2	
CO 2	3		3		2		2		2			1
CO 3		2	3		2		3		2		3	

O.E: 405 B. HEALTH EDUCATION

Course Objectives

. Describes the concept and approaches in health education

2. knows the etiology of communicable and non-communicable diseases

3. Outlines the health services at central, state and District levels

UNIT-I

Health education – Definition, concept and characteristics of Health education

UNIT- II

Approaches and Principles of Health Education, Ethics of health education – Roles and responsibilities of Health Educator

UNIT-III

Epidemiology- Definition – Concept – Principles, uses, measures

UNIT-IV

Diseases - Communicable Diseases – Diarrheal diseases – Malaria – Tuberculosis – Acute Respiratory Infections

Non-Communicable Diseases: Cancer – Cardiovascular diseases – Diabetes and Chronic Kidney Diseases

UNIT-V

Channels of Health Education – Importance and Barriers of Health education

Health Services at Central – State – District – Panchayath – Rural

References

1. Social & Preventive Medicine by Park & Park
2. WHO Reports
3. Cline R., American Public Health Association (APHA) Health Communication Working Group Brochure, 2003.

Teresa L. Thompson; Alicia Dorsey; Roxanne Parrott; Katherine Miller (1 April 2003). The Handbook of Health Communication. Lawrence Erlbaum Assoc.ISBN 978-1-4106-0768-3. Retrieved 30

Course Outcomes

1. Discover the Roles, Responsibilities, Approaches and ethics in Health Education
2. Describe the Behavioral, Environmental, and Genetic risk factors for Communicable and Non- communicable diseases
3. Evaluate channels of Health education and organizational health set up at Central, State and District levels

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		3	2		2		3		2	
CO 2		2		3		3		2		1		2
CO 3			3		3		2		1		2	

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF SANSKRIT



Course

M.A. SANSKRIT

Choice Based Credit System (CBCS)

Academic Year 2021-2022

Amended as per NEP-2020

About the Department:

The Department of Sanskrit was started in the year 1959. The founder Head of the Department was Sri T.K. Gopolswamy Iyengar. Founder Professors of the Department are T.K. Gopalaswamy Iyengar, Prof. E.R. Sreekrishna Sarma, Dr. V.V. Varadachari, Prof. V.A. Sarma and Sri K. Dakshinamurthy. Main objective of starting the department is propagation of Sanskrit literature, its heritage and culture in the society.

Vision

It is proposed to start **"Applied Sanskrit Studies and Comparative Literature"** in the P.G. level. In addition to this, a comprehensive study of **Dharma Sastra and Mimamsa**as a special subject at P.G level is proposed. Standard works such as Natyasastra, Abhinavabharati, etc., in original Sanskrit and studies in English like the History of Sanskrit poetics by P.V. Kane and others are to be translated into Telugu for the use and reference to students. In fact this can be a major project of the department.

Mission

To make the students to learn Indian Sanskrit heritage and to make the students to preserve the traditional Sanskrit literature against the global modernization.

CHOICE BASED CREDIT SYSTEM (CBCS):

- The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average

(CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed.

- Students of this course would be expected to :
- Be able to play leading role in industry, research and the public services;
- Be able to adapt and respond positively and flexibly to changing
- circumstances;
- Develop the professional skills and personal attributes to deal with complex
- issues, both systematically and creatively;
- Have the capacity for individual work and teamwork;
- Be lifelong learners with intellectual and practical skills.

PROGRAM SPECIFIC OUTCOMES:

- The students get knowledge in Sanskrit language, literature, Grammar linguistics and communication skills.
- The students get market vendor for employment and further research.
- The students acquire knowledge in values, ethics and rhetoric
- The students become more human beings with an compare to other people
- To practice Indian culture is over Indian life.

PROGRAMME OBJECTIVES:

- To trained students in Sanskrit language grammar, literature, linguistics and soft skills.
- To make the students market vendor for employment/further research.
- To make them with the skills, values, ethics and way of talking.

PROGRAMME OUTCOMES:

- To impart knowledge on Sanskrit language studies its history and verity in a global context.
- To create knowledge about Ithihasa and Puranic literature to instruct students in an advanced level of literary studies, comparative studies and translation studies.
- To make the students on par with the best Universities globally/Nationally with highly relevant and frequently updated generic electives.

- To provide the necessary environment for the students to home their literary creative, critical, translation and research abilities.
- To convert students into language trainers and personality developers.

Program Educational Objectives:

The educational objectives of our programme ensures:

- Engage themselves in successful professional practices of teaching profession
- They can prove themselves as outstanding administrators in running the institutions
- They can mould the next generation ethically strong and morally sound.
- They can promise productive citizens of the nation by imparting values incorporated in literature since ages.
- They can integrate theory and practice to address complex situations/ challenges of life

RESTRUCTURED CURRICULUM FOR M.A.SANSKRIT (REGULAR) PROGRAMME

TO BE IMPLEMENTED WITH EFFECT FROM THE ACADEMICYEAR 2021-2022

Semester - I

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core	SNSKT 101	Elements of Darsanas-I	6	4	20	80	100
2	Core	SNSKT 102	Vedic Texts-I	6	4	20	80	100
3	Core	SNSKT 103	Prose And Poetry –I	6	4	20	80	100
4	Core	SNSKT 104	Drama, Alankara and Prosody-I	6	4	20	80	100
5	Compulsory Foundation	SNSKT 105(A) SNSKT 105(B) SNSKT 105(C)	History of Sanskrit Literature-I Drama & Poetry-I Alankara & Prosody-I	6 6 6	4 4 4	20 20 20	80 80 80	100 100 100
6	Elective Foundation	SNSKT 106(A) SNSKT 106(B)	Comparative Philology & Siddhanta koumudi-I Kavyalankara sutra vritti-I	6 6	4 4	20 20	80 80	100 100
7	Audit Course	SANSKT 107	Human values and Professional Ethics - I	6	0	100	--	100
Total				36	24	120	480	600

Semester - II

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core	SNSKT 201	Elements of Darsanas-II	6	4	20	80	100
2	Core	SNSKT 202	Vedic Texts-II	6	4	20	80	100
3	Core	SNSKT 203	Prose And Poetry – II	6	4	20	80	100
4	Core	SNSKT 204	Drama, Alankara and Prosody-II	6	4	20	80	100
5	Compulsory Foundation	SNSKT 205(A) SNSKT 205(B) SNSKT 205(C)	History of Sanskrit Literature-II Drama & Poetry-II Alankara & Prosody-II	6 6 6	4 4 4	20 20 20	80 80 80	100 100 100
6	Elective Foundation	SNSKT 206(A) SNSKT 206(B)	Comparative Philology & Siddhanta koumudi-II Kavyalankara sutra vritti-II	6 6	4 4	20 20	80 80	100 100
7	Audit Course	SANSKT 207	Human values and Professional Ethics -II	6	4	20	80	100
Total				36	24	120	480	600

Semester - III

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core	SNSKT 301	(Sahitya)-Rasagangadhara-I	6	4	20	80	100
2	Core	SNSKT 302	(Sahitya)-Dhvanyaloka-I	6	4	20	80	100
3 4	Generic Elective	SNSKT 303(A)	Kavyaprakasa and Dasarupaka -I	6	4	20	80	100
	Generic Elective	SNSKT 303 (B)	History of Sanskrit Poetics & Sanskrit essay-I	6	4	20	80	100
5	Generic Elective	SNSKT 303 (C)	Natya sastram Chapter –I & VI only	6	4	20	80	100
6	Generic Elective	SNSKT 303 (D)	Bhojaraja Champu Ramayana (Balakanda only)	6	4	20	80	100
7	Skill Oriented Course	SANSKT 304	Personality Development in Pancatantra(Mitrabheda and Mitrapraptikam only)	6	4	20	80	100
8	Open Elective	SANSKT 305(A)	Introduction of Sanskrit Language infant reader complete	6	4	20	80	100
9	Open Elective	SANSKT 305(B)	Raghuvamsam (Ist canto only)	6	4	20	80	100

Semester - IV

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core	SNSKT 401	(Sahitya)-Rasagangadhara-II	6	4	20	80	100
2	Core	SNSKT 402	(Sahitya)-Dhvanyaloka-II	6	4	20	80	100
3	Generic Elective	SNSKT 403(A)	Sahitya)-Kavya Prakasa and Dasarupaka-II	6	4	20	80	100
4	Generic Elective	SNSKT 403(B)	History of Sanskrit Poetics And Sanskrit Essay	6	4	20	80	100
5	Generic Elective	SNSKT 403(C)	Kavyadarsa Chapter-I	6	4	20	80	100
6	Generic Elective	SNSKT 403(D)	Kavyameemamsa I to VIII Adhyayas	6	4	20	80	100
7	Multi Disciplinary Course	SANSKT 404	Introduction to Indian Epigraphy	6	4	20	80	100
8	Open Elective	SNSKT405 (A)	Hithopadesa of Narayana Pandita Mitralabha and Mitrabheda	6	4	20	80	100
9	Open Elective	SNSKT405 (B)	Kautilya's Arthasastra Chapter-I (Vinayadhikarika)	6	4	20	80	100

SEMESTER-I

Core Theory

SANSKT:101	ELEMENTS OF DARSANAS - I

Objectives – 1. To create knowledge on Darsanas like Astika and Nastika Darsanas
2. To create the knowledge of performs of yaga.
3. To knowledge in principles of Buddism

Syllabus:

UNIT –I : From the beginning to the end of Dravyaprakarana (P 1-13) GunalaksanaprakaranauptoSabda (P 14-21)

UNIT – II: From the definition of Buddhi to the end of Pratyaksapramana (P 21-32)

UNIT – III: Anumanapramana (Complete) (P 34-48)

UNIT – IV: From the beginning to the end of thearthakarma

UNIT – V: Bauddha School only Jaina School

Outcomes: An understanding of the evolution of Darsanas.

1. To create an awareness of the Darsanas
2. Acquire Knowledge of the Baudda and Jaina Darsanas
3. To get the Knowledge of Meemamsa Sastra

TEXT BOOKS: An understanding of the evolution of Darsanas

1) Tarkasangraha of Annambhatta, (Athalye edition) from the beginning to Anumanaprakarana (Complete) (Unit I-III)
2) MimamsaParibhasa from the beginning till the end of Arthakarma(Unit -IV)
3) Saddarsanasamucchaya.Bauddha and Jainadarsanas (Unit V)

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2		2	3	3	2	2		3
CO 2	3	3		2		2	3	3	2	2		3
CO 3	3	2		2		2	2	3	2	2		3

Core Theory

SANSKT :102	VEDIC TEXTS -1

Objectives – 1. To acquire the Vedic knowledge according to Rgaveda Bashya Bhumika
2. To acquire the knowledge of the Vedic Gods
3. To introduce the Vedic chadas and Grammar to introduce the Upanishadic knowledge

Syllabus:

UNIT– I: Agni (1-1) and Nasadiya (10-29)

UNIT – II: Savitru (1-35)

UNIT –III: Maruts (1-85)

UNIT –IV: Kathopanisad (I-III Chapters)

UNIT-V: Kathopanisad (IV-VI Chapters)

TEXT BOOKS:

1) A Vedic Reader for students by A.A.Macdonell (Units I-III)
2) Kathopanisad (Units IV- V)

Outcomes:

1. Students able to get the Vedic knowledge
2. Students know the importance of Vedic gods
3. Students are understanding the Vedic chandas to make understanding the spiritual knowledge through Kathopanishat

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		3	3	3	3	2	2	3
CO 2	3	2		2		3	3	3	3	2	2	3
CO 3	3	2		2		2	2	3	2	2	2	3

Core Theory

SANSKT :103	PROSE AND POETRY-1

Objectives: –1.To make the students to know the features of gadya kavyas
2.To know the different types of Gadya Kavyas
3.To know the importance of poetry, purpose and also the Poems to understand the ethical values in poetry.

Syllabus:

UNIT –I: SudrakaVarnanam, ChandalakanyakaVarnanam, Sukaprasamsa

UNIT – II: Sudrakasabhavisarjanam, Sudrakasnanam, SudrakanityakrityaVarnanam

UNIT –III: Sabhamandapavarnanam, Vindhyatavi, Agastyasramavarnanam Pampasarovarah, Salmalitaruch, Sukajanmavrittantah

UNIT-IV: 1st Canto of Kiratarjuneeyam

UNIT-V:2nd Canto of Kiratarjuneeyam

TEXT BOOKS:

1) BanaBhatta's Kadambari (Kathamukha portion From Sudrakavarnanam to Sukajanmavruttantah)(Units I-III)
2) Bharavi's Kiratarjuneeyam(Contos 1-2) (Units IV-V)

Outcomes:

1. An understanding of evolution of Sanskrit poetry across the ages until the modern age
2. Get the knowledge of gadya kavya
3. Understand the poetical skills understand the importance of kiratarjuneeya in Sanskrit literature

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2	2	3	2	2		3
CO 2	3	2		2		2	2	2	2	2		3
CO 3	3	2		2		3	3	3	3	3		3

Core Theory

SANSKT :104	DRAMA, ALANKARA AND PROSODY -1

Objectives–1. To introduce the features of the Sanskrit Drama
2. To know the origin and development of Sanskrit Drama
3. To understand the skillness of kalidasa in dramaturgy to acquire the knowledge of Viswanatha's Sahitya darpana

Syllabus:

UNIT –I:1st& 2nd Acts of AbhijnanaSakuntalam

UNIT –II : 3rd & 4th Actsof AbhijnanaSakuntalam

UNIT – III: 1stParicchedaof SahithyaDarpana .

UNIT –IV:2ndParicchedacomplete and Kavyabedhas in the 6thParicchedа.

UNIT –V : Prosody that occurs in the drama

TEXT BOOKS:

1) Kalidasa'sAbhijnanaSakuntalamIst Four Acts only. KalidasaGranthavali edited by AcharyaSitaramaChaturvedi. ChowkhambaVidyabhavan, Varanasi-1980.
2) Viswanatha's SahityaDarpanam (I,II Paricchedas and Sravyakavyabhedas in the VI Paricheda) with exhaustive notes by P.V. Kane, MotilalBanarasidas, Delhi, 1974.
3) Prosody that occurs in the drama

Outcomes: Student will be able to get

1. Understanding the features of Sanskrit drama
2. Knowledge of organ and development of Sanskrit dramas understanding the efficiency of kalida's poetic skill.
3. Get the knowledge of chandas et the knowledge of different types of chandas

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		3		3	3	3	3	3		3
CO 2	3	2		3		3	3	3	3	3		3
CO 3	3	2		3		3	3	3	3	3		3

Compulsory Foundation

SANSKT 105(A)	HISTORY OF SANSKRIT LITERATURE – 1	

Objectives –

1. To introduce to the history of Sanskrit literature
2. Create knowledge of importance of veda and its date
3. To know the meaning and cantents of Aitareya, Taittiriya, Gopada Brahmanas

Syllabus:

UNIT-I: 1) The Rgveda-General Description, Arrangement, Chronological DatainRg. Veda. Importance and Age of Rg Veda.The Religion and Deities of Rg Veda. The Secular Hymns,Mythological dialogues,Sayanacarya.

2) The arrangement and contents of AntharvavedaSamhita. Its origin and Relation with other Vedas.

3) TheYajurveda: SuklaYajurveda and Krishna Yajurveda. The Date and Contents, Arrangement of both the Vedas.

4) Sama Veda, its arrangement and contents.

UNIT-II : 1) Brahmanas. The meaning and contents of the Aitareya, Kausitaki,Pancavimsa, Taittiriya, Satapatha and gopatha Brahmanas. The religion and Social conditions as reflected in the Brahmanas.

2) TheAranyakas. The Contents and arrangement of the Aitareya andTaittiriyaAranyakas.

3) TheUpanisads. The fundamental doctrine of Upanisads. The Chandogya.Brhadaranyaka and Tattiriya Upanishads. Vedangas

UNIT –III: The Ramayana, Contents, Date and Importance

UNIT-IV: The Mahabharata Contents, Date and its relation with Ramayana.

UNIT-V: AstadasaPuranas – A Brief Study

REFERENCE BOOKS:

1) M. Winternitz. A History of Indian Literature Vol-I (Section I &II, pp 45 to 494) MotilalBanarasidas, Delhi -1990
2) AA.Macdonell. A History of Sanskrit Literature. MotilalBanarasidasPvt.Ltd., Delhi, 1990.

Outcomes: After completed of course the students are able to

1. Know the origin and development of Sanskrit literature know the importance of Vedas and its date.
2. Know the meaning and contest of Brahmanas, Aranyakas and Upanishads
3. Know the social conditions as reflected in the Brahmanas, know the importance of Ramayana and its date

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		3		2	3	3	3	3		3
CO 2	3	1		2		2	2	2	3	3		3
CO 3	3	1		3		3	3	3	3	3		3

Compulsory Foundation

ANSKT :105(B)	DRAMA AND POETRY -1

Objectives – 1

1. To introduce of features of Drama. Sentiment, Characterization and Moralities.
2. To know the importance of Rasa in Dramas. To know about Bhavabuti and his theory of Karuna Rasa.
3. To introduce the lyric poetry in Sanskrit and the important of Natures description.

SYLLABUS:

Unit- I - 1. First and second act in Uttara Ramacharitra
Unit- II- 2. Third act in Uttara Ramacharitra
Unit- III-3. Fourth act in Uttara Ramacharitra
Unit-IV-4. Slokas from 1 to 30 Meghasandesam
Unit-V – 5. Slokas from 31 to 55 end of the Purva Megha

TEXT BOOKS:

1. Uttara Ramacharitra of Bhavabhuti Chowkhamba Sanskrit pratishtham Post Box No.1069 Varanasi -1995
2. Meghasandesa of Kalidasa (Chowkhamba Sanskrit Vidya Bhavan Post Box No.1069 Varanasi -1995

Outcomes:

1. Students will be able to gain understanding the features of Drama, Sentiment Moralities. Through understanding the importance and place of Rasa in the Drama
2. The knowledge about the skillfulness of Bhavabhutis Dramatergy. Recognize the transpiration of human experiences into dramatic experiences
3. The knowledge about importance of Sandesa Kavyas in Sanskrit Literature

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		3		2	2	3	3	3		3
CO 2	3	1		2		2	2	3	2	1		3
CO 3	3	1		2		2	2	2	2	1		3

Compulsory Foundation

SANKT:105(C)	ALANKARA AND PROSODY - 1

Objectives:

1. To know the different types of Alankaras in poetry. To know the importance of Alankaras in poetry
2. The origin and development of Alankara on the basis of similes
3. To understand the Matra and Vrutta prosodies. Know the important of prosody in Sanskrit Literature

SYLLABUS:

Unit-1: From Upama to sahokti (1 – 20) in kuvalayananda

Unit-II From 21 to 40 Vinokti to Adhika

Unit-III From 41 to 60 Alpalankara to Arthantharanyasa

Unit-IV Chapter -I

Definition of Guru and Laghu.
Definition of yati and Pada
Definition of Sama, Ardha samavishama vritta
Definition of Dandaka

Unit-V Chapter – III

Anustup, Indravajra, Upendravajra, Shalinee, Upajati, Praharshni, Vamsastam, Thotakam, Bhujamgaprayatam, Rasoddtha, Vasanthathilaka and Malini

TEXT BOOKS:

1. Kuvalayananda of Appaya Dixita Chowkhamba Sanskrit series (post Box-1118) Varanasi – 221001
2. Vrittaratnakara of Bhattakedara Chowkhamba Sanskrit samstan Post Box-1139 Varanasi - 221001

Outcomes:

1. Students will understand the different types of Alankara. Know the importance of Alankara in the poetry
2. Understand the development of on the basis of similar
3. Recognize the Guru and Laghu in prosody. Know the importance of melogy through prosody

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	1	1	1	2		3
CO 2	3	1		2		2	1	1	1	2		3
CO 4												

Elective Foundation

SANSKT:106(A)	COMPARATIVE PHILOLOGY AND SIDDHANTA KAUMUDI- 1

Objectives: The aim of this course is to understand-

1. The classification of semantic change
2. The formation of words-semantic and suffixes
3. The awareness of morphology. The characteristics of vibhakthis and to know the number of roots

Syllabus:

UNIT-I: Introduction Classification of Languages

UNIT-II: Phonology Linguistic Change

UNIT-III: Samjna and ParibhashaPrakaranas

UNIT-IV: Ach and PrakrtibhavaSandhis HalsandhiPrakarana

UNIT-V: Visarga and SvadisandhiPrakaranas

TEXT BOOKS:

1) Comparative Philology, By T.K.RamachandraIyer RS.Vadhyar& Sons, Palghat 1999. (Units 1-2)
2) SiddhantaKaumudi of BhattojiDikshita, Vol.-I MotilalBanarasidas Pvt. Ltd., Varanasi, 1986. (Units 3-5)

Outcomes: After complication of the course students are able to-

1. Find out the main causes of semantic change
2. Know the classification of suffixes the theories on the origin of suffixes
3. Learn the morphological classification of verbs. Know the structure of vibhaktis and roots system and develops their writing skills without grammatical mistakes.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		1	1	1	2	3		3
CO 2	3	1		2		1	1	2	2	3		3
CO 3	3	1		3		1	1	2	2	3		3

Elective Foundation

SANSKT:106(B)	KAVYALANKARA SUTRA VRITTI -I

Objectives:

1. To know the definition and purpose of poetry
2. To know the different types Kavyangas. To know the definition and nature of riti.
3. To know the different types of Gadya and its subdivisions

SYLLABUS:

Unit-I : Adhikarana – I Adyaya – I
Unit-II : Adhikarana – I Adyaya – II
Unit-III : Adhikarana – II Adyaya – I
Unit-IV : Adhikarana – II Adyaya – II
Unit –V : Adhikarana –III Adyaya - I

TEXTBOOKS

1. Kavyalankara sutra vritti of Vamana, Chowkhamba Sanskrit series Post Box 138 Varanasi

Outcomes:

1. Know the definition of poetry and prose
2. Know the different types of Kavya
3. Understand the different types of Riti. Understand the Pada and Padartha Doshas

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		3		1	1	1	2	2		3
CO 2	3	1		2		1	1	1	2	2		3
CO 3	3	1		3		1	1	1	2	3		3

Audit Course

SANSKT:107	HUMAN VALUES AND PROFESSIONAL ETHICS -I

Objectives:

1. The importance of human values and professional ethics contemporary materialistic world.
2. The values embedded in BhagavadGita and classics. Suggestions of Budda by living through the noble truths and eight fold path
3. Name of the values good and bad ends and means. Actural and political values, Moral concept.

SYLLABUS:

1) Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.
2) Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.
3) Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)- Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).
4) Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths - Aryaastangamarga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.
5) Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Text Books:

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn,
4. Response Books:New Delhi.

5. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
6. Harold H. Titus: Ethics for Today
7. Maitra, S.K: Hindu Ethics
8. William Lilly : Introduction to Ethics
9. Sinha: A Manual of Ethics
10. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
11. SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
12. CarakaSamhita :Tr. Dr.Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
13. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
14. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.

Outcomes: After completion of the course students are able to –

1. Understand Bhagavad Gita as a guide for modern life style. Know the principles of Buddism and Jainism
2. Realize the necessary of practicing Human values and ethics in walks of life.
3. Acquire the knowledge of Good and Bad. Know the about crime and punishment according manu and Yajnavalkya

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		3	2	3	3	3		3
CO 2	3	2		3		3	3	3	3	3		3
CO 3	3	2		3		3	3	3	3	3		3

SEMESTER-II

Core Theory

SANSKT - 201	ELEMENTS OF DARSANAS –II

Objectives:

1. To make the students to know the upamana and sabda pramanas
2. To understand the Ayatharthanu Bhava
3. To know the knowledge of Bhavana

Syllabus:

UNIT-I: Upamana and Sabdapramanas (P 49-54)

UNIT-II: Ayatharthanubhava to the end of the text (P 56-64)

UNIT-III: Arthibhavana to VikalpeDoshattakam

UNIT-IV: VedasyaPramanavicarah to Kramanirupanam

UNIT-V: Sankhya School only

TEXT BOOKS:

1)Tarkasangraha of Annambhatta from Upamana to the end of the text(Units I-II)
2)Mimamsaparibhasha from Arthibhavana till the end of the text(Units III-IV)
3)SaddarsanaSamucchaya.Sankhya school.(Unit V)

Outcomes: After completion of the course students are able to –

1. Understand the knowledge of upamana and sabda pramanas
2. Get the knowledge of Ayatharthanu Bhava
3. Understand the Bahavana. Understand the Principals of Sankhya

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	2	3	2	2		3
CO 2	3	1		2		2	2	3	3	2		3
CO 3	3	1		2		3	1	2	3	3		3

Core Theory

SANSKT – 202	VEDIC TEXTS –II

Objectives:

1. To develop the knowledge of Vedic Suktas
2. To introduce the concept of Nirukta
3. To understand the meaning g of Vedic words through Nirukta

Syllabus:

UNIT-I: Indrasuktam (2-12), Parjanyasuktam (5-83)

UNIT-II:Kitavasuktam (10-34), Purusasuktam (10-90)

UNIT-III: Yaska'sNirukta. 1,2 Padas of the first Chapter

UNIT-IV3,4 Padas of the First Chapter

UNIT-V: 5,6 Padas of the 1st Chapter and1stpada of the 2nd Chapter

TEXT BOOKS:

1) A Vedic Reader for students by Macdonell(Units I-II)
2) Yaska'sNiruktam(1st Chapter and 1stPada of the 2nd Chapter) (Unit IIIto V)

Outcomes: Students will know-

1. The importance of Suktas
2. The definition and purpose of Nirukta
3. The meaning of Vedic words

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		1		2	3	3	2	2		3
CO 2	3	2		2		2	3	3	2	2		3
CO 3	3	1		2		2	3	3	2	2		3

Core Theory

SANSKT - 203	PROSE AND POETRY - II

Objectives:

1. To make the students to understand the prose kavya kadmbari
2. To know the importance of Kadambari in prose Kavyas
3. To make the students with knowledge of rhyme, meter and artha gaurava in Kiratarjuniya

Syllabus:

UNIT-I: Prabhatavarnanam, Sabaramrugayavarnanam, Sabarasainyavarnanam Sabarasenapativarnanam, SabaraCharitalochanam

UNIT-II: SukanasavarnanamHaritavarnanam

UNIT-III: Jabalyasramavarnanam, Jabalivarnanam, Sukasyavarnanam, Sandhyavarnanam, Ratrivarnanam

UN IT-IV:1-29 Slokasof Kiratarjuniyam

UNIT-V: 30-60 Slokas of Kiratarjuniyam

TEXT BOOKS:

1)BanaBhatta'sKadambariKathamukha from Prabhatavarnanam to Ratrivarnanam
2)Bharavi'sKiratarjuniyam 3rd canto only.

Outcomes: Students will able to get-

1. The beautification of prose literature.
2. Enhancement of knowledge in appreciation of classical poetry
3. Understanding about text that are selected. Teaching skills in prose and poetry.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12

CO 1	3	1		2		3	3	3	2	2		3
CO 2	3	1		2		3	3	3	2	2		3
CO 3	3	1		2		3	3	3	2	2		3

Core Theory

SANSKT – 204	DRAMA ALANKARA AND PROSODY – II

Objectives:

1. To introduce the importance of Sakunthala of Kalidasa in Dramatic Literature
2. To make the students to understand the importance and message of sakuntala
3. To introduce the knowledge on Alankara sastra

Syllabus:

UNIT-I: 5thAct of AbhijnanaSakuntalam .

UNIT-II:6th&7th Acts of AbhijnanaSakuntalam.

UNIT-III:9thUllasa of Kavyaprakasa.

UNIT-IV: 10th Ullasauptothe Arthantaranyasalankara

UNIT-V: Prosody that occurs in the Drama

TEXT BOOKS:

1) Kalidasa'sAbhijnanaSakuntalam. From V act to the end of VII Act, KalidasaGranthavali edited by AcharyaSitaramaChaturvedi. ChowkhambaVidyabhavan, Varanasi-1980.

2) Mammata'sKavyaPrakasa (IX ullasa and X ullasauptoArthantaranyasa are prescribed) with the Telugu commentary "Balanandini" by Prof. P. Sriramachandrudu, SamskrutaBhashapracharaSamiti. Hyderabad – 1995.
3) Prosody that occurs in the Drama.

Outcomes: Students will know-

1. The different characteristic features in Dramas
2. The importance of nature and hermitages
3. The features of Alankara and Classification of Alankaras. The knowledge of prosody

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		3		3	3	3	3	2		3
CO 2	3	2		3		3	3	3	3	2		3
CO 3	3	2		3		3	3	3	3	2		3

Compulsory Foundation

SANSKT –205 (A)	**HISTORY OF SANSKRIT LITERATURE –II**

Objectives: The aim of the course is to understand –

1. The definition of mahakavya and the other kavyas
2. The development of the drama literature
3. The origin and development of tales

Syllabus:

UNIT-I: Definition of Mahakavya, Pancamahakavyas.

1) Other Mahakavyas: Janakiharanam and Bhattikavya etc.
2)Khandakavyas: Meghandesa, Hamsasandesa of Vedantadesika.
3) Satakatraya of Bhartrhari, Gitagovinda and Saundaryalahari.

UNIT-II:Bhasa. His position in Sanskrit Literature.His plays.

UNIT-III: 1) Prose-The Origin of Prose, Dandi, Subandhu, Bana and later works.

2)Campu- Campuramayana, Bharatacampu&Visvagundarsacampu.
3) Historical Kavyas: Harsacarita, Navasahasankacarita, Rajatarangini, Vikranankadevacarita and Madhuravijayam.

UNIT-IV: Popular Tales: 1)TheBrhatkatha of Gunadhya. Kathasaritsagara of Somadeda. The Brhatkathamanjari of Ksemendra and Vetalapancavimsatika of Sivadasa.
2)Didactic literature: The Characterstics of Didactic literature. The Panchatantra and the Hitopadesa.

UNIT-V: The origin and Development of Sanskrit drama. The Dramas of Sudraka, Harsa, Bhattanarayana, Bhavabhuti, Visakhadatta, Murari and krisnaMisra.

TEXT BOOKS :

1) AB.Keith, A History of Classical Sanskrit Literature (Chapter I to XV) MotilalBanarasidasPvt.Ltd., 1996.
2) AB, Keith, The Sanskrit Drama. Oxford University press, Delhi.

Outcomes: After the completion of the course the students are able to-

1. Know the features of Mahakavyas

2. Know the structure of Drama and social message
3. Know the moral values through the tales. Get the glance of classical Sanskrit literature

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		3		3	3	3	3	3		3
CO 2	3	2		3		3	3	3	3	3		3
CO 3	3	2		3		3	3	3	3	3		3

Compulsory Foundation

SANSKT –205 (B)	**DRAMA AND POETRY - II**

Objectives:

1. To understand the Sandhis in Drama. To understand the definition of Nataka . To understand the purpose of Drama
2. To make the students study the texts of great play Wright across ages, in order to understand the artistic and literary values.
3. To understand the description geographical historic in Meghasandesam

Syllabus:

Unit-I : V act in Uttara Ramacharitha
Unit-II : VI act in Uttara Ramacharitha
Unit –III :VII Act in Uttara Ramacharitha
Unit –IV : Slokas from 56 to 80 in Meghasandesam
Unit – V : Slokas from 81 to 110 Meghasandesam

TEXT BOOKS:

1. **Uttara Ramacharitra of Bhavabhuti Chowkhamba Sanskrit pratishtham (Post Box No.1069 Varanasi -1995**
2. **Meghasandesa of Kalidasa (Chowkhamba Sanskrit Vidya Bhavan (Post Box No.1069 Varanasi -1995**

Outcomes:

1. Get knowledge of good. Know the character of Hero and Heroin etc., in the Drama
2. Know the changes stories between original and creativeness
3. Know the importance skill fullness in poetry of Kalaidasa

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		3		3	3	3	3	3		3
CO 2	3	2		3		3	3	3	3	3		3
CO 3	3	2		3		3	3	3	3	3		3

Compulsory Foundation

SANSKT –205 (C)	**ALANKARA AND PROSODY - II**

Objectives:

1. To know the eights types uktis
2. To understand the definition of Tadguna and Atadguna Alankara
3. To recognize the difference between pratishedha, Vidhi and Hethu Alankara

Syllabus:

Unit – I : From 61 TO 80 vikaswaralankara to unmilitha
Unit – II : From 81 to 100 viseshakam to Hethu Alankara
Unit – III : From 101 to 118 Rasavath Alankara to Sankara Sankara
Unit – IV : Shikharinee, Mandhakrantha, Sardhulavikriditham, Sragbhara, Utpalamala, Champakamala, Mattebham, Bhabrakam, Harinee, Kronchapada
Unit-V :Priyamvada, Prudhvi, Kokilakam, Malathi, Bhadrika, Sasikala, Narkurakam, Pushpitagra, Vagavathi, Dhrutamadhya, Gayatri

Text Books:

1. Kuvalayananda of Appaya Dikshita
   Chowkhamba Sanskrit series (post Box- 1118) Varanasi – 221001
2. Vrittaratnakara of Bhattakedara Chowkhamba Sanskrit samstan
   Post Box-1139 Varanasi – 221001

Outcomes:

1. Know the features and Examples. Understand the different types of Uktis in Alankaras
2. Know the difference between stuti and Ninda Alankaras

3. Get knowledge of sikharini and Mandakranta vrittas. Know the definition and importance of Gayatri Mantras

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		3		2	2	2	2	2		3
CO 2	3	2		3		2	2	2	2	2		3
CO 3	3	2		3		2	2	2	2	1		3

Elective Foundation

SANSKT - 206 (A)	**COMPARATIVE PHILOLOGY AND SIDDHANTA KAUMUDI – II**

Objectives: The aim of this course is to understand-

1. The classification of semantic change
2. The formation of words- semantic and suffixes
3. The awareness of morphology. The characteristics of vibhakthis and to know the number of roots

Syllabus:

UNIT-I: Semantics, Syntax Morphology

UNIT-II: Nominal Morphology Verbal Morphology

UNIT-III: PrathamaVibhakti to ChaturthiVibhaktis(from Karaka Prakarana)

UNIT-IV: Panchami and ShashthiVibhaktis

UNIT-V: SaptamiVibhakti, Prescribed Roots, Bhu. Edha, Ada, Asa, Hu, Man, Div, Jam, Sun, Tuda, Rudhir, Tanu, Dukrin and Cur.

TEXT BOOKS:

1) Comparative Philology. By T.K. RamachandraIyer, RS. Vadhyar& Sons, Palghat 1999. (I-II Units)
2) SiddhantaKaumudi of BhattojiDikshita, Vol-I and III MotilalBanarasidasPvt.Ltd., Varanasi, 1986. (III-V Units)

Outcomes: After complication course the students are able to –

1. Find out the main causes of semantic change. Know the classification of suffixes the theories on the origin of suffixes
2. Learn the morphological classification of verbs.
3. Know the structure of vibhaktis and roots system and develops their writing
   Skills without grammatical mistakes

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2		2	2	2	2	3		3
CO 2	3	3		2		2	2	2	2	3		3
CO 3	3	3		2		2	2	2	2	3		3

Elective Foundation

SANSKT -206 (B)	**KAVYALANKARA SUTRA VRITTI - II**

Objectives:

1. To introduce the Guna and Alankara. To acquire knowledge on the Sabda Gunas
2. To make the students to understand the Kavyatma
3. To enlighten the students in the Sabdalankaras

Syllabus:

Unit-1 : Adhikarana – III Adhyaya – II

Unit-II :Adhikarana – IV Adhyaya – I

Unit-III :Adhikarana – IV Adhyaya – II&III

Unit-IV :Adhikarana – V Adhyaya – I

Unit-V :Adhikarana – V Adhyaya – II

TEXT BOOKS

1. Kavyalankara sutra vritti of Vamana, Chowkhamba Sanskrit series Post Box 138 Varanasi

Outcomes:

1. Know the difference between Guna and Alankara

2. Ability to understand the theory of Riti. To enable to understand the usage of Sabdalankaras
3. Know the contribution of Vamana to alankara sastra

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2	1	2	2	2		3
CO 2	3	2		2		2	1	2	2	2		3
CO 3	3	2		2		2	1	2	2	2		3

Audit Course

SANSKT -207	HUMAN VALUES AND PROFESSIONAL ETHICS - II

Objectives: the aim of the course in to understand

1. The relevance of value based education the present day society
2. The medical ethics according to charaka samhitha and other ancient vaidhyas
3. The solutions of illregal practices and their solutions

Syllabus:

I. Value Education- Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem. Family values- Components,structure and responsibilities of family- Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

II. Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

IV. Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions. Characterics of ethical problems in

management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

V. Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

VI. Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

Text Books :

1.John S Mackenjie: A manual of ethics.

2."The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.

3."Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn,
Response Books:New Delhi.

4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haughton.
10. SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. CarakaSamhita :Tr. Dr.Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Education-Telugu Akademi, Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin&coJulundhar

Outcomes:

1. Understand the relevance of value based education in modern society
2. Understand the old traditions of medical ethics. Understand the solutions of illegal and unethical practice
3. Understand the man and nature, Natural calamities and get the solution regarding those situations.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		3	3	3	3	3		3
CO 2	3	2		2		3	3	3	3	3		3
CO 3	3	2		2		3	3	3	3	3		3

SEMESTR -III

Core Theory

SANSKT :301	(Sahitya) RASAGANGADHARA, (ANANA.I) – I (IE)

Objectives:

1. Know the definition of Rasa. Know the Kavya Lakshana & Kavya Prayojana
2. Know the different opinion of Alankarikas on Kavya Lakshana
3. Know the Kavya Bhedas and interpretation of Rasa sutra. Know the Bhavaabhasa, Rasabhasa Bhavodya, and Bhavasabalatha.

Syllabus:

UNIT-I: Introduction. Jagannatha's life and works. His Arguments for the Composition of Rasagangadhara (P 1-8).
Kavyaprayojana, Kavyalakshana, The Rejection of Mammata's andVisvanatha's definitions (P 9-26)

UNIT-II: Kavyahetus. (P 27-36) Kavyaprabheda.Jagannatha's View-
An Examination of Mammata's classification of poetry. (P 36-84)

UNIT-III:Rasasvarupa and Rasabhedas. Explanation (P85-96).
UNIT-IV:1) Bharata'sRasasutra
2)Rasasutra's interpretation according to Abhinavagupta
3)Bhattanayakas interpretation (P 96 -110)
UNIT-V:1) Rasasutra according to Navyas.
2)Rasasutra according to Parakeeyamata
3)Bhattalollata's interpretation (P 111- 124)
Rasasutra's interpretation according to Srisankuka and minor views (P 124-131)

TEXT BOOKS:

1) Rasagangadhara. ChaukhambaVidyabhavan, Varanasi edition (Units I - V)

Out comes: After the completion of the course students are able to

1. Understand the Rasaswarupa
2. Understand the purpose of Kavya and different types of Kavya
3. Know the interpretations of Rasa sutras and ten types of Gunas. Know the Abhasas

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2		2	2	2	2	2		3
CO 2	3	3		2		2	2	2	2	2		3
CO 3	3	3		2		2	2	2	2	2		3

Core Theory

SANSKT :302	DHVANYALOKA - 1

Objectives This course aims to -

1. Know the definition of Dhvani and its varieties. Know the opinions of Dhvanyabhavavadins
2. Know the kavyatma and classifications of Dhvani
3. Know the varieties of Avivakshitavachyadhvani.

Syllabus:

UNIT-I: 1-12 Karikas of Udyota I
UNIT-II:13-22 Karikas of Udyota I
UNIT-III: 1-4 Karikas of Udyota II
UNIT-IV: 5-6 Karikas of Udyota II
UNIT-V:7-13Karikas of Udyota II
TEXT BOOKS:

1)Dhvanyaloka of Anandavardhana, Kavyamala Series. MunshiramManoharalal
Publishers Pvt.Ltd., New Delhi, 1983. (Units I-V)

Outcomes: on completion of the course the students are able to -

1. Understand the Dhvani swarupam. Understand the opinion of Dhvanyabhavavadins
2. Know the Dhavanikavya Lakshana. Know the Vyangya as Kavyatma
3. Get the knowledge of splendid sastra Dhvanyaloka

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2		2	2	2	2	2		3
CO 2	3	3		2		2	2	2	2	2		3
CO 3	3	3		2		2	2	2	2	2		3

Generic Elective

SANSKT :303-A	KAVYAPRAKASA AND DASARUPAKA-1(IE)

Objectives:

1. The course aims to enable the students to know the definition of Kavya Different types of kavya
2. Understand the vruthis and the varieties of vyangya. Understand the arthavyanjana swarupam
3. Enable the students to know the characteristics of Drama.Understand the ten types of rupakas

Syllabus:

UNIT-I: 1st&2ndUllasas of KavyaPrakasa .
UNIT-II: 3rdUllasa of KavyaPrakasa.
UNIT-III: From the beginning to Sandhisamanyalaksana (P 1-19)
Dasarupaka Mukha and Pratimukhasandhis (P 20-35)
UNIT-IV: Garbha, Avamarsa and NirvahanaSandhis (P 36-63)
UNIT-V: The remaining portion of the first Prakasa (P 64-71)

TEXT BOOKS:

1) Mammata'sKavyaPrakasa (Ist three ullasas (1-3) are prescribed) with the Telugu commentary "Balanandini" by Prof. P. Sri Ramachandrudu, SamskrutaBhashapracharaSamiti. Hyderabad – 1995.

2) Dasarupakam of Dhananjaya. Edited by T.Venkatachary. The Adayar Library and Research Center. Madras. The First Prakasa only.

Outcomes: Students will get -

1. The knowledge of definition of kavya, types of kavyas
2. The Knowledge about verities of vyangya
3. The Knowledge of vyanjanaswarupa. An idea of ten types of Rupakas

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2	2	2	2	3		3
CO 2	3	2		2		2	1	1	2	3		3
CO 3	3	2		2		2	2	2	2	3		3

Generic Elective

SANSKT:303-B	HISTORY OF SANSKRIT POETICS ANDSANSKRIT ESSAY-I

Objectives: The course intends to -

1. Bring awareness on sentence formation, and essay writing skills
2. Bring awareness knowledge of famous Alankarikas
3. Acquire knowledge of Aesthetic theories – Alankara and Rithi. Acquire knowledge of vakrokti and Auchitya.

Syllabus :

UNIT-I: Sanskrit Essay

UNIT-II:&III: Aesthetic theories: 1. Alankara, 2. Riti, 3. Vakrokti and 4. Aucitya.

UNIT-IV: Authors: 1. Bharata, 2. Bhatti, 3. Bhamaha, 4. Dandin, 5. Udbhata, 6. Vamana, 7.Rudrata, 8.Anandavardhana, 9. Rajasekhara, 10.Kuntaka, 11. Abhinavagupta,

12. Dhananjaya, 13. Mahimabhatta, 14.Bhoja,
15. Ksemendra, 16.Mammata, 17.Ruyyaka,
18. Hemachandra, 19. Jayadeva, 20.Vidyadhara,
21. Viswanatha, 22. Jagannatha, 23.Appayya Dikshita

UNIT-V: Works: 1. Agnipurana, 2. Natyasastra, 3. Kavyalankara,
4. Kavyadarsa, 5. avyalankarasutravruthi,6.Kavyamimamsa,
7. Dhvanyaloka, 8. Dasarupaka, 9.Vyaktiviveka, 10.Sarasvati Kantabharana,11. Aucityavicharacharcha,12.Kavyaprakasa,
13. AlankaraSarvasva, 14. Kavyanusasana, 15.Chandraloka,
16. Ekavali, 17. Prataparudriya, 18.Sahityadarpana,
19. Rasatarangini, 20. Rasagangadhara

Topics for Sanskrit Essay:

1. Samskrutasyavaisistyam, 2. Vidyadhanam Sarvadhanapradhanam, 3.Ahimsaparamodharmah,
4. Gurubhaktih, 5.Silamparamabhusanam, 6. Strividya,
7. Nastyudyama Samobandhuh,

TEXT BOOKS:

1) History of Sanskrit Poetics by P.V.Kane, Bombay, 1923.

Outcomes: On completion of the course the students are able to -

1. Get the knowledge of sentence formation to write the essays on different issues. Acquire the knowledge of Alankarikas
2. Understand the different theories in Alankara sastra.
3. Understand the theory of Alankara and Rithi

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		3	3	2	2	2		3
CO 2	3	2		2		3	3	2	2	2		3
CO 3	3	2		2		3	3	2	2	2		3

Generic Elective

SANSKT:303-C	**Natyasastram Chapter I & VI only**

Objectives:

1. The work covers ancient Indian dramaturgy and histrionics, especially Sanskrit theatre. Bharata is considered the father of Indian theatrical art forms. The first chapter of the Nāṭyaśāstra gives a semi-historical and *purāṇic* account of the creation of the work. It gives an outlook of different theoretical and artistic mediums.
2. This is evident in the several deśi art forms which have evolved with regional variations based on the *mārga* set by Bharata.

3. The structural aspects of form such as lyrics, music and the language of gestures which are required to communicate the content to evoke an aesthetic experience (*rasa*) are all dealt with in detail in the Nātyaśāstra, i.e., it caters to both form and content. Moreover, it guarantees the fulfilment of the four-fold aspects of human-pursuit, i.e., the *puruṣārtha–s* धर्म, अर्थ, and काम, and also gives us a glimpse of the experience of Bliss (मोक्ष). Sixth chapter presents the Rasa theory.

TEXT BOOKS:

Natyasastra of Bharatamuni Edited by Pandit Kedaranath BharatiyaVidyaprakashan, Delhi, 1983

Syllabus:

Unit: I Chapter I – 1 to 42 Slokas
Unit: II Chapter I– 43 to 83 Slokas
Unit: III Chapter I – 84 to 128 Slokas
Unit: IV Chapter VI – 1 to 49 Slokas
Unit: V Chapter VI – 50 to 84 Slokas

Outcomes:

1. Students can able to understand Bharata subtly cautions connoisseurs about their responsibility of having a detached attitude while witnessing a play or any work of art in general. Emotional over-involvement and extrapolation of the incidents to everyday life will cause harm to both the art and the connoisseurs.

2. More philosophically, when the *bhava*s do not get elevated to the level of *rasa* in a connoisseur's mind due to his lack of maturity, art cannot be

enjoyed. It shows that the creation of such a great treatise was an outcome of combining different theoretical and artistic mediums.

3. Students can able to understand that Rasa is produced from a combination of विभाव (determinants), अनुभाव (consequents)and व्यभिचारिभावs (transitory states).

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2	2	3	3	3		3
CO 2	3	2		2		2	2	3	3	3		3
CO 3	3	2		2		2	2	3	3	3		3

Generic Elective

SANSKT:303-D	**Bhojaraja's Champu Ramayana (Balakanda only)**

Objectives:-

1. The course aims to enable the students to know the C.R.of Bhoja is one of the most popular kavyas of the champu type
2. To know for the beauty of expressions

3. To get the knowledge of Sanskrit language grammar. To know the most beautiful alankaras

TEXT BOOKS: Champu Ramayana of Bhojaraja, Chowkhamba Krishna Das Academy, Varanasi, Vikrama Era 2036

Syllabus:

Unit: I - 1 to21Slokas with Gadyam
Unit:II - 22 to 44 Slokas with Gadyam
Unit:III - 45 to 69 Slokas with Gadyam
Unit:IV - 70 to 94 Slokas with Gadyam
Unit:V - 95 to 117 Slokas with Gadyam

Out comes: Students will get –

1. The knowledge of advanced poetic and linguistic aspects of Sanskrit literature along with grammatical elements.
2. To good knowledge of Sanskrit language and grammar. Ability to understand simple spoken Sanskrit
3. The knowledge of alamkaras particulary noticeable are praasa and Yamaka which is the poet Bhoja manages to frequently, where the same sequence of syllable recurs in different worse (with of course different meanings)

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	2	3	2	3		3
CO 2	3	1		2		2	2	3	2	3		3
CO 3	3	1		2		2	2	3	2	3		3

Skill Oriented Course

SANSKT:304	**Personality Development in Pancatantra (Mitrabheda and Mitrapraptikam only)**

Objectives:

1. To know the importance of friendship
2. To get knowledge through stories of Panchatantra
3. To get world knowledge from Panchatantra. To know the valueof friendship

SYLLABUS:

Unit-I : Introduction of Neethikavyas- Personality development in Neethikavyas – Panchatantra

Unit-II : Stories from Keelotpativanara to Vishnurupadhruk – Kaulika

Unit-III : Stories from kaki – Krishna Sarpa to Matsyatraya

Unit-IV : Stories from chataka – Kunjara to choura Brahmana

Unit-V :(Mitraprapthikam) stories from chitragreeva vrutthanta to Vrushabhanuga srugala

TEXT BOOKS:Panchatantram by Sri Vishnu Sharma, Sanskrit Basha Prachara Samithi Hyderabad – 2007

Outcomes :1.Know the losses arriving out of Non friend ship
2.Know the world knowledge
3.Achieving personality development through Panchatantra

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		3	3	3	3	3		3
CO 2	3	2		2		3	3	3	3	3		3
CO 3	3	2		2		3	3	3	3	3		3

Open Elective

SANSKT:305-A	**Introduction of Sanskrit language Infant Reader complete**

Objectives:

1. To introduce the Sanskrit Alphabets and vowels
2. To know the consonants and consonants with vowels
3. To give the students with grammatical and conversational and Glossary etc., for a pleasant and quick study of Sanskrit.

Text Books: R.S.Vadyar& Sons Book- Sellers & Publishers Kalpathi – Palghat – 3, Kerala

Syllabus :

Unit-I : 1 to 8 lessons
Unit – II : 9 to 17 lessons
Unit – III :18 to 23 lessons
Unit – IV :24 to 29 lessons
Unit – V : lesson 30 only (Upadesamala Complete)

Out comes: student will be able to get

1. To know the Sanskrit Aalphabets and consonants
2. They can aware the difference of consonants and consonants with vowels
3. Get the knowledge of Sanskrit basic grammar and they can able to talk with simple Sanskrit language.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		1	1	2	2	3		3
CO 2	3	1		2		1	1	2	2	3		3
CO 3	3	1		2		1	1	2	2	3		3

Open Elective

SANSKT:305-B	Raghuvamsam (Ist canto only)

Objectives: The course aims to –

1. Create the knowledge of Sanskrit language. Know the purpose of poetry
2. Bring awareness on panchamahakavyas. Introduce the great poet mahakavi kalidasa.
3. Know the beautificfation of Alankaras through the wonderful depictions

Syllabus:

Unit – I : 1 to 20 slokas
Unit –I I : 21 to 40 slokas
Unit – III :41 to 61 slokas
Unit – IV :62 to 78 slokas
Unit – V :79 to 95 slokas

Text Books:

RaghuvamsaMahakavyam of Kalidasa
Chowkhamba Krishna Das Academy, Varanasi, 2002

Outcomes: on completion of the course the students are able to –

1. Understand the greatness of Sanskrit Language.Know the greatness of poetry
2. Get knowledge on panchamahakavya's after the epic literature
3. Get the knowledge about the kalidasas Natural and beautiful creations. Understand the uses of upamalankara by kalidasa

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2	2	3	2	3		3
CO 2	3	2		1		2	2	2	2	2		3
CO 3	3	2		2		1	2	3	3	2		3

SEMESTER - IV

Core Theory

SANSKT:401	(SAHITYA) RASAGANGADHARA(ANANA-I)

Objectives: The course is aimed to –

1. Know the number of Rasas and Sthayeebhavas
2. Know the names of Rasas. Know to knowledge of Gunas
3. Know the definition and Classifications of Bhava

Syllabus:

UNIT-I: Rasa Number. 9. Types.Santa as a Rasa, P.131-135.
1)Sthyibhavas, number, Definitions. III illustrations
2)The nature of Vibhavas(P 136-149)

UNIT-II: The Rasas of Srungara, Karuna, Santa, Raudra (P 150-162)
The Rasa of Vira, Adbhuta, Hasya, Bhayanaka, Bhibhatsa (P 163-191)RasanamVirodhavirodhacintaRasadoshas (P 191-215)

UNIT-III: 1) Gunanirupanam
2)Jagannatha's Views
3)Vamana, Dandi views on Gunas
4)Sabdagunas (P 216-235)

UNIT-IV: 1) Arthagunas
2)GunanamVyanjakarachana
3) RacanayamVarjaniyam
4) BhavadhvaniNirupanam (P237-287)

UNIT-V: 1) Bhavalakshana
2) 33Vyabhicharibhavas
3)Rasabhasa
4) Bhavasanti
5)Bhavodaya
6)Bhavasabalata
7)Asamlaksyakramadhvani can also sometimes be samlaksyakrama
8)Varnaracanadinamrasadivyanjakatvanirakaranam

TEXT BOOKS:

1) Rasagangadhara of Jagannatha. ChaukhambaVidyabhavan, Varanasi-6, 1970. (Units I - V)

Outcomes: After completion of the students are able to –

1. Know the number of Rasas in kavyas
2. Know the uses of Rasa to elevate the situations in kavya
3. Acquire the knowledge of Gunas and their role in Kavyas. Understand the differentiation of Bhava in Alankara sastra.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2	2	3	2	2		3
CO 2	3	2		3		2	1	2	2	2		3
CO 3	3	2		1		1	1	1	1	1		3

Core Theory

SANSKT :402	DHVANYALOKA –II

Objectives : The aims of the course is –

1. To introduce the different kinds of schools like Dhvani Rasa etc.,
2. To know the students the classification of Dhvani
3. To introduce the different kinds of Alankara Dhvanis

Syllabus:

UNIT-I: 14- 22 Karikas of Udyota II
UNIT-II:23-28 Karikas of Udyota II
UNIT-III:29-34 Karikas of Udyota II and 1- 4 korias of Udyota – 4
UNIT-IV: 5-6 Karikas of Udyota IV
UNIT-V:7-17 Karikas of Udyota IV

TEXT BOOKS:

1) Dhvanyaloka of Anandavardhana, Kavyamala Series. MunshiramManoharalal Publishers Pvt.Ltd., New Delhi, 1983. (Units I-V)

Outcomes: Students will be able to get-

1. The knowledge about different forms of schools. Knowledge about the classification of Dhvani Siddhanta
2. Knowledge regarding different alankara dhvanis. Know the difference between Rasadhvani and Rasavadalankara
3. Know the main Rasa in Ramayana and Mahabharatha

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3		2		1	2	2	2	2		3
CO 2	3	2		2		1	2	1	2	2		3

CO 3	3	3		2		1	1	1	2	2		3

Generic Elective

SANSKT:403(A)	KAVYAPRAKASA AND DASARUPAKA–II

Objectives the course is aims to –

1. Know the varieties of kavyas. The definition of Rasa and it's Bhedaas
2. The classification of Dhvani. Know the definition of Nataka.
3. Know the types of Natakas

Syllabus:

UNIT-I:4thUllasa from KavyabhedaNirupana to the end of Bhavasanthi.

UNIT-II: From Dhvanibhedasupto the end of 4thUllasa.

UNIT-III: From the beginning of the third Prakasa up to end of Prastavanangam (P 135-148) From verse No. 21 to the end of natakalaksana (P 140-153) Dasarupakam

UNIT-IV: Prakarana, Bhana, Prahasana and Dima (P 154-160)

UNIT-V: From Vyayoga to the end of the Prakasa (P 160-165)

TEXT BOOKS:

1) Mammata'sKavyaprakasa (IVth Ullasa only)
2) Dasarupakam of Dhananjaya (IIIrdPrakasa only)

Outcomes: After the completion of the course students are able to –

1. Understand the structure of the Kavya. Get the knowledge of Rasa and it's Bhedas
2. Find out the classification of Dhvani. Understand the Lakshana of Nataka.
3. Get the knowledge about 10 types of Nataka Bhedas

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		1	1	2	2	2		3
CO 2	3	2		1		1	1	2	1	2		3
CO 3	3	2		2		1	1	2	2	2		3

Generic Elective

SANSKT :403(B)	HISTORY OF SANSKRIT POETICSAND SANSKRIT ESSAY-II

Objectives The course intends to –

1. Bring awareness on essay writing skills
2. To know the essay writing on social related issues
3. To acquire the knowledge on Aesthetic theories. Know the *great* Aesthetic poets

Syllabus:

UNIT-I: Sanskrit Essay

Topics for Sanskrit Essay

1. Bharatiyasamskrutihi,
2. .Sanganakayantra'upayogah
3. Ahimsa paramodharmah,
4. Klesahphalena hipunarnavatamvidhatte
5. visvasanterupayah,
6. Gunahpujasthanamgunishunacha lingam nachavayah
7. Dharmorakshatirakshitah
8. Sada sathyam samacharet

UNIT-II: & III: Aesthetic theories: 1.Dhvani 2.Rasa 3. Kavyalakshana 4.KavyaPrayojanas

UNIT-IV: Authors: 1. Mahimabhatta,2. Bhoja, 3.Kshemendra,4.Mammata, 5. Ruyyaka, 6. Hemachandra , 7.Jayadeva, 8.Vidyadhara, 9. Viswanatha, 10. Jagannatha, 11.Appayya Dikshita

UNIT-V: Works: 1. Aucityavicaracrca, 2. Kavyaprakasa, 3. AlankaraSarvasva, 4. Kavyanusasana, 5.Chandraloka, 6. Ekavali, 7. Prataparudriya, 8.Sahityadarpana, 9. Rasatarangini, 10. Rasagangadhara

TEXT BOOKS:

1) History of Sanskrit Poetics by P.V.Kane, Bombay, 1923.

Outcomes: After the completion of the course students are able to –

1. Get the knowledge of writing skills. Understand the main theories on kavya of different poets

2. Acquire the knowledge of several Aesthetic poets like Mammata, Ruyyaka
3. Get the knowledge of presentation skills on social related issues

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		2	2	3	2	2		3
CO 2	3	1		2		2	2	2	1	2		3
CO 3	3	2		2		1	1	1	1	2		3

Generic Elective

SANSKT :403(C)	Kavyadarsa Chapter - I

Objectives:

The course intends to –

1. To bring awareness of different poetic devices
2. To know the purposes and sources of poetry
3. Create the knowledge of importance of Guna and Doshas, Sabdha and Artha and their role in a Kavya

Syllabus:

UNIT-I : from the beginning to KavyasyaTraividhyam
UNIT-II : from MuktakadeenamMahakavyangatvam to VaidarbhaGoudeya MargayohVivechanam
UNIT-III : from Dasagunas to sabdagramyatavivechanam
UNIT-IV : from Sukumaratagunanirupanam to kaantigunanirupanam
UNIT-V : from Varthabhidhanayohkantehnidarsanam to vaagupasana Mahatvam (end of first chapter)

TEXT BOOKS: Kavyadarsah by AcharyaDandin
Chowkhamba Krishna Das Academy, Varanasi, 2005

Out Comes:

1. After completion of the course students can get the kmowledge of theirty six types of poetic devices like shlesha, Prasada and Samata etc.,
2. Learn the classification of Kavya
3. Can aware the poetic diction (Marga) and their constituent excellence (Guna) and defects.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	2	2	1	2		3
CO 2	3	1		1		1	1	2	2	1		3
CO 3	3	2		2		1	2	1	1	2		3

Generic Elective

SANSKT :403(D)	KavyaMeemamsa first to Eight Adhyayas

Objectives:

The course intends to -

1. Bring awareness on Alankara literature to a system
2. To know the orgin of the Kavyapurusha. To know the literary traditions
3. To know some geographical names and the ancient notions regarding world geography find a lucid experession

Syllabus:

UNIT-I :1 to 3 adhyayas
UNIT-II :4 to 5 adhyayas
UNIT-III : 6 adhyaya only
UNIT-IV :7 adhyaya only
UNIT-V : 8 adhyaya only

TEXT BOOKS: Kavyameemamsa by Rajasekhara
Chowkhambavidyabhavan, Varanasi, 2010

Out comes: After completion of the course students will get-

1. To understand the Alankara literature. Get the knowledge of several traditions which are important in the history of Sanskrit literature.
2. Can get the knowledge of large number of geographical names ex., Jambudveepa situated in the center and its chief mountain is Mahameru
3. To know the number of mountains Rivers, Country names and their products.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		2		1	2	2	2	2		3
CO 2	3	1		1		1	1	1	2	1		3
CO 3	3	1		2		2	1	2	1	2		3

Multi disciplinary Course

SANSKT :404	Introduction to Epigraphy and Manuscriptology

Objectives: The course intends to –

1. Bring awareness on Inscriptions. To know the Epigraphically studies in India
2. To acquire the knowledge on Brahmi and kharoshthi scripts. Know the different kinds of manuscripts
3. Know the writing materials in Ancient India

Syllabus:

Unit – I:Epigraphy as source for the study of Indian History – History of Epigraphical studies in India - origin and antiquity of writing in ancientIndia

UNIT-II: The Brahmi script – origin and development, kharoshthi script – writing Materials – Palm leaf – Bhurjapatra- Stone etc.,

UNIT-III: Types of inscriptions and their general characteristics - Eras – Languages used innscriptions and manuscripts.

UNIT-IV : Kinds of manuscripts – preparations of manuscripts – writing instruments and Ink scripts used for Sanskrit language – pagination punctuation etc.,

UNIT-V : Preservation and cataloguing of manuscripts – Edition and critical edition of manuscripts

TEXT BOOKS:

1. Sircar.D.C : Indian epigraphy , Delhi 1965
2. Sivarama murthy. C.Indian Epigraphy and south Indian scripts, Madras, 1952
3. Dr.N.Krisha Reddy – Sasana parichayam (Telugu) Tirupati 1992
4. Gai G.S. Introduction to Indian Epigraphy Mysore, 1986
5. R.S.Sivaganesh Murthy: Introduction to manuscriptlogy, Sharada publishing House, Delhi, 1996

Outcomes: After the completion of the course students are able to –

1. Get the knowledge of inscriptions .Acquire the knowledge of Brahmi and kharoshthi scripts
2. Get the knowledge of writing materials in Ancient India
3. Get the knowledge of edition and critical edition of Manuscripts

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1		2		2	2	2	3	3		3
CO 2	3	2		2		2	2	2	3	2		3
CO 3	3	1		1		3	3	2	3	3		3

Open Elective

SANSKT :405 (A)	**Hithopadesa of Narayanapandita Mitralabha and Mitrabheda**

Objectives: The aim of this course is –

1. Intended to teach particularly in having moral instruction as an ulterior motive
2. To introduce ethical stories in Sanskrit
3. To get the knowledge through the stories even in childhood

Syllabus:

UNIT-I : Stories from Chitragreeva to Subuddhi

UNIT-II : Stories from Jaradgava to Chitrangada

UNIT-III : Stories from Keelotpativanara to DadhikarnaBidala

UNIT-IV : Stories from GhantaKarna – Kuttani to Gopi – Jaradgava

UNIT-V : Stories from Kaki – Krishasarpa to Samuda – Tittibha story.

TEXT BOOKS: Hithopadesa by Narayana Pandita
Chowkhamba Sanskrit series office, Varanasi -1999

Course Out comes: Students will be able to –

1. Get the moral values, Understand the mentality of different kinds of people in the society
2. Acquire the knowledge to behave a good citizen and a well human being
3. Understand the message through neetikavya

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	2	2	2	2		1	2	2		3
CO 2	3	3	2	2	2	2		1	2	2		3
CO 4												

Open Elective

SANSKT :405(B)	**Kautilya'sArthasastra Chapter – I (Vinayadhikarikam)**

Objectives

1. To know the king and his training the appointment of ministers and their officers of the state
2. The daily routine to be followed by the ruler and his safety and security.
3. To know valuable document which throws light on the state and society in india at the time of Kautilya

Syllabus:

UNIT-I : Vidyasamuddesa and vrddhasamyoga only

UNIT-II : Indriyajaya to Gudhapurushotpatti

UNIT-III : GudhapurushaPranidhi to Mantradhikara

UNIT-IV : Dutapranidhi to Rajapranidhi

UNIT-V : Nisantapranidhi and atmarakshitakam

TEXT BOOKS: Kautilya's Arthasastra Motilal Banarsidass, Delhi 1989

Course Out comes: After the completion of the course students are able to-

1. To know how to appoint of ministers for the development of the good society.
2. To get good personality development and to know safety rules
3. To get highly administrative skills.

CO-PO Mapping

Course Out come	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		3		3	3	3	2	3		3
CO 2	3	2		3		3	3	3	2	3		3
CO 3	3	2		3		3	2	3	2	3		3

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF SOCIOLOGY

Course

M.A. SOCIOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

Sri Venkateswara University

Department of Sociology

M.A. Sociology (Two year Programme-Four semesters)

Choice Based Credit System (with effect from the Academic year 2016-2017)

Programme Code (MASO)

About the Department

The Department of Sociology was started in 1971, as combined Department of Anthropology and Sociology with two teaching faculty, Prof. A.S.N. Murthy and Prof. M.S. N. Reddy and became in independent Department in 1975. At present, there are 2 Professors, and 1 Assistant Professor in the Department.

The Department offers three courses: M.A., M.Phil and Ph.D.Programmes to be abreast with social demands and keeping in view the social relevance the department makes selective choices of areas for teaching, research and extension. The Departmental Library has a good collection of over 600 books and an audio system.

The course curriculum is job / career-oriented offering electives in emerging and inter-disciplinary areas like Sociology of Development and Welfare, Medical Sociology and Environmental sociology Criminology. The Department has a 'Career Guidance Cell' catering to the career prospects of the student fraternity.

The students of III semester carryout field work by staying in the field by at least ten days for collection of primary data on a specific theme individually and also apply PRA techniques. They submit a Field Report at the end of the semester. Further, they prepare and submit a dissertation after the analysis of data.

Outreach and Extension have been important foci of the department. Many activities like awareness on social problems and blood donation, organization of blood grouping

activities and lectures on spiritual and moral values, etc., are taken up as part of both curricular and non-curricular aspects.

Regarding University-community interface the Department is collaborating with NGOs like RASS, Rise and PASS and also with TirumalaTirupatiDevasthanams, SVIMS, Physiotherapy, Nursing colleges.

The Department so far has successfully guided 82 Ph.Ds and 67 M.Phils. The Department has hosted 11 National Seminars 15 International webinars and 2 international conferences. The number of Department publications are 24 books and 261 articles in National and International Journals. The Faculty of the department have attended 272 International and National Conferences / Seminars.Two gold medals have been instituted in the department Prof. ASN Murthy Memorial Gold Medal is Awarded to the best outgoing student. Prof. Sepuri Bhaskar's Mother Smt. Narayanamma Memorial Gold Medial has been instituted for the outgoing women student.

Vision

- To promote the department as an institute of Advanced studies in sociology/ Applied sociology/ Center for multi-disciplinary social research.

Mission

- To undertake Trans-disciplinary teaching, empirical research and to launch more society oriented and outreach programmes as University Social Responsibility (USR)

Program Specific Objectives

PSO 1: To inculcate theory and practical knowledge together

PSO 2: To include Scientific zeal and enable them for Sociological enquiry

PSO 3: Conjeeture of Science and Social science Research Aptitude

PSO 4: To mould them with Trans-disciplinary understanding for lifelong learning

Program Objectives

- Ability to formulate Sociological insights with 'Think Globally and act Locally basis '
- Familiarity with Sociological Imagination and Methodology
- Articulating insights of tradition and transition towards Inclusive society and Development
- Analyse and Interpret Social facts with Science based Aptitude
- Articulate Trans-disciplinary knowledge effectively and efficiently to deal with crises situation

Program Outcomes

- PO 1. Broader Theoretical base
- PO 2. Investigate Social Facts
- PO 3. Value based Evaluation
- PO4. Dissemination of knowledge
- Po 5. Apttidue for project knowledge
- PO 6. To instil Social Zeal
- PO7.New or original work
- PO8. Conglomeration of science and social science
- PO9.Change in knowledge
- PO10.Change in Attitude
- PO11.Change in Practice
- Po12.Memorize and improvize

Programme Educational Objectives

- To gain knowledge about contemporary social problems and its causes, consequences and remedial measures.
- To introduce students to the basic social processes of society, social institutions and patterns od social behaviour
- Be able to effectively engage with and apply their " sociological imagination" to think critically about the social World and which separates sociology from other social science disciplines
- To help students acquire skills that will be useful to them in their personal and professional life.
- To provide basic and advanced theoretical as well as methodological knowledge of sociology for application.

SRIVENKATESWARA UNIVERSITY

DEPARTMENT OF SOCIOLOGY

(Revised Scheme of Instruction and Examination ,Syllabusetc, under CBCS Regulation – 2016

Is Amended as per NEP – 2020)

(With efect from the batch admitted in the academic year 2021-2022)

M.A. SOCIOLOGY

I – SEMESTER

Core Course	Name of the Course	Credit Hrs/ Week	No of Credits	Core / Elective	University / Exam-Marks	Internal marks	Total Marks
MASO101	Classical Sociological Theories	6	4	C	80	20	100
MASO 102	Sociological Research Methods and Statistics	6	4	C	80	20	100
MASO 103	Indian Society and Inclusive Growth	6	4	C	80	20	100
MASO 104	Participatory Research	6	4	C	80	20	100
MASO 105	Principles of Sociology	6	4	Comp	80	20	100
MASO 106	Nature Agriculture and Rural Livelihood (New Paper)		4	Elective	80	20	100
	Total	36	24		480	120	600
MASO 107	Human values and Professional Ethics – 1	0	0	Adult course	100	0	0

- **All Core papers are Mandatory**
- **Compulsory Foundation – Choose one paper2**
- **Elective Foundation– Choose one paper**
- **Audit course – 100 Marks (Internal) – Zero Credits under self-study**
- **Interested students may register for MOOC with the approval of the Concerned DDC but it will be**

considered for the grade as open elective only giving extra credits

II SEMESTER

Core Course	**Name of the Course**	**Credit Hrs/ Week**	No of Credits	**Core / Elective**	**University / Exam-Marks**	**Internal marks**	**Total Marks**
MASO 201	Applied Sociology	6	4	C	80	20	100
MASO 202	Social Demography	6	4	C	80	20	100
MASO 203	Rural Sociology and Development	6	4	C	80	20	100
MASO 204	Extension Work	6	4	C	80	20	100
MASO 205	Environmental Sociology	6	4	Comp	80	20	100
MASO 206	Media Education and Society (New Paper)		4	Elective	80	20	100
	Total	36	24		480	120	600
MASO 207	Human values and Professional Ethics - 1	0	0	Aduit course	100	0	0

- **All Core papers are Mandatory**
- **Compulsory Foundation – Choose one paper2**
- **Elective Foundation– Choose one paper**
- **Audit course – 100 Marks (Internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the Concerned DDC but it will be**

considered for the grade as open elective only giving extra credits

III SEMESTER

Core Course	Name of the Course	Credit Hrs/ Week	No of Credits	Core / Elective	University / Exam-Marks	Internal marks	Total Marks
MASO 301	Medical Sociology	6	4	C	80	20	100
MASO 302	Urban Sociology and Development	6	4	C	80	20	100
MASO 303	Field Work and Extension (Village placement)	6	4	C	80	20	100
MASO 304	Generic electives (a) Human Rights (b) Sociology of Gender (c) Gerontology (d) Sociology of Andhra Pradesh	6	4	G.E G.E	80 80	20 20	100 100
MASO 305	Open elective (a) Social Psychology and Personality Development (b) Business And Society	6	4	O.E	80	20	100
	Total	**36**	**24**		**480**	**120**	**600**

- **All Core papers are Mandatory**
- **Generic elective –choose two papers**
- **Multidisciplinary course is mandatory(MDC)**
- **Open elective are for the Students of other Departments. Minimum one paper should be opted. Extra Credits may be earned by opted for more number of open elective depending on the interest of the students through Self – Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC**

IV SEMESTER

Core Course	Name of the Course	Credit Hrs/ Week	No of Credits	Core / Elective	University / Exam-Marks	Internal marks	Total Marks
MASO 401	Criminology	6	4	C	80	20	100
MASO 402	Industrial Dynamics	6	4	C	80	20	100
MASO 403	Field Work	6	4	C	80	20	100
MASO 404	Generic electives (a) Social Welfare and Welfare Administration (b) Human values and professional Ethics (c) Sociological Perspectives (d) Globalization and society	6	4	G.E G.E	80 80	20 20	100 100
MASO 405	Open elective (a) Social Entrepreneurship Innovation and Start ups (New Paper) (b) Visual Sociology	6	4	O.E	80	20	100
	Total	36	24		480	120	600

- **All Core papers are Mandatory**
- **Generic elective –choose two papers**
- **Multidisciplinary course is mandatory(MDC)**

First Year (Ist semester)

MASO 101: Classical Sociological Theories (Core)

Objectives:

1. This paper seeks to expose the students to the classical thinkers and their contribution in building theoretical sociology.
2. To Compare and contrast the basic theoretical perspectives of sociology
3. To acquaint students with recent trends in Sociological thought.

Syllabus:

Unit-I :

Sociological Theory: Nature and Characteristics, Types of theories: Speculative and Grounded theories, Grand and Miniature theories. Macro and Micro theories, Middle range theories

Unit-II :

Beginnings of Sociological Thought: Auguste Comte: Hierarchy of Sciences, Law of Human Progress. Herbert Spencer: Theory of Evolution. Organic Analogy

Unit –III:

Emile Durkheim: Methodology of Social Sciences. Division of labour, Suicide, Social interpretation of Religion

Unit-IV:

Max Weber: Methodology, Values in Social Sciences, Types of Authority. Bureaucracy, Class, Status and Power. Religion and the rise of Capitalism

Unit-V:

Creativity and innovation, originality, Advancement of knowledge, Application to the society

References

- Aron, Raymond. 1967. Main Currents in Sociological Thought. Vol. I and II. Harmondsworth: Penguin Books.
- Bendix, R. Max Weber: An IntellectualPortrait.Bottomore, Tom,B- "Marxist sociology", in David L. Sills (Ed.). The International Encyclopaedia of the Social Sciences.Vol. 10. New York: Macmillan Company.
- Bottomore, Tom,B. 1965. Classes in Modern Society. London: George Alien andUnwin
- Collins, Randall. 1997. Sociological Theory. New Delhi:Rawat.
- Coser, Lewis A. 1996. Masters of Sociological Thought. New Delhi: Rawat Publications.
- Durkheim, Emile. 1938. The Rules of Sociological Method. New York: TheFree Press.
- Durkheim, Emile. 1947. The Division of Labour in Society. New York: The Free Press.
- Durkheim, Emile. 1961. The Elementary Forms of Religious Life. New York: CollierBooks.
- Durkheim, Emile. 1970. Suicide: A Study in Sociology. London: Routledge and Kegan Paul.

Outcomes

1. After the completion of this course the students will be able to know the classical thinkers and their contributions to sociology
2. Students also will get in depth knowledge and understanding of basic theoretical perspectives of sociology
3. Students will be sensitized towards recent trends in sociological thought

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	2	3	-	-	-	-	2	1	1	-
CO2	2	3	3	3	-	2	-	-	1	1	1	-
CO3	3	2	2	1	-	-	-	-	1	1	1	-

*1- Low, 2. Medium,3.-Strong

MASO 102: Sociological Research Methods and Statistics (Core)

Objectives

1. This course aims to enable the students to understand the fundamental nature of the scientific approach towards social research and apply the skills in undertaking social research.
2. To equip the students with strategies of development for different segments of society.
3. To provide ways and means of understanding and studying social reality

Syllabus:

Unit- I

Science and Scientific Method: Definition and Characteristics of Scientific Method. Applicability of Scientific method to Social Phenomena. Sociological Research: Meaning and Uses. Hypothesis: Meaning.Definition Functions and Types inter-relation between theory and research.

Unit –II

The Research Process: Major steps in Social Research. Research Design: Types of Research designs.

Unit-III

Quantitative Methods and Survey Research Sampling

Method: Types.

Probability Sampling: Simple Random Sample, Systematic Sampling Stratified Random Sampling, Multistage Cluster Sampling

Non Probability sampling: Purposive quota and snowball sampling

Collection data

Questionnaire-Advantages and limitations

Interview-interview schedule, advantages and limitations

Unit-IV

Qualitative research methods: Field Work Observation- Participant and non- participant. Case study, content Analysis.

Unit –V

Statistics- Definition Correlation and Causation.Karl Pearson's Coefficient of Correlation. Chi-Square Test- Characteristics, Degrees of freedom, Levels of Significance. Uses of Chi-Square Test.

Reference:

- Babbie. Earl.1989. The practice of social research Belmont: Wadsworth PublishingCompany.
- Barnes, John A.1979.Who should know What. Social Science, Privacy and Ethics. Harmondsworth:Penguin
- Beteille, A. and T.N.Madan.1975. Encounter and Experience: Personal Accounts of Fieldwork. New Delhi: VikasPublishingHouse
- Bosc, Pradip Kumar. 1995. Research Methodology. NewDelhi:ICSSR
- Bryman,Alan.1988. Quality and Quantity in Social Research. London: UnwinHyman
- Croxtan, Frederick E and Cowden, Dudly J.1969. Applied General Statistics, New Delhi:Prentice Hall of India (P)Ltd.
- Goode and Hatt,1952. Methods in Social Research,McGraw-Hill International BookCompany-London.
- Gupata,S.P.1991.Statistical Methods.in New Delhi:Sultan Chand and Sons.

Outcomes

1. After the completion of this course students will be able to understand the fundamental nature of the social research perspectives and Methods (both quantitative and qualitative research)
2. Students will be able to practice and apply the techniques and methods in the field situations as well as for data analysis
3. Students will be able to understand the social reality

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	-	3	3	3	3	3	3	-	3	3	2	-
CO2	-	2	2	3	-	2	3	-	2	2	1	-
CO3	-	2	-	2	3	2	3	-	2	-	-	-

*1- Low, 2. Medium,3.-Strong

MASO 103: Indian Society And Inclusive Growth (Core)

Objectives

1. This paper presents a comprehensive and integrated profile
2. To gain a better understanding of past and present structure and continuity of society
3. Identify and analyze the problems in Indian society and suggest solutions from sociological perspective

Syllabus

Unit-1

Approaches to the study of Indian Society – Archeological approach, Ideological approach, Ethical Approach, Sociological Approach, Religious approach. Distinctive characteristics of Indian Society, Linguistic diversity and Cultural diversity..

Unit-II

Family: Family and household. Family structure and composition.Types of family, Joint, Nuclear families. Changes in family

Unit-III

Marriage: Marriage as an institution. Rules of marriage .Forms of marriage. Challenges-Dowry, divorce, separation. Status of women in contemporary India.

Unit-IV

Social inequality .Origin and future of Caste system, Mahatma Jyothirao Pule Dr.BabasahebAmbedkar Life Skills Education

Unit-V

Inclusive Growth: Inclusive growth in India: Past performance and Future Prospects – Inclusive Growth – Strategy for more Inclusive Growth – Growth in Agriculture – Infrastructure and Energy – Public Expenditure on Education and Health care – Governance Issues.

Reference:

- De Souza ,P.R. ed. 2000 contemporary India –Transitions(New-Delhi:Sage)
- Dhanagare, D.N.1993: Themes and Perspectives in Indian Sociology (Jaipur, Rawat)
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- Madan , T.N1965. family and kinship: A study of the pundits of Rural Kashmir,Bombay:Asia PublishingHouse.
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Outcomes

1. After completion of this paper students will have comprehensive understanding of society
2. Students will able to better understand the past and present structures of society
3. Student will be empower to deal with these issues and to serve as Change agents both in Governmental and Non-Governmental organizations

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	-	2	-	2	-	2	2	-	2	2	2	1
CO2	-	2	-	3	-	2	1	-	3	2	1	1
CO3	-	3	-	3	-	-	-	-	2	2	1	1

*1- Low, 2. Medium,3.-Strong

MASO 104: Participatory Research (Core)

Objectives

1. This paper is to inspire students to undertake research in partnership with stakeholders
2. To explain the emancipatory and empowering, collaborative and reflective approaches
3. To discuss the relationship between PRA and scientific method to incorporate the results to change the practice and policy.

Syllabus

Unit-I

Origin of Participatory action research (PAR), Historical roots of Participatory Action Research,(PAR) Historical roots of Participatory Rural Appraisal (PRA), Foundations of Participatory Rural Appraisal (PRA), Principles of Participatory Rural Appraisal(PRA).

Unit-II

Participatory Action research, Conventional Research methodology differences, Participatory development, stages of Participatory development, CLTS (community led total sanitation)

Unit –III

Tools and Techniques of PRA: Mapping: Transect Walk, Village history, Social mapping, Resource mapping, Mobility map, Venn diagram (Chapati/Institutional)

Unit –IV

Ranking: Wealth/Wellbeing ranking, Pair wise ranking, Timeline, Problem analysis and problem prioritization, Hundred seed methods .

Unit-V

Voluntarism: NGOs and Development, Evaluation and Monitoring of Personal Project , Livelihoods Analysis.

References:

- De Silva G.V.S, N.Mehatha, A. Rehman and P. Wignarafa. 1979.'' Bhoomisena:Astruggle for people's power" Development Dialogue2:3- 70
- Mohd. AnisurRahman .1985" The theory and practice of participatory Action Research" in Orlando FalsoBorda (Ed), The challenge of social Change, SAGE pub,NewDelhi,1985.
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- Rossi, Peter H., Howard E. Freeman and Mark W. Lipsey. Evaluation: A systematic approach. SAG Publications, 2004. 7th ed.(reserve
- Stoecker, Randy. Research Methods for Community Change. Chapter 7. Thousand Oaks, SAGE Publications, 2007.(reserve)

Outcomes

1. After completion of this course the students will be able to undertake research in partnership with those affected by the issues
2. Students will be able to understand relationship between PRA and scientific method
3. Students can execute collaborative research approach by co-learning; promoting development; capacity building; and empowerment for desirable changes

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	-	2	-	2	3	2	2	3	2	2	1	1
CO2	-	-	3	-	2	2	-	2	2	2	2	1
CO3	-	3	3	2	3	2	-	2	3	3	2	1

*1- Low, 2. Medium,3.-Strong

MASO 105: Principles of Sociology (Compulsory foundation)

Objectives

1. This paper gives the students an understanding of the basic principles of Sociology as an academic discipline
2. To analyze the ways in which people interact and function in groups
3. It provides a basic knowledge on the fundamental aspects of the important social institutions

Syllabus

Unit- I

Sociology: Nature and Scope; Methods of Enquiry. Sociology and other Social Sciences.Human Society-Characteristics. Individual and Society: Mutual relationship.

Unit- II

Culture: Concept and Development, Concept of social system., Social structure and Function. Role, status, norms, values, power, authority and folkways.

Social movement, concept, causes and types

Unit- III

Personality and Social System.Significance of Heredity and Environment. Socialization: Concept, Growth and Development of Self. Theories of Freud, Mead and Cooley. Social Groups: Concept and Types

Unit- IV

Social Inequalities and Social Stratification: Dimensions of Stratification. Functional and Conflict analysis of social stratification. Social Control: Significance, Mechanism and Agencies.

Unit- V

Social change: Concept and Explanation. Factors of Social Change. Theories of Social Change: General Outlines of Evolutionism, Diffusionism, Functional and Conflict Schools.

References

- Bierstedt, Robert. *1971, Social Order. Bombay: Tata McgrawHill*
- Bottomore, TomB. 1975, *Sociology: A Guide to Problems and Literature.* London, The Macmillan PressLtd.,
- Davis, Kingsley. 1960. *Human Society.* New Delhi;Macmillan.
- Dube, S.C. 1971, *Explanation & Management of Change* New Delhi: Tata-MacgrawHill.
- Etzioni, A. &Etzioni (Ed.). 1964, *Studies in Social Change.* New York: Basic Books Inc.,Publishers
- Inkles, Alex. 1987. *What is Sociology?* New Delhi: Prentice Hall of India
- Jayaram.N. 1987 *Introductory Sociology*, New Delhi: Macmillan India Ltd.,
- Johnson, Harry M. 1995 *Sociology : A Systematic Introduction.* New Delhi, AlliedPublishers
- Lapiere, Richard, T. 1965 *Social Change, New York: McGraw - Hill Co.,*
- Maclver and Page.1959; *Society: An Introductory Analysis,* London, Macmillan.

Outcomes

1. After the completion of this course students will be well equipped with strategies of development for different segments of society
2. Students will have an understanding of dealing with self and Group living through the process of social information and interaction
3. Students will able to realize fundamental aspects of various social institutions

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	-	3	1	2	1	-	-	3	1	1	-	2
CO2	3	3	3	3	-	2	-	2	3	-	1	3
CO3	-	3	2	2	-	-	-	2	3	2	-	3

*1- Low, 2. Medium,3.-Strong

MASO 106: Natural Agriculture and Rural Livelihood

Objectives

- To improving the living standards of rural people by utilizing the easily available nature and human resources
- To assess the importance of natural farming and paradigm for the community
- To explain sustainable livelihood practices identify their strengths and weaknesses

Syllabus

Unit - I

Natural Farming – Principles of Agriculture, Nature of Agriculture, Seed to Seed, Zero budget, Organic Farming and Organic food, Diversification in Agriculture, Agro- farms

Unit – II

Organic Farming – Pure Organic farming Definition concept and benefits , Traditional Farming v/s modern farming, Government policies and Nature Agriculture, Green farming, A new way of farming, impact of Chemical fertilization in Agriculture , impact of Industrial Agriculture

Unit – III

Organic Manure- Compost Organic Manure, Rural compost, city compost, animal wastage vermin compost Liquid manure, Coco peat organic manure, Advantages of organic fertilizers Human manure Green manure.

Unit – IV

Rural Livelihood- Livelihood in Rural Areas - Definition, need for Improvement in livelihood opportunities, role of Organic culture, Animal Husbandry and allied sectors Improving Rural livelihood opportunities

Unit- V

Livelihood System

Rural Production system and Livelihood - Cropping Pattern, Economics of allied agricultural activities Dairy, Poultry Duck rearing, Sheep, Fishery, Horticulture, Flori culture, Sericulture, Honeybee, Production of Vegetables, Nurseries

References

- Anon, 2003 Green Revolution to Organic Revolution, Comprehensive Organic Community April. Pp.21-35
- DahamaAk, 2002, Organic Farming for Sustainable Agriculture, A gribios (India)
- Singh.GR 2001 Organic farming for sustainable Agriculture, Indian Farming. June
- Paramparagatkrishvikasyojana 2017
- Howard, Si Alberd, 1940 An Agriculture Testament, Research Round action for science. Technology and technology. New Delhi
- Sanlearam Ayala 2001, Organic farming Eco Technological focuses for stability and sustatnalaililty. Indian Farming June

Outcomes

- To promote the natural agriculture practices for better way of life
- Explain the livelihood concept and critically apprise the use of sustainable livelihood frameworks for rural livelihood analysis
- To levels of food security, income security, health, wellbeing, asset accumulation and high status in the community

CO-PO Mapping

Course	**PO1 Knowledge**	**PO2 Analysis**	**PO3 Design**	**PO4 Development**	**PO5 Modern tools**	**PO6 Society**	**PO7 Environment**	**PO8 Ethic**	**PO9 Teamwork**	**PO10 Communtation**	**PO11 Programme Management**	**PO12 Life long Learning**
CO1	3	2	3	1	2	3	2	2	-	1	2	3
CO2	3	-	2	2	2	2	3	1	-	2	1	3
CO3	3	2	-	2	-	3	2	2	1	1	2	3

*1- Low, 2. Medium,3.-Strong

MASO 107 - HUMAN VALUES AND PROFESSIONAL ETHICS

Objectives

1. To help students distinguish between values ,skills, and understand the need, basic guidelines, content and process of value education
2. To provide Human Values and Ethics relating to Religion, Business, Law, Media and Environment
3. To provide an in depth knowledge about the Moral and ethical values for interpretation in their day to day life

Unit-I

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment.Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

Unit-II.

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders. Character and Conduct

Unit-III.

Individual and Society:Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)- Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).

Unit-IV.

Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths - Aryaastangamarga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.

Unit-V.

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

References :

- John S Mackenjie: A manual ofethics.
- “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
- “ManagementEthics-integrityatwork’byJosephA.PetrickandJohn
- F. Quinn, Response Books: NewDelhi.

- “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
- Harold H. Titus: Ethics forToday
- Maitra, S.K: HinduEthics
- William Lilly : Introduction toEthics
- Sinha: A Manual ofEthics
- Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the India System of Duties: Religious and Civil(ed.)G.C.Haughton.
- SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77only.

Outcomes

1. After the completion of this course students will understand harmony at all the levels of human living,
2. Students will be able to know the importance of Ethics and Human Values in various professions.
3. Students also will get an in depth knowledge and understanding of moral values and ethical code of the Indian Society especially embedded in various scriptures.

CO-PO MAPPING

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	-	2	2	-	-	-	-	3	2	2	-	3
CO2	3	1	2	-	-	-	3	3	1	1	-	2
CO3	3	-	-	-	-	-	-	3	1	2	-	2

*1- Low, 2. Medium,3.-Strong

Books for study:

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the India System of Duties: Religious and Civil(ed.) G.C.Haughton.
10. SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. CarakaSamhita :Tr. Dr.Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.

15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education& Telugu Academic Hyderabad
16. C Sharma Ethical Philosophy of India. Nagin&coJulundhar.

Outcome Mapping: Semester - 1

CO/PO	PO1	PO2	PO3	PO4	PO5
CO 1	S	L	S	M	M
CO 2	S	L	S	S	M
CO 3	S	S	S	M	L
CO 4	S	S	M	M	L
CO 5	S	M	S	L	M
CO 6	M	M	S	L	L

*1- Low, 2. Medium,3.-Strong

First Year (IIndSemester)

MASO 201: Applied Sociology (Core)

Objectives

1. To help students develop clear understanding of key concepts in classical and contemporary sociology and how these concepts relate to some of the perennial themes in the discipline
2. To develop an appreciation of the link between sociological theory and practice
3. To help students master the art of explaining abstract material in clear, precise ways that can be easily understood even by a lay man

Syllabus:

Unit- I

Sociological Imagination-Understanding clients -communications – Research – Interpersonal skills, Critical thinking.

Unit- II

Sociologists work-What is Human services-Industries – private Organizations – Public Agencies – NGO's

Unit- III

Applied Sociologists – Man Made Disasters – Translational Role-communicating knowledge- General business skills – attention to detail – specialist knowledge in technical – commercial, industrial (or) scientific areas – Consultancy -Natural Disasters

Unit-I V

Distinguishing Academic and Applied Sociology-Creative Collaboration – Productive partnerships – professional Dent

Unit- V

Sociological practices -Clinical Sociology, social Engineering. Public Sociology, Jobs in Applied Sociology.

References

- Wade. Louise C. 1967. The Heritage from Chicago's Early Settlement Houses. Journal of the Illinois State Historical Society, 60:4,411-441.
- Nyden, Phillip, Leslie Hossfeld, and Gwendolyn Nyden. 2012. Public Sociology Research, Action, and Change.Sage.
- Steele, Stephen F. and Jammie Price. 2007. Applied Sociology: Terms, Topics, Tools, and Tasks. CengageLearning.
- Cragun, Ryan T., and Ronald Lawson. 2010. "The Secular Transition: The Worldwide Growth of Mormons, Jehovah's Witnesses, and Seventh-day Adventists." Sociology of Religion71(3):349-373.
- Lee, James, Vera Sanchez, Claudio G. and Yoko Baba. 2013 "Sunday Friends: The Working Alternative to Charity". Journal of Applied Social Science 7 (2):148-187.
- Onesimo Sandoval, J.S., Jennings, J. Rataj. M. and E. Klein. 2012. "Engaging Latinos in Access to Counseling and Education: An Applied Research Project to Understand Quality of Life Among Latino Immigrants in St. Louis, MO." Journal of Applied Social Science 7 (1) 24-41.
- Stanger-Hall, K. F., & Hall, D. W. (2011). Abstinence-Only Education and Teen Pregnancy Rates: Why We Need Comprehensive Sex Education in the U.S. Plos ONE, 6(10), 1-11. doi:10.1371/journal.pone.0024658
- Nichols, Laura, and Norma A. Winston. 2014. Undergraduate Students as Applied Sociologists: Community-Based Research Addresses Homelessness. Footnotes. April2014.
- Clark, Elizabeth. 1990 "Contemporary Clinical Sociology: Definitions and Directions." Clinical Sociology Review 8:100-115.
- Iutcovich. Joyce, M. 1997 Professionalization of Applied Sociology: The Role of Sociological Practice Organizations. In Directions in Applied Sociology (ed. Steele, S. and J.M. Iutcovich) p. 7-39: Society for AppliedSociology.

Outcomes

1. After completion of this course students can build a community in which they can support and encourage each other
2. Student will be able to master the key concepts and theories of the discipline
3. Students will be provided a foundation to build upon through additional reading and exploration

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communication	PO11 Programme Management	PO12 Lifelong Learning
CO1	-	3	2	-	2	2	-	2	3	2	-	2
CO2	3	2	3	2	1	2	-	-	3	2	-	2
CO3	3	2	2	1	1	2	-	2	2	1	-	3

*1- Low, 2. Medium,3.-Strong

MASO 202: Social Demography (Core)

Objectives

1. To introduce the significance of population and its relation to society
2. To provide a theoretical knowledge of the basic concepts of population and changes
3. To enable the students to realize impact of population , changing global scenario ,awareness on population control devices and analyse prospects

Syllabus

Unit- I

Social Demography: Nature and scope, Basic concepts - Fertility, Mortality, Fecundity, Migration, Sterility, Family size, Contraception. Sources of demographic data: Census, Vital statistics, National Sample Survey.

Unit- II

Population theories: Malthusian Theory, Demographic Transition Theory, Optimum Theory of population.

Unit -III

Components of Population change: Fertility, mortality and migration. Fertility: Factors affecting fertility, causes for higher fertility in developing countries. Mortality: Crude Death Rate, Infant Mortality, causes for mortality decline in India. Migration: Types of migration, causes and consequences of migration.

Unit -IV

Population problems: Population growth in India. Causes of population explosion in India.Problems of rapid population growth in India.

Population structure and characteristics: Causes of population explosion in India. Problems of Rapid population growth.

Unit-V

Family Planning in India- Achievements and failures. Population education, Need, importance, and objectives .

References:

- Bhende, Asha and Tara Kanitkar. 1978. Principles of population studies. Bombay: Himalayan Publishing House
- BogueDonald . 1969. Principles of Demography. New York: John Wiley &Sons Inc.
- Davis, Kingsley. 1951. *The population of India and Pakistan.* Princeton: PrincetonUniversity.
- SaxenaGB .*Indian population in Transition.*
- Thomlinson, Ralph. 1965. *Population Dynamics.* New York: Random House.
- Thomson, Warren :*PopulationProblems.*
- CICRED .*The Population ofIndia.*
- *Census of IndiaReports.*
- Hatcher Robert et al. 1997. *The Essentials of ContraceptiveTechnology,*

Baltimor: John Hopkins School of Public Health.

- Bose, Asish. 1991. *Demographic Diversity of India.* Delhi : B.R. Publishing Corporation.

Outcomes

1. After completion of this course students will realize the significance of population and its relation to society
2. Students will able to understand theoretical knowledge of the basic concepts of population and its changes
3. Students will be aware of training techniques to study population studies and population control devices

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO1	2	1	-	-	-	2	-	-	-	-	-	1
CO2	3	2	-	1	-	1	-	-	-	-	1	1
CO3	-	2	1	2	2	2	-	-	2	-	-	2

*1- Low, 2. Medium,3.-Strong

MASO 203: Rural Sociology and Development (Core)

Objectives

1. This course is to help the students to understand the difference between urban and rural development
2. To analyse the dynamics of rural Indian society in the context of its socio, political and economic contradictions
3. To evaluate the problems related to development in relation to the needs and aspirations of the marginalized sections

Syllabus

Unit-I

Concept of Rural Development, Basic elements of Rural Development and change Dilemmas in development: Rural V/S Urban Development, Agriculture V/S Industrial development – Barriers to development: social, economic, political, attitudinal and behavioral

Unit-II

History of Rural Development in India. Community Development Programmes. Type of Revolution, Land reforms, area approach programmes: IRDP, IAAP, HADP, TADP, DPAP. Target Group Approach Programmes: SFDA, MFDA, DWCRA, Antyodaya MNP, DDR, NREP, IWDP, Mudra

Unit-III

Problems of rural society: Poverty, Unemployment, Under Employment, Immigration, Agrarian Crisis, Farmer Suicide, Health care Services .

Unit-IV

Current Rural Development programmes: MGNREGS, CLDP, IWMP, RWSS , (Rural water supply and sanitation) INDIRAMMA NABARD

Unit-V

Rural Development Administration: Administrative Structure and functions, Role of NGO's, GOs, AIIB and ADB

References:

- Desai A.R.1984. Rural sociology in India .Bombaypopular
- Desai, Vasant.1991 Ruraldevelopment
- NIRD 1988 Rural development inIndia
- GR Madan Changing pattern of Indian Villages Chand &co Delhi1964
- NABARD Bombay ,NIRD Hyderabad , AMR-APARD,CRD
- Journal of Rural Development ,NIRDKurukstra

Outcomes

1. After the completion of this course students will able to know the nature and need of rural and urban development in India
2. Students will be exposed to analysis and evaluation of different types of planning and programs
3. Students will evaluate problems related to development in relation to the needs and aspirations of the rural and urban disadvantaged sections

CO-PO Mapping

Course	**PO1 Knowledge**	**PO2 Analysis**	**PO3 Design**	**PO4 Development**	**PO5 Moder n tools**	**PO6 Society**	**PO7 Environment**	**PO8 Ethic**	**PO9 Teamwork**	**PO10 Commutation**	**PO11 Programme Management**	**PO12 Life long Learning**
CO1	1	-	2	1	-	2	-	-	2	1	2	2
CO2	-	3	2	-	-	2	-	-	2	2	3	1
CO3	2	2	3	2	-	2	-	-	2	2	2	2

*1- Low, 2. Medium,3.-Strong

MASO 204: Extension work (Core)

Objectives

1. This paper expose the students to apply sociological theories and principles in field areas
2. To give direct experience of social institutions and social problems through field work
3. To train for creative and innovative experiences in social field using research techniques

Syllabus

Under this course, the students will be required to visit five of the Institutions mentioned below, study their structure and activities, carry out some extension work and submit a report (including some case studies) at the end of the semester:

- NGO
- Orphanages
- LeprosyHomes
- Hospitals
- WelfareHostel
- ShelterHomes
- Old ageHomes
- Other such Organizations/Institutions

Outcomes

1. After the completion of this course students will execute the theoretical knowledge and principles in field areas
2. Students will able to understand the role and importance of NGOs and other various social institutions in Field work
3. Students will able to analyze the process of socialization and group dynamics and gain Creative and Innovative experiences

IInd Semester First year paper IV

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO1	3	1	2	3	-	2	-	-	2	1	3	-
CO2	2	3	3	-	-	2	-	-	3	-	2	1
CO3	2	2	2	3	2	-	-	-	3	2	1	2

MASO 205: Environmental Sociology (Compulsory foundation)

Objectives

1. This paper aims to provide the students with a comprehensive conceptual, theoretical and empirical backgrounds of interaction between Social world and Nature
2. To explore the relationship between human society and the larger natural environment
3. To prepare the students for further research in broad areas of environment and natural resource governance from sociological perspective

Syllabus

Unit – I

Definition, Nature and scope of Environmental Sociology- Branches of Ecology - Plant, Animal and Human – Nature and Nurture relationship Community social Responsibility on Perishable and Non-Perishable resources

Unit – II

Environmentalism - Tribal and Forest Livelihood – Forest policy and Tribal development – Rural Livelihood – Social, economic and Environmental issues - Environment and Urbanization - Rural indigenous community – Local culture and environmental protection

Unit – III

Population Explosion and Ecological Imbalances – Climate change – Global Warming - Disaster Management – Natural Calamities –Environmental degradation Challenges, River linking projects – Sustainable energy – New and Renewableenergy

– Biomass –Pollution – Air, water, land, soil, radiation, ozone depletion, AcidRain

Unit – IV

Environmental Activism – Environmental crises Awareness – NGOs role – Gender, Caste, Land and Water use – SHGs in Eco-protection – Wasteland, Drought and Desert area development

Unit – V

Environmental policy and Management - State and Inter National agencies – National movements on environment - Bio - diversity Act - Information Building on Solar Power – Corporate Social Responsibility (CSR) – Naturopathy –Eco-Tourism, Environmental planning for sustainable development

References

- Binde N. Lohari, Environmental Quality and Management
- Centre for Science and Environment GOI, the State of India's environment
- David M. Meer, Society and population
- NithaBhalla, climate change threatens India's Economy food security
- Satishpandey ,A Journal of environmental Research and Development
- World Bank, Tourism and the Environment

Outcomes

1. After the completion of this course students will understand the social roots of environmental problems and social responses to the arising problems
2. Students will be able to recognize the relationship between social world and natural worlds
3. Students will be able examine the emergence of the concept of sustainable development and Resource Governance for better future

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	2	-	-	1	2	-	-	2	-	2
CO2	-	1	2	2	-	2	3	1	1	2	3	3
CO3	-	1	2	2	-	2	3	2	1	2	0	3

*1- Low, 2. Medium,3.-Strong

MASO 206 Media, Education and Society

Objectives

- To know the role of Mass Media in Higher Education
- To access the Teaching- Learning process with the use of various media
- To explore the educational broadcast towards the educational programmes

Syllabus

Unit-I: Introduction

Media: Definition, Nature, Scope, Basic concepts, components, Socio Logical approach to Mass media studies

Unit-II: Function of media and audience orientation

Function of Mass media – Manifest vs Latent functions, Mass media as an agent of social control Dysfunctional mass media

Audience orientation on Mass media – Active vs passive audience, the audio logical impact consequences of active audience, Auditions

Unit-III : Social constructionism and media

Social and Historical context- The intended message , the target audience , content analysis, the media as an agent of propaganda, Role of social media in shaping Social and Political world

Unit-IV: State and Central Governments - Higher Education

New Education Policy-2020-Roles and Responsibilities, Vision, Salient features, Recommendations, Functions, Schemes, Learning for all out comes, Andhra Pradesh state council of Higher Education (APSCHE), Transformational Reforms in Higher Education Systems

Unit-V: Educational Broadcast

Educational Broadcast- Meaning, Importance, All India Radio. Doordarshan, SwayamPrabha, Exploring Challenges for Participatory learning among students

References

- Biagi, Shirley (1993). Media/Reader: Perspectives on Mass Media-Industries, Effects, and Issues. Wadsworth Publishing Company
- C. Canton, Gregg Lee (1998). Empirical Approaches to Sociology: Classic and Contemporary Readings. (Second Edition)
- Conteau, David and Hoynes. William. (1997). Media/Society: Industries, Images and Audiences. Pine Forge Press
- IGNOU (2000). Course ES-318: Communication Technology for Distance Education, Post Graduate Diploma in Distance Education programme, New Delhi: IGNOU
- Paul N. (1968). School Television in India, New Delhi: All India Radio
- Rodman, George. (2006). Mass Media in a Changing World: History, Industry, and Controversy (1st Edition.) McGraw-Hill
- Satyanarayana, P. and Sesharatnam, C. (2000). Distance Education: What? Why? How? Booklinks Corporation, Hyderabad (India), pp: 95-96
- Wekesson, Carol (Editor), (1995). Violence in the Media. Green haven Press

Outcomes

- Towards Knowledge gain for various Mass Media Educational progammes
- Improve Teaching- Learning process with the use of various media
- Bring positive social change with respect to Education and sensitization

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	-	3	3	2	-	1	2	2	2	3
CO2	2	3	2	2	3	2	-	2	1	2	3	3
CO3	2	2	3	-	3	3	-	1	2	1	-	3

*1- Low, 2. Medium,3.-Strong

MASO 404b: Human Values and Professional Ethics-II

(Elective foundation)

Objectives

1. To provide knowledge about Value oriented education, Medical ethics, Family values , Ethics and Moral code
2. To provide the Business, Environmental and social ethics followed and practiced
3. To enhance values of self-esteem and self-respect among students

Syllabus

Unit-I

Value Education-Definition-relevance to present day-Concept of Human Values self-introspection- Self-esteem. Family values-Components, structure and responsibilities of family-Neutralization of anger-adjustability- Threats of family life-Status of women in family and society- Caring for needy and elderly - Time allotment for sharing ideas and concerns.

Unit- II

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals.Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit- III

Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions.Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit- IV

Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

Unit-V

Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

References

- John S Mackenjie: A manual ofethics.
- "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
- "Management Ethics - integrity at work' by Joseph A. PetrickandJohn F. Quinn, Response Books:NewDelhi.
- "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
- Harold H. Titus: Ethics forToday
- Maitra, S.K: HinduEthics
- William Lilly: Introduction toEthics
- Sinha: A Manual ofEthics
- Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.)G.C.Haughton.
- SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77only.

Outcomes

1. After completion of this course the students will be able to follow and practice good behavior with human values and moral support to their elderly
2. Students will be able to gain knowledge on Medical ethics and Business ethics, They also gain knowledge about the preservation of Environment, social ethics and the role of Print and Electronic Media in prevention and protection of Human Rights
3. To help students to be better Citizens and Professionals in real life

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	-	-	-	2	-	3	-	2	-	3
CO2	-	3	2	2	-	2	-	2	-	2	-	3
CO3	-	2	-	-	-	3	-	2	2	1	-	3

*1- Low, 2. Medium,3.-Strong

Books for study:

1. John S Mackenjie: A manual of ethics.

2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.

3. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.

4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.

5. Harold H. Titus: Ethics for Today

6. Maitra, S.K: Hindu Ethics

7. William Lilly : Introduction to Ethics

8. Sinha: A Manual of Ethics

9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haughton.

10. SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.

11. CarakaSamhita :Tr. Dr.Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.

12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.

14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.

15. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Education-Telugu Akademi, Hyderabad.

16. I.C Sharma Ethical Philosophy of India.Nagin&coJulundhar

Outcome Mapping: Semester - II

CO/PO	PO1	PO2	PO3	PO4	PO5
CO 1	S	S	S	M	S
CO 2	M	M	M	S	M
CO 3	S	S	M	S	S
CO 4	S	S	M	S	S
CO 5	S	S	M	S	S
CO 6	S	M	M	M	M

***L-** Low, **M-**Medium, **S-**Strong

Second Year (III rd semester)

MASO 301: Medical Sociology (Core)

Objectives

1. This course will help the students to understand the concepts of health and illness
2. To understand the social facts of health and the root causes of illness
3. To apply sociological theories, concepts, and research to experiences of health, illness, health education, public health and the intense public issues related to health

Syllabus

Unit – I

Medical Sociology - Nature and Scope – Functions of Medical sociologist - Lifestyle – Social Attitudes, Variables, class and Health – Medical Tourism

Unit – II

The Sick role - Basic needs like water, Nutrition, Hygiene and Sanitation – The Patient - Physician relationship – Labeling theory, Deviance, Stigma and Stress – Physiotherapy - Counseling

Unit – III

Methods in Socio – Medical Research - Interview Techniques – Non – directiveorunstructuredinterview–Focusedinterview–Repetitiveinterview Key informant interview – Rapid qualitative assessment techniques – Rapid rural appraisal – Rapid Epidemiological assessments – Rapid assessment using anthropological methods – RAP Methodology – Social marketing – Price – Operational research – OR in Health services – Social surveys, Case study and files study and Field study –Observation

Unit – IV

The Hospital as a social system - The Nurse practitioner – Emerging Para Medical practitioners –Health care services delivery by the state of Andhra Pradesh

Unit – V

Pain and Behavior Therapy – Welfare of the Disabled–OrganandBodydonation-Naturopathy

References

- Bird, Chloe E.; Conrad, Peter; and, Fremont, Allen M. (2000). Handbook of Medical Sociology (5th ed.). Upper Saddle River, NJ: Prentice Hall. ISBN 978-0-13-014456-0. OCLC42862076.
- Charles C. Ragin, Constructing Social Research: The Unity andDiversity of Method, Pine Forge Press, 1994, ISBN0-8039-9021-9
- Childhood Mortality and Health in India. Source: Institute of Economic Growth University of Delhi Enclave North Campus India by Suresh Sharma. Retrieved 2011-09-20.
- Cockerham. William C. 1978. Medical Sociology. Prentice Hall inc, New Jersey, USA
- Conrad, Peter (2007). The Medicalization of Society: On the Transformation of Human Conditions into Treatable Disorders. Baltimore, MD: Johns Hopkins University Press. ISBN 978-0-8018- 8584-6. OCLC72774268.
- Earl Babbie, The Practice of Social Research, 10th edition, Wadsworth, Thomson Learning Inc., ISBN 0-534-62029-9
- European Commission, The Leader approach — A basic guide, Luxembourg: Office for Official Publications of the European Communities, 2006, ISBN92-79-02044-7
- Glenn Firebaugh, Seven Rules for Social Research, Princeton University Press, 2008, ISBN978-0-691-13567-0
- Hardy, Paul A. J. (1997). Chronic pain management: the essentials. U.K.: Greenwich Medical Media. ISBN1-900151-85-5.
- Helman, Cecil (2007). Culture, Health, and Illness (5th ed.). London, England: Hodder Arnold. ISBN 978-0-340-91450-2. OCLC74966843.

Outcomes

1. After completion of this course students will be able to understand the concepts of health and illness
2. Student will be able to understand the social roots of sickness and sick role
3. Students will be able to explore the economy of medicine and how health care system does more than just heal but also serves as a tool for social development

III[nd] Semester Second year paper I

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	2	-	-	3	-	-	2	2	-	2
CO2	3	2	1	-	-	2	-	-	2	1	-	2
CO3	3	2	1	-	-	3	-	-	2	1	-	2

-

*1- Low, 2. Medium,3.-Strong

MASO 302: Urban Sociology and Development (Core)

Objectives

1. This paper attempts to analyse the urban social world and its dynamics, various theoretical constructs concerning the patterning and growth of towns and cities
2. To understand the various theoretical approaches to urban development and apply them to different aspects of cities
3. To study historical, economic, and political trends that have affected the growth and development of cities

Syllabus

Unit-I

Introduction to Urban Sociology: Nature, Scope, Growth and importance of study of Urban Sociology. Rural-Urban differences and continuum, Urban Community and spatial dimension: Park, Burgers.

Unit-II

Urban Social structure: Urban centers- Traditional and modern: Marriage, Family, Kinship, Caste, Religion in Urban; Changing occupational structure.

Unit –III

Urban social process: Urbanism- concept, causes and consequences: origin and development of cities: classification of cities: Urban ecology-concept andprocess: Urbanism as a way of life.

Unit-IV

Urban Social Problems: Unemployment, poverty, slums, drug addiction, environmental degradation, pollution, crime, prostitution, street children, gambling, alcoholism, child labor, beggary.

Unit-V

Urban Planning and Development: Factor affecting planning. Panicles. Principles, Programmers and consequences: barriers to Urban Development NGOs and Urban Development.

Reference:

- Abrahamson, M.1976. urban sociology. Eaglewood: PrenticeHall.
- Bharadwaj, R.K.1974. Urban Development in India. National Publishing House.
- Bose Ashish, 1978. Studies in India Urbanization 1901-1971, TATA McGraw Hall.
- Castells, M.1977. The Urban Question. Arnold London.
- Coiling Worth, J.B. 1972. Problems of Urban Sociology. Vol. VII, George and UnwinLtd.
- Desai A. R. and PillaiS.d.(ed) 1970. Slums and Urbanization. Popular Prakashan, Bombay.
- Gold, Harry. 1982. Sociology of Urban Life. Prentice Hall Englewood cliff.
- Howard. S.Becker. 1996. Social Problems – A Modern Approach, Printed in United States of America.
- Madhan, G.R. 1987. Indian Problems, Allied Publishers, Hyderabad ,Bangalore, Chennai
- And New Delhi.
- Mishra, V.S.2009, EnviranmentalDisasterandlaw, APH Publishing Corporation, New Delhi.

Outcomes

1. After completion of this course students can recognize the reasons of people living in towns and groups based on their race, ethnicity, and social class
2. Students will be able to develop a critical outlook on the process of urbanization and its implication on developing countries
3. Students will be able to identify the role of the caste and class in shaping social interactions, and how space is related to mechanisms of both formal and informal social control

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	1	2	1	-	-	-	2	1	-	2
CO2	3	1	-	2	-	-	-	-	2	1	-	1
CO3	-	-	-	3	-	-	-	-	1	1	-	-

*1- Low, 2. Medium,3.-Strong

MASO 303: Field Work And Extension (10 days placement) (Core)

Objectives

1. This paper aims at direct exposure of students to the real world and problems confronting society
2. Students will carry out field work in village for 10 days for practical experience
3. To learn about sociological study techniques like Participatory Rural Appraisal, Sampling, Interview and Extension

Syllabus:

The student will carry out field work for at least 10 days in a village/town to collect primary data on a specific problem under the personal supervision of one or two faculty . During the course of field work the students will also under take extension work in the field area and apply any one of the participatory research techniques learnt in course

The students will prepare a field report with details of field work, sampling methods data collecting techniques , profile of the field area extension work carried out and the participatory research techniques applied .

At the end of the course, the students will appear before a viva voce Board as specified under the scheme ofvaluation.

Outcomes

1. After completion of this paper students will able to realize the difference between theoretical position and real problems in society
2. Students will be able to learn new skills and communicative skills in professional manner
3. Students will be able to analyze social problems and suggest solutions and strategies to resolve conflicts through data analysis and report writing

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	-	3	2	2	1	1	-	-	3	2	2	1
CO2	-	2	3	2	1	2		-	2	1	1	2
CO3	3	2	2	2	2	-	-	-	1	-	-	-

*1- Low, 2. Medium,3.-Strong

MASO 304: General Electives (Any two)

MASO 304a: Human Rights

Objectives

1. To study Human rights and Constitutional framework
2. To recognize the role of human rights in development, theories of development, development and tradeoff on human rights
3. To Understand the social, political, cultural, and comparative construction of human rights history , institutions, discourses, and futures

Unit -I

Nature and scope of Human Rights; types- Natural civil and political importance of study of Human Rights, limitations of the study of Human Rights.

Unit- II

Evolution of Human Rights - Magna Carta, Bill of Rights in England, American Bill of Rights, U.N. Charter, Universal Declaration of Human Rights in India.

Unit-III

Human Rights and Constitutional Framework - Preamble, Fundamental Rights, Directive Principles, Fundamental Duties, Protection of HumanRightsAct(l 993).

Unit- IV

Role of Human Rights in Development, Theories of Development, Development and trade off on human rights. Rights of disadvantaged groups: Problems of rights of dalits, OBCs, Minorities, children andwomen.

Unit- V

Human Rights Education - Need for Human Rights Education.Promotion of positive social attitudes. Global efforts- Role of Advocacy Groups- National Human Rights' Commission, State Human Rights Commissions. Role of Universities and NGOs in Human Rights Education.

References

- Bajwa, G.S. Human Rights in India implementation and violation, annual publication, New Delhi- 1995.
- Bhalla, S.L. 1991. Human Rightsj an Institutional Framework for Implementation. Doctashelf.
- Baxi, Upendra(Ed.). 1987. *The Right to be Human.* New Delhi: Lancer International.
- Chandana U; Human rights. Allahabad law agumen publication Allahabad 1999.
- Gokulesh Sharma; Human rights and social justice development and dep publication1997.
- Haragopal, G. *Course Material for P.O. Diploma in Human Rights, 5* Vo Is. 1998. Hyderabad, Centre for Distance Education, University ofHyderabad.
- ILO. 1970. Trade Union Rights and their relation to Civil Liberties. Geneva: Vijapur, Abdul P. and Kumar Suresh. 1999. *Perspectives on Human Rights.* New Delhi: ManakPublications.

Outcomes

1. After the completion of this course students will able to understand the significance of Human rights and Fundamental rights with in the constitution
2. Students will able to recognize the violation of human rights on disadvantaged groups and developmental aspects
3. Students will be able to understand social, political, cultural, and comparative construction of human rights through Human rights Education

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO 1	-	-	1	-	-	-	-	-	1	1	-	-
CO 2	3	2	-	-	-	--	-	-	-	-	-	-
CO 3	-	2	-	-	-		-	3	-	2	-	-

*1- Low, 2. Medium,3.-Strong

MASO 304b: Sociology of Gender

Objectives

1. To examine how society influences understandings and perception of differences between masculinity (what society deems appropriate behavior for a "man") and femininity (what society deems appropriate behavior for a "woman").
2. To understand influences of gender on identity and social practices.
3. To pay special focus on the power relationships that follow from the established gender order in a given society and changes over time.

Syllabus

Unit –I

Concept of Gender, Nature, Biology, culture and Gender. Sexual division of labour, Gender roles and Gender role attitudes. Women and House work. Character sticks of Housework. Multiple roles and role conflict.

Unit- II

Feminist perspectives. Varieties of feminism:

Liberal Feminism: JS Mill,Betty Freidan Social

feminism : Julit Mitchell ,Alison Jagger

Radical feminism: Kate Millet, Shulamith Firestone

Unit- III

Socio-economic problems of women in India: Gender Gap in Indian census. Gender discrimination, Women Education, Dowry, Female infanticide. Atrocities of women: Domestic violence, forms of violence against women: Physical violence, Sexual violence, Emotional violence – Sexual harassments at workplace.

Unit- IV

Impact of violence against women: Physical, Sociological, Psychological, Economical impact and Health impact.

Unit –V

Empowerment and Development of women in India. Strategies for empowerment: Education, Economic, Political, and Health impact, Women's Commission: National and A.P state; Programmes for women Development; Central and A.P state (current progremmes) , Role of women in technology.

References:

- Bhasin Kamala, Understanding Gender, Kali for Women, New Delhi,2000.
- BasuAparna, Women's Education in India in Ray and Basu (edt): From Independence Towards Freedom , OUP,1999.
- ChodhuriMaitreyee, Feminism in India,Women Unlimited, New Delhi, 2004.
- Chakravarty Uma, Gendering caste through a feminist Lense ,Stree, Calcutta,2003.
- Courting Disaster , PUDR Report,2003.
- Davis Kathy, Evans Mary, Lorber, J (edt), Handbook of Gender and Women's Studies ,Sage Publication , UK,2006.
- DelamontSara,FeministSociology,SagePublications Ltd,2003.
- Radha Kumar, History of Doing, Kali for Women, New Delhi,1992.
- RegeSharmila,Sociology of Gender , Sage Publications, New Delhi,2003.
- 16. Wharton A. S,Sociology of Gender , Blackwell, 2005

Outcomes

1. After the completion of this course students will be able to differentiate how society influences our understandings and perception between masculinity and femininity
2. Students will able to understand the influences of gender on identity and social practice
3. Students will be able to examine the power relationships that follow from the established gender order in society and changes over time

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	1	-	-	2	-	-	-	1	1	2
CO2	-	1	1	-	-	2	-	-	-	1	-	2
CO3	-	2	1	-	-	2	-	-	1	1	-	1

*1- Low, 2. Medium,3.-Strong

MASO 304c: Gerontology

Objectives

1. This paper aims at understanding physical, psychosocial, and cultural aspects of the aged
2. To understand aging transitions and intergenerational issues at various contexts and its nexus
3. To examine health and illness adjusting to loss and care of persons with chronic illnesses and rehabilitative needs

Unit-I: INTRODUCTION

Aged-Definition, Concept, Nature, Scope and Dimensions, Trends and patterns of Ageing-Global and Indian Scenario. Structural, Functional and Conflict Perspective, Engagement Vs Integration Role Theory's, Biological and Sociological Theories

Unit-II: The Aged and Society

Factors of Ageing Social Life- Span and Successful Ageing, Life Style of the Aged, Religiosity of the Aged, Social Adjustment in Old aged, Changes in the family and Ageing.

Unit-III: Problems of Ageing

Factors of Ageing- Problems of Ageing, Problem of Coping with Ageing for Retirement Salaried People, Elderly Abuse, Aged people in organized and unorganized Sector.

Unit-IV: Adjustment in Later Life

Caregivers: The informal support and it's relevance in later life, Living arrangements of the Elderly, Retirement, Reemployment and leisure Facilities.

Unit-V: Programmes and Policies of Ageing

Role of the State Policies and Programmes for the Aged in India, role of NGOs, National Policy on Aged.

References:

- Biswas SK(ED) 1987 Ageing in contemporary India. Calcutta; Indian AnthropologicalSociety.
- Bhatia, PC (ED) 2000 Lecture – series in Geriatrics, New Delhi: National Institute of PrimaryHealth.
- Choudary S.K(ED) 1992. Problems of the Aged and Old age Homes, Bombay; AksharPratiroop Ltd.
- Dhillon, P.K. 1992. Psycho-Social Aspects of Ageing in India, New Delhi:Concept Publishing Company.
- Indira Jai Prakash (ED) 1991. Quality Aging Collocated Papers, Varasnasi: Association of Gerontology.
- Kumudini, Dandekar. 1996. The Elderly in Indiaa, New Delhi, Sage.
- Mthayya B.C and M Annesuding, 1992. Rural aged: existing Conditions,. Problems and Possible interventions- a study in Andhra Pradesh, Hyderabad, National Institute of Rural Development.
- Sati P.N.1987. Needs and the Problems of the Aged; Udaipur: Himanshu Publishers.
- Sharma.M.L and T.M.Dak.1987. Ageing in India, Ajantha Publications New Delhi.
- Vijayakumar, S: 1991. Family life Socio-Economic problems of the Aged, New Delhi: Asish Publishing House.
- Rao K.S 1994. Ageing, New Delhi, National Book Trust ofIndia.
- Sati P.N 1987.Needa and Problems of the aged. Udaipur, Himanshu Publishers. Soodam, K.S., 1975.Ageing in India. Calucutta; T.K. Mukherjee Minerva Association(Pvt.)Ltd.,

Outcomes

1. Students will be able to realize the importance of the multidisciplinary focus on gerontology
2. After completion of this course students will able to understand development and appreciation of interdisciplinary strategies
3. Students will able to understand various policies and programs related to Elderly

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	2	2	2	-	-	2	-	-	1	2	2	2
CO2	1	2	-	2	-	2	-	-	-	2	-	2
CO3	1	2	3	-	-	2	-	-	-	-	2	2

MASO 304.d: Sociology of Andhra Pradesh

Objectives

1. This paper aims to study the historical outline and emergence of Andhra society
2. To understand the culture and various social movements in Andhra Pradesh
3. To analyze the welfare and developmental programmes of the rural and urban Andhra Pradesh

Syllabus

Unit-I

Profile of Andhra Pradesh: Historical outline of Andhra Society; Emergence of A.P; Ecological and regional facts of AP.

Unit-II

Culture and Society: Telugu Language and culture, population of AP., Tribal Communities and culture in AP, Social Stratification in AP.

Unit-III

Social Movements in Andhra Pradesh; Social reform movements: Anti arrack movement, Peasant Movements, Political Movements : Freedom struggle in AP. Telangana Armed struggle, Naxalite Movement, Separate Telangana Movement, Jai Andhra Movement, Rayalaseema Movement. Political parties and ideologies in AP

Unit-IV

Welfares and development: Rural Development Programmes, Development of urban poor, various programmes for the welfare of weaker sections and minorities. Contemporary development issues, JanmaBhoomi, Women Empowerment ,Self help groups and Development, Special programmes for poverty alleviation.,

Unit-V

Meaning, causes and consequence of social tensions.Regional disparities and tensions Social Tensions Change

References:

- Bhargava, G.S: A study of the Communist Movement in Andhra, Dellhi,1995
- Chow, Paul 1966. A hand Book of Social Welfare. Delhi: Atma Ram and Sons.
- Desai, A.S.(ed). Peasant struggles in India(1979).
- Gurunatham, J.: The Andhra Movement,Guntur,1913.
- Kesavanarayana, B. Political and Social Factors in Andhra, Vijawada,1976.
- Kothari, Rajani, (ED) . Caste in Indian Politics(1970).
- Krishna Rao, Y.V., and A. Balaram Murthy. 1987.Andhra Pradesh Darsini. Visalandhra Publishing House –Hyderabad.
- Lakshmiranjhanam , K.&BalenduSekharam, K. AndhruluCharitra-Samskaruti (Andhra History and Culture),Kurnool ,1952.
- landsberger, Henrg A. (ED) .Rural protest, peasant Movements and Social change(1974).
- Madan TN, 1994. Pathways, Approaches to the Study of Society in India. OUP. New Delhi.

Outcomes

1. After completion of this paper students will be able to identify the ecological and regional facets of Andhra Pradesh
2. Students will be able to recognize the socio-cultural aspects behind the various social movements
3. Students will understand various welfare and developmental programmes for the rural and urban Andhra Pradesh

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	-	2	2	-	-	-	-	2	2	1	1
CO2	2	2	-	-	-	2	-	-	-	2	-	2
CO3	-	3	-	2	2	-	-	-	2	1	2	2

305: Open Electives

(For the students of Other Departments with any one paper)

MASO 305a: Social Psychology and Personality Development

Objectives

1. This paper aims at the understanding the relationship of cognition and attitudes of individual and society
2. To focus on psychological aspects of the individual in the context of social behaviour
3. To examine group dynamics such as group thinking and decision making, leadership, persuasion, conflict and cooperation)

Syllabus

Unit – I

Foundations Of Social Psychology- Methods in Social Psychology, The Social Self, Self-Esteem and Self-Serving Biases, Attributions About Others, Social Judgments

Unit-II

Attitudes and Behavior Persuasion, Behavioral influences, Conformity and Obedience to Authority, Compliance on attitudes

Unit -III

Aggression, Stereotyping, Prejudice, Discrimination, Stigma, Reducing Intergroup Conflict

Unit – IV

Group Processes, Attraction to Others, Love and Close Relationships

Unit – V

Personality: Meaning, definition, theories, types and factors influencing personality – Motivation: Meaning, definition, types and characteristics of motive, theories of motivation. Intelligence: Concept, theories and assessment. Important tests for measurement of personality, attitude and intelligence.

References

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Outcomes

1. After completion of this course students will able to understand social cognition and attitudes
2. Students will be able to locate the reasons behind the Aggression, Pro-social behaviours and Attraction and Interpersonal relationships towards social behaviour
3. Students will be able to recognize Psychological changes and Group dynamics

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	2	1	2	-	-	2	-	-	2	2	-	2
CO2	2	2	2	-	-	-	-	2	1	1	-	1
CO3	2	3	3	2	1	2	-	3	2	2	-	2

*1- Low, 2. Medium,3.-Strong

MASO 305b : Business and Society

Objectives

1. This paper aims at understanding the concepts of Social economy and knowledge management
2. To examine the business community and social responsibility
3. To understand the inter-relation among business firms, organizations , public policy, business law and governance

Syllabus

Unit- I

Business and Society _ Business innovations-Business exists to serve society- Basics Ass value for society -s well as business-Beyond the core to change the system -Embed the values in the Business-Business -innovation Design-Steps of Business innovation

Unit- II

The Social Economy – Knowledge Economy, Definition ofSocial Economy, Relation to the Private & Public Sector- Evolution of an Ideas-Social economy and civilsociety:.Concept andCharacteristics of Evolution-Driving forces:Introducing Knowledge Management-DefinitionDimensions, Strategies andMotivation

Unit- III

Corporate Social Responsibility-Definition of SocialResponsibility- Sustainability and C.S.R-Business in Society-Community Social Responsibility- Business and Community Social Responsibility-Businesses can be categorized by their level of community Social Responsibility

Unit- IV

Business and Society relationship- Business Ethics and stakeholders - Business Environment- Relationship between business and Society - The dynamic environment of business- Definition of stakeholders- Good faith and fair Dealing- Definition Business Environment - External factors

Unit- V

The firm and organization-Business and public policy Business law and Governable- The Ubiquity of organization- Motivation and Efficiency in organization- A model of the organization of the firm- Business lad of corporate Government Minor.

References

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Outcomes

1. After the completion of this paper students will be able to understand the importance of social relations and knowledge management
2. Students will be able to recognize the importance of business community and social responsibility
3. Students will be able to understand the inter-relation among business firms, organizations, public policy, business law and governance

CO-PO Mapping

Course	**PO1 Knowledge**	**PO2 Analysis**	**PO3 Design**	**PO4 Development**	**PO5 Modern tools**	**PO6 Society**	**PO7 Environment**	**PO8 Ethic**	**PO9 Teamwork**	**PO10 Communtation**	**PO11 Programme Management**	**PO12 Life long Learning**
CO 1	2	2	2	1	-	2	-	-	-	2	-	2
CO 2	2	2	3	2	-	2	-	-	-	2	2	2
CO 3	3	1	3	1	1	3	-	-	2	2	3	2

*1- Low, 2. Medium,3.-Strong

CO/PO	PO1	PO2	PO3	PO4	PO5
CO 1	S	S	M	S	S
CO 2	S	S	M	S	M
CO 3	M	S	S	S	S
CO 4	S	L	L	M	S
CO 5	M	S	S	M	S
CO 6	S	S	S	S	S

***L-** Low, **M-**Medium, **S-**Strong

Second Year (IVthSemester)

MASO 401: Criminology (Core)

Objectives

1. This paper seeks to describe the students about the different types of crime and scope of criminology
2. To illustrate the causes of crime and crime rates
3. To study the crime scientifically through data on crime, trends and various theoretical approaches

Syllabus

Unit –I

Criminology concept scope, Causes and Characteristics and Types of Crime in Mega Cities of Deviance – Crime against Children, women and aged - scope of Criminology- Characteristics of crime

Unit – II

Socio and Psychological factors–Influence of T.V. Cinema and Inter Net-Politics and Crime - Human Trafficking – Cyber crimes Communal violence – Terrorism - Corruption - Reasons for not seeking Legal help- Modes of Operation of crime – Access Perception of methods and Technology - Forensic and other reasons

Unit – III

Theories of crime - Classical and Positivist theories-Radical Criminology- Labeling theory- Constitutional theories- Genetic explanations- Environmental explanations

Unit – IV

Crime prevention and HRD - Police – Public role Relationship – Crime against Poor and Marginalized – Rehabilitation of victims – Judicial Activism – Nirbhaya Act - The Toxic continuum From Incivility to Violence and the role of HRD

Unit – V

Crime control by Youth Development - Programmes in India – Self Employment – Social Entrepreneurship – Ready set Go Top Skills for Job Seekers.

References

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- Glenn Firebaugh, Seven Rules for Social Research, Princeton University Press, 2008, ISBN978-0-691-13567-0
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Outcomes

1. After completion of this course students will be able to to characterize the different types of crimes and scope of criminology
2. Students will be able to know the definition and measurement of crime, trends, various theoretical approaches of crime
3. Students will be able understand an overview of the scientific study of crime including the history of criminology

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO1	3	1	1	-	-	2	-	-	1	1	-	2
CO2	-	-	2	-	-	2	-	2	2	1	-	2
CO3	3	2	2	2	-	2	-	-	2	1	-	2

*1- Low, 2. Medium,3.-Strong

MASO 402: Industrial Dynamics (Core)

Objectives

1. This paper aims to provide the students about the structure and process of industrial organizations from sociological perspective
2. To deal with the effects of industrialization on Indian social systems and institutions
3. To study the internal relations which are connected directly or indirectly with industry

Unit- I

Nature and Scope of Industrial Sociology.Internal Structure of the Industrial Organization-Line and Staff.Formal and Informal Organizations, Factory as a social system.

Unit -II

Scientific Management - Human side of enterprise - Taylor and Lillian Gilbreth Time and Motion studies.Human Relations Approach- Hawthorne experiments.

Unit -III

Sociology of Work, Morale and Motivation- Industrial Leadership.Workers participation in management.

Unit -IV

Growth and Functions of Trade Unions with special reference to India.Industrial Conflict.Strikes, Methods of resolving Industrial conflicts, Collective barraging.Grievance procedure.Labour Welfare Officer: ResponPPsibilities and Duties.

Unit- V

Technology and industrial relations. Concept of technological change, impact of technological changes: Mechanization automation, industry and society. Labour policy and the five yearplans.

References

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- Parker and Brown. 1972. *Sociology of Industry.* London: George Alien and Unwin Ltd.

Outcomes

1. After the completion of this course students will be able to understand structure and process of industrial organizations from sociological perspective
2. Students will be able to know the social relations which have directly or indirectly connected with industry.
3. Students will be able to assess industrial relations and labour management

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	-	2	2	-	2	-	-	2	-	1	2
CO2	-	3	2	2	-	2	2	-	2	2	-	2
CO3	-	3	3	2	-	2	-	-	2	2	2	2

*1- Low, 2. Medium,3.-Strong

MASO 403: Dissertation and Viva-Voce (Core)

Objectives

1. This paper aims at exposing students in analyzing the data
2. To understand the different variations in viva-voce
3. To understand the recent patterns in Practice

Syllabus:

The student will prepare and submit a dissertation based on the data collected under the course MASO 305 – Field work and extension after classification, tabulation, application of appropriate statistical techniques, analysis and interpretation of data. They will work under the supervision of the faculty member .at the end of the semester, the student will appear before a viva voce board as specified under the scheme of valuation and defend their work

Outcomes

1. After completion of this course students will be able to analyze data
2. Students will be able to recognize and overcome different kinds of ambiguities in the process of research
3. Students will be able to learn proper usage of examples and anecdotes and approaches for viva-voce

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Communtation	PO11 Programme Management	PO12 Life long Learning
CO1	2	3	-	2	3	2	-	-	3	3	3	2
CO2	-	2	-	2	-	2	-	-	2	2	2	2
CO3	2	3	-	2	-	2	-	-	2	2	2	2

*1- Low, 2. Medium,3.-Strong

MASO 404:General Elective (Any two)

MASO 404a: Social Welfare and Administration

Objectives

1. This paper aims at understanding the efficiency of resources and services to meet the needs of the individuals, families, groups and communities
2. To understand the problems of Schedule castes, Schedule tribes, Backward classes and Minorities
3. To facilitate social relationship and adjustments necessary for the disadvantaged sections, children, women, youth and elderly

Syllabus:

Unit –I

Social Welfare: Concept and Philosophy,AHistorical out-line of Social Welfare and Development.

Unit –II

Community Welfare Scheme and Programmes in India – People' Participatory Approach (PPA)

Unit –III

Problems of schedule Caste, Schedule Tribes, other Back ward class and minorities in India. Constitutional safeguards and welfare Programmes for Weaker Sections: Scheduled Castes, Scheduled Tribes, Other Back ward classes, and Minorities – Critical evolution.

Unit –IV

Problems and Welfare Programmes for Women, Children, Orphans, Youth, Old, Disabled and Poor – Critical evolution.

Unit –V

Social Welfare Administration – Central Social Welfare Board and State Social Welfare Board – Structure and Functions.Panchayat Raj, District Rural Development Agency and Social Welfare Department - Structure and Welfare Functions. Role of Voluntary/ Non-Government Organizations in Social Welfare.Case study of N.G.Os.

References

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- Chowdhary, Paul. 1966. A Handbook of Social Welfare. Delhi: Atma Ram &Sons.
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Outcomes

1. After the completion of this course students will be able to understand the efficiency of resources and services to meet the needs of the society
2. Students will be able to analyse the problems of Schedule castes, Schedule tribes, Backward classes and Minorities
3. Students will be able to realize the problems of disadvantaged sections , children, women, youth and elderly

CO-PO Mapping

Course	**PO1 Knowledge**	**PO2 Analysis**	**PO3 Design**	**PO4 Development**	**PO5 Modern tools**	**PO6 Society**	**PO7 Environment**	**PO8 Ethic**	**PO9 Teamwork**	**PO10 Communtation**	**PO11 Programme Management**	**PO12 Life long Learning**
CO1	2	-	-	-	-	3	-	-	-	2	-	2
CO2	3	2	-	-	-	2	-	-	2	2	-	2
CO3	-	3	-	-	-	2	-	-	-	2	-	3

*1- Low, 2. Medium,3.-Strong

MASO 404c: Sociological Perspectives

Objectives

1. This paper aims at the students to compare and contrast basic theoretical perspectives of sociology through rigorous scientific enterprise
2. To sensitize the need for empirically grounded theories
3. To acquaint students with the recent trends in Sociological thought

Syllabus

Unit-I

Functionalist Perspective

Emergence of Functionalism, Functionalism and Anthropological Tradition.A.R.Radcliff Brown, Malinowski, R.K. Merton: Empirical Functionalism. Paradigm for functional Analysis. Critique of functional Postulates, Latent and Manifest functions. Theories of the Middle Range, Karl Marx: The Dialectics. Theory and Dynamics of Social Change.Concept of Class, Class Contradiction, Class formations, Class Struggle and Social Change.Alienation.

Unit-II

Conflict Perspective

George Simmel: Functions of Conflict

Dahrendorf: Dialectical Conflict model

Unit-III

Symbolic Interactions

C H Cooley: Self and its emergence - Looking Glass Self.

G H Mead: Stages in the Development of Self- Play Stage, Game Stage

Unit-IV

Ethnomethodology

Origin and nature of Ethnomethodology Garfinkel:

The Documentary Method Zimmerman: The

Practicalities of Rule use

Unit-V

Applied Sociological perspectives Action

Research Methodology

Audio – Visual Media as a tool in Research

References

- Alexander, Jeffrey C. 1987. Twenty Lectures. Sociological Theory since World War II. New York: ColumbiaUniversity.
- Bottomore, Tom, 1984. The Frankfurt School. London:Tailstock Publications
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- Meltzer, Bermad N. et al. 1975. Symbolic Interactionism. London: Routledge and KaganPaul.

Outcomes

1. After the completion of this course students will be able to compare and contrast basic theoretical perspectives of sociology
2. Students will be sensitized towards the need for the empirically grounded theories
3. Students will be able to identify the recent trends in sociological thought

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	-	2	-	2	-	-	-	2	-	2
CO2	3	-	-	-	-	2	-	-	-	1	-	2
CO3	-	3	2	2	-	2	-	-	-	-	2	2

*1- Low, 2. Medium,3.-Strong

MASO 404d: Globalization and Society

Objectives

1. This paper aims at the students to understand the nature and dynamics of globalization and social context though various agencies
2. To analyze the interconnected changes in the economic, cultural, social, and political spheres of society
3. To understand ever-increasing integration of nations, regions, communities

Syllabus

Unit –I

The Nature and Dynamics of Globalization the Historical and Social Context of Globalization World Capitalism, Modernization and Globalization Distinctive Characteristics of Globalization, Advantages and Disadvantage of Globalization the role of Information and communication technology

Unit –II

Agencies of Globalization : Multinational Corporations (MNC's) , Media , Market Non Governmental Organizations (NGO's), International Agencies (International Monetary Fund , World Bank etc.)

Unit –III

Globalization and Culture Cultural Aspects of Globalization, Globalization and the Resurgence of Ethnic Consciousness: Global Tourism, Diaspora Communities, Transnational Ethnic and Religious Movements, Religious fundamentalism. Globalization and Gender Socio-economical status of women in the World, Neo-Liberal Policies and Gender equality in the world.Gender and Human Development.

Unit –IV

Social Consequences of Globalization Inequality within and among Nation - states, Differential Perception of Globalization Mass Media & Consumer Culture. Global Culture and Local Cultures.socio economic impact of Globalization –Impact on individual and Group identities

References :

- Frans J. Schuurman (ed) Globalization and Development Studies, New Delhi: Vistaar Publications.2001
- JoesphSlightsGlobalizationandits Discontents New Delhi, Penguin Books (p) Ltd.2003
- Martin Albrow Globalization, Knowledge and Society. Delhi, Sage Publications,1990
- Appadurai, Arujun Modernity at Large :Cultural Dimensions of Globalization. New Delhi : Oxford Univ. press,1997
- Dreze Jean and Indian Economic Development and Social Opportunity Delhi: Oxford Univ.press,1996
- Escober, Arturo Encountering Development: The Making and Unmaking of the Third World. Princeton: Princeton Univ. Press,1995
- Walters, MalcolmGlobalization,London.Routledge,1996

Out comes

1. After completion of this paper students will be able to understand nature and dynamics of globalization
2. Students will be able to analyze the interconnected changes in the economic, cultural, social and political spheres of society
3. Students will be able to understand the process of integration of nations, regions and communities

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	2	3	-	-	-	2	-	-	-	1	-	2
CO2	-	3	2	2	-	2	-	-	2	1	-	2
CO3	2	-	2	2	-	2	-	-	-	2	-	2

*1- Low, 2. Medium,3.-Strong

MASO 405: (For the students of other departments with any one paper)

MASO 405: A. Social Entrepreneurship ,Innovation and start ups

Objectives

1. The aim of this paper is to understand the theoretical positions of the Social entrepreneurship development
2. To be aware of the contemporary approaches to social entrepreneurship
3. To have comprehensive understanding of the context, process and effects of entrepreneurial activities

Syllabus

Unit- 1: Entrepreneurship: What, Why and How

- Entrepreneurship- Concept, Functions, Need and Importance.
- Myths about Entrepreneurship
- Pros and Cons of Entrepreneurship
- Process of Entrepreneurship.

Unit- 2: An Entrepreneur

- Types of Entrepreneurs
- Competencies and Characteristics; Ethical Entrepreneurship.
- Entrepreneurial Value: Values, Attitudes and Motivation.
- Mindset of an Employee and an Entrepreneur-Difference
- In trapreneur: Importance in Any Organization.

Unit- 3: Entrepreneurship Journey

- Self Assessment of Qualities, Skills, Resources and Dreams.
- Generation of Ideas.
- Feasibility Study
- Opportunity Assessment
- Business Plan Preparation
- Execution of Business Plan
- Role of Society and Family in the growth of an entrepreneur.

- Challenges faced by women in Entrepreneurship.

Unit- 4: Entrepreneurship as Innovation and Problem Solving

- Entrepreneurs- as problem solvers.
- Innovations and Entrepreneurial Ventures.
- Social Entrepreneurship-Concept and Importance
- Risk taking-Concept; types of business risks.
- The role of technology/ social media in creating new forms of firms, organizations, networks and cooperative clusters.
- Barriers to Entrepreneurship.
- Support structure for promoting entrepreneurship (various Government Schemes).

Unit – V

Start Ups – Introduction and Importance of Start Ups Initiation of Indian Governments, Schemes of Introduce by Government of India Micro Unit Development and refinance Agency (MUDRA), Providing Credit Benefits to agriculture as well as other cottage and village industries (NABARD), Credit Guarantee Scheme(CGS), standup India Scheme, New Gen Innovation and Entrepreneurship Development Centre, Atal Innovation Mission (AIM), Credit Linked Capital Subsidy Scheme (CLCSS), The SIDBI Make in India Soft Loan Fund for MSMEs provides soft loans to MSME, Loan for Rooftop Solar PV Power Projects by IREDA, Modified Special Incentive Package Scheme (MSIPS), A scheme for promoting Innovation and Rural Entrepreneurship (ASPIRE), and Venture Capital Assistance (VCA) Scheme for the welfare of farmer-entrepreneur

References

- Adam S. (1999). Competences and other factors affecting the small enterprise sector in Ibadan, Nigeria. In K. King & S. McGrath (Eds.), Enterprise in Africa: Between poverty and growth (pp. 179-190). London: Intermediate Technology.
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- Buame, S. K. (1996). Entrepreneurship: A contextual perspective. Lund, Sweden: Lund University Press.
- Ken Banks, Social Entrepreneurship and Innovation: International Case Studies and Practice
- Mark B. Durieu Social Entrepreneurship For Dummies
- Mohammad Yunus, Building Social Business
- Raj Kumar, The Business of Changing the World
- Roger L. Martin Getting Beyond Better: How Social Entrepreneurship Works
- Roger L. Martin Getting Beyond Better: How Social Entrepreneurship Works
- Teresa Chahine, Introduction to Social Entrepreneurship

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	3	2	-	-	-	2	-	-	2	-	-	3
CO2	-	3	2	-	-	3	-	-	2	1	-	2
CO3	-	3	-	2	-	2	-	-	-	2	-	2

*1- Low, 2. Medium,3.-Strong

MASO 405b: Visual Sociology

Objectives

1. This paper aims at providing the students a new perspective in study of deliberate versus spontaneous behavior
2. To be aware of recording social signals, expressions as spontaneous as possible
3. To organize the recording of reactions and variations that occur as a response to the context

Syllabus:

Unit-I

Visual Sociology – definition and Scope in India Visual Communication Images with messages - Applied Visual sociology-Study of visual Communication-Images analysis-Visual sides - Types of visual aids -Visual aids media simple to advanced

Unit-II

The advantages value of visual Exploration-Interactive tools -Tools of olyphlayout-Dimension of -selection tools-Visualization techniques-Initial , visual exploration of Demands Data

Unit-III

Visual Applying Research Methods-Participant generated Visual methods Ethical warnings-Visual Ethnography-Doing Ethnographic photography- Photographing the community

Unit-IV

Visual Documentary Research –And-Innovation-Business and Media-Digital video as qualitative -Research practice-Presentation – History of Ethnographic Film -Research practices- Digital video methodology-Sociology media the business Benefits may be Enormous -Reputational, legal operational

Unit-IV

Use Social Media and Abuse-Capturing social problems/traumas on Film Video-piracy-Social Networking Negative Effects -Social Networking Negative positive effects-Dangers of socialNetworking

References

- Lester, E (2000) Visual Communications: Images with Messages. Thomson Learning
- Schildgen, T (1998). Pocket Guide to color with digital applications. ThomsomLearning
- Picture this: Media Representation of Visual Arts and artists. University of Luton Press
- Palmer, Frederic: Visual Elements of Art and Design,1989,Longman
- Porter, Tom and Goodman, Sue: Manual of Graphic Technique 2: For Architects,
- Graphic Designers, and Artists,1982, Astragal Books.London
- Palmer. F: Visual Awareness (Bats ford,1972)
- David Sless (1981). Learning and visual communication.p.187
- Kenneth Louis Smith (2005). Handbook of visual communication: theory, methods, and media. p.123. ISBN978-0-8058-4178-7
- Jorge Frascara (2004). Communication design: principles, methods, and practice.p.68

Outcomes

1. After completion of this course students will be able to differentiate between deliberate and spontaneous behavior
2. Students will be aware of recording social signals and expressions as spontaneous as possible
3. Students will be able to organize the recording reactions and variations that occur as a response to the context

CO-PO Mapping

Course	PO1 Knowledge	PO2 Analysis	PO3 Design	PO4 Development	PO5 Modern tools	PO6 Society	PO7 Environment	PO8 Ethic	PO9 Teamwork	PO10 Commutation	PO11 Programme Management	PO12 Life long Learning
CO1	2	2	-	2	1	2	-	-	2	1	-	2
CO2	-	-	3	1	2	1	-	-	2	1	3	2
CO3	-	-	2	1	-	1	-	-	2	1	-	1

*1- Low, 2. Medium,3.-Strong

CO/PO	PO1	PO2	PO3	PO4	PO5
CO 1	M	S	S	M	S
CO 2	M	S	M	S	M
CO 3	S	S	S	S	S
CO 4	M	S	S	S	M
CO 5	M	M	M	L	M
CO 6	M	S	L	M	M

Outcome Mapping: Semester - IV

***L-** Low, **M-**Medium, **S-**Strong

SRI VENKATESWARA UNIVERSITY, TIRUPATI
DEPARTMENT OF SOCIOLOGY
S.V.U.COLLEGE OF ARTS; TIRUPATI

Dated; 20.1.2022

From
Prof.G.Stanley Jaya Kumar
Chairman , BOS
Dept. of Sociology
S.V. University
Tirupati

To
The Registrar
S.V. University
Tirupati

THROUGH PROPERCHANNEL

Sub: SVUCA – Dept. of Sociology - Sending of the copy of the copy of the revised syllabus for placing before the meeting of the Academic Senate – NEP, 2021 – Req

Ref: Your letter No .BC-II(A.B&F)/P.G-Revise Syllabi/NEP-2021, Dated.1.10.2021

****

I am here with sending the soft and hard copies of the revised syllabus (under choice based credit system) along with common question paper (for all semester paper) from the academic year 2021-2022 (students who were admitted in The first semester) for placing before the meeting of the academic senate. The syllabus revised due to the guidelines of NEP ,2021.

In this connection, I am informing you that the internal and external members of the BOS of the Department of Sociology convened a meeting on 12-11-2021 at 12 Noon in the chamber of Head. I am also here with sending the Minutes copy of the above meeting for your kind information and take further necessary action in this regard.

Thanking you
Yours faithfully

(G.STANLY JAYAKUMAR)

Encl: As above
Copy to the Principal SVUCA of Arts, Tirupati for information
Copy to the Controller of Examinations, SV University, Tirupati for Information
Copy to files

S.V.UNIVERSILTYH OLLEGE OF ARTS
DEPARTMENT OF SOCIOLOGY

Minutes of the meeting of the BOS of the Dept.of Sociology held on 18.01.2022 on 11 Noon in the Chamber of the Head Dept.of Sociology S.V.University College of Arts, Tirupati.

Members Present:

1.Prof.G.StanleyJayakumar	:	BOS Chairman & Head
2. Dr.A.Kusuma	:	Member

Resolved to recommend to implement the revised syllabus (under Choice Based Credit System) from the academic year 2021-22 for the students who were admitted in First Semester of M.A.Sociology\ as per NEP 2020 guidelines of UGC.

Signatures:

1.Prof.G.StanleyJayakumar

2.Dr.A.Kusuma

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U. COLLEGE OF ARTS

DEPARTMENT OF TAMIL



Course

M.A. TAMIL

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

SVU COLLEGE OF ARTS

DEPARTMENT OF TAMIL

TITILE PAGE

1.About the Department

This statement of Panambaranar an ancient, who wrote the foreword to Tolkapplyan the ancient Tamil Grammar (BC 5000) says that 'Venkatan' i.e., Tirupati was the northem boundary of the Tamil Speaking Country. Hence, it is more appropriate to establish a Tamil Department in Tirupati, the Tamil Speaking place. There is also another property to establish the Department of Tamil in S.V. University, Tirupati i.e., hundreds of hymns have been sung by Always in Tamil on this Vaishnava Temple. Thanks to the Govt. of Tamil Nadu for its liberal Good-will grant of Rs.50,000/- to establish the Department in S.V. University. The Department of Tamil of S.V. University which was a bud from 1960 to 1969, blossomed in the year 1970 as a full-fledged Post-Graduate and Research Department. With commendable pioneering spirit, Dr.N.Subbu Reddiar conceived the idea of the Post Graduate and Research Department was strengthened by sanctioning of two readers and two lecturers by the UGC. Later the Govt. of Tamil Nadu sanctioned a chair for the post of Professor. Thus, a full-pledged department was established in the IX plan the UGC was kind enough to sanction one more Professor Post to the department. Hundreds of Post graduate students received their P.G. Degree and most of them are employed in different parts of the country. The department has produced 112 Ph.Ds, 70 M.Phils and has organized 70 National Seminars, 20 UGC Major Research Projects has been completed.

2.Vision

- To uplift the literary, Socio cultural and educational standards in Rayalaseema region.
- To preserve the dignity and aesthetic values of Tamil Language and Literature.
- To spread awareness about the literary and cultural importance of Tamil Language.
- To carry out the original research for the development and betterment in the field of literature and to enrich the social and human values in the society.
- To be center of excellence in the fields of Teaching, learning and research.
- Facilities to learn Tamil language through Junior and Senior diploma are available.

3.Mission

- Inculcating the literary taste and sense and significance of language and culture through class room teaching, library and online sources.
- Provide knowledge and skill to explore and excel in the world of poetry, authoring novels etc., and thus contributing note to the Tamil Language and literature.
- Supervising the research scholars to carry out the original research for the development and betterment of literature and the values in the society.
- Almost all our research work and project (MRP) on South Indian Languages and literatures.
- We are conducting weekly seminars in the department in order to enrich the subject knowledge of the students and research scholars.

4.Choice Based Credit System (CBCS)

The choice based credit system (CBCS) allows students to choose inter disciplinary, intra-disciplinary courses and provides an opportunity for the students to choose course from the prescribed course comprising core, elective are skill based courses.

- Students of this course would be able to:
- CBCS makes education broad based and at par with global standards.
- Be able to adopt and respond positively and flexibly to the changing circumstances.
- Play a major rule in research and the public services.
- Develop the professional skills and personal attributes to deal with complex issues, both systematically and creatively.

5.programme Specific Outcomes (PSO's)

- Provide Knowledge and skill to explore and excel in the world of poetry, authoring novels

etc., and thus contributing more to the Tamil language and literature.

- Encourages students to take up research in the topic of their interest as this program

presents them with an overall view of and various facets of Tamil language.

- Develops Critical thinking and reasoning abilities of the students and transforms students

In to better humans to have a positive impact on society.

6. Programme Objectives

- To provide knowledge of Tamil Literature and grammatical text.
- Introducing various genres types and trends of Tamil literature learning grammar will help students to write, speak and use Tamil language in correct way.
- To understand the contribution of literary critics to the development of Tamil literature.
- To introduce students to the great history of Tamil literature and enable them to appreciate the intricacies of Tamil literature that had existed in the past.
- To equip students with basic grammatical knowledge so that they can read and understand poetries in a better way.
- Students will be better equipped to do comparative study of Tamil language with that of another Dravidian language.
- To introduce students to the Dravidian movements that were focused on equality untouchability casteism etc.,

7. Program Outcomes

- This program will help students to learn and demonstrate their knowledge about the rich history of Tamil literature that has played a prominent role in cultural and societal development
- This program will enable students to create, select, apply, adapt, and extend appropriate methodologies, resources while doing research and comparative study of literature of other languages with that of their own language.
- This program aims to produce scholars in Tamil language having the ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve societal and cultural issues besides contributing to language development.
- This program will help students in expanding the boundaries of their knowledge on Tamil language through imparting knowledge on its literature, Grammar and History.
- This program intends to motivate students to take up research in the field of Tamil language and will improve the competencies of students in the field of research on Tamil language.
- Helps the students to gain the abilities to communicate with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and thesis documentation, and to give and effectively respond to clear instructions.
- Improves the ability of the students to grasp/learn other languages easily as they learn linguistics as part of the program.
- Students will be provided with an understanding of the roles and responsibilities of a civilian in the society, especially the primary role of protection of the public and the public interest.
- Helps the students to extend Tamil research to interdisciplinary and collaborative programs through understanding of the interactions that Tamil literature has with the economic, social and cultural and environmental aspects of society
- This program guides students to explore the vastness of the Tamil literature and imparts the skills that are necessary to take up and excel in the field of literature.
- This program imbibes good ethics, values and morals and transforms students into better humans.
- An ability to identify and to address their own educational needs to maintain their competence and to allow them to contribute to the advancement of knowledge.

8. Programme Educational Objectives (PEO's)

- Education seeks to grow the overall personality of the learner. These include physiological intellectual, moral, social and spiritual growth. The aim of education is the acquisition of knowledge, skills and attitudes. It helps to adjust properly in one's own environment. The aims and objectives of education must be a real one that makes every student to be unique in nature. It must creat in a student enthusiasm that inspires the students to learn more for life.

9. SYLLABUS SCHEMES

SRI VENKATESWARA UNIVERSITY: TIRUPATI

DEPARTMENT OF TAMIL

P.G. Degree Programme (CBCS) Regulations-2016 Amended as per NEP-2020

(With effect from the batch admitted in the academic year 2021-22)

M.A., TAMIL

SEMESTER-I

Sl. No	Code	Title of the Course	Credit Hrs./ Week	No. of Credits	Components of Study	IA Marks	Sem End Exam Marks	Total
1	101	Modern Literature – I	6	4	Core	20	80	100
2	102	Medieval Literature - I	6	4	Core	20	80	100
3	103	Grammar - I	6	4	Core	20	80	100
4	104	Principles of Literary Criticism - I	6	4	Core	20	80	100
5	105	5a. History of Tamil Literature	6	4	Compulsory Foundation	20	80	100
		5b. Tholliyal (Archeology)						
		5c. Puthukkavithai Kattamaippu						
6	106	6a. General Linguistics	6	4	Elective Foundation	20	80	100
		6b..Journalism						
	Total		36	24		120	480	600
7	107	Human Values and Professional Ethics - I	0	0		100	--	--

*ALL CORE Papers are Mandatory

- Compulsory Foundation – Choose one paper
- Elective Foundations – Choose one paper

- Audit Course – 100 Marks (Internal) – Zero Credits under Self Study
- Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade ass open elective only giving extra credits

Course objectives:

- Introducing various genres, types and latest trends of modern literature with examples.
- To understand the current state of Tamil literature and its evolution.

PAPER TML 101 : MODERN LITERATURE – I

UNIT 1: **Poetry -** Bharathiyar – Panchali sabatham.

UNIT 2: **Drama –** Sundaram Pillai – Manon Maniyam.

UNIT 3: **Novel –** Dr.M.Varadarajan – Nenjil Oru Mul.

UNIT 4: **Short Story –** Puthumaippithan – Puthumaippithan Cirukathaigal.

UNIT 5: **Prose –** Thiru. Vi.Ka – Pennin Perumai (allathu) Vazhikaith thumai.

Course Outcomes:

- The students will be able to know the latest trends in the Tamil literature.
- The students will gain complete knowledge about contemporary Tamil language and its usage.

CO-PO MAPPING

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	H			M						H		
CO2	H	H						L				

H=High, M=Middle, L=Low

Course objectives:

- Introducing various genres, types and trends of medieval Tamil literature with examples.
- To provide knowledge of History of Tamil literature and grammatical texts pertaining to medival period.

PAPER TML 102: MEDIEVAL LITERATURE – I

UNIT I Thevaram – Thirugnana Sambandhar—Mudal Tirumurai – 1, 2, 3 Padikangal. Thiru-ch-chathakam of Manikkavachakar (1 to 5 Pathikams)

II Andal Tiruppavai (30 hymns)

UNIT III Kamba Ramayanam – Bala kandam - Mithilai.katchchi padalam

UNIT IV Cirappurannam – Manam Poruththu Padalam

UNIT V Krishna Pillai, H.A.- Ratchanya Manoharam (Nal Manasatchi, Thothiram, Pizhai Ninainthirangal)

Course Outcomes:

- Students will gain knowledge about the various aspects of medieval literature.
- Students will learn about the History of medieval Tamil Culture through literature.

CO-PO MAPPING

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	H			H		M			H			
CO2	H			M		H			L			

H=High, M=Middle, L=Low

PAPER TML 103: GRAMMER – I

NANNOOL: EZHUTHIYAL & PADHAVIYAL

Course objectives:

1. Learning Grammar will help students to write, speak and use Tamil language in a correct way
2. To equip students with basic grammatical knowledge so that they can read and understand poetries in a better way

UNIT I A General Survey of Tamil Grammatical traditions Tolkappiyam –Nannool Yappu – Ani

etc.,

UNIT II Paayiram, En(Ezhuthu), Peyar, Murai

UNIT III Pirappu, Uruvam & Maaththirai

UNIT IV Mudhal, Iru, Idainilai, Poli

UNIT V Padhaviyal – Paghupadam, & Pagappadham 4

Course Outcomes:

1. Students will acquire basic knowledge in Tamil Grammar

2. Students will be able to use the language in a structured manner as per the rules of the grammar

CO-PO MAPPING

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1				H	H		H					
CO2				H	M		H					

H=High, M=Middle, L=Low

PAPER TML 104 PRINCIPLE OF LITERARY CRITICISM –I

Course objectives:

1. To understand the meaning, types and importance of criticism and the scope of Literary criticism 2. To understand the contribution of contemporary literary critics to the development of Tamil literature

- The Nature and Elements of Literature
- The Scope of Literary Criticism
- Theme & Form
- Types of Criticism
- Isms – Contribution by critics.

Unit -1	Definition and Meaning of Literature – Literature and Life – The impulse Behind Literature. Theme of Literature – Classification of Literature, Elements of Literature etc.,
Unit -2	Meaning of Criticism – Criticism and Literature – The use and abuse of literary Criticism.
Unit -3	Critic and the qualifications of a Critic.
Unit -4	Interpretative Criticism, Inductive Criticism, Judicial Criticism, Historical Criticism and Comparative Criticism etc.,
Unit -5	Feelings and emotion – Imagination – Theme and Form.
Unit -6	Fancy and Imagination – The diction of poetry – style – Metaphor –Satire – Simile, Images and Imagery – Allegory.
Unit -7	Symbolism – Irony – Pun and word play, The Tragic elements in literature – Patterns of myth in literature.
Unit -8	Contribution of the Contemporary Literary Critics to the Development of Tamil Literary Criticism. – Dr Kailasapathy –K.N. Subramanyam , Siva Thambi , M. Varadarajan, V.S.P.Manickam & Tamil Annal.

Books recommended :

□□Dr. M.Varadarajan Ilakkia – t-tiran

□□Dr. A.S. Gnana Sambandan Ilakkia- k- kalai

□□Dr. K. Kailasapathy Ilakkiyamum Thiranaivum

□□Dr. S. Balachandran Ilakkiya Thiranaivu.

□□Dr. N. Pichamuthu Ilakkiya Iyakkangal

English books:

□□An Introduction to the study of Literature - William Henry Hudson.

Course Outcomes

1. This subject will help students become a responsible critic offering constructive criticism rather than abusing literary criticism

2. Students will be able to contribute to the development of Tamil literature through quality criticism.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H		H						H		
CO2		H		H						M		

H=High, M=Middle, L=Low

PAPER TML 105A - HISTORY OF TAMIL LITERATURE - I

Course Objectives:

1. To introduce students to the great History of Tamil literature and enable them to appreciate the intricacies of Tamil literature that had existed in the past. 2. To understand the contribution of various personalities to the development of Tamil literature over the years.

Unit -1	An Introduction to Tolkappiyam and its Fore Runners – The three Sangams – The Fourth sangam by vajrananti – Literary and Epigraphical Evidence from pallava Period.
Unit -2	Tolkappiyam – Agam , Puram classification – Characteristics of Sangam Literature – The conception of 'Tokai' and the absence of epic before the cilappathikaram- Natrinai – Kurunthokai Ainkurunoorupathirtupathu- Paripadal- Kalithogai – Aganannooru- Purananooru.
Unit -3	The Ten Idyls – Thirumuragartupadai – Porunartu-p-padai –Cirupanatru- p-Padai - Perumpanatru- p- Padai – Mullaippattu –Madhurai Kanchi - edunalvaadai – Kurinjippattu – Pattinappaalai –Mallaippadukadam –The Sangam age as the Golden period in the History of Tamil Literature.
Unit -4	The Ethical Works – Their general Trends Characteristic features inter Relations – Influence of Thirukkural and its place in Tamil Literature –The growth of epics Cilappathikaram and its relationship with Sangam its influences on Laterday Literature, Its relationship with Manimekalai – The concept of Twin epics. The Nayanars – Thirugnana Sambandar – Thirunavukkarasar – Sundara Murthy Nayanar and Manikkavasakar – The Azhvaar – Poikai Azhavaar – Poothath Azhvaar – Peyaazhvaar – Thirumazhisai Azhvaar – Andaal – Thirumankaiyaazhvaar – and Madhur -Kaviyazhvaar.
Unit -5	The Buddhists and Jains – Purapporal Venba malai – Irayanaar Kalaviyal Urai, Perunkatai - Muthollayiram – Thirukkaliayagnana Ula

	– Nanti– K-Kalambagam, Bharatha verba – The contribution of Jains and Buddhists – Small treaties like Narivirutham and Elivirutham and Nikandus – Grammatical works—prose works and others. The concept of five great kaavyas – Valayaapathi – Kuntalakesi – And Ceevaka Cinthamani – fivesmall kavyas – Utayana kumara kaaviyam—Naaga kumar kaaviyam – yasodara kaaviyam – culamani – and Neelakesi - Other poets of Thirumurai – nambiyagapporul – Yaapparunkalakarikai – Veerachozhiyam – Nannool – Dhandhi alankaram – Nikantus – Avvaiyaar Kalilkattu – Parani – kambaramayanum – Ottakoothar – Kanthapuranam

Books recommended :

- Varadarajan. M. — Tamil Ilakkiya Varalaaru
- Rajamanickam. M. — Tamil Mozhi Ilakkiya Varalaaru
- Velu Pillai — Kaalamum Karuthum
- Periya Karuppan. R.M — Pudhiya Nokkil Tamil Ilakkiya Varalaaru

Course Outcomes

1. Students will understand the richness of Tamil literature by studying the great works of sangam age
2. Students will know the contribution of Buddhists, Jains, Pallavas, Cholas etc., to the evolution of Tamil literature

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H	H								
CO2	H		H	L								

H=High, M=Middle, L=Low

PAPER TML 105B THOLLIYAL (ARCHEOLOGY)

Course Objectives:

1. The course provides a general introduction 2 archeology as a scientific and progessionsl discipline and practice in today's society.
2. It also makes students look at the History and development of archeology as well as selected aspects of archaeology in its current form.

UNIT 1 : Tholliyal Arimugam

Thollilіyalin porul, Varaivilakkkanam Martrum Athan Mukkiyaththuvam-Varalartrukku Chanraga Tholliyal-Tholliyal Vagaigal-Tholliyalin Ceyal Nokkam-Tholliyalukkum pira yiyalukkum Idaiyeyana Thodarbu-Tholliyalaarin Panigal-churtraivu-Arumporutkalaip paadhukaaththal.

UNIT-2 : Agazhvaaiviyal

Agazhvaaivum Adhan Vagaigalum-Kaalavaraiyarai Ceidhal-Thamizh Naatin Agazhvaaividangal-Kaaviripoompattinathil Agagh Vaaivugal-Uraiyurin Agaghvaaraaichi-Keralathil Agazhvaaivugal-Brousput Thondu.

UNIT-3 : Varalartrukku Murpatta Kaalam

Mannil Kaalamum Perumpanippadarvu Kaalamum-Karkaalam-Ulogakaalam-Indhiya

Matkalap Panpaadu-Indhiya Tholliyal Thurai.

UNIT-4 : Kalvettiyal

Kalvettiyalin Porulum Mukkiyathuvamum-Kalvettugalin Vagaigal-Thollezhuthiyal-

Tamizh ezhuthu (or) Thamizh Birami Ezhuthi-Vattezhuthu-Girandha ezhuthu-Kalvettukalin Kaala Nirnayam-Paandiyarin Ukkirakkottai-Paandiya Naattilulla cila

veerakarkal.

UNIT-5 : Mouriyar kaala Naanayangal Kushanargalkaala Naanayangal-Cherar Naanayangal-Pallavar Naanayangal-Chozhar Kaala Naanayangal-Vijayanagara Arasarkaala Naanayangal-Indhiyaavil Ayal Naatu Naanayangal-Thmizh Naattiyeal Ayalaga Naanayangal.

Books recommended :

1.Prof.Naai Maarisaani : Tholliyal (Archeaology) Paavai Publications, 142, Jonijonkan salai, Rayapettai-Ch-600 014, Irandam Padhipu-2013

2.Prof.Ko.Vi.Raman : Tholliyal Aaivugal, New Century Book House, Chennai-98, 1st Edition, 2014

3.Ko.Sundar (Tamil) : Poulpon Tholliyal, 1205/1, Buthanatham, 621010, 1 st Edition, 2007

4.Prof.Ko.Vijaya Venu Gopal: Tholliyal Aaivu thoguthi, Tholporul Thozhilnutpa Paniyaalar Pannattu Kazhagam, Madurai, 1st Edition, 1985

5.Kaa.Rajan : Tholliyal Nokkil Sangakalam Ulaga Tamilaaraichi Niruvanam, Chennai-113

6.Kaa.Rajan : Kalvettiyal, Mano Pathippagam, Thanjavur-2006

7.R.Poonkundran : Chengam Nadukarkal-oru Aaivu, Pudhumalar Padhippagam, Thiruvalluvar Nagar (Kizhakku), Kovai-641045, 2001

Course Outcomes:

1. Students will be able define and discuss the relationship between therories of knowledge and archeological analisis and interprecation.
2. Students will be able describe and criticaly assess the use of various methods of analysis and dating in archaeology today.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H	H					H				
CO2		H	M					H				

H=High, M=Middle, L=Low

PAPER TML 105C - PUTHUKKAVITHAI KATTAMAIPPU

Course Objectives:

1. To interduce students to the new age poetry of Tamil Literature and its impact of the society.
2. The students understand the literary tradition in Tamil.

UNIT - I :

Thamizhkavithai Marabu – Paattu (song) – Seiyul (Verse) – Kavithai (poetry) – Vasanam (prose) – Vasanakavithai (Prose poetry) – Pudhukavithai (Free verse) – Velinattuk Kavithaigal – Mozhi peyarpuk kavithaigal – Velinaatuk Kavithaiyin Thaakkam – Eezhath Thamizh Pudukkavithai

UNIT - II :

Bharathiyar Kaalam – Thamizhil Pudhukkavithai Thortram – Pudhukkavithai Peyarkkaaranam – Pudhukkavithaiyin Ilakkanam – Pudhukkavithaiyin Nokkam – Kottpadu -vadivam – Marabukkavithaiyum Pudhukavithaiyum – Vasanakavithaiyum Pudhukkavidhaiyum – Manikkodikkaalam – Na.pichamurthi – Ku.pa. Rajagopalan – pudhumaipithan – Vallikkannan – Ezhuthukkaalam – Vaanambaadikaalam – Haikus – Tanka – Cenriyu - limerik – limeraiku - Ghazal.

UNIT - III :

Pudhukavithaiyin Porul – Puratchi – Podhuvudamai – Arasiyal – Angatham – Naadu – Makkal – Oozhal – Varumai – Varadhatchanai – Mudhirkanni – Penniyam – Dhalithiyam – Velaiyillathindattam – Cirarthozhil – Uzhaippaali – Naatuppatru – Mozhippatru – Penkavignargal.

UNIT - IV :

Nadaiyial Utthigal – Utthiyin indriyamaiyaamai – Pudhukavithaiyum Utthigalum – Uvamai – Uruvagam – Padimam – Padima Vagaigal – Padimappayan – Kuriyeedu – Kuriyeetu vagaigal – Kuriyeettupayan - Kurippu Muran – Thonmam-Karpanai – Irattura Mozhidhal – Uraiyadal – Vinaavidai – Kadhaikooral – Kadidhamurai – Illakkanai – Varunanai – Thirumbakkooral – Olinayam.

UNIT - V :

Naattuppuraviyal Koorugal – Thaalattu – Pazhamozhi – Vidukathai – Khathalpaattu – Thozhirpaattu – Kadhaippaatu – Themmaangu pattu – Oppari – Nattupura Nambikkaigal – Nattupura Maruththuvam – Irunmai (obsevrity).

3. Books Reffered:

1. Dr.M.Govindaraju : Pudhukkavithai Kattamaippu
   NCBH Pvt, Ch-98. 2011
2. Thamizhanban.Erodu. : Cigarangal Mel Viriyum Ciragugal
   Thirumagal Nilayam, Chennai
3. Na.Pichamurthy : Na.Pichamurthy Kavithaigal
   Mathi Nilayam, Cehnnai
4. Mu.Metha : Velicham Veliye Illai
   Vijaya Pathipakam. 1982 . Kovai.
5. Unnamalai.V : Pudhukkavithaiyil Samudhayam
   Selma Veliyeedu, 1991
   Sivagangai
6. Sampath.R. : Pudhukkavithai Nokkum Pokkum
   Thirumathi Senbagam Subbaiah
   Arakkattalai Veliyeedu. 2002,
   Thanjavur
7. Dr.N.Subbu Reddiyar : Pudhukkavithai Nokkum Pokkum
   1983, Paari Nilayam, Chennai

Course Outcomes:

1. Students will appreciate the modern thoughts present in the new age poetry and carry forward it.
2. Students will acquire effiecient communicative and expressive capabilities.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						H			H			H
CO2						H			M			M

H=High, M=Middle, L=Low

PAPER TML 106A GENERAL LINGUISTICS

Course objectives:

1. To understand the intricacies of a language by delving into the nuances of language such as linguistics, phonetics, phonemics etc 2. To learn what language is, its characteristics, classification and their broad geographical distribution

Unit -1	Definitions of Language – Characteristics of Language – Human & Animal communications.
Unit -2	Linguistics : Definition, Nature & Scope – is Linguistics a science? – Linguistic levels – Linguistics and related fields – Synchronic & Diachronic Linguistics
Unit -3	Language families – Basis for classification of Languages— Genealogical Classification, Geographical classification, Typological classification - Language family of the world : Indo – European, Afro – Asiatic, Sino- Tibetan, Altaic, Dravidian , Austro – Asiatic & Finno – Ugric families. The Language families of India - Dravidian, indo – Aryan, Mundriyan, Tibato Burman - their broad geographical distribution.
Unit -4	Phonetics : production and classification of speech sounds. Three Approaches in the phonetics – Auditory, accustic and articulatory : I.P.A. Phonetic transcription
Unit -5	Phonemics : Definition of phoneme – principles of phoneme analysis, Classification of phonemes. Morphology : Definition of morpheme – different models of Grammatical description – types of morphemes – principles of Morpheme analysis – various Morphemes – tinai, gender etc., The Relation ship between morphology and syntax morpho phonemics. Word classification – dialects, special language – Iyarool, tiricol, vatacol and ticaicol. Syntax: Phrase – The word order – Sentence and its parts – The Structure of a sentence – Types of Sentence immediate constituent Analysis – Generative grammar – Transformational grammar. Formation of scripts.

Books Recommended:

1. S.Innasi - Mozhiyiyal
2. Dr.Porko - Pothu Mozhiyiyal
3. Dr.K.Paramasivan - Ikkala Mozhiyiyal Arimugam

Outcomes

1. Students will gain knowledge about various languages and basis on which they are classified
2. Students will have good understanding about the concepts of Linguistics, Phonetics, Phonemics etc.,

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			H			H	H					
CO2			M			H	H					

H=High, M=Middle, L=Low

PAPER TML 106 Journalism

Course Objectives:

1. The students will learn about the various types of Journalism.
2. To import students with the abilities that are necessary for a good journalist.

UNIT I : Communication theory – Definition – Nature and Scope – Role of Communication media.

UNIT II : Society and Culture – Communication Process – Psychological and Sociological aspects of communication

UNIT III : Kinds of Communication – Inter Personal group and Mass Communication – Communication models – Role of Language in Communication.

UNIT VI : Press & the fourth branch of Government other media of Communication – Radio – Television – Publications – News Papers – The origin and development of Journalism in India with special.

UNIT V: Evolution of Tamil Publication – Role of Western scholars.

UNIT V I : Organizational revolutions in press field – Tamil press (1980-1970.

UNIT VII : Early Tamil Press – Emergence of the Tamil Press under the company rule.

UNIT VIII: Evolution of Tamil Press (1875-1947) National movement – After Independence.

Books recommended :

1. Antony Raju, A.P. — Idhazhiyal Oor Arimugam
2. Raja, K. — Idhazhiyal
3. Kalaivani, V. — Idhazhiyal Uthigal
4. Krishnaswamy, V. — Thagaval Thodarbiyal
5. Guruswamy, M.P. — Idhazhiyal Kalai
6. Kodandapani, R. — Idhazhiyal
7. Sambandan, M.S. — Tamil Idhazhiyal Varalaru
8. Swamy, A.M. — Tamizh Idhazhiyal Thottram Valarchi
9. Mohammed Ussan, M.A. — Tamizh Idhazhiyal

Course out comes:

1. Students will learn about various types of journalism and way of their help societies.
2. Stduents will gain substantional knowledge about journalism.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					H		H				
CO2	H					H		M				

H=High, M=Middle, L=Low

PAPER TML 107 HUMAN VALUES AND PROFESSIONAL ETHICS – I (AUDIT COURSE)

Course objectives:

1. To bring out the hidden good values and the importance of value-based education among the students.
2. Apart from specialization in the subject it is also the duty of the curriculum to teach the social responsibility to the student. To provide knowledge the basic ethics of the society will help him to decide over good and evil.

Unit -1	Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics – Goals-Ethical Values in various Professions**.**
Unit -2	Nature of Values – Good ans Bad, Ends and Means, Actual and Potential Values, Objective and Subject Values, Analysis of basic Moral concepts- right, ought, duty, obligation, justice, responsibility And freedom, Good behaviour and respect for elders**.**
Unit -3	Ahimsa (Non-Violence), Satya (Truth), Bramacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non-Stealing), Purushar Thas (Cardial virtues)- Dharma (Righteousness), Artha(Wealth) Kama (Fulfillment Bodily Desires), Moksha(Liberation)**.**
Unit -4	Bhagavad Gita-(a) Niskama karma, (b) Buddhism- The Four Noble Truths – Arya astanga marga, (c) Jainism- mahavratas and anuvar- Tas. Values Embedded in various Religions, Relirious Tolerance, Gandhian Ethics.
Unit -5	Crime and Theories of punishment-(a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya**.**

Course Outcomes

1. Value based education will help the student to act with responsibility in the social environment
2. Helps the student to act with Ethics and create awareness among the public.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								H			H	H
CO2								H			H	M

H=High, M=Middle, L=Low

SEMESTER-II

Sl. No	Code	Title of the Course	Credit Hrs./ Week	No. of Credits	Components of Study	IA Marks	Sem End Exam Marks	Total
1	201	Modern Literature – II	6	4	Core	20	80	100
2	202	Medieval Literature - II	6	4	Core	20	80	100
3	203	Grammar – II (Tholkappiam – Elutthathikaram)	6	4	Core	20	80	100
4	204	Principles of Literary criticism - II	6	4	Core	20	80	100
5	205	5a. History of Tamil Literature	6	4	Compulsory Foundation	20	80	100
		5b. Feminism						
		5c. Environment in Tamil Literature						
6	206	6a. Comparative Grammar of Dravidian Languages and History of Tamil Languages	6	4	Elective Foundation	20	80	100
		6b. Bakthi Ilakkiyam						
	Total		36	24		120	480	600
7	207	Human Values and Professional Ethics - II	0	0		100	--	--

*ALL CORE Papers are Mandatory

- Compulsory Foundation – Choose one paper
- Elective Foundations – Choose one paper
- Audit Course – 100 Marks (Internal) – Zero Credits under Self Study
- Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade ass open elective only giving extra credits

PAPER TML 201 – MODERN LITERATURE – II

Course objectives:

1. To introduce students to contemporary Tamil writers and their works to understand the current trend of Tamil literature
2. To enable students to grasp the works of contemporary writers and their contribution to the field of Tamil literature

Unit -1	Bharathidasan : 'Kudumba Vilakku'
Unit -2	A. Palani : 'Anicha Adi'
Unit -3	Rajamkrishnan : 'Setril Manidargal'
Unit -4	Jayakanthan : 'Yuga sandhi'
Unit -5	Dr.Mu. Varadarajan : 'Tamil Nenjam'

Course Outcomes

1. Students will know the latest works, contemporary writing style and better equipped to emulate and produce better works
2. Students will understand and appreciate the contribution of contemporary writers to Tamil literature

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M						H		
CO2	H	H						L				

H=High, M=Middle, L=Low

PAPER TML 202:CORE - MEDIEVAL LITERATURE – II

Course objectives:

1. Students will gain knowledge about the various works of medieval Tamil literature
2. Students will learn about the History of Medieval Tamil culture through literature

Unit -1	Thirunavukkarasar Devaram 6th Thirumurai (4,5,6 Pathikams), Thiru-ch-chathakam of Manikkavachakar(6,7,8,9,10 Pathikams)
Unit -2	Kambha Ramayanam – Sundara kandam : Katchi Padalam
Unit -3	Krishna Pillai. H.A., Ratchanya Manoharam (Kai Adaipathikam, Deva Kirubaiyum Matchimaiyum)
Unit -4	Vedanayaka Sastriyar – Bethlagame Kuravanchi (Manuda kumaran, Kulavalam, Kristhuvin Maghimai, Vasalvalam, Desavalam)
Unit -5	Kumara Kuruparar – Meenakshi Amman Pillai Thamizh,
Unit -6	Kavimani Desigavinayagam Pillai's – Umar Gayam Padalgal

Course Outcomes

1. Students will learn in depth about some of the works done during the Medieval period of Tamil literature
2. Students will be able to appreciate the contribution of the medieval age authors to the evolution of Tamil language

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			H		M			H			
CO2	H			M		H			L			

H=High, M=Middle, L=Low

PAPER TML 203 – GRAMMAR – II

THOLKAPPIAM - ELUTTHATHIKARAM

Course Objectives:

1. Learning Grammar will help students to write, speak and use Tamil language in a correct way
2. To equip students with grammatical knowledge of prosody so that they can read and understand poetries in a better way

UNIT I Introduction - nūṉmarapu, moḻimarapu, piṟappiyal

UNIT II puṇariyal, tokaimarapu, urupiyal

UNIT III uyir mayaṅkiyal

UNIT IV puḷḷi mayaṅkiyal

UNIT V kuṟṟiyalukarap puṇariyal

Books recommended:

1. Tolkāppiyam eḻuttatikāram - Iḷampūraṇar urai

Course Outcomes

1. Students will acquire knowledge about Tholkappiam Eluttathikaram.
2. Students will be able to use the language in a structured manner as per the rules of the grammar

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				H	H		H					
CO2				H	M		H					

H=High, M=Middle, L=Low

PAPER TML 204 – (A) PRINCIPAL OF LITERARY CRITICISM-II

Course objectives:

1. To understand the meaning, types and importance of criticism and the scope of Literary criticism 2. To understand the contribution of contemporary literary critics to the development of Tamil literature

1. Aspects of Literature in Critical Evaluation.
2. The Terms and Categories of Literary Criticism.
3. The Various Isms.
4. Tholkappiyar's theory of Simile.

UNIT I Feelings and emotion – Imagination – Theme and Form.

UNIT II Fancy and Imagination – The diction of poetry – Style – Metaphor – Satire – Smile. Image and Imagery - Allegory

UNIT III Symbolism – Irony – Fun and word play. The Tragedy in Literature – Patterns of myth in Literature.

UNIT IV Realism – Surrealism – Romanticism – Imagism – Neoclassism etc.,

UNIT V Tholkappiyar's Theory of Simile (Uvamai Iyal) – Emotions Maipaathiyal). The concept of nokku of Tolkappiyar.

Books recommended :

1. Dr.M.Varadarajan : Ilakkia-t-Tiran
2. Dr.M.Varadarajan : Ilakkia Marabu
3. Dr.A.S.Gnana Sambandan : Ilakkia-k-Kalai
4. Dr.K.Kailasapathy : Ilakkiyamun Thiranivum
5. Dr.N.Subbu Reddiar : Agathinai Kolgaigal
6. Dr.N.Pichaimuthu : Ilakkiya Iyakkangal
7. Dr.S.Balachandran : Ilakkiya Thiranaivu

English books recommended :

1. William Hendry Hudson An Introduction to be study of Literature

Course Outcomes

1. This subject will help students become a responsible critic offering constructive criticism rather than abusing literary criticism

2. Students will be able to contribute to the development of Tamil literature through quality criticism.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H		H						H		
CO2		H		H						M		

H=High, M=Middle, L=Low

PAPER TML 205A HISTORY OF TAMIL LITERATURE –II

Course objectives:

1. To introduce students to the great History of Tamil literature and enable them to appreciate the intricacies of Tamil literature that had existed in the past.
2. To understand the contribution of various personalities to the development of Tamil literature over the years.

UNIT I The Commentator's- Saiva Cittanta Sastras – Thiru untiyaar – Thirukalir –Rap-petiyaar,

Sivanagnanapotham—sivagnana cittiyaar, Iruppa Irupadhi Unmai vilakkam civapprakasam, Thiruvaratpayiram, vina venpa- pooripakrot Venpa–Nenchuvidu-th-Thoothu,Unmaineri Vilakkam,Sangalpa Nivakaranam.

UNIT II The Commentators of literature and Grammer ; Ilampooranar, Peraciriyar, Cenaavaraiyar,

Naccinaarkiniyar, Atiyaarku Nallar, manakkutavarm Kaalinkar, Parimelazhakar, parithiyaar and Theivaccilaiyar, Ativeerarama Pandiyar, Kacciyappa Munivar – Veera

Kaviraayar, paran Jyothi Munivar, Villiputhuraar, Arunakirunaathat, Kaalameka Pulavar,

Athimadhurakavi, Irattaiyarkal, Tolkappiya Thevar. The contributions of saiva mutts to

Tamil Literature- Sivapprakasa Swamigal – Muslim poets.

UNIT III Period of Europeans; The developments of prose literature in Tamil Europeans Scholars:

Veerama Munivar, Zeaganpalku Iyar, Ellis Thurai, Ranius, G.U. pope, Dr. Caldwell; Tamil Christian Scholars: Vedanayakanpillai H.A. Krishnapillai, Vedanayaka Sastriyar,

Winalow, Thirikootarachappa Kavirayar- Mukkoodar Pallu, Arunachalakkavi, Vatamalaiyappa pillai, Ramachandra kaviraayar, Mahavidwan Meenakshi sundaram pillai, Ramalinka Adigal.

UNIT IV The Scholars of Jaffna and their contribution to Tamil Literature Aarumuka Naavalar,

C.V. Damodaram pillai, Dr. V.V. Saminatha Iyar, Pandithamani kathiresan chettiar,

Vibulaananthan, Maraimalai Adikal, Thiru.vi.ka, Vaiyapuri Pillai, Dr.M. Varadarajan,

18th to 20th century poets and Tamil scholars.

UNIT V Iyal Tamil: Bharathiar, Desika Vinayakam Pillai, Bharathi Dasan Namakkal Kavignar –

Blank Verse – Living Poets- Isai Tamil – Nadakathamizh. Development of Short story:

The early writer puthumaippithan – K.P. Raja Gopalan – Kalki- Rajaji – Arignar Annathurai and other living writers, Jayakanthan, Samuthiram etc., Development of Novels: Historical Novels – Social Novels – Women Novelists Progressive writers – Novels by Translation. Development of Tamil in twentieth century: Biographies- Books

on Modern Knowledge, Literary Research Publications – Books on Literary History- Editions of Tamil Books- Essays on Tamil Grammar – Travelogues - Books of philosophy, Linguistics and history of Tamil Language- History of Tamil country – Books on Literary Criticism – New trends in poetry.

Books recommended:

- Varadarajan. M. : Tamil Ilakkiya Varalaaru
- Velu Pillai : Kaalamum Karuthum
- Periya Karuppan. R.M : Pudhiya Nokkil Tamil Ilakkiya Varalaaru

Course Outcomes

1. Students will understand the evolution of Tamil language and its literature over different time periods.
2. By studying this subject, Students will be able to learn about the Tamil culture of the past and how it has evolved over generations.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H	H								
CO2	H		H	L								

H=High, M=Middle, L=Low

Unit -5	Iyal Tamil : Bharathiar, Desika Vinayakam Pillai, Bharathi Dasan Namakkal Kavignar – Blank Verse – Living Poets- Isai Tamil – Nadakathamizh. Development of Short story : The early writer puthumaippithan – K.P. Raja Gopalan – Kalki- Rajaji – Arignar Annathurai and other living writers, Jayakanthan , Samuthiram etc., Development of Novels : Historical Novels – Social Novels – Women Novelists Progressive writers – Novels by Translation. Development of Tamil in twentieth century : Biographies- Books on Modern Knowledge , Literary Research Publications – Books on Literary History- Editions of Tamil Books- Essays on Tamil Grammar – Travelogues- Books of philosophy, Linguistics and history of Tamil Language- History of Tamil country – Books on Literary Criticism – New trends in poetry.

Course Outcomes

1. Students will understand the evolution of Tamil language and its literature over different time periods.
2. By studying this subject, Students will be able to learn about the Tamil culture of the past and how it has evolved over generations.

Books recommended :

□□Varadarajan. M. Tamil Ilakkiya Varalaaru

□□Velu Pillai Kaalamum Karuthum

□□Periya Karuppan. R.M Pudhiya Nokkil Tamil Ilakkiya Varalaaru

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									M	M	H	
CO2									H	M	H	

H=High, M=Middle, L=Low

PAPER TML 205B FEMINISM

Course Objectives:

1. To study and understand about Feminism, women and their evolution over the ages, discrimination faced by women, rights of women
2. To know Feminism in its true spirit and its importance in current world and to study contemporary works about Feminism.

Note: Select any one in the above 204 core paper

UNIT I Pennia Arimugam – Pennia Kotpaadugal - Pennia nokkam, Pengalin Urimaigal,

UNIT II Pen Paadukkappu (Pudiasattangal) - Thurai Thorum pengal

UNIT III Ikkala Ilakkiyangalil (Kavithai, chirukathai, Novel) Pennia Cinthanaikal**.**

Books Recommended:

1. Penniam - R. Prema.

Course Outcomes

1. Students will understand the rights of women in the society and treat them equally with respect and dignity

2. Students will gain right knowledge about feminism and contribute to the development of gender equality through literature as well as in their daily lives.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M							H			H	
CO2	H							H			M	

H=High, M=Middle, L=Low

PAPER TML 205C ENVIRONMENT IN TAMIL LITERATURE

Course Objectives

1. To understand about the environment, changes affecting the environment and its causes and impacts.
2. To study and understand the importance of the Environment as mentioned in the Tamil literary works

UNIT I Suttru Suzhal kalvi – Suzhalial Matrangal – Karanigal. Masupaadugal

UNIT II Suzhalial IkkalaIllakiyangalil (Kavithai – Chirukathai, Novel)

UNIT III Suzhaliyal Cinthanaigalum Kalviyum**.**

Books Recommended:

1. Suttru Suzhalkalvi – Susila Appadurai**.**

Course Outcomes

1. Students will understand the importance of saving the environment from adverse changes that is happening currently.
2. Students will adapt environment friendly practices in their day to day life to minimize the impact of human activities on natur

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			H						H	H		
CO2			M						H	H		

H=High, M=Middle, L=Low

PAPER TML 206A. COMPARATIVE GRAMMAR OF DRAVIDIAN LANGUAGES AND HISTORY OF TAMIL LANGUAGES

Course Objectives

1. To make a comparative study of Grammar of Dravidian languages to understand the similarities and influences among the Dravidian languages
2. To study about History of Tamil language, the intricacies of its grammar with special focus on borrowing of words that happened between Tamil and various other languages

UNIT I Comparative Grammar of Dravidian And History of Tamil Language

A general Introduction to the Dravidian Languages in North Central and South Dravidian –

the place of Tamil Language in Dravidian – antiquity of Tamil Evidence Phonology of Dravidian Languages (Plosives nasals – Convertibility of Shurds and Sonarants) Displacement of sound (metathesis etc.,) Stress in Dravidian Syllabation. Morphology Formation of Gender –Tinai,Number – Personal pronouns Classification of Nouns – Formation of case and its affixes – Dravidian – Verbs – tenses – Tanvinai, Piravinai, (Non – Eragative, Eragative) Negative Verbs and passive verbs. Adjectives - Structure of numerals – monosyllabic words – root words Difference between the Indo – Aryan and Dravidian Languages – sounds and Words – Borrowing.

UNIT II History of Tamil Language

Ancient Dravidian Languages and its Classification. South Dravidian Languages. Special characteristic feature of Phonology in Tolkappiyam. History of alphabet changes of short and long vowels – Shape of Aytum and its history interchange of ‘I,u’, into ‘e,o’ and the Consequent changes in the word form changed of consonants – structure of Ai, and convertibility of sounds.

UNIT III

Changes in noun forms – Historical study of personal nouns and numerical Nouns. Verb

historical changes of verbs – relative (OR) adjectival Participles – History of Negative verbs

classification and change of tanvinai and piravinai. non eragative change in the form passive

voice.

UNIT IV

Tense markers the non-finite verb (eecam) signifies Tense – tense Classification –the

Language – Dravidian and Indo – Aryan Languages. cteristic features of Medieval Tamil

and characteristic feature of usages of chola period – syntax grammatical tradition, current

usages, characteristic features of Medieval Tamil and Modern Tamil.

UNIT V Borrowing - Loans (Words):

Tamil words in other languages – Sanskrit, English other Languages. From other languages

into Tamil (1) Greek, Hebrew,Syrin,Arabic,Urdu, Persian words (2) French Portuguese ,

Dutch, English (3) Neighbouring Languages of the Modern Period. Dravidian languages:

Telugu, Kannada, Malayalam and other Dravidian Languages.

Tamil Books Recommended:

- Meenakshisundaram T.P History of Tamil languages,
- Kumaraswamy Raju.N. Post nasal voiceless plosives in Dravidian
- Varadarajan.M. Mozhi Nool
- Varadarajan.M. Mozhi Varalaaru
- Srinivasan .R. Mozhi Oppiyalum Varalaram
- Dr.Agesthiyalingam.S Dravida Mozhigal – 1, 2, & 3
- Dr.Agesthiyalingam.S Ulaga Mozhigal – 1, 2, & 3
- Dr.Agesthiyalingam.S Mozhi Iyal Vaazhvum Varalaarum
- Dr.Agesthiyalingam.S Mozhi yal 1 & 2
- Dr.Agesthiyalingam.S Col Iyal 1 & 2

English Books Recommended:

- Caldwell Dr. R - A Comparative Grammar of Dravidian languages
- Jules Block - The Grammatical structure of Dravidian languages,
- Emeneau M.B - Dravidian comparative Phonology
- Andronev M.S - Dravidian languages

Outcomes

1. Students will understand the important characteristic features of Grammar of Dravidian languages through a comparative study
2. Students will gain knowledge about the grammatical aspects of various languages and the mutual borrowing of words between Tamil language and other languages.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H		H								H
CO2		M		H								M

H=High, M=Middle, L=Low

PAPER TML 206B. BAKTHI ILAKKIYAM

Course Objectives:

1.The course will interduce students to the Bakthi tradition thorugh poems which spans centruries.

2.The course will lead the students to understand that Bakthi is also about questioning and dessent as much as it is about faith, love and ecstasy.

UNIT I 1 Thirugnana Sambanthar Thevaram - Mannil Nalla Vannam Vaazhalam Mudhal Thirumurai –

Thirukkazhumalam Pathikam (1-11 Padalgal)

2 Thirunavukkarasar Thevaram - Maadharpiraikkanniyaanai – 5th Thirumurai Thiruvaiyaru

Pathikam (1-10 Padalgal)

3 Sundharar Thevaram - Ponnaar Meniyane – 7th Thirumrai Thirumazhapaadi Thiruppathikam (1-10 Padalgal)

4 Manikkavasagar - Thiruvasagam Adaikkalappathu (1-10 Padalgal)

UNIT II 1. Nammalwar - Thiruvaaimozhi – Mudhal Thirumozhi 9th Paththu. Konda Pendir enath Thodangum Pasuram (1-10 Padalgal)

2. ThirumangaiAlwar - Periya Thirumozhi Vaadinen Vaadi Pasuram (1-10 Padalgal)

3. Andal - Naachiyar Thirumozhi Karuppuram Naarumo Pasuram (1-10 Padalgal)

4. Thiruvarangathu Amudhanar - Ramanusa Noortrandhadhi (1-10 Padalgal)

UNIT III 1 Thirumoolar - Thirumandhiram – Mudhal Thandhiram Vaanacirappu Mudhal Nadunilamaivarai (1-10 Padalgal)

2 Arunagirinadhar - Kandhar Alankaram (1-25 Padalgal)

3 Sivaprakasar - Naalvar Naanmanimaalai (1-8 Padalgal)

4 Vallalar - Thiruvarutpa 6th Thirumurai – Muraiyeedu (1-10 Padalgal)

UNIT IV H.A. Krishnapillai - Ratchaniya Manogaram

1. Baalya Prarthanai (1-20)
2. Adiyargalin Ozhukkam (1-20)
3. Thirunamap Pathikam (1-11)
4. Seeva Vaakku (1-10)

UNIT V Gunangudi Masthan Saahibu - Gunangudi Masthan Saahibu Padalgal

1. Agatheesar Sadhakam (1-10 Padalgal)
2. Aanandhak kalippu

Reference books :

1 Dr.P.Arunachalam - Bakthi Ilakkiyam – Oru Arimugam Thamizh - Puthagalayam Bycrapts Road. Ch-5.1973

2 Dr.S.N. Kandhasami - Thirumurai Ilakkiyam, Ulagathamizhaaraaichi Niruvaram, Chennai -112, 1995

3 P.Arunachalam - Vainava Samayam, Paari Puthagappannai, Ch – 1982

4 Mayilai.seeni. Venkatasaami - Kiristhuvamum Thamizhum Kazhaka Veliyeedu – Ch-18, 2000

5 Dr.C.Nayinaar - Masthaan Saahibum Thaayumaanavarum Muhammadhu Umaru Pathippagam, 6, Pera - aciriyar Kudiyiruppu – Thiruchirappalli-20. 1993

6. Dr.S.Amirthalingam - Vallalaarin Aalumai Uruvaakkam, The Parkkar. Rayapettai Ch-14, 2004

3. K.Vellaivaaranar - Panniru Thirumurai Varalaaru irandu Thoguthigal, Annamalai University,
Annamalai Nagar.

Course OutComes:

1. It will develop critical sensibility and reflectivity towards self and society.
2. Gain relevant skills to build an academic argument.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H				H			H			
CO2		H				M			H			

H=High, M=Middle, L=Low

PAPER TML 207 HUMAN VALUES AND PROFESSIONAL ETHICS – II (AUDIT COURSE)

Course objectives
1. To bring out the hidden good values and the importance of value based education among the students 2. Apart from specialization in the subject it is also the duty of the curriculum to teach the social responsibility to the student. To provide knowledge the basic ethics of the society will help him to decide over good and evil.

Unit -1	Value Education-Definition-relevance to present day – Concept of Human Values –self introspection – Self esteem. Family values-Components, structure and responsibilities of family – Neutraliza-Tion of anger – Adjustability – Threats of family life – Status of Women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.
Unit -2	Medical Ethics – Views of Charaka, Sushruta and Hippocratus on Moral responsibility of medical practitioners. Code of ethics for Medical and healthcare professionals. Euthanasia, Ethical obliga-Tion to animals, Ethical issues in relation to health care Prefession-Als andpatients. Social justice in health care, human cloning, Problems of abortion. Ethical issues in genetic engineering and Ethical issues taised by new biological technology or knowledge.
Unit -3	Business ethics – Ethical standards of business-immoral and illegal Practices and their solutions. Characterics of ethical problems in Management, ethical theories, causes of unethical behaviour ethical Abuses and work ethics.

Unit -4	Environmental ethics – Ethical theory, man and nature – Ecological Crisis, pest control, pollution and waste, climate change, Energy and Population, justice and environmental health.

Unit -5	Social ethics-Organ trade, Human trafficking, human rights violation and social disparities. Feminism ethics, Surrogacy/pregnancy. Ethics of media-Impact of Newspapers. Television, Movies and Internet.

Books for study:

1. John S mackenjie: A manual of ethics.
2. "The Ethics of Management" by larue Tone Hosmer, Richard D.Irwin Inc.
3. "Management Ethics"- integrity at work by joseph A. Petrick and John F.Quinn Response books, New Delhi.
4. "Ethics Management" by S.A. Sherlekar, Himalaya publishing House.
5. Harold H. Titus: Ethics for Today.

Course outcomes

1. Value based education will help the student to act with responsibility in the social environment
2. Helps the student to act with Ethics and create awareness among the public

CO-PO MAPPING

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								H			H	H
CO2								H			H	M

H=High, M=Middle, L=Low

SEMESTER-III

Sl. No	Code	Title of the Course	Credit Hrs./ Week	No. of Credits	Components of Study	IA Marks	Sem End Exam Marks	Total
1	301	Ancient Literature – I	6	4	Core	20	80	100
2	302	Grammar – III Tholkappiam - Collathikaram	6	4	Core	20	80	100
3	303	3a. Comparative study of South Indian Literature	6	4	Generic Elective	20	80	100
		3b. Dravidian movement in Tamil Literature	6	4		20	80	100
		3c. Telugu Literature and Literary Movements						
		3d. Folk Arts in Tamil						
4	304	Principles and Theories of Translation	6	4	Skill Oriented Course	20	80	100
5	305	5a.Temples of Tamil Nadu			Open Elective			
		5b.Tamil Culture	6	4		20	80	100
	Total		36	24		120	480	600

*ALL CORE Papers are Mandatory

- Generic Elective - students as two choose any paper two
- Skill Oriented Course is Mandatory
- Open Electives are for the students of other Departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through Self Study
- Interested students may register for MOOC with the approval of the concerned DDC

PAPER TML 301.ANCIENT LITERATURE – I

Course Objectives:

1. Introduce students to Ancient Tamil authors and their works to understand the richness of Tamil literature
2. To enable students to grasp the works of ancient authors and their contribution to the field of Tamil literature

- Kurunthokai - 1 - 50 Songs
- Kalithokai - Paalai –k – kali
- Tirukkural - Arathuppal
- Cilappathigaram - Pugar Kaandam

UNIT I An Introduction to Sangam Literature -- Pattu & Thogai

UNIT II Kurunthokai - (1 -- 50 Songs).

UNIT III Kalithogai - Paalaikkali

UNIT IV Tirukkural - Arathuppal: Paayiram, Illaraviyal, Thuravaraviyal & Uzhiyal

UNIT V Cilappathigaram - Pugar Kaandam

Course outcomes

1. Students will learn about the works pertaining to Sangam age
2. Students will be able to appreciate the contribution of the ancient age authors to the evolution of Tamil language

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H	H			
CO2	H							M	H			

H=High, M=Middle, L=Low

PAPER TML 302 GRAMMAR - III
THOLKAAPPIYAM - COLLATHIKARAM

Course Objectives:

1. Learning Grammar will help students to write, speak and use Tamil language in a correct way
2. To equip students with grammatical knowledge of prosody so that they can read and understand poetries in a better way

UNIT I Tholkkappiyam – The structure of the Grammatical treatise The age of Tholkkappiyam**.**

UNIT II Kilaviyaakkam, Vetrumal Iyal.

UNIT III Vetrumai Mayangiyal, Vili Marabu & Peyar Iyal.

UNIT IV Vinai Iyal.

UNIT V Idai Iyal, Uri Iyal, & Ecchaviyal.

Books Recommended:

1. Tholkappiyam Col – Ilampuranar Urai

Course OutComes:

1. Students will have a better understanding of grammatical usage in Tamil literature.

2. Students will be able to use the language in a structured manner as per the rules of the grammar.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				H	H		H					
CO2				H	M		H					

H=High, M=Middle, L=Low

PAPER TML 303A. COMPARATIVE STUDY OF SOUTH INDIAN LITERATURE-I

Course Objectives

1. To study and understand the aim, history and theory of comparative literature
2. To understand and learn about the influence of Sanskrit on south Indian languages and influence of Tamil on other languages

UNIT I An Introduction to the study of Comparative Literature – The scope and aim of Comparative studies.

UNIT II A brief history of Comparative Literature – The various theories of Comparative Literature

UNIT III Early Literature in the south Indian Languages – Telugu, Tamil, kannada and Malayalam.

UNIT IV The Influence of Sanskrit on Telugu, Kannada and Malayalam Literature.

UNIT V The translated works such as Mahabharatha, Ramayana. The Translated works such as Bhagavatham, Puranas and other Sanskrit Classics in the South Indian Literature. The Influence of Tamil on Telugu, Kannada and Malayalam Literature. The Influence of Tamil on Saiva and Vaishnava Literature.

Books recommened:

Kailasapathy. K. Oppiyal Ilakkiyam

Kailasapathy. K. Oppilakkiya Aaivu

Mahadevan. K. Oppilakkiya Nokkil Sangalam

Manavai Musthaba Dravida Oppiyal Ilakkiyam

Periya Karuppan .R.M. Oppilakkiya Arimugam

Sarma . C.R. Ramayanam in Telugu & Tamil

Sithapathi. G.V. History of Telugu Literature

Sita Ramayya. L.k. A hand book on Telugu Literature

Sourirajan.P.& Sarvotham.K. Annamaya oor Arimugam

George. K.M. A Survey of Malayalam Literature

Parameswara Nair. P.K. Malayala Illakkiya varalaaru

Mugali. R.S The Heritage of Karnataka

Rice. Edward. P. History of Kannada Literature.

Siddalingaiah. T.R. Kannada kathuraigal

Course Outcomes

1. Students will learn about the early literature in south Indian languages and the influence they had on each other

2. Students will learn about the Sanskrit classics that were translated into south Indian languages

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H		H							
CO2	H		H		M							

H=High, M=Middle, L=Low

PAPER TML 303(B): DRAVIDIAN MOVEMENT IN TAMIL LITERATURE

Course objectives

1. To introduce students to the Dravidian Movements that were focused on equality, untouchability, casteism etc.,
2. To study and understand the literary works on Dravidian movement

UNIT I Dravida Iyakka Arimugam – Dravida Iyakka munnodigal

UNIT II Parppaniya yethirppu - Samathuvam – Jathiya ozhippu – Theendamai – Penn Adimai ozhippu

UNIT III Dravida Iyakka Ilakkiyangal.

Books Recommended:

1. Dravida Iyakka varalaru - K.G Radha Manalan

Course outcomes

1. Students will learn about the history of Dravidian movements, its proponents and its contribution to the betterment of the society

2. Students will understand the positive impact that the Dravidian movement has created on the Tamil society and its development

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			H						H			H
CO2			M						M			M

H=High, M=Middle, L=Low

PAPER TML 303(C): TELUGU LITERATURE & LITERARY MOVEMENT

Course Objectives

1. To introduce students to the History of Telugu literature and literary movements
2. To study and learn about few literary works of Telugu language that were authored across various time periods

UNIT I Pandaiya Ilakkiyangal = Moover bharatham saiva ilakkiyangal - Ranganatha Ramayanam.

Prabanda kalam = Prabandas maro charithra, Amuktha malyatha.

UNIT II Thennandra kalam - vijaya vilasam - Annamaiya keerthanaigalpada padaIlakkiyam – Thyagaraya Keerthanaigal – Vemanar padalgal – Sathaga Ilakkiyangal.

UNIT III Adunika yugam – kavitha – nadagam – naval, chirukathai – Janapada Sahithyam.

Books Recommended:

Telugu illakkiya Varalaru - Jayaprakash - Sethupandian

Course Outcome

1. Students will learn about the evolution of Telugu literature by studying various prominent literary works of different ages
2. Students will be better equipped to do comparative study of Tamil language with that of another Dravidian language i.e. Telugu

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H						H		H		
CO2		H						M		M		

H=High, M=Middle, L=Low

PAPER TML 303(D): FOLK ARTS IN TAMIL

Course Objectives

1.To study and understand about various Folk arts related to Tamil culture

2. To study in detail and learn about each of the Folk Art

UNIT I Karagattam – Poikkal kuthirai attam – Manattam – Cilambattam –Kavadiyattam

UNIT II Mannpandakkalai – Nesavukkalai – Kattidakkalai

UNIT III Oviyakkalai – Chirpakkalai – Adal - kalai Padal kalai – Oppanaikkalai.

Books Recommended:

1. A.Dhakshnamurthy - Tamizhar nagarigamum panpadum
2. S. Sakthivel - Nattuppuravial Oru Arimugam 21

Course Outcomes

1. Students will learn about the various Folk arts and the Tamil culture in a detailed manner

2. Students will appreciate the role of Folk arts in preserving, sustaining and evolution of Tamil culture.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					H				H	M		
CO2					H				H	M		

H=High, M=Middle, L=Low

PAPER TML 304: PRINCIPLES AND THEORIES OF TRANSLATION

Course Objectives:

1. To make students aware of various types of translation.
2. To enable students to undertake translation of literary text.

UNIT 1: Mozhipeyarppin Indriyamaiyaamai-Mozhipeyarpiyal Kotpadugalin Adippadaigal – Moolathin Ulladakkamum Mozhipeyarpum

UNIT 2: Mozhipeyarppu Nigarangal – Mozhi Vazhakkugalum Mozhipeyarppum

UNIT 3: Ilakkanaththai Thagavura Amaiththal-Porulai Porundha Amaithal-Collaakkan

UNIT 4: Mozhipeyarppin Moondru Padinilaigal-Mozhipeyarppaalan

UNIT 5: Mozhipeyarppiyal Kotpadugal-Vagupparai Mozhipeyarppu

Reference book :

1. Dr.Sethumani Maniyan : Mozhipeyarpiyal Kotpadugalum Uththigalum
2. S. Shanmuga Velayudam : Mozhipeyarpiyal, Ulage Tamizh Aarachi Niruvanam, Chennai. 1983

Course OutComes:

1.Able to undertake literary translation work at primary level.
2. Understant varity of translations.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H									
CO2	M	H	M									

H=High, M=Middle, L=Low

PAPER TML 305(A): TEMPLES OF TAMIL NADU (THAMIZH NATTU KOVILGAL)

Course Objectives

1. To understand the remarkable features and specialties of Hindu Temples in Tamil nadu

2. To study and learn about religiousness of Tamil people and various modes of worship they follow – its characteristics

UNIT I Tamizhum Baktineriyum Tamizhum Samayamum

UNIT II Tamizharin Bhakthi Neriyum Vazhipadukalum – Kovil Ozhugalarugal

UNIT III Hindukkalin Pugazhpetra Kovilgal (Saivam & Vaishnavism) Kovilgalin Cirappukal- Mathanal Kattum unnata Vazhigal

Books Recommended:

1. S.Saktivel - Nattuppuraviyal Oru Arimugam
2. M.Radha Krishnan - Thennaattu Koyilgal

Course Outcomes

1. Students will gain in-depth knowledge about various Hindu temples situated in the state of Tamil Nadu

2. Students will understand the meaning, origin and history of various religious practices that take place in temples

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 10	PO 11	PO 12
CO1	H		H						H			
CO2	H		H						M			

H=High, M=Middle, L=Low

PAPER TML 305(B): TAMIL CULTURE

Course Objectives

1. To learn about Tamil culture and its prominent characteristics

2. To understand in detail about traditions, rituals, beliefs, humanism, hospitality etc., of Tamil culture

UNIT I Thamizharin pannpattukkuyrugal

UNIT II pazhakka vazhakkangal – nambikkaigal – Sadangugal

UNIT III Virunthombal – Manitha neyam.

Books Recommended:

1. V.T. Selvam - Tamizhaga Varalarum Panpadum
2. Dr. K.K.Pillai - Tamizhaga varalarum makkal Panpadum

Course Outcomes

1. Students will gain knowledge about various aspects of Tamil culture and its history
2. Students will understand the evolution of Tamil culture over different time periods.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H						H			
CO2	M		H						H			

H=High, M=Middle, L=Low

SEMESTER-IV

Sl. No	Code	Title of the Course	Credit Hrs./Week	No. of Credits	Components of Study	IA Marks	Sem End Exam Marks	Total
1	401	Ancient Literature – II	6	4	Core	20	80	100
2	402	Grammar – IV Tholkappiam - Porulatikaram	6	4	Core	20	80	100
3	403	3a. Comparative Study of South Indian Literature - II	6	4	Generic Elective	20	80	100
		3b. Research Methodology	6	4		20	80	100
		3c. Tirukkural (Porutpal)						
		3d. Folk Festivals						
4	404	Culture and Civilization of the Tamils	6	4	Multidisciplinary Course/Project Work	20	80	100
5	405	5a. Cilappathikaram (Madhurai Kandam)	6	4	Open Elective	20	80	100
		5b. Panneru (12) Alvargal						
	Total		36	24		120	480	600

*ALL CORE Papers are Mandatory

- Generic Elective - students as two choose any paper two
- Multy disciplinary course/project work is mandatory
- Open Electives are for the students of other Departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through Self Study
- Interested students may register for MOOC with the approval of the concerned DDC

PAPER TML 401: ANCIENT LITERATURE -II

Course Objectives

1. Introduce students to Ancient Tamil authors and their works to understand the richness of Tamil literature
2. To enable students to grasp the works of ancient authors and their contribution to the field of Tamil literature

1. Aganaanooru -- From 126 – 150 songs
2. Puranaanooru -- From 101 – 150 songs
3. Cirupaanaatrupadai -- Full Text
4. Naaladiyar -- Porutpal
5. Cilappathigaram -- Madhurai Kaandam & Vanchi kaandam

UNIT I Aganaanooru -- From 126 to 150 songs (25 Songs)

UNIT II Puranaanooru -- From 101 to 150 songs (50 Songs)

UNIT III Cirupaanaatrupadai Full Text

UNIT IV Naaladiyar -- Porutpal 131 – 180 (50 Songs)

UNIT V Cilappathigaram -- Madhurai Kaandam, Vanchi Kaandam

Course Outcomes

1. Students will learn about the ancient Tamil literature works like Agananooru, Purananooru etc.,
2. Students will be able to appreciate the contribution of the ancient age authors to the evolution of Tamil language

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H	H			
CO2	H							M	H			

H=High, M=Middle, L=Low

PAPER TML 402: GRAMMAR – IV

TOLKĀPPIYAM – PORUḶATIKĀRAM

Course Objectives:

1. Learning Grammar will help students to write, speak and use Tamil language in a correct way
2. To equip students with grammatical knowledge of prosody so that they can read and understand poetries in a better way

UNIT I General Introduction - akattiṇaiyiyal, puṟattiṇaiyiyal

UNIT II kaḷaviyal, kaṟpiyal, poruḷiyal

UNIT III meyppāṭṭiyal, uvamaviyal

UNIT IV ceyyuḷiyal

UNIT V marapiyal

Course OutComes:

1. Students will have a better understanding of poetics in Tamil literature.

2. Students will be able to use the language in a structured manner as per the rules of the grammar

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				H	H		H					
CO2				H	M		H					

H=High, M=Middle, L=Low

PAPER TML 403(A): COMPARATIVE STUDY OF SOUTH INDIAN LITERATURE – II

Course Objectives

1. To do a comparative study of south Indian literature and understand the contribution of Christian and Islam poets to Dravidian languages
2. To learn about the various influences or impacts on Dravidian language – its evolution and major literary movements

UNIT I The Impact of Bakti movement in South Indian Literature, Saiva and Vaishnava Literature.

UNIT II Various prabandas in Tamil, Telugu, Kannada and Malayalam.

UNIT III The contribution of Christian poets to the Dravidian languages. The contribution of Islam poets to the Dravidian Languages.

UNIT IV Western Influences on Dravidian literature–A General Survey of the development of Dramas, Novels, short stories and other prose literature.

UNIT V Common features and natural influences on South Indian Literature. Major Literary Movements.

Books recommened:

Meenakshi Sundaram.T.P - History of Tamil Literature

Vairapuri Pillai.K. - History of Tamil Literature

Varadarajan.M - Tamil Ilakkiya Varalaaru

Chenchaiah & Bujangaraya Sarma - History of Telugu Literature Chenchaiah.P & Raju - Telugu Literature

Ramakrishnaiah.K - Telugu Literature outside the Telugu Country.

Parameswara Nair.P.K - Malayalam Illakkiya Varalaaru.

Rice.Edward.P. - History of kannada Literature.

Sv. Subramanyam - Dravida Mozhikalin Oppilakkiyam 23

Course Outcomes

1. Students will understand and appreciate the influence of various movements and contribution of Islam and Christian poets to Dravidian languages

2. Students will learn about the major literary movements in the history.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H		H							
CO2	H		H		M							

H=High, M=Middle, L=Low

PAPER TML 403(B): RESEARCH METHODOLOGY

Course Objectives:

1. To introduce students to the concept of research, its methodology and the approach required for doing a quality research on any topic.
2. To impart students with the abilities that are necessary for a quality researcher.

UNIT I Aaraaichi – Vilakkam – Ayvaalarkkuriya thaguthigal –

UNIT II Ayvuchikkal, Ayviyal Anugu muraigal –

UNIT III Karuthugol – Aiyvu vadi vamaippu – noolaga payan padu – mertkol Adikkurippu – kala

Ayvu nerkkanal – Thurainoort pattiya

Books recommened:

1. Prof. M. Ponnusamy - Ariviyal Anugumurai Arachihiyal

Course OutComes:

1. Students will understand the methodology, approach and the prominence of a quality research
2. Students will be motivated to take up research and produce quality outcomes

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			H	H					H			
CO2			H	M					H			

H=High, M=Middle, L=Low

PAPER TML 403(C): TIRUKKURAL – (Porutpal)

Objective

1. To introduce students to Thirukkural (Porutpal) and learn the teachings of Tiruvalluvar
2. To encourage students to explore and understand the work of Thirukkural

UNIT I Introduction of Thirukkural and its author Saint Tiruvalluvar

UNIT II Classification of Thriukkural

UNIT III Porutpal - Arasiyal: Kalvi – Kallamai – Kelvi and Arividaimai

Outcomes

1.Students will gain immense knowledge and wisdom by studying the profound teachings of Saint Tiruvalluvar

2.Students will have a new perspective towards politics, education, life and the world in general afer studying the wise teachings of Triruvalluvar.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H			H	
CO2	H							M			H	

H=High, M=Middle, L=Low

PAPER TML 403(D): FOLK FESTIVALS

NATTUPPURA THIRUVIZHAKAL

Course Objectives

1. To learn about the various folk festivals of different religions existing in our country
2. To understand the importance and origin of various folk festivals

UNIT I Thiruvizha vagaigal – (a) Samayam – (b) Naadu – (c) Gramam – (d) Malai Vazh, Makkal Thiru Vizhakkalal Vilaiyum Nanmaigal Grama Otrumai, Makkal Enaithu, Vazhipadal, Inbamural. Hindu Samyam - Pongal thiruvizha, Chitri, Deepavali, Sivaraathri, Kaarthigai Deepam, Navaraathri, Maraiamman,

UNIT II Mugamathaiar Thiruvizhakkal – Moharam, Ramzan, Bakrith.

UNIT III Kiruthura Vizhakkal, Christmas, Easter, Velankani Vizha.

Books Recommended:

1. S. Saktivel - Nattupuraviyal Oru Arimugam 24

Outcomes

1. Students will learn about various types of folk festivals and the way of their celebrations.
2. Students will gain substantial knowledge about the nitty gritty of folk festivals of different religions

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					H				H	M		
CO2					H				H	M		

H=High, M=Middle, L=Low

PAPER TML 404: CULTURE AND CIVILIZATION OF THE TAMILS

Course Objectives:

1.Introduction to cultural studies will be relevant to students instrusted in populat culture and the cultures of everyday life.

2.The course will pocuss on key thinkers in cultural studies as well as the ways idendities are constructed and maintained through everyday practices.

UNIT I Nagarigamum Panpadum - Sangakalaththu Arasiyal – Pormurai - Thozhil Pirivinarum Samuga Amaippum - Pandai Thamizharin Thirumana MuraiKudumpa Vaazhvu

UNIT II Thamizhnattu Vaniga Valam-Pandai thamizharin Unavu-Udai-Uraiyul-Irappu-Eemachadangu-Nadugal-Thenpulathar Kadan

UNIT III Pandaithamizharin Kalvi nilai - Vaaniyal Arivu - Vilaiyaattum Pozhudhu Pokkum – Vizhakkal - Nambikkaigal

UNIT IV Isaikkalai – Sirpakkalai - Koyil kattidakkalai – Oviyakkalai - Koothu kkalai – Maruthuvakkalai - Nadagakkalai

UNIT V Indhiya Neagarigathil Tamizh Panpaattu kurugal - Vaaimozhi Ilakkiyangalum Thanizh Panpadum - Pazhamozhiyum Panpadum

Reference book :

1. Dr.A.Dhakshnamurthi : Thamizhar Naagariganum Panpadum

Course OutComes:

1.To enable the students to comprehend the globle trends in cultural studies.

2.To enable the students to master the theory and practice of cultural studies.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H							H		
CO2	M		H							M		

H=High, M=Middle, L=Low

PAPER TML 405(A): CILAPPATHIKARAM (MADURAI KANDAM)

Objectives

1. Meant for other disciplinary students to opt as an open elective subject.
2. To introduce students to the First Epic in Tamil language

UNIT I Introduction to First Epic in Tamil (Cilappathikaram)

UNIT II Maduraikantam 13 kaathaikal – Maduraiyin cirappu, Kovalan Irandupadal Kannaki vazhakkadal, Arasan Manaiviyudan irathal, Madurai thipatri Eridal, Avalathirku Madurapathi Theivam vilakkam kooral, kannaki than Munvinai Arinthu- Aartrupadal cheranadu chendru vinnakam cheral.

Outcomes

1. Students will gain knowledge about the most prominent chapter of the First Epic in Tamil i.e. Maduraikantam

2. Students will be motivated to study the first Epic in Tamil in its entirety

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H						H			
CO2	H		H						H			

H=High, M=Middle, L=Low

PAPER TML 405(B): PANNERU (12) ALVARGAL
(TAMIZH VAINAVA ADIKAL)

Objectives

1. Meant for other disciplinary students to opt as an open elective subject
2. To learn about the Alvars, their works and their contribution to the Tamil language.

UNIT I Boodhathalvar, peyaalvar, Poigaialvar

UNIT II Thirumazhisai Alvar, Thirumangai Alvar, Madhura kavi Alvar, Thondaradipodi Alvar, Kulasekarlvar, nammalvar, Thiruppanalvar Periyalvar, Andal

Books Recommended:

1. Dr. N. Subbu Reddiar - Vainava selvam
2. Dr. M. Varadarajan - Vainava Vilakku

Outcomes

1. Students will gain knowledge about the Tamil Alvars and their contribution to the Tamil literature
2. Students will be well equipped to understand the magnificent literary works of Tamil Alvars.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H						H			
CO2	H		H						M			

H=High, M=Middle, L=Low

SRI VENKATESWARA UNIVERSITY
TIRUPATI – 517 502
ANDHRA PRADESH



DEPARTMENT OF TLEUGU STUDIES

PROGRAMME : M.A TELUGU

PROGRAMME OBJECTIVES & OUTCOMES
COURSE OBJECTIVES & OUTCOMES

Academic Year 2023-2024

ABOUT THE DEPARTMENT

The Department of Telugu was started in the Academic year 1959-60, five years after the S.V. University was founded. The Department of Telugu later renamed as "The Department of Telugu Studies" in 1981, keeping in view of the extensive and wide range of both Teaching and Research activities of the Department. The year 1984-85 was the Silver Jubilee year and 2009-2010 was the Golden Jubilee year of the Department.

The Department has been providing instruction in M.A. Telugu Language and Literature. At present the year intake of students is about 40 for Regular students for period of two years duration. The Department also introduced Self-Supporting course with strength of 40 students during the academic year 2006-07 based on the demand and job opportunities in Telugu Course.

The Department is actively engaged in teaching and research extension. The Faculty of the Department is also assisting the Directorate of Distance Education, S.V. University in Conducting M.A. Telugu Course through correspondence.

Since its inception, the Department of Telugu Studies has a steady growth and has developed to be one of the Major Department in the University and of the leading Telugu Departments among other Universities in the Country.

The curriculum of the P.G. Course in Telugu S.V. University has certain distinctive features. It provides emphasis to Language and Literature besides introducing innovative subjects like Comparative Study of South Indian Literature. The Structure of Modem Telugu, Functional Telugu, Telugu Journalism, Linguistics, Special Study of Annamacharya, Telugu Folk Literature, History of Literature, Literary Criticism both classical & Modern Andhra History and Culture, Theory of Translation, Pada Kavitha, Telugu Fiction – Novel and Shorty Story, Special Author, Official Language, Modern Telugu Poetry etc. as compulsory Optional papers.

The Department of Telugu Studies introduced Onamastics - the Study of Place Names, Surnames and Gothras, Individual Names Village Names and Street Names etc. at research level.

The Department of Telugu Studies is the first and foremost Department, which has introduced Vyavaharika Bhasha (Spoken Telugu) for drafting M. Phil. dissertations and Ph.D. Theses. The first and foremost Ph.D. thesis drafted in Telugu Spoken Language in the year 1973.

The Department is helping in the Research Programmers of other Departments of S.V. University like English, Hindi, Tamil and Urdu and other Universities of Andhra Pradesh in comparative aspects.

The Department is also giving Guidance to the students of the Department and also other candidates who are appearing for Competitive Examinations like Civil Services, APPSC, NET, JRF and AP SET Examinations.

The Department of Telugu Studies successfully completed UGC SAP Programmers of both phase – I, Phase – II and Phase – III and ASIHSS Programme during the academic year 2007.

VISION

Have an overview of all the relevant areas of Telugu Studies to be an effective Teacher and Researcher. Have acquainted with the subject knowledge including Journalism and Translation for meeting industry needs and achievements social values.

Have thorough knowledge of the History and Culture of Telugu Literature along with Folk and Regional Literature to bear an Societal challenges. Be able to work wisely, creatively and effectively for betterment of Human Kind.

The vision is to become the Centre of excellence, Research and Training in Telugu Language and Literature.

MISSION

The Department's academic and research programmes will provide the students and research scholars value based, Language and Literature education in a trusting and caring environment. The faculty strive to equip the students with research and Literature knowledge to keep pace with the changes to meet the new challenges in Modern Society.

Programme Outcomes, Programme Specific Outcomes and Course Outcomes

Programme Outcomes

I. Programme specific Outcomes (PSOs)

1. Developed application skill through the knowledge in the Telugu Literature and Culture along with folk and resanal literature.
2. Acquainted synthesis and analysis skills through the study of literary criticism.
3. Have getting evaluative ability through the study of short Stories, Navels and Dramas.
4. Imbibing the morals, ideals and culture through the study of classical Literature.
5. To become good human beings through the study of Telugu Literature.
6. Equipped good Language skills through the study of Telugu Language and Literature.
7. To Generate good teacher and researcher skills through the study Telugu courses.

II. Programme Objectives (POs)

1. Have an overview of all the relevant areas of Telugu Studies to create Knowledge in all Fields.
2. Have acquainted in the main areas of Language and Literature to create Comprehensive skill.
3. Have through Knowledge of the History and Culture of Telugu Literature along with Folk and Regional Literature with able to develop Application skill.
4. To create synthesis and analysis skills through the study of Literary Criticism.
5. Be able to evaluate through the study of Short Stories, Navels and Dramas.

6. Be able to remember the Morals Ideas and Culture through the study of Classical Literature.
7. Be able to acquire Human Values and Ethics.
8. Be able to Speak and write with an effective way through the study of Telugu Literature.
9. Be able to communicate the ideas in effective way through the Study of Telugu Language.
10. Have prepared themselves to be an effective and innovative Teacher and Researcher.
11. Have prepared themselves to be a good and responsible human being for the society.
12. Have prepared themselves to be good creative writers and critics.

III. Programme Outcomes (POs)

1. Outgoing students are acquired all fields of Knowledge in the relevant areas of Telugu programme.
2. Have acquired sufficient skills in the areas of Language and Literature.
3. Developed application skill, have through Knowledge in the literary and culture of Telugu Literature along with Folk and regional Literature.
4. Acquainted synthesis and analysis skills through the study of literary criticism.
5. Have getting evaluative ability through the study of short stories, Novels and Dramas.
6. Imbibing the morals, Ideals and culture through the study of Classical Literature.
7. Students become good human beings through the study of Telugu Literature.
8. Equipped good speaking and writing ability through the study of Telugu Language and Literature.
9. Developed effective communicative skills through the study of Telugu language.
10. Generated good teacher and researcher skills through the study of Telugu Courses.
11. Made good human beings in the society through to get the knowledge from the Telugu Programme.
12. Acquired better skills and knowledge in the fields of creative writing and Criticism.

Programme Educational Objectives (PEO)

To enable the students to:

1. Know the Indian Literature through the study of Comparative study
2. Apply Language skills for the development of the community and nation.
3. Imbibe the human values and professional ethics through the study of Literature for personal and social harmony.
4. Interpret research outcomes for community national development.

THE STUDY OF PROGRAMME AND
THE SCHEME OF EXAMINATIONS

Semester-I

S.No.	Components of Study	Course Code TEL	Title of the Course	Credit hours per week	No. of Credits	Internal Assessment Marks	End Semester Exam Marks	Total	PAGE NO.
1.	Core (Mandatory)	101	Prescribed Texts Classical Poetry & Drama	6	4	20	80	100	1
2.		102	General Linguistics	6	4	20	80	100	4
3.		103	History of Telugu Literature-I (Pre Nannaya to Srinadha Period)	6	4	20	80	100	8
4.		104	Telugu Grammar and Prosody	6	4	20	80	100	12
5.	Compulsory Foundation Opt - I	105 A	Folk LORE	6	4	20	80	100	16
		105 B	Sataka Sahityam						19
		105 C	Special Study : Potana						22
6.	Elective Foundation Opt - I	106 A	Classical Telugu Genres	6	4	20	80	100	25
		106 B	Pada Sahityam						28
	Total			**36**	**24**	**120**	**480**	**600**	
7.	Audit Course	107	Human Values and Profetional Ethics – 1	**0**	**0**	**100**	**---**	**---**	31

Semester-II

S.No.	Components of Study	Course Code TEL	Title of the Course	Credit hours per week	No. Of Credits	Internal Assessment Marks	End Semester Exam Marks	Total	PAGE NO.
1.	Core (Mandatory)	201	Prescribed Texts: Modern Poetry	6	4	20	80	100	34
2.		202	Evolution of Telugu Language	6	4	20	80	100	38
3.		203	History of Telugu Literature-2 (Prabandha period to Modern Period)	6	4	20	80	100	41
4.		204	Telugu Grammar and Poetics	6	4	20	80	100	44
5.	Compulsory Foundation Opt - I	205 A	Rayalaseema Sahityam	6	4	20	80	100	49
		205 B	Comparitive Literature						52
		205 C	Special Author : Potuluri Veerabrahmam						55
6.	Elective Foundation Opt - I	206 A	Modern Telugu Genres	6	4	20	80	100	58
		206 B	Samsthana Sahityam						61
	Total			**36**	**24**	**120**	**480**	**600**	
7.	Audit course	207	Human Values Professional Ethics-II	**0**	**0**	**100**	**---**	**---**	64

Semester-III

S.No.	Components of Study	Course Code TEL	Title of the Course	Credit hours per week	No. Of Credits	Internal Assessment Marks	End Semester Exam Marks	Total	PAGE NO.
1.	Core (Mandatory)	301	Classical Literary Criticism	6	4	20	80	100	67
2.		302	Telugu Culture	6	4	20	80	100	70
3.	Generic Elective Opt - 2	303 A	Telugu Journalism	6	4	20	80	100	73
		303 B	Modern Telugu Literature						77
		303 C	Telugu Feministic Literature	6	4	20	80	100	80
		303 D	Special Author : Gurajada						83
4.	Skill Oriented course (Mandatory)	304	Personolity Developmet & Language Skills	6	4	20	80	100	86
5.	Open Elective Opt - 1	305 A	Introduction of Telugu Literature	6	4	20	80	100	89
		305 B	Fundamentals of Modern Telugu Language						92
	Total			**36**	**24**	**120**	**480**	**600**	

Semester-IV

S.No.	Components of Study	Course Code TEL	Title of the Course	Credit hours per week	No. Of Credits	Internal Assessment Marks	End Semester Exam Marks	Total	PAGE NO.
1.	Core (Mandatory)	401	Modern Telugu Literary Criticism	6	4	20	80	100	95
2.		402	Sanskrit Literature and Grammar	6	4	20	80	100	98
3.	Generic Elective Opt - 2	403 A	Methods of Translation	6	4	20	80	100	102
		403 B	Research Methodology						105
		403 C	Telugu Dalith Literature	6	4	20	80	100	108
		403 D	Indian Literature						112
4.	Multi Disciplinary Course (Mandatory)	404	India : A Phylosophical, Sociological & Historical Study	6	4	20	80	100	115
5.	Open elective Opt = 1	405 A	Fundamentals of Folk Lore	6	4	20	80	100	119
		405 B	Telugu Nataka Sahityam						122
	Total			**36**	**24**	**120**	**480**	**600**	

SEMESTER – I

SEMESTER – I

CC : TEL 101	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	PRESCRIBED TEXTS: CLASSICAL POETRY AND DRAMA (CORE)	EXT.Mrks: 80

నిర్దేశించిన పాఠ్యాంశాలు : ప్రాచీన కవిత్వం – నాటకం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021-22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To help the Students Understand the Significance of Ancient Traditional and Classical Literature.
2. To introduce the Student the History and the Characteristics, practices of Epic Poetry.
3. To acquaint the Student with the Socio - Political, Cultural and Economic conditions of the ancient days.
4. To acquire Language Knowledge in depth.

యూనిట్ - I **ఎర్రన - ఆంధ్రమహాభారతం - 'యక్షప్రశ్నలు' 'ఆరణ్య పర్వం' 'సప్తమాశ్వాసం'**

ప.423(దినకరు నెయ్యది...) - 458(ధర్మనందనుండు)

యూనిట్ - II **పింగళి సూరన**

'కళాపూర్ణోదయం' మణికంధరుని తీర్థయాత్ర ఆ.ద్వితీయాశ్వాసం

ప.109(వినుము గంధర్వనందను...) – 180(వినుమిట్టి పనుల కెంతయు...)

యూనిట్ - III **పోతులూరి వీరబ్రహ్మం**

'కాళికాంబ తకం' ప.15(సర్వలక్షణములు...) - 123(తిరములేని దేహ...)

యూనిట్ - IV **రంగాజమ్మ – మన్నారు దాస విలాసము (యక్షగానము)**

యూనిట్ - V **బలిజేపల్లి లక్ష్మీకాంతం - 'సత్యహరిశ్చంద్రీయము నాటకం'**

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand the significance of Ancient Traditional and Classical Literature.
2. Understand the History and the Characteristics and the Practice of Epic Poetry.
3. Understand the Soci - Political, Cultural and Economic conditions of the ancient day.
4. Acquire Language Knowledge indepth.

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2				6	7				11	
CO2	1	2	3			6	7				11	
CO3	1	2	3			6						
CO4	1	2	3			6						
CO5	1	2				6	7			10	11	

TEL 101 - PRESCRIBED TEXTS : CLASSICAL POETRY AND DRAMA

ప్రాచీన కవిత్వం – నాటకం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది పద్యాలలో ఒక దానికి సమగ్ర వ్యాఖ్య రాయండి 1x13=13

(అ) నరునకు నాత్మ యెవ్వఁడు? ఘనంబుగ దైవిక మైన చుట్ట మె
వ్వ? రతనికిం దదీయ మగు వర్తన మేమిటి నిర్వహించు? భూ
వర! యతఁడేమి పూని యనవద్యతఁ బొందు? నెఱుంగఁ జెప్పు మీ
వరుదుగ' నన్న నక్కురుకులాగ్రణి యాతనితోడ ని ట్లనున్

(ఆ) ఓ లలితాంగి! యా తపసి యుగ్రత నింత నితాంత దుర్దమా
భీల తపో ధురంధరతఁ దేర్చుట, నా సుర రాజ్య లక్ష్మిఁ దా
నేలఁగఁ గోరి కావలయు; నిప్పుడ దీనికిఁ బ్రత్యుపాయముం
జాలఁగ నెంచి చేయఁదగు, సంశయ మంతయు మానునట్లుగన్

బి - విభాగం

I. ఈ క్రింది వాటిలో మూడిరటికి సందర్భ సహిత వ్యాఖ్యలు రాయండి 3x5=15

(1) శ్రుతము వలన శ్రోత్రియుడగు

(2) సజ్జనులు దిక్కుసూవె యీ సర్వమునకు

(3) పద పద్మములఁజిక్కి పాయదునా దృష్టి

(4) తప్పుచేసి శివుని తలపోయ ఫలమేమి?

(5) ఎవరంపగా వచ్చితి వెవ్వరి దానవు?

(6) జవదాటి ఎఱుగదీయువతీలలామంబు పతిమాట

సి - విభాగం

III. ఈ క్రింది ప్రశ్నలకు సమాధానం రాయండి 4x13=52

1. అ) కవిత్రయంలో ఎర్రనను పరిచయం చేయండి?

(లేదా)

ఆ) యక్షుని ప్రశ్నలను వివరించండి?

2. అ) మణికంధరుని తీర్థయాత్ర విశేషాలను తెలియచేయండి?

(లేదా)

ఆ) మీ పాఠ్యభాగం ఆధారంగా పింగళి సూరన కవితారీతుల్ని చేయండి?

3. అ) కాళికాంబ శతకం ద్వారా వీరబ్రహ్మం గారి తాత్త్వికతను వివరించండి?

(లేదా)

ఆ) కాళికాంబ శతకం ద్వారా వీరబ్రహ్మంగారిచ్చిన సందేశమేమిటి?

4. అ) యక్షగాన లక్షణాలను తెలిపి, మన్నారుదాస విలాసములో సమన్వయించండి?

(లేదా)

ఆ) నాటక లక్షణాలను తెలిపి 'సత్యహరిశ్చంద్రీయము'లో సమన్వయించండి?

@@@

CC : TEL 102	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	GENERAL LINGUISTICS (CORE)	EXT.Mrks: 80

సామాన్య భాషా శాస్త్రం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021-22

COURS OBJECTIVES (COs)

The aim of the course is -

1. To indroduce the General Linguistics to the Students.
2. To acquaint the Students with branches of Linguistics such as Socio - Lintuistics, Comparative Linguistics, Psycho - Linguistics and Structural Linguistics.
3. To help the Students to understand Phonology, Syntax and Phonitics.
4. To help the students to understand the services of Indian and Western Linguists regarding Linguistics.

యూనిట్ - I భాష - వృద్ధి - నిర్వచనం - భాషోత్పత్తివాదాలు - భాషాలక్షణాలు

చారిత్రక, వర్ణనాత్మక, తులనాత్మక భాషాధ్యయనం

భాషా శాస్త్ర చరిత్ర - ప్రాచ్య పాశ్చాత్య భాషా పండితుల కృషి

భాషల వర్గీకరణ - భౌగోళిక, జన్యాత్మక, రూపాశ్రిత వర్గీకరణ

యూనిట్ - II ధ్వని విజ్ఞానం - అధ్యయన విధానాలు : ఉచ్చారణ - శ్రవణ - ధ్వని

తరంగ విజ్ఞానం - వాగవయవాలు - భాషా ధ్వనుల ఉత్పత్తి - వర్గీకరణ

ఉచ్చారణ విధేయ లిపి, ఐపిఏ పట్టిక

యూనిట్ - III వర్ణ విజ్ఞానం : వర్ణం - సవర్ణం: నిర్వచనం - వర్ణ నిర్ణయ విధానం - అధ్యాంశిక వర్ణాలు

పదాంశ విజ్ఞానం : పదం - పదాంశం - సపదాంశం నిర్వచనాలు,

పదాంశ రకాలు - పదాంశ నిర్ణయ విధానం

యూనిట్ - IV వాక్యం నిర్వచనం - సన్నిహిత అవయవ విశ్లేషణ;

ధ్వని పరిణామం - కారణాలు - రకాలు

ధ్వని సూత్రాలు - పరిమితులు

అర్థపరిణామం - కారణాలు - రకాలు

యూనిట్ - V మాండలికం : నిర్వచనం, మాండలికాలు ఏర్పడే విధానం, లక్షణాలు

వ్యవహార భేదక రేఖలు - మాండలిక పదాలు, ప్రమాణ భాష

ఆధార గ్రంథాలు :

1. **'భారతీయ తత్త్వశాస్త్రం' - సర్వేపల్లి రాధాకృష్ణన్**
2. **'విశ్వదర్శనం, భారతీయ చింతన' - నండూరి రామమోహన రావు, లిఖిత ప్రచురణలు, విజయవాడ**
3. **'భారతీయ దర్శనము (బి.ఏ) - తెలుగు అకాడమి, హైదరాబాద్**
4. **'భారతీయ తత్వశాస్త్రం సులభ పరిచయం' - దేవీ ప్రసాద్ చటోపాధ్యాయ, విశాలాంధ్ర పబ్లిషింగ్ హౌస్, హైదరాబాద్**
5. **'ప్రపంచ చింతనా ధోరణులు' - తెలుగు అకాడమి, హైదరాబాద్**
6. **'భారతీయ తాత్త్విక స్రవంతి సజీవాంశాలు నిర్జీవ ధోరణులు' - దేవీ ప్రసాద్ చటోపాధ్యాయ, ప్రజాశక్తి బుక్ హౌస్, విజయవాడ**
7. **ప్రముఖుల జీవిత చరిత్రలు**

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand the General Linguistics.
2. Acquaint the Various branches of Linguistics.
3. Understand the Phonology, Syntax and Phonitics.
4. Understand the Services of Indian and Westren Linguists.

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2							9			
CO2	1	2							9			
CO3	1	2							9			
CO4	1	2							9			
CO5	1	2	3						9			

TEL 102 - GENARAL LINGUSTICS

సామాన్య భాషా శాస్త్రం

Time : 3 Hours **MODEL QUESTION PAPER** **Marks-80**

ఎ - విభాగం

I. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి **5x4=20**

(1) వర్ణనాత్మక భాషా శాస్త్రం

(2) రూపాశ్రిత వర్గీకరణ

(3) ఐపిఎ పట్టిక

(4) సినోటిబెటన్ భాషా కుటుంబాలు

(5) ఆధ్యాంశిక వర్ణాలు

(6) సపదాంశం

(7) ధ్వని సూత్రాలు

(8) మాండలిక పదాలు

(9) తొల్కాప్పియం

(10) శిక్షలు

బి - విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి **5x12=60**

11 (అ) భాషను నిర్వచించి లక్షణాలను తెలియజేయండి

(లేదా)

(ఆ) భాషా శాస్త్రానికి పాశ్చాత్యులు చేసిన కృషిని వివరించండి

12. అ) ఈ క్రింది సంకేతాలకు నిర్వచనాలు, నిర్వచనాలకు సంకేతాలను రాయండి

P, s, d,o, ʃ, æ, R, m, e, :

1) నాదం ఉభయోష్ఠ్య స్పర్శం

2) మూర్ధన్యానునాసికం

3) దంత్య పార్శికం

4) దంతమూలీయ కంపితం

5) కేంద్రాచ్చు

(లేదా)

ఆ) ధ్వని విజ్ఞానాన్ని నిర్వచించి అందులోని విభాగాలను తెలపండి

13. అ) 'వర్ణం' ను నిర్వచించి, వర్ణ నిర్ణయ విధానాన్ని గురించి రాయండి

(లేదా)

ఆ) పదం పదాంశాలను తెలిపి, పదాంశ రకాలను వివరించండి

14. అ) వాక్యంను నిర్వచించి, పదనిర్మాణ క్రమాన్ని తెలపండి

(లేదా)

ఆ) అర్ధ పరిణామాన్ని గురించి విపులీకరించండి

15. అ) 'మాండలికాన్ని' నిర్వచించి, లక్షణాలను, ఏర్పడే క్రమాన్ని తెలపండి

(లేదా)

ఆ) 'ప్రమాణ భాష'ను నిర్వచించి, అది ఏర్పడే తీరును, ఆవశ్యకతను వివరించండి

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CC : TEL 103	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	HISTORY OF TELUGU LITERATURE – I (Pre Nannaya Period to Srinadha Period) (CORE)	EXT.Mrks: 80

తెలుగు సాహిత్య చరిత్ర – 1

(ప్రాజ్ఞన్నయ యుగం నుండి శ్రీనాథ యుగం వరకు)

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021-22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To help the Students that how to study the methods of History of Literature.
2. To introduce the Student to the Prang - Nannaya Age in Telugu Literature.
3. To Familiarize the students with the Political, Religious and Cultural Life Styles of Different Ages.
4. To acquaint the students with various Genres in classical Literature, Part - I

యూనిట్ - I వాఙ్మయం - సారస్వతం - సాహిత్య అధ్యయన పద్ధతులు

తెలుగు సాహిత్య చరిత్రకు ఆధారాలు.

సాహిత్య చరిత్రలోయుగాలు - యుగకర్త : యుగవిభజన పద్ధతులు.

ప్రాఙ్నన్నయ యుగం క్రీ.శ.1000 సం॥లకు ముందున్న తెలుగు భాషా

సాహిత్యాల స్థితిగతులు.నన్నయకు పూర్వం తెలుగు కవులు.

యూనిట్ - II నన్నయ ఆదికవి అనడంలో సామంజస్యం

నన్నయ భారతాంధ్రీకరణ విధానం నన్నయ కవిత్వ లక్షణాలు

నన్నయ ఇతర కృతులు - నన్నయ సమకాలికులు - నారాయణ భట్టు,

పావులూరి మల్లన, మల్లియరేచన.

యూనిట్ - III శివకవుల ప్రత్యేకత - మార్గ, దేశి, వస్తు కవిత, జానుతెనుగు - వీటి స్వరూప స్వభావాలు.

నన్నెచోడుని కుమార సంభవం - ప్రథమాంధ్ర ప్రబంధం.

పాల్కురికి సోమన కృతులు - శివకవియుగంలో ఇతర కవులు.

రంగనాథరామాయణ కర్తృత్వం - గ్రంథ ప్రాశస్త్యం - అవాల్మీక అంశాలు

ద్విపద వాఙ్మయవికాసం - ద్విపద లక్షణాలు.

యూనిట్ - IV **తిక్కన హరిహరనాథ తత్వం - తిక్కన వ్యక్తిత్వం – తిక్కన భారత రచనా వైశిష్ట్యం**

తిక్కన భారతానికి ఉత్తమాధికారి - తిక్కన రసాభ్యుచిత బంధం

తిక్కన సమకాలిక కవులు - కేతన, మంచన, మారన మొదలగు వారు.

యూనిట్ - V **ఎర్రన రచనలు - ప్రబంధ పరమేశ్వరుని సూక్తివైచిత్రి**

ఎర్రన, నాచనసోమనల కవితా తారతమ్యం

భాస్కర రామాయణ కర్తృత్వం - ఎర్రన సమకాలిక కవులు.

శ్రీనాధుని కృతులు - ఆంధ్రీకరణ విధానం - శ్రీనాధుని కవితా శైలి

పోతన భాగవతం - భక్తితత్త్వం

శ్రీనాధ, పోతనల సమకాలిక కవులు

శ్రీనాధ పోతనల కాలంనాటి సాహిత్య స్థితి గతులు.

ఆధార గ్రంధాలు :

1. **ఆంధ్ర సాహిత్య చరిత్ర** - **పింగళి లక్ష్మీకాంతం**
2. **ఆంధ్రసారస్వత చరిత్ర** - **ఖండవల్లి లక్ష్మీరంజనం**
3. **తెలుగు సాహిత్య చరిత్ర** - **దివాకర్ల వెంకటావధాని**
4. **తెలుగు సాహిత్య సమీక్ష** - **జి. నాగయ్య (మొదటి సంపుటం)**
5. **తెలుగు కావ్యావతారికలు** - **జి. నాగయ్య**
6. **తెలుగు సాహిత్య చరిత్ర** - **కొర్లపాటి శ్రీరామమూర్తి** [I to IV Volumes]
7. **తెలుగు సాహిత్యంలో చర్చనీయాంశాలు - జి.వి. సుబ్రహ్మణ్యం**
8. **సమగ్రాంధ్ర సాహిత్యం సంపుటాలు - 'ఆరుద్ర'**
9. **ఆంధ్రవిజ్ఞాన సర్వస్వం** - **3వ సంపుటం**
10. **తెలుగు సాహిత్య చరిత్ర** - **ద్వానా శాస్త్రి**
11. **తెలుగు సాహిత్య చరిత్ర** - **వి. సిమ్మన్న**

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand that how to study the methods of History of Literature.
2. Understand the different works of various Poets in Classical Literature, Part - I
3. Understand the Political, Religious and Cultural Life Styles analysed in classical Literature, Part - I
4. Understand the various Genres in Classical Literature, Part – I

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3			6						
CO2	1	2	3			6						
CO3	1	2	3			6						
CO4	1	2	3			6						
CO5	1	2	3			6						

TEL 103 - HISTORY OF TELUGU LITERATURE – I

తెలుగు సాహిత్య చరిత్ర – 1

(ప్రాజ్ఞన్నయ యుగం నుండి శ్రీనాథ యుగం వరకు

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

ఈ క్రింది వాటిలో ఐదింటికి సంగ్రహ సమాధానాలు రాయండి **5x4=20**

1) మార్గ - దేశి
2) నారాయణ భట్టు
3) నన్నెచోడుడు
4) మార్కండేయ పురాణం
5) తెనాలి రామకృష్ణుడు
6) దశకుమార చరిత్ర
7) గౌరన
8) చెన్నమల్లుసీసములు
9) హరవిలాసం
10) నృసింహ పురాణం

బి - విభాగం

ఈ క్రింది వాటికి ఐదింటికి సమాధానాలు రాయండి **5x12=60**

11. అ) ప్రాజ్ఞన్నయ యుగ సాహిత్య విశిష్టతను వివరించండి

(లేదా)

ఆ) యుగ విభజన పద్ధతులు - తెలుగు సాహిత్య యుగ విభజనను తెలుపండి

12. అ) నన్నయ భారత ఆంధ్రీకరణ విధానాన్ని విశదీకరించండి

(లేదా)

ఆ) తిక్కన నాటకీయతను పరిచయం చేయండి

13. అ) పోతన భక్తి తత్త్వాన్ని తెలియజేయండి

(లేదా)

ఆ) 'ఎర్రన ప్రబంధ పరమేశ్వరుడు' వివరించండి

14. అ) శ్రీనాథుని కృతులను పరిచయం చేయండి

(లేదా)

ఆ) క్రీడాభిరామ కర్తృత్వ నిర్ణయాన్ని తెలియజేయండి

15. అ) శ్రీనాథుని నైషద ఆంధ్రీకరణ విధానాన్ని వివరించండి

(లేదా)

ఆ) 'ఒక్కడు నాచన సోమన' వివరించండి

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CC : TEL 104	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	GRAMMAR AND PROSODY (CORE)	EXT.Mrks: 80

వ్యాకరణం – ఛందస్సు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To encourage the Students to interpret, analyze, evaluate and respond to the ideas about Traditional / Classical Telugu Grammar.
2. To enable the Students to Understand the aims and Characteristics of ancient Poetry, Epic, and Grammar Terminology.
3. To familiarize the Students to understand the concepts of some Gramatical Parichhedas.
4. To enable the Students to Understand the aims and Features of Prosody in classical Poetry.

బాలవ్యాకరణము :

యూనిట్ - I వ్యాకరణము, నిర్వచనాలు, వ్యాకరణ ప్రయోజనాలు

సూత్రనిర్మాణం తెలుగులో ముఖ్యవ్యాకరణాల పరిచయం

బాలవ్యాకరణ వైశిష్ట్యం - బాలవ్యాకరణంలోని పారిభాషిక పదాల పరిచయం

యూనిట్ - II సంజ్ఞ, సంధి పరిచ్ఛేదాలు

యూనిట్ - III తత్సమ పరిచ్ఛేదం

యూనిట్ - IV ఆచ్చిక, కారక పరిచ్ఛేదాలు

యూనిట్ - V ఛందస్సు

ఎ). యతులు - పరిచయం :

1. స్వరయతులు	4. కాకుస్వరయతి	7. పోలికయతి
2. ఋకార స్వరూపయతి	5. నిత్యయతి	8. సంయుక్తయతి
3. ప్రాదియతి	6. వర్గయతి	9. వికల్పయతి
10. అభేదయతి		

బి). ప్రాసల పరిచయం :

1. సమప్రాసము	2. ప్రాదిప్రాసము
3. వికల్పప్రాసము	4. దుష్కరప్రాసము
5. ద్వంద్వ ప్రాసము	6. అంత్యప్రాసము

సి). ఛందోరీతుల పరిచయం :

1. ద్విపద	4. కందము	7. పంచచామరము	10. లయగ్రాహి
2. మధ్యాక్కర	5. ఆటవెలది	8. శార్దూలం	
3. తేటగీతి	6. స్రగ్ధర	9. సీసము	

ఆధార గ్రంధాలు :

1. బాలవ్యాకరణము	- పరవస్తు చిన్నయసూరి
2. బాలవ్యాకరణ రమణీయము	- దువ్వూరి వెంకటరమణశాస్త్రి
3. బాలవ్యాకరణ ఘంటాపథము	- వంతారాం రామకృష్ణరావు
4. బాలవ్యాకరణము (శ్రీ ప్రభావ్యాఖ్య)	- పి. నరసింహారెడ్డి
5. సులక్షణసారము	- లింగమగుంట తిమ్మకవి
6. అప్పకవీయము	- బులుసు వేంకట సత్యనారాయణ మూర్తి
7. బాలవ్యాకరణ ప్రసాధని	- ఆచార్య పాపిరెడ్డి నరసింహారెడ్డి
8. బాలవ్యాకరణము	- పుల్లూరి ఉమ (వ్యాఖ్యాత)

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Interpret, analyze, evaluate and respond to the ideas about classical Telugu Grammer.
2. Understand the aims and Characteristics of Classical Poetry and Grammar terminology.
3. Understand the concepts of some Parichhedas in Balavyakaranam.
4. Understand the aims and Features of Prosody in Classical Poetry.

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2							9			
CO2	1	2							9			
CO3	1	2							9			
CO4	1	2							9			
CO5	1	2							9			

TEL 104 – GRAMMAR AND PROSODY

వ్యాకరణం – ఛందస్సు

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగము

(బాలవ్యాకరణము - మార్కులు - 50)

1. అ) వ్యాకరణ అధ్యయన ఆవశ్యకతను తెల్పండి. 1x14=14

(లేదా)

ఆ) నాలుగు పారిభాషిక పదాలను సోదాహరణంగా వివరించండి

ఎ) సంధి డి) ఉపద జి) ఆమ్రేడితం

బి) తత్సమం ఇ) ఉపోత్తమం హెచ్) స్త్రీసమం

సి) బహుళము ఎఫ్) క్ష్వార్థం

2. అ) రెండు సూత్రాల్ని వ్యాఖ్యానించండి 2x6=12

ఎ) నకారంబు ద్రుతంబు

బి) యరలవలు లఘువులని యలఘువులని ద్వివిదంబులు

సి) ఇకాదులకు దప్ప ద్రుత ప్రకృతిక ములకు సంధి లేదు

డి) అన్యంబులకు సహిత మిక్కార్యంబు కొండొకచో గానంబుడియెడి

(లేదా)

ఆ) మూడింటికి రూపసాధన చేయండి

ఎ) భయపడె, బి) హరికిచ్చి, సి) రాజునాజ్ఞ

డి) ఏలితివపుడు ఇ) పేదరాలు ఎఫ్) చిట్టెలుక

3. అ) రెండు సూత్రాల్ని వ్యాఖ్యానించండి 2x6=12

ఎ) అమహన్నపుంసకముల కదంతములకు మువర్ణకంబుగు

బి) మధ్యమ పురుష క్రియలందిత్తునకు సంధియగు

సి) దూతాదులకు స్త్రీత్వంబు బహుళంబుగానగు

డి) బల్లిదాదులు సంస్కృత తుల్యంబులు

(లేదా)

ఆ) మూడింటికి రూపసాధన చేయండి.

ఎ) కందోయి, బి) ముంగొంగు, సి) గోతులు

డి) వజ్రాలు, ఇ) ప్రాఁగెంపు, ఎఫ్) పిడికిళులు

4. అ) క్రింది వానిలో రెండు సూత్రాలను వ్యాఖ్యానించండి 2x6=12

ఎ) కద్రువ నాగమాత

బి) కూఁత శబ్దము ప్రథమైక వచనంబునకు రువర్ణవంబగు

సి) కర్మంబున ద్వితీయయగు

డి) సంప్రదానంబునకుం చతుర్థియగు

(లేదా)

ఆ) మూడింటికి రూపసాధన చేయండి

ఎ) బాలురు, బి) కొడవళ్ళు, సి) గండండ్రు

డి) కన్నె, ఇ) మాటలుపెక్కిల, ఎఫ్) రాజుసేనల తోడవచ్చె

విభాగము - బి
ఛందస్సు - మార్కులు - 30

5. మూడు యతుల్ని సోదాహరణంగా వివరించండి 10

ఎ) స్వరయతి బి) ప్రాదియతి సి) కాకుస్వరయతి

డి) వికల్పయతి ఇ) నిత్యయతి ఎఫ్) అభేదయతి

6. మూడు ప్రాసల్ని సోదాహరణంగా వివరించండి 10

ఎ) ద్వంద్వ ప్రాసము బి) ప్రాది ప్రాసము సి) దుష్కర ప్రాసము

డి) వికల్ప ప్రాసము ఇ) సమ ప్రాసము ఎఫ్) అంత్యప్రాసము

7. మూడు ఛందో రీతుల్ని సోదాహరణంగా వివరించండి 10

ఎ) సీసము బి) ఆటవెలది సి) మధ్యాక్కర

డి) కందం ఇ) స్రగ్ధర ఎఫ్) లయగ్రాహి

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CC : TEL 105 A	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	FOLK LORE (COMPULSORY FOUNDATION)	EXT.Mrks: 80

జానపద విజ్ఞానం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is –

1. To introduce the students the Folk Literature and Folk Arts from Natine Languages.
2. To familiarize the students with the rich regacy of Literature in Folk Arts and Cultural artifacts
3. To acquaint the students with traditional performing Art Forms from Native rural life.

యూనిట్`I 1. జానపదం - జానపదులు - జానపద విజ్ఞానం - వర్గీకరణ - ప్రయోజనాలు

2. జానపద సాహిత్యం - నిర్వచనాలు - వర్గీకరణ

3. జానపద, శిష్ట సాహిత్యాలు : భేద సాదృశ్యాలు

4. జానపద విజ్ఞానం : ప్రాచ్య, పాశ్చాత్య పండితుల కృషి

యూనిట్ - II 1. జానపద గేయాలు - లక్షణాలు - వర్గీకరణ

2. జానపద కథాగేయాలు - లక్షణాలు - వర్గీకరణ

3. వీరగాథలు - స్వరూప స్వభావాలు - వర్గీకరణ

4. జానపద గద్యాఖ్యానాలు - వర్గీకరణ

యూనిట్ - III 1. సామెతలు - జాతీయాలు - లక్షణాలు - వర్గీకరణ

2. పొడుపు కథలు - లక్షణాలు - వర్గీకరణ

3. జానపద కళలు - ఆవిర్భావం, వికాసాలు - ప్రయోజనాలు - వర్గీకరణ

4. జానపద సంగీతం - పుట్టు పూర్వోత్తరాలు - వర్గీకరణ - జానపద వాద్యాలు

యూనిట్-IV 1. జానపద సంగీత కారులు - భిక్షుక గాయకులు - పిచ్చుక కుంట్లు -
శారదకాండ్రు - బవనీలు - గొల్లసుద్దులు - దాసరులు

2. జానపద నృత్యం - ఆవిర్భావ వికాసాలు - వర్గీకరణ - ప్రయోజనాలు

3. జానపద రూపకాలు - వర్గీకరణ

యూనిట్-IV 1. జానపద వస్తు కళలు

2. జాతరలు, పండుగలు సందర్భాల్లో ప్రదర్శించే వివిధ కళారూపాలు వాటి ప్రాధాన్యత

3. జానపద కళల్లో కన్పించే సంస్కృతి విశేషాలు

ఆధార గ్రంథాలు :

1. బి. రామరాజు - తెలుగు జానపదగేయ సాహిత్యం
2. హరి ఆదిశేషువు - జానపద గేయ వాఙ్మయ పరిచయం
3. నేదునూరి గంగాధరం - జానపద వాఙ్మయ వ్యాసావళి
4. ఆర్వీయస్ సుందరం - ఆంధ్రుల జానపద విజ్ఞానం
5. జి.ఎస్. మోహన్ - జానపద విజ్ఞాన అధ్యయనం
6. టి.వి. సుబ్బారావు - తెలుగు వీర గాథా కవిత్వం
7. నాయని కృష్ణకుమారి - తెలుగు జానపద గేయ గాథలు
8. పి. నరసింహారెడ్డి - తెలుగు సామెతలు, జన జీవనం
9. పేట శ్రీనివాసులు రెడ్డి - జానపద శృంగార గేయాలు
10. జి. నాగయ్య - దాక్షిణాత్య కళారూపాలు
11. చిగిచర్ల కృష్ణారెడ్డి - జానపద నృత్యకళలు
12. కసిరెడ్డి వెంకట రెడ్డి - పాడుపు కథలు
13. కె. మునిరత్నం - చిత్తూరు జిల్లా జానపద గేయాలు
14. ఆరుద్ర – ప్రజాకళలు – ప్రగతివాదులు

COURSE OUTCOMES

After the Completion of the Course the Students are able to -

1. Understand the students the Folk Literature and Folk Arts from Natine Languages.
2. Understand the students with the rich regacy of Literature in Folk Arts and Cultural artifacts
3. Understand the Students with traditional performing Art Forms from Native rural life.

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3									
CO2	1	2	3									
CO3	1	2	3									
CO4	1	2	3									
CO5	1	2	3									

FL 105 – FOLK LORE

జానపద విజ్ఞానం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

I) ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి 5x 4=20

(1) జానపద వి విజ్ఞానం

(2) వీరగాథలు

(3) పిచ్చుక కుంట్లు

(4) సామెత

(5) శిష్ట సాహిత్యం

(6) జానపద గద్యాఖ్యానాలు

(7) జానపద కళలు

(8) దాసరులు

(9) శారద కాండ్రు

(10) జానపదులు

బి - విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి 5x12=60

11 (అ) జానపద సాహిత్యాన్ని నిర్వచించి వర్గీకరించండి ?

(లేదా)

(ఆ) జానపద విజ్ఞానానికి ప్రాచ్య, పాశ్చాత్యులు చేసిన కృషిని గూర్చి వివరించండి

12. అ) జానపద గేయ లక్షణాలను వివరించండి ?

(లేదా)

ఆ) జానపద కథాగేయ లక్షణాలు తెల్పి వర్గీకరించండి?

13. అ) పొడుపు కథ లక్షణాలను విశ్లేషించండి?

(లేదా)

ఆ) జానపద వాద్యాలను గూర్చి సమగ్రంగా తెల్పండి?

14. అ) జానపద నృత్య ఆవిర్భావ వికాసాలను తెల్పండి?

(లేదా)

ఆ) జానపద రూపకాలను గూర్చి వివరించి వాటిని వర్గీకరించండి?

15. అ) జానపద, శిష్ట సాహిత్యాల మధ్య గల భేదాలను తెల్పండి?

(లేదా)

ఆ) జానపద సంగీతం పుట్టుపూర్వోత్తరాలను వివరించండి?

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CC : TEL 105 B	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	SATAKA SAHITYAMU (COMPULSORY FOUNDATION)	EXT.Mrks: 80

శతక సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES

The aim of the course is to understand -

1. The importance of Special genre 'Sathakam' and its divisions.
2. The Special features of Sathakam and its Origin and Evolution.
3. The Special Sathakas: Sumathi, Bhaskara and Vemana Sathakas.

యూనిట్ - I

ఎ) 1. శతకం`నిర్వచనం - లక్షణాలు

2. శతకం - స్వరూప స్వభావాలు

బి) 1. శతక సాహిత్య పరిణామ వికాసం

2. శతకాల ప్రత్యేకత

యూనిట్ - II

ఎ). భక్తి శతకాలు

1. వేంకటేశ్వర శతకము - తాళ్ళపాక అన్నమాచార్య

2. శ్రీ కాళహస్తీశ్వర శతకము - ధూర్జటి

యూనిట్ - III

ఎ). వ్యాజస్తుతి శతకం

1. సింహాద్రి నారసింహ శతకం - గోగులపాటి కూర్మనాధ కవి

బి). అధిక్షేప శతకం

1. దాశరధీ శతకం - కంచెర్ల గోపన్న (రామదాసు)

యూనిట్ - IV

ఎ). నీతి శతకాలు

1. సుమతీ శతకం - బద్దెన

2. భాస్కర శతకం - మారద వెంకయ్య

3. వేమన శతకం - వేమన

యూనిట్ - V

1. శతకం - సామాజిక అంశాలు

2. శతకం – రూపనిర్మాణాంశాలు

ఆధార గ్రంథాలు :

1. శతక సాహిత్యం : గోపాలకృష్ణారావు.కె

2. సమగ్రాంధ్ర సాహిత్యం : ఆరుద్ర

3. తెలుగు సాహిత్య సమీక్ష : ఆచార్య నాగయ్య. జి

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand the importance of Special Genre 'Sathakam' and its divisions.
2. Understand the Special features of Sathakam and its Origin and Evolution.
3. Understand the Special Sathakas of Baddena, Marada Venkayya and Vemana.

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3			6		8				
CO2	1	2	3			6		8				
CO3	1	2	3			6		8				
CO4	1	2	3			6		8				
CO5	1	2	3			6		8				

FL 105 B – FOLK LORE

శతక సాహిత్యం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

విభాగం - ఎ

1. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమగ్ర సమాధానాలు రాయండి 5x4=20

1. శతక లక్షణాలు

2. సుమతీ శతకం

3. భాస్కర శతకం

4. కాళహస్తీశ్వర శతకం

6. శతకాల ప్రత్యేకత

7. ధూర్జటి

8. బద్దెన

9. పాల్కురికి సోమన

5. శతక ప్రయోజనాలు 10. కె. గోపాల కృష్ణారావు

బి - విభాగం

2. ఈ క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5x12=60

11. శతకాన్ని నిర్వచించి లక్షణాలను తెలుపండి

(లేదా)

శతక సాహిత్య పరిణామ వికాసాన్ని వివరించండి

12. భక్తి శతకాల గురించి రాయండి

(లేదా)

సింహాద్రి నారసింహ శతక ఔన్నత్యాన్ని వివరించండి

13. వేమన శతక వైశిష్ట్యాన్ని తెలపండి

(లేదా)

వేమన హేతువాద తత్త్వాన్ని విశదీకరించండి

14. అధిక్షేప శతకాన్ని గురించి, దాని ఔన్నత్యాన్ని తెలపండి

(లేదా)

శతక స్వభావాన్ని పరిచయం చేయండి

15. శతకంలోని సామాజిక అంశాలను తెలియజేయండి

(లేదా)

శతకం రూపనిర్మాణ అంశాలను పేర్కొనండి

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CC : TEL 105 C	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	SPECIAL STUDY : POTANA (COMPALSORY FOUNDATION)	EXT.Mrks: 80

ప్రత్యేక అధ్యయనం : పోతన

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES

The aim of the course is to understand –

1. To help the students to understand the importance of potana and the devotion is Bhagavadgeetha introduce the students the Folk Literature and Folk Arts from Natine Languages.
2. To acquaint the students with social Conditions during the time of Poet Pothana.
3. To enhance the ability of the students to understand the ultimati goal of life and the way of life

యూనిట్ - I పోతన కాలం - జీవితం - రచనలు

పోతన కాలంనాటి సామాజిక, సాహిత్య స్థితిగతులు

పోతన సమకాలీన కవులు - పరిచయం

యూనిట్ - II పురాణ లక్షణాలు – పోతన భాగవతం - భాగత పురాణం

పోతన కవితారీతులు - అనువాద విధానం

పోతన సహజ పాండిత్య తత్వం - పద్య శిల్పం

యూనిట్ - III పోతన భాగవతం - పోతన భక్తి తత్వం - మధురభక్తి

పోతన భాగవతం ప్రత్యేక అధ్యయనం : రుక్మిణీ కల్యాణం - గజేంద్ర మోక్షం,

గోపికాగీ కుచేలోపాఖ్యానం

యూనిట్ - IV పోతన ఇతర కావ్యాలు - పరిచయం :

బోగినీ దండకం - నారాయణ శతకం - వీరభద్ర విజయం

యూనిట్ - V తెలుగు సాహిత్యంలో వెలువడిన ఇతర

భాగవత రచనలు - తెలుగు భక్త కవుల్లో పోతన స్థానం

పోతన పై జరిగిన పరిశోధనలు - వెలువడిన విమర్శలు

ఆధార గ్రంథాలు :

1. దివాకర్ల వెంకటావధాని - పోతన

2. పి. యశోదరెడ్డి - పోతన కవితా సుధ

3. ఎన్. రాజేశ్వరి - పోతన కృతులు, కవితా వైభవ పరిశీలన

4. కొర్లపాటి శ్రీరామమూర్తి - పోతన సాహిత్య గోష్ఠి

COURSE OUTCOMES

After the Completion of the Course the Students are able to -

1. Understand the importance of potana and the devotion is Bhagavadgeetha introduce the students the Folk Literature and Folk Arts from Natine Languages.
2. Understand the students with social Conditions during the time of Poet Pothana.
3. Understand the Students the ultimate goal of life and the way of Life.

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3				7	8		10	11	
CO2	1	2	3				7	8		10	11	
CO3	1	2	3				7	8		10	11	
CO4	1	2	3				7	8		10	11	
CO5	1	2	3				7	8		10	11	

FL 105 B – FOLK LORE

ప్రత్యేక అధ్యయనం : పోతన

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

I) ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి **5x4=20**

(1) పోతన

(2) పోతన కాలంనాటి సామాజిక స్థితిగతులు

(3) పురాణ లక్షణాలు

(4) భాగవత పురాణం

(5) మధుర భక్తి

(6) గోపికా గీతాలు

(7) వీరభద్ర విజయం

(8) పోతనపై జరిగిన పరిశోధనలు

(9) భక్తి కవులు

(10) కుచేలోపాఖ్యాన సందేశం

బి -విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి **5x12=60**

11 (అ) పోతన రచనలను సంక్షిప్తంగా పరిచయం చేయండి

(లేదా)

(ఆ) పోతన సమకాలీన కవులను, వారి రచనలను వివరించండి

12. (అ) పోతన భాగవతం ఆధారంగా వారి కవితారీతులను తెలపండి

(లేదా)

(ఆ) 'పోతన సహజ పండితుడు' చర్చించండి

13. (అ) రుక్మిణీ కల్యాణ విశిష్టతను తెలుపండి

(లేదా)

(ఆ) గజేంద్ర మోక్షం ఆంతర్యాన్ని వివరించండి

14. (అ) పోతన 'భోగినీ దండకం' ప్రత్యేకతను తెలపండి

(లేదా)

(ఆ) నారాయణ శతక విశిష్టతను వివరించండి

15. (అ) తెలుగులో వెలువడిన ఇతర భాగవత రచనలను, వాటి ప్రత్యేకతను తెలపండి

(లేదా)

(ఆ) తెలుగు భక్తి కవుల్లో పోతన స్థానాన్ని తెలపండి

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CC : TEL 106 A	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	CLASSICAL TELUGU LITERATURE GENRES (ELECTIVE FOUNDATION)	EXT.Mrks: 80

ప్రాచీన తెలుగు సాహిత్య ప్రక్రియలు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES

The aim of the course is to understand -

1. To enable the students to learn the relation between Literature and Gesro.
2. To a coceaint the students that the ancint genres and its Special features in classical Telugu Literature
3. To familiarize the students that the different fenses and its Special features in classical Telugu Literature

యూనిట్ - I ప్రక్రియ - అర్థవివరణ - ప్రక్రియలు ఏర్పడటానికి గల కారణాలు

సాహిత్యం : ప్రక్రియ సంబంధం

యూనిట్ - II పురాణము - ఇతిహాసము - కావ్యము లక్షణాలు : ప్రక్రియా వికాసము

యూనిట్ - III శతకము - ఉదాహరణము దండకము - రగడ : లక్షణాలు : ప్రక్రియా వికాసము

యూనిట్ - IV కథా కావ్యము - ప్రబంధము - సంకీర్తన : లక్షణాలు - ప్రక్రియా వికాసం

యూనిట్ - V యక్షగానం - వచన కావ్యం - చాటువు - అవధానం : లక్షణాలు - ప్రక్రియా వికాసం

ఆధార గ్రంధాలు :

1. ఆరుద్ర : సమగ్ర ఆంధ్ర సాహిత్యం - సంపుటాలు
2. జి. నాగయ్య : తెలుగు సాహిత్య సమీక్ష - సంపుటాలు
3. సి. నారాయణరెడ్డి : ఆధునికాంధ్ర కవిత్వము సంప్రదాయాలు, ప్రయోగాలు
4. చేకూరి రామారావు : వచన రచన తాత్త్వాన్వేషణ
5. ఎన్.ఎస్. రాజు(సంపా.) : వచన కవిత - రూప పరిశీలన
6. ద్వానా శాస్త్రి : తెలుగు సాహిత్య చరిత్ర
7. ఇతర సాహిత్య విమర్శనా గ్రంధాలు

COURSE OUTCOMES

After the Completion of the Course the Students are able to -

1. Understand the students to learn the relation between Literature and Gesro.
2. Understand the students that the ancint genres and its Special features in classical Telugu Literature
3. Understand the students that the different fenses and its Special features in classical Telugu Literature

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3				7	8				12
CO2	1	2	3				7	8				12
CO3	1	2	3				7	8				12
CO4	1	2	3				7	8				12
CO5	1	2	3				7	8				12

TEL 106 A – CLASSICAL TELUGU LITERARY GENRES

ప్రాచీన తెలుగు సాహిత్య ప్రక్రియలు

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

I. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి **5X4=20**

(1) ప్రక్రియ

(2) ఇతిహాసము

(3) ఉదాహరణము

(4) దండకము

(5) సంకీర్తన

(6) చాటువు

(7) అవధానం

(8) ప్రబంధ లక్షణాలు

(9) పురాణం

(10) పదము

బి - విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి **5X12=60**

11 (అ) ప్రక్రియ స్వరూప స్వభావాలు

(లేదా)

(ఆ) సమాజం - సాహిత్యం - ప్రక్రియకు గల సంబంధాన్ని తెలపండి

12. (అ) **'కావ్యం' ను నిర్వచించి, లక్షణాలను తెలపండి**

(లేదా)

(ఆ) **తెలుగులోకి కావ్య వికాసాన్ని విపులీకరించండి**

13. (అ) **తెలుగులోని 'శతక' వికాసాన్ని వివరించండి**

(లేదా)

(ఆ) **'రగడ' లక్షణాలను, రకాలను, వికాసాలను తెలపండి**

14. (అ) **కథాకావ్యాల వికాసాన్ని వివరించండి**

(లేదా)

(ఆ) **ప్రబంధ వికాసాన్ని తెలపండి**

15. (అ) **'యక్షగానం' లక్షణాలను, వికాసాన్ని తెలపండి**

(లేదా)

(ఆ) **'వచన కావ్య' ప్రారంభ పరిణితిని తెలియజేయండి**

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CC : TEL 106 B	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	PADA SAHITYAM (ELECTIVE FOUNDATIONS)	EXT.Mrks: 80

పద సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To familiarize the Students with Various Genres of Indigenous Literature.
2. To Provide the Students with the Knowledge of Desi Literature Preserved in the form of diverse native cultures and races.
3. To acquaint the Students with the rich legacy of Musical Compositions by great Vaggeya karas like Annamayya. Saranga Pani etc.

యూనిట్ - I పదం – కృతి –సంకీర్తన నిర్వచనాలు – స్వరూపాలు

పద కవిత ఆవిర్భావ వికాసాలు – తెలుగు, తమిళ, కన్నడ, సంస్కృత భాషల్లో

పద కవిత – పదకవుల చరిత్ర – యుగ విభజన –

తాళ్ళపాక అన్నమయ్య రచనలు – జీవిత విశేషాలు.

యూనిట్ - II తాళ్ళపాక పెదతిరుమలయ్య రచనలు – జీవిత విశేషాలు -

తాళ్ళపాక చినతిరుమలయ్య రచనలు – జీవిత విశేషాలు –

క్షేత్రయ్య – రామదాసు సారంగపాణి – త్యాగరాజు రచనలు – జీవిత విశేషాలు

యూనిట్ - III తాళ్ళపాక అన్నమయ్య సంకీర్తనలు – భక్తిత్వం – శృంగార తత్త్వం -

పెద తిరుమలయ్య చిన తిరుమలయ్య సంకీర్తనలు – భక్తి తత్త్వం

శృంగార తత్త్వం – తాళ్ళపాక కవుల లఘు కృతులు

యూనిట్ - IV క్షేత్రయ్య పదాలు – మధుర భక్తి -

రామదాసు కీర్తనలు – భక్తి, నీతి, వైరాగ్య ప్రవృత్తి -

త్యాగరాజు కృతులు – విశేషాంశాలు

యూనిట్ - V తాళ్ళపాక కవుల సంకీర్తనలు – భాషా విశేషాలు – సామాజిక సాంస్కృతిక అంశాలు–

తాళ్ళాపాక కవుల సంకీర్తనలు – ప్రత్యేకత అధ్యయనం

అన్నమయ్య సంకీర్తనలు – ౩౦, పెదతిరుమలయ్య సంకీర్తనలు - 10

చిన్నతిరుమలయ్య ప్రసిద్ధ సంకీర్తనలు – 10

ఆధార గ్రంథాలు :

1. ఆంధ్ర వాగ్గేయ కారుల చరిత్రము – బాలాంత్రపు రజనీకాంత రావు

2. తాళ్ళపాక కవుల కృతులు – సాహితీ విశేషాలు – డా. వేటూరి ఆనందమూర్తి

3. తాళ్ళపాక కవుల కృతులు – భాషా విశేషాలు – డా. వేటూరి ఆనందమూర్తి

4. సారంగపాణి పద సాహిత్యం – డా. ఎస్. గంగప్ప

5. క్షేత్రయ్య పద సాహిత్యం - డా. ఎస్. గంగప్ప

6. అన్నమాచార్య సంకీర్తన సుధ - డా. ఎస్. గంగప్ప

7. అన్నమాచార్య ప్రముఖ వాగ్గేయ కారుల తులనాత్మక అధ్యయనం

8. అన్నమాచార్య ప్రసిద్ధ సంకీర్తనలు – పరిచయం – డా. ఉగ్రాణం చంద్రశేఖర రెడ్డి

9. సారంగపాణి పదములు – డా. గల్లా చలపతి

10. అన్నమాచార్య సంకీర్తనామృతం – సముద్రాల లక్షమణయ్య నాయుడు

11. సంకీర్తనామృతం - సముద్రాల లక్షమణయ్య నాయుడు

12. సంకీర్తన కౌముది – డా. పాన్నా లీలావతి

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand the Various Geners of Indigenous Literature.
2. Understand the Desi Literature Preserved in the Form of Divers native cultures and races.
3. Understand the musical compositions and writings of Annamayya, Sarangapani ect.

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3					8			11	
CO2	1	2	3					8			11	
CO3	1	2	3					8			11	
CO4	1	2	3					8			11	
CO5	1	2	3					8			11	

TEL 106 B – CLASSICAL TELUGU LITERARY GENRES

పద సాహిత్యం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

I. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి 5X4=20

(1) మధురభక్తి

(2) అన్నమయ్య

(3) రామదాసు

(4) సంకీర్తన

(5) తమిళ పద కవిత

(6) పదకవిత – భాష

(7) పరమయోగి విలాసం

(8) పదసాహిత్యం - శృంగారం

(9) వాగ్గేయకారులు

(10) క్షేత్రయ్య

బి - విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి 5X12=60

11 (అ) తెలుగు, తమిళ, కన్నడ, సంస్కృత భాషల్లో పదకవితను చర్చించండి

(లేదా)

(ఆ) పద కవిత యుగ విభజనను వివరించండి?

12. (అ) తాళ్ళపాక చిన్నన్న జీవిత విశేషాలను, రచనలను పేర్కొనండి?

(లేదా)

(ఆ) అన్నమయ్య పద సాహిత్యంలోని సామాజికాంశాలను వివరించండి?

13. (అ) అన్నమయ్య, రామదాసు కీర్తనల్లోని భక్తి, వైరాగ్య దృక్పథాన్ని వివరించండి?

(లేదా)

(ఆ) పెద తిరుమలాచార్యుని నీతి శతకం గురించి విపులీకరించండి?

14. (అ) అన్నమయ్య కీర్తనల్లోని శృంగారాన్ని పేర్కొనండి?

(లేదా)

(ఆ) త్యాగరాజు కృతులల్లోని ప్రత్యేకతల్ని విశదీకరించండి?

15. (అ) తాళ్ళపాక కవుల పద నిర్మాణ రీతిని విశ్లేషించండి?

(లేదా)

(ఆ) తాళ్ళపాక కవుల లఘుకృతులను వివరించండి?

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CC : TEL 107	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 100	HUMAN VALUES AND PROFESSIONAL ETHICS - I (AUDIT COURSE)	EXT.Mrks: 80

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is –

1. The importance of human values and professional ethics in the contemporary materialistic world.
2. The values embedded in Bhagvad Gita and the other classics.
3. The importance of simple living in the modern world as suggested by Jainism of Mahaveera.
4. Buddha's suggestions of living through the Four Noble truths and the Eight Fold Path
5. The nature of punishments for committing various crimes as mentioned in Manu Smruthi.

UNILT-I Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics – Goals – Ethical Values in various Professions.

UNIT-II Nature of Values – Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts – right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders, Character and Conduct.

UNIT-III Individual and Society: Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non – stealing). Purusharthas (Cardinal virtues) – (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).

UNIT-IV Bhagavad Gita- (a) Niskama karma. (b) Bhddhism – The Four Noble Truths – Arya astanga marga, (c) Jainism – mahavratas and anuvaratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.

UNIT-V Crime and Theories of punishment – (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for Study:

1. John S Mackenjie: A Manual of Ethics.
2. "The Ethics of Management"by Larue Tone Hosmenr, Richard D. Irwin Inc.
3. "Management Ethics – intergrity at work' by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. "Ethics in Management"by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S. K. : Hindu Ethics

7. William Lilly : Introduction to Ethics
8. Sinha : A Manual of Ethics
9. Manu : Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.). G.C.Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanalal, Kunjalal Brishagratha, Chowkamba Sanskrith Series, Vol. I, II and III, Varnasi, Vol. I oo, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita : Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, May field Publishing Company, 1999.
14. An introduction to Applied Ethics (ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin & co Julundhar.

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Realize the necessity of practicing Human values and Ethics in all walks of life including the profession they opt for
2. Understand Bhagavat Gita as a guide for modern lifestyle.
3. Understand thought of Jainism and their necessity in contemporary living.
4. Understand the principles of Buddhism for a better living.
5. Understand the punishments given in Manu Smuriti for a comparsion with modern punishments.

Co- Po Mapping

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2					7				11	
CO2	1	2					7				11	
CO3	1	2					7				11	
CO4	1	2					7				11	
CO5	1	2					7				11	

TEL 107 - HUMAN VALUES AND PROFESSIONAL ETHICS-I

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-100**

SECTION-A

I) Write any five of the following short notes **5x5=25**

1. Define value
2. Reformative theory of punishment
3. Retributive theory of punishment
4. Deterrent theory of punishment
5. Justice
6. Responsibility
7. Freedom
8. Mahavratas
9. Anuvratas
10. Ethics of Islam

SECTION-B

II) Write All Questions **5x15=75**

1. a) Define Ethics; bring out its nature and its relation to Religion, Politics, Law, and Medicine.

(OR)

b) Give an account of the need and importance of Ethics

2. a) What is meant by Value? Bring out in brief the values of Good and Bad, Actual and potential Values, Objective and Subjective Values,

(OR)

b) Analyse the basic moral concepts of right, ought, duty and, obligation

3. a) Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (non possession) and Aparigraha (Non-stealing).

(OR)

b) Analyse the importance of Purusharthas (Dharma, Artha, Kama, Moksha.)

4. a) Discuss the Bhagavad Gita ethics with special emphasis on Nishkama karma.

(OR)

b) Explain the ethical theory of Buddhism with reference to The Four NOble Truths (Arya astanga marga)

5. a) Examine the place of Religious Tolerance in Gandhian Ethics.

(OR)

b) Explain the ethical Views of Manu and Yajnavalkya and their importance to the present society.

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SEMESTER – II

SEMESTER - II

CC : TEL 201	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	PRISCRIBED TEXTS : MODERN POETRY (CORE)	EXT.Mrks: 80

నిర్దేశించిన పాఠ్యాంశాలు : ఆధునిక కవిత్వం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is –

1. To help the Students to Understand the Significance of Modern Poetry.
2. To acquaint the Students with the Socio-Political, Cultural and Economic conditions of the Modern days.
3. To acquaint the Students with the modern and Contermporary Trends in Telugu Poetry.
4. To acquaint the Students with the modern and Contermporary Trends in Telugu Poetry.

యూనిట్ - I : **ఖండకావ్యం**

1) గుర్రం జాషువా - గబ్బిలం (మొదటి భాగం)

యూనిట్ - II : **అభ్యుదయ కవిత్వం ఖండికలు**

1) శ్రీశ్రీ - ప్రతిజ్ఞ

2) ఆరుద్ర - విప్లవ సౌభాగ్యం

యూనిట్ - III : **దిగంబర; విప్లవ కవిత్వాలు – ఖండికలు**

1) అ. నిఖిలేశ్వర్ - ఆత్మయోని (ఖండిక)

ఆ. చెరబండరాజు - వందేమాతరం (ఖండిక)

2) అ. సుబ్బారావు పాణిగ్రాహి ` హెచ్చరిక

ఆ. శివసాగర్ - నా చెల్లి చెంద్రమ్మా

యూనిట్ - IV : **స్త్రీ వాద; దళిత వాద కవిత్వాలు – ఖండికలు**

1) అ. విమల - సౌందర్యాత్మక హింస

ఆ. చల్లపల్లి స్వరూపరాణి - మంకెనపూవు

2) అ. మద్దూరి నగేష్‌బాబు - ఎగిరే పళ్ళేలు

ఆ. కలేకూరి ప్రసాద్ - పిడికెడు ఆత్మగౌరవం కోసం

యూనిట్ - V : **మైనారిటి; ప్రపంచీకరణ కవిత్వాలు – ఖండికలు**

1) అ. ఖాదర్ మొహియుద్దీన్ - పుట్టుమచ్చ

ఆ. షాజహాన - పర్దాహఠాకె దేఖో

2) అ. అద్దేపల్లి రామమోహనరావు - పాగచూరిన ఆకాశం (వెనుకఅట్ట కవిత)

ఆ. తుల్లిమల్లి విల్సన్ సుధాకర్ - నిద్రపోతున్న దేశం

ఆధార గ్రంధాలు :

1. గబ్బిలం	**- జాషువా**
2. మహాప్రస్థానం	**- శ్రీశ్రీ**
3. దిగంబర కవిత్వం	**- (సమగ్ర కవితా సంపుటి)**
4. శివసాగర్ కవిత్వం	**- శివసాగర్**
5. నీలిమేఘాలు	**- అస్మిత ప్రచురణ**
6. జల్ జలా	**- (సంపా) స్కైబాబ**
7. పాగచూరిన ఆకాశం	**- అద్దేపల్లి రామమోహనరావు**
8. మనపాట (సంకలనం)	**- రైతుకూలి సంఘం (ఆం. ప్ర.)**
9. అడవి ఉప్పొంగిన రాత్రి	**- విమల**
10. మంకెన పూవు	**- చల్లపల్లి స్వరూపరాణి**
11. మీరేవుట్లూ	**- మద్దూరి నగేష్ బాబు**
12. మాకూ ఒక బాష కావాలి	**- తుల్లిమల్లి విల్సన్ సుధాకర్**

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand the significance of Modern Poetry.
2. Understand the Socio – Political Cultural and Economic conditions of the Modern Days.
3. Understand the Modern and Contermporary Trends in Telugu Poetry.
4. To acqire the Knowledge of Present Social – Scenario in depth.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3				7			10	11	
CO2	1	2	3				7			10	11	
CO3	1	2	3				7			10	11	
CO4	1	2	3				7			10	11	
CO5	1	2	3				7			10	11	

TEL 201 – PRESCRIBED TEXTS : MODERN POETRY

నిర్దేశించిన పాఠ్యాంశాలు : ఆధునిక కవిత్వం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

ఈ క్రింది ప్రశ్నలలో మూడింటికి సందర్భ సహిత వాఖ్యాలు రాయండి **3x4=12**

(1) యినుప గజ్జెల తల్లి జీవనము సేయు

(2) కవిత్వం సమ్మె చేస్తుంది

(3) సింహ కంఠనాదంతో వస్తారిక కాచుకోండి

(4) అంద విహీనతని మనం ప్రేమిద్దాం

(5) నాకోసం కన్నీరు కార్చకండి

(6) ఒక కట్టుకథ నన్ను కాటేసింది

బి - విభాగం

ఈ క్రింది నాల్గింటిని సంగ్రహంగా వివరించండి **4X5=20**

(7) ప్రతిజ్ఞ

(8) నిఖిలేశ్వర్

(9) మంకెనపువ్వు

(10) విమల

(11) కలేకూరి ప్రసాద్

(12) ఖాదర్ మొదీయుద్దీన్

(13) సుబ్బారావు పాణిగ్రాహి

(14) ప్రపంచీకరణ

సి - విభాగం

ఈ క్రింది ప్రశ్నలకు సమాధానాలు రాయండి **3X6=48**

15. (అ) గబ్బిలం కావ్యం ద్వారా జాషువ ఆత్మసంవేదనను ఆవిష్కరించండి

(లేదా)

(ఆ) వందేమాతరం ఖండిక ద్వారా రచయిత ఉద్దేశాన్ని తెలపండి

16. (అ) స్త్రీ వాదాన్ని పరిచయం చేసి మీ పాఠ్యభాగ ఖండికలను సమీక్షించండి

(లేదా)

(ఆ) మీ పాఠ్యభాగ ఖండికల ఆధారంగా దళితవాద దృక్పథాన్ని తెలియజేయిండి

17. (అ) మీ పాఠ్యభాగం ఆదారంగా ప్రపంచీకరణ స్వభావాన్ని వివరించండి?

(లేదా)

(ఆ) మీ పాఠ్యభాగం ఆధారంగా మైనార్టీవాద కవిత్వాన్ని గురించి వివరించండి

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CC : TEL 202	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	EVOLUTION OF TELUGU LANGUAGE (CORE)	EXT.Mrks: 80

తెలుగు భాషా వికాసం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is –

1. To introduce the Students the Origin of Various Telugu Dialects.
2. To demonstrate the Practicality of the need of Standard Language in Using in Administration.
3. To encourage the Students to Undertake Research in the Various aspects of Telugu Dialects.

యూనిట్ - I	**భారతదేశంలోని భాషా కుటుంబాలు - ఆంధ్రం, తెనుగు, తెలుగు పదాల చరిత్ర - తెలుగు భాష వర్ణాలు - వాటి వ్యాప్తి తెలుగు భాష - సంధి స్వరూపం**
యూనిట్ - II	**తెలుగు భాష - నామ నిర్మాణం - సమాస నిర్మాణం - లింగ వచన విభక్తి నిర్మాణం - సర్వనామాలు, సంఖ్యావాచకాలు, విశేషణాల నిర్మాణం (శాసన భాష నుంచి ఆధునిక భాష వరకు)**
యూనిట్ - III	**తెలుగు భాష - క్రియా ప్రాతిపదికల నిర్మాణం - సామాన్య సంశ్లిష్ట క్రియలు - సమాపక, అసమాపక క్రియా నిర్మాణం - కాల, అర్థ, పురుష బోధక ప్రత్యయాలు, క్రియా జన్య విశేషణాల నిర్మాణం (శాసన భాష నుంచి ఆధునిక భాష వరకు)**
యూనిట్ - IV	**తెలుగు భాష - వాక్య నిర్మాణం - వాక్య భేదాలు - సామాన్య, సంశ్లిష్ట, సంయుక్త వాక్యాలు - కర్తరీ, కర్మణీ ప్రయోగాలు - సంబంధబోధక వాక్యాలు - అనుకృతి వాక్యాలు - నామ్మీకరణం**
యూనిట్ - V	**తెలుగు భాష - ఆధునీకరణ - ప్రమాణీకరణ - ఆవశ్యకత, పద్ధతులు - సమస్యలు - వివిధ రంగాల్లో తెలుగు వాడకం - తెలుగులో అన్యదేశ్యాలు**

ఆధార గ్రంధాలు :

1. ఆధునిక ప్రామాణికాంధ్ర వ్యాకరణం - వజ్జల వెంకటేశ్వర్లు
2. ఆంధ్రభాషా వికాసం - గంటిజోగి సోమయాజి
3. ఈనాడు భాషా స్వరూపం - బూదరాజు రాధాకృష్ణ
4. భాషాశాస్త్ర వ్యాసాలు - బూదరాజు రాధాకృష్ణ
5. తెలుగు భాషా చరిత్ర - (సం) భద్రిరాజు కృష్ణమూర్తి
6. తెలుగులో వెలుగులు - చేకూరి రామారావు
7. తెలుగు వాక్యం - చేకూరి రామారావు
8. భాషానువర్తనం - చేకూరి రామారావు
9. ద్రావిడ భాషలు - పి.ఎస్. సుబ్రహ్మణ్యం
10. నేటి తెలుగు నివేదిక - గిడుగు వేంకట రామమూర్తి
11. భాష - ఆధునిక దృక్పథం - పోరంకి దక్షిణామూర్తి
12. భాష – సమాజం - సంస్కృతి - భద్రిరాజు కృష్ణమూర్తి
13. వాడుక భాషేరాస్తున్నామా - రంగనాయకమ్మ

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand the origin of Various Telugu Dialects.
2. Understand the Practicality of the need of Standard Language in Using Various fields.
3. Understand to undertake Research in the Various aspects of Telugu Dialects.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2							9			
CO2	1	2							9			
CO3	1	2							9			
CO4	1	2							9			
CO5	1	2							9			

TEL 202 – EVOLUTION OF TELUGU LANGUAGE

తెలుగు భాషా వికాసం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విబాగం

I. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమగ్ర సమాధానాలు రాయండి 5X4=20

1. ఆంధ్రం 2. విభక్తులు 3. క్రియాజన్య విశేషణాలు
4. సమాసం 5. భావార్థకం 6. నామ్నీకరణం
7. సంఖ్యావాచకాలు 8. పురుషబోధక ప్రత్యయం 9. వైకృతాలు
10. విశేషణాలు

II. ఈ క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11. అ) తెనుగు`తెలుగు పదాల వ్యుత్పత్తి తెలపండి?

(లేదా)

ఆ) తెలుగు భాష సంధి స్వరూపం వివరించండి?

12. అ) తెలుగు భాష వచన నిర్మాణం రాయండి?

(లేదా)

ఆ) తెలుగు భాష సర్వనామాలను తెలపండి?

13. అ) తెలుగులో సమాపక క్రియా నిర్మాణాన్ని చర్చించండి?

(లేదా)

ఆ) తెలుగు భాష అసమాపక క్రియలను సోదాహరణంగా వివరించండి?

14. అ) తెలుగు వాక్య భేదాలను రాయండి?

(లేదా)

ఆ) తెలుగులో అన్యదేశ్యాలను సోదాహరణంగా వివరించండి?

15. అ) తెలుగు భాష ఆధునీకరణ పద్ధతులను తెలపండి?

(లేదా)

ఆ) వివిధ రంగాల్లో తెలుగు వాడకాన్ని వివరించండి?

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CC : TEL 203	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	HISTORY OF TELUGU LITERATURE – 2 (PRABANDHA PERIOD TO MODERN PERIOD)	EXT.Mrks: 80

తెలుగు సాహిత్య చరిత్ర – 2

(ప్రబంధయుగం నుండి ఆధునికయుగం వరకు)

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is –

1. To familiarize the students with the Political. Religious and cultural Life – Styles of Different ages in History of Telugu Literature – II i.e. from Prabandha period to Modern period.
2. To acquaint the Students with the reasons to establish Modern Age in Telugu Literature.
3. To acquaint the Students with some of the modern trends, in the Modern Literature.

యూనిట్ - I ప్రబంధ యుగం - ప్రబంధలక్షణాలు -

ప్రబంధ కవులు - అష్టదిగ్గజ కవుల నిర్ణయం ;

ప్రబంధ కవుల రచనా వైశిష్ట్యం - ప్రబంధ లక్షణాల సమన్వయం ;

ప్రబంధ యుగంలో ఇతర కవులు

యూనిట్ - II దక్షిణాంధ్ర యుగం - నాయక రాజుల సాహిత్య సేవ -

చేమకూర వెంకట కవి - తెలుగు కవయిత్రులు -

దక్షిణాంధ్ర యుగ వైశిష్ట్యం. యక్షగాన ప్రక్రియ

పదకవులు : సారంగపాణి - క్షేత్రయ్య - త్యాగయ్య

యూనిట్ - III క్షీణయుగం - క్షీణయుగం అనడానికి కారణాలు -

క్షీణ యుగ సాహిత్యం, తీరు తెన్నులు -

ప్రముఖ కవులు - కావ్యాలు : కంకంటి పాపరాజు -

కూచి మంచి తిమ్మకవి - కూచి మంచి జగ్గకవి

ఏనుగు లక్ష్మణ కవి - అడిదము సూరకవి

యూనిట్ - IV ఆవిర్భావ దశలో ఆధునిక యుగం - కుంఫిణీ

వారు తెచ్చిన కొన్ని మార్పులు - తెలుగు భాషా

సాహిత్యాలకు ఆంగ్లేయుల సేవ ; సి.పి. బ్రౌన్ -

కాలెన్ మెకంజి - విలియం బ్రౌన్ - ఎడి. కాంబెల్

కొందరు తెలుగు ప్రముఖులు : కావలి సోదరులు - చిన్నయసూరి

యూనిట్ - V **ఆధునిక కవిత్వం :**

జాతీయ పునరుజ్జీవ చైతన్యం; దేశభక్తి కవిత్వం, రాష్ట్ర భక్తి కవిత్వం;

సంఘ సంస్కరణ కవిత్వం

ఆధార గ్రంధాలు :

1. ఆంధ్ర సాహిత్య చరిత్ర **- పింగళి లక్ష్మీకాంతం**

2. ఆంధ్ర సారస్వత చరిత్ర **- ఖండవల్లి లక్ష్మీరంజనం**

3. తెలుగు సాహిత్య చరిత్ర(5 సంపుటాలు) **- కొర్లపాటి శ్రీరామమూర్తి**

4. తెలుగు సాహిత్య సమీక్ష (రెండవ సంపుటం) **- జి. నాగయ్య**

5. ఆధునికాంధ్ర కవితా సమీక్ష **- కాకర్ల వెంకటరామ నరసింహం**

6. ఆధునికాంధ్ర కవిత్వం`సంప్రదాయం ప్రయోగాలు **- సి. నారాయణ రెడ్డి**

7. సమగ్రాంధ్ర సాహిత్యం **- ఆరుద్ర**

8. తెలుగు సాహిత్య చరిత్ర **- ద్వా.నా. శాస్త్రి**

9. తెలుగు సాహిత్యంలో చర్చనీయాంశాలు **- జి.వి. సుబ్రహ్మణ్యం**

10. తెలుగు కవితా వికాసం **- కడియాల రామమోహనరాయ్**

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand the Political, Religious and Cultural life styles of various Ages in later part of Classical Literature.
2. Understand the reasons to establish the Modern Age in Telugu Literature.
3. Understand same of the modern trends in the History of Telugu Literature.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3			6	7					
CO2	1	2	3			6	7					
CO3	1	2	3			6	7					
CO4	1	2	3				7			10	11	
CO5	1	2	3				7			10	11	

TEL 203 – HISTORY OF TELUGU LITERATURE – 2
(PRABHANDHA PERIOD TO MODERN PERIOD)
తెలుగు సాహిత్య చరిత్ర – 2
(ప్రభంధయుగం నుండి ఆధునికయుగం వరకు)

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

I. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి 5X4=20

(1) 'ప్రబంధం' నిర్వచనం
(2) అష్టదిగ్గజ కవులు
(3) ముద్దుపళని
(4) త్యాగయ్య
(5) కూచిమంచి జగ్గకవి
(6) క్షీణయుగం
(7) కాలెన్ మొకంజి
(8) కావలి సోదరులు
(9) ఖండ కావ్యం
(10) స్వీయ చరిత్ర

బి - విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి 5X12=60

11 (అ) 'ప్రబంధమును నిర్వచించి, ప్రబంధ లక్షణాలను తెలపండి
(లేదా)
(ఆ) ప్రబంధ కవుల రచనా వైశిష్ట్యాన్ని వివరించండి

12. (అ) నాయకరాజుల సాహిత్య సేవను తెలపండి
(లేదా)
(ఆ) దక్షిణాంధ్ర యుగ విశిష్టతను వివరించండి

13. (అ) 'క్షీణ యుగం' అనడానికి గల కారణాలను చర్చించండి
(లేదా)
(ఆ) 'క్షీణ యుగం' సాహిత్య తీరుతెన్నులను తెలపండి

14. (అ) తెలుగు భాషా సాహిత్యాలకు ఆంగ్లేయులు చేసిన సేవను వివరించండి
(లేదా)
(ఆ) ఆధునిక యుగంలో కుంఫిణీ వారు తీసుకవచ్చిన మార్పుల గురించి రాయండి

15. (అ) తెలుగు వెలువడిన దేశభక్తి కవిత్వాన్ని వివరించండి
(లేదా)
(ఆ) తెలుగులో వెలువడిన సంఘుంసంస్కరణ కవిత్వాన్ని విశ్లేషించండి

@@@

CC : TEL 204	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	GRAMMAR AND PROSODY (CORE)	EXT.Mrks: 80

వ్యాకరణ – అలంకారాలు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is –

1. To Aquire the students the Knowledge of Classical Telugu Grammar.
2. To Aquire the students the Grammatical Terms Particularly in Bala Vyakaranam
3. To Aquire the students the Various Alankaras in Telugu Literature.

బాలవ్యాకరణము:

యూనిట్ - I **సమాస, తద్ధిత పరిచ్ఛేదాలు**

యూనిట్ - II **క్రియాపరిచ్ఛేదం - సమాపక క్రియానిర్మాణం**

యూనిట్ - III **క్రియాపరిచ్ఛేదం - సమాపకేతర క్రియానిర్మాణం**

ధాతుజ విశేషణ నిర్మాణం, తత్సమ, ఆచ్ఛిక

ధాతునిర్మాణం, ప్రేరణార్థక క్రియా నిర్మాణం.

యూనిట్ - IV **కృదంత, ప్రకీర్ణక పరిచ్ఛేదాలు**

యూనిట్ - V **అలంకారాలు:**

ఎ) అర్థాలంకారాలు

1) ఉపమ	**2) ఉత్ప్రేక్ష**
3) రూపకం	**4) దీపకం**
5) అతిశయోక్తి	**6) కావ్యలింగం**
7) స్మృతి	**8) భ్రాంతి**
9) శ్లేష	**10) వక్రోక్తి**
11) స్వభావోక్తి	**12) అర్థాంతరన్యాసం**
13) వ్యాజస్తుతి	**14) వ్యాజనింద**
15) అప్రస్తుత ప్రశంస	

బి) శబ్దాలంకారాలు

1) వృత్యనుప్రాస 2) లాటానుప్రాస

3) ఛేకానుప్రాస 4) అంత్యానుప్రాస

5) ముక్తపదగ్రస్తం 6) యమకం

ఆధార గ్రంధాలు :

1. బాలవ్యాకరణము - పరవస్తు చిన్నయసూరి

2. బాలవ్యాకరణ రమణీయము - దువ్వూరి వెంకటరమణశాస్త్రి

3. బాలవ్యాకరణ ఘంటాపథము - వంతారాం రామకృష్ణరావు

4. బాలవ్యాకరణము (శ్రీ ప్రభావ్యాఖ్య) - పాపిరెడ్డి నరసింహారెడ్డి

5. ఆంధ్ర చంద్రాలోకం - అక్కిరాజు ఉమాకాంతం

6. బాలవ్యాకరణ ప్రసాధని - పాపిరెడ్డి నరసింహారెడ్డి

7. బాలవ్యాకరణం - పుల్లూరు ఉమ

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand the Knowledge of Classical Telugu Grammar.
2. Understand the Grammatical Terms particularly in Bala Vyakaranam
3. Understand the various Alankaras in Telugu Literature.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2							9			
CO2	1	2							9			
CO3	1	2							9			
CO4	1	2							9			
CO5	1	2							9			

TEL 204 – GRAMMAR AND POETICS

వ్యాకరణం – అలంకారాలు

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

విభాగము - ఎ (50 MARKS)

1. అ) రెండు సూత్రాలను సోదాహరణంగా వ్యాఖ్యానించండి 10

ఎ) తత్పురుషాదులకు లక్షణంబు ప్రాయికంబుగా సంస్కృతోక్తంబయగు

బి) ఆచ్ఛిక శబ్దంబుతోడ స్త్రీ సమంబు ప్రాయికంబుగ ద్వంద్వబగు

సి) చిన్నాదులకు ఱీక వర్ణకంబగు

డి) మగంటి మ్యాదులు యథా ప్రయోగంబుగ గ్రాహ్యంబులు

(లేదా)

ఆ) మూడు రూపాల్ని సాధించండి

ఎ) ముక్కంటి బి) మాతాపితలు సి) ఆటకాఁడు

డి) ఇచ్చిందిగాఁడు ఇ) వగలాఁడి ఎఫ్) మోకాలిబంటి

2. అ) రెండు సూత్రాలను సోదాహరణంగా వ్యాఖ్యానించండి 10

ఎ) లకారంబునకు డుఱ్రవురును ముఱ్ఱుగు

బి) దివీతరంబగు డుఱ్ఱుపరంబగు నపుడున్నాను బంధంబునకు దీర్ఘంబగు

సి) కలఱి పరంబులగునపుడు నుగాగమంబగు

డి) లిడ్లాట్టుల వకారంబునకు లోపంబు విభాషనగు

(లేదా)

ఆ) మూడు రూపాల్ని సాధించండి

ఎ) వండుదురు బి) చిలుకలు వలికెను సి) వండకుము

డి) కొట్టక ఇ) వినవె ఎఫ్) కులాలుడు కుండలువానును

3. అ) రెండు సూత్రాలను సోదాహరణంగా వ్యాఖ్యానించండి 10

ఎ) తుమర్థ భావలక్షణంబు లందు నుఱియగు

బి) పడుఱ్యను బంధంబు కర్మంబు నందగు

సి) నిర్ణిమాణంబుల కయుగాగమంబు గలుగడు

డి) సంస్కృతంబున కంగలాదుల కించుక్కగల

(లేదా)

ఆ) మూడు రూపాల్ని సాధించండి

ఎ) జయించు బి) రంజిల్లు సి) ల్రేఁపక

డి) వినుట ఇ) వండను ఎఫ్) ఉన్నాఁడు

4. అ) రెండు సూత్రాలను సోదాహరణంగా వ్యాఖ్యానించండి 10

ఎ) సృజికి నిర్మితిని గుణంబు లేదు

బి) ప్రేరణంబునందించుక్కు మీద నించుక్కు లేదు

సి) తే తేరురు తెచ్చున కగు

డి) చు వర్ణంబు తోడ దుగ్దకారంబు తకారంబగు

(లేదా)

ఆ) మూడు రూపాల్ని సాధించండి

ఎ) కావుతను బి) పచింపించు సి) భుజియించు

డి) ఈఁడు ఇ) రావించు ఎఫ్) నిగిడె

5. అ) రెండు సూత్రాలను సోదాహరణంగా వ్యాఖ్యానించండి 10

ఎ) ఇమి వర్ణకంబు కలుగ్వాదులకగు

బి) పు వర్ణకంబు యయ్యాదులకగు

సి) అక్కటాదుల జడ్డకు లోపంబు విభాషనగు

డి) ఓ యారాదులందొలి దీర్ఘంబునకం హ్రస్వంబు విభాషనగు

(లేదా)

ఆ) మూడు రూపాల్ని సాధించండి

ఎ) అప్పన బి) తిరిపము సి) అతడు ఋషి

డి) అంజిక ఇ) కోరికి ఎఫ్) అలుక

విభాగము - బి

అలంకారాలు - మార్కులు - 30

6. అ) రెండిరటికి అలంకారాల్ని గుర్తించి, ఉదాహరణ రాయండి 5

ఎ) ఒక దానిని చూచి మరొకటిగా భ్రమించడం

బి) ప్రస్తుతం తోచునట్లుగా అప్రస్తుతం వర్ణించడం

సి) ఏనుగు మదం చేతను, రాజు ప్రతాపం చేతను ప్రకాశించును.

డి) పక్షులలో ఒక్కటియే సుకృతి, అది ఇంద్రుని తప్ప మరెవరిని యాచింపదు.

ఆ) రెండిరటికి లక్షణాలను నిర్దేశించండి 5

ఎ) ఇది సరోజమా? చంద్రబింబమా? మాకు నిర్ణయం కలుగలేదు

బి) ఓ గంగా పాపాత్ములను గూడ స్వర్గమునకు జేర్చు నీకు వివేకమెక్కడిది

సి) రాజు కువలయానందకరుడు

డి) హనుమంతుడు సముద్రమును దాటెను. మహాత్ములకు సాధ్యముకాని కార్యముగలదా

7. రెండు జంటలకు సామ్య వైషమ్యాలను వివరించండి 10

ఎ) వక్రోక్తి`స్వభావోక్తి

బి) స్మృతి`భ్రాంతి

సి) వ్యాజ స్తుతి`వ్యాజ నింద

డి) దృష్టాంతం`నిదర్శనం

8. ఒక అలంకారంతో అవాంతర భేదాల్ని వివరించండి 10

ఎ) ఉత్ప్రేక్ష

బి) అతిశయోక్తి

సి) రూపకం

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CC : TEL 205 A	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	RAYALASEEMA SAHITYAM (COMPULSORY FOUNDATIONS)	EXT.Mrks: 80

రాయలసీమ సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is –

1. To familiarize the Students with the Historical and Geographical back – ground of Ryalaseema.
2. To acquaint the Students with the Special Culture and Dialect of Rayalaseema.
3. To familiarize the Students with the ancient and modern literature of Rayalaseema in various Genres.

యూనిట్ - I **1. రాయలసీమ చారిత్రక నేపథ్యం**

1.1. రాయలసీమ భౌగోళిక చరిత్ర

1.2. రాయలసీమ చారిత్రకాధారాలు ` శాసనాలు, కైఫీయతులు

1.3. రాయలసీమ ` జానపద సంస్కృతి : సాంఘికాచారాలు, వస్తు సంస్కృతి

1.4. రాయలసీమ జానపద సాహిత్యం – కళలు

యూనిట్ - II **2.రాయలసీమ ప్రాచీన సాహిత్యం**

2.1. రాయలసీమ భాష

2.2. సంప్రదాయ సాహిత్యం

2.3. తాత్త్విక, లౌకిక సాహిత్యం

2.4. శతక, సంకీర్తన సాహిత్యం

యూనిట్ - III **3.రాయలసీమ ఆధునిక కవిత్వం**

3.1. రాయలసీమ అవధాన సాహిత్యం

3.2. ఆధునిక కాలంలో సంప్రదాయ కవిత్వం`చారిత్రక కావ్యాలు

3.3. భావ, అభ్యుదయ, విప్లవ కవిత్వం,

3.4. దళిత, స్త్రీవాద, ముస్లిం మైనారిటివాద, ప్రపంచీకరణ కవిత్వం

యూనిట్ - IV **4. రాయలసీమ కల్పనా సాహిత్యం**

4.1. రాయలసీమ నవల

4.2. రాయలసీమ కథానిక

4.3. రాయలసీమ నాటకం

యూనిట్ - V **5. రాయలసీమ సాహిత్య విమర్శకులు**

కట్టమంచి, రాళ్ళపల్లి, రా.రా., వల్లంపాటి, రాచపాళెం

ఆధార గ్రంధాలు :

1. నాగయ్య. జి : **తెలుగు సాహిత్య సమీక్ష సంపుటాలు**

2. వెంకటసుబ్బయ్య, వల్లంపాటి : **రాయలసీమ ఆధునిక సాహిత్యం - సాంస్కృతిక అధ్యయనం**

3. భూమన్ : **రాయలసీమ ముఖచిత్రం**

4. ఇమాం (సం) : **తరతరాల రాయలసీమ**

5. మల్లారెడ్డి, వై.వి. : **రాయలసీమ ప్రస్థానం**

6. ఉమామహేశ్వరశాస్త్రి, అవధానం : **కడపజిల్లా శాసనాలు**

7. అహోబలరావు, కల్లూరు : **రాయలసీమ రచయితల చరిత్ర 4సం॥లో**

8. రామచంద్ర, ఎన్ : **రాయలసీమ సంప్రదాయ కవులు**

9. ఆరుద్ర : **సమగ్ర ఆంధ్ర సాహిత్యం సంపుటాలు**

10. వెంకటయ్య, తవ్వా : **రాయలసీమ కథాతొలకరి**

11. వెంకటయ్య, తవ్వా : **రాయలసీమ కథానిక తొలిదశ**

12. సీమరత్నాలు : **కొత్వాలు అమరేంద్ర**

13. హరినాథ రెడ్డి, ఎ : **మొదటి తరం రాయలసీమ కథానికలు**

COURSE OUTCOMES (CLOs)

After the Completion of the Course the Students are able to -

1. Understand the Historical and Geographical back – ground of Rayalaseema.
2. Understand the Special Culture and Dialect of Rayalaseema.
3. Understand the ancient and modern Literature of Rayalaseema in different Genres.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3									
CO2	1	2	3					8				
CO3	1	2	3							10		
CO4	1	2	3	4	5						11	
CO5	1	2	3	4								

TEL 205 A – Rayalaseema Sahityam

రాయలసీమ సాహిత్యం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

విబాగం - ఎ

1. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమగ్ర సమాధానాలు రాయండి 5X4=20

1. రాయలసీమ భౌగోళికత
2. క్రైఫేయతులు
3. రాయలసీమ లౌకిక సాహిత్యం
4. కాళికాంబ శతకం
5. రాయలసీమ భావ కవిత్వం
6. రాయలసీమ ముస్లిం కవిత్వం
7. రాయలసీమ అవధాన సాహిత్యం
8. రాయలసీమ జానపద సంస్కృతి ప్రాముఖ్యం
9. రాయలసీమ నాటకం
10. నూతలపాటి గంగాధరం

బి - విభాగం

2. ఈ క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5 X12=60

11. రాయలసీమ చరిత్ర నేపథ్యాన్ని వివరించండి

(లేదా)

రాయలసీమ జానపద కళలను గురించి రాయండి

12. రాయలసీమ సంప్రదాయ సాహిత్యాన్ని గురించి రాయండి

(లేదా)

రాయలసీమ తాత్త్విక సాహిత్యాన్ని విశదీకరించండి

13. రాయలసీమ ఆధునిక చారిత్రక కావ్యాలను పరిచయం చేయండి

(లేదా)

రాయలసీమ అభ్యుదయ కవిత్వాన్ని గూర్చి రాయండి

14. రాయలసీమ నవలా ప్రాముఖ్యాన్ని, ప్రత్యేకతను వివరించండి

(లేదా)

రాయలసీమ కథానికా వికాసాన్ని వివరించండి

15. రాచమల్లు రామచంద్రారెడ్డి విమర్శ ప్రస్థానాన్ని తెలపండి

(లేదా)

విమర్శకుడిగా వల్లంపాటిని విశదీకరించండి

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CC : TEL 205 B	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	COMPARITIVE LITERATURE (COMPULSORY FOUNDATION)	EXT.Mrks: 80

తులనాత్మక సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To enable the students to learn the Origin and the development of Comparitive study.
2. To introduce the students to the various aspects of Comparitive study in various genres like Poetry. Novel and Short Story.
3. To acquaint the Students with comparitive aspects of south Indian Languages.

యూనిట్ - I తులనాత్మక సాహిత్యం - పరిచయం - చరిత్ర

తులనాత్మక సాహిత్య అధ్యయనం - ఆవశ్యకత

యూనిట్ - II దక్షిణ భారతీయ భాషలు - ఆధునిక సాహిత్యం

తులనాత్మక సాహిత్య అధ్యయన వికాసం

రాజశేఖర చరిత్ర - ప్రతాప మొదలియార్ చరిత్ర

యూనిట్ - III నవలా ప్రక్రియ : తులనాత్మక అధ్యయనం

వాసిరెడ్డి సీతాదేవి 'మట్టిమనుషులు' (తెలుగు)

శివరామ కారంత్ 'మరల సేద్యానికి' (కన్నడ)

యూనిట్ - IV కథానిక ప్రక్రియ : తులనాత్మక అధ్యయనం :

తెలుగులోకి అనువదించబడిన వివిధ భారతీయ

భాషల్లోని జానపద కవులు కథలు

యూనిట్ - V తులనాత్మక సాహిత్యం - ప్రత్యేక అధ్యయనం :

1. కందుకూరి - పెరియార్

2. గురజాడ - సుబ్రమణ్య భారతి

3. ఓల్గా - రాజం కృష్ణన్

ఆధార గ్రంథాలు :

1. భారతీయ తులనాత్మక సాహిత్యం - ఎస్. జయప్రకాష్

2. శివరామ కారంత్ 'మరల సేద్యానికి' - అనువాదం - తిరుమల రామచంద్ర

3. వేదనాయగం పిళ్ళై ప్రతాపమొదలియార్ చరిత్ర - అనువాదం - ఎస్. జయప్రకాష్

4. రాజశేఖర చరిత్ర - కందుకూరి వీరేశలింగం

5. సమకాలీన భారతీయ సాహిత్యం - కేంద్ర సాహిత్య అకాడమి

6. తమిళ సాహిత్య చరిత్ర - ము. వరదరాజన్

7. తెలుగు విజ్ఞాన సర్వస్వం - సంపు. 6 - తెలుగు విశ్వవిద్యాలయం

8. ఉత్తర కర్నాటక జానపద కథలు - ఎస్. లింగన్న

9. తెలుగు జానపద కథలు - కె. సుమతి

10. తమిళ దేశపు జానపద కథలు - ఎ.ఎన్. పెరుమాళ్

11. సంచిగ్ధ రాజస్థాని జానపద కథలు - డి. విజయ్

12. ఓల్గా నవలలు

13. కందుకూరి, పెరియార్, గురజాడ, సుబ్రమన్య భారతి వంటి వారి జీవిత చరిత్రలు

14. రాజం కృష్ణన్ నవలలు

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the Origin and the development of Comparitive study
2. Understand the various aspects of Comparitive study in various genres like Poetry. Novel and Short Story
3. Understand the comparitive aspects of south Indian Languages

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1			3	4								12
CO2			3	4	5					10		12
CO3			3	4	5							12
CO4			3	4	5							12
CO5			3	4								12

TEL 205 B – COMPARITIVE LITERATURE

తులనాత్మక సాహిత్యం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

I. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి **5X4=20**

(1) తులనాత్మకత

(2) కందుకూరి

(3) నవల

(4) కథానిక

(5) ఓల్గా

(6) పెరియార్

(7) శివరామ కారంత

(8) సుబ్రమణ్య భారతి

(9) రాజంకృష్ణన్

(10) ఆధునిక సాహిత్యం

బి - విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి **5X12=60**

11 (అ) తులనాత్మిక సాహిత్యాన్ని నిర్వచించి, దాని చరిత్రను గురించి రాయండి?

(లేదా)

(ఆ) తులనాత్మక సాహిత్య అధ్యయన ఆవశ్యకతను వివరించండి

12. అ) దక్షిణ భారతీయ భాషల ఆధునిక సాహిత్య వికాసం గురించి రాయండి

(లేదా)

ఆ) రాజశేఖర చరిత్ర, ప్రతాప మొదలియార్ చరిత్రల తారతమ్యాల గురించి తెల్పండి

13. అ) తెలుగు - కన్నడ నవలా ప్రతిమ వికాసాన్ని గురించి రాయండి

(లేదా)

ఆ) మట్టిమనుషులు - మరలసేద్యానికి నవలల మధ్య గల జీవితచిత్రణను వివరించండి

14. అ) తెలుగులోకి అనువదింపబడిన తమిళ జానపద కథలు కవుల గురించి రాయండి

(లేదా)

ఆ) భారతీయ భాషల జానపద కథలోని సామ్యవైషమ్యాలను తెల్పండి

15. అ) కందుకూరి - పెరియార్‌ల సంఘసంస్కరణ కృషిని వివరించండి

(లేదా)

ఆ) గురజాడ - సుబ్రహ్మణ్య భారతి ల సేవను తులనాత్మకంగా తెలిజేయండి

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CC : TEL 205 C	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	SPECIAL STUDY : POTULURI VEERA BRAHMAM (COMPULSORY FOUNDATION)	EXT.Mrks: 80

ప్రత్యేక అధ్యయనం : పోతులూరి వీరబ్రహ్మం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To help the students to Understand the importance of Pothuluri Veerabrahmam and his thoughts from his Literature.
2. To acquaint the students with social Conditions during the period of Pothuluri Veerabrahmam.
3. To enhance the ability of the students to understand the ultimate goal of life and the way of philosophycal Life

యూనిట్ - I భారతీయ సాహిత్యం - భక్తి ఉద్యమం; 17 వ శతాబ్దం
సామాజిక స్థితిగతులు; తెలుగులో ఆస్థాన కవులు

యూనిట్ - II పోతులూరు వీరబ్రహ్మం జీవితం, సాహిత్యం;
వీరబ్రహ్మం తాత్త్విక దృక్పథం - సంస్కరణ దృక్పథం - స్త్రీ దృక్పథం

యూనిట్ - III పోతులూరు వీరబ్రహ్మం సాహిత్యం - దేశీయత;
పదం - తత్వం - కీర్తన : ప్రక్రియలు : స్వరూప స్వభావాలు;
వీరబ్రహ్మం తత్త్వాలు : శతకం; గోవింద నామాలు

యూనిట్ - IV భారతీయ కాలజ్ఞాన సాహిత్యానికి పోతులూరు వీరబ్రహ్మం దోహదం -
అనంతర కాలంలో వీరబ్రహ్మం సంప్రదాయం

యూనిట్ - V పోతులూరు వీబ్రహ్మం - వేమన : తులనాత్మక అధ్యయనం
దేశీయ కవుల్లో వీరబ్రహ్మం స్థానం
తెలుగులో వీరబ్రహ్మం పై జరిగిన పరిశోధనలు;
వెలువడిన విమర్శలు

ఆధార గ్రంథాలు :

1. కన్నెగంటి రాజమల్లాచారి - శ్రీ పోతులూరు వీరబ్రహ్మంగారి జీవితం, రచనలు

2. డా. యండపల్లి పాండురంగ - శ్రీ పోతులూరి వీరబ్రహ్మేంద్రస్వామి - సమగ్ర పరిశోధన

3. మూల మల్లికార్జున రెడ్డి - శ్రీ వీరబ్రహ్మేంద్రుని తాత్విక దార్శినికత

4. పిల్లలమర్రి రాములు - తెలుగులో భక్తి కవిత్వం - సామాజిక విశ్లేషణ

5. కె.కె. రంగనాథాచార్యులు (సంపా.) - తొలి తెలుగు సామాజిక కవులు

6. కె.కె. రంగనాథాచార్యులు (సంపా.) - తెలుగు సాహిత్యం మరోచూపు

7. వెలుదండ నిత్యానందరావు - విశ్వవిద్యాలయాలలో తెలుగు పరిశోధన

8. ప్రజాశక్తి ప్రచురించిన పోతులూరి వీరబ్రహ్మం గారి వివిధ రచనలు

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the importance of Pothuluri Veerabrahman and his thoughts from his Literature.
2. Understand the social Conditions during the period of Pothuluri Veerabrahmam.
3. Understand the ultimate goal of life and the way of philosophycal Life

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3				7	8		10	11	
CO2	1	2	3				7	8		10	11	
CO3	1	2	3				7	8		10	11	
CO4	1	2	3				7	8		10	11	
CO5	1	2	3				7	8		10	11	

TEL 205 C - SPECIAL STUDY : POTULURI VEERA BRAHMAM

ప్రత్యేక అధ్యయనం : పోతులూరి వీరబ్రహ్మం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

I. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి 5X4=20

(1) బారతీయ సాహిత్యం

(2) భక్తి ఉధ్యమం

(3) వీరబ్రహ్మం జీవిత విశేషాలు

(4) పోతులూరి వీరబ్రహ్మం పదాలు

(5) గోవింద నామాలు

(6) కాలజ్ఞానం

(7) వేమన

(8) తులనాత్మకత

(9) పోతులూరిపై వచ్చిన విమర్శలు

(10) వీరబ్రహ్మం దృష్టిలో స్త్రీ

బి - విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి 5X12=60

11 (అ) భారతదేశంలోని భక్తి ఉద్యమాల గురించి పరిచయం చేయండి

(లేదా)

(ఆ) తెలుగులో ఆస్థాన కవుల సాహిత్యాన్ని దృక్పథాన్ని తెలపండి

12. (అ) వీరబ్రహ్మం రచనలను పరిచయం చేయండి

(లేదా)

(ఆ) వీరబ్రహ్మం తాత్త్విక దృక్పథాన్ని విశదీకరించండి

13. (అ) వీరబ్రహ్మం గారి దేశీయ సాహిత్యాన్ని పరిచయం చేయండి

(లేదా)

(ఆ) కాళికాంబ శతకంలోని వస్తు వైవిద్యాన్ని వివరించండి

14. (అ) భారతీయ కాలజ్ఞాన సాహిత్యానికి వీరబ్రహ్మం గారి పాత్రను తెలపండి

(లేదా)

(ఆ) వేమన - వీరబ్రహ్మంల తాత్త్విక దృక్పథంలో తులనాత్మకతను తెలపండి

15. (అ) దేశీయ కవుల్లో వీరబ్రహ్మం స్థానాన్ని నిర్ధారించండి

(లేదా)

(ఆ) తెలుగులో బ్రహ్మంగారిపై జరిగిన పరిశోధన, తీరుతెన్నులను వివరించండి

@@@

CC : TEL 206 A	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	MODERN TELUGU LITERARY GENRES (ELECTIVE FOUNDATION)	EXT.Mrks: 80

ఆధునిక తెలుగు సాహిత్య ప్రక్రియలు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the students modern Telugu poetry, Novel and Short Stories.
2. To acquaint the students with the major Trends in Modern Telugu Literature.
3. To help the students to know the influence of westren Literature on Modern Telugu Literature.

యూనిట్ - I ప్రక్రియ - స్వరూప స్వభావాలు - ఆధునిక సాహిత్య ప్రక్రియ : ఆవిర్భావ కారణాలు సమాజము. సాహిత్య ప్రక్రియ - సంబంధం

యూనిట్ - II కవితా ప్రక్రియలు : ఖండకావ్యం - గేయం - వచన కవిత - దీర్ఘ కవిత - మినీ కవిత - ముత్యాల సరాలు - కూనలమ్మ పదాలు - హైకూ - గజల్ - రుబాయి. లక్షణాలు - వికాసం.

యూనిట్ - III కల్పనా సాహిత్య ప్రక్రియలు : నవల - నవలిక - కథ : కథానిక - కార్టుకథ - గల్పిక : స్కెచ్ : లక్షణాలు, వికాసం

యూనిట్ - IV దృశ్య కావ్య ప్రక్రియలు : నాటకం - నాటిక - ప్రహసనం - ఆధునిక వీధి నాటకం ఇతర ప్రయోగాలు : తెరలేని నాటకం, రంగస్థలం లేని నాటకం, స్త్రీ పాత్ర లేని నాటకం, పురుష పాత్రలేని నాటకం : లక్షణాలు - వికాసం

యూనిట్ - V ఇతర ప్రక్రియలు : జీవిత చరిత్ర - స్వీయచరిత్ర - యాత్రా చరిత్ర - లేఖ వ్యాసం - సమీక్ష - లక్షణాలు - వికాసం

ఆధార గ్రంధాలు :

1. ఆంధ్ర సాహిత్య చరిత్ర - పింగళి లక్ష్మీకాంతం
2. ఆంధ్రసారస్వత చరిత్ర - ఖండవల్లి లక్ష్మీరంజనం
3. తెలుగు సాహిత్య చరిత్ర - దివాకర్ల వెంకటావధాని

4. తెలుగు సాహిత్య సమీక్ష - జి. నాగయ్య (మొదటి సంపుటం)

5. తెలుగు కావ్యావతారికలు - జి. నాగయ్య

6. తెలుగు సాహిత్య చరిత్ర - కొర్లపాటి శ్రీరామమూర్తి

7. తెలుగు సాహిత్యంలో చర్చనీయాంశాలు - జి.వి. సుబ్రహ్మణ్యం

8. సమగ్రాంధ్ర సాహిత్యం సంపుటాలు - 'ఆరుద్ర'

9. ఆంధ్రవిజ్ఞాన సర్వస్వం - 3వ సంపుటం

10. తెలుగు సాహిత్య చరిత్ర - ద్వానా శాస్త్రి

11. తెలుగు సాహిత్య చరిత్ర - వి. సిమ్మన్న

12. తెలుగు కథానిక స్వరూప స్వభావాలు - పోరంకి దక్షిణామూర్తి

13. తెలుగు నాటక రంగం నూతన ధోరణలు - ప్రయోగాలు - కందిమళ్ళ సాంబశివరావు

14. కథాశిల్పం, నవలశిల్పం - వల్లంపాటి వెంకటసుబ్బయ్య

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the modern Telugu poetry, Novel and Short Stories.
2. Understand the major Trends in Modern Telugu Literature.
3. Understand the influence of westren Literature on Modern Telugu Literature.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2		4						10		12
CO2	1	2		4						10		12
CO3	1	2		4						10		12
CO4	1	2		4						10		12
CO5	1	2		4						10		12

TEL 206 A - MODERN TELUGU LITARARY GENRES

ఆధునిక తెలుగు సాహిత్య ప్రక్రియలు

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

I, ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి 5X4=20

(1) ప్రక్రియ

(2) సమాజము

(3) వచన కవిత

(4) హైకూ

(5) నవలిక

(6) గల్పిక

(7) స్కెచ్

(8) నాటిక

(9) రంగస్థలం లేని నాటకం

(10) లేఖ

బి - విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి 5X12=60

11 (అ) ఆధునిక సాహిత్య ప్రక్రియ ఆవిర్భావ కారణాలను తెలపండి

(లేదా)

(ఆ) ఆధునిక ప్రక్రియ స్వరూప స్వభావాలను పేర్కొనండి

12. (అ) దీర్ఘకవితల ప్రారంభ వికాసాన్ని వివరించండి

(లేదా)

(ఆ) తెలుగులోకి వచ్చిన విదేశీ ప్రక్రియలగురించి స్థూలనంగా పేర్కొనండి

13. (అ) తెలుగు 'నవల' వికాసాన్ని తెలపండి

(లేదా)

(ఆ) కథానిక లక్షణాలను, వికాసాన్ని వివరించండి

14. (అ) తెలుగులోని ప్రహసనాలను వాటి ప్రాముఖ్యాన్ని వివరించండి

(లేదా)

(ఆ) 'వీధినాటకం' ప్రారంభ వికాసాలను తెలపండి

15. (అ) తెలుగులోని 'యాత్రాచరిత్రల' ద్వారా తెలుసుకోగలిగే సామాజిక అంశాలను తెలపండి

(లేదా)

(ఆ) 'వ్యాసం'ను నిర్వచించి, పరిణామ వికాసాన్ని వివరించండి

@@@

CC : TEL 206 B	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	SAMSTHANA SAHITYAM (ELECTIVE FOUNDATION)	EXT.Mrks: 80

సంస్థాన సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the students that what are the Samstaanas and its histories in Telugu States.
2. To acquaint the students with some of the major poets and writers and their writings of various Samstaanaas.
3. To entnce the ability of the students to know the placement of Samstana Literature in Telugu Literature.

యూనిట్ - I సంస్థానాలు - సుబాలు : పరిచయం

వరంగల్లు సుబాకవులు - మెదక్ సుబాకవులు

కర్నూలు సుబాకవులు - కడప సుబాకవులు

యూనిట్ - II సురపురం సంస్థాన కవులు - గద్వాల సంస్థాన కవులు

శిరాసుబా కవులు - ఆర్కాటు సుబాకవులు

యూనిట్ - III కొండవీడు సర్కారు కవులు - కొండపల్లి సర్కారు కవులు;

ప్రోలునాటి కవులు - కళింగ కవులు

యూనిట్ - IV విజయనగరం సంస్థానం - చరిత్ర

విజయనగర సంస్థాన కవులు

గొడేవారి వంశ చరిత్ర

గొడేవారి సంస్థాన కవులు

యూనిట్ - V బొబ్బిలి సంస్థానం - చరిత్ర

బొబ్బిలి సంస్థాన కవులు

వెంకటగిరి సంస్థానం - చరిత్ర

వెంకటగిరి సంస్థాన కవులు

ఆధార గ్రంథాలు :

1. తూమాటి దొణప్ప - ఆంధ్ర సంస్థానములు సాహిత్య పోషణ

2. ఆరుద్ర - సమగ్ర ఆంధ్ర సాహిత్యం, సంపుటాలు

3. తెలుగు సాహిత్య చరిత్రలు

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the Samstaanas and its histories in Telugu States.
2. Understand the major poets and writers and their writings of various Samstaanaas.
3. Understand the placement Telugu Literature.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4								12
CO2	1	2	3	4								
CO3	1	2	3	4								
CO4	1	2	3	4								
CO5	1	2	3	4								

TEL 206 B – SAMSTHANA SAHITYAM

సంస్థాన సాహిత్యం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

I. ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమాధానాలు రాయండి **5X4=20**

(1) సంస్థానాలు
(2) కర్నూలు సుబా కవులు
(3) గద్వాల సంస్థాన కవులు
(4) శిరాసుబా కవులు
(5) ప్రోలునాటి కవులు
(6) గొడేవారి వంశ చరిత్ర
(7) సంస్థాన సాహిత్యం
(8) వెంకటగిరి సంస్థాన చరిత్ర
(9) సంస్థాన సాహిత్య ప్రయోజనం
(10) సంస్థాన రాజుల పరిచయం

బి - విభాగం

II. ఈ క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి 5X12=60

11 (అ) సంస్థాన సాహిత్యం నిర్వచించి, తెలుగు సాహిత్యానికి సంస్థానాలు అందించిన ప్రోత్సాహాన్ని గురించి తెలపండి ?

(లేదా)

(ఆ) వరంగల్లు సుబాకవులు సాహిత్య కృషిని వివరించండి

12. అ) సురపురం సంస్థాన కవుల గురించి తెలపండి

(లేదా)

ఆ) ఆర్కాటు సుబాకవులు అందించిన సాహిత్యాన్ని దాని ప్రత్యేకతను తెలపండి

13. అ) కొండవీడు సర్కారు కవుల సాహిత్య ప్రత్యేకతను వివరించండి

(లేదా)

ఆ) కళింగ కవుల సాహిత్యాన్ని పరిచయం చేయండి

14. అ) విజయనగర సంస్థాన కవుల సాహిత్య ప్రత్యేకతను తెలియజేయండి

(లేదా)

ఆ) గొడేవారి వంశ చరిత్రను విపులీకరించండి

15. అ) బొబ్బిలి సంస్థానం ప్రత్యేకతను తెలియజేయండి

(లేదా)

ఆ) వెంకటగిరి సంస్థాన కవుల సాహిత్యాన్ని వివరించండి?

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CC : TEL 207	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 100	HUMAN VALUES, PROVESSIONAL ETHICS - II (CORE)	

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is to understand -

1. The importance of human values and relevance to Present day.
2. The importance of Medical ethics in all aspects.
3. The importance of Business ethics to avoid immoral and illegal practices.
4. The importance of Social ethics in all aspects.

UNIT-I Value Education – Definition _ relevance to present day – Concept of Human Values _ self introspection – Self esteem. Family values –Components, structure and responsibilities of family – Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

UNIT-II Medical ethics – Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social Justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT-III Business ethics – Ethical standards of business – Immoral and illegal practices and their solutions. Characterics of ethical problems in management, ethical theries, causes of unethical behavior, ethical abuses and work theics.

UNIT-IV Environmental ethics – Ethical theory, man and nature – Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

UNIT-V Social ethics – Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media – Impact of Newspapers, Television, Movies and Internet.

Books for Study:

1. John S Mackenjie: A Manual of Ethics.
2. "The Ethics of Management"by Larue Tone Hosmenr, Richard D. Irwin Inc.
3. "Management Ethics – intergrity at work' by Joseph A. Petrick and John F. Quinn,

   Response Books: New Delhi.
4. "Ethics in Management"by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today

6. Maitra, S. K. : Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha : A Manual of Ethics
9. Manu : Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.). G.C.Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanalal, Kunjalal Brishagratha, Chowkamba Sanskrith Series, Vol. I, II and III, Varnasi, Vol. I oo, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita : Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, May field Publishing Company, 1999.
14. An introduction to Applied Ethics (ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin & co Julundhar.

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the Human Values and relavence to present day.
2. Understand the Medical ethics in all aspects.
3. Understand the Business ethics to avoid immoral and illegal practices.
4. Understand the Social ethics in all aspects.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2		4			7				11	12
CO2	1	2		4			7				11	12
CO3	1	2		4			7				11	12
CO4	1	2		4			7				11	12
CO5	1	2		4			7	8			11	12

TEL 207 - HUMAN VALUES AND PROFESSIONAL ETHICS-II

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-100**

SECTION-A

I) Write any five of the following short notes **5x5=25**

1. Value Education and its relevance to present day
2. Self introspection
3. Self esteem
4. Family Values-Components, structure and responsibilities of family
5. Neutralization of Anger-Adjustability
6. Threats of Family life
7. Status of Women in family and society
8. Caring for needy and elderly
9. Time allotment for sharing ideas and concerns
10. Environmental Health and Justice.

II) Write All Questions **5x15=75**

1. a) Give an account of Medical ethics of Charaka, Sushruta and Hippocratus on moral responsi bility of medical practitioners.

(OR)

b) Write an essay on the concept of Euthanasia and, Ethical Obligation to anilmals.

2. a) Dosciss the Ethical issues in relation to healthcare professionals and patients.

(OR)

b) Examine Social justice in health care, human cloning and, problems of abortion

3. a) Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge

(OR)

b) Discuss Ethical standards of business-Immoral and illegal practices and their solutions

4. a) Give an exposition of Environmental ethics with reference to Ecological crisis, Pest control, Pollution and waste.

(OR)

b) Critically analyze Social ethics with reference to Organ trade, Human trafficking and Human rights Violation.

5. a) How do you justify Surrogacy/Pregnancy? Discus its place in Feminist ethics.

(OR)

b) Discuss critically Ethics of media and its Impact on News Papers, Television, Movies and Internet.

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SEMESTER – III

SEMESTER – III

CC : TEL 301	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	CLASSICAL LITERARY CRITICISM (CORE)	EXT.Mrks: 80

ప్రాచీన సాహిత్య విమర్శా

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the Students to Literary Criticism.
2. To acquaint the Students with the Origin and Development of various theories in Indian Alankara Sastras.
3. To help the Students to understand that the earliar methods of Criticism in Telugu Literature.
4. To help the students to understand that the definitions and uses of Kavyas among Indian and Westren critics.

యూనిట్ - I విమర్శ స్వరూప స్వభావాలు - విమర్శ ప్రయోజనం కావ్య స్వరూపం కావ్య హేతువులు – కావ్యాత్మ

యూనిట్ - II కళలు - లలిత కళలు – దృశ్య, శ్రవ్య, కళలు - లలిత కళల్లో కవిత్వ స్థానం

యూనిట్ - III రససిద్ధాంతం - లాక్షణికుల భిన్న దృక్పథాలు - రసరాజం – రసాభాస

యూనిట్ - IV ధ్వని సిద్ధాంతం - శబ్ద వృత్తులు - ధ్వని భేదాలు - ప్రాచీన సాహిత్య ప్రక్రియలు శతకం - ప్రబంధం – యక్షగానం

యూనిట్ - V రూపకం ఆవిర్భావ వికాసం - నాటక లక్షణాలు ట్రాజడి, కామెడి ఆవిర్భావ వికాసాలు - కెథార్సిస్.

ఆధార గ్రంధాలు :

1. సాహిత్య శిల్ప సమీక్ష - పింగళి లక్ష్మీకాంతం

2. సాహిత్య దర్శనం - కె.వి.ఆర్. నరసింహం

3. సాహిత్య సోపానాలు - దివాకర్ల వేంకటావధాని

4. కావ్యాలంకార సంగ్రహం - సన్నిదానం సూర్యనారాయణశాస్త్రి

5. భారత ధ్వని దర్శనము - శలాక రఘునాథశర్మ

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the Literary Criticism
2. Understand the Origin and Development of various theories like Rasa, Dhwani ect. from Indian Alankara Sastras.
3. Understand the earlier methods of Criticism in Telugu Literature.
4. Understand the definitions and uses of Kavyas by Indian and Westren Critics.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4						10		12
CO2	1	2	3	4						10		12
CO3	1	2	3	4						10		12
CO4	1	2	3	4						10		12
CO5	1	2	3	4						10		12

TEL 301 – CLASSICAL LITERARY CRITICISM

ప్రాచీన సాహిత్య విమర్శ

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

విభాగం - ఎ

కింది వాటిలో ఐదింటిని సంగ్రహంగా వివరించండి 5X4=20

1. వ్యుత్పత్తి
2. స్థిర కళలు
3. సాత్త్విక భావాలు
4. కరుణము
5. సాధారణీకరణము
6. జహదభిధేయము
7. రసధ్వని
8. యక్షగానం
9. ట్రాగోడియా
10. కామెడి

విభాగం - బి

కింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11. (అ) విమర్శ ప్రయోజనాలను తెలియజేయండి?

(లేదా)

ఆ) 'కావ్యాత్మ'ను వివరించండి?

12. (అ) కళల్లో లలిత కళల విశిష్టతను విశ్లేషించండి?

(లేదా)

ఆ) లలిత కళల్లో కవిత్వస్థానాన్ని నిర్దేశించండి?

13. అ) భరతుని రస సూత్రాన్ని విశదీకరించండి?

(లేదా)

ఆ) శృంగార రస ప్రాధాన్యాన్ని తెలియచేయండి?

14. అ) శబ్దవృత్తులను వివరించండి?

(లేదా)

ఆ) ప్రబంధ ప్రక్రియను విశ్లేషించండి?

15. అ) భారతీయ నాటక లక్షణాలను తెలియచేయండి?

(లేదా)

ఆ) 'కెథార్సిస్'ను విశ్లేషించండి?

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CC : TEL 302	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	TELUGU CULTURE (CORE)	EXT.Mrks: 80

తెలుగు సంస్కృతి

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To enable the Students to Study about the Geographical and Historical importance of Andhra.
2. To acquaint the Students with the evolution of Andhra Culture since Satavahana Period.
3. To familiarize the Students with the customs and Practices of Andhra life.

యూనిట్ - I సంస్కృతి, నాగరికత నిర్వచనాలు సంస్కృతిలోని అంశాలు, చరిత్ర పూర్వ యుగం నాటి తెలుగు సంస్కృతి, తెలుగు సంస్కృతి నిర్మాణానికి ఆధారాలు. శాతవాహన యుగం, శాతవాహనుల రాజకీయ వైభవం, శాతవాహనుల నాటి సాహిత్య సాంస్కృతిక విశేషాలు

యూనిట్ - II శాతవాహనుల అనంతరకాలం. ఇక్ష్వాకుల నుంచి విష్ణుకుండినుల వరకు గల రాజవంశాలు - మతపరిణామం, సామాజిక సాంస్కృతిక విశేషాలు
తూర్పు చాళుక్యులు - రాజకీయ మత విషయాలు - సాహిత్య సాంస్కృతిక విశేషాలు వివిధ చాళుక్య వంశాలు. తెలుగు చోళులు - వెలనాటి చోళులు మత సంస్కృతులు

యూనిట్ - III కాకతీయుల కాలం నాటి ఆంధ్రదేశం - మత సంస్కృతి, శిల్పవిశేషాలు, వాస్తుకళ, సాహిత్య సామాజిక విశేషాలు.
రెడ్డిరాజ్యాలు - రాజకీయ విశేషాలు, మత, సాహిత్య సాంస్కృతిక అంశాలు పద్మనాయకులు మత సంస్కృతి

యూనిట్ - IV విజయనగర యుగం - సామాజిక సాంస్కృతిక జీవన విధానం - సాహిత్యం లలితకళలు గోల్కొండ సామ్రాజ్య వైభవం, సాహిత్య సాంస్కృతిక విశేషాలు

యూనిట్ - V ఆధునిక యుగం - వలన పాలన సాంస్కృతిక పునరుజ్జీవనం - పాశ్చాత్య నాగరికత ప్రభాన సాహిత్యపు తీరుతెన్నులు - క్రైస్తవ మిషనరీలు - ఆంధ్ర రాష్ట్రావతరణం - విశాలాంధ్రకు దోహదం.

ఆధార గ్రంధాలు :

1. ఆంధ్రుల చరిత్ర సంస్కృతి - **ఖండవల్లి లక్ష్మీరంజనం**

2. ఆంధ్రుల సాంఘిక చరిత్ర - **సురవరం ప్రతాపరెడ్డి**

3. ఆంధ్రోద్యమం - **మాడపాటి హనుమంతరావు**

4. రెడ్డి సంచిక - **మారేమండ రామారావు (సంపాదకుడు)**

5. శాతవాహన సంచిక -

6. History of Reddi Kingdoms - **మల్లంపల్లి సోమశేఖర శర్మ**

7. The Kakatiyas - **పి.వి. పరబ్రహ్మశాస్త్రి**

8. తరతరాల తెలుగు వారి మతాచార విశేషాలు - గల్లా చలపతి

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the Geographical and Historical importance of Andhra.
2. Understand the evolution of Andhra Culture since Satavahana period.
3. Understand the Customs and Practices of Andhra Life.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4			7					
CO2	1	2	3	4			7					
CO3	1	2	3	4			7					
CO4	1	2	3	4			7					
CO5	1	2	3	4			7					

TEL 302 - TELUGU CULTURE

తెలుగు సంస్కృతి

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

విభాగం - ఎ

క్రింది వాటిలో ఐదింటి ని వివరించండి 5X4=20

1. శ్రీకృష్ణదేవరాయలు
2. విష్ణుకుండినులు
3. సంస్కృతి ప్రయోజనం
4. రాజరాజ నరేంద్రుడు
5. పెదకోమటి వేమారెడ్డి
6. ఇబ్రహిం కుతుబ్‌షా
7. గోల్కొండ కోట
8. క్రైస్తవ మిషనరీలు
9. విశాలాంధ్ర
10. పాశ్చాత్య నాగరికత

విభాగం - బి

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11. (అ) తెలుగువారి చరిత్ర, సంస్కృతి అధ్యయనానికి గల ఆధారాలను వివరించండి?

(లేదా)

(ఆ) సంస్కృతి, నాగరికతలను నిర్వచించి; చారిత్రక పూర్వయుగ సంస్కృతిని పేర్కొనండి?

12. (అ) తూర్పు చాళుక్యుల కాలం నాటి మత, సాంస్కృతిక విషయాలను వివరించండి?

(లేదా)

(ఆ) శాతవాహన యుగం నాటి సాహిత్య, సాంస్కృతిక విశేషాలను తెల్పండి?

13. (అ) రెడ్డి రాజుల కాలం నాటి సామాజిక పరిస్థితులను విశదీకరించండి?

(లేదా)

(ఆ) కాకతీయుల కాలంనాటి వాస్తు, శిల్ప విశేషాలను వివరించండి?

14. (అ) విజయనగర రాజుల కాలం నాటి సామాజిక పరిస్థితులను చర్చించండి?

(లేదా)

(ఆ) గోల్కొండ రాజుల సాహిత్య కళా పోషణను విపులీకరించండి?

15. (అ) ఆంధ్రరాష్ట్ర అవతరణకు దారితీసిన సాంస్కృతిక, రాజకీయ పరిస్థితులను తెల్పండి?

(లేదా)

(ఆ) వెలనాటి చోళుల మత సంస్కృతులను వివరించండి?

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CC : TEL 303 A	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	TELUGU JOURNALISM (CORE)	EXT.Mrks: 80

తెలుగు జర్నలిజం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the students the system of Mass Communication, its origin and development since ancient days.
2. To acquaint the Students with different channels of Communication and the role of Communication in Socio - political, economic, scientific and cultural fields.
3. To enable the Students to learn the importance of Communication in personality development and employment opportunities.

యూనిట్ - I సమాచారాల చేరవేత, పాత్రికేయత్వం సమాచారాల చేరవేత పద్ధతులు సాధనాలు, పత్రిక, పాత్రికేయత్వం, పాత్రికేయుడు, రిపోర్టింగ్ - రిపోర్టర్ అర్హతలు, లక్షణాలు, విధులు, వివిధ రిపోర్టర్లు, రిపోర్టింగ్‌లో రకాలు (పాటించవలసిన విలువలు)

యూనిట్ - II ఎడిటింగ్, ఎడిటర్ బాధ్యతలు, వివిధ రకాల కాపీలు - వాటి నిర్వహణలు సబ్ ఎడిటర్ అర్హతలు, లక్షణాలు, వార్తల్లోని రకాలు, వాటి నిర్వహణ, వార్త, నిర్వచనాలు, లక్షనాలు, వార్తల్లోని రకాలు, ఫీచర్ - నిర్వచనాలు, లక్షణాలు, రకాలు వార్తాసంస్థలు, ఫీచర్`సిండికేట్లు

యూనిట్ - III తెలుగులో ముద్రణ, తెలుగు పత్రికల ఆవిర్భావం. తొలి తెలుగు పత్రిక తెలుగు పత్రికల వికాసం. తెలుగు పత్రికల వర్గీకరణ, తెలుగు పత్రికలు ఉద్యమాలు, జాతీయోద్యమం, ఆంధ్రరాష్ట్రోద్యమం, గ్రంథాలయోద్యమం భాషోద్యమాలు

యూనిట్ - IV ఎ) సుప్రసిద్ధ తెలుగు పత్రికలు - సుజన రంజని, ఆముద్రిత గ్రంథ చింతామణి, ఆంధ్రభాషా సంజీవని, పురు ర్థ ప్రదాయిని, భారతి, కిన్నెర, సృజన, స్రవంతి, ఆంధ్రప్రతిక, ఆంధ్రజ్యోతి, ఆంధ్రప్రభ, ఆంధ్రభూమి, ఈనాడు, వార్త, విశాలాంధ్ర, ప్రజాశక్తి, సాక్షి, మొ॥

బి) ప్రముఖ తెలుగు పాత్రికేయులు - కందుకూరి వీరేశలింగం పంతులు, కాశీనాధుని నాగేశ్వరావు పంతులు, ముట్నూరి కృష్ణారావు, నార్ల, ఖాసాసుబ్బారావు, రామ్మోహనరావు, పాత్తూరి వెంకటేశ్వరరావు, రామోజిరావు, ఎబికె. ప్రసాద్ మొ||

యూనిట్ - V ఎ) పత్రికలకు రాయడం - వార్త రాయడం, ఫీచర్ రాయడం, ఇంటర్వ్యూలు నిర్వహించడం, గ్రంధ సమీక్షలు రాయడం కాలమ్స్, సంపాదకీయాలు రాయడం

బి) శ్రవణ మాధ్యమాలకు రాయడం` ఉపన్యాసం, గోష్ఠులు, సంభాషణలు, సృజనాత్మక రచనలు, దృశ్యశ్రవణ మాధ్యమానికి రాయడం (టి.వి.) సృజన రచనలు, టెలిఫిల్ములు, వార్త రచన, వాణిజ్య ప్రకటనలు మొ||

ఆధార గ్రంధాలు :

1. తెలుగు జర్నలిజం - డా|| వి. లక్ష్మణరెడ్డి
2. తెలుగు జర్నలిజం చరిత్ర వ్యవస్థ - రాపోలు ఆనంద భాస్కర్
3. జర్నలిజం - దుర్గం రవీంద్ర
4. జర్నలిజం పరిచయం - డా|| బూదరాజు రాధాకృష్ణ
5. తెలుగులో సాహిత్య పత్రికలు - డా|| యస్.హెచ్. సౌభాగ్యమ్మ
6. మనం మన పాత్రికేయులు - డా|| యస్.హెచ్. సౌభాగ్యమ్మ
7. సమాచారాల చేరవేత, పాత్రికేయత్వం - డా|| ఎస్జీడి. చంద్రశేఖర్
8. వెలుగు దారిలో తెలుగు పత్రికలు - వేదగిరి రాంబాబు

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the system of Mass Communications, its origin and development since ancient days.
2. Understand the different channels of Communications, and the role of Communications in Various fields like Socio - Political, Economic, Scientific, Cultural ect.
3. Understand the importance of Communications in personality development and employment opportunities.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3					8	9			12
CO2	1	2	3					8	9			12
CO3	1	2	3					8	9			12
CO4	1	2	3					8	9			12
CO5	1	2	3					8	9			12

TEL 303 A - TELUGU JOURNALISM

తెలుగు జర్నలిజం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

విభాగం - ఎ

క్రింది వాటిలో ఐదింటికి సమగ్ర సమాధానాలు రాయండి 5X4=20

1. భారతి సాహిత్య పత్రిక
2. కందుకూరి
3. చింతామణి
4. ఆంధ్రభాషా సంజీవని
5. ముట్నూరి కృష్ణారావు
6. ఎల్లో జర్నలిజం
7. ఫీచర్స్
8. సంపాదకీయాలు
9. సృజనాత్మక రచనలు
10. వాణిజ్య ప్రకటనలు

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానములు రాయండి 5X12=60

11. ఆ) సమాచారాల చేరవేత పద్ధతులను వివరించండి

(లేదా)

ఆ) రిపోర్టర్ అర్హతలను, లక్షణాలను విపులీకరించండి

12. అ) వార్తను నిర్వచించి, లక్షణాలను తెలియజేయండి?

(లేదా)

ఆ) వార్తల్లోని రకాలను పరిచయం చేయండి?

13. అ) తెలుగు పత్రికలు ఆవిర్భావ వికాసాలను వివరించండి?

(లేదా)

ఆ) జాతీయోద్యమంలో పత్రికల పాత్రను వివరించండి?

14. అ) తెలుగు సాహిత్య పత్రికల సేవను వివరించండి?

(లేదా)

ఆ) కాశీనాధుని నాగేశ్వర పంతులు పత్రికలకు చేసిన సేవను పరిచయం చేయండి?

15. అ) పత్రికల్లో వివిధ కాలమ్స్ రాయడాన్ని వివరించండి?

(లేదా)

ఆ) దృశ్యమాధ్యమానికి, శ్రవణమాధ్యమానికి రాయడంలో ఉన్న తేడాను పరిచయం చేయండి?

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CC : TEL 303 B	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	MODERN TELUGU LITERATURE (CORE)	EXT.Mrks: 80

ఆధునిక తెలుగు సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the students modern Telugu poetry, Novel, Short Stories and Drama.
2. To acquaint the students with the major Trends and Social Movements in Modern Telugu Literature.
3. To help the students to know the influence of westren Literature on Modern Telugu Literature.

యూనిట్ - I ఆధునిక తెలుగు సాహిత్యం ` పుట్టుక, నేపథ్యం;

నవ్య కవిత్వం – లక్షణాలు; సంఘ సంస్కరణోద్యమ సాహిత్యం

ప్రక్రియలు : కవిత్వం - నవల - కథానిక - నాటకం

ప్రత్యేక అధ్యయనం : కందుకూరి - గురజాడ - కుసుమ ధర్మన్న - చలం

యూనిట్`II భావ కవిత్వం – లక్షణాలు; భారత జాతీయోద్యమ సాహిత్యం;

అభ్యుదయోద్యమ సాహిత్యం - ఆవిర్భావం - సైద్ధాంతికత.

ప్రక్రియలు : కవిత్వం - నవల - కథానిక – నాటకం;

ప్రత్యేక అధ్యయనం : రాయప్రోలు - జాషువా - శ్రీశ్రీ - సుంకర

యూనిట్`III దిగంబర కవిత్వం - ఆవిర్భావం – వస్తువైవిధ్యం;

విప్లవోద్యమ సాహిత్యం - ఆవిర్భావం – సైద్ధాంతికత;

ప్రక్రియలు : కవిత్వం - నవల - కథానిక - నాటకం

ప్రత్యేక అధ్యయనం : చెరబండరాజు - సుబ్బారావు పాణిగ్రాహి - శివసాగర్ - గద్దర్

యూనిట్ - IV వర్తమాన సాహిత్యం - స్త్రీవాద, దళితవాద, మైనారిటివాద,

ప్రపంచీకరణ సాహిత్య ధోరణులు : ఆవిర్భావం, సైద్ధాంతికత;

ప్రక్రియలు : కవిత్వం - నవల - కథానిక - నాటకం;

ప్రత్యేక అధ్యయనం : రంగనాయకమ్మ, మద్దూరి నగేష్‌బాబు, షాజహాన,

అద్దేపల్లి రామమోహనరావు

యూనిట్ - V ఆధునిక సాహిత్యం - ప్రత్యేక అధ్యయనం

1. కన్యాశుల్కం (నాటకం) - గురజాడ అప్పారావు

2. చిక్కనవుతున్న పాట (కవితా సంకలనం) - (సం.పా.) త్రిపురనేని శ్రీనివాస్

3. అంటరాని వసంతం (నవల) - జి. కల్యాణరావు

4. సీమ కథలు (కథా సంకలనం) - (సం.పా.) సింగమనేని నారాయణ

ఆధార గ్రంధాలు

1. తెలుగు నవలా వికాసం	**-**	**మొదలి నాగభూషణశర్మ**
2. నవలా శిల్పం	**-**	**వల్లంపాటి వెంకటసుబ్బయ్య**
3 కథానిక శిల్పం	**-**	**వల్లంపాటి వెంకటసుబ్బయ్య**
4. కథానిక స్వరూప స్వభావాలు	**-**	**పోరంకి దక్షిణామూర్తి**
5. తెలుగు నవల, కథానిక వికాసం	**-**	**కాత్యాయని విద్మహే**
6. మన నవలలు ` మన కథలు	**-**	**రాచపాలెం చంద్రశేఖరరెడ్డి**
7. ఆధునికాంధ్ర కవిత్వము	**-**	**సి. నారాయణ రెడ్డి**
8. సమగ్ర ఆంధ్ర సాహిత్యం (ఆధునిక సంపుటాలు) -		**ఆరుద్ర**
9. 'కమ్యూనిజం' స్త్రీల సమస్యల ప్రత్యేక సంచిక -		**విశాలాంధ్ర ప్రచురణ**

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the modern Telugu poetry, Novel and Short Stories,
2. Understand the students with the major Trends and Social Movements in Modern Telugu Literature.
3. Understand the students to know the influence of westren Literature on Modern Telugu Literature.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3		5					10	11	
CO2	1	2	3		5					10	11	
CO3	1	2	3		5					10	11	
CO4	1	2	3		5					10	11	
CO5	1	2	3		5					10	11	

TEL 303 B - MODERN TELUGU LITERATURE
ఆధునిక తెలుగు సాహిత్యం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటి ని వివరించండి **5X4=20**

(1) కందుకూరి

(2) గురజాడ

(3) దిగంబర కవిత్వం

(4) సీమ కథలు

(5) అద్దేపల్లి రామమోహనరావు

(6) జాతీయోద్యమ సాహిత్యం

(7) కథానిక

(8) నవ్య కవిత్వం

(9) ప్రపంచీకరణ సాహిత్యం

(10) రాయప్రోలు

బి - విభాగం

క్రింది ప్రశ్నలన్నింటికి సమాధానాలు రాయండి **5X12=60**

11 (అ) ఆధునిక సాహిత్యం పుట్టుక, నేపథ్యాలను వివరించండి?

(లేదా)

(ఆ) సంఘసంస్కరణోద్యమ నేపథ్యంతో వచ్చిన నవలలను విశ్లేషించండి?

12. అ) భావ కవిత్వ లక్షణాలను వివరించండి?

(లేదా)

ఆ) జాషువా అభ్యుదయ భావాలను విశ్లేషించండి?

13. అ) విప్లవోద్యమ సాహిత్యసైద్ధాంతికను తెలియజేయండి?

(లేదా)

ఆ) దిగంబర కవిత్వంలో వస్తు వైవిధ్యాన్ని పరిచయం చేయండి?

14. అ) స్త్రీ వాద సాహిత్య ఆరంభ వికాసాలను తెల్పండి?

(లేదా)

ఆ) ప్రపంచీకరణ నేపథ్యంగా వచ్చిన సాహిత్య ప్రక్రియలను పరిచయం చేయండి?

15. అ) చిక్కనవుతున్న పాటని విశ్లేషించండి?

(లేదా)

ఆ) అంటరాని వసంతం నవల నేపథ్యాన్ని వివరించండి?

@@@

CC : TEL 303 C	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	TELUGU FEMINISTIC LITERATURE (CORE)	EXT.Mrks: 80

తెలుగు స్త్రీవాద సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the students to the emerging trends of Feminism across the world
2. To acauint the students with origin and development of Ferminism movements in Telugu Literature
3. To familiarise the students with concepts such as Patriarchy, Gender discrimination, lingustic, Oppression in Socio-Political and economic spheres in the Feminist writings.

యూనిట్ - I స్త్రీ వాద సాహిత్యం – పరిచయం; ప్రారంభం - వికాసం - నిర్వచనాలు: విభిన్న అభిప్రాయాలు - స్త్రీ వాదం : సామాజిక సాంస్కృతిక నేపథ్యం

యూనిట్ - II స్త్రీవాద సాహిత్యం : లక్షణాలు - ఉద్దేశాలు - పితృస్వామ్యం – లింగవివక్ష - మాతృత్వం - గృహ హింస - పని వత్తిడి - ఆర్థిక స్వావలంబన వంటి అంశాలను స్త్రీ వాద సాహిత్యం ఆవిష్కరించిన తీరు

యూనిట్ - III తెలుగులో స్త్రీ వాద కవిత్వం : గురిచూసి పాడే పాట (సంకలనం); నీలిమేఘాలు (సంకలనం): వస్తు వైవిధ్యం - సమస్యలు, పరిష్కారాలు

యూనిట్ - IV తెలుగులో స్త్రీ వాద కల్పనా సాహిత్యం : స్త్రీ వాద నవలలు - స్త్రీ వాద కథలు - పరిచయం - వస్తు వైవిధ్యం - సమస్యలు; పరిష్కారాలు

యూనిట్ - V స్త్రీ వాద సాహిత్యం : ప్రత్యేక అధ్యయనం

1. కందుకూరి వీరేశలింగం
2. గురజాడ అప్పారావు
3. గుడిపాటి వెంకట చలం
4. రంగనాయకమ్మ
5. సావిత్రి
6. ఓల్గా

ఆధార గ్రంథాలు

1. కఠోర షడ్జమాలు - వసంత కన్నభిరాం
2. గురిచూసి పాడే పాట (కవితా సంకలనం) - (సంపా) త్రిపురనేని శ్రీనివాస్
3. నీలి మేఘాలు (కవితా సంకలనం) - అస్మిత ప్రచురణ
4. పితృస్వామ్యం ఒక పరిచయం - కమల భాంసేన్ ` అనువాదం : ఓల్గా
5. స్త్రీ విముక్తి ఉద్యమాలు - అనువాదం : ప్రతిమ
6. భావకవిత్వంలో స్త్రీ - జయప్రభ
7. స్త్రీ వాద వివాదాలు - సంపా. ఎస్వీ సత్యనారాయణ
8. కందుకూరి, గురజాడ, చలం రచనలు : వాటిపై వెలువడిన వివిధ విమర్శనా గ్రంథాలు

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the emerging trends of Feminism across the world
2. Understand the origin and development of Ferminism movements in Telugu Literature
3. Understand the concepts such as Patriarchy, Gender discrimination, lingustic, Oppression in Socio-Political and economic spheres in the Feminist writings.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4	5					10		
CO2	1	2		4	5					10		
CO3	1	2		4	5					10	11	
CO4	1	2		4	5					10	11	
CO5	1	2		4	5					10	11	

TEL 303 C - TELUGU FEMINISTIC LITERATURE

తెలుగు స్త్రీవాద సాహిత్యం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటికి ని వివరించండి 5X4=20

(1) స్త్రీ వాద సాహిత్య నేపథ్యం

(2) ఆర్థిక స్వావలంభన

(3) విమల

(4) బందిపోట్లు

(5) రంగనాయకమ్మ

(6) స్వేచ్ఛ

(7) స్త్రీ వాదం

(8) స్త్రీ వాద కథలు

(9) పైటను తగలెయ్యాలి

(10) జయప్రభ

బి – విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11 (అ) స్త్రీ వాద సాహిత్యం ప్రారంభ వికాసాలను వివరించండి?

(లేదా)

(ఆ) స్త్రీ వాద సాహిత్య ఆవిర్భావానికి గల సామాజిక, సాంస్కృతిక నేపథ్యాన్ని తెలపండి?

12. అ) స్త్రీ వాద సాహిత్య ఉద్దేశాలను వివరించండి?

(లేదా)

ఆ) స్త్రీల కుటుంబ సమస్యలను స్త్రీ వాద సాహిత్యం ఆవిష్కరించిన తీరును తెలపండి?

13. అ) 'గురిచూసి పాడేపాట' సంకలనంలోని స్త్రీవాద సమస్యలను తెలపండి?

(లేదా)

ఆ) 'నీలి మేఘాలు కవిత్వ సంకలనంలోని వస్తువైవిధ్యాన్ని వివరించండి?

14. అ) స్త్రీ వాద నవలలను పరిచయం చేయండి?

(లేదా)

ఆ) స్త్రీవాద కథల్లో చిత్రించిన సమస్యలను, పరిష్కార మార్గాలను విశదీకరించండి?

15. అ) స్త్రీ జనోద్ధరణ కోసం కందుకూరి వీరేశలింగం పంతులు చేసిన కృషిని వివరించండి?

(లేదా)

ఆ) గురజాడ అప్పారావు ఆవిష్కరించిన, స్త్రీ హృదయాన్ని తెలపండి?

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CC : TEL 303 D	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	SPECIAL AUTHOR : GURAJADA (CORE)	EXT.Mrks: 80

ప్రత్యేక అధ్యయనం – గురజాడ అప్పారావు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To help the Students to Understand the importance of Gurajada and the devotion of Nation, Humanism in his writings.
2. To acquaint the Students with Special Conditions during the time of Gurajada.
3. To enhance the ability of the Students to Understand the responsiblity in Construction of Modern Society.

యూనిట్ - I 1. గురజాడ జీవిత పరిచయం

2. గురజాడ సాహిత్యం నేపథ్యం

3. గురజాడ సాహిత్యం : నేటి సమాజంతో గల సంబంధం

యూనిట్ - II 2. గురజాడ కవిత్వం

2.1. గురజాడ ఖండకావ్యాలు కన్యక - పూర్ణమ్మ - డామన్‌పితియస్

2.2. గురజాడ వస్తు కవితలు మనిషి, ముత్యాల సరములు, దేశభక్తి

యూనిట్ - III 3. గురజాడ - కథానికలు - దిద్దుబాటు, సంస్కర్త హృదయం మొ||

యూనిట్ - IV 4. గురజాడ నాటకం

4.1. కన్యాశుల్కం

4.2. సమకాలీన జీవిత ప్రతిఫలనం

4.3. నాటకశిల్పం, నాటక వైశిష్ట్యం

యూనిట్ - V 5. గురజాడ లేఖలు, వ్యాసాలు

ఆధార గ్రంధాలు :

1. రమణారెడ్డి, కె.వి. : మహోదయం

2. తిరుమలరావు సర్దేశాలు : కన్యాశుల్క నాటకకళ

3. రామకోటిశాస్త్రి, కేతవరపు : మళ్ళీ కన్యాశుల్కం

4. సంపత్కుమారాచార్యులు, కోవెల : కన్యాశుల్కం` మరోచూపు

5. ప్రసాద్, పటుకూరి (సం) : కన్యాశుల్కం, నూరేళ్ల సమాలోచనం

6. కాత్యాయనీ విద్మహే. కె. : కన్యాశుల్కం` కుటుంబ సంబంధాలు

7. నరసింహమూర్తి, ము.ఎ. : కన్యాశుల్కం 19ల శతాబ్దపు ఆధునిక భారతీయ నాటకం

8. చంద్రశేఖరరెడ్డి. రాచపాళెం : గురజాడ తొలికొత్త తెలుగుకథలు

9. చంద్రశేఖరరెడ్డి. రాచపాళెం : దీపధారి గురజాడ

10. శ్రీనివాస్‌శిష్లా : కపిత్థాకారా భూగోళా

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the importants of Gurajada and the devotion of Nation, Humanism in his writings.
2. Understand the Special Conditions during the time of Gurajada.
3. Understand the responsiblity in Construction of Modern Society.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3									12
CO2	1	2								10	11	12
CO3	1	2								10	11	12
CO4	1	2							9	10	11	12
CO5	1	2									11	12

TEL 303 D - SPECIAL STUDY : GURAJADA APPA RAO

ప్రత్యేక అధ్యయనం – గురజాడ అప్పారావు

Time : 3 Hours **MODEL PAPER** **MARKS-80**

విభాగం - ఎ

క్రింది వాటిలో ఐదింటి ని వివరించండి. 5X4=20

1. గురజాడ
2. కన్యక
3. కాసులు
4. దేశభక్తి
5. మధురవాణి
6. గిరీశం
7. లుబ్ధావధానులు
8. బుచ్చమ్మ
9. రామప్పంతులు
10. ముత్యాల సరములు లక్షణములు

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11. అ. గురజాడ సాహిత్య నేపథ్యాన్ని గురించి రాయండి?

(లేదా)

ఆ. గురజాడ సాహిత్యానికి నేటి సమాజంతో గల సంబంధాన్ని విశదీకరించండి?

12. అ. గురజాడ ఖండకావ్యాల సందేశాన్ని వివరించండి?

(లేదా)

ఆ. గురజాడ 'ముత్యాల సరములు' కవితను విశదీకరించండి?

13. అ. గురజాడ కథానికలను పరిచయం చేయండి?

(లేదా)

ఆ. గురజాడ కథానికల శిల్పవైశిష్ట్యాన్ని వివరించండి?

14. అ. గురజాడ కన్యాశుల్క నాటక ఇతివృత్తాన్ని తెలుపండి?

(లేదా)

ఆ. కన్యాశుల్కంలోని సంస్కరణ భావాలను వివరించండి?

15. అ. గురజాడ లేఖలను గురించి వివరించండి?

(లేదా)

ఆ. గురజాడ వ్యాసాలను, అందులోని ప్రాముఖ్యతలను విశదీకరించండి?

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CC : TEL 304	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	PERSONOLITY DEVELOPMENT & LANGUAGE SKILLS (CORE)	EXT.Mrks: 80

వ్యక్తిత్వ వికాసం – భాషా నైపుణ్యములు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To Promote soft skills among the students as to develop attributes that could enhance individuals interactions, earning power and job performance.
2. To inculcate potential skills in the students to communicate effectively, take initiative, solve problems, and demonstrate a positive work ethics so as to demonstrate good impresssion and positive impact.
3. To face the interviews with Confidence to secure a productive job and to sustain it with Confidence and enhanced productivity.

యూనిట్ - I వ్యక్తిత్వం నిర్మాణం : ఆదర్శ మూర్తుల - అనుకరణ పాత్ర -

విద్య ప్రాధాన్యం - కులం, జెండర్, సమాజం పాత్ర -

వ్యక్తిత్వ వికాసం : పెళ్ళి - కుటుంబం - పిల్లలు;

ఆత్మన్యూనత : పరిష్కారమార్గాలు

యూనిట్ - II నాయకత్వం యొక్క భావన - నాయకత్వం రకాలు -

నాయకత్వం లక్షణాలు - నాయకత్వం యొక్క విధులు

యూనిట్ - III సృజనాత్మకత భావన - సృజనాత్మకత కలవారి లక్షణాలు -

సృజనాత్మకత - పద్ధతులు

యూనిట్ - IV సంఘర్షణ - సంఘర్షణ యొక్క భావన -

సంఘర్షణకు ఉండే కారణాలు -

సంఘర్షణను అధిగమించే విధానాలు

యూనిట్ - V భాషా నైపుణ్యాలు : జాతీయాలు – సామెతలు;

వినే నైపుణ్యాలు : మాట్లాడే నైపుణ్యాలు; పరస్పర సంబంధాలు;

చదివే నైపుణ్యాలు : చదివే పద్ధతులు - చదివే ప్రక్రియ - చదవడంలో మెలుకువలు -

భాషా ప్రయోగ నైపుణ్యాలు

రాసే నైపుణ్యాలు : లిపి - రకాలు, లిపికీ, ధ్వనికీ ఉన్న సంబంధం; రాత రూపాలు - తెలుగు, సంస్కృత, ఆంగ్ల పదాలు; తప్పొప్పులు -మాండలిక పదాలు, ప్రామాణిక భాష

ఆధార గ్రంధాలు

1. జాన్ హోల్ట్ : పిల్లలు నేర్చుకోవడంలో ఎలా వెనుకబడతారు?
2. బి. ఎస్. రాములు : వ్యక్తిత్వ వికాసం
3. బి.వి. పట్టాభిరామ్ : లీడర్‌షిప్
4. బి.వి. పట్టాభిరామ్ &

   కె. రవికాంత్‌రావు : మూర్తిమత్వ వికాసం

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understandius soft skills, types of soft skills and intrapersonal skills.
2. Exhibiting different type of people skills.
3. Demonstrating oral communication skills throush effective presentations.
4. Exhibiting various modes of written communication.
5. Developing employability skills.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4			7			10	7	
CO2	1	2	3	4			7				7	
CO3	1	2					7			10	7	
CO4	1	2					7			10	7	
CO5	1	2					7		9		7	

TEL 304 - PERSONOLITY DEVELOPMENT & LANGUAGE SKILLS

వ్యక్తిత్వ వికాసం – భాషా నైపుణ్యములు

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటికి ని వివరించండి 5X4=20

(1) జెండర్ స్పృహ

(2) నాయకత్వ రకాలు

(3) సృజనాత్మక భావన

(4) సంఘర్షణ

(5) జాతీయాలు

(6) చదివే పద్ధతులు

(7) వినే నైపుణ్యాలు

(8) మాండలిక పదాలు

(9) రాతరూపాలు

(10) మాట్లాడే నైపుణ్యాలు

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11 (అ) వ్యక్తిత్వ నిర్మాణంలో ఆదర్శమూర్తుల, ప్రాధాన్యాన్ని వివరించండి?

(లేదా)

(ఆ) వ్యక్తిత్వ వికాసంలో కుటుంబ పాత్రను తెలియజేయండి?

12. అ) 'నాయకత్వ భావన'ను నిర్వచించి, నాయకత్వ లక్షణాలను వివరించండి?

(లేదా)

ఆ) నాయకత్వ విధులను, బాధ్యతలను తెలపండి?

13. అ) సృజనాత్మకత లక్షణాలను, పద్ధతులను వివరించండి?

(లేదా)

ఆ) 'సంఘర్షణ భావన' తెలిపి, సంఘర్షణకు గల కారణాలను పేర్కొనండి?

14. అ) వ్యక్తి సంఘర్షణను అధిగమించే విధానాలను గురించి రాయండి?

(లేదా)

ఆ) భాషా వాడుకలో జాతీయాలు, సామెతల ప్రాముఖ్యాన్ని తెలపండి?

15. అ) చదవడంలోని మెలుకవలను వివరించండి?

(లేదా)

ఆ) 'లిపి'ని, 'ధ్వని'ని వివరించి, వీటి మధ్య ఉన్న సంబంధం గురించి రాయండి?

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CC : TEL 305 A	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	INTRODUCTION OF TELUGU LITERATURE (CORE)	EXT.Mrks: 80

తెలుగు సాహిత్య పరిచయం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the Students the Literary ages from Prang-Nannaya to Modern Period.
2. To introduce the Studunts the major Poets and their works in Telugu Literature.
3. To introduce the Students the major Trends in Telugu Literature.
4. To introduce the Students the Various Genres in Classical and Modern Telugu Literature.

యూనిట్ - I **ప్రాఙ్నన్నయ యుగం నుండి శివకవియుగం వరకు**

1. సాహిత్యం, సారస్వతం, వాఙ్మయం ప్రాఙ్నన్నయ యుగం

2. నన్నయ యుగకవులు - ఆదికవి

3. శివకవి యుగకవులు - కావ్యాలు`ద్విపద సాహిత్యం - వీరశైవం

యూనిట్ - II **తిక్కన యుగం నుండి శ్రీనాథయుగం వరకు**

1. తిక్కన యుగకవులు - కావ్యాలు

2. ఎర్రన యుగకవులు - కావ్యాలు

3. శ్రీనాథ యుగకవులు - కావ్యాలు

యూనిట్ - III **ప్రబంధయుగం నుండి క్షీణ యుగం వరకు**

1. ప్రబంధ యుగకవులు - కావ్యాలు

2. దక్షిణాంధ్ర యుగకవులు - కావ్యాలు

3. క్షీణ యుగకవులు - కావ్యాలు

యూనిట్ - IV **ఆధునిక యుగం**

1. ఆధునిక యుగం - ఆవిర్భావ హేతువులు

2. భావ - అభ్యుదయ - దిగంబర - విప్లవ ధోరణులు

3. స్త్రీవాద - దళితవాద - మైనారిటీ వాదాలు

యూనిట్ - V **సాహిత్య ప్రక్రియలు**

1. ఎ). పురాణం - ఇతిహాసం **బి). కావ్యం**

2. ఎ). ప్రబంధం **బి). సంకీర్తన** **సి). యక్షగానం**

3. ఎ). ఖండ కావ్యం **బి). గేయం** **సి). వచనకవిత**

డి). మినీ కవిత **ఇ). హైకూ** **ఎఫ్). గజల్**

4. ఎ). నవల **బి). కథానిక** **సి)నాటకం**

డి). వ్యాసం

ఆధార గ్రంధాలు :

1. ఆరుద్ర **: సమగ్ర ఆంధ్ర సాహిత్యం సంపుటాలు**

2. జి. నాగయ్య **: తెలుగు సాహిత్య సమీక్ష సంపుటాలు**

3. సి. నారాయణరెడ్డి **: ఆధునికాంధ్ర కవిత్వము, సంప్రదాయాలు, ప్రయోగాలు**

4. చేకూరి రామారావు **: వచన రచన తాత్త్వాన్వేషణ**

5. కొలకలూరి ఇనాక్ **: వ్యాస పరిణామం**

6. ఇతర సాహిత్య విమర్శనా గ్రంధాలు

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand all Literory Ages from before Nannaya to modern period.
2. Understand the major Poets and their works in Telugu Literature.
3. Understand the major Trends in Telugu Literature.
4. Understand the various Genres in Classical and Modern Telugu Literature.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4			7			10		
CO2	1	2	3	4			7			10		
CO3	1	2	3	4			7	8		10		
CO4	1	2	3	4	5		7			10	11	12
CO5	1	2	3	4	5		7			10		12

TEL 305 A - INTRUDUCTION OF TELUGU LITERATURE

తెలుగు సాహిత్య పరిచయం

Time : 3 Hours **MODEL PAPER** **MARKS-80**

విభాగం – ఎ

క్రింది వాటిలో ఐదింటిని వివరించండి 5X4=20

1. సారస్వతము
2. ఆదికవి
3. కేయూర బాహుచరిత్ర
4. పోతన
5. రంగాజమ్మ
6. ఉత్తర రామ చరిత్రము
7. ఆధునిక యుగం
8. మైనారిటీ వాదం
9. హైకూ
10. గజల్

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11. అ. నన్నయ యుగకవులను పరిచయం చేయండి?

(లేదా)

ఆ. తెలుగు సాహిత్య చరిత్రలో పాల్కురికి స్థానాన్ని నిర్దేశించండి

12. అ. యర్రన యుగ కవులను వివరించండి

(లేదా)

ఆ. శ్రీనాథుని రచనలను విశ్లేషించండి

13. అ. తెలుగు ప్రబంధాలను పరిచయం చేయండి

(లేదా)

ఆ. క్షీణయుగ లక్షణాలను తెలియచేయండి

14. అ. భావ కవిత్వం లోని శాఖలను విశ్లేషించండి

(లేదా)

ఆ. దిగంబర కవిత్వం ఆవిర్భావాన్ని వివరించండి

15. అ. సంకీర్తనా సాహిత్యాన్ని పరిచయం చేయండి

(లేదా)

ఆ. వచన కవిత్వం ఆవిర్భవ వికాసాలను తెలియ చేయండి

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CC : TEL 305 B	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	FUNDAMENTALS OF MODERN TELUGU LANGUAGE (CORE)	EXT.Mrks: 80

ఆధునిక తెలుగు భాష : మౌలికాంశాలు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the Students the primary features of Telugu Language.
2. To introduce the Students the Noun, Pro-noun and Verbal forms in Telugu Language.
3. To introduce the Students the Syntax of Telugu and Translation.
4. To introduce the Students the Various types of Writings in Telugu.

యూనిట్ - I ఆధునిక తెలుగు - వర్ణాలు, ఆధునిక తెలుగు - సంధి,

యూనిట్ - II ఆధునిక తెలుగు - నామవాచకాలు, లింగవచన విభక్తి నిర్మాణం,
ఆధునిక తెలుగు సర్వనామాలు, విశేషణాలు

యూనిట్ - III ఆధునిక తెలుగు - క్రియా నిర్మాణం
ఆధునిక తెలుగు - వాక్య నిర్మాణం

యూనిట్ - IV భాషా ప్రయోగ రంగాలు - అనువాదం - పత్రికా రచన

యూనిట్ - V లేఖా రచన, వ్యాస రచన, సృజనాత్మక ప్రక్రియారచన

ఆధార గ్రంథాలు :

1. తెలుగు భాషా చరిత్ర : భద్రిరాజు కృష్ణమూర్తి
2. తెలుగులో వెలుగులు : రామారావు, చేకూరి
3. తెలుగు వాక్యం : "
4. భాషా - సంస్కృతి ` సమాజం : భద్రిరాజు కృష్ణమూర్తి
5. భాషాను వర్తనం : రామారావు, చేకూరి
6. భాషాంతరంగాలు : "

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the primary features of Telugu Language.
2. Understand the Various Forms like Noun, Pronoun ect. in Telugu Language.
3. Understand the Syntax of Telugu and Translation.
4. Understand the Various types of Writings in Telugu.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3					8	9			
CO2	1	2	3					8	9			
CO3	1	2						8	9			
CO4	1	2						8	9			12
CO5	1	2						8	9			12

TEL 305 B - FUNDAMENTALS OF MODREN TELUGU LANGUAGE

ఆధునిక తెలుగు భాష : మౌలికాంశాలు

Time : 3 Hours **MODEL PAPER** **MARKS-80**

విబాగం - ఎ

క్రింది వాటిలో ఐదింటి ని వివరించండి **5X4=20**

1. వర్ణసంయోజన నియమావళి
2. సర్వనామాలు
3. కర్మణి ప్రయోగాలు
4. నామ్మీకరణాలు
5. సామాన్యవాక్యం
6. వర్గయుక్కులు
7. వాడుక భాష
8. మాండలిక భేదాలు
9. అనుకృతి వాక్యాలు
10. విశేషణాలు

విభాగం - బి

ఈ క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11. అ) ఆధునిక భాష వర్ణాల ప్రాముఖ్యాన్ని, వాటి వ్యాప్తిని గురించి రాయండి?

(లేదా)

ఆ) ఆధునిక తెలుగు భాషలోని సంధి స్వరూపాన్ని వివరించండి?

12. అ) ఆధునిక తెలుగు భాషలోని నామ నిర్మాణం గురించి తెలపండి?

(లేదా)

ఆ) ఆధునిక తెలుగు భాషలోని విభక్తి నిర్మాణాన్ని పేర్కొనండి?

13. అ) ఆధునిక తెలుగులోని క్రియా ప్రాతిపదికల నిర్మాణం గురించి వివరించండి?

(లేదా)

ఆ) ఆధునిక తెలుగులోని సమాపక, అసమాపక క్రియా నిర్మాణాన్ని వివరించండి?

14. అ) ఆధునిక తెలుగులో వాక్య భేదాలను తెలపండి?

(లేదా)

ఆ) ఆధునిక తెలుగులో సంఖ్యా వాచకాలను గురించి రాయండి?

15. అ) తెలుగు భాష ఆధునీకరణను తెలిపి, ఆవశ్యకత, పద్ధతులను వివరించండి?

(లేదా)

ఆ) ప్రామాణిక భాష రూపకల్పనలోని సమస్యలను తెలపండి?

@@@

SEMESTER – IV

SEMESTER – IV

CC : TEL 401	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	MODERN TELUGU LITERARY CRITICISM (CORE)	EXT.Mrks: 80

ఆధునిక తెలుగు సాహిత్య విమర్శ
CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURS OBJECTIVES (COs)

The aim of the course is -

1. To introduce the Students the Modern Literary Criticism in Telugu
2. To acquaint the Students with the Various approaches in Western Literary Criticism.
3. To help the Students to understand the impact of Western Literary Trends besides getting the Knowledge of theory and practice of Literary Criticism.
4. To help the students to Study the different Telugu Genres in a Critical way.

యూనిట్ - I ఆధునిక విమర్శ ఆవిర్భావం ` తెలుగు సాహిత్య విమర్శపై పాశ్చాత్య విమర్శ ప్రభావం ` ఆలంకారిక విమర్శ ` గ్రంథ పరిష్కరణ ` వ్యాఖ్యాన సంప్రదాయం

యూనిట్ - II తెలుగులో ఆధునిక విమర్శన దృక్పథాలు : చారిత్రక విమర్శ ` మనో వైజ్ఞానిక విమర్శ ` మార్క్సిస్టు విమర్శ.

యూనిట్ - III స్త్రీవాద విమర్శ`దళితవాద విమర్శ` మైనారిటీవాద విమర్శ ` ప్రాంతీయ అస్తిత్వవాద విమర్శ

యూనిట్ - IV శైలిశాస్త్ర విమర్శ ` తులనాత్మక సాహిత్య విమర్శ ` రూపవాద విమర్శ ` కళాతత్త్వ శాస్త్ర విమర్శ

యూనిట్ - v ప్రముఖ విమర్శకులు : త్రిపురనేని మధుసూదనరావు ` కె.కె. రంగనాథాచార్యులు కాత్యాయిని విద్మహే ` జి. లక్ష్మీ నరసయ్య

ఆధార గ్రంథాలు

1. సాహిత్యంలో వస్తు శిల్పాలు, ఇతర విమర్శన గ్రంథాలు - త్రిపురనేని మధుసూదనరావు
2. ఆంధ్రసాహిత్య విమర్శ- ఆంగ్ల ప్రభావం - జి.వి. సుబ్రహ్మణ్యం
3. సంప్రదాయ సాహిత్యం స్త్రీవాద దృక్పథం ఇతర విమర్శన గ్రంథాలు - కాత్యాయిని విద్మహే
4. దళిత సాహిత్యవాదం - జాషువా - కత్తి పద్మారావు
5. ఆధునిక విమర్శ సూత్రం - కొలకలూరి ఇనాక్
6. ఆధునిక సాహిత్య విమర్శ రీతులు - సి.హెచ్. లక్షణ చక్రవర్తి
7. సమకాలీన వాదాలు సాహిత్య విమర్శ - శ్రీనివాసమూర్తి

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the Modern Literary Criticism in Telugu.
2. Understand the Various approaches in Western Literary Criticism.
3. Understand the impact of Western Literary Criticism on Telugu Criticism.
4. Understand the features of various Telugu Genres in a Critical way.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4								
CO2	1	2	3	4								
CO3	1	2	3	4						10		
CO4	1	2		4						10		12
CO5	1	2		4						10		12

TEL 401 - MODERN TELUGU LITERARY CRITICISM

ఆధునిక తెలుగు సాహిత్య విమర్శ

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటి ని వివరించండి **5X4=20**

(1) గ్రంథ పరిష్కరణ

(2) రూపవాద విమర్శ

(3) కె.కె. రంగనాథాచార్యులు

(4) తులనాత్మక సాహిత్య విమర్శ

(5) మైనారిటి వాద విమర్శ

(6) చారిత్ర విమర్శ

(7) వ్యాఖ్యాన సంప్రదాయం

(8) జి. లక్ష్మీనరసయ్య

(9) స్త్రీ వాద విమర్శ

(10) శైలి శాస్త్ర విమర్శ

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి **5X12=60**

11 (అ) తెలుగు సాహిత్య విమర్శపై పాశ్చాత్య విమర్శ ప్రభావం గురించి తెలపండి?

(లేదా)

(ఆ) ఆధునిక విమర్శ ఆవిర్భావ వికాసాలను వివరించండి?

12. అ) మనోవైజ్ఞానిక విమర్శ సైద్ధాంతికతను వివరించండి?

(లేదా)

ఆ) మార్క్సిస్టు విమర్శను విశ్లేషించండి?

13. అ) దళితవాద విమర్శ భూమికను వివరించండి?

(లేదా)

ఆ) స్త్రీ వాద విమర్శలను పరిచయం చేయండి?

14. అ) ప్రాంతీయ అస్తిత్వవాద విమర్శను గురించి వివరించండి?

(లేదా)

ఆ) శైలిశాస్త్ర విమర్శను గూర్చి సమగ్రంగా చర్చించండి?

15. అ) త్రిపురనేని మధుసూదనరావు విమర్శన దృక్పథాన్ని పరిచయం చేయండి?

(లేదా)

ఆ) విమర్శన రంగంలో కాత్యాయని విద్మహే కృషిని వివరించండి?

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CC : TEL 402	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	SANSKRIT LITERATURE AND GRAMMAR (CORE)	EXT.Mrks: 80

సంస్కృత సాహిత్యం – వ్యాకరణం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the Students to the World's most ancient language, Sanskrit.
2. To enhance the ability of the Students in Understanding the Glory and importance of Sanskrit Literature
3. To familiarize the students with Vedic Literature, Epics, Puranas, Kavyas and Genres in Sanskrit.
4. To introduce the Students the Sanskrit Grammar.

యూనిట్ - 1

వైదిక సాహిత్యం : వేదాలు, బ్రాహ్మణాలు, ఆరణ్యకాలు, ఉపనిషత్తులు, వేదాంగాలు, పురాణాలు, స్మృతులు

లౌకిక సాహిత్యం : సంస్కృత భాష వైశిష్ట్యం - సంస్కృత సాహిత్య వైశిష్ట్యం - రామాయణం, మహాభారతం

యూనిట్ - 2

కావ్య సంప్రదాయం : కాళిదాసు - అశ్వఘోషుడు - భారవి - శ్రీ హర్షుడు -

రూపక సంప్రదాయం : భాసుడు - కాళిదాసు - శూద్రకుడు - విశాఖదత్తుడు - భట్టనారాయణుడు - భవభూతి

లఘు కావ్యాలు : ఖండకావ్యం - మహాకావ్య : భేదాలు

కాళిదాసు - మేఘసందేశం, భర్తృహరి సుభాషితాలు;

జయదేవుడు - గీత గోవిందం

గద్య కావ్యాలు : గద్యకావ్య భేదాలు - కథ, ఆఖ్యాయిక : లక్షణాలు

సుబంధు - దండి - బాణుడు.

చారిత్రక కావ్యాలు : బాణభట్టు - హర్షచరిత్ర, కల్హణుడు - రాజతరంగణి

కథా కావ్యాలు : కథా కావ్యాల ఆవిర్భావం - వికాసం - భేదాలు

బృహత్కథ - పంచతంత్రం

యూనిట్ - 3 వ్యాకరణం

శబ్దాలు: అజంతాలు - పుంలింగాలు: రామ, హరి, శంభు, ధాతృ, గోః

స్త్రీలింగాలు: రమా, గౌరీ, ధేను, మాతృ

నపుంసక లింగాలు: జ్ఞాన, వారి, మధు, కర్తృ

హలంతాలు: జలముక్, భిషక్, మరుత్, దివిషద్

పుంలింగాలు: రాజన్, ఆత్మన్, గుణిన్, విద్వన్

ధాతువులు: పరస్మైపదీ, ఆత్మనేపదీ } లట్, లజ్, లిట్, లృట్, లిజ్, లోట్

యూనిట్ - 4 సంధి ప్రకరణం

అచ్సంధులు : సవర్ణ, గుణ, యణాదేశ, వృద్ధి, అయవాదేశ, పూర్వరూప, పరరూప సంధులు

హల్సంధులు : శ్చుత్వ, ష్టుత్వ, జశ్త్వ, అనునాసిక, పరసవర్ణాదేశ సంధులు

విసర్గ సంధులు :

యూనిట్ - 5

సమాసాలు స్థూల అవగాహన

ఆధార గ్రంధాలు

1. శబ్దమంజరి రవ్వా శ్రీహరి - శ్రీ పాతూరి సీతారామాంజనేయులు
2. లఘుసిద్ధాంత కౌముధి - వ్యాఖ్యానం - రవ్వా శ్రీహరి
3. సంస్కృత సాహిత్య చరిత్ర - ముదిగంటి గోపాలరెడ్డి
   ముదిగంటి సుజాతారెడ్డి
4. లఘుసిద్ధాంత కౌముది - శలాక రఘునాథ శర్మ

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Know about the most ancient Language in the world, Sanskrit.
2. Understand the Glory and importance of Sanskrit Literature and Grammar.
3. Understand the Vedic literature, and other Ancient Genres in Sanskrit.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3			6	7					
CO2	1	2	3		5		7			10		
CO3	1	2	3				7		9	10		
CO4	1	2	3				7		9	10		
CO5	1	2	3				7		9	10		

TEL 402 - SANSKRIT LITERATURE AND GRAMMAR

సంస్కృత సాహిత్యం – వ్యాకరణం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటి ని వివరించండి 5X4=20

(1) వేదాలు (6) రాజతరంగిణి

(2) ఉపనిషత్తులు (7) గీతగోవిందం

(3) భారవి (8) పంచతంత్రం

(4) ఖండకావ్యం (9) దండి

(5) కాళిదాసు (10) భర్తృహరి

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11 (అ) సంస్కృత సాహిత్య విశిష్టతను వివరించండి?

(లేదా)

(ఆ) భారతీయ ఇతిహాసాలిచ్చే సందేశాన్ని గురించి రాయండి

12. అ) క్రింది వాటిలో నాల్గింటికి విభక్తి ప్రత్యయాల్ని రాయండి

1. రామ 5. రాజన్

2. గౌరీ 6. గోః

3. జ్ఞాన 7. మాతృ

4. భిషక్ 8. విద్వాన్

(లేదా)

ఆ) క్రింది ధాతువులకు అకర్మక, సకర్మక రూపాలను రాయండి

1. భూ
2. ష్ఠా
3. దృశ్
4. పా
5. విధ
6. వది
7. లభష్
8. పృధు

13. అ) క్రింది వాటిలో నాల్గింటిని సంధించి సంధిపేర్లను రాయండి

1. సుధి + ఉపాస్యః
2. ఋణం + ఋణం
3. నై + అకః
4. జగత్ + ఈశః
5. రాజ + ఋషిః
6. విద్వాన్ + లిఖిత
7. గో + అగ్రమ్
8. హోతృ + ఋకారః

(లేదా)

ఆ) క్రింది వాటిలో నాల్గింటిని విడదీసి సంధి కార్యాల్ని రాయండి

1. శ్రీశః
2. గంగోదకమ్
3. దేవైశ్వర్యం
4. పావకః
5. తన్మాత్రమ్
6. మనోరథః
7. సుద్యుపాసః
8. తల్లయః

14. అ) క్రింది వాటిలో నాల్గింటికి విగ్రహ వాక్యాల్ని రాసి సమాసాల పేర్లను తెల్పండి

1. గ్రామగమి
2. మాసపూర్వః
3. సీతాస్వయంవరమ్
4. అక్షశౌండం
5. పంచరాత్రమ్
6. ధర్మార్థౌ
7. కణ్ఠేకాలః
8. నీలోత్పలాని

(లేదా)

ఆ) క్రింది వాటిలో నాల్గింటికి పారిభాషిక పదాల్ని రాయండి

1. సవర్ణం
2. వృద్ధులు
3. టి
4. పదమ్
5. కర్మధారయం
6. బహువ్రీహి
7. యణ్ణులు
8. తత్పురుష

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CC : TEL 403 A	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	METHODS OF TRANSLATION (GENERIC ELECTIOVE)	EXT.Mrks: 80

అనువాద పద్ధతులు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To introduce the students to the different tools, techniques, and methods of Translation.
2. To familiarize the students with the problems and challenges in translation
3. To felicitate the students to learn translations as a bridge not only between two Languages but also between two cultures.

యూనిట్ - I అనువాదం – నిర్వచనాలు; అనువాదం - సిద్ధాంతాలు; క్యాట్ ఫోర్డ్ సిద్ధాంతం, నైడా సిద్ధాంతం, న్యూయార్క్ సిద్ధాంతం.

అనువాదం : బహుళ్యవస్థ సిద్ధాంతం

యూనిట్ - II అనువాదం ప్రాధాన్యం - ప్రత్యేక ప్రతిపత్తి గల విభాగంగా అనువాదం ;

అనువాదం - శాస్త్రం - కళ

యూనిట్ - III తెలుగు అనువాదం - సంప్రదాయం - చరిత్ర -

ఉత్తమ అనువాదకుడు:లక్షణాలు,

అనువాదం ` మూల్యాంకన రీతులు

యూనిట్ - IV తెలుగులో అనువాదం జరిగేతీరు : మూల భాష - లక్ష్య భాష -

అనువాద పద్ధతులు : మూల విధేయ అనువాదం - స్వేచ్ఛానువాదం -

అనుసరణ అనువాదం - నుడికారానువాదం - అర్థాను వాదం -

భావాను వాదం - సంపూర్ణానువాదం - పాక్షికానువాదం - యంత్రానువాదం

యూనిట్ - V సాహిత్యానువాదాలు : వివిధ ప్రక్రియలు, ప్రత్యేకతలు

కవిత్వం - కథ – నాటకం ;

సాహిత్యేతరానువాదాలు : పారిభాషిక పదాలు

పరిపాలన - న్యాయ విషయాలు

అనువాద సమస్యలు : భాష సమస్యలు - సాంస్కృతిక సమస్యలు

ఆధార గ్రంథాలు

1. రాచమల్లు రామచంద్రారెడ్డి - అనువాద సమస్యలు

2. ఎస్. అక్కిరెడ్డి - అనువాద సిద్ధాంతాలు

3. బూదరాజు రాధకృష్ణ - అనువాద పాఠాలు

4. గోవిందరాజు చక్రధర్ - అనువదించడం ఎలా?

5. Bassnet MC. – Translation Studies

6. Bassnett Suson – Translation History and Culture

7. Catford J.C - A Linguistic Theory of Translation

8. Lakshmi H - Problems of Translation

9. Narasimhaiah C.D. & Srinath - Problems of Translation

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Unverstand the different tools, techniques, and methods of Translation.
2. Understand the problems and challenges in translation
3. Understand to learn translations as a bridge not only between two Languages but also between two cultures.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2						8	9			
CO2	1	2		4				8	9			
CO3	1	2						8	9			
CO4	1	2						8	9			
CO5	1	2	3					8		10		12

TEL 403 A - TRANSLATION METHODS

అనువాద పద్ధతులు

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటికి ని వివరించండి 5X4=20

(1) అనువాదం నిర్వచనాలు

(2) అనువాదం ` కళ

(3) అనువాద సంప్రదాయం

(4) పాక్షికానువాదం

(5) యంత్రానువాదం

(6) సాహిత్యానువాదం ` కవిత్వం

(7) పారిభాషిక పదాలు

(8) నుడికారానువాదం

(9) న్యూయార్క్ సిద్ధాంతం

(10) అనువాద భాషాసమస్యలు

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11 (అ) 'అనువాదం'ను నిర్వచించి. అనువాద సిద్ధాంతాల గురించి రాయండి?

(లేదా)

(ఆ) 'అనువాదం' బహుళ్యవస్థ సిద్ధాంతం చర్చించండి?

12. (అ) అనువాద ప్రాధాన్యాన్ని గురించి రాయండి?

(లేదా)

(ఆ) అనువాద చరిత్రను వివరించండి?

13. (అ) ఉత్తమ అనువాదకుడి లక్షణాలను తెలపండి?

(లేదా)

(ఆ) అనువాద మూల్యాంకన రీతులను వివరించండి?

14. (అ) అనువాద పద్ధతుల గురించి రాయండి?

(లేదా)

(ఆ) తెలుగులో అనువాదం జరిగే తీరును చర్చించండి?

15. (అ) కథానువాదంలో తీసుకునే ప్రత్యేకతల గురించి రాయండి?

(లేదా)

(ఆ) అనువాదంలోని సాంస్కృతిక సమస్యలను వివరించండి?

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CC : TEL 403 B	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	RESEARCH METHODOLOGY (CORE)	EXT.Mrks: 80

పరిశోధన పద్ధతులు – ప్రణాలికలు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To Create the inteest to the students to do research after succesfully compleated the Programme.
2. To provide knowledge to the students how to take the Research Topic
3. To provide Knowledge to the students how many methods to get information regarding the research work.

యూనిట్ - 1 పరిశోధన - నిర్వచనం - లక్షణాలు - పరిధి - రకాలు - ప్రయోజనాలు - శాస్త్రీయ దృక్పథం

యూనిట్ - 2 పరిశోధకులు - అర్హతలు - లక్షణాలు - పరిశోధనాంశం ఎంపిక : సమస్యలు - పరిష్కారాలు

యూనిట్ - 3 పరిశోధన ప్రణాళిక - ముఖ్యాంశాలు - ప్రయోజనాలు - ఊహా ప్రతిపాదన : లక్షణాలు - రకాలు

యూనిట్ - 4 పరిశోధనలో విషయ సేకరణ పద్ధతులు : వివిధ ఆకరాలు - క్షేత్ర పర్యటన - పరిశీలన - ప్రశ్నావళి - సందర్శన పద్ధతులు

యూనిట్ - 5 సిద్ధాంత వ్యాస రూపకల్పన - సిద్ధాంత వ్యాస స్వరూపం - గ్రంథ పూర్వ భాగం (ఉపోద్ఘాతం / ప్రవేశిక) - ఉపసంహారం - అనుబంధాలు - పాదసూచికలు - ఉల్లేఖనాలు - ఉపయుక్త గ్రంథసూచి తొలి, మలి, తుది ప్రతుల రూపకల్పన

ఆధార గ్రంథాలు

1. పరిశోధనా సూత్రాలు - రాచపాళెం చంద్రశేఖర రెడ్డి, హెచ్.ఎస్. బ్రహ్మానంద
2. పరిశోధనా విధానం - ఎస్. జయప్రకాష్
3. పరిశోధనా పద్ధతులు - ఆర్వీయస్ సుందరం

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the importance of research work
2. Understand how to take the Research Topic
3. Understand that how many methods to get information regarding the research work.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2		4			7					
CO2	1	2		4			7					
CO3	1	2		4			7					
CO4	1	2					7		9			
CO5	1	2					7		9			

TEL 403 B - RESEARCH METHODOLOGY

పరిశోధన పద్ధతులు – ప్రణాలికలు

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటిని వివరించండి **5X4=20**

(1) పరిశోధన లక్షణాలు

(2) పరిశోధకుడు

(3) ప్రశ్నావళి

(4) ఊహా ప్రతిపాదన

(5) పాద సూచికలు

(6) పరిశోధన పరిధి

(7) పరిశోధనాంశం ఎంపిక

(8) పరిశోధన ప్రణాళిక

(9) క్షేత్రపర్యటన

(10) ఉపయుక్త గ్రంథసూచి

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11 (అ) పరిశోధనను నిర్వచించి పరిశోధనా రకాలను తెల్పండి

(లేదా)

(ఆ) పరిశోధనా ప్రయోజనాలను వివరించండి?

12. అ) పరిశోధకునికి ఉండవలసిన అర్హతలను తెలియజేయండి?

(లేదా)

ఆ) పరిశోధనాంశం ఎంపికలో ఎదురయ్యే సమస్యలను తెలియజేసి, పరిష్కారాలు తెలపండి?

13. అ) పరిశోధన ప్రణాళికలోని ముఖ్యాంశాలను వివరించండి?

(లేదా)

ఆ) ఊహాప్రతిపాదన రకాలు, ప్రయోజనాలు తెల్పండి?

14. అ) పరిశోధనలో విషయ సేకరణలో వివిధ ఆకారాలను గూర్చి వివరించండి?

(లేదా)

ఆ) క్షేత్ర పర్యటనలో తీసుకోవలసిన జాగ్రత్తలను, సందర్శన పద్ధతులను గూర్చి వివరించండి?

15. అ) సిద్ధాంత వ్యాసరూపకల్పన గూర్చి సమగ్రంగా తెలపండి?

(లేదా)

ఆ) సిద్ధాంత వ్యాస తొలి,మలి, తుదిప్రతుల రూపకల్పన గూర్చి వివరించండి?

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CC : TEL 403 C	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	TELUGU DALITH LITERATURE (GENERIC ELECTIVE)	EXT.Mrks: 80

తెలుగు దళిత సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OUTCOMES (COs)

The aim of the course is -

1. To enable the students to learn the origin and the development of caste system in India.
2. To introduce the students to the Indian social Darsanaaas like Charvaka, Jaina and Boudha.
3. To acquaint the students with Dalith Literature in Telugu, some Social events and some of the major Dalith Poets and writers.

యూనిట్ - I దళిత శబ్దం - అర్థవివరణ - వ్యాప్తి

భారతీయ సమాజం - వర్ణవ్యవస్థ - దళిత వ్యవస్థ

ఆవిర్భావ నేపథ్యం - వైవిధ్యాలు - వైరుధ్యాలు -

భగవద్గీత - మనుధర్మ శాస్త్రం

యూనిట్ - II సామాకజిక దర్శనాలు : చార్వాకం - జైనం - బౌద్ధం

ప్రాచీన తెలుగు సాహిత్యం - దళిత ప్రస్థావనలు -

దళిత జీవిత ప్రతిఫలనాలు

యూనిట్ - III ఆధునిక సామాజికోద్యమాలు : సంఘసంస్కరణోద్యమ సాహిత్యం -

స్వాతంత్ర్యోద్యమ సాహిత్యం - అభ్యుదయ, విప్లవ సాహిత్యాలు :

దళిత జీవిత ప్రతిఫలనం

ప్రత్యేక అధ్యయనం : గురజాడ ` కుసుమ ధర్మన్న - జాషువా -

బోయి భీమన్న - కొలకలూరి ఇనాక్ - గద్దర్ - శివసాగర్

యూనిట్ - IV దళిత శబ్దం దళిత వాదంగా పరిణమించడం -

దళిత వాద తాత్వికత - ఆవిర్భావ నేపథ్యాలు -

వివిధ ఆలోచనా విధానాలు - కారంచేడు, చుండూరు, నీరుకొండ ప్రాంతాల్లో

జరిగిన సంఘటనలు

ప్రత్యేక అధ్యయనం : కత్తి పద్మారావు - బొజ్జా తారకం

యూనిట్ - V దళితవాద తాత్త్వికత - తెలుగు సాహిత్యం - విభిన్న ప్రక్రియలు:
కవిత్వం - కథానిక - నవల – నాటకం;
దళిత స్త్రీవాదం; దండోరా సాహిత్యం
ప్రత్యేక అధ్యయనం : కలేకూరి ప్రసాద్, మద్దూరి నగేష్ బాబు,
ఎండ్లూరి సుధాకర్, శిఖామణి, చల్లపల్లి స్వరూపరాణి

ఆధార గ్రంధాలు

1. ఆనందరావు - హరిజనాభ్యుదయం : ఆధునికాంధ్ర కవిత్వం

2. వి. పోన్న - తెలుగు నాటకం : హరిజనాభ్యుదయం

3. కె. లక్ష్మీనారాయణ - హరిజనాభ్యుదయం : తెలుగు కథానిక

4. నన్నుమాస స్వామి - అస్పృశ్యతా సమస్య - తెలుగు

5. జి. భాను - తెలుగు నవలల్లో అస్పృశ్యత సమస్య

6. పిల్లి శాంసన్ - దళిత సాహిత్య చరిత్ర

7. కలేకూరి ప్రసాద్ - దళిత సాహిత్యం

8. శిఖామణి - దళిత సాహిత్య తత్త్వం

9. ఎస్వీసత్యనారాయణ - దళితవాద వివాదాలు

10. కాకాని సుధాకర్ - దండోరా కవిత్వం

11. పాసుగోటి కృపాకర్ మాదిగ - దండోరా వ్యాసాలు

12. చల్లపల్లి స్వరూపరాణి - అస్తిత్వగానం

13. ప్రముఖ దళిత సాహిత్య సంపుటాలు, సంకలనాలు

14. దార్ల వెంకటేశ్వరరావు - విమర్శన గ్రంథాలు

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand to learn the origin and the development of caste system in India.
2. Understand the Indian social Darsanaaas like Charvaka, Jaina and Boudha.
3. Understand Dalith Literature in Telugu, some Social events and some of the major Dalith Poets and writers.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3									
CO2	1	2	3									
CO3	1	2	3							10	11	
CO4	1	2	3							10	11	12
CO5	1	2	3							10	11	12

TEL 403 C - TELUGU DALITH LITERATURE

తెలుగు దళిత సాహిత్యం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటిని వివరించండి **5X4=20**

(1) భారతీయ సమాజం

(2) భగవద్గీత

(3) చార్వాకం

(4) దళిత వాదం

(5) స్వాతంత్ర్యోద్యమ సాహిత్యం

(6) కుసుమ ధర్మన్న

(7) శివసాగర్

(8) బొజ్జా తారకం

(9) దళిత కవిత్వం

(10) కలేకూరి ప్రసాద్

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి **5X12=60**

11 (అ) దళిత శబ్దానికి గల అర్థాన్ని, వ్యాప్తిని తెలపండి?

(లేదా)

(ఆ) వర్ణవ్యవస్థలో మనుధర్మశాస్త్ర పాత్రను వివరించండి?

12. (అ) భారతదేశంలోని సామాజిక దర్శనాలను, వాటి సిద్ధాంతాలను తెలపండి?

(లేదా)

(ఆ) ప్రాచీన తెలుగు సాహిత్యంలో దళిత జీవిత ప్రతిఫలనాలను తెలపండి?

13. (అ) సంఘసంస్కరణోద్యమ సాహిత్యం గురించి రాయండి?

(లేదా)

(ఆ) బోయి భీమన్న చిత్రించిన దళిత జీవిత ప్రతిఫలనాలను తెలపండి?

14. (అ) దళితవాద తాత్త్విక ఆవిర్భావ నేపథ్యాల గురించి రాయండి?

(లేదా)

(ఆ) వివిధ ప్రాంతాల్లో జరిగిన దళిత సామాజిక సంఘటనల ప్రతిఫలనాలను చర్చించండి?

15. (అ) తెలుగు కథా సాహిత్యంలో చిత్రించిన దళిత జీవితాన్ని ఆవిష్కరించండి?

(లేదా)

(ఆ) దళిత స్త్రీ వాదాన్ని వివరించి, అది సాధించిన విజయాలను తెలియచేయండి?

@@@

CC : TEL 403 D	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	INDIAN LITERATURE (CORE)	EXT.Mrks: 80

భారతీయ సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OUTCOMES (COs)

The aim of the course is -

1. familiarise with defferent religions schools of Modran Literature.
2. acquaint with different movements and trends is Indian Literature.
3. acquaint with comparitive aspects of different Genres is Indian Literature.

యూనిట్ - 1 భారతీయ సాహిత్య భావన - నిర్వచనం - వివరణ - భక్తి ఉద్యమం -
భారతీయ సాహిత్యం - వివిధ మత భావనలు : శైవం - వైష్ణవం - సూఫి

యూనిట్ - 2 సంఘ సంస్కరణోద్యమం - భారతీయ సాహిత్యం
వివిధ ప్రక్రియలు : కవిత్వం - కథానిక - నవల - నాటకం

యూనిట్ - 3 భారత జాతీయోద్యమం - భారతీయ సాహిత్యం
వివిధ ప్రక్రియలు : కవిత్వం - కథానిక - నవల - నాటకం

యూనిట్ - 4 అభ్యుదయోద్యమాలు - భారతీయ సాహిత్యం
వివిధ ప్రక్రియలు : కవిత్వం - కథానిక - నవల - నాటకం

యూనిట్ - 5 వర్తమాన సామాజిక స్థితిగతులు - భారతీయ సాహిత్యం -
స్త్రీవాద, దళిత వాద, మైనారిటి వాద ధోరణులు - వివిధ ప్రక్రియలు

ఆధార గ్రంధాలు

1. K. M. George – Comparitive Indian Literature
2. K. M. George – Facets of Indian literature
3. Sisira Kumar Das – History of Indian Literautre
4. Encyclopedia of Indian Literature (5 Valumes) – Sahitya Academy

5. భారతీయ భాషల సాహిత్య చరిత్రలు (తెలుగు అనువాదాలు)
- కేంద్రసాహిత్య అకాడమి ప్రచురణలు, న్యూఢల్లీ

6. ఆధునిక సాహిత్య ఉద్యమాలు, దోరణులు : వివిధ సంకలనాలు

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand with defferent religions schools of Modran Literature.
2. Understand different movements and trends is Indian Literature.
3. Understand comparitive aspects of different Genres is Indian Literature.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3				7					
CO2	1	2	3	4			7			10		
CO3	1	2	3	4			7		9	10		
CO4	1	2	3				7		9	10		12
CO5	1	2	3				7			10		12

TEL 403 D - INDIAN LITERATURE

భారతీయ సాహిత్యం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటిని వివరించండి **5X4=20**

(1) సూఫి

(2) సంఘసంస్కరణోద్యమ నవల

(3) భక్తి ఉద్యమం

(4) అభ్యుదయోద్యమ కవిత్వం

(5) భారత జాతీయోద్యమం

(6) మైనారిటీవాద కవిత్వం

(7) దళితవాద సాహిత్యం

(8) అభ్యుదయోద్యమ నవల

(9) సంఘసంస్కరణ నేపథ్య కథానికలు

(10) జాతీయోద్యమ నవల

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11 (అ) భారతీయ సాహిత్యాన్ని నిర్వచించి వివరించండి?

(లేదా)

(ఆ) భారతీయ సాహిత్యంలో వివిధ భావనలను విశ్లేషించండి?

12. అ) సంఘ సంస్కరణోద్యమ నేపథ్యాన్ని గూర్చి తెలియజేయండి?

(లేదా)

ఆ) సంఘసంస్కరణోద్యమ నేపథ్యంగా వివిధ సాహిత్య ప్రక్రియలను గూర్చి వివరించండి?

13. అ) భారత జాతీయోద్యమంలో సాహిత్యం పాత్ర గూర్చి చర్చించండి?

(లేదా)

ఆ) భారత జాతీయోద్యమ నేపథ్యంలో వచ్చిన నాటకాలను గూర్చి వివరించండి

14. అ) అభ్యుదయోద్యమ సాహిత్య ఆరంభ, వికాసాలను గూర్చి తెల్పండి?

(లేదా)

ఆ) అభ్యుదయోద్యమ సాహిత్యంలో వివిధ ప్రక్రియల పాత్రను వివరించండి?

15. అ) భారతీయ వర్తమాన సామాజిక స్థితిగతుల నేపథ్యంలో వచ్చిన సాహిత్య ధోరణులు గూర్చి తెల్పండి?

(లేదా)

ఆ) స్త్రీ వాద నేపథ్యంగా వచ్చిన సాహిత్య ప్రక్రియలను పరిచయం చేయండి?

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CC : TEL 404	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	INDIA : A PHYLOSOPHICAL, SOCIOLOGICAL & HISTORICAL STUDY (CORE)	EXT.Mrks: 80

బహుముఖ శాస్త్రాధ్యయనం :

భారతీయ తాత్విక, లాక్షణిక, సామాజిక, చారిత్రిక శాస్త్రాలు

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OUTCOMES (COs)

The aim of the course is -

1. to introduce the students the knowledge of Various schools of ancient Indian Phylosophy to understand the Indianism.
2. To inculcate the students the back ground of some Historics, Sociological movements to understand class & caste systems in India.
3. To gain the students the lamparatric Knowledge of Indian Literatures.

యూనిట్ - I **నాస్తిక దర్శనాలు**

1. చార్వాకం - విశ్వము, ప్రమాణాలు, సమాజం

2. జైనం - అణువ్రతాలు, అణువ్రత ఉద్యమం, స్యాత్‌వాదం

3. బౌద్ధం - అనిత్యము, అనాత్మ, ఆర్యసత్యాలు, అష్టాంగమార్గం, నిర్వాణం

యూనిట్ - II **వేదాంత భాష్యాలు**

1. శంకరుని అద్వైతం - అద్వైత వాఙ్మయం, పదార్థ శాస్త్రం,
ప్రమాణ శాస్త్రం, మాయా స్వరూప నిరూపణం, జీవుడు,

2. రామానుజుని విశిష్టాద్వైతం - పదార్థ శాస్త్రం, ప్రమాణ శాస్త్రం,
మాయవాద ఖండన, జీవుడు

3. మధ్వాచార్యుని ద్వైతం - పదార్థ శాస్త్రం', ప్రమాణ శాస్త్రం, జీవుడు,
నైతిక విధానం

యూనిట్ - III **భారతీయ ఆలంకారికలు**

1. భరతుడు - నాట్య శాస్త్రం

2. ఆనంద వర్ధనుడు - ధ్వన్యాలోకం

3. అభినవగుప్తుడు - లోచనం

4. జగన్నాథ పండితుడు - రసగంగాధరం

యూనిట్ - IV **ఆధునిక భారతీయ సామాజిక వేత్తలు**

1. మహాత్మా జ్యోతిరావ్ పూలే, 2. రాజా రామమోహన్ రాయ్

3. దయానంద సరస్వతి, 4. మహాత్మా గాంధీ

5. డా|| బి.ఆర్. అంబేద్కర్, 6. ఇ.వి. పెరియార్

7. నారాయణ గురు

యూనిట్ - V **భారతీయ సామాజిక ఉద్యమాలు - చారిత్రకత**

1. భక్తి ఉద్యమాలు

2. సాంస్కృతిక పునరుజ్జీవనోద్యమాలు

3. తెలంగాణ రైతాంగ పోరాటం

4. శ్రీకాకుళం గిరిజన రైతాంగ పోరాటం

ఆధార గ్రంథాలు

1. భారతీయ తత్త్వశాస్త్రం - **సర్వేపల్లి రాధాకృష్ణన్**

2. 'విశ్వదర్శనం, భారతీయ చింతన' - **నండూరి రామమోహన రావు,**

3. 'భారతీయ దర్శనము (బి.ఏ) - **తెలుగు అకాడమి, హైదరాబాద్**

4. 'భారతీయ తత్వశాస్త్రం సులభ పరిచయం' - **దేవీ ప్రసాద్ చటోపాధ్యాయ**

5. 'ప్రపంచ చింతనా ధోరణుల' - **తెలుగు అకాడమి, హైదరాబాద్**

6. 'భారతీయ తాత్త్విక స్రవంతి : సజీవాంశాలు నిర్జీవ ధోరణులు'

- దేవీ ప్రసాద్ చటోపాధ్యాయ,

7. ప్రముఖుల జీవిత చరిత్రలు

8. భారతీయ సామాజిక శాస్త్రాలు, చరిత్ర గ్రంథాలు

9. భారతీయ సంస్కృతీ వైతాళికులు, ఆలంకారికులు

- పబ్లికేషన్స్ డివిజన్, సమాచారశాఖ, భారతప్రభుత్వం

10. శ్రీకాకుళ గిరిజన రైతాంగ ఉద్యమం - **వెంకట్, తరిమెల నాగిరెడ్డి ట్రస్ట్ ప్రచురణ**

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the knowledge of Various schools of ancient Indian Phylosophy to understand the Indianism.
2. Understand the back ground of some Historical, Sociological movements to understand class & caste systems in India.
3. Understand the Comparitive Knowledge of Indian Literatures.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4				8				
CO2	1	2	3	4				8				12
CO3	1	2		4								12
CO4	1	2	3	4						10		
CO5	1	2	3							10		

TEL 404 - INDIA : PHILOSOPHICAL, AESTHETICAL, SOCIOLOGICAL & HISTORICAL STUDY

బహుముఖ శాస్త్రాధ్యయనం :

భారతీయ తాత్విక, లాక్షణిక, సామాజిక, చారిత్రిక శాస్త్రాలు

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

ఎ - విభాగం

క్రింది వాటిలో ఐదింటిని వివరించండి **5X4=20**

(1) ఆర్య సత్యాలు

(2) చార్వాకము విశ్వము

(3) ద్వైత పదార్థ శాస్త్రం

(4) లోచనం

(5) రసగంగాధరం

(6) రాజా రామ్‌మోహన్ రాయ్

(7) ఇ.వి. పెరియార్

(8) తెలంగాణ రైతాంగ పోరాటం

(9) స్యాత్ వాదం

(10) నారాయణ గురు

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి **5X12=60**

11 (అ) భారతదేశంలో జైనమత ఆవిర్భావానికి గల నేపథ్యాన్ని, జైనమత ప్రతిపాదనలను వివరించండి?

(లేదా)

(ఆ) బౌద్ధమత సిద్ధాంతాన్ని తెలిపి, అష్టాంగమార్గ ప్రాముఖ్యాన్ని వివరించండి?

12. అ) అద్వైత వాఙ్మయం ద్వారా మాయా స్వరూప నిరూపణం గురించి రాయండి?

(లేదా)

ఆ) విశిష్టాద్వైతం ప్రతిపాదించే వివిధ అంశాల గురించి వివరించండి?

13. అ) భరతుడి నాట్య శాస్త్రం ప్రతిపాదించే అంశాల గురించి రాయండి?

(లేదా)

ఆ) అలంకార శాస్త్రాలలో ధ్వన్యాలోక విశిష్టతను గురించి రాయండి?

14. అ) భారతీయ సమాజానికి పూలే చేసిన కృషిని తెలియజేయండి?

(లేదా)

ఆ) రాజ్యాంగ రూపకల్పనలో అంబేద్కర్ పాత్రను వివరించండి?

15. అ) భారతదేశంలో ఆవిర్భవించిన భక్తి ఉద్యమాలను, వాటి పాత్రను విశదీకరించండి?

(లేదా)

ఆ) శ్రీకాకుళ గిరిజన రైతాంగ పోరాట ఉద్యమాన్ని, అది సాధించిన విజయాలను వివరించండి?

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CC : TEL 405 A	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	FUNDAMENTALS OF FOLK (OPEN ELECTIVE)	EXT.Mrks: 80

జానపద విజ్ఞానం = పరిచయం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is -

1. To Introduce the Students the Folk Literature as a popular Art Form in native Languages.
2. To familiarize the Students with rich legacy of Literature in Folk Songs, Folk Performing Arts and other Cultural Artifacts.
3. To acquaint the students with traditional Values, beliefs, customs and devotional methods on rural Goddess ect.

యూనిట్ - 1 జానపద విజ్ఞానం వర్గీకరణ`జానపద విజ్ఞానం వల్ల ప్రయోజనాలు,
జానపద విజ్ఞాన అధ్యయనంపై ఇంతవరకు జరిగిన ప్రాచ్య పాశ్చాత్యుల కృషి.
జానపద సాహిత్యానికి, శిష్ట సాహిత్యానికుండే తారతమ్యాలు

యూనిట్ - 2 జానపద గేయం - లక్షణాలు జానపద గేయ వర్గీకరణ`శ్రామిక గేయాలు`బాంధవ్య గీతాలు(కౌటుంబిక గీతాలు) - పిల్లల పాటలు(బాల గేయాలు) - వేడుక పాటలు - శృంగార గేయాలు - కరుణరస గేయాలు - హాస్య గేయాలు - భక్తి గీతాలు

యూనిట్ - 3 జానపద కథాగేయాలు — లక్షణాలు - వర్గీకరణ,
పౌరాణిక కథాగేయాలు : (ఊర్మిళాదేవి నిద్ర-లక్ష్మణదేవర నవ్వు-ధర్మరాజు జూదం` శ్రీకృష్ణుని జననం - బాల నాగమ్మ - లక్ష్మమ్మ - వీర రాజమ్మ
వీర గాథలు - స్వరూప స్వభావాలు - వర్గీకరణ
పల్నాటి వీర చరిత్ర - కాటమరాజు కథ - బొబ్బిలి యుద్ధం - సర్వాయి పాపని కథ - ఉయ్యాలవాడ నరసింహారెడ్డి.

యూనిట్ - 4 జానపద గద్యాఖ్యానాలు`వర్గీకరణ - పురాగాథలు`ఐతిహ్యాలు - జానపద కథలు (అద్భుత, వినోద, ప్రాణి, నీతి, సమస్యాత్మక కథలు),
సామెతలు`పొడుపు కథలు.

యూనిట్ - 5 సాంఘిక జానపదాచారాలు - వస్తు సంస్కృతి`జానపద ప్రదర్శన కళలు

సంగీతం : వాద్య, గాత్ర సంగీతం - జానపద వృత్తి గాయకులు

నృత్యం - రూపకాలు

ఆధార గ్రంధాలు

1. బి. రామరాజు	**-**	**తెలుగు జానపద గేయ సాహిత్యం**
2. హరి ఆదిశేషువు	**-**	**జానపదగేయ వాఙ్మయ పరిచయం**
3. నేదునూరి గంగాధరం	**-**	**జానపద వాఙ్మయ వ్యాసావళి**
4. ఆర్వీయస్ సుందరం	**-**	**ఆంధ్రుల జానపద విజ్ఞానం**
5. జి.యస్. మోహన్	**-**	**జానపద విజ్ఞాన వ్యాసావళి**
6. టి.వి. సుబ్బారావు	**-**	**తెలుగు వీరగాధా కవిత్వం**
7. నాయని కృష్ణకుమారి	**-**	**తెలుగు జానపద గేయగాధలు**

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the Folk Literature as a popular Art Form in native Languages.
2. Understand the rich legacy of Literature in Folk Songs, Folk Performing Arts and other Cultural Artifacts.
3. Understand the traditional Values, belifs, customs and devotional methods on rural Goddess ect.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4								
CO2	1	2	3					8	9			
CO3	1	2	3			6				10		
CO4	1	2	3			6						
CO5	1	2	3			6						

TEL 405 A - FUNDAMENTALS OF FOLK LORE

జానపద విజ్ఞానం = పరిచయం

Time : 3 Hours **MODEL QUESTION PAPER** **MARKS-80**

విబాగం - ఎ

క్రింది వాటిలో ఐదింటిని వివరించండి 5X4=20

1. జానపద విజ్ఞానం`ప్రయోజనాలు
2. జానపద, శిష్టసాహిత్యాల తారతమ్యం
3. పిల్లల పాటలు
4. భక్తి గీతాలు
5. వీర రాజమ్మ కథ
6. బాల నాగమ్మ కథ
7. పల్నాటి వీర చరిత్ర
8. ఉయ్యాల వాడ నరసింహారెడ్డి
9. పాడుపు కథలు
10. జానపద నృత్యాలు

బి - విభాగం

క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11. అ) జానపద విజ్ఞానాన్ని వర్గీకరించి, సోదాహరణగా వివరించండి

(లేదా)

ఆ) జానపద గేయ లక్షణాలను పేర్కొనండి

12. అ) శ్రామిక గేయాలను గూర్చి సోదాహరణగా పేర్కొనండి

(లేదా)

ఆ) శృంగార గేయాలను గూర్చి విశదీకరించండి

13. అ) పౌరాణిక కథాగేయాలను గూర్చి చర్చించండి

(లేదా)

ఆ) వీరగాథలను వర్గీకరించి విపులీకరించండి

14. అ) గద్యాఖ్యానాలను వర్గీకరించి వివరించండి

(లేదా)

ఆ) సామెతలను గూర్చి సోదాహరణగా చర్చించండి

15. అ) సాంఘిక జానపదాచారాలను గూర్చి విపులీకరించండి

(లేదా)

ఆ) జానపద ప్రదర్శన కళలను గూర్చి పేర్కొనండి

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CC : TEL 405 B	TITLE OF THE COURSE	L T P C 6 1 0 4
INT. Mrks: 20	TELUGU NATAKA SAHITYAM (CORE)	EXT.Mrks: 80

తెలుగు నాటక సాహిత్యం

CBCS REVISED SYLLABUS – EFFECTIVE FROM 2021 – 22

COURSE OBJECTIVES (COs)

The aim of the course is to understand -

1. The importance of Special Genre 'Natakam' and its features.
2. The stages in evolution of 'Natakam'
3. The difference between Natakam (play) and Natika (Play let) by Studying some 'Natakas' and 'Natikas'.

యూనిట్ - 1 నాటకం – నేపథ్యం; ప్రాచీన తెలుగు సాహిత్యం - నాటక ధోరణులు, ప్రస్తావనలు, ఆధునిక తెలుగు నాటకం - పరిణామం, వివిధ దశలు, తెలుగు నాటకంపై పాశ్చాత్య ప్రభావం

యూనిట్ - 2 తెలుగులో సంప్రదాయ నాటకం - వస్తు వైవిధ్యం - భారత, రామాయణ, పురాణ కథలు; ప్రసిద్ధ నాటక కర్తలు : ధర్మవరం రామకృష్ణమాచార్యులు - తిరుపతి వేంకట కవులు - త్రిపురనేని రామస్వామి చౌదరి

యూనిట్ - 3 ఆధునిక తెలుగు నాటకం - ప్రయోగాలు - స్త్రీ పాత్ర లేని నాటకాలు - తెరలేని నాటకాలు - ఆధునిక వీధి నాటకాలు; ప్రముఖ నాటక కర్తలు : పరుచూరి వెంకటేశ్వరరావు ` గొల్లపూడి మారుతి రావు ` యండమూరి వీరేంద్రనాథ్

యూనిట్ - 4 వివిధ సామాజిక సమస్యలు - తెలుగు నాటకం; అభ్యుదయ, దళితవాద, ప్రపంచీకరణ నేపథ్యం ప్రముఖ నాటక కర్తలు : సి.యస్.రావు - ఆత్రేయ - వల్లూరి శివప్రసాద్

యూనిట్ - 5 తెలుగు నాటకం - ప్రత్యేక అధ్యయనం

1. కన్యాశుల్కం - గురజాడ అప్పారావు
2. మా భూమి - సుంకర, వాసిరెడ్డి
3. పాలేరు - బోయి భీమన్న
4. పడమటిగాలి - పాటిబండ్ల ఆనందరావు

ఆధార గ్రంధాలు

1. అప్పారావు. పి.యస్ ఆర్ : తెలుగునాటక వికాసం

2. డి.ఎస్.యన్. మూర్తి : తెలుగు నాటక సాహిత్యం వివిధ రీతులు ` పరిణామాలు

3. రాధాకృష్ణ, మిక్కిలినేని : ఆంధ్రనాటకరంగ చరిత్ర

4. సుబ్బరామిరెడ్డి, గండవరం : ఆధునిక తెలుగు నాటకం

5. మీనన్, కె.కె. (సం) : రజిత రంజని

6. నాగభూషణశర్మ, మొదలి : నాటకశిల్పం

COURSE LEARNING OUTCOMES (CLOs)

After Completion of the Course the Students will be able to -

1. Understand the importance of Special Genre 'Natakam' and its features.
2. Understand the stages in evolution of 'Natakam'
3. Understand the difference between Natakam (play) and Natika (Play let) by Studying some 'Natakas' and 'Natikas'.

POS	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	4								
CO2	1	2	3							10		12
CO3	1	2	3							10	11	12
CO4	1	2	3							10	11	
CO5	1	2	3								11	

TEL 405 B - TELUGU NATAKA SAHITYAM

తెలుగు నాటక సాహిత్యం

Time : 3 Hours **MODEL PAPER** **MARKS-80**

విబాగం - ఎ

ఈ క్రింది ప్రశ్నలలో ఐదింటికి సమగ్ర సమాధానాలు రాయండి 5X4=20

1. నాంది
2. ప్రస్థావన
3. పాండవోద్యోగ విజయాలు
4. త్రిపురనేని రామస్వామిచౌదరి
5. ఆధునిక వీధినాటకం
6. పరుచూరి వెంకటేశ్వరరావు
7. అభ్యుదయ నాటకం
8. వల్లూరి శివప్రసాద్
9. మా భూమి
10. పడమటి గాలి

బి - విభాగం

ఈ క్రింది ప్రశ్నలకు సమాధానాలు రాయండి 5X12=60

11. అ) ప్రాచీన తెలుగు సాహిత్యంలో నాటకీయ ప్రస్తావనలను తెలియచేయండి?

(లేదా)

ఆ) తెలుగు నాటకంపై పాశ్చాత్య ప్రభావాన్ని వివరించండి?

12. అ) తెలుగులో వెలువడిన భారత సంబంధ నాటకాలను పరిచయం చేయండి?

(లేదా)

ఆ) తెలుగు నాటక రంగ వికాసానికి ధర్మవరం వారు చేసిన కృషిని వివరించండి

13. అ) ఆధునిక తెలుగు నాటకంలోని ప్రయోగశీలతను తెలియచేయండి?

(లేదా)

ఆ) యండమూరి వీరేంద్రనాథ్ నాటికలను పరిచయం చేయండి

14. అ) తెలుగు నాటకాలలో ఆవిష్కృతమైన వివిధ సామాజికాంశాలను వివరించండి?

(లేదా)

ఆ) తెలుగు నాటక రంగ వికాసానికి ఆత్రేయ చేసిన కృషిని తెలియచేయండి?

15. అ) 'కన్యాశుల్కం' నాటక వైశిష్ట్యాన్ని విశ్లేషించండి?

(లేదా)

ఆ) 'పాలేరు' నాటకం ప్రాశస్త్యాన్ని తెలియచేయండి?

@@@

DEPARTMENT OF ARABIC, PERSIAN & URDU

S.V.U. COLLEGE OF ATRS

SRI VENKATESWARA UNIVERSITY: TIRUPATI



RESTRUCTURED CURRICULUM FOR

M.A. URDU

WITH EFFECT FROM THE ACADEMIC YEAR 2021-2022

SYLLABUS

Choice Based Credit System (CBCS)

Academic Year 2023-2024

SRI VENKATESWARA UNIVERSITY :: TIRUPATI
DEPARTMENT OF ARABIC, PERSIAN & URDU

About the Department:

The Department of Arabic, Persian & Urdu, S.V.University, Tirupati established in the year **1959** with the aim to promote the two classical languages Arabic and Persian and one Indian language Urdu – Both the classical languages, Arabic and Persian are taught as compulsory foundation papers in M.A.(Urdu) programme. In the past, scholars like Mohammed Hassen Nainar, a renowned historian; Shaik Md. Hassan a Persian scholar; Prof. Raziuddin Ahamed, an un-matched authority on the egotistic literature of Maulana Abul Kalam Azad , a student of Dr. Zakir Hussain (President of India); Prof. Sulaiman Ather Jaweed, a renowned cirtic, a great scholar, familiar journalist and a good poet who got recognition to the department of urdu in India and abroad; Prof. Ehathasham Ahamed Nadvi Arabic scholar and a President awardee; Janab Shehab Jaffery, a well known poet of progressive movement ; Dr. Abdul Ahad, (field of specialization is National Integration in Urdu Literature) and Dr. Abdul Gani "Farooqui' (well known Scholar of Arbic and Persian); Prof. K. Basheer Ahmed, expertise in Urdu Linguistics and Urdu fiction; Prof. K. Muzaffer Ali Shahmiri, known for his innovative teaching, a scholar, poet, critic and served as a founder Vice chancellor of Dr.Abdul Haq Urdu University, Kurnool and Prof. S.A.Sattar Sahir, specialized in Dakaniyat, Iqbaliyat and Regional literature of Rayalaseema and a founder Registrar of Dr.Abdul Haq Urdu University, Kurnoolhave rendered valuable services for the development of the department.

The department of Arabic,Persian & Urdu, S.V.university is the prestigious post-graduate and Research department in the state of Andhra Pradesh. The department is offering M.A. (Urdu) and Ph.D.(Urdu) programs.68 Ph.D. degrees awarded so far focusing the thrust areas of this region. The department celebrated Golden Jubilee Celebrations in the year 2020 and released a book entitled "Samt o Raftar" on the Literary contributions of the department from the inception. At present 2 regular faculty Dr. M.Ameenulla and Dr. Mohamed Nisar Ahmed, 2 Academic Consultants and 1 Guest Faculty is actively engaged in the development of the department. The Department is organizing National and International seminars, workshops, literary and cultural programmes regularly.

Vision:

- To preserve the dignity and aesthetic values of Urdu language and literature.
- To spread awareness about the literary and cultural importance on Urdu language.
- To carry out the original research for the development and betterment in the field of literature and the social and human values in the society.
- To be a centre of excellence in the fields of teaching, learning and research.
- To introduce the Diploma courses in Arabic, Persian & Urdu.

Mission:

- Producing graduates and research scholars with good command on Urdu language and literature to serve as teachers, researchers and writers.
- Inculcating the literary taste and sense and significance of language and culture through classroom teaching, library and online sources.
- Supervising the research scholars to carry out the original research for the development and betterment of literature and the values in the society.
- Collaborating with other institutions in teaching and research programmes.
- To promote the Urdu language and literature and its culture in the society by conducting literary programmes like seminars , conferences, mushairas etc.,

CBCS

The 2 years M.A.(Urdu) program has designed as per the regulations of the Choice Based Credit System(CBCS). It provides an opportunity for students to choose and learn interested courses from prescribed syllabus. The syllabus comprises core, compulsory foundation, generic elective, open elective, skill oriented and multi disciplinary courses.

In I & II semesters there are 4 core courses and it is mandatory for all students. In compulsory foundation, student has to choose 1 course among 3 courses. The knowledge of this course help the student for better understanding the subject. In elective foundation course, the student has to choose 1 course out of 2 courses. In total the student will study 6 courses in each semester of first year.

In III & IV semester, there are 2 core papers which are mandatory for all students. In Genereic Elective, student has to choose 2 courses among 4 courses. There are Skill Oriented and Multi Disciplinary courses in 3rd and 4th semester respectively. In Open Elective category, there is an opportunity for students of other department to opt minimum of one paper. And in total there are 6 courses for each semester in both the semesters of second year.

And also there is fecilty for interested students may register for MOOC with approval of the concerned DDC.

The coursed are evaluated by grading system as per uniform grading system in entire Higher Education. In order to bring the uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examination. The UGC formulated the guidelines to be followed.

Program Specific Outcomes

PSO-1: Understanding of Dakani, Moderns Dakani and Regional literature.

PSO-2: Knowledge of writing critical essays and news for Urdu Mass Media.

PSO-3: Ability to write creative writings in forms of prose and poetry.

PSO-4: Pursuing further education in Journalism and Translation

Program Objectives

1. To bring the awareness about the history of Urdu language and literature.
2. To analyse the critical study of popular Urdu genres and Urdu writers.
3. To create interest about Arabic and Persian language and literature.
4. Compete NET, SET and other competitive exams with Urdu as specialization.
5. To acquire introductory knowledge about Ilm e Arooz (Rhetoric & Prosody).
6. To cater the knowledge about the various Urdu softwares and skills for employment in Urdu DTP.
7. To equip the students with life skills, values, ethics and rhetoric, to transform them into more humane beings as Literary studies are an important facet of Humanities studies in general.
8. To aware the students about the prospects of Urdu Mass Media&Urdu Translation
9. To inculcate the interest to study the literature of other languages.

Program Outcomes

After completion of P.G. program, the students are able to:

PO-1 : Overall Understanding the tradition and the dignity of Urdu literature.

PO-2 : Compete NET, SET and other competitive exams with Urdu as specialization.

PO-3 : Pursue research in Urdu language and literature.

PO-4 : Pursue further study in Urdu Journalism.

PO-5 : Differentiate among Classical, Modern and Dakani literature.

PO-6 : Write news reports and articles for Urdu mass media.

PO-7 : Teach Urdu language and literature in better manner in schools and colleges.

PO-8 : Understand the text analytically and critically.

PO-9 : Ability to appreciate literature with critical analysis.

PO-10 : An understanding of relationship between literature and real life.

PO-11 : Write critical essays on creative writings.

PO-12 : Enrich the creative skills in forms of prose and poetry.

Program Educational Objectives

PEO-1 : To aware the students to understand the dignity of Urdu language and literature.

PEO-2 : To train the students to teach Urdu language and literatue in educational institutions.

PEO-3 : To make the students to compete competitive exams with Urdu as specialization.

PEO-4 : To train the students to write creative writings and articles.

PEO-5 : To encourage the students to pursue further education and research.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI 517502
DEPARTMEN OF ARABIC, PERSIAN & URDU
SVU COLLEGE OF ARTS
P.G Degree Programme M.A (Urdu) CBCS Pattern - Amended as per NEP-2020
(With effect from the batch admitted in the academic year 2021-22)

The Course of Study and the Scheme of Examinations

SEMESTER- I

S. No	Components of Study		Title of the Course	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	Core	1	URD 101 : Urdu Zaban Ki Ibtedai Tareekh	6	4	20	80	100
2		2	URD 102 : Dakan Mein Urdu Zaban O Adab	6	4	20	80	100
3		3	URD 103 : Shumali Hind Mein Urdu Shayeri Ka Aghaz	6	4	20	80	100
4		4	URD 104 : Urdu Adab Mein Tanz O Mizah	6	4	20	80	100
5	Compulsory Foundation	5a	URD 105(A) : Arabi Zaban O Adab	6	4	20	80	100
		5b	URD 105(B) : Urdu Qaseeda					
		5c	URD 105(C) : Urdu Marsiya					
6	Elective Foundation	6a	URD106(A) : Urdu Drama	6	4	20	80	100
		6b	URD106(B):Junoob E Bayeed Ke Muntakhab Dakani Shura					
	Total			36	24	120	480	600
7	Audit Course	7	URD 107: Insani Aqdaar Aur Mansabi Akhlaqiyath (HVPE-I)	0	0	100	--	--

* All CORE Papers are Mandatory

- Compulsory Foundation- Chose one paper
- Elective Foundation- Chose one paper
- Audit Course - 100 Marks (Internal)-Zero credit Self Study
- Interested Students may registered for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving Extra credits

SEMESTER- II

S. No	Components of Study		Title of the Course	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exam	Total
1	Core	1	URD 201: Tareekh E Adab E Urdu-Shayeri	6	4	20	80	100
2		2	URD 202: Asnaf E Sukhan	6	4	20	80	100
3		3	URD 203: Tareekh E Adab Urdu-Nasr	6	4	20	80	100
4		4	URD 204: Urdu Dastan	6	4	20	80	100
5	Compulsory Foundation-I	5a	URD 205(A): Farsi Zaban O Adab	6	4	20	80	100
		5b	URD 205(B): Faiz Ahmed Faiz : Khusoosi Mutaliya					
		5c	URD 205(C): Sulaiman Ather Jaweed : Khusoosi Mutaliya					
6	Elective Foundation -II	6a	URD 206(A): Rayalseema Mein Urdu Sher O Adab	6	4	20	80	100
		6b	URD 206(B) : Arooz Aur Balaghath					
	Total			36	24	120	480	600
7	Audit Course	7	URD 207: Insani Aqdaar Aur Mansabi Akhlaqiyath (HVPE-II)	0	0	100	--	--

* All CORE Papers are Mandatory

- Compulsory Foundation- Chose one paper
- Elective Foundation- Chose one paper
- Audit Course - 100 Marks (Internal)-Zero credit Self Study
- Interested Students may registered for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving Extra credits

SEMESTER- III

S. No	Components of Study		Title of the Course	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	Core	1	URD 301 : Urdu Ghazal	6	4	20	80	100
2		2	URD 302 : Urdu Nazm	6	4	20	80	100
3	Generic Elective	3a	URD 303(A) : Urdu Novel	6	4	20	80	100
		3b	URD 303(B) : Urdu Afsana	6	4	20	80	100
		3c	URD 303(C): Bunyadi Computer Course : URDU DTP					
		3d	URD 303(D) : Urdu Khud Navishth					
4	Skill Oriented Course	4	URD 304 : Sahafath Aur Zara E Iblagh	6	4	20	80	100
5	Open Elective	5a	URD 305(A) : Jadeed Dakani Shayeri	6	4	20	80	100
		5b	URD 305(B) : Urdu Tarjuma Nigari					
	Total			36	24	120	480	600

* All CORE Papers are Mandatory

- Generic Elective- Chose Two paper
- Skill Oriented Course is Mandatory
- Open Elective are for the Students of Other Departments . Minimum One Paper should be opted.Extra credits may be earned by opting for more number of open electives depending on the interest of the students through self study.\
- Interested Students may registered for MOOC with the approval of the concerned DDC .

SEMESTER- IV

S. No	Components of Study		Title of the Course	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	Core	1	URD 401 : Urdu Lisaniyath	6	4	20	80	100
2		2	URD 402 : Urdu Tahqeeq	6	4	20	80	100
3	Generic Elective	3a	URD 403(A) : Urdu Tanqeed	6	4	20	80	100
		3b	URD 403(B): Ghair Afsanavi Adab					
		3c	URD 403(C): Hali: : Khusoosi Mutaliya	6	4	20	80	100
		3d	URD 403(D): Klaseeki Urdu Ghazal					
4	Multi Disciplinary course	4	URD 404: Telugu, Hindi Aur Angrezi Zaban O Adab Ka Taaruf	6	4	20	80	100
5	Open Elective	5a	URD 405(A): Sir Syed Ahmed Khan : Khusoosi Muthaliya	6	4	20	80	100
		5b	URD 405(B):Allama Iqbal : Khusoosi Muthaliya					
Total				36	24	120	480	600

* All CORE Papers are Mandatory

- Generic Elective- Chose Two paper
- Multi Disciplinary course / Project Work is Mandatory
- Open Elective are for the Students of Other Departments . Minimum One Paper should be opted.Extra credits may be earned by opting for more number of open electives depending on the interest of the students through self study.
- Interested Students may registered for MOOC with the approval of the concerned DDC .

SEMESTER-I
Core Paper-1
URD 101 : URDU ZABAN KI IBTEDAI TAREEKH

Objectives

(1) To know about the basic History of Urdu Language.
(2) To provide the knowledge about the ancient and modernIndo-Aryan languages.
(3) To bring the detailed study about the origin and evolution of Urdu Language.

Unit -1	**Hind Aryai Zabanein (Indo Aryan Languages) :** Introduction to the history of Ancient Indian Languages, Indo European, Indo Iranian, Indo Aryan Languages.
Unit -2	**Prakrith Zabanein (Prakrith Languages) :** Introduction, Indo Aryan Languages of central India, Types of Prakrith: Magdhi, Pali
Unit -3	**ApaBhransh Aur Khari Boli (Apa Bhransh and Khari Boli) :** Modern Indo Aryan,Transition Period, ApaBhransh-Various Dialects of ApaBhransh, KhariBoli.
Unit -4	**Urdu ZabanKaAghaz – MukhtalifNazariyath(Origin of Urdu Language, Various Theories) :** Muhammed Hussain Azad, Mahmood Sheerani, Masood Hussain Khan
Unit -5	**Dakani Zaban (Deccani Language) :** Origin and Development of Deccani, Historical Cultural backdrop, Linguistic features.

Suggested Books:

	Author:
1. Hind Aryai Aur Hindi:	Sunithi Kumar Chatterji (Urdu Translation)
2. Tareekh e Adab Urdu:	Jameel Jalibi (Vol.I)
3. Hindustani Lisaniyath:	Mohiuddin Qadri Zor
4. Hindustani Lisaniyath Ka Khaka:	John Benz (Tr.Syed Ihtesham Hussain)

Course Outcomes:

(1) Knowledge of history of basic Urdu Language.
(2) Awareness about ancient and modern Indo-Aryan languages.
(3) Command over origin and evolution of Urdu language.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*M*	*L*	-	-	-	*H*	-	-	-	-	-
CO 2	*M*	*H*	*L*	-	-	-	*M*	-	-	-	-	-
CO3	*M*	*H*	*L*	-	-	-	*H*	-	-	-	-	-

SEMESTER-I
Core Paper-2
URD 102 : DAKAN MEIN URDU ZABAN O ADAB

Objectives

(1) To educate about the history of Dakani litarature.
(2) To bring awareness about the writngs of Mohd. Quli Qutb Shah.
(3) To bring the critical study of Classical genres of Dakani literature.

Unit -1	**Sufia e Kiram Ki AdabiKhidmaath(Literary Services of Sufi saints) :** Origin of Dakani Prose and Poetry, Hazrath Khaja Banda Nawaz, Meeran Ji Shamsul Ushaq: Life sketch and Literary Services.
Unit -2	**BahmaniDaur(Bahmani Period) :** Hazrath Mohammmed Akbar Hussaini, Mushtaq, Nizami, Luthfi: Life sketch and Literary Services.
Unit -3	**QutubShahiDaur(QutubShahi Period) :** Feroze, Mulla Wajhi, Quli Qutub Shah, Ghawwasi, Ibn Nashati: Life sketch and Literary Services.
Unit -4	**AdilShahiDaur(AdilShahi Period) :** Burhanuddin Jaanam, Ibrahim Adil Shah Sani, Rusthami, Nusrathi, Hashimi: Life sketch and Literary Services.
Unit -5	**Dakan Mein MughliaDaur(Mughal Period in Deccan) :** Vali Dakani, Qazi Mahmood Bahri, Zauqi,WajihuddinWajdi, Siraj Aurang Abadi: Life sketch and Literary Services.

Suggested Books: **Author:**

1. Dakan Mein Urdu: NaseeruddinHashmi
2. Dakani Shayeri, Tahqeeq o Tanqeed: Dr. Mohammed Ali Asar
3. Tareekh e Adab Urdu: Jameel Jalibi (Vol.I)
4. Tareekh e Adab Urdu: Syed Aijaz Hussain

Out come

(1) Student understands the brief history of Dakani Literature.
(2) Student will be able to analyses the writings of Mohd Quli Qutub Shah.
(3) Student will learn about the classical genres of Dakani literature.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*H*	*H*	-	*H*	-	*M*	*M*	*L*	*L*	*L*	*M*
CO 2	*M*	*M*	*M*	-	*M*	-	*M*	*M*	-	*M*	*L*	*M*
CO3	*L*	*M*	*M*	-	*M*	-	*L*	*L*	*L*	*L*	-	*L*

SEMESTER-I
Core Paper-3
URD 103 : SHUMALI HIND MEIN URDU SHAYERI KA AGAHZ

Course Objectives:
(1) To Understand the beginning of Urdu poetry in Northern India.
(2) To understand the socio-cultural background and influence of Persian language.
(3) To analyses the critical study of Eminent early poets.

Unit -1	**Ibtedai Naqoosh (Earlier Examples) : Hazrath Ameer Khusro, Barahman, Noori, Jaffer Zatalli:** Life sketch and Literary Services, Critical Analysis.
Unit -2	**SamajiTahzeebi Pas-Manzar(Socio-Cultural Background) :** Poetry in Persian Language, Arzoo: Impact of Vali Dakani, Begining of Urdu Poetry in Delhi, Critical Analysis.
Unit -3	**MutaqaddimeenShu-ra(Earlier Poets) :** Faa'iz, Aabroo, Naji, Mazmoon, Yaqeen: Life sketch and Literary Services, Critical Analysis.
Unit -4	**MirzaMazharJaan e Jaanan(MirzaMazhar) :** Life Sketch, Poetry, Literary Services, Linguistic Reforms: Critical Study..
Unit -5	**Shah Haatham (Shah Zahuruddin Haatham) :** Life Sketch, Poetry, Literary Services, Linguistic Reforms:Critical Study..

Suggested Books:	**Author:**
01 Aab e Hayath:	Mohammed Hussain Azad
02 Tareekh e Adab Urdu:	Ram Babusaxena
03 Tareekh e Adab Urdu:	Jameel Jalibi (Vol.I)
04 Tareekh e Adab Urdu:	Syed Aijaz Hussain

Course Outcomes:
(1) Student will be able to understand the early Urdu poetry of Northern India.
(2) Understanding the different forms of Urdu Poetry and poets.
(3) To knowledge about the distinctive features of Urdu poetry.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*H*	-	*M*	-	*H*	*M*	*H*	*H*	*M*	*L*
CO 2	*H*	*H*	*M*	-	*M*	-	*H*	*M*	*H*	*M*	*M*	*M*
CO3	*H*	*M*	*M*	-	*M*	*L*	*H*	*M*	*M*	*M*	*L*	*L*

SEMESTER-I
Core Paper-4
URD 104 : URDU ADAB MEIN TANZ O MIZAH

Course Objectives:
(1) To know the tradition and importance of Humour and Satire in Urdu literature.
(2) To understand prose and poetic text of humour and satire of eminent poet and prose writers.
(3) To learn to identify the elements of satire and humour in selected text.

Unit -1	**Tanz o Mizah(Satire and Humour) :** Introduction, Characteristics and Importance, Humour and Satire in Urdu Literature, Earlier writings, Jaffer Zatalli, Hajviyath, Shahr Aashoob
Unit -2	**Urdu Shayeri Mein Tanz o Mizah(Satire and Humour in Urdu Poetry) :** Awadh Punch Poets, National and Reform Movements, Akbar Ilahabadi, Literary Movements, Contemporary Urdu Poetry.
Unit -3	**Muntakhab Shayeri-Tanz o Mizah (Selected Poetry) :** Study and Critical Analysis of prescribed Text:
Unit -4	**Urdu Nasr Mein Tanz o Mizah(Satire and Humour in Urdu Prose) :** Fasana Azad, Awadh Punch, National and Reform Movements, Nazeer Ahmed, Literary Movements, Contemporary Urdu Prose.
Unit -5	**Muntakhab Nasr-Tanz o Mizah(Selected Prose) :** Study and Critical Analysis of prescribed Text.

Suggested Books: **Author:**

01 Urdu Adab Mein Tanz o Mizah:	Vazir Agha ¸
02 Urdu Adab Mein Tanz o Mizah Ki Riwayath:	Ed. Dr. Khalid Mahmood
03 Tanz o Mizah Ka Tanqeedi Jayeza:	Khaja Abdul Ghafoor
04 Azadi Ke Baad Urdu Shayeri Mein Tanz o Mizah:	Dr. Mazhar Ahmed
05 Azadi Ke Baad Urdu Nasr Mein Tanz o Mizah:	Nami Ansari
06 Shah Rah-Tanz o Mizah Number:	Ed. Fikr Tonsavi

:

Course Outcomes:
(1) Knowledge about the tradition of humor and satire in Urdu literature.
(2) Differentiate between satire and humor in text.
(3) Analyze the text and identify the elements of satire and humor.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*M*	*M*	-	-	-	*M*	*M*	*M*	*H*	*M*	*M*
CO 2	*H*	*L*	*M*	-	-	-	*M*	*L*	*M*	*M*	*M*	*L*
CO3	*L*	*L*	*L*	-	-	-	*L*	*M*	*L*	*M*	*M*	*L*

SEMESTER-I
Compulsory Foundation-5A
URD 105(A) : ARABI ZABAN O ADAB

Course Objectives:

(1) To create interest about Arabic language & literature.
(2) To teach Arabic grammar and remember the basics.
(3) Equip the knowledge about the simple translation of Arabic sentences.
(4) To acquire introductory knowledge about Arabic literature.

Unit -1	**ArabiZaban o Adab Ki Nasho Numa (Development of Arabic Language and Literature) :** Brief history of the Development of Arabic Language and Literature.
Unit -2	**Zamana e Jahiliyath (Pre-Islamic Era) :** Characteristics of Arabic Prose and Poetry in the Pre-Islamic Era:Imrau l Qais, Zuhair Bin Abi Salma, A'sha, Anthara Absi: Introduction, Study and analysis.
Unit -3	**Sab-a Muallaqath (Seven Great Poems) :** Introduction, Importance, Characteristics: Study and analysis.
Unit -4	**Zahoor e Islam Ke Baad Ka Daur (Islamic Era) :** Important Poets: Farzduq, Jareer, Hassan Bin Sabith, Khansa, Abu Navas: Introduction, Study and Analysis.
Unit -5	**Mathn Ka Muthalia, Tafheem o Tashreeh (Study of Text, Explanation):** Verses from Quran (Two Selected Verses): Hadees (Two Selected Hadees) Farzduq (Two Selected Couplets):Hassan Bin Sabith (Two Selected Couplets): Abu Navas (Two Selected Couplets)

Suggested Books: **Author:**

01 Tareekh e Adab Arabi: Abdul Haleem Nadvi (Vol.I&Vol.II)
02 Tareekh e Adab Arabi: Ahmed Hasan Zayat (Tr. M. Naeem Siddiqi)

Course Outcomes:

(1) Able to read, write and understand simple Arabic sentences.
(2) Translate simple Arabic sentences.
(3) Student will gain brief awareness of Arabic literature

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	-	-	-	-	-	-	*L*	-	-	*M*	-	-
CO 2	-	-	-	-	-	-	*L*	-	-	*L*	-	-
CO3	-	-	-	-	-	-	*L*	-	-	*L*	-	-

SEMESTER-I
Compulsory Foundation-5B
URD 105(B) : URDU QASEEDA

Course Objectives:
(1) To know the tradition and importance of Urdu Qaseeda.
(2) To understand the text of Dakani and Urdu Qaseeda.
(3) To understand critically the writings of Nusrati, Sauda and Zauq.

Unit -1	**SinfQaseeda(Panygeric Ode) :** Introduction, Importance, Salient Featuresand Characteristics, Types of Urdu Qaseeda, Parts of Urdu Qaseeda
Unit -2	**Urdu Qaseeda, Aghaz o Irteqa(Origin and Development of Urdu Qaseeda) :** The Legacy of Qaseeda , Qaseeda in Dakani Period, Development of Qaseeda in North India, Critical Analysis.
Unit -3	**Nusrathi: (Qaseeda by Nusrathi) :** Introduction, About the Poet : Features and Characteristics, Art and Technique, Critical Analysis.
Unit -4	**Sauda: (Qaseeda by Sauda) :** Introduction, About the Poet : Features and Characteristics, Art and Technique, Critical Analysis
Unit -5	**Zauq: (Qaseeda by Zauq) :** Introduction, About the Poet : Features and Characteristics, Art and Technique, Critical Analysis

Suggested Books:
01 Urdu Mein Qaseeda Nigari:
02 Urdu Qaseeda Nigari Ka Tanqeedi Jayeza:
03 Dakani Adabmein Qaseeda Nigariki Riwayat:

Author:
Dr. Abu Muhammed Sahar
Prof. Mahmood Elahi
Syeda Jafer

Course Outcomes:
(1) Knowledge about the tradition of Urdu Qaseeda from Dakani period.
(2) Differentiate between the Dakani and Urdu Qaseeda with respect of language, diction and style
(3) Understand the salient features of Urdu Qaseeda with special reference to Nusrati, Sauda and Zauq.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*M*	*L*	-	*L*	-	*L*	*L*	*M*	*M*	*L*	*M*
CO 2	*L*	*H*	*M*	-	*L*	-	*M*	*L*	*L*	*L*	-	*M*
CO3	*L*	*L*	*L*	-	*M*	-	*L*	-	-	*M*	-	*L*

SEMESTER-I
Compulsory Foundation-5C
URD 105 (C) : URDU MARSIYA

Course Objectives:
(1) To know the tradition and importance of Urdu Marsiya.
(2) To read and understand the text of selected Urdu Marsiya.
(3) To critically comparing the writings of Meer Anees and Mirza Dabeer

Unit -1	**SinfMarsiya(Elegy) :** Introduction, Importance, Salient Features and Characteristics, Types of Urdu Marsiya, Parts of Urdu Marsiya.
Unit -2	**Urdu Marsiya, Aghaz o Irteqa(Origin and Development of Urdu Marsiya) :** The Legacy of Marsiya, Marsiya in Dakani Period, Development of Marsiya in North India, Critical Analysis
Unit -3	**Meer Anees(Marsiya by Meer Anees) :** Introduction, About the Poet : Features and Characteristics, Art and Technique, Critical Analysis.
Unit -4	**MirzaDabeer (Marsiya by MirzaDabeer) :** Introduction, About the Poet : Features and Characteristics, Art and Technique, Critical Analysis.
Unit -5	**AneesAurDabeerKa TaqabuliMuthaliya(Comparitive Study of Anees and Dabeer) :** Introduction, Features and Characteristics, Art and Technique, Critical Analysis

Suggested Books:	**Author:**
01 Urdu Marsiya Ka Irteqa:	Dr. Maseeh Zaman
02 Anees Shanasi:	Dr. Gopichand Narang
03 Mawazina Anees o Dabeer :	Shbli Naumani
04 Marasi Anees:	Ed. Masood Hussain Razvi
05 Dakanmein Marsiaaur Azadari:	Dr. Rasheed Mosavi

Course Outcomes:
(1) Knowledge about the tradition of Urdu Marsiya.
(2) Compare and analyse the Marsiya of Anees and Dabeer.
(3) Understand the salient features of Urdu Marsiya of Meer Anees and MirzaDabeer

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*L*	-	*M*	-	*M*	*H*	*H*	*L*	*L*	*L*
CO 2	*M*	*H*	*L*	-	*M*	-	*L*	*M*	*H*	*L*	*M*	*L*
CO3	*M*	*H*	*L*	-	*M*	-	*M*	*M*	*H*	*M*	*H*	*L*

SEMESTER-I
Elective Foundation-6A
URD 106(A) : URDU DRAMA

Course Objectives:
(1) To know about the importance and tradition of Urdu Drama.
(2) To know about the types and techniques of Urdu Drama.
(3) To know the salient features of Urdu Dramas: Anar kali and Inder Sabha

Unit -1	**AfsanaviAdab, Sinf Drama-Taaruf(Fiction-Genre Drama) :** Urdu Drama-Introduction, Salient Featuresand Characteristics, Art and Technique, Origin and Development of Urdu Drama.
Unit -2	**Urdu Drama KaAghaz(Begining of Urdu Drama) :** Prescribed Dramas, Introduction and Critical Analysis: (1) Rahas-Radha Kanhayya: Wajid Ali Shah (2)Inder Sabha: Amanath Lakhnawi
Unit -3	**Urdu Theatre CompaniyonKaDaur-Agha Hashar Kashmiri :** (Urdu Theatre Companies: Agha Hashar Kashmiri) : Introduction, About the Writer : Features and Characteristics, Art and Technique, Characterization, Dialogues, Critical Analysis of the prescribed Text. Yahudi Ki Larki: Agha Hashar Kashmiri
Unit -4	**Jadeed Urdu Drama KaAghaz-Imtiaz Ali Taj(Modern Urdu drama-Imtiaz Ali Taj) :** Introduction, About the Writer : Features and Characteristics,Art and Technique, Characterization, Dialogues, Critical Analysis of the prescribed Text:Anar Kali: Imtiaz Ali Taj
Unit -5	**Ma-asir Urdu Drama (Contemporary Urdu Drama) :** Introduction, About the Writer, Features andCharacteristics, Art and Technique, Characterization, Dialogues, Critical Analysis of the prescribed Text. (1) Agra Bazar: HabeebTanveer(2)Zahhak: MuhammedHasan

Suggested Books:	**Author:**
01 Urdu Drama Funn Aur Manzilein:	Prof. Syed Waqar Azeem
02 Urdu Drama	Ed. Dr. Qamar Raees
03 Urdu Drama Fann Aur Riwayath:	Dr. Muhammed Shahid Hussain
04 Urdu Drama Ki Tareekh o Tanqeed:	Ishrat Rahmani
05 Urdu Drama Ka Irteqa:	Ishrat Rahmani
06 Urdu Drama Aur Anar Kali:	Syed Hyder Abbas Razvi

Course Outcomes:
(1) Knowledge about tradition of Urdu Drama.
(2) Distinguish various forms and techniques of Urdu Drama.
(3) Analyses critically the text of Anar kali and Inder Sabha.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*M*	-	*M*	-	*M*	*M*	*M*	*H*	*L*	*L*
CO 2	*H*	*M*	*M*	-	*M*	-	*L*	*M*	*M*	*H*	*L*	-
CO3	*H*	*H*	*L*	-	*L*	-	*L*	*H*	*L*	*M*	*L*	*L*

SEMESTER-I
Elective Foundation-6B
URD 106(B) : JUNOOB E BAYEED KE MUNTAKHAB DAKANI SHU'RA

Course Objectives:
(1) To enrich the knowledge about the Urdu poets and writers of Andhra Pradesh and Tamil Nadu.
(2) To understand the features of regional Urdu poets and writers.

Unit -1	**HazrathQurbi(HazrathQurbi of Vellore) :** Introduction, Life Sketch, Poetry, Salient features and Characteristics, Critical Analysis
Unit -2	**BaqarAagah(BaqarAagah of Vellore) :** Introduction, Life Sketch, Poetry, Salient features andCharacteristics, Critical Analysis.
Unit -3	**Vali Vellori (Vali of Vellore) :** Introduction, Life Sketch, Poetry, Salient features and Characteristics, Critical Analysis.
Unit -4	**Hazrath Shah Fil-hal(Hazrath Shah Fil-hal of Rayalseema) :** Introduction, Life Sketch, Poetry, Salientfeatures and Characteristics, Critical Analysis.
Unit -5	**Hazrath Shah Kamal (Hazrath Shah Kamal of Rayalseema) :** Introduction, Life Sketch, Poetry, Salient features and Characteristics, Critical Analysis.

Suggested Books :
01 Deewan Qurbi:
02 Maulana Baqar Aagah Vellori:
03 Madras Mein Urdu Ki Nash o Numa:
04 Dakani Kulliyath Hzt.Shah Fil-hal Ki Tanqeedi Tadveen:
05 Shah Miri Auliya:
06 Kadapa Mein Urdu :

Author:
Ed.Prof.Syed Mohammed Fazlullah
Dr. Zakira Ghouse
Prof. Syed Afzaluddin Iqbal
Dr. Waheed Kausar
Hakeem Syed Mahmood Bukhari
Dr. Rahi Fidai Course

Course Outcomes:
(1) The student would enrich the knowledge about the Urdu poets and writers of Andhra Pradesh and Tamil Nadu.
(2) Would understand the features of regional Urdu poets and writers.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*L*	*H*	-	*M*	-	*L*	*M*	*M*	*L*	*L*	*L*
CO 2	*M*	*L*	*H*	-	*H*	-	*L*	*M*	*M*	*M*	*M*	*M*

SEMESTER-I

Audit Course

URD 107 : INSANI AQDAAR AUR MANSABI AKHLAQIYATH (HVPE-I)

Course Objectives:

(1) Cater the knowledge about Human Values.
(2) To know the importance Human Values in religions and philosophies.
(3) Awareness of consequences of violating Human Values.

Unit -1	**Definition and Nature of Ethics :** Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics , Goals -Ethical Values in various Professions
Unit -2	**Nature of Values :** Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders. Character and Conduct.
Unit -3	**Individual and Society:** Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Nonpossession) and Aparigraha (Non- stealing). Purusharthas (Cardinal virtues)-Dharma (Righteousness),Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).
Unit -4	**Bhagavad Gita:** (a) Niskama karma. (b) Buddhism- The Four Noble Truths – Aryaastan gamarga, (c) Jainismma havratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.
Unit -5	**Crime and Theories of punishment:** (a) Reformative, Retributive and Deterrent. (b) Views on Manu and Yajna valkya.

Suggested Books :

	Author:
01 A manual of ethics.	John S Mckenzi:
02 Ethics for Today	Harold H. Titus:
03Hindu Ethics	Maitra, S.K:
04 Introduction to Ethics	William Lilly
05 A Manual of Ethics	Sinha:
06 Ethics, Theory and Contemporary Issues: Wadsworth/Thomson Learning, 2001.	Barbara Mackinnon,

Course Outcomes:

(1) Understand, What are the Human Values accepted globally.
(2) Knowing the importance of Human Values in religious scriptures and philosophies.
(3) Help to become a responsible Human being.

SEMESTER-II
Core Paper-1
URD 201 : TAREEKH E ADAB URDU-SHAYERI

Objectives:

(1) To make students aware of important historical events of Urdu Poetry.
(2) To know about the most important schools of thought of Urdu literature.

Unit -1	**DakaniDaur(Deccani Period):** Bahmani to Mughal R ule in Deccan, Introduction, Historical Cultural Background, Dakani Poetry, Analysis
Unit -2	**Shumali Hind Mein Urdu Shayeri Ki Ibteda(Begining of Urdu Poetry in North India):** Introduction, Impact of Vali Dakani, Important Poets- Schools of Thought in Urdu Poetry, Delhi School and Lucknow School: Historical and Cultural Background, Salient features and characteristics, Analysis
Unit -3	**IslahiTahreekathKaAsar(Impact of Reform Movements):** Introduction, Historical and Cultural Background Political awakening, Patriotism, Social Reforms,Humourous and Satirical Poetry. Aligarh Movement- Aims and Objectives, Literary Reforms, Impact.
Unit -4	**AdabiTahreekath o Rujhanath(Literary Movements and Trends):** Progressive Movement, Literary Circle of Arbab e Zauq, Modernism Movement- Introduction, Aims and Objectives, Impact on Urdu Poetry, Result, Critical Analysis.
Unit -5	**Ma-asir Urdu Shayeri(Contemporary Urdu Poetry):** Contemporary Urdu Ghazal and Urdu Poem- Introduction, Characteristics, Critical Analysis. Ghazal in other Indian Languages-Telugu Ghazal, Introduction, Characteristics, Critical Analysis.

Suggested Books :

	Author:
01 Dakan Mein Urdu:	Naseeruddin Hashmi
02 Aab e Hayath:	Mohammed Hussain Azad
03 Naye Adabi Rijhanat:	Dr. Ejaz Hussain
04 Jadeed Adab Manzar aur Pas Manzar:	Prof. Ehtisham Hussain
05 Aligarh Tehreek Aagaz ta Imroz:	Compiled by Naseem Qureshi
06 Urdu mein Taraqqi Pasand Adabi Tehreek:	Khaleelur Rehman Aazmi
07 Taraqi Pasand Tehreek aur Halqae Arbabe Zauq:	Prof. Sadia Shafaqat.
08 Jadeed Shayari:	Dr. Ibadat Barelvi Course Objectives:

Course Outcomes:

(1) Have learn about the important historical events of Urdu Poetry.
(2) Have knowledge about the most important schools of thought of Urdu literature.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*H*	-	*L*	-	*H*	*M*	*M*	*H*	*M*	*M*
CO 2	*M*	*M*	*H*	-	*L*	-	*H*	*L*	*M*	*L*	*M*	*M*
CO3	*M*	*L*	*L*	-	-	-	*M*	*L*	*L*	*L*	*L*	*L*

SEMESTER-II
Core Paper-2
URD 202 : ASNAF E SUKHAN

Objectives:
(1) To Understand various forms of urdu poetry.
(2) To Understand the art and technique offamous Urdu poets.
(3) To know about the distinctive features of Urdu poetry.

Unit -1	**Qaseeda(Panygeric Ode) :** Introduction, Characteristics, Art and Technique, Origin and Development.Study and Critical analysis of the prescribed Text: (1) Kal Hirs Nam Shakhsey (Mathla Awwal) : Mirza Rafi Sauda (18 Couplets) (2) Wah Wah Kya Mu'tadil Hai (Mathla Awwal) : Ibrahim Zauq (20 Couplets)
Unit -2	**Masnavi (Epic Poem)** : Introduction, Characteristics, Art and Technique, Origin and Development.Study and Critical analysis of the prescribed Text: (1) Sehrul Bayan : Meer Hasan (Chapter-I First 30 Couplets) (2) Gulzar e Naseem: Daya Shankar Naseem (Chapter-I 23 Couplets)
Unit -3	**Marsiya (Elegy) :** Introduction, Characteristics, Art and Technique, Origin and Development. Study and Critical analysis of the prescribed Text: (1) Marsiya: Mir Anees (First 10 Stanzas) (2) Marsiya: MirzaDabeer (First 10 Stanzas)
Unit -4	**Rubaiyath (Quatrains) :** Introduction, Characteristics, Art and Technique, Origin and Development.Study and Critical analysis of prescribed Quatrains: (1) Be-khud Main Raroohn...(2) Is Seene Mein Kainath.. : Amjad Hyderabadi (1) Azad Zameer Ho...(2)Yeh Rooh Na Band e Gham Se.: Jagat Mohan Lal Rawan
Unit -5	**Deegar Asnaf (Other Poetic Genres) :** Introduction, Characteristics, Art and Technique of the following Genres of Urdu Poetry: Geeth, Doha, Mahia, Hicu, Triolette, Sonnet.

Suggested Books:	**Author:**
01 Urdu Qaseeda Nigari:	Compiled by Dr. Umme Hani Ashraf
02 Urdu Qaseeda Nigari ka Tanqeedi Jayeza:	Dr. Mahmud Elahi
03 Urdu ki Teen Masnavian:	Prof. Khan Rasheed
04 Mavazina e Anees O Dabeer:	Shibli Nemani
05 Aneesaur Dabeer:	Compiled by Gopi Chand Narang
06 Tanqeed e Rubai:	Dr. Farid Parbati
07 Urdu Shairimein Hayyat ke Tajrube:	Dr. Unwan Chishti

Out come
(1) Student understands the brief history of Dakani Literature.
(2) Student will be able to analyze the writings of Mohd Quli Qutub Shah.
(3) Student will learn about the classical genres of Dakani literature.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*H*	*L*	-	*M*	-	*M*	*M*	*M*	*L*	-	-
CO 2	*M*	*L*	*M*	-	*M*	-	*M*	*H*	*L*	*L*	*L*	-
CO3	*M*	*M*	*L*	-	*M*	-	*M*	*L*	*L*	*L*	-	-

SEMESTER-II
Core Paper-3
URD 203 : TAREEKH E ADAB URDU-NASR

Objectives:

(1) To create awareness about the classics of Urdu prose.
(2) To read and understand the text.
(3) Analyzing and Critical understanding of the classics.

Unit -1	**DakaniDaur(Deccani Period)** : Bahmani Era to Mughal Rule in Deccan, Introduction, Historical Cultural Back ground, Dakani Prose, Analysis.
Unit -2	**Shumali Hind Mein Urdu Nasr (Urdu Prose in North India) :** Introduction, Historical and Cultural Back ground, Literary services of Fort William college, ImportantWriters, Dr. Gilchrist, Meer Amman, Sher Ali Afsos : Literary services of Delhi College.
Unit -3	**Nayi Urdu Nasr (New Trends in Urdu Prose) :** Letter Writings of Ghalib, Impact of Sir Syed, Important Companions of Sir Syed, Five Pillars of New UrduProse and Translation Department of Jamia Osmania.
Unit -4	**TaraqqiPasandTahreekAur Urdu Nasr (Progressive Movement and Urdu Prose) :** Impact of Progressive Movement on Urdu Novel, Short Story and Literary Criticism in Urdu, Critical Analysis
Unit -5	**Jadeediyath Ki TahreekAur Urdu Nasr (Modernism Movement and Urdu Prose) :** Impact of Modernism Movement on Urdu Novel, Short Story and Literary Criticism in Urdu, Critical Analysis.

Suggested Books:

Author:

01 Dakan Mein Urdu: Naseeruddin Hashmi
02 Tahreekh e Adab Urdu Vol.I& II: Jameel Jalibi
03 Urdu Adab ki Tanqeedi Tahreekh: Syed Ihtesham Hussain
04 Jadeed Adab, Manzar Aur Pas Manzar: Syed Ihtesham Hussain
05 Naye Adabi Rujhanath: Dr. Syed Aijaz Hussain
06 "Adeeb" Spl. Issue-Urdu Zaban Ka Tareekh Number

Out come

(1) Student will know about the classics of Urdu prose.
(2) Student will be able to read and understand the text.
(3) Student will learn critical awareness of the text.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*H*	-	*H*	-	*H*	*M*	*H*	*H*	*M*	*M*
CO 2	*H*	*H*	*H*	-	*M*	-	*H*	*H*	*M*	*H*	*M*	*M*
CO3	*M*	*M*	*H*	-	*M*	-	*M*	*M*	*M*	*M*	*L*	*M*

SEMESTER-II
Core Paper-4
URD 204 : URDU DASTAN

Objectives:

(1) To create awareness about the classics of Urdu prose.
(2) To read and understand the text.
(3) Analyzing and Critical understanding of the classics

Unit -1	**Afsanavi Adab, Sinf Dastan-Taaruf (Fiction-Genre Dastan) :** Urdu Dastan-Introduction, Salient Features and Characteristics, Art and Technique, Brief history of Urdu Dastan
Unit -2	**Sab-Ras: MullaWajhi(Sab-Ras, By: MullaWajhi) :** Introduction, About the Writer, Definition and Characteristics of Tamseel, Art, Critical Analysis
Unit -3	**Karbal Katha, Fazal Ali Fazli (Karbal Katha, By: Fazal Ali Fazli) :** Introduction, About the Writer, Art and Technique, Characterization, Critical Analysis.
Unit -4	**Bagh o Bahar, Meer Amman Dehlavi(Bagh o Bahar, By: Meer Amman Dehlavi) :** Introduction, About the Writer, Art and Technique, Critical Analysis. Comparative study of Fasana e Aja-ib and Bagh o Bahar.
Unit -5	**Fasana e Aja-ib, Rajab Ali BaigSuroor(Fasana e Aja-ib, By: Rajab Ali BaigSuroor) :** Introduction, About the Writer, Art and Technique, Critical Analysis: Comparative study of Fasana e Aja'ib and Bagh o Bahar

Suggested Books:	**Author:**
01 01 Urdu Ki Nasri Dastanein:	Gyan Chand Jain
02 Dastan Se Novel Tak:	Ibn e Kanwal
03 Dastan Ka Fan:	Ather Parvez
04 Dastan Se Afasane Tak:	Waqar Azeem
05 Hamari Dastanein:	Prof. Syed Waqarazeem
06 Urdu Dastan-Tahqeeq o Tanqeed:	Qamrul Huda Fareedi
07 Bagh o Bahar:	Mir amman (Ed. Rasheed Hasan Khan)
08 Fasana e ajaib:	Rajab Ali Baigsuroor (Ed. Rasheed Hasan Khan)
09 Sab-ras Ki Tanqeedi Tadveen:	Dr. Humera Jalili

Out come

(1) Student will know about the classics of Urdu prose.
(2) Student will be able to read and understand the text.
(3) Student will learn critical awareness of the text.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*L*	-	*H*	-	*M*	*H*	*M*	*H*	*L*	*L*
CO 2	*M*	*M*	*M*	-	*H*	-	*M*	*M*	*H*	*H*	*M*	*M*
CO3	*L*	*M*	*L*	-	*M*	-	*M*	*M*	*M*	*M*	*M*	*L*

SEMESTER-II
Compulsory Foundation-5A
URD 205(A) : FARSI ZABAN O ADAB

Course Objectives:
(1) To create interest about Persian language & literature.
(2) To teach Persian grammar and remember the basics.
(3) To Equip brief introduction about Sa'di, Hafiz and Iqbal.
(4) To acquire introductory knowledge about Persian literature

Unit -1	**Farsi Zaban o Adab Ki Nash o Numa(Development of Persian Language and Literature) :** Brief history, Ancient Period, Islamic Era, Impact of Arabic, Evolution of Modern Persian Language.
Unit -2	**Farsi Aur Sanskrit KaBahmiRishta(Persian and Sanskrit) :** Zorastrian Period, Avista, Zand, Pahlavi, Persian and Sanskrit, Common Linguistic Features, Analysis
Unit -3	**Farsi Ke Nasri Shahkar (Persian Masterpieces-Prose) :** Introduction, Importance, and Characteristics ofthe following Masterpieces from Persian Prose: Gulistan e Sadi, Ruq-aath e Aalamgir, Akhlaq e Muhsani.
Unit -4	**Farsi Ke Sheri Shahkar(Persian Masterpieces-Poetry) :** Introduction, Importance, and Characteristics ofthe following Masterpieces from Persian Poetry: Shahnama, Deewan e Hafiz, Rubaiyath e Khayyam.
Unit -5	**MathnKaMuthalia, Tafheem o Tashreeh(Study of Text, Explanation):** (1)(Selected Couplets) (2) Deewan e Hafiz (First Five Couplets of the First Ghazal) (3) Gulistan e Sadi (Two Selected Apologues) (4)Omar Khayyam (Two Selected Quatrains) (5) AmeerKhusro (First Five Couplets of the prescribed Ghazal).

Suggested Books:	**Author:**
01 Sukhandan e Fars :	Muhammed Hussain Azad
02 Sherul Ajam:	Shibli Naumani
03 Omar Khayyam :	Syed Sulaiman Nadvi
04 Farsi Adab Ki Mukhtasar Tareen Tareekh:	Dr. Muhammed Riyaz & Dr. Siddiq Shibli
05 Farsi Sher o Adab:	Qazi Abdul Wadood

Course Outcomes:
(1) Student will be able to read, write and understand simple persian sentences.
(2) Acquire Knowledge about the Persian poetic writings of Sa'di, Hafiz and Iqbal.
(3) Student will gain brief awareness of Persian literature.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	-	-	-	-	-	-	*L*	-	-	*M*	-	-
CO 2	-	-	-	-	-	-	*L*	-	-	*L*	-	-
CO3	-	-	-	-	-	-	*L*	-	-	*L*	-	-

SEMESTER-II
Compulsory Foundation-5B
URD 205(B) : FAIZ AHMED FAIZ-KHUSOOSI MUTHALIYA

Course Objectives:

(1) To know about Faiz Ahmed Faiz in detail.
(2) To know the biography of Faiz Ahmed Faiz his era and his literary contributions.
(3) To put special focus on poetry Faiz Ahmed Faiz..

Unit -1	**Faiz Ke Baarey Mein (About the Poet, Faiz Ahmed Faiz) :** Introduction, Biography, Education, Teaching andLearning, Travels abroad, Books, Awards and Felicitations, Demise.
Unit -2	**FaizKaAhd(Contemporary Era of Faiz) :** Introduction, Impact of Two World Wars, Communist Movement, Independence and Partition, Ideology of Faiz.
Unit -3	**AdabiAurSiyasiNazariyath(Literary and Political Thought) :** Communist Ideology, Progressive Movement, Life and Art, Romanticism and Revolution, Critical Essays and Reviews.
Unit -4	**Muntakhab Ghazlein (Selected Ghazals):** Study, Explanation, and Critical appreciation of prescribed Text: (1) Rung Pairahan Ka Khush Boo Zulf Bikhrane Kh Nam (2) Gulon Mein Rung Bhare Baad e Naubahar Chale (3) Donon Jahan Teri Muhabbath Mein Haar Ke
Unit -5	**MuntakhabNazmein(Selected Poems):** Study, Explanation, and Critical appreciation of prescribed Text: (1) Mujh Se Pahli Si Muhabbath... (2) Tanhaayi(3) Subh e Azadi

Suggested Books:

01 Nuskha Ha e Wafa (Anthology) :
02 Meezan (Essays) :
03 Tafheem e Faiz
04 Umr e Guzish taki Kitab:

Author:

Faiz Ahmed Faiz
Faiz Ahmed Faiz

Zafrul Hasan Course Outcomes:

Course Outcomes:
(1) Specialized in the life and contributions of Faiz Ahmed Faiz.
(2) Identify the uniqueness of the poetry of Faiz Ahmed Faiz.
(3) Understanding the salient features of the poetry of Faiz Ahmed Faiz.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*M*	*L*	-	-	-	*M*	*L*	*L*	*L*	*L*	*L*
CO 2	*M*	*H*	-	-	*L*	-	*M*	*H*	*M*	*H*	*H*	*M*
CO3	*H*	*M*	-	-	*L*	-	*M*	*M*	*M*	*M*	*M*	

SEMESTER-II
Compulsory Foundation-5C
URD 205(C) : SULAIMAN ATHER JAWEED-KHUSOOSI MUTHALIYA

Course Objectives:
(1) To know about SulaimanAtherJaweed in detail.
(2) To know the biography of SulaimanAtherJaweedhiscontributions.
(3) To put special focus on writings of SulaimanAtherJaweed: critic, researcher, columnist,poet and prose writer.

Unit -1	**Sulaiman Ather Jaweed, Hayath Aur Shakhsiyath(Sulaiman Ather Jaweed, Life and Personality):** Introduction, Biography, Education, Teaching and Learning, Books, Awards and Felicitations, Demise.
Unit -2	**TanqeedNigari(Literary Cririticism) :** Introduction, Literary Idealogy, Principles of Literary Criticism,Important Topics of Interest, Reviews by his contemporary Writers.
Unit -3	**Tahqeeqi Khidmaath (Literary Research) :** Introduction, Principles of Literary Research, Supervision andGuidance to Research Scholars, Important Topics of Interest, Reviews by his contemporary Writers.
Unit -4	**Shayeri Aur Muraqqa Nigari (Poetry and Portrait Writing):** Poetry-Introduction, Ghazal, Nazm: Anthology "Aangan Aangan Dukh Ke Ped" Critical Appreciation. Portrait Writing-Introduction, Salient Features: Anthology "Bazm e Charaghaan" Critical Appreciation.
Unit -5	**AdabiSahafath Column Nigari(Literary Journalism):** Weekly Columns, Important Topics, Salient Features,Anthology of Selected Columns "Adabi Diary-1" Critical appreciation

Suggested Books:	**Author:**
01 Urdu Shayeri Mein Ishariyath:	SulaimanAtherJaweed
02 Deewan e GhalibKaPahlaSher:	SulaimanAtherJaweed
03 AanganAanganDukhKePed:	SulaimanAtherJaweed
04 Adabi Diary-1 :	SulaimanAtherJaweed
05 Bazm e Charaghaan:	SulaimanAtherJaweed
06 Nazr e Jaweed:	Ed. Prof. MuzaffarShahmiri
07 Ahd e Jawidaan:	Ed. Prof. SattarSahir

Course Outcomes:
(1) Specialized in the life and contributions of SulaimanAtherJaweed
(2) Contributions of SulaimanAtherJaweed as a critic and columnist.
(3) Contributions of SulaimanAtherJaweed as a poet, researcher & writer.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*L*	-	*L*	*L*	*L*	*M*	*L*	*M*	*M*	*L*	*M*	*L*
CO 2	*M*	-	*M*	*H*	*L*	*H*	*M*	*M*	*M*	*M*	*L*	*M*
CO3	*M*	-	*L*	-	*L*	*L*	*M*	*L*	*L*	*M*	*M*	*L*

SEMESTER-II
Elective Foundation-6A
URD 206(A) : RAYALSEEMA MEIN URDU SHER O ADAB

Course Objectives:

(1)To create awareness about the literature written inRayalseema region.
(2)To teach the style of new poets of this region.
(3)To aware the types of prose writers in the area.

Unit -1	**Rayalseema Mein Urdu Sher o Adab (Urdu Poetry & Prose in Rayalseema) :** Introduction- BriefHistorical/Cultural Back ground, Origin and Development of Urdu Poetry in the RayalseemaRegion,Contemporary Scenario.
Unit -2	**Nasr Nigari(Prose) :** Introduction, Brief History- Study and Critical Analysis of prescribed Text: (1) Insha e Haq (Selected Essay): Dr. Abdul HaqKurnooli (Ed. Dr. ZakiraGhouse) (2) Inqilab 1857(Drama): Yusuf Safi (3) Dhancha (Selected Short Story): MahmoodShahid
Unit -3	**Shayeri(Poetry) :** Introduction, Brief History- Study and Critical Analysis of prescribed Text: (1) MakhzanulIrfan (Muntakhab Kalam): Hazrath Shah Kamal II (2) Isbaath (Selected Ghazal): Sagar Jayyedi
Unit -4	**Tahqeeq o Taqeed(Research and Criticism) :** Introduction, Brief History- Study and Critical Analysis ofprescribed Text of the following: (1) Adab Aur Aqdaar: Prof. Sulaiman Ather Jaweed (2) Ibn e Raza Aur Qaseeda Burdah: Dr. Rahi Fidai (3) Wajihuddin Wajdi: Dr. Waheed Kausar
Unit -5	**Tanz o Mizah(Humour and Satire) :** Introduction, Brief History- Study and Critical Analysis of prescribed Text: (1) Aabiley (Selected Poem and Quatrains): Moin Nizami (2) Bil kulliyath (Selected Poem and Ghazal): SiddiqQaisi Qamarnagri

Suggested Books:	**Author:**
01 AdabkaBadaltaMizaj:	Dr. SulaimanAtherJaveed
02 Kadapamein Urdu:	Dr. RahiFidai
03 Wajdi se YaseerTak:	Dr. WaheedKousar
04 Insha e Haq:	Compiled by AnwarulHaq
05 Deccan mein Urdu:	NaseeruddinHashmi
06 Kurnulmein Urdu Sher o AdabAzadikePahle:	Dr. QaisiQamarnagri

Course Outcomes:

(1) Awareness of literature written in Rayalaseema.
(2) Understand the style of new poets of thisregion.
(3) Gain knowledge about two of the pominent prose writers of this area.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*L*	-	*L*	-	*L*	-	*M*	*H*	*L*	*M*	*L*	*L*
CO 2	*M*	-	*L*	-	*L*	-	*M*	*M*	*L*	*M*	*L*	*L*
CO3	*M*	-	*L*	-	*L*	-	*L*	*L*	*L*	*L*	*L*	*L*

SEMESTER-II
Elective Foundation-6B
URD 206(B) : AROOZ AUR BALAGHATH

Course Objectives:
(1) To know the basics of Ilm e Bayan.
(2) To introduce Ilm e Arooz.
(3) To acquire introductory knowledge about the modern forms of Urdu poetry.

Unit -1	**Ilm e Arooz(Urdu Prosody) :** Introduction, Importance and Necessity, Basics of Urdu Prosody, Units of UrduProsody, Metre, Rhyming Words.
Unit -2	**Bahoor(Metres) :** Introduction, Importance and Necessity, Types of Metres, Quatrain Metres, Metres frequently used in Urdu Poetry, Scansion
Unit -3	**Ilm e Bayan (Discourse) :** Introduction, Importance and Necessity, Branches of Discourse: Tash'beeh,Iste;aara, MajazMursal, Kanaya(Simile, Metaphor, Synechdoche, Metonomy.)
Unit -4	**Sana'eLafzi(Rhetorics) :** Introduction, Importance and Necessity, Selected topics: Tajnees, Takreer, Talmee,FouqunNuqath/TahtunNuqath/Riqtha/GhairManqooth.
Unit -5	**Sana'eMa'navi(Rhetorics) :** Introduction, Importance and Necessity, Selected topics: Eeham, Hashv,Laf o Nashr, Mura'athunNazeer.

Suggested Books: **Author:**

01 Dars e Balaghath:	Ed. Shamsur Rahman Faruqi
02 Arooz Aahang Aur Bayan :	Shamsur Rahman Faruqi
03 Balaghath:	Dr. Wahab Ashrafi
04 Funn e Shayeri:	Akhlaq Ahmed Dehlavi

Course Outcomes:
(1) Apply the skills of Ilm e bayan and identifying the phrases in poetry.
(2) Applying Ilm e Arooz skill in poetry.
(3) Build an understanding about the modern genres of Urdu poetry.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*H*	*H*	-	-	-	*H*	*H*	*M*	*L*	*H*	*H*
CO 2	*H*	*H*	*M*	-	-	-	*H*	*H*	*M*	*L*	*H*	*H*
CO3	*H*	*H*	*L*	-	-	-	*H*	*H*	*M*	*L*	*H*	*H*

SEMESTER-II

Audit Course

URD 207 - INSANI AQDAAR AUR MANSABI AKHLAQIYATH (HVPE-II)

Course Objectives:

(1) To cater the knowledge about Professional Ethics.
(2) To know the importance Professional Ethics for a better society.
(3) Awareness of consequences of violating Professional Ethics.

Unit -1	**Value Education:** Definition, relevance to present day- Concept of Human Values, Self introspection, Self-esteem. Family values-Components, structure and responsibilities of family- Status of women in family andsociety - Caring for needy and elderly - Time allotment for sharing ideas and concerns.
Unit -2	**Medical Ethics:** Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation toanimals, Ethical issues in relation to health care professionals and patients. Social justice in health care,human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by newbiological technology or knowledge.
Unit -3	**Business Ethics:** Ethical standards of business-Immoral and illegal practices and their solutions. Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses andwork ethics.
Unit -4	**Environmental Ethics:** Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste,Climate change, Energy and population, Justice and environmental health
Unit -5	**Social Ethics:** Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

Suggested Books:

01 A manual of ethics
02 Ethics for Today
03 Maitra,
04 Introduction to Ethics
05 A Manual of Ethics
06 Ethics, Theory and Contemporary Issues:

Author:

John S Mckenzi
Harold H. Titus
S.K: Hindu Ethics
William Lilly
Sinha:
Barbara Mackinnon,
Wadsworth/Thomson Learning, 2001.

Course Outcomes:

(1) Awareness about Professional Ehics and its categorization.
(2) Understand the importance of Professional Ethics in society.
(3) Develop a feeling to become a responsible citizen and a good human being.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1												
CO 2												
CO3												

SEMESTER-III
Core Paper-1
URD 301 : URDU GHAZAL

Objectives

(1) To know about the form and tradition of Urdu Ghazal.
(2) To aware about Dakani Ghazal and poets.
(3) To know about Classiki Ghazal and Jadeed Ghazal

Unit -1	**Urdu Ghazal (Urdu Ghazal) :** Introduction, Characteristics, Art and Technique, Basic Prosody and Rhetoric.
Unit -2	**Urdu Ghazal Ka Aaghaz o Irteqa (Origin and Development of Urdu Ghazal) :** Urdu Ghazal in Deccan,Urdu Ghazal in Delhi, Urdu Ghazal in Lucknow, Aligarh Movement and Urdu Ghazal.
Unit -3	**Classical Ghazlein (Selected Classical Ghazals) :** Study and Critical Analysis of Prescribed Text: (1) Ghazal: Qutub Shah (2) Ghazal: Vali (3) Ghazal: Mir Taqi (4) Ghazal: Mir Dard (5) Ghazal: Ghalib
Unit -4	**Beeswin Sadi Mein Urdu Ghazal (Urdu Ghazal in Twentieth Century) :** Transition period of Urdu Ghazal,Progressive Movement and Urdu Ghazal, Modernism Movement and Urdu Ghazal, Contemporary Urdu Ghazal
Unit -5	**Muntakhab Ghazlein (Selected Ghazals) :** Study and Critical Analysis of Prescribed Text: (1)Ghazal: Shad Azeemabadi (2)Ghazal: Firaq (3) Ghazal: Jigar (4)Ghazal: Majrooh (5)Ghazal: Shahrya

Suggested Books: **Author:**

01 Urdu Ghazal Ma Intekhab:	Dr.Yusuf Hussain Khan
02 Jadeed Ghazal:	Rasheed Ahmed Siddiqui
03 Urdu Ghazal ka Tareekhi Irteqa:	Dr. Ghulam Aasi Rasheedi
04 Urdu Ghazal Goi:	Firaq Gorakhpuri
05 Urdu Ghazal Unniswin Sadi ke Tanazur Mein:	Dr. Jalal Anjum
06 Ekkeeswin Sadimein Urdu Ghazal:	Compiled by Dr. Mansur Khushtar

Course Outcomes:
(1) Knowledge about the forms and tradition of Urdu Ghazal.
(2) Understanding Dakani Ghazal with reference to eminent Dakani poets.
(3) Understanding Classiki Ghazal and Jadeed Ghazal with reference to eminent poets in each category

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*H*	-	*H*	*L*	*H*	*M*	*H*	*M*	*H*	*M*
CO 2	*H*	*H*	*M*	-	*H*	*L*	*H*	*H*	*H*	*M*	*M*	*M*
CO3	*H*	*H*	*H*	-	*H*	-	*H*	*M*	*H*	*M*	*M*	*M*

SEMESTER-III
Core Paper-2
URD 302 : URDU NAZM

Objectives

(1) To understand the forms of Urdu Nazm.
(2) To understand critically the style of famous Urdu poets
(3) To know about the distinctive features of Urdu Nazm

Unit -1	**Urdu Nazm (Urdu Poem) :** Introduction, Characteristics, Art and Technique, Types of Urdu Poem: Paband Nazm, Mu-arra Nazm, Azad Nazm, Nasri Nazm (Meteoric Poem, Blank Verse, Free Verse, Prose Poem).
Unit -2	**Urdu Nazm KaAaghaz o Irteqa (Origin and earlier Development of Urdu Poem) :** Urdu Poem in Deccan, Urdu Poem in North India, Aligarh Movement and Urdu Poem, Patriotism and Social Reform, Anjuman e Punjab, Critical Analysis.
Unit -3	**MuntakhabNazmein(Selected poems) :** Study and Critical Analysis of Prescribed Text: (1)Basanth: Quli Qutub Shah (2) Banjara Nama: Nazeer (3)Barkha Ruth: Hali (4)Khuda Ki San-ath: Ismail Meeruthi (5)Zauq o Shauq: Allama Iqbal.
Unit -4	**Beeswin Sadi Mein Urdu Nazm(Urdu Poem in Twentieth Century) :** Movements and Trends, Halqa Arbab e Zauq, Progressive Movement and Urdu Poem, Modernism Movement and Urdu Poem, Contemporary Urdu Poem.
Unit -5	**Muntakhab Nazmein (Selected Poems) :** Study and Critical Analysis of Prescribed Text: (1) Shakasth e Zindan: Josh (2) Tanhaai: Faiz (3) Haveli: Makhdoom (4) Taj Mahal: Sahir (5) Circus Ka Ghoda: Balraj Komal

Suggested Books:

	Author:
01 Jadeed Urdu Nazm Nazria o Amal:	Aqeel Ahmed Siddiqui
02 Urdu Nazm Aur Uski Qismein:	Sahil Ahmed
03 Urdu Nazm Ki Daryafth:	Hamidi Kashmiri
04 Azad Nazm Urdu Shayeri Mein:	Kanwal Krishan Bali
05 Urdu Mein Nazm e Muarra Aur Azad Nazm:	Dr. Haneef Kaifi
06 Nai Nazm Aur Poora Aadmi:	Saleem Ahmed

Out comes

(1) Understanding the forms of Urdu Nazm.
(2) Critically estimate and explain the art and technique of famous Urdu poets.
(3) Knowledge about the distinctive features Urdu Nazm

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*M*	-	*M*	-	*M*	*M*	*L*	*L*	*M*	*L*
CO 2	*M*	*H*	*M*	-	*M*	-	*M*	*H*	*M*	*L*	*H*	*M*
CO3	*M*	*H*	*M*	-	*M*	-	*L*	*M*	*H*	*L*	*H*	*M*

SEMESTER-III
Generic Elective-3A
URD 303 (A) : URDU NOVEL

Objectives

(1) To create awareness about the classics of Urdu prose.
(2) To read and understand the text.
(3) Analyzing and Critical understanding of the classics.

Unit -1	Afsanavi Adab, Sinf Novel-Taaruf (Fiction-Genre Novel) : Urdu Novel-Introduction, Salient Features and Characteristics, Art and Technique, Origin and Development of Urdu Novel.
Unit -2	**Daur e Awwal (First Generation Urdu Novels) :** Prescribed Text, Introduction and Critical Analysis: (1) Taubath un Nasooh: Deputy Nazeer Ahmed (2) Umrao Jan Ada: Mirza Hadi Ruswa (3) Fasana e Azad-Baab Awwal: Ratan Nath Sarshar (Chapter I).
Unit -3	**TaraqqiPasand Novel (Progressive Urdu Novels) :** Prescribed Text, Introduction and Critical Analysis: (1) GauDaan: Munshi Prem Chand (2) Terhi Lakeer: Ismath Chughtai (3) EkChadarMaili Si: Bedi
Unit -4	**Jadeed Urdu Novel (Modern Urdu Novels) :** Prescribed Text, Introduction and Critical Analysis: (1)AagKa Darya: QurrathulAyneHyder (2)Basthi: IntezarHussain (3)UdasNaslein: Abdullah Hussain
Unit -5	**Ma-aasir Urdu Novel (Contemporary Urdu Novels)** : Prescribed Text, Introduction and Critical Analysis: (1) Fire Area: Ilyas Ahmed Gaddi (2) Numberdar Ka Neela: Syed Muhammed Ashraf (3) Kayi Chand ThaySar e Aasman: Shamsur Rahman Faruqi

Suggested Books:

	Author:
01 Urdu Nvel Ki Tareekh Aur Tanqeed:	Ali Abbas Hussaini
02 Dastan Se Novel Tak:	Ibn e Kanwal
03 Urdu Novel-Aghaz o Irteqa:	Azeemush Shan Siddiqi
04 Biswin Sadi Mein Urdu Novel:	Yusuf Sarmasth
05 Urdu Novel Azadi Ke Baad:	Aslam Azad
06 Nazeer Ahmed Ke Novel, By:	Ashfaq Ahmed Khan
07 Prem Chand Ka Tanqeedi Muthalia, By:	Qamar Raees

Out come

(1) The learner would understand about the mile stones of Urdu Novel.
(2) The learner would understand the technical features of Urdu Novel.
(3) The learner would understand about the Urdu Novel writers.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*H*	*H*	-	*H*	-	*H*	*M*	*H*	*H*	*M*	*M*
CO 2	*H*	*H*	*H*	-	*M*	-	*M*	*L*	*L*	*H*	*M*	*M*
CO3	*H*	*H*	*M*	-	*M*	-	*M*	*M*	*M*	*M*	*L*	*M*

SEMESTER-III
Generic Elective-3B
URD 303(B) : URDU AFSANA

Objectives

(1) To know about the importance and tradition of Urdu Afsana.
(2) To know about era of fiction writer Prem chand.
(3) To know the influence of modern movements and trends on Urdu Afsana

Unit -1	**Afsanavi Adab, Sinf Dastan-Taaruf (Fiction-Genre Dastan) :** Urdu Dastan-Introduction, Salient Features and Characteristics, Art and Technique, Brief history of Urdu Dastan
Unit -2	**TaraqqiPasandAfsana(Progressive Urdu Short Story) :** Introduction and Critical Analysis of Prescribed Text: (1) Kafan: Munshi Prem Chand (2) Hum Wahshi Hain: Krishan Chander (3)Apne Dukh Mujhe Dey Do: Bedi (4) Babu Gopi Nath: Saadath Hasan Munto
Unit -3	**Jadeed Afsana (Modern Urdu Short Story) :** Introduction and Critical Analysis of Prescribed Text: (1) Tamasha Ghar: Iqbal Majeed (2) Masdood Rasthey: Iqbal Mateen (3) Khodu Baba Ka Maqbara: Joginder Paul (4) Radtha Band Hai: Jeelani Bano
Unit -4	**Tajreedi Alamathi Afsana (Sumbolic Urdu Short Story) :** Introduction and Critical Analysis of Prescribed Text: (1)Bijuka: SurenderPrakash (2)Woh: BalrajMenra (3)RethAurSamandar: DevendraIssar(4)RoshanLamhon Ki Saughath: HameedSuharwardi.
Unit -5	**Ma-asir Urdu Afsana (Contemporary Urdu Short Story) :** Introduction and Critical Analysis of Prescribed Text: (1) Ahram Ka Meer Muhasib: Nayyar Masood (2) Der Se Ruki Hui Gaadi: Abdul Samad (3) Nadi: Salam Bin Razzaq (4) Bagh Ka Darwaza: Tariq Chattari

Suggested Books:

	Author:
01 Naya Afsana:	Waqar Azeem
02 Urdu Afsana Riwayath Aur Masa-il:	Ed.Gopi Chand Narang
03 Prem Chand-Kahani Ka Rahnuma:	Jaffer Raza
04 Afsaney Ki Himayath Mein:	Shamsur Rahman Faruqi
05 Jadeed Afsany Ka Zahni Safar:	Devendra Issar
06 Alamathi Afsaney KeIblagh Ka Mas-ala:	Shahzad Manzar

Out come

(1) Knowledge about tradition of Urdu Afsana.
(2) Awareness of literary trends and its impact on Urdu Afsana.
(3) Identifying and distinguishing the elements in Urdu Afsana

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*H*	*H*	*L*	-	-	*H*	*H*	*M*	*M*	*H*	*M*
CO 2	*H*	*H*	*H*	-	-	-	*M*	*H*	*M*	*M*	*H*	*L*
CO3	*M*	*M*	*H*	-	-	-	*L*	*M*	*L*	*M*	*M*	*L*

SEMESTER-III
Generic Elective-3C
URD 303(C) : BUNIYADI COMPUTER COURSE: URDU DTP

Course Objectives:
(1) To know about the history of computer.
(2) To know about the various urdu soft wares of Computer.
(3) Knowledge about Urdu DTP.

Unit -1	**Computer Ka Aaghaz o Irteqa (Begining and Development of Computer) :** Introduction, Brief History, Basic Terminology of Computers, In put/Out put/Operating System.
Unit -2	**Computer KaIste'mal (Using a Computer) :** Start, Shut down, Windows, Internet.
Unit -3	**Zaroori Soft Ware (Important Soft Wares) :** MS Office, Photo Shop, Coral Draw.
Unit -4	**Urdu DTP (DTP in Urdu) :** Introduction, Brief History of Urdu DTP, Introduction to In-Page Urdu Soft Ware, Using In-Page Urdu, Basic Points, Use of Urdu in MS Word.
Unit -5	**Urdu Aur Internet (Internet and Urdu) :** Introduction and Brief History of Internet, Using Internet, Basic information, Usage of Urdu in Internet.

Suggested Books: **Author:**

01 Computer Hardware Guide:	Nayeem Ahsan
02 Ibtedai Computer Training Course:	Nayeem Ahsan
03 Computer Hardware Guide:	Mohd. Muneer Quresi
04 Mukammal Computer Training Guide:	Shafqath Ali
05 Computer Master Guide:	Jawad Ahmed Bhatti
06 Urdu Zaban Ke Naye Takneeki Wasail Aur Imkanath:	Dr. Khaja Ikram

Course Outcomes:
(1) The learner would understand about the history of computer.
(2) The learner would understand the technical features of Urdu computer.
(3) The learner would understand about the Urdu DTP.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	-	-	*L*	*H*	-	*H*	-	-	-	-	-	-
CO 2	-	-	*L*	*H*	-	*H*	-	-	-	-	-	-
CO3	-	-	*L*	*H*	-	*H*	-	-	-	-	-	-

SEMESTER-III
Generic Elective-3D
URD 303(D) : URDU KHUD NAVISHTH

Course Objectives:

(1) To know the tradition and techniques of Urdu Khudn vaisht.
(2) To know the difference between biography and auto biography.
(3) To critically analyze the biographies of 2 eminent literary persons.

Unit -1	**Khud Navishth, Ta'aruf (Auto Biography, an introduction) :** Brief History, Art and Technique, Important Features and Characteristics, Differnce between Biography and Auto Biography.
Unit -2	**Urdu Khud Navishth, Aaghaz o Irteqa (Origin and Development of Urdu Auto Biography) :** Brief history of Auto Biography in Urdu, Important Writers.
Unit -3	**Deewan Singh Maftoon (Deewan Singh Maftoon) :** Introduction and Brief Life sketch of the Writer, Book "Na Qabil e Faramosh" (Chapter: Mehnath Aur Kamyabi) Study and Critical appreciation
Unit -4	**Josh Maleehabadi (Josh Maleehabadi) :** Introduction and Brief Life sketch of the Writer, Book"Yadon Ki Baraath" (Chapter: I) Study and Critical appreciation.
Unit -5	**Aal e Ahmed Suroor (Prof. A.A.Suroor) :** Introduction and Brief Life sketch of the Writer, Book"Khwab Baqi Hein" (Chapter: I) Study and Critical appreciation

Suggested Books:

	Author:
01 Na Qabil e Faramoosh:	Deewan Singh Maftoon
02 Yadon ki Baraat:	Josh Maleeh Aabadi
03 Khwab Baqi Hain:	Aal Ahmed Suroor
04 Urdu Mein Khud Navisht Sawaneh Hayat:	Dr. Sabiha Anwar
05 Urdu Mein Fan-e-Sawaneh Nigari ka Irteqa:	Dr. Mumtaz Fakhira:

Course Outcomes:

(1) Knowledge about the tradition of Urdu Khud navisht.
(2) Distinguish between biography and auto biography.
(3) Understand critically the salient features of 2 Urdu biographies :Yadon ki Baraat and Khwab Baqi Hain.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*H*	*M*	-	*M*	*L*	*H*	*M*	*M*	*H*	*M*	*L*
CO 2	*M*	*H*	*M*	-	*M*	*L*	*H*	*L*	*M*	*M*	*M*	*M*
CO3	*H*	*H*	*M*	-	*M*	-	*H*	*M*	*L*	*H*	*L*	*L*

SEMESTER-III
Skill Oriented Course
URD 304 : SAHAFATH AUR ZARA E IBLAGH

Course Objectives:
(1) To know about the importance, aims and objectives of the Journalism.
(2) To know the tradition of Mass Media in urdu language
(3) To aware the students about the prospects of Urdu Mass Media.

Unit -1	**Sahafath Aur Zara e Iblagh (Journalism and Media) :** Introduction- Importance and Role of Media, Brief History of Urdu Media: Urdu Journalism, Radio, Film and T.V, Modern Media.
Unit -2	**Urdu Sahafath (Urdu Journalism) :** Art and Technique- Editorial, Report, Interview, Column writing.
Unit -3	**Radio Nashriyath (Radio Broadcasting) :** Art and Technique- Radio Script, News, Commentary, Radio Talk, Feature, Drama, Debate.
Unit -4	**Film Aur Television (Film And Television**) : Art and Technique- Script, Screen Play, Dialogue, Lyrics, Serials, News, Drama, Debate.
Unit -5	**Jadeed Zara e Iblagh (Modern Media and Net work)** : Introduction- Modern Media Net work and Urdu: Internet, YouTube, e-mail, Face Book, Whatsapp, Twitter, Instagram, Telegram.

Suggested Books: **Author:**

01 Urdu Sahafath Unneeswin Sadi Mein:	Dr. Taher Masood
02 Urdu SahafathCompiled by:	Anwar Ali Dehalvi
03 Funn e Sahafath:	Prof. Zahooruddin
04 Iblag hiyath:	Dr. Mohd. Shahid Husain
05 Urdu Radio Aur Television Mein Tarseel o Iblagh Ki Zaban:	Dr. Kamal Ahmed Siddiqi

Course Outcomes:
(1) The learner will know about the aims and objectives of the Journalism.
(2) Distinguish between writings of news paper, radio and television.
(3) The learner will know about the different fields of Urdu journalism.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*L*	*L*	*M*	*H*	-	*H*	-	*L*	*L*	-	-	-
CO 2	*L*	*M*	*M*	*H*	-	*H*	-	*L*	*L*	-	-	-
CO3	*L*	*M*	*M*	*H*	-	*H*	-	-	*L*	-	-	-

SEMESTER-III
Open Elective-5A
URD 305(A) : JADEED DAKANI SHAYERI

Course Objectives:

(1) To know about the Jadeed Dakani Shairi.
(2) To know about eminent poets of Jadeed Dakani
(3) To know the salient features of the poets of Jadeed Dakani

Unit -1	**Sulaiman Khateeb (Sulaiman Khateeb) :** Introduction, Life Sketch of the Poet, Study and Critical analysis of the following Poems: (1) Chhora Chhori (2) Saas Bahoo,
Unit -2	Ghulam Sarwar Danda (Ghulam Sarwar Danda) : Introduction, Life Sketch of the Poet, Study and Critical analysis of the following Poems: (1) Janta Ki Arzi (2) Idey Na Ma
Unit -3	Gilli Nalgondavi (Gilli Nalgodavi) : Introduction, Life Sketch of the Poet, Study and Critical analysis of the following Poems: (1) Fashionable Wife (2) Begum Sanbhal Ko Baitho
Unit -4	Moin Nizami (Moin Nizami) : Introduction, Life Sketch of the Poet, Study and Critical analysis of the following Poems: (1) Clerc (2) Mera Potta
Unit -5	Talib Khundmiri (Talib Khundmiri) : Introduction, Life Sketch of the Poet, Study and Critical analysis of the following Poems: (1) Iblees Ka Ai'teraf (2) Ghalib Haseenon Ke Jhurmut Mein

Suggested Books: **Author:**

01 Kewde Ka Ban: Sulaiman Khateeb
02 Imli Ban: Sarwar Danda
03 Aabiley: Moin Nizami (Ed. Dr. Kareem Rumani)

Course Outcomes:

(1) Knowledge about Jadeed Dakani Shairi.
(2) Understand Jadeed Dakani Shairi and its vocabulary and diction.
(3) Critical awareness about 5 eminent poets of Jadeed Dakani.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*M*	*L*	-	*H*	-	*M*	*H*	*M*	*M*	*L*	*L*
CO 2	*H*	*L*	*M*	-	*M*	-	*M*	*M*	*M*	-	*L*	-
CO3	*M*	*M*	*L*	-	*M*	-	*M*	*M*	*L*	-	*L*	-

SEMESTER-III
Open Elective-5B
URD 305(B) : URDU TARJUMA NIGARI

Course Objectives:
(1) To teach the techniques and types of translation.
(2) To know about the basic issues of translation.
(3) To know about the tradition of Urdu translation and some important literary translations.

Unit -1	**Tarjuma Ka Fann Aur Takneek (Art and Technique of Translation) :** Introduction, Importance and necessity, Art and Technique, Principles and Theories
Unit -2	**Tarjuma Ki Aqsaam (Types of Translation) :** Introduction, Literal and Free Translation, Re-creation, Full and Partial Translation, Inter lingual and Intra lingual Translation, Transliteration
Unit -3	**Tarjuma Ke Masa'il (Challenges in Translation) :** Introduction, Ambiguity, Translation of Terminology, Challenges in Translation of Knowledge, Theological and Literary Texts
Unit -4	**Urdu Mein Tarjuma Nigari Ki Riwayath (History of Translation works in Urdu) :** Introduction, Earlier Urdu Translations, Translation of Theological, Technical and Literary Texts in Urdu, Services of Fort William College, Delhi College and Translation Division of Jamia Osmania
Unit -5	**Urdu Mein Adabi Tarajum(Literary Translations in Urdu) :** Introduction, Translations of Arabic and Persian Literature in Urdu, Important Translators: Translations of English Literature in Urdu, Important Translators.

Suggested Books:
01 Tarjume Ka Fun Aur Riwayat:
02 Fun e Tarjuma Nigari:
03 Usool e Waz e Istilahat:
04 Daruttar juma Osmania Ki Ilmi Aur Adabi Khidmaath:

Author:
Ed. Prof. Qamar Rayees
Ed. Dr. Khaleeq Anjum
WahiduddinSaleem
Dr. Mujeebul Islam

Course Outcomes:
(1) Knowledge about types, techniques and issues of translation.
(2) Distinguish between various types of translations.
(3) Understand the tradition of Urdu translation and literary translation

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*L*	*L*	*H*	-	*M*	-	*L*	-	-	*M*	*M*
CO 2	*L*	*L*	*L*	*H*	-	*H*	-	*L*	-	-	*M*	*M*
CO3	*L*	*L*	*L*	*M*	-	*M*	-	-	-	-	*L*	*M*

SEMESTER-IV
Core Paper-1
URD 401 : URDU LISANIYATH

Objectives

(1) To know the basics of linguistics.
(2) To provide the knowledge about the ancient and modern Indo Aryan languages.
(3) To bring the detailed study about the origin and evolution ofUrdu language.

Unit -1	**Ilm e Zaban (Linguistics) :** Introduction, Salient Features, Different Types, Language and Dialect, Rules of Standard Language
Unit -2	**Sauthiyath(Phoenitics) :** Introduction, Pronounciation, Consonents, Vowels, Classification of Urdu Phoenitics.
Unit -3	**Fonimiyath (Phonology) :** Introduction, Phoenitics and Phoenym, Identification Methods of Phoenym,Urdu Phoenym.
Unit -4	**Marfimiyath (Sarf) AurNahv (Morphology and Syntax) :** Introduction to Morphology, Different Types,Word and Types of Word, Scope of Morphology and Syntax : Introduction to Syntax, Types of Sentences,Transformation.
Unit -5	**Ma-niyath(Semantics) :** Introduction to Semantics, Different Types, Relation between Sound and Meaning, Development of Meaning, Polysemantics, Synonymy, Rules of Semantics.

Suggested Books: **Author:**

01 Aam Lishniyath:	Prof. Gyan Chand Jain
02 Urdu Lisaniyath:	Dr. Shaukath Sabzwari
03 Urdu Lisaniyath:	Naseer Ahmed Khan
04 Urdu Saakht Ke Buniyadi Anasir:	Naseer Ahmed Khan
05 Urdu Zaban Ka Lisaniyathi Tajziya:	Shamshad zaidi
06 Urdu Lafz Ka Sautiyathi Muthalia:	Masood Hussain Khan
07 Lisani Muthaliye:	Dr. Gyan Chand jain

Course Outcomes:
(1) Knowledge of Basic Linguistics.
(2) Awareness about ancient and modern Indo-Aryan languages.
(3) Command over origin and evolution of Urdu language.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	-	*L*	-	-	-	-	-	-	*L*	-	-	-
CO 2	-	*M*	-	-	-	-	-	-	-	-	-	-
CO3	*L*	*H*	*L*	-	*M*	-	*M*	-	*L*	-	-	-

SEMESTER-IV
Core Paper-2
URD 402 : URDU TAHQEEQ

Objectives

(1) To know about the research in Urdu language and literature.
(2) To know about the choosing research topic, collection of material and sketch the research work.
(3) To know how to write research paper.

Unit -1	**Tahqeeq, Muhaqqiq Aur Tahqeeqi Maqala (Research. Researcher and Thesis) :** Introduction to Literqry Research, Types of Research, Relations between Research Scholar and Guide, Types of Theses, Elements of Research Thesis
Unit -2	**Usool e Tahqeeq(Methodology) :** Introduction, Basic Principles of Literary Research, Methodology, Editing of Text, Sources, Interviews
Unit -3	**Urdu Mein TahqeeqKaIrteqa(Development of Literary research in Urdu) :** Introduction, Impact of Aligarh Movement: Introduction, Life Sketch and Literary Services of the following Scholars: (1) Sir Syed (2) Muhammed Hussain Azad (3)Maulana Hali (4)Shibli Naumani
Unit -4	**BeeswinSadi Mein Urdu Tahqeeq(Literary Research in Urdu during Twentieth Century):** Introduction, Life Sketch and Literary Services of the following Scholars: (1) Maulvi Abdul Haq (2) Naseeruddin Hashmi (3) Muhiuddin Qadri Zor (4) Imtiaz Ali Arshi
Unit -5	**Ma-asir Urdu Tahqeeq(Contemporary Literary Research in Urdu) :** Introduction, Life Sketch and Literary Services of the following Scholars: (1) Rasheed Hasan Khan (2) Gyan Chand jain (3) Jameel Jalibi (4) Muhammed Ali Asar

Suggested Books: **Author:**

01 Adabi Tahqeeq.Masa-il AurTajziya:	RsheedHsan Khan
02 Tadveen, Tahqeq, Riwayath:	RsheedHsan Khan
03 Tahqeeq Ka Fann:	Gyan Chand
04 Tahqeeq o Tadveen:	Dd. Ibn e Kanwal
05 Meezan e Tahqeeq:	Muhammed Akmal
06 Azadi Se Qabl Urdu Tahqeeq:	Muhammed Akmal

Out comes

(1) Knowledge about research, types of research and method of research.
(2) Distinguish between various types of research writings.
(3) Capable for selection of topic, material collection, designing the research work and writing research paper.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*H*	-	-	-	*M*	-	*M*	*L*	*H*	*M*
CO 2	*M*	*M*	*H*	-	-	-	*L*	*L*	*L*	-	*M*	*M*
CO3	*L*	*M*	*H*	-	-	-	*L*	*L*	*L*	-	*H*	*M*

SEMESTER-IV

Generic Elective-3A

URD 403(A) : URDU TANQEED

Objectives

(1) To know the definition, aims and objectives and importance of iterary criticism.
(2) To know about the contributions of pioneers of Urdu criticism.
(3) To awareness of some schools of criticism: Tasurati, Nafsiyati,Marksi, Scientific, Sakhtiyati and sloobiyati.

Unit -1	**TanqeedKaMafhoomTaaruf(Literary Criticism) :** Introduction, Characteristics, Significance, Importance, Essential Characteristics of a Literary

	Critic , Pros and Cons: Literary Research and Criticism.
Unit -2	**Urdu Mein Tanqeed(Literary Criticism in Urdu) :** Introduction, Origin and Development, Earlier Period, Tazkirey, Important Anthologies of Urdu Poets, Importantant Poet Critics of Anthologies
Unit -3	**Urdu Tanqeed Ki Ba-zabithaRiwayath(Foundation of New Urdu Literary Criticism) :** Introduction, LiteraryCritical approach of Hali and ShibliNaumani.
Unit -4	**TanqeedKeDabistan(Schools of Literary Criticism) :** Introduction, Salient Features and Characteristics of the following Schools of Literary Criticism: (1) Impressionistic (2) Aesthetic (3) Marxist (4) Sceintific (5)Psychological Schools of Literary Criticism.
Unit -5	**AhamNaqideen(Important Literary Critics) :** Introduction, Life Sketch, Literary Services of the following : (1)Abdul RahmanBijnouri (2)Kaleemuddin Ahmed (3)Aal Ahmed Suroor (4)MajnuGorakhpuri (5)ShamsurRahmanFaruqi

Suggested Books:	**Author:**
01 TanqeedAurAmaliTanqeed:	Syed IhteshamHussain
02 NayiTanqeed:	JameelJalibi
03 Urdu Tahqeeq Par EkNazar:	Kaleemuddin Ahmed
04 AdabiTahqeeq o Tanqeed:	Dr. Abu MuhammedSahar
05 Tanqeed Se TahqeeqTak:	Dr. UnwanChishti
06 MashriqiSheriyathAur Urdu Tanqeed Ki Riwayath:	AbulKalamQasmi

Out come

(1) Knowledge about Literary criticism.
(2) Vies and contributions of Hali and Shibli on literary criticism.
(3) Understanding 6 schools of literary criticism.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*H*	-	*M*	*M*	*H*	*H*	*H*	*H*	*M*	*M*
CO 2	*H*	*H*	*H*	-	*M*	*H*	*H*	*H*	*M*	*M*	*H*	*L*
CO3	*H*	*M*	*M*	-	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*L*

SEMESTER-IV

Generic Elective-3B

URD 403(B) : GHAIR AFSANAVI ADAB

Objectives

(1) To know about the tradition of Ghair Afsanavi Adab.
(2) Tradition of Maktoob Nigari,Inshaiya,Khaka and Safarnama.
(3) Reading and understanding critically the text of above forms.

Unit -1	**GhairAfsanaviAdab, SinfMazmoon(Non Fiction-Genre Mazmoon) :** Mazmoon-Introduction, Salient Features and Characteristics, Art and Technique, Origin and Development of Urdu Mazmoon.Study and Critical Analysis of the prescribed Text- Rasm o Riwaj: Sir Syed Ahmed Khan
Unit -2	**GhairAfsanaviAdab, SinfInshaiya(Non Fiction-Genre Essay) :** Inshaiya-Introduction, Salient Features and Characteristics, Art and Technique, Origin and Development of Urdu Inshaiya.Study and Critical Analysis of the prescribed Text- Char Payee :

	Rasheed Ahmed Siddiqi
Unit -3	**GhairAfsanaviAdab, SinfKhaka(Non Fiction-Genre Sketch) :** Khaka-Introduction, Salient Features and Characteristics, Art and Technique, Origin and Development of Urdu Khaka. Study and Critical Analysis of the prescribed Text: Nam Dev Mali : Maulvi Abdul Haq
Unit -4	**GhairAfsanaviAdab, Sinf Safar Nama(Non Fiction-Genre Travelogue) :** Safar Nama-Introduction, Salient Features and Characteristics, Art and Technique, Origin and Development of Urdu Safar Nama.Study and Critical Analysis of the prescribed Text: Japan Chalo Japan Chalo: MujtabaHussain
Unit -5	**GhairAfsanaviAdab, SinfMaktoobNigari(Non Fiction-Letter Writing) :** Maktoob Nigari-Introduction, Salient Features and Characteristics, Origin and Development of Urdu Maktoob Nigari.Study and Critical Analysis of the prescribed Text: Ghubar e Khatir: Maulana Abul Kalam Azad, Maktoob – Habeebur Rahman Khan Sherwani, Dt.16 June 1943.

Suggested Books: **Author:**

01 MazmoonNigari:	AllamaAkhlaq Ahmed Dehlavi
02 Fann e MazmoonNigari:	AftabAzharSiddiqi
03 InshaiyaKeKhad o Khaal:	Vazir Agha
04 Urdu Mein KhakaNigari:	SbiraSayeed
05 AzadiKeBaad Urdu Safar Nama:	Sayeed Ahmed

Out come

(1) Understand the tradition of Ghari Afsanavi Adab and its salient features.
(2) Literary importance of Maktoob Nigare and Inshaiya.
(3) Literary importance of Khaka and Safarnama.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*M*	*M*	*L*	*H*	*M*	*M*	*M*	*M*	*H*	*M*	*M*
CO 2	*H*	*M*	*L*	*L*	*M*	*L*	*L*	*M*	*L*	*M*	*L*	*L*
CO3	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*M*	*L*

SEMESTER-IV

Generic Elective-3C

URD 403(C) : HALI: KHUSOOSI MUTHALIYA

Course Objectives:

(1) To know about the importance of contributions of Altaf Husain Hali.
(2) Biography of Hali - Detailed study of Musadassas&Muqadamma e Sher of Shayeri.
(3) The style of Maqalat e Hali and biography writing

Unit -1	**Hali: Hayat aurShaksiyath(Hali: Life and Personality) :** Lineage, Birth, Education, Professional Services, Literary and Social Reform Services, Main Characteristics of Hali's Personality, Writings, Demise.
Unit -2	**AdabiAurIslahiNazariyath(Literary and Reformist Concepts of Hali) :** Impact of Shaiftha, Ghalib and Sir Syed, Aligarh Movement, Educational and Literary Reform, Poetry and Literary Criticism.
Unit -3	**Hali Ki Shayeri(Poetry of Hali) :** Introduction, Estimate as a Major Poet, Art of Hali, Salient Features and Characteristics, Magnum Opus "Musaddas e Hali" Critical Appreciation
Unit -4	**Hali Ki TanqeedNigari(Literary Criticism of Hali) :** Introduction, Estimate as the First Literary Critic in Urdu,Views on Art and Literature, Impact of Sir Syed's Idealogy on Literature, Salient Features and Characteristics, Magnum

	Opus "Muqaddama Sher o Shayeri" Critical Appreciation.
Unit -5	**Hali Ki SawanehNigari(Biographical writings of Hali) :** Introduction, Salient Features and Characteristics, Magnum Opus "Yadgar e Ghalib" Critical Appreciation

Suggested Books: **Author:**

01 Yadgar e Hali:	SalehaAbidHussain
02 Hali Meri Nazar Mein :	KhajaGhulamusSyedain
03 Hali Ba'Haisiyath e Shayer:	Shuja'ath Ali Sindelavi
04 Musaddas Madd o Jazr e Islam:	KhajaAltafHussainHali
05 Muqadam e Sher o Shairi:	KhajaAltafHussainHali
06 Yaadgar e Ghalib:	KhajaAltafHussainHali

Course Outcomes:

(1) Understand the literary contributions of Altaf Husain Hali.
(2) Importance and salient features of Mussadas, Muqaddama & Maqalat.
(3) Understand the writing style of Hali as a biographer

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*M*	*M*	*L*	-	*H*	-	*H*	*M*	*M*	*M*	*M*	*L*
CO 2	*H*	*M*	*M*	-	*M*	-	*M*	*L*	*M*	*M*	*H*	*L*
CO3	*L*	*L*	*L*	-	*L*	-	-	*L*	-	*M*	*M*	-

SEMESTER-IV

Generic Elective-3D

URD 403(D) : KLASEEKI URDU GHAZAL

Course Objectives:

(1) To know about the form and tradition of Urdu Ghazal.
(2) To aware about Dakani Ghazal and poets.
(3) To know about Classiki Ghazal and Jadeed Ghazal.

Unit -1	**Ghazal: Ta'reefAurKhusoosiyaath(Ghazal: Definition and Characteristics) :** Introduction, Art and Technique, Conventional Topics, Style, Substance, Literary and Cultural importance of Urdu Ghazal.
Unit -2	**Dakani Ghazal (Ghazal in Deccan) :** Linguistic characterics of Dakani Ghazal, Indi-Islami Cultural Elements, Important Ghazal Poets of Deccan: Quli Qutub Shah, Ghawwasi, Vali Dakani, Siraj Aurangabadi
Unit -3	**Shumal Mein Urdu Ghazal KaAaghaz(Begining of Urdu Ghazal in North India) :** Impact of Vali Dakani, Art and Technique, Conventional Topics, Style, Substance, Trend of Eeham Goi, Important Ghazal Poets :Faa'iz, Aabroo, Jan e Janan, Hatam.
Unit -4	**Dabistan e DehliKeMuntakhabGhazalgoShu'ra(Selected Ghazal Poets of Delhi School)** Mir Taqi Mir, Mir Dard, Mirza Ghalib, Hakeem Momin Khan Momin.
Unit -5	**Dabistan e LucknowKeMuntakhabGhazalgoShu'ra(Selected Ghazal Poets of Lucknow School)** Shaik Imam Bakhsh Nasikh, Ghulam Hamadani Mus'hafi, Khaja Hyder Ali Aatish, Insha-Allah Khan Insha.

Suggested Books:	Author:
01 Urdu Ghazal:	Dr. Yusuf Hussain Khan
02 Urdu Shayeri Par Ek Nazar:	Kaleemuddin Ahmed
03 Urdu Ghazal Ke Aham Mod :	Shamsur Rahman Faruqi
04 Urdu Ghazalgoi:	Firaq Gorakhpuri
05 Ghazal Tanqeed (Vol.1 & Vol.2):	Ed. Usloob Ahmed Ansari:

Course Outcomes:

(1) Knowledge about form and tradition of Urdu Ghazal.
(2) Understanding Dakani Ghazal with reference to 2 Dakani poets.
(3) Understanding Classiki Ghazal and Jadeed Ghazal with reference to 2 poets in each category.

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*M*	-	*M*	*L*	*H*	*M*	*M*	*M*	*L*	*M*
CO 2	*H*	*H*	*M*	-	*H*	-	*H*	*M*	*H*	*M*	*M*	*L*
CO3	*H*	*H*	*M*	-	*H*	-	*H*	*M*	*H*	*M*	*M*	*L*

SEMESTER-IV

Multi Disciplinary Course-4

URD 404 : TELUGU, HINDI AUR ANGREZI ZABAN O ADAB KA TAARUF

Course Objectives:

(1) To aware about the introductory information of language and literature of Telugu, Hindi and English.
(2) Understanding importance of these languages and literature

Unit -1	**Telugu Zaban o Adab Ka Aghaz o Irteqa –Taaruf Aur Jayeza:** Introduction and Study, Origin and Development of Telugu Language and Literature
Unit -2	**Yogi Vemana Ki Shayeri:** (1) Taruf Aur Jayeza (Introduction and Critical Analysis of Yogi Vemana Poetry.) (2) Sri Sri Ki Shayeri:Taruf Aur Jaiza (Introduction and Critical Analysis of Sri Sri Poetry.)
Unit -3	**Hindi Zaban o Adabkaaghaz o Irteqa -TaarufAurJayeza:** Introduction and Study, Origin and Development of Hindi Language and Literature.
Unit -4	**Kabir Das Ki Shayeri: Taruf Aur Jayeza:** (1) Introduction and Critical Analysis of Kabir Das Poetry.) (2) Prem Chand Ki Kahaniyan: Taruf Aur Jayeza (Introduction and Critical Analysis of Short Stories of Prem Chand.). .
Unit -5	**AngreziZaban o AdabkaIrteqa -William Shakespeare KaTaaruf:** Introduction to the Development of English Language and Literature, Introduction to William Shakespeare.

Suggested Books:	Author:
01 Telugu Zaban o Adab:	Prof. Sulaiman Ather Jaweed
02 Hindi Adab Ki Tareekh:	Muhammed Hasan
03 Mukhtasar Tareekh e Angrezi Adab:	Muhammed Yaseen

Outcomes:
(1) Able to know the history and trends of Telugu, Hindi and English languages.
(2) Gain the comparative knowledge of various languages and their literature

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	-	-	*M*	-	-	*M*	*M*	-	*M*	*H*	*M*	*M*
CO 2	-	-	*M*	-	-	*M*	*M*	-	*M*	*H*	*M*	*M*

SEMESTER-IV
Open Elective-5A
URD 405(A) : SIR SYED AHMED KHAN: KHUSOOSI MUTHALIYA

Course Objectives:
(1) To know about Sir Syed Ahmed Khan in detail.
(2) To know the biography of Sir Syed Ahmed Khan and his literary contributions.
(3) His contributions as a educationist and his literary friends.

Unit -1	**Sir Syed Ahmed Khan:Hayat aurShaksiath(Sir Syed Ahmed Khan: Life and Personality)** Lineage, birth, education, youth, Sir Syed and Mutiny 1857, Main Characteristics of Sir Syed's Personality.
Unit -2	**Sir Syed kaTasawwureTaleem(Sir Syed's Concept of Education) :** Sir Syed's Educational Concepts-Mohammedan Anglo Oriental College, Scientifi Society, Aligarh Muslim University.
Unit -3	**Afkar e Sir Syed (Thoughts of Sir Syed) :** Religious Thoughts, Political Thoughts, Journalistic Thoughts, Sir Syed and Greatness of Women
Unit -4	**Sir Syed: Urdu Zaban o Adab(Sir Syed: Urdu Language and Literature) :** Sir Syed's participation in development of Urdu Language and Literature, Beginning of Modern Prose, Urdu Poetry and Sir Syed's Part, Letters of Sir Syed College, Delhi College and Translation Division of Jamia Osmania
Unit -5	**Sir Syed Ki MuntakhabTahreerein(Selected writings of Sir Syed) :** Study, Summary, and Critical Analysis of the prescribed Text: (1) Essay: Bahs o Takrar (2)Essay: Ummeed Ki Khushi.

Suggested Books:

	Author:
01 Inte Khab e Mazameen e Sir Syed:	Compiled by Anwar Siddiqui
02 Khutoot e Sir Syed :	Compiled by Dr. Syed Raas Masood
03 Fikr o Nazar-Sir Syed Number:	Aligarh Muslim University
04 Nazr e Sir Syed:	Editor, Tauseef Barelvi
05 Sir Syed Shanasi:	Mujahid Hussain
06 Urdu Sahafat Aur Sir Syed Ahmed Khan:	Abdul Hai
07 Sir Syed Aur Aligarh Tehreek:	Prof. Khaleeq Ahmed Nizami

Course Outcomes:
(1) Specialized in the contributions of Sir Syed Ahmed Khan.
(2) Contributions of Sir Syed Ahmed Khan, as literary person and as a educationist.
(3) Understanding the contributions of his literary friends

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*M*	-	*M*	-	*H*	*M*	*M*	*H*	*H*	*H*
CO 2	*H*	*M*	*M*	-	*M*	-	*H*	*H*	*L*	*H*	*M*	*M*
CO3	*M*	*M*	*M*	-	*M*	-	*M*	*L*	*L*	*M*	*M*	*L*

SEMESTER-IV

Open Elective-5B

URD 405(B) : ALLAMA IQBAL: KHUSOOSI MUTHALIYA

Course Objectives:
(1) To know about Sir Mohammed Iqbal in detail.
(2) To know the biography of Sir Mohammed Iqbal and his literary contributions.
(3) To put special focus on his poetry with reference to Bal e Jibreel.

Unit -1	**Allama Iqbal: Hayat aur Shakhsiyath (Allama Iqbal: Life and Personality) :** Lineage, Birth, Education, Youth, Education in Europe, Profession, Main Characteristics of Iqbal's Personality, Literary and Intellectual Characteristics, Demise.
Unit -2	**Fikr o Funn(Art and Thought) :** Basic elements of Thought, Hypothesis of Self Esteem, Character of Exemplary Believer, Metaphor of Falcon, Criticism on Western Philosophy, Regaining of Eastern and Islamic Grandeur
Unit -3	**AllamaIqbal Ki Shayeri(Poetry of AllamaIqbal) :** Introduction, Poems, Ghazals, Other Poetic Genres, Art and Technique, Topics, Grand Style, Critical Appreciation of AllamaIqbal as a Poet.
Unit -4	**Ghazlein(Ghazals: AllamaIqbal) :** Study, and Explaination of First FIVE Ghazals from the Poetical Collection "Baal e Jibreel"
Unit -5	**Nazmein(Poems: AllamaIqbal) :** Study, and Explaination of the following Poems: (1) Zauq o Shauq(2) Masjid e Qartaba(3) SaqiNama..

Suggested Books: **Author:**

01 Kulliyath e Iqbal:	Pub. Educational Book House, Delhi
02 Sharah Kulliyath e Iqbal:	Ed. Yusuf Saleem Chishti
03 Afkaar e Iqbal:	M.A.Salam Khan
04 Iqbal, Shayer Aur Mufakkir:	Prof. Noorul Hasan Naqvi
05 Iqbal, Ma-vara e Dair o Haram:	Prof. Sulaiman Ather Jaweed

Course Outcomes:
(1) Specialized in the contributions of Sir Mohammed Iqbal.
(2) Contributions of Allama Iqbal with reference to Bal e Jibreel.
(3) Understanding the poetic genius of Allama Iqbal..

PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*
CO1	*H*	*H*	*M*	-	*M*	-	*H*	*H*	*M*	*H*	*H*	*L*
CO 2	*M*	*L*	*M*	-	*M*	-	*L*	*M*	-	*H*	*M*	*L*
CO3	*H*	*M*	*M*	-	*M*	-	*H*	*M*	*M*	*H*	*M*	*L*

DEPARTMENT OF ANTHROPOLOGY

S.V.U. COLLEGE OF SCIENCES

SRI VENKATESWARA UNIVERSITY: TIRUPATI



Revised Syllabus Amended as per National Educational Policy - 2020)

M.Sc. ANTHROPOLOGY (REGULAR) PROGRAMME

ACADEMIC YEAR 2023-24

SYLLABUS

Choice Based Credit System (CBCS)

ANTHROPOLOGY DEPARTMENT :

GENESIS :

The Department of Anthropology came into being in 1971, with the auspices of the former Vice-Chancellor Prof. Dr. D. Jagannadha Reddy. He invited a famous and reputed Anthropologist, Prof. D. P. Mukherjee to run the Department by laying a strong foundation and strengthening different sub-divisions of Anthropology.

PROGRAMMES FOR SPECIAL ASSISTANCE :

The department has been identified by the University Grants Commission, New Delhi for financial assistance through Special Assistant Programme (SAP) in the year 1992. Three phases of the SAP programme has been successfully completed. Students, research scholars and faculty have been actively involved in the research and our contributions were reckoned by the scientific community.

Further the department was also awarded "Special Assistance to Strengthen Infrastructure in Humanities and Social Sciences" (ASIHSS) by the UGC.

In appreciation of this, University Grants Commission, New Delhi has recognized this department as "Centre of Advanced Studies (CAS)" for five years (2013-18) in the Phase-1.

The thrust areas under this programme are: Bio-cultural Perspectives of Health and Disease

Biological dimensions of health and disease

Socio-cultural dimensions of health and disease.

NUMBER OF M.Phil / Ph.Ds PRODUCED :

M.Phils : 15

Ph.Ds : 86

DEPARTMENT HIGHLIGHTS:

The Department has made an immense contribution with respect to the generation of Anthropological knowledge. The only Anthropology department from south India to achieve the "Centre of Advanced Studies (CAS)" for five years (2013-18) in the Phase-1. The Department has been actively engaged in Teaching and research in all branches of Anthropology. The Department has well equipped in terms infrastructural facilities to carryout advanced research in the all the fields of Anthropology. The Department ensures that the syllabus has framed with periodical modifications to meet the emerging needs of the society.

VISION:

- Anthropology is the study of humans and its biological relatives across time and space
- To address the diversity of the human experience in its biological, cultural and historical contexts
- Provide knowledge to analyze and addresses the issues with respect to biological, social and environmental problems.
- Provides the answer to our questions about our self, our past, present and future.
- The study the ability to lower the barrier of peoples ethnocentric news of the world around them.

A degree in Anthropology will give a wide range of skills useful to many job roles, communication, research, problem solving, independent and collaborative work.

MISSION:

- To nurture the students and young researchers with latest knowledge and skills in Anthropology and its subdivisions by enabling them to ensure human welfare and to improve the quality of life of people.
- Committed to produce quality human resources upgrading the quality concerns to realize better employment potential within its disciplinary boundaries.
- To transform the department into a centre of excellence with state-of-art infrastructural facilities and also as a resource centre to provide inputs to young researchers in terms of technology.

About the programme - Courses & Specializations :

The department offers the following courses:

1. M.Sc., with specialization in Biological Anthropology (four semesters of two years duration)
2. M.Sc., with specialization in Social Cultural Anthropology (Four semesters of two years duration)
3. Ph.D., (Full time and Part-Time)

In the first two semesters, the students of the above two specializations will have common courses. In the third and fourth semesters, separate courses of respective specializations are offered.

The P.G. course will have the following components :

Class room teaching, laboratory experiments, practical's in material culture and museum objects, designing research tools, and project work. Fieldwork is mandatory part of M.Sc., Anthropology in both specializations during which the IV Semester students visit rural or tribal areas for 15 days to collect data on specific topics/ issues. Based on this, a dissertation is submitted.

CHOICE BASED CREDIT SYSTEM (CBCS):

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed. Students of this course would be expected to :

- Be able to play leading role in industry, research and the public services;
- Understand and appreciate major public concerns and issues associated with Anthropology

- Have an understanding and grasp of international research environment where the frontiers of knowledge in Anthropology are under research;
- Be able to adapt and respond positively and flexibly to changing circumstances;
- Develop the professional skills and personal attributes to deal with complex issues, both systematically and creatively;
- Have the capacity for individual work and teamwork;
- Be lifelong learners with intellectual and practical skills.

Programme Specific Outcomes (PSOs):

- Understanding culture as the distinguishing phenomenon of human life, and the relationship of human biology and evolution.
- Awareness of human diversity and the ways humans have categorized diversity.
- Knowledge of the significant findings of archaeology, cultural anthropology, and physical anthropology, and familiarity of the important issues in each sub-discipline.
- Knowledge of the history of anthropological thought and its place in modern intellectual history.
- Comprehension of migration, colonialism, and economic integration as significant phenomenon shaping global society.
- Understand the importance of anthropological research in policy making and improving human life.
- They should comprehensively understand the concepts and theories of Biological Anthropology
- They should comprehensively understand the concepts and theories of Social Cultural Anthropology
- They should comprehensively understand the concepts and theories of Archeological Anthropology
- A student of anthropology should be able to relate all the core and elective papers with each other and with overall health of populations
- They should achieve the efficiency in detecting the major or social problems of society/populations.
- They should themselves give research based feasible solutions related any aspect of human life.

Programme Objectives (POs):

- Students of M.Sc. Anthropology should comprehensively understand the concepts and theories of major branches of anthropology i.e. Biological, Social and Archaeological anthropology.
- Students should be familiar with approaches, techniques, methodology and study designs commonly used in anthropological research.
- Awareness on value of anthropological knowledge in contemporary society, and the ability to apply it in solving social issues.
- Learn about conducting population based fieldwork independently in collecting qualitative and quantitative data pertaining to the research work.
- They should be aware of ethical principles and right to privacy and data protection.

Programme Educational Objectives (PEOs):

- Students should be familiar with approaches, techniques, methodology and study designs commonly used in anthropological studies.
- The students will be able to understand and apply the basic concepts like groups, institutions, organization and community in understanding of society and culture
- They will also critically understand the various approaches to understand society and culture be able to understand how the knowledge of anthropology is important for health, business, ecology, psychology, media and public policy.
- To understand the relevance of genetic data bases in human genetic research
- Students will be able to draw genealogies and collect verbal as well as non verbal data. They would be able to prepare questionnaire and schedule to collect information on a specific topic and also organize and take notes in a focus group discussion.
- They will be able to explain the critical concepts of tribe caste, class, gender in understanding of Indian social reality.

Sri Venkateswara University :: Tirupati

DEPARTMENT OF ANTHROPOLOGY

M.Sc., Anthropology Course Scheme of Instruction and Examination

(With effect from 2021-2022)

CHOICE BASED CREDIT SYSTEM Pattern

Semester		Particulars	No. of Credits	Tota l
I		**CORE THEORY**: 1. Introduction to Biological Anthropology 2. Introduction to Social Cultural Anthropology	8	24
		COMPULSARY FOUNDATION :**3 Papers (select any one)** 1. Introduction to Archaeological Anthropology 2. Indian Anthropology 3. Social Problems and Anthropology	4	
		ELECTIVE FOUNDATION: **3 Papers (select any one)** 1.Economic and Political Anthropology 2. Human Ecology 3. Tribal Development in India	4	
		Practical -1 : .Somatometry and Somatoscopy	4	
		Practical – II : Archaeological Anthropology	4	
		Audit Course : Human Values and Professional Ethics - I		
II		**CORE THEORY**: 1.Comparative Ethnography and Indian Anthropology 2. Principles of Genetics	8	24
		COMPULSORY FOUNDATION : **3 Papers (select any one)** 1. Prehistoric India 2. Urban Anthropology 3. 3. Fieldwork Traditions	4	
		ELECTIVE FOUNDATION : **3 Papers (select any one)** 1. Research Methods in Anthropology 2. Biology, Helath and Disease 3. Early Civilizations	4	
		Practical -1 : Doing Ethnography	4	
		Practical -1I : Craniology and Craniometry	4	
		Audit Course : Human Values and Professional Ethics - II		
III	BIOLOGICAL ANTHROPOLO	**CORE THEORY**: 1. Human Evolution and Fossil Evidence 2. Human Genetics	8	24
		GENERIC ELECTIVES : **3 Papers (select any one)** 1. Anthropological Demography 2. Forensic Anthropology 3.	4	

		Epidemiology and Public Health		
		Practicals : 1. Dermatoglyphics and Human Osteometry	4	
		SKILL OREIENTED COURSE : (Theory=50 M + Practical =50M)1. Bio statistics and Computer Applications	4	
		OPEN ELECTIVE: **1 Paper (For others):** 1.Palaeoanthropology 2. Fundamentals of Anthropology	4	
III	SOCIAL CULTURAL ANTHROPOLOGY	**CORE THEORY**: 1. Theories of Culture 2. Social Anthropology of Complex Societies	8	24
		GENERIC ELECTIVES: 3 Papers (select any One): 1. Ecological Anthropology 2. Applied Anthropology- Indigenous Communities 3. Anthropology of Religion-Sacred Complexes In India	4	
		PRACTICAL: 1. Participatory Research Methods in Development Process	4	
		SKILL ORIENTED COURSE : : (Theory=50 M + Practical =50M) **1**. Data Management and Computer Applications	4	
		OPEN ELECTIVE: 1 Paper (For others) : 1.Anthropology and Career Promotion 2. Tribal Studies	4	
IV	BIOLOGICAL ANTHROPOLOGY	**CORE THEORY**: 1. Biological Anthropology 2. Human Population Genetics	8	24
		GENERIC ELECTIVES : 3 Papers (select any one) :1. Human Growth and Physique and Nutrition 2. Applied Biological Anthropology 3. Medical Genetics	4	
		PRACTICALS : 1. Advanced Biological Anthropology	4	
		MULTI DISCIPLINARY COURSE / PROJECT WORK : Field work and Dissertation , Viva-Voce	4	
		OPEN ELECTIVE: 1 Paper (For others): 1.Epidemiology 2. Applied Biological Anthropology	4	
IV	SOCIO CULTURAL	**CORE THEORY**: 1. Structural Anthropology 2. Developmental Anthropology	8	24
		GENERIC ELECTIVES: 3 Papers (select any one) : 1. Medical Anthropology 2. Culture and Management 3. Anthropology of Displaced	4	

		Populations		
		PRACTICALS: 1. Non- Government organizations and Extension studies	4	
		MULTI DISCIPLINARY COURSE / PROJECT WORK : Field work and Dissertation , Viva-Voce	4	
		OPEN ELECTIVE: 1 Paper (For others) :1. Visual Anthropology 2. Environmental Anthropology	4	
Total credits				96
PS: Students can choose extra any number of external electives				

The course of the study and scheme of examination

Semester-I

S.No	Components of study	Title of the Course	Title of the Paper	Credits Hrs/week	No. of Credit	IA Marks	Sem End Exam Marks	Total
1.	Core	1	Introduction to Biological Anthropology	6	4	20	80	100
2.		2	Introduction to Social –Cultural Anthropology	6	4	20	80	100
3.	Compulsory Foundation	3a	Introduction to Archaeological Anthropology	6	4	20	80	100
		3b	Indian Anthropology					
		3c	Social Problems and Anthropology					
4.	Elective Foundation	4a	Economic and Political Anthropology	6	4	20	80	100
		4b	Human Ecology					
		4c	Tribal Development in Inida					
5.	Practical -I	5	Somatometry and Somatoscopy	9	4	--	100	100
6.	Practical – II	6	Archaeological Anthropology	9	4	--	100	100
	Total			**42**	**24**	**80**	**520**	**600**
7.	Audit Course: Human values and professional Ethics-I			0	0	**100**	0	0

Semester-II

S.No	Components of study	Title of the Course	Title of the Paper	Credits Hrs/week	No. of Credit	IA Marks	Sem End Exam Marks	Total
1.	Core	1	Comparative Ethnography and Indian Anthropology	6	4	20	80	100
2.		2	Principles of Genetics	6	4	20	80	100
3.	Compulsory Foundation	3a	Prehistoric India	6	4	20	80	100
		3b	Urban Anthropology					
		3c	Field work Traditions					
4.	Elective Foundation	4a	Research methods in Anthropology	6	4	20	80	100
		4b	Biology, Health and Disease					
		4c	Early Civilizations					
5.	Practical -I	5	Doing Ethnography	9	4	--	100	100
6.	Practical – II	6	Craniology and Craniometry	9	4	--	100	100
	Total			**42**	**24**	**80**	**520**	**600**
7.	Audit Course: Human values and professional Ethics-II			0	0	**100**	0	0

(Specialization- B – Biological Anthropology)

Semester-III

S.No	Components of study	Title of the Course	Title of the Paper	Credits Hrs/week	No. of Credit	IA Marks	Sem End Exam Marks	Total
1.	Core	1	Human Evolution and Fossil Evidence	6	4	20	80	100
2.		2	Human Genetics	6	4	20	80	100
3.	Generic Elective	3a	Anthropological Demography	6	4	20	80	100
		3b	Forensic Anthropology					
		3c	Epidemiology and Public Health					
4.	Practicals	4	Dermatoglyphics and Human Osteometry	9	4	---	100	100
5.	Skill Oriented Course	5	Biostatistics and computer Applications	9 (3+6)	4	10	90 (40+50)	100
6.	Open Elective	6a	Palaeo Anthropology	6	4	20	80	100
		6b	Fundamentals of Anthropology					
	Total			**42**	**24**	**90**	**510**	**600**

Semester-IV

S.No	Components of study	Title of the Course	Title of the Paper	Credits Hrs/week	No. of Credit	IA Marks	Sem End Exam Marks	Total
1.	Core	1	Biological Anthropology	6	4	20	80	100
2.		2	Human Population Genetics	6	4	20	80	100
3.	Generic Elective	3a	Human Growth, Physique and Nutrition	6	4	20	80	100
		3b	Applied Biological Anthropology					
		3c	Medical Genetics					
4.	Practicals	4	Advanced Biological Anthropology	9	4	---	100	100
5.	Multi Disciplinary course/project work	5	Filed work, Dissertation, Viva-Voce	--	4	---	100	100
6.	Open Elective	6a	Epidemiology	6	4	20	80	100
		6b	Applied Biological Anthropology					
	Total			**33**	**24**	**80**	**520**	**600**

(Specialization - B : Social Cultural Anthropology)

Semester-III

S.No	Components of study	Title of the Course	Title of the Paper	Credits Hrs/week	No. of Credit	IA Marks	Sem End Exam Marks	Total
1.	Core	1	Theories of Culture	6	4	20	80	100
2.		2	Social Anthropology of Complex Societies	6	4	20	80	100
3.	Generic Elective	3a	Ecological Anthropology	6	4	20	80	100
		3b	Applied Anthropology- Indigenous communities					
		3c	Anthropology of Religion –Sacred complexes in India					
4.	Practicals	4	Participatory Research Methods in Community Development process	9	4	---	100	100
5.	Skill Oriented Course	5	Data Management and Computer Applications	9 (3+6)	4	10	90 (40+50)	100
6.	Open Elective	6a	Anthropology & Career Promotion	6	4	20	80	100
		6b	Tribal Studies					
	Total			**42**	**24**	**90**	**510**	**600**

Semester-IV

S.No	Components of study	Title of the Course	Title of the Paper	Credits Hrs/week	No. of Credit	IA Marks	Sem End Exam Marks	Total
1.	Core	1	Structural Anthropology	6	4	20	80	100
2.		2	Developmental Anthropology	6	4	20	80	100
3.	Generic Elective	3a	Medical Anthropology	6	4	20	80	100
		3b	Culture and Management					
		3c	Anthropology of Displaced Populations					
4.	Practicals	4	Non-Governmental Organizations and Extension studies	9	4	---	100	100
5.	Multi Disciplinary course/project work	5	Filed work, Dissertation, Viva-Voce	-	4	---	100	100
6.	Open Elective	6a	Visual Anthropology	6	4	20	80	100
		6b	Environmental Anthropology					
	Total			**33**	**24**	**80**	**520**	**600**

M. Sc., Anthropology Syllabus for I , II, III & IV Semesters

(Revised Syllabus Amended as per National Educational Policy - 2020)

(With effect from the batch admitted in the academic year -2021-2022)

CHOICE BASED CREDIT SYSTEM (CBCS)

(First and Second Semesters are common for Specializations (A) Biological Anthropology (B) Social Cultural Anthropology)

SEMESTER – I

ANO : 101 - Core Theory :

INTRODUCTION TO BIOLOGICAL ANTHROPOLOGY

Course Objectives:

1. To understand the scope, relation with other branches and historical development of biological anthropology
2. To study the comparative anatomy of man and Asps
3. To understand human origins and evolution
4. To know about the race, racism and classification of major races.

Unit I: Meaning, Scope of Biological Anthropology. Relations with other Branches of Anthropology and with Biological, Social and Medical Sciences; Its historical development. Man's Place in the Animal Kingdom. Classification of Primates; Salient Feature of Primates; Primate behaviour with special reference to monkeys and apes Comparative Anatomy of Apes and Man

Unit II: Principles of Evolution – Speciation, Irreversibility, Parallelism and Convergence, Adaptive Radiation, Extinction and Theory of Orthogenesis; Theories of Organic Evolution - Lamarckism, Darwinism, Synthetic Theory.

Unit III: Human Origins and Evolution: Fossil Evidence-Pongid and Hominid, Emergence of Man: Evidences, Distribution and Pattern of Australopithecines, Homo erectus, Neandertal, Homo sapiens.

Unit IV: Race, Ethnicity and Populations: Concepts: Race, Racism; Classification of Races – Major Races of the World; Racial Criteria used for Racial Classification - Morphological,

Serological and Genetic; Racial Classification of world population – Hooton, Coon, Garn and Boyd Racial Classification India Populations – Risley, Guha and Sarkar

Course Outcomes:

a. Exposed to the basic concept, meaning and scope of Biological Anthropology
b. Explain how human being acts as the central figure of Anthropology
c. Elucidate the major divisions of Biological/ physical Anthropology
d. Know the inter-relationship between Biological Anthropology and other sciences
e. To know how Man evolved in animal kingdom
f. To understand how evolution has occurred and what are the evidences of evolution and addresses human variation and the causes of variations

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	2	1	--	2	1	--	--	--	--	3
CO_2	3	1	1	---	--	2	2	1	--	--	--	3
CO_3	3	2	2	---	--	2	2	1	1	--	--	3
CO_4	3	2	3	--	--	3	1	2		2	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Buettner-Janusch, J. 1966. Origins of Man: Physical Anthropology. John Wiley & Sons, New York.
2. Buettner-Janusch, 1973. Physical Anthropology: A Perspective. New York: John Wiley and Sons.
3. Chiareelli, A.B. 1973. Evolution of the Primates: An Introduction to the Biology of Man. London: Academic Press.
4. Clark, Le Gross. W. E. 1962. The Antecedents of Man: An Introduction to the Evolution

of the Primates. Edinburgh: Edinburgh University Press.

5. Clark, Le Gross, W. E. 1964. The Fossil Evidences of Human Evolution: An Introduction to the Study of Paleoanthropology. Chicago: University of Chicago Press.
6. Coon, C. S. 1965. The Origin of Races. New York: Alfred A. Knopf.
7. Das, B. M. 1999. Outlines of Physical Anthropology. New Delhi: Kitab Mahal.
8. Dobzhansky, T. 1962. Mankind Evolving: The Evolution of the Human species. New Haven: Yale University Press.
9. Hulse, F. S. 1963. The Human Species: An Introduction to Physical Anthropology. New York: Random House.
10. Montague, A. M. F. 1960. An Introduction to Physical Anthropology. Illinois: Charles C. Thomas Publishers.
11. Montagu, A. M. F. (Ed.). 1964. The Concept of Race. New York: The Free Press of Glencoe.
12. Napier, J. R. and Napier P.H. 1967. A Handbook of Living Primates. New York: Academic Press.
13. Pfeiffer, J.E. 1978. The Emergence of Man. New York: Harper and Row, Publishers.
14. Poirier, Frank, E. 1973. Fossil Man: An Evolutionary Journey. St. Louis: C.V. Mosby Company.
15. Shukla, B. R. K. and Rastogi, S. 2000. Physical anthropology and Human Genetics - An Introduction. Delhi: Palaka Prakashan.
16. Stein P. L. and Row, B. M. 1989. Physical Anthropology. New York: McGraw-Hill Book Company.
17. Turnbaugh, W. A., Nelson, H., Jurmain, R. and Kilgone, L. 1996. Understanding Physical Anthropology and Archaeology. New York: West Publishing House.
18. Weiss, M. L. and Mann, A. E. 1978. Human Biology and Behavior: An Anthropological Perspective. Boston: Little Brown.
19. Relethford, J.H. 2002. An Introduction to Biological Anthropology. Boston: Mc. Graw Hill.
20. Ember,C. Ember,M. and Peregrine,P. 2008 Anthropology (12th Edition] New Delhi:Prentice Hall of India.
21. Jurmain R, L.Kilgore and Trevathan, W 2010 Essentials of Physical Anthropology. [8th Edition New York, Wiley- Blackwell.

ANO : 102 - Core Theory :

INTRODUCTION TO SOCIAL CULTURAL ANTHROPOLOGY

Course Objective :

1. To understand the basics about socio-cultural anthropology: its history, origin, elements and relationship to other branches.
2. To understand the basic concepts like society, culture, Institutions, social organizations and socio stratification.
3. To know the social institutions like family, marriage and kinship
4. To understand the religion, magic, animism, taboo and ancestral worship

Unit I : Social-Cultural Anthropology: Meaning, Scope and Specializations; Basic Approaches: Holistic, Comparative, Historical, Nomothetic and Idiographic; Relationship to History, Psychology, Economics, Sociology, Management, Medical and Nutritional sciences.

Unit II : Basic Concepts: Society, Culture, Community, Association, Institution, Status and Role, Social Structure, Social Organization and Social Stratification.

Unit III : Family, Marriage and Kinship: Definition of Family and Marriage; Rules, Typology; Feminist Perspectives on Family and Marriage; Marriage Rules and Patterns of Marriage in Dravidian Kinship regions (Thomas T. Trautmann); Meaning and Sociological significance of Kinship; Classification of Kin terms; Descent: Rules and Descent groups; Kinship behavior.

Unit IV : Religion and Magic: Definition; Elements of Religion: Religious Beliefs; Ceremony; Ritual and Myth; Animism; Animatism; Taboo; Totemism; Ancestral Worship; Magic and Science; Types (J. Frazer).

Course Outcomes:

a. Exposed to the basic introductory background about Socio-cultural Anthropology, its historical background and relation to other branches
b. Provides knowledge about the entire subject matter of the socio-cultural anthropology as well as its different sub-branches.
c. Exposed to social institutions
d. Know the religion beliefs, rituals and myth

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Management
CO_1	3	2	2	--	--	2	--	--	--	--	--	3
CO_2	3	--	2	1	--	3	--	--	--	--	1	3
CO_3	3	2	3	--	--	3	--	--	--	--	--	3
CO_4	3	2		--	--	3	1	2		2	--	3

High -3, Medium – 2 , Low -1

Recommended Readings :

1. Beals, R. and Hoijer, H. 1971. An Introduction to Anthropology. London: Collier McMillan Company Ltd.
2. Bohannan, Paul. 1963 Social Anthropology. New York: Holt, Rinehart and Winston.
3. Child, A. B. and Child, I. I. 1975. Religion and Magic in the Life of Traditional People. Englewood Cliffs: Prentice-Hall, Inc.
4. Ember, C. R., Ember, M. and Peregrine, P. N. 2002. Anthropology. Delhi: Pearson Education Asia.
5. Evans-Pritchard, E. E. 1965. Theories of Primitive Religion. Oxford: Clarendon Press.
6. Firth, Raymond.1956 Elements of Social Organization. London : Watts and Co.,
7. Fox, Robin. 1971. Kinship and Marriage: An anthropological Perspective. Harmondsworth: Penguin Books.
8. Herskovits, M. J.1959.Cultural Anthropology. New Delhi: Oxford & IBH Publications Co.
9. Hoebel, E.A and Weaver, T. 1979. Anthropology and the Human Experience. New York: McGraw Hill Book Company.
10. Kapadia, K.M. 1971. Marriage and Family in India. Calcutta: Oxford University Press.
11. Kottak, C. P. 1982. Anthropology: The Exploration of Human Diversity. New York: Random House.

12. Lowie, R.H. 1971. Social Organization. London: Routledge and Kegan Paul Ltd.
13. Murdock, G.P. 1965. Social Structure. Illinois: Free Press, Glencoe
14. Radcliffe-Brown, A. R. 1973. Structure and Function in Primitive Society. London: Routledge and Kegan Paul Ltd.
15. Scientific American. 1972. Biology and Culture in Modern Perspective. San Francisco: W. H. Freeman Company.
16. Stephens, W.N. 1963. The Family in Cross-cultural Perspective. New York: Holt, Rinehart and Winston.
17. Trautmann, T. R. 1998. Marriage Rules and Patterns of Marriage in the Dravidian Kinship Region. In. Family, Kinship and Marriage in India. (Ed.). Oberoi, P. New Delhi: Oxford.

ANO : 102 - Core Theory :

INTRODUCTION TO BIOLOGICAL ANTHROPOLOGY

Course Objectives:

5. To understand the scope, relation with other branches and historical development of biological anthropology
6. To study the comparative anatomy of man and Asps
7. To understand human origins and evolution
8. To know about the race, racism and classification of major races.

Unit I: Meaning, Scope of Biological Anthropology. Relations with other Branches of Anthropology and with Biological, Social and Medical Sciences; Its historical development. Man's Place in the Animal Kingdom. Classification of Primates; Salient Feature of Primates; Primate behaviour with special reference to monkeys and apes Comparative Anatomy of Apes and Man

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Unit III: Human Origins and Evolution: Fossil Evidence-Pongid and Hominid, Emergence of Man: Evidences, Distribution and Pattern of Australopithecines, Homo erectus, Neandertal, Homo sapiens.

Unit IV: Race, Ethnicity and Populations: Concepts: Race, Racism; Classification of Races – Major Races of the World; Racial Criteria used for Racial Classification - Morphological, Serological and Genetic; Racial Classification of world population – Hooton, Coon, Garn and Boyd Racial Classification India Populations – Risley, Guha and Sarkar

Course Outcomes:

g. Exposed to the basic concept, meaning and scope of Biological Anthropology
h. Explain how human being acts as the central figure of Anthropology
i. Elucidate the major divisions of Biological/ physical Anthropology
j. Know the inter-relationship between Biological Anthropology and other sciences
k. To know how Man evolved in animal kingdom
l. To understand how evolution has occurred and what are the evidences of evolution

and addresses human variation and the causes of variations

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	2	1	--	2	1	--	--	--	--	3
CO_2	3	1	1	---	--	2	2	1	--	--	--	3
CO_3	3	2	2	---	--	2	2	1	1	--	--	3
CO_4	3	2	3	--	--	3	1	2		2	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

22. Buettner-Janusch, J. 1966. Origins of Man: Physical Anthropology. John Wiley & Sons, New York.
23. Buettner-Janusch, 1973. Physical Anthropology: A Perspective. New York: John Wiley and Sons.
24. Chiareelli, A.B. 1973. Evolution of the Primates: An Introduction to the Biology of Man. London: Academic Press.
25. Clark, Le Gross. W. E. 1962. The Antecedents of Man: An Introduction to the Evolution of the Primates. Edinburgh: Edinburgh University Press.
26. Clark, Le Gross, W. E. 1964. The Fossil Evidences of Human Evolution: An Introduction to the Study of Paleoanthropology. Chicago: University of Chicago Press.
27. Coon, C. S. 1965. The Origin of Races. New York: Alfred A. Knopf.
28. Das, B. M. 1999. Outlines of Physical Anthropology. New Delhi: Kitab Mahal.
29. Dobzhansky, T. 1962. Mankind Evolving: The Evolution of the Human species. New Haven: Yale University Press.
30. Hulse, F. S. 1963. The Human Species: An Introduction to Physical Anthropology. New York: Random House.
31. Montague, A. M. F. 1960. An Introduction to Physical Anthropology. Illinois: Charles C. Thomas Publishers.

32. Montagu, A. M. F. (Ed.). 1964. The Concept of Race. New York: The Free Press of Glencoe.
33. Napier, J. R. and Napier P.H. 1967. A Handbook of Living Primates. New York: Academic Press.
34. Pfeiffer, J.E. 1978. The Emergence of Man. New York: Harper and Row, Publishers.
35. Poirier, Frank, E. 1973. Fossil Man: An Evolutionary Journey. St. Louis: C.V. Mosby Company.
36. Shukla, B. R. K. and Rastogi, S. 2000. Physical anthropology and Human Genetics - An Introduction. Delhi: Palaka Prakashan.
37. Stein P. L. and Row, B. M. 1989. Physical Anthropology. New York: McGraw-Hill Book Company.
38. Turnbaugh, W. A., Nelson, H., Jurmain, R. and Kilgone, L. 1996. Understanding Physical Anthropology and Archaeology. New York: West Publishing House.
39. Weiss, M. L. and Mann, A. E. 1978. Human Biology and Behavior: An Anthropological Perspective. Boston: Little Brown.
40. Relethford, J.H. 2002. An Introduction to Biological Anthropology. Boston: Mc. Graw Hill.
41. Ember,C. Ember,M. and Peregrine,P. 2008 Anthropology (12th Edition] New Delhi:Prentice Hall of India.
42. Jurmain R, L.Kilgore and Trevathan, W 2010 Essentials of Physical Anthropology. [8th Edition New York, Wiley- Blackwell.

ANO : 103 -3(a) – Compulsory foundation :

INTRODUCTION TO ARCHAEOLOGICAL ANTHROPOLOGY

Course Objectives :

1. To make understand meaning, scope, relation to other branches of Archeological anthropology
2. To understand Pleistocene epoch
3. To understand the tool typology and technology
4. To know above different dating methods
5. To know the cultural chronology of Paleolithic, Mesolithic and Neolithic cultures

Unit I: Meaning, definition and scope of archeological anthropology. Relationship to other Branches of Anthropology, Earth Sciences, Physical Sciences, Life Sciences and Social Sciences. Define environmental Archaeology and ethno-archaeology.

Unit II: A Brief Outline on the Origin of Earth and Life and Geological Time Scale. Pleistocene Epoch Chronology; Pleistocene - Holocene Interphase Changes, Tool Typology and Technology. Tool Families: Pebble Tools, Hand Axe-Clever Complex, Flake Tool Complex, Blade Tool Complex, Microliths and Ground and Polished Tools.

Unit III: Dating Methods: Absolute and Relative Dating: Stratigraphy, Dendrochronology, Thermo-luminescence Dating, Pollen Dating, Varve analysis, Uranium Dating, Potassium-Argon Method, and C-14 Dating.

Unit IV: Cultural Chronology - Paleolithic, Salient Features of the Lower, Middle and Upper Palaeolithic Cultures, Mesolithic and Neolithic Cultures and their Artificers.

Course Outcomes:

a. Able to define archaeological anthropology and its branches
b. Understand the geological timescale, tool typology and technology
c. The Course will explain the basic concepts and terminology used in prehistoric archaeology
d. Understand chronological and cultural determinants of Indian and European prehistory

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	--	2	--	2	2	2	--	--	--	--	3
CO_2	3	2	2	1	2	2	2	--	--	--	--	3
CO_3	3	2	1	2	2	2	3	--	--	--	--	3
CO_4	3	2	1	--	--	3	2	--	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Agrawal, D.P. 1982. The Archaeology of India. London: Curzon Press
2. Barnouw, V. 1978. Physical Anthropology and Archaeology. Homewood: The Dorsey Press.
3. Bhattacharya, D. K. 1990. An Outline of Indian Prehistory. Delhi: Palaka Prakashan
4. Bordes, J. 1970. Tools of the O1d and New Stone Age. New York: Natural History Press.
5. Bordes, F. 1968. The Old Stone Age. London: Weidenfeld & Nicholson.
6. Coles, J. M. and Higgs, E. S. The Archaeology of Early Man. London: Faber & Faber.
7. Daniel, G. 1967. The Origins and Growth of Archaeology. London: C.A. Watts & Co.
8. De Terra, H. and Paterson, T. T. 1939. Studies on the Ice Age in India and Associated Human Culture. Washington: Carnegie Institute, Publication No. 499.
9. Hole, F and Heizer, R. F. 1965. An Introduction to Prehistoric Archaeology. New York: Holt, Rinehart and Winston, Inc.
10. Kottak, C. P. 1982. Anthropology: The Exploration of Human Diversity. New York: Random House.
11. Michel, J. W. 1980. Dating Methods in Archaeology. Seminar Press.
12. Oakley, K. P. 1964. Man the Tool Maker. Chicago: University of Chicago Press.
13. Oakley, K. P. 1964. Frameworks for Dating Fossil Man. Chicago: Aldine Publishing Company.
14. Piggot, S. 1950. Prehistoric India. Harmondsworth: Pelican Books.
15. Rami Reddy, V. 1987. Elements of Prehistory. New Delhi: Mittal Publication.
16. Sali, S. A. 1990. Stone Age India. Aurangabad: Shankar Publications.

17. Sankalia, H.D. 1964. Stone Age Tools: Their Techniques, Names and Probable Functions. Poona: Deccan College Series.
18. Sankalia, H. D. New Archaeology - Its Scope and Application to India, Ethnographic and Folk Culture Society
19. Sankalia, H. D. 1974. Prehistory and Prehistory of India and Pakistan. Pune: Deccan College Series.
20. Sankalia, H. D. 1977. New Archaeology: Its Scope and Application to India. (D.N. Majumdar Memorial Lecture 1964) Lucknow: Ethno- graphic and Folk Culture.
21. Scientific American. 1972. Biology and Culture in Modern Perspective. San Francisco: W. H. Freeman Company.
22. Turnbaugh, W. A., Nelson, H., Jurmain, R. and Kilgone, L. 1996. Understanding Physical Anthropology and Archaeology. New York: West Publishing House.
23. Weitz, C. A. 1979. Introduction to Physical Anthropology and Archaeology. Englewood Cliffs: Prentice-Hall, Inc.
24. Zeuner, F. E. 1958. Dating the Past. London: Methuen & Co.

ANO : 103- 3 (b) – Compulsory foundation : INDIAN ANTHROPOLOGY

Course Objectives :

To make understand

1. Unity and diversity in Indian society and culture
2. Basis of traditional Indian social structure and life cycle
3. Different Caste system in India
4. Major contributions of Indian Anthropologists to Anthropology

Unit- I : Unity and diversity in Indian society and culture : linguistic. Polotical , ethnic, communal and religious tensions and conflicts national integration.

Unit-II : Basis of traditional Indian social structure and life cycle: varnasharam dharma, purushartha, village : a part society : Jajmani system

Unit-III : Caste system- definition and criteria of caste system, varna and caste dominant caste Back ward castes and scheduled castes: statutory provisions.

Unit-IV : Major contributions of Indian Anthropologists M. N. Srinivas, S.C. Dube Andre Battlie and L. P. Vidyarthi.

Course Outcomes:

a. Exposed to diversified linguistic, Political , ethnic, communal and religious tensions and conflicts national integration.
b. Understand the social structure and lifecycle patterns of different past societies
c. Understand the caste and varna systems.
d. Learn the major contributions of different Indian Anthropologists to Anthropology

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern toll	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering

					s							
CO_1	3	--	--	--	--	3	3	2	--	2	--	3
CO_2	3	2	--	--	--	3	2	1	--	--	--	3
CO_3	3	1	--	1	--	3	2	1	--	--	--	3
CO_4	3	2	1	--	--	3	2	--	--	2	--	3

High -3, Medium – 2 , Low -1

Recommended Readings :

1. Allchin . B. & Allchin. T. The Rise of civilization in India and Pakistan, Cambridge University Press.
2. Sankalia, H. D. pre and proto History of India and Pakistan, Pune , Deccan college.
3. Karve, Irawathi, Kinship organization in India
4. Karve, Irawathi, Hindhu society – an interpretation.
5. Mandelbaum, D. Society in India
6. Marriot, M, Village Indl: Studies in the Little community.
7. Singh, K. People of India: An Introduction , Calcutta Anthropological survey of India.
8. Vidyarthi, L. P. Scared complex of Kashi, A. Microcosm of Indian civilization, New Delhi, concept publication.
9. Leach, E. R. Aspects of caste in south India, Ceylon and North- West Pakistan.
10. Singer M; when a Great Tradition Modernizes.
11. Srinivas, M. N. Social change in Modern India.
12. Haimendorf, c. Tribes of India the struggle for survival..
13. Singh, K. S. Tribal Society in India.
14. Dube, S. C. India's changing villages.

ANO : 103 3 (c)– Compulsory Foundation : SOCIAL PROBLEMS AND ANTHROPOLOGY

Course Objectives :

1. Aims to understand the ecology, Eco-system and adoptive tendency of the populations in contemporary situations Unity and diversity in Indian society and culture
2. To understand ecological problems
3. To know about peasantry problem and prospects

4. Aims to study urban social problems

. **Unit- I** : Ecology : Basics concepts-Ecosystem, Ecological population , Symbiosis, Niche, adaptation and Homeostasis

Unit-II : Ecological Problems: Shifting Cultivation and Ecological imbalance.

Unit-III : Peasantry : Characteristics of Peasant life. Peasant Upheavals. Indian Peasantry (problem and prospects)

Unit-IV : Urban social problems : Family, Kinship and castes in Indian Peasantry (problem and prospects)

Course Outcomes:

a. Exposed to eco-systems, symbiosis and homeostasis.
b. Know about the shifting cultivation and ecological inbalance
c. Understand the problems and perspectives of Indian peasantry
d. Understand the family, Kinship and caste system in india

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	--	--	--	3	3	2	--	2	--	3
CO_2	3	2	--	--	--	3	2	1	--	--	--	3
CO_3	3	1	--	1	--	3	3	2	--	--	--	3
CO_4	3	2	1	--	--	3	2	--	--	2	--	3

e. High -3, Medium – 2 , Low -1

Recommended Readings :

1. Frake, C. D. 1962. Cultural Ecology and Ethnography. American Anthropologist. 64: 53-60.

2. Harris, M. 1968. The Rise of Anthropological Theory. New York: Thoma Y. Crusell. (Chapter 23. pp. 654-687.
3. Meggars, B. J. 1954. Environmental Limitation to the Development of Culture. American Anthropologist. 56: 801-824.
4. Hardesty, D. L. 1977. Ecological Anthropology. New York: Wiley and Sons.
5. Kothari, A. et al. 1998. Communities and Conservation. New Delhi: Sage Publications.
6. Moran, E. R. 1971. Human Adaptability: An Introduction to Ecological Anthropology. Colorado: Westview Press.
7. Netting, R. Mc, C. 1971. The Ecological Approach in Cultural Study. New York: Addison Wesley Modules in Anthropology. Module – 6 Sand Hill; Road, Menlo Park: Cummings Publishing Company.
8. Odum, E. P. 1991. Fundamentals of Ecology. Delhi: Nataraj Publishers.
9. Fox, Robin. 1971. Kinship and Marriage: An anthropological Perspective. Harmondsworth: Penguin Books.
10. Herskovits, M. J.1959.Cultural Anthropology. New Delhi:
11. Oxford & IBH Publications Co.
12. Hoebel, E.A and Weaver, T. 1979. Anthropology and the Human Experience. New York: McGraw Hill Book Company.
13. Kapadia, K.M. 1971. Marriage and Family in India. Calcutta: Oxford University Press.
    Kottak, C. P. 1982. Anthropology: The Exploration of Human Diversity. New York: Random House
14. Foster, G. M. 1965. Peasant Society and the Image of the Limited Good. American Anthropologist. 63: 293-315.
15. Halperin, R. 1977. Peasant Livelihood: Studies in Economic Anthropology and Cultural Ecology. New York: St. Martins.
16. Redfield, R. 1956. Peasant Society and Culture: An Anthropological Approach to Culture. Chicago: university of Chicago Press.
17. Rudolph, K. and Rudolf, L. 1960. The Political Role of India's Caste Associations. Pacific Affairs Vol. XXXIII No.1
18. Shanin, T. (Ed). 1970. Peasant and Peasant Societies. New York: Penguin Books.

ANO : 104- 4 (a) – Elective Foundation : ECONOMIC AND POLITICAL ANTHROPOLOGY

Course Objectives :

1. Aim to understand the scope and basic concepts of economic anthropology
2. To understand the economic organizations and impact of globalization in traditional societies
3. To know about meaning and scope of political organization and its basic concepts
4. To understand the political systems and local institutions

Unit I: Economic Anthropology: Definition and Scope; Social Framework; Formalist – Substantives Controversy. Basic Concepts: Economic Organization; Concept of Property; Primitive Communism; Division of Labour; Barter; Reciprocity and Redistribution; Ceremonial Exchange; Subsistence Economy and Market Economy.

Unit II: Economic Organization: Types of Traditional Economic Organization: Hunting-Gathering/Fishing/Pastoralism/Horticulture/Shifting/SettledAgriculture;Modernization of Peasant Economics. Globalization and impact of capital penetration in traditional Societies

Unit III: Political Organization: Meaning and Scope; Basic Concepts: Power and Authority; Sanction; Leadership; Law and Customary Law; Cultural background of Law; Laws in Cross-cultural Perspectives: Eskimo Law; Ifugao Law; Nuer Law and Ashanti Law.

Unit IV: Political Systems: Types: Stateless and State Systems; Band; Tribe; Chieftains; Kingship; State: Local Institutions: Panchayats (Traditional and Statutory); Decision by Consensus: F. G. Bailey; Factions: Ralph W. Nicholas.

Course Outcomes:

a. Able to learn meaning and scope of economic anthropology
b. To understand the division of labor by gender and age, exchange of goods and gifts, and to understand the market economy.
c. Able to know the historical background of Political Organization besides types and trends of Political Organization including types like i.e. Band, Tribe, Chiefdoms and State
d. To know the local institutions: panchayats (traditional and statutory)

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	--	2	--	3	2	2	--	2	--	3
CO_2	3	2	1	--	2	3	1	1	--	--	--	3
CO_3	3	--	2	--	--	3	1	2	--	--	--	3
CO_4	3	2	--	--	--	3	--	1	--	1	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Balandier, Georges. 1970. Political Anthropology. pp. 1-12
2. Banton, Michael. (Ed.) 1965. Political System and the Distribution of Power. ASA Monograph 2. London: Tavistock Publications. (pp. 1 - 60)
3. Beals, R. and Hoijer, H. A. 1977. An Introduction to Anthropology New York: Macmillan Publishing Company, Inc.
4. Bohannan, Paul. 1963. Social Anthropology. New York: Holt, Rinehart and Winston
5. David Hocks and Margaret A. Gwynne. 1994. Cultural Anthropology. Harper Collins College Publications, (pp. 207 – 229)
6. Dalton, George1971. Traditional Tribal and Peasant Economies: An Introductory Survey of Economic Anthropology. A Mc Calab Module in Anthropology. An Addison-Wesley Module, Massachusetts: Addison-Wesley publishing Co. Inc.
7. Fried, Morton H.1976. Explorations in Anthropology. New York: Dutton and Dutton Publishing Company.
8. Gould, H. A.1971 Caste and Class: A Comparative View. A Mc Calab Module in Anthropology. Massachusetts: Addison-Wesley Publishing Co. Inc.
9. Herskovits, M.J. 1974. Economic Anthropology. New Delhi: Eurasia Publishing House

(p) Ltd.

10. Hoebel, A. and Weaver, T. 1979. Anthropology and Human Experience. McGraw-Hill Book Company. pp 486–518
11. Keesing, R.M. & Keeling, F.M. 1971. New Perspectives in Cultural Anthropology. New York: Holt, Rinehart and Winston.
12. Kottak, C. P. 1982. Anthropology: The Exploration of Human Diversity. New York: Random House.

ANO : 104 – 4 (b)- Elective Foundation : HUMAN ECOLOGY

Course Objectives :

Students to understand

1. Human ecology definition scope, and types of habitat
2. To understand human variation
3. To know human growth and development
4. Know about genetic adoptation

Unit- I : Human Ecology : Definition , Terms and concepts, Types of Habitat and Scope

Unit-II : Human Variation : Sources and Evidences, Ecological Evaluation and Adaption.

Unit-III : Human Growth, and development: An Environmental Perspective, Reactivity , Eco-Sensitivity, Adaptability of Human organism.

Unit-IV : Genetic Adaption : Differential Fertility and Mortality, Survival Indices, quality of Life and Fitness.

Course Outcomes:

a. Exposed to the various ecological settings of human habitat .
b. Know the ecological evaluation and adaptation.
c. To understand the growth and development in various eco-systems
d. Understand the Differential Fertility and Mortality, Survival Indices, quality of Life and Fitness.

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 development	PO_5 Modern tolls	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	--	--	**	--	3	3	2	--	--	--	3
CO_2	3	1	--	--	--	3	3	1	--	1	--	3

CO_3	3	2	--	--	--	3	3	2	--	2	--	3
CO_4	3	2	--	--	--	3	3	1	--	2	--	3

High -3, Medium – 2 , Low

Recommended Readings :

1. Barth, F. 1956. Ecological Relationships of Ethnic Groups in Swat, Northern Pakistan. American Anthropologist, 58: 79
2. Beals, A. R. 1974. Village Life in South India: Cultural Design and Environmental Variation.Aldine Publishing Company, Chicago.
3. Conklin, H. C. 1954. An Ecological Approach to Shifting Agriculture. Transactions of the New York Academy of Sciences Series 2. 17: 133-142.
4. Fikret B. (Ed.). Common Property Resources: Ecology and Community Based Sustainable Development. London: Belhaven Press - A Division of Printer Publishers. (Chapter 3: Natural Resources: Access Rights-to-Use and Management. Pp. 33-54).
5. Harrison, G. A., Tanner, J. M., Pilbeam, D. R. and Baker, P. T. (Eds.). 1988. Human Biology: An Introduction to Human Evolution, Variation, Growth and Adaptability. Oxford: Oxford University Press.
6. Lewis, R. 2001. Human Genetics: Concepts and Applications. London: McGraw Hill.
7. Little, M. A. and Haas, J. D. 1989. Human Population Biology: A Transdisciplinary Science. New York: Oxford University Press.
8. Nussbaum, Robert L., Mclinnes, Roderick R. and Willard, Huntington F. 2001. Thompson and Thompson's Genetics in Medicine. Philadelphia: W. B. Saunders Company.
9. Schutkowski, H. Berlin 2006 Human Ecology: Bio- Cultural adaptations in human
10. communities-Springer Verlag.
11. Brown D E. 2010 Human Biological Diversity- An introduction to human biology.
12. Barry Bogin, Patterns of Human Growth, 2nd ed. (1991) Cambridge University, London.
13. J.M. Tanner, Growth at Adolescence, 2nd ed. (1962) Oxford ; Blackwell Scientific..
14. Kaushik Bose Concept of Human physical growth and development (03-10-2007) URL No. http://nsdl.niscair.res.in/jspui/handle/123456789/243
15. Harrison, G. A., Tanner, J. M., Pilbeam, D. R. and Baker, P. T. (Eds.). 1988. Human Biology: An Introduction to Human Evolution, Variation, Growth and Adaptability. Oxford: Oxford University Press.
16. Garm, S.M. and Zvishamir. 1958. Methods for Research in Human Growth Charless. C. Thomas publishers, Springfield, Illlinois.
17. Indian Council for Medical Research, 1989. Growth and Physical Development of Indian

infants and children. Tech. Rep. ser.,18. New Delhi.

18. Singh, I.P. and Bhasin, M.K. 1968 Anthropometry, Bharathi Bhavan Delhi.
19. Watson, E.H. and Lowrey, G.H. 1954. Growth and development of children. The year book publishers, Inc. Chicago, pp.296.
20. Nag, M. 1962. Factors Affecting Human Fertility in Non-Industrial Societies: A Cross-Cultural Study. Yale University Publication in Anthropology. No. 66.
21. Swedlund, A. C. and Armelagos, G. J. 1976. Demographic Anthropology. Dubuque: WM. C. Brown Company Publishers.
22. Thomlinson, R. 1976. Population Dynamics: Causes and Consequences of World Demographic Change. New York: Random House.
23. Weiss, K.M. and Ballonoff, P. A. (Eds.). 1975. Demographic Genetics. Pensylvania: Hutchinson & Ross.

ANO : 104 – 4(c)- Elective Foundation : TRIBAL DEVELOPMENT IN INIDA

Course Objective :

Students to understand

1. Concept and Definition of Tribe
2. Tribal Development Administration
3. Constitutional bodies and institutional arrangement for Tribal Development
4. Development Initiatives

To understand the tribal development during pre and post independent period.

Unit- I : Concept and Definition of Tribe : Definition and classification of Tribe; Approaches towards Tribal development during pre and post independent period, Constitutional safeguards for Schedule Tribes; Fifth & Sixth schedules.

Unit-II :Tribal Development Administration : Tribal Sub- Plan- Integrated Tribal Development Agency (ITDA). Modified Area Development Agency(MADA), Cluster, Disperse Tribal Development Plan (DTDP) and Micro project.

Unit-III : Constitutional bodies and institutional arrangement for Tribal Development National Commission for STs, Tribal Advisory Council, Tribal Welfare Department, Tribal Research Institute.

Unit-IV : Development Initiative- Implementation and Impact of R& R Act, PESA and FRA.

Course Outcomes:

a. Exposed to the various constitutional safeguard for schedule tribes.
b. To understand the various tribal sub planes.
c. To know the National Commission for STs, Tribal Advisory Council, Tribal Welfare Department
d. To understand the implementation of developmental initiatives.

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	--	--	1	--	3	2	2	--	--	--	3
CO_2	3	--	--	1	--	3	1	1	--	1	--	3
CO_3	3	--	--	1	--	3	2	2	--	2	--	3
CO_4	3	--	--	1	--	3	2	1	--	2	--	3

High -3, Medium – 2 , Low

Recommended Readings:

1. Aron, Raymond & Levi Strauss. Cultural Dynamics in Approaches to the Science of Socio-economic development (ed) by Peter Lengyel.
2. Vidyarthi L. P.(ed). Applied Anthropology in India.
3. Vidyarthi L. P & B. N. Shay(ed). Applied Anthropology and Development in India.
4. Behura, N. K. and Panigrahi, N. Indian Constitution and the Tribals: Functioning of Fifth Schedule in the state of Orissa.
5. Cassen Robert & Associate (ed) Does Aid work?
6. Cernea, Michael M. Putting people first: Sociological Variables in Rural Development.
7. Chambers, Robert, Rural Development; Putting the Last First.
8. Commission for UNESCO Neitherlands. Cultural Dimension of Development.
9. Mathur, Hari Mohan (ed). Anthropology in the Development Process.
10. Meier, Gerald, M. Leading Issues in Economic Development.
11. Dube, S.C. Modernization & Development: The Search for Alternative Paradigms.
12. Dube, S.C. Cultural Dimensions of Development in International Science Journal.
13. Foster, G. M. Traditional Culture and Impact of Technological Change.
14. Harris. J. (ed) Rural Development.
15. Mathur, Hari Mohan. The Human Dimension of Development: Perspectives from Anthropology
16. Nieuwinhuijze C. A. O., Van. Culture and Development: False dilemmas and real issues in ISSJ, Vol. 18.

17. Schumacher, E. F Small is Beautiful.
18. Skar, Horold (ed) Anthropological Contributions to planned change and Development.
19. Sharma, B. D. Planning for Tribal Development.

ANO : 105 – Practical – I : SOMATOMETRY AND SOMATOSCOPY

Unit I: Anthropometry and Anthropometric Instruments: Different Divisions of Anthropometry; Description of Anthropometric Instruments Used in the Practicals; Instrumental Errors and Description of Landmarks.

Unit II: Somatometric Measurements on Head and their Indices: Maximum Head Length, Maximum Head Breadth, Head Circumference, Minimum Frontal Breadth, Maximum Bizygomatic Breadth, Bigonial Breadth, Nasal Height, Nasal Length, Nasal Breadth, Morphological Facial Height, Morphological Upper Facial Height and the Indices.

Unit III: Somatometric Measurements on Body and their Indices: Height Vertex (Stature), Body Weight, Sitting Height, Biacromial Breadth, Chest Breadth (Transverse), Chest Depth (Sagittal),

Chest Girth (Inspiration, Expiration and Normal), Total Right Upper Extremity Length / Total Right Lower Extremity Length, Right Upper Arm Length, Right Fore Arm Length, Right Hand Breadth, Right Hand Length, Right Foot Length, Right Foot Breadth, Upper Arm Girth, Skin fold Measurement at Biceps, Triceps, Sub scapular and Supra-Iliac.

Unit IV: Somatoscopic Observations on Living Individuals: Head Form; Hair – Colour and Form; Eye – Colour and Form; Nose Form and Skin Colour.

Recommended Readings:

1. Comas,J.1960.Manual of Physical Anthropology Springfield: Charles C. Thomas and Co.
2. Croney, John. 1981. Anthropometry for Designers New York: Van Nostrand Reinhold Company.
3. Das, B. M. and Deka, R. 1993. Physical Anthropology Practical. Allahabad: Kitab Mahal.
4. France, D. L. and Horn, A. D. 1992. Lab Manual and Workbook for Physical Anthropology. St. Paul: West Publishing Company.
5. Ghoshmaulik, S. K., Rath, B. and Mishra, S. K. 1990. Practical Anthropology. Bhubaneswar: Society for Anthropological and Archaeological Studies, Orissa.
6. Kelso, J. and Ewing, G. 1985. Introduction to Physical Anthropology Laboratory Manual. Boulder: Pruett Press, Inc.
7. Lohman, T. G., Roche, A. F. and Martorell, R. 1988. Anthropometric Standardization Reference Manual. Champaign: Human Kinetics Books.

8. Montague, A. M. F. 1960. A Handbook of Anthropometry. Springfield: Charles C. Thomas and Co.
9. Singh, I. P. and Bhasin, M. K. 1968. Anthropometry. Delhi: Kamalraj Publications.
10. Wiener, J. S. and Lourie J. A. 1969. Human Biology: A Guide to Field Methods. London: Blackwell Scientific Publications.
11. Wiener, J. S. and Lourie, J. A. 1981. Practical Human Biology. London: Academic Press.
12. Wolfe, L. D. and Lieberman, L. S. 1990. Physical Anthropology: Laboratory Textbook. Raleigh: Contemporary Publishing Company.
13. Sing, Inder P., and Bhasin, M.K. 2004. A manual of Biological Anthropology Kamal-Raj Enterprises, Delhi.

ANO :106- Practical- II: ARCHAEOLOGICAL ANTHROPOLOGY

Unit I: Drawing, Description and Measurement of Tool Families belonging to Paleolithic cultural Period

Unit II: Drawing, Description and Measurement of Tool Families belonging to Mesolithic cultural Period

Unit III: Drawing, Description and Measurement of Tool Families belonging to Neolithic cultural Period

Recommended Readings :

1. Bhattacharya, D. K. 1979. O1d stone Age Tools: A Manual of Laboratory Techniques of Analysis. Calcutta: K. P. Bagchi & Company.
2. Bordes, F. 1968. The Old Stone Age. London: Weidenfeld & Nicholson.
3. Cornwall, I. W. 1958. Soils for the Archaeologist. London: Phoenix House.
4. Jackson, M.L. Physical and Chemical Analysis of Soil. Englewood Cliffs: Prentice-Hall
5. Oakley, K. P. 1964. Man the Tool Maker. Chicago: University of Chicago Press, Phoenix Books.
6. Oakley, K. P. 1964. Frameworks for Dating Fossil Man. Chicago: Aldine Publishing Company.
7. Sankalia, H. D. 1971. Stone Age Tools and Techniques. Deccan College, Pune
8. Sankalia, H. D. 1994. Stone Age Tools: Their Techniques, Names and Probable Functions. Poona: Decan College Series.
9. Shackley, M. L. 1975. Archaeological Sediments: A Survey of Analytical Methods. New York: Butterworth.

ANO : 107 - AUDIT COURSE : HUMAN VALUES AND PROFESSIONAL ETHICS - I

UNIT-I : Definition and Nature of Ethics-its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics-Goals –Ethics values in various professionals.

UNIT –II : Nature of Values –Good and Bad, Ends and means, Actual and potential values, objectives and subjective values, Analysis of basic moral concepts-right, ought duty obligation justice, responsibility and freedom. Good behavior and respect for elders, character and conduct.

UNIT – III : Ahimsa (non-violence) satya (truth), Brahmacharya (Elibacy), Asteya (non-possession) and Aparigraha (non-stealing). Purusharthas (Cardinal vitues) –Dharm (Righteousness), Artha (wealth) Kama (Fulfillment Bodily Desires) Moksha (Liberation).

UNIT – IV : Bhavad Gita-(a) Niskama karma. (b) Buddhism-The Four Noble thruth-Arya Astanga marga, (c) Jainism-mahavrats and anuvrats. Values embedded in various religions, religious tolerance, Gandhian ethics.

UNIT – V : Crime and theories of punishments – (a) Reformative, Retributive and Deterrent (b) views on manu and Yajnavalkya.

References :

1. R. Subramanyam. Professional ethics, oxford university press.
2. John S Mackenjie: A manual of Ethics
3. The Ethics of Management by Larue Tone Hosmer. Richard D. Irwin Inc
4. Management ethics integrity at work by joseph A. Petrick and john F Quinn Response Books: New Delhi.
5. Ethics in management by S.A. Sherlekar Himalaya publishing house.
6. Harold H. Titus: Ethics for today
7. Maitra, S.K. Hindu Ethics
8. William Lilly: Introduction to Ethics
9. Sinha: A Manual of Ethics
10. Manu: Manava Dharma Sastra or the institute of Manu: Comprising the Indian system Samh of Duties: Religious and Civil (ed) G C. Halington.
11. Susrpta Samh its: Tr. Kaviraj Kunjanlal, Kunjalal Brishagratha. Chowkarnba Sanskrit series. Vol.LII and III Varanasi Vol.I 00,16’20,21,-32 and 74-77 only.
12. CAraka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambaha Sanskrit series. Vanarani I, 11.111 Vol IPP 183-191.

13. Ethics, theory and Contemporary Issues. Barbara Makinnon Wadsworth/Thomson learning,2001.
14. Analyzing Moral Issues, Judith A. Boss. May Field Publishing Company – 1999.
15. An Introduction to Applied Ethics (Ed) John H.Piet and Ayodhya Prasad.
16. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education – Telugu – Akademi, Hyderabad.
17. I.C Sharma Ethical Philosophy of India. Nagin & co Julundhar.

SEMESTER - II

ANO : 201 – Core Theory : COMPARATIVE ETHNOGRAPHY AND INDIAN ANTHROPOLOGY

Course Objective :

1. To understand meaning, scope and major ethnological regions of the world
2. To understand peoples and cultures of India
3. To know the traditional Indian culture
4. To understand the contributions to Indian Anthropology by different anthropologists

Unit I: Ethnology and Ethnography – Meaning, Scope and Method; Major Ethnological Regions of the World.

Unit II: Peoples and Cultures of India – Ethnic and Linguistic Classifications; Caste, Tribe, Dalits and Minorities (Broad Features and Identities); The Aryan controversy; Caste, family, marriage, kinship, authority and female autonomy in South India and North India.

Unit III: Traditional Indian Culture – Hindu Religious and Philosophical Traditions; Jajmani System and agrarian economy; Joint family; India as a Cultural Region; Ethnicity and pluralism; Sanskritization; Westernization; Modernization.

Unit IV: Contributions to Indian Anthropology – V. Elwin; N. K. Bose; I. Karve; M. N. Srinivas; S. C. Dube; S. C. Sinha; C. V. Furer-Haimendorf, L.P. Vidyarthi, Milton Singer Contemporary India: Globalization and Indian culture and society

Course Outcomes:

a. To understand the major ethnological regions of the world
b. To know the ethnic and linguistic classifications
c. Able to understand the traditional Indian culture
d. To know the contributions of Indian anthropologists

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	--	--	--	--	3	2	1	--	--	--	3
CO_2	3	3	2	--	--	3	1	2	--	--	--	3
CO_3	3	--	--	--	--	3	2	2	--	--	--	3
CO_4	3	2	1	--	--	3	2	--	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Cohn, B. S. 1975. India: Social Anthropology of a Civilization. Englewood Cliffs: Prentice-Hall.
2. Elwin, V. 1959. A Philosophy for NEFA. Shillong: Sachin Roy on behalf of the North-East Frontier Agency.
3. Elwin, V. 1965. Tribal World of Elwin.
4. Forde, C. D. 1963. Habitat, Economy and Society: A Geographical Introduction to Ethnology. New York: Dutton and Company
5. Government of India. 1973. Tribal People of India. New Delhi: Publications Division, Ministry of Information and Broadcasting.
6. Haimendorf, C. 1982. Tribes of India, the Struggle for Survival. Delhi: Oxford..
7. Karve, I. Hindu Society - an Interpretation
8. Leach, E. R. Aspects of Caste in South India, Ceylon and North-West Pakistan
9. Linton, R. 1955. The Tree of Culture New York: Harper & Row Publishers.
10. Majumdar, D. N. 1973. Races and Cultures of India. Bombay: Asia Publishing
11. Mandelbaum, D. 1970. Society in India. Bombay: Popular Prakashan.
12. Oswald, W. H. 1972. Other Peoples and Other Customs: World Ethnography and Its History. New York: Holt, Rinehart and Winston.

13. Singer, M. 1972. When a Great Tradition Modernizes: An Anthropological Approach to Indian Civilization. New York: Praeger.
14. Singh, K. People of India: An Introduction. Anthropological survey of India, Calcutta
15. Singh, K. S. Tribal Society in India.
16. Srinivas, M. N. 1962. Caste in Modern India and other Essays. London: Asia Publishing House.
17. Vidyarthi, L. P. and Rai, B. K. 1993. Tribal Cultures of India New Delhi: Concept Publishing House.
18. Middleton,J. 1976. Studies in Social and Cultural Anthropology. New York: Thomas Cromwell & Co.

ANO : 202 – Core Theory : PRINCIPLES OF GENETICS

Course Objectives :

1. Make the students to understand the meaning, scope and historical development genetics
2. To understand the biology of cell, cell division and their genetic significance
3. To understand patterns of inheritance in man
4. To know about the blood groups and their anthropological perspectives

Unit I: Meaning and Scope of Genetics; Brief History and Development of Genetics. Basic concepts and principles

Unit II: Biology of Cell: Structure, Function and Biological Significance. Cell Division: Mitosis and Meiosis and their Genetic Significance.

Unit III: Mendelian Laws of Heredity in Man. Patterns of Inheritance in Man: Autosomal dominant and recessive, Sex-linked dominant and recessive, Sex-limited and Sex- Influenced. Additive (Codominant).

Unit IV: Multiple allelism and Polygenic Inheritance with suitable examples. Blood groups and their Anthropological Perspectives. The ABO, Rh, and MN System.

Course Outcomes:

a. understand about the scope of genetics and its historical development
b. to learn the biology of cell and cell division
c. Exposed to the patterns of the inheritance
d. Know about blood groups and their anthropological perspective

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern toll	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team	PO_{10} Communication	PO_{11} Programme Manage	PO_{12} Life Long Leering

					s				work		ment	
CO_1	3	--	--	2	2	3	---	---	--	--	--	3
CO_2	3	3	3	--	2	--	--	--	--	--	--	3
CO_3	3	3	2	--	--	3	1	1	--	--	--	3
CO_4	3	3	3	--	3	3	2	--	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Bodmer, W. F. and Cavalli-Sforza, L. L. 1976. Genetics, Evolution and Man. San Francisco: W. H. Freeman and Company.
2. Buettner-Janusch, J. 1966. Origins of Man: Physical Anthropology. New York: John Wiley and Sons.
3. Buettner-Janusch, 1973. Physical Anthropology: A Perspective. New York: John Wiley and Sons.
4. Cummins, A. and Midlo, C. 1962. Finger Prints, Palms and Soles: An Introduction to Dermatoglyphics. New York: Dover.
5. Das, B.M. 1999. Outlines of Physical Anthropology. New Delhi: Kitab Mahal.
6. Downs, J. F. and H. B. Bleibtreau 1969. Human Variation: An Introduction to Physical Anthropology London: Collier - Macmillan & Co.
7. Holt, S. B. 1978. The Genetics of Epidermal Ridges. Springfield: Charles C. Thomas and Company.
8. Emery, A. E. H. 1983. Elements of Medical Genetics. Edinburgh: Churchill Livingstone.
9. Pai, A. C. 1985. Foundations of Genetics: A Science for Society. New York: McGraw Hill Book Company.
10. Peter Snustad, D. and Michael J. Simmons, 2003. Principles of Genetics. New York: John Wiley & Sons, Inc.
11. Race, R. R. and Sanger, R. 1975. Blood Groups in Man. Oxford: Blackwell Scientific Publications.
12. Shukla, B. R. K. and Rastogi, S. 2000. Physical Anthropology and Human Genetics. Delhi: Palaka Prakashan.
13. Robert H. Tammarin, 2002. Principles of Genetics. Delhi: Tata Mc. Graw-Hill publishing company limited.

14. Singh, B.D. 2004. Fundamentals of Genetics. New Delhi: kalyani publishers.
15. Stern, C. 1973. Principles of Human Genetics. San Francisco: W. H. Freeman and Company.
16. Vogel, F and Motulsky, A.G. 1982. Human Genetics: Problems and Approaches. New York: Springer Publications.

ANO : 203 – 3 (a) - Compulsory Foundation : PREHISTORIC INDIA

Course Objectives :

1. To understand the pre-history of India
2. To know about the Indian Meosolithic culture in India
3. To know the Indian Neolithic culture and Harappan civilizations
4. To understand the metallic cultures and distribution of Megaliths

Unit I: Prehistory of India: Regional Distribution of Lower Paleolithic, Middle Paleolithic and Upper Paleolithic Cultures.

Unit II: Mesolithic Cultures: Climatic Changes, Typo-Technology, Habitat, Economic Activity and Socio-Religious features; Indian Mesolithic Cultures.

Unit III: Neolithic: Northern Zone, North-East Zone, Central Zone and Southern Zone; Harappan Civilization:

Unit IV: Copper and Iron age, Features and Distribution Megaliths.

Course Outcomes:

a. learn the regional distribution of lower, middle, and upper Paleolithic cultures
b. To learn the Mesolithic culture and typo- technology
c. Learn the regional distributions of Neolithic cultures
d. understand the copper and iron age
e. exposed to the distribution of megaliths

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	--	--	1	2	2	--	--	--	--	3

CO_2	3	2	2	--	2	2	2	--	--	--	--	3
CO_3	3	--	--	--	--	3	3	--	--	--	--	3
CO_4	3	2	1	--	--	3	2	--	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings:

1. Agrawal, D.P. 1982. The Archaeology of India. London: Curzon Press
2. Allchin, B. and Allchin, F. R. 1968. The Birth of Civilization. Harmondsworth: Penguin Books
3. Allchin, B and Allchin, F. R. 1982. The Rise of Civilization of India and Pakistan. Cambridge: Cambridge University Press
4. Banerjee, N. R. 1965. Iron Age in India. Delhi: Munshiram Manoharlal
5. Barnouw, V. 1978. Physical Anthropology and Archaeology. Homewood: The Dorsey Press.
6. Bhattacharya, D.K. 2006. An Outline of Indian Prehistory. Delhi: Palaka Prakashan
7. Bordes, F. 1968. The Old Stone Age. New York: World University Press.
8. Brothwell, D. and Higgs, E. (Ed). 1970. Science in Archaeology. London: Thames & Hudson.
9. Butzer, K. W. 1971. Environment and Archaeology: An Ecological Approach to Prehistory. Chicago: Aldine.
10. Chakrabarti, D. K. 1992. The Early Use of Iron in India. Delhi: Oxford University Press.
11. Clark, D. L. 1968. Analytical Archaeology. London: Methuen & Co. Ltd
12. Coles, J. M. and Higgs, E. S. The Archaeology of Early Man. London: Faber & Faber
13. Hester, J. J. Introduction to Archaeology. New York: Holt, Rinehart and Winston.
14. Kennedy, A. R. and Gregory, L. P. Studies in Archaeology and Palaeoanthropology of South Asia. London: Oxford & IBH Publishing Co.
15. Oakley, K. P. 1951. Man the Tool Maker. London: Weidenfeld and Nicolson.
16. Ramana, M. S. 1983. Megaliths of South India and South-East Asia. Madras: New Era Publications.
17. Rami Reddy, V. 1989. Palaeolithic and Mesolithic Cultures. New Delhi: Mittal Publication.
18. Rami Reddy, V. 1991. Neolithic and Post-Neolithic Cultures. New Delhi: Mittal Publication.
19. Sankalia, H. D. 1977. New Archaeology: Its Scope and Application to India. (D.N. Majumdar Memorial Lecture 1964) Lucknow: Ethno- graphic and Folk Culture Society.

20. Sankalia, H. D. 1974. Prehistory and Protohistory of India and Pakistan. Pune: Deccan College Series.
21. Turnbaugh, W. A., Nelson, H., Jurmain, R. and Kilgone, L. 1996. Understanding Physical Anthropology and Archaeology. New York: West Publishing House.
22. Bailey. G & Pspikns (Edn 2008) Mesolithic Europe Cambridge Uni Press
23. Possehi, G 2002. Harappan civilization A contemporary perspective New Delhi: Vistar Pub.

ANO : 203 -3 (b)- Compulsory Foundation : URBAN ANTHROPOLOGY

Course Objectives :

1. To understand history of urbanization
2. To know about the Urban Environment and Ecological Processes
3. To know about the Urban Ethnicity and urban development
4. Urbanization and Industrialization in India

To understand the effect of urbanization on cultural transformation of different populations.

Unit- I : History of Urbanization : Cultural process, theory-orthogenetic-Cultural Transformation Heterogenitic Cultural Transformation, Chicago School Folk – Urban Continuum, Urbanization and Urbanism.

Unit- II : Urban Environment and Ecological Processes : General Structure of Cities, Concentric Zone, Multiple Nuclei, Minor Nuclei, Slums, Suburbs and Satellites; Land use patterns ; Growth of Cities and Towns: Effects of Demographic Growth on Urbanization: Urban Communication Networks.

Unit- III : Urban Ethnicity : Concept of Ethnicity : Formation of Language, Religious and Ethnic Groups Ethnic identity Ethnic Behavior : Ethnicity among Urban Immigrants; Ethnic Conflicts and its effects on Urban Folk.

Unit- IV : Urbanization and Industrialization in India: Cultural complexity and Urban society, Urbanism and Social organization; Social Categories : caste, Kinship and other forms of Associations Life styles of Urban Folk; Urban immigrants; Regional – Linguistic Patterns of Immigrants, Structural Factors responsible for the inflow from Rural areas.

Unit- V : Urban Development : Problems and Perspectives, Urban Poverty, relevance of Anthropology to Urban Industry, Business and Corporate Sectors; Urbanization and Social Change in India.

Course Outcomes:

a. Exposed to the history of urbanization.
b. Understand the environment and ecological processes of urban
c. Understand the urbanization and industrialization on cultural complexity
d. Understand the relevance of anthropology to urban industry, Business and Corporate Sectors; Urbanization and Social Change in India.

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	--	--	--	3	3	--	--	2	--	3
CO_2	3	1	--	1	--	3	3	--	--	2	--	3
CO_3	3	1	--	--	--	3	3	--	--	2	--	3
CO_4	3	1	--	1	--	3	3	--	--	2	--	3

High -3, Medium – 2 , Low -1

Recommended Readings :

1. Banton, M. (Ed.). 1966. Social Anthropology of Complex Societies. London: Tavistock Publications.
2. Basham, R. and Degroot, D. 1977. Current Approaches to the Anthropology of Urban and Complex Societies. American Anthropologist. 79: 414-440.
3. Beidelman, T. O. 1959. A Comparative Analysis of the Jajmani System. Locust Valley, New York: Monograph of the Association for Asian Studies, No.8.
4. Betteille, A. 1974. Six Essays in Comparative Sociology. Delhi: Oxford University Press.
5. Blanter. 1976. Anthropological Study of Cities. ARA.
6. Eisenstadt, S. N. 1961. Anthropological Studies of Complex Societies, Current Anthropology, Vol.2, 201-210.
7. Fox, R. G. 1977. Urban Anthropology: Cities in their Cultural Setting. New York: Prentice-Hall.
8. Marriott, M. (Ed.). 1972. Village India: Studies in the Little Community. Chicago: The

University of Chicago Press.

9. Rudolph, K. and Rudolf, L. 1960. The Political Role of India's Caste Associations. Pacific Affairs Vol. XXXIII No.1
10. Shah, A. M. Baviskar, B. S. and Ramaswamy, E. A.1996. Social Structure and Change. Vol. 3. Complex Organizations and Urban Communities. New Delhi: Sage Publications. Chapters 1, 4, 5 and 10.
11. Sharma, K. L. 1972. 'Modernization and Rural Stratification: An Application at the Micro-Level. Economic and Political weekly, Vol. 37.
12. Singer, M. When a Great Tradition Modernizes: An Anthropological Approach to Indian Civilization. New York: Praeger.

ANO : 203 -3 (c)- Compulsory Foundation : FIELD WORK TRADITIONS

Course Objectives

1. To understand the different field work traditions
2. To Know about the different data collection methods
3. To understand the Participatory Rural Appraisal (PRA)
4. To gain the knowledge about social mobilization and extension

Unit I: Field Work Tradition in Anthropology; Approaches: Emic-Etic, Macro-Micro Methods

UNIT 2: Ethnography, Comparative Method, Genealogical Method, Case Study and Survey.

Unit III: Participatory Rural Appraisal (PRA): Conventional Research Methodology; Genesis of PRA; Critical Appraisal of PRA; Prerequisites for PRA.

Unit IV: Social Mobilization and Extension: Meaning and Nature; Development of Tourism: A Critique; Demand Driven Approach.

Course Outcomes:

a. Exposed to the various field work approaches.
b. Know the ethnography, case study and survey methods.
c. To understand the participatory rural appraisal (PRA) in India
d. Understand the developmental tourism,.

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	1	--	--	3	1	--	--	2	--	3
CO_2	3	2	3	2	--	3	3	--	--	2	--	3
CO_3	3	3	3	2	--	3	2	--	--	2	--	3

CO_4	3	2	2	--	--	3	2	--	--	2	--	3

e. High -3, Medium – 2 , Low -1

Recommended Readings:

1. Bernard, H. R. 1988. Research Methods in Cultural Anthropology. London: Sage Publications.
2. Cohen, L. 1963. Statistical Methods of Social Scientists: An Introduction. New Delhi: Prentice - Hall of India (p) Ltd.
3. Danda, A. Research Methodology in Anthropology. Inter-India New Delhi
4. Goode, J. and Hatt, P. K. 1962. Methods in Social Research, New York: Mc Graw Hill Book Company.
5. Kothari, C. R. 1997. Research Methods: Methods and Techniques. Delhi: Wishwa Prakashan.
6. Madge, J. 1952. Tools of Social Science. New York: Free Press of Glencoe

ANO : 204 – 4 (a)-Elective Foundation : RESEARCH METHODS IN ANTHROPOLOGY

Course Objectives:

1. To under stand the field work traditions in anthropology
2. To familiar with research design types of research design
3. Make the students to understand different data collection techniques
4. Prepare the students to understand the usage of different statistical tools in data analysis and preparation of writing the research report.

Unit I: Field Work Tradition in Anthropology; Approaches: Emic-Etic, Macro-Micro Methods: Ethnography, Comparative Method, Participant Observation, Genealogical Method, Case Study and Survey.

Unit II: Research Design: Review of Literature, statement of the research problem; Objectives, Hypotheses, Research Questions, Conceptual Model, Types of Research Design.

Unit III: Techniques of Data Collection: (a) Primary Sources: Observation, Interview, Key Informants, Schedule and Questionnaire, Life History, Focus Group Discussion, Scaling Techniques, (b) Secondary Sources: Census, National Sample Survey, Documents and Records, Maps, National and International Reports (UNDP, World Bank, UNICEF, etc.); Archaeological Methods – Exploration, Excavation and Documentation.

Unit IV: Statistical Methods and Research Report: Sampling, Classification and Tabulation of Data, Variables, Measures of Central Tendency and Dispersion; Hypothesis Testing Statistics: t-Test and $\chi 2$ Test; Different Types of Reports. Preparation of Anthropological Research Report.

Course Outcomes:

a. To understand the fieldwork traditions in Anthropology
b. To understand the concept of research and its purpose
c. highlight the conceptual structure of a research design
d. understand the various statistical tools in the analysis and interpretation of the data

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Desi	PO_4 development	PO 5 Mod	PO 6 Soci	PO_7 Environment	PO_8 Ethics	PO 9 Tea	PO_{10} Communicati	PO_{11} Programme	PO_{12} Life Long

			gn		ern toll s	ety			m work	on	Manage ment	Leering
CO_1	3	3	3	2	2	2	---	---	--	--	--	3
CO_2	3	3	3	2	2	--	--	--	--	--	--	3
CO_3	3	3	3	2	2	2	1	--	--	--	--	3
CO_4	3	3	3	2	3	--	--	--	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Bernard, H. R. 1988. Research Methods in Cultural Anthropology. London: Sage Publications.
2. Cohen, L. 1963. Statistical Methods of Social Scientists: An Introduction. New Delhi: Prentice - Hall of India (p) Ltd.
3. Danda, A. Research Methodology in Anthropology. Inter-India New Delhi
4. Goode, J. and Hatt, P. K. 1962. Methods in Social Research, New York: Mc Graw Hill Book Company.
5. Kothari, C. R. 1997. Research Methods: Methods and Techniques. Delhi: Wishwa Prakashan.
6. Madge, J. 1952. Tools of Social Science. New York: Free Press of Glencoe
7. Royal Anthropological Institute. 1967. Notes and Queries on Anthropology. London: Routledge and began Paul
8. Sundar Rao, P. S. S. and Richard, J. 1996. An Introduction to Biostatistics. New Delhi: Prentice-Hall of India.
9. Thomas, D. H. 1976. Figuring Anthropology: First Principles of Probability and Statistics. New York: Holt, Rinehart and Winston.
10. Werner, O. and Schoepfle. G. M. 1987. Systematic Field Work (Vo1.1) Foundations of Ethnography and Interviewing. Newbury Park: C.A. Sage Publications.

ANO : 204 – 4 (b)-Elective Foundation : BIOLOGY, HEALTH AND DISEASE

Course Objectives:

Pupils to understand

1. Reproductive Health problems and preventions
2. Nutrition, Diet, Health and Disease
3. Ecology, Biology and Disease
4. Ageing and Longevity

Unit- I : Reproductive Health of Mankind : Meaning and Definition, the Reproductive Health situation in India, Need for an integrated Reproductive Health Services Programme: Bio – Social implications in sex related diseases like STD, HIV and Aids- problems and prevention.

Unit- II : Nutrition, Diet, Health and Disease : Diet and Nutrition – Balanced diet, malnutrition, under nutrition Nutritional status and susceptibility to infectious diseases, Bio-social implications of Malnutrition in India.

Unit- III : Ecology, Biology and Disease : Malaria and Sickle –Cell Haemoglobin (HbS), and G-6-PD Deficiency: Thalassemia and Haemoglobin disorder, Ecology and Disease –Fluorosis, Filariasis ---------- etc. Pollution- water, Air, Soil, Noise – and health Hazards.

Unit- IV : Ageing and Longevity : Meaning, Processes of Ageing, Factors affecting Ageing, Socio – Cultural problems of Aged- people in india; factors influencing Longevity – Genetic, Socio – Cultural Psychological. Health status of the aged people in India.National policy for the welfare of the aged in india.

Course Outcomes:

a. Exposed to the reproductive health problems and its impact women's health
b. To know the Balanced diet, malnutrition, under nutrition Nutritional status and susceptibility to infectious diseases
c. Learn about different diseases due to pollution and health hazards
d. Understand the problems of ageing and longevity in India.

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	--	2	2	3	2	2	--	2	--	3
CO_2	3	2	--	1	2	3	2	2	--	2	--	3
CO_3	3	2	--	1	2	3	2	2	--	2	--	3
CO_4	3	2	--	2	1	3	2	2	--	2	--	3

High -3, Medium – 2 , Low -1

Recommended Readings :

1. Robert H. Fletcher, Suzanne W Fletcher. Clinical Epidemiology : The Essentials

Robert C. E. Ston, Jare M Olson, Lyce Palmes. Biostatistical Genetics and Genetic Epidemiology

2. Ron Stall, Sandra m Cifford, Croing R Jeans. Anthropology and Epidemiology : Inter Disciplinary Approaches to the study of Health and Disease
3. Gary D Friedman. Primer of Epidemiology
4. Sackett et al., 1991. Clinical Epidemiology : A Basic Science for Clinical Medicine
5. Penny Webb, Chris Bain, Sandi Pirozzo. Essential Epidemiology : An Introduction for students and Health Professionals
6. JH. Abramson, Z.H. Abramson. Survey Methods in Epidemiological research, Programme Evaluation and Community Medicine
7. Singh, I.P. and Bhasin, M.K. 1968 Anthropometry, Bharathi Bhavan Delhi.
8. Bhende, A. and Kanitkar, T. Principles of Population Studies. Bombay: Himalaya Publishing House.

9. Bogue, D. 1969. Principles of Demography. New York: John C. Wiley & Sons, Inc.
10. Cavalli-Sforza, L. L. and Bodmer, W. F. 1971. The Genetics of Human Population. San Francisco: W. H. Freeman and Company.
11. Crawford, M. H. and Workman, P. L. (Eds.). 1973. Methods and Theories of Anthropological Genetics. Albuquerque: University of New Mexico Press.
12. Harrison G.A. and Boyce, J. (Eds.). 1972. The Structure of Human Populations. Oxford: Clarendon Press.
13. Hauser G. A. and Duncan, O. D. 1959. The study of Population. Chicago: The University of Chicago.

ANO : 204 –4 (c)- Elective Foundation : Early Civilizations

Course Objectives :

1. To understand the Concept of genesis Civilization
2. To learn about Early Indian Civilizations
3. To know about early civilizations of west asia
4. To know about Early Civilizations in China and South East Asia

Unit- I : Concept of Civilization, Genesis of Civilization, Factors Contributing to the Emergence of Civilization and Urbanization.

Unit- II : Early Indian Civilizations- Indus Valley and Indus Civilization Distribution; settlement patterns: Economy and Agriculture: Craft and Technology; Art and Religion, Burial Customs; Language; Racial Composition; Chronology; Origin and Decline.

Unit- III : Early Civilizations of West Asia-Mesopotamia, Sumer and Egypt.

Unit- IV : Early Civilizations in China and South East Asia-Examples from China and Thailand and Early Civilizations in New world – Mexico and Peru.

Course Outcomes:

a. Understand the Factors Contributing to the Emergence of Civilization and Urbanization.
b. To Know about the Indus valley civilizations.
c. Exposed to early civilizations of west Asia
d.To know the early civilizations in China, South east Asia and in new world.

CO- Po MAPPING :

Course	PO_1 Knowl	PO_2 Analysi	PO 3	PO_4 developm	PO 5	PO 6	PO_7 Environme	PO_8 Ethics	PO 9	PO_{10} Comm	PO_{11} Program	PO_{12} Life

	edge	s	Desi gn	ent	Mod ern toll s	Soci ety	nt		Tea m work	unicati on	me Manage ment	Long Leering
CO_1	3	--	--	--	--	3	2	1	--	2	--	3
CO_2	3	--	--	--	--	3	2	1	--	2	--	3
CO_3	3	--	--	--	--	3	2	1	--	2	--	3
CO_4	3	--	--	--	--	3	3	1	--	2	--	3

High -3, Medium – 2 , Low -1

Recommended Readings :

1. Allchin , B and Allchin, F. R. 1968. The Birth of Indian Civilization. Harmondsworh: Pelican Books.
2. Allchin, B and Allching F. R. 1982. The Rise of Civilization of India and Pakistan, Cambridge University press.
3. Barnouw V. 1978 , Physical Anthropology and Archaeology Homewood: The Dorsey press.
4. Braidwood, R. J, 1952. The Near East and the Foundation of Civilizations. Oregon: Condon Lectures, Oregon state system of Higher Education, Eugine.
5. Childe, V. G. 1964. New Light on the Most Ancient East. London. Routledge & Kegan Paul Ltd.
6. Gordon, D. H. The Pre-historic background of Indian cultures
7. Makkan L. 1985. Rise of Civilization in the middle Ganga Valley New Delhi: B. R. Publishing corporation.
8. Mellart L. 1965. The Earliest Civilization of the Near East. London : Thames and Hudson.
9. Mellowan, M. E. L. Early Mesopotamia and Iran
10. Sankalia, H. D. 1974. Prehistory and Protohistory of India and Pakistan. Pune : Deccan College Series.
11. Weitz C.A. 1979. Introduction to Anthropology and Archaeology. Engelwood Cliffs. Prentice- hall, Inc

ANO : 205 – PRACTICAL - I : DOING ETHNOGRAPHY

Unit I: Ethnographic tools: Introduction Anthropological. Applications Photography

Unit II: Material Culture: Identification, Drawing and Description of the Prescribed Ethnographic Objects; Implements used in Procuring Food –Hunting and Gathering, Fishing, and Agriculture;

Recommended Readings:

1. Basu, M. N. 1975. A Study of Material Culture. Calcutta: The World Press Pvt. Ltd.
2. Lips, J. 1938. Material Culture. New York: Watts & Co.
3. Collier, Jr. J.1978. Visual Anthropology: Photography as a Research Method.
4. Gabel, C. 1967. Analysis of Prehistoric Economic Patterns. New York: Holt, Rinehart and Winston, Inc.
5. Indian National Trust for Art and cultural Heritage. 1987. A Portrayal of Peoples. In Essays on Visual Anthropology in India. ASA New Delhi: Inter-India Publications.
6. Langness, L. L. 1967. The Life History in Anthropological Sciences. New York: Holt, Rinehart and Winston, Inc.
7. Madge, J. 1952. Tools of Social Science. New York: Free Press of Glencoe
8. Mead, M. 1963. Anthropology and the Camera. Encyclopedia of Photography. Ed. W.D. Morgan.
9. Royal Anthropological Institute. 1967. Notes and Queries on Anthropology. London: Routledge.
10. Sahay, K. N. 1982. A Brief History of Ethnographic Films in India. Visual Anthropology. Bulletin. IV: (1). June.
11. Williams, T. R. 1907. Field Methods in the Study of Culture. New York: Holt, Rinehart and Winston, Inc.

ANO : 206 – PRACTICAL - II- CRANIOLOGY AND CRANIOMETRY

Unit I: Human Osteology: Identification, Location and Description of the Human Skeleton. Sex Determination from Skull and Pelvis.

Unit II: Drawing of different views of Skull and Description of Landmarks.

Unit III: Craniometry: Techniques, Landmarks and Measurements on Skull and Mandible and

Relevant Indices: Skull – Maximum Cranial Length, Maximum Cranial Breadth, Maximum Frontal Breadth, Maximum Occipital Breadth, Least Frontal Breadth, Palatal Length, palatal Breadth, Facial Depth/Prosthion-Basion Line, Bizygomatic Breadth, Bimaxillary Breadth, Nasal Heigth, Nasal Breadth, Biauricular Breadth, Basion-Bregma Length, Frontal Chord, Parietal Chord, Occipital Chord, Facial Profile Angle/ Lower Jaw (Mandible) Height of Ramus, Symphysal Height, Minimum Breadth of Ramus, Mandibular Angle Bicodylar Breadth and, Bigonial Breadth.

Recommended Readings:

1. Comas,J.1960.Manualof Physical Anthropology Spring Field: Charles C.Thomas and Co.
2. France, D. L. and Horn, A. D. 1992. Lab Manual and Workbook for Physical Anthropology. St. Paul: West Publishing Company.
3. Kelso, J. and Ewing, G. 1985. Introduction to Physical Anthropology Laboratory Manual. Boulder: Pruett Press, Inc.
4. Lohman, T. G., Roche, A. F. and Martorell, R. 1988. Anthropometric Standardization Reference Manual. Champaign: Human Kinetics Books.
5. Montague, A. M. F. 1960. A Handbook of Anthropometry. Springfield: Charles C. Thomas and Co.
6. Singh, I. P. and Bhasin, M. K. 1968. Anthropometry. Äelhi: Kamalraj Publications.
7. Wiener, J. S. and Lourie J. A. 1969. Human Biology: A Guide to Field Methods. London: Academic Press.
8. Wiener, J. S. and Lourie, J. A. 1981. Practical Human Biology. London: Academic Press.
9. Wolfe, L. D. and Lieberman, L. S. 1990. Physical Anthropology: Laboratory Textbook. Raleigh: Contemporary Publishing Company.
10. Singh, Inder P., and Bhasin, M.K.. 2004. A manual of Biological Anthropology. Kamal Raj Enterprises, Delhi.

ANO : 207 : AUDIT COURSE - HUMAN VALUES AND PROFESSIONAL ETHICS - II

Unit – I : Value Education – Definition – relevance to present day – Concept of Human Values – self introspection – self esteem – family values – components, structure and responsibilities of family – Neutralization of anger – Adjustability – Threats of family life – status of women in family and society – Caring for need and elderly – Time allotment for sharing ideas and concerns.

Unit – II : Medical ethics – views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals. Ethical issues in relation to health care professionals and patients. Social justice in health care human cloning problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit – III : Business ethic – Ethical standards of business – Immoral and illegal practices and their solutions. Characterics of ethical problem in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit – IV : Environmental ethics – Ethical theory, man and nature – Ecological crisis, pest control, pollution and waste, CI imate change, energy and population, justice and environ mental health.

Unit – V : Social ethics-organ trade, human trafficking. Human rights violation and social disparities, Feminist ethics. Surrogacy/pregnancy. Ethics of media – impact of newspapers Television, Movies and Internet.

Recommended Readings:

1. John S Mackenjie: A Manual of ethics
2. The Ethics of Management by larue Tione Hosmer, Richard D. Irwin Inc.
3. Management Ethics integrity at work by joseph A. Petrick and john F. Quinn. Response books : New Delhi.
4. Ethics in Management by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus : Ethics for Today
6. Maitra, S.K. : Hindu Ethics.
7. William Lilly : Introduction to Ethics.
8. Sinha : A Manual of Ethichs.
9. Manu: Manava Dharma Sastra or the Institute of Manum Comprising the Indian system of Duties: Religious and civil (ed) GC Haligton.

10. Susrpta Samh ita : Tr. Kaviraj Kunjala Brishagratha. Chowkarnba Sanskrit series. Vol. L1I and I11, Varanasi, Vol I 00, 16’20,21-32 and 74-77 only.
11. Caraka Samhita : Tr Dr. . Ram karan sarma and vaidya bhagavan dash.
12. Ethics theory and contemporary issues. Barbara Mackinnon wadsworth/Thomson learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss. May Field Publishing Company – 1999.
14. An Introduction to Applied Ethics (Ed) John H.Piet and Ayodhya Prasad.
15. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education – Telugu – Akademi, Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin & co Julundhar.

SEMESTER - III

(SPECIALIZATION IN BIOLOGICAL ANTHROPOLOGY)

ANB : 301 -Core Theory : HUMAN EVOLUTION AND FOSSIL EVIDENCES

Course Objectives:

1. To understand the theories of human evolution through paleontological evidences
2. To understand the stages of human evolutions
3. To understand the Neanderthal Origin; Phylogeny; Extinction; Affinities; Antiquity and Cultural Life
4. To understand the spatial distributions of homo sapiens and future of human species

Unit I: Theories of Human evolution Paleontological evidence, evolutionary trends of primates prosimians to homosapiens with special reference to Dentition and limbs, Human bipadalism, Homanization processes.

Unit II: Hominid evolution. The problem of Ramapithicus and Dryopithicus. The Stages of Human Evolution Austrolopithicine stage Pithicinthropine stage - The Distribution, Antiquity and Origin; Nomenclature; Taxonomic Status; Skeletal Biology and Phylogeny; Cultural Life.

Unit III: The Neanderthals: Distribution, Taxonomy, Western European or Classical Neanderthals; The Neanderthal Collaterals: Fossil Hominids from Eastern Europe, Western Asia and Northern Africa; The Neaderthaloids and the Progressive Neanderthals; The Neanderthal Origin; Phylogeny; Extinction; Affinities; Antiquity and Cultural Life.

Unit IV: Homo sapiens: Discoveries; Distribution in Europe, Asia, Africa and Australia; Anatomical Characters; Cultural Variation and Development; Phylogenic Position. The Continuing Human Evolution and the Future of Human Species.

Course Outcomes:

a. Understand the evolutionary trends of primates, prosimianms to homosapiens
b. To know the hominid evolution
c. To know the Neanderthals distributions and extension
d. Exposed to the homo sapiens distribution and feature of human species

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	--	--	--	---	2	2	--	--	--	--	3
CO_2	3	2	--	--	1	2	2	--	--	--	--	3
CO_3	3	--	--	--	--	2	3	--	--	--	--	3
CO_4	3	2	1	--	--	3	1	--	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Brace, C. L. 1967. The Stages of Human Evolution: Human and Cultural Evolution. Englewood Cliffs: Prentice-Hall, Inc.
2. Buettner-Janusch, J. 1969. Origins of Man: Physical Anthropology. New Delhi: Wiley Eastern Pvt. Ltd.
3. Buettner-Janusch, J. 1973. Physical Anthropology: A Perspective. New York: Wiley and Sons.
4. Chiarelli, A. B. 1973. Evolution of the Primates: An Introduction to the Biology of Man. Oxford: Clarendon Press.
5. Clark, Le Gross, W. E. 1962. The Antecedents of Man: An Introduction to the Evolution of the Primates. Edinburgh: Edinburgh University Press.
6. Clark, Le Gross, W. E. 1964. The Fossil Evidences of Human Evolution: An Introduction to the Study of Paleoanthropology. Chicago: University of Chicago Press.
7. Lewin, R. 1989. Human Evolution: An Illustrated Introduction. Boston: Blackwell Scientific Publications.
8. Nelson, H and Jurmain, R. 1991. Introduction to Physical Anthropology. New York: West Publishing Company.
9. Poirier, F. E. 1973. Fossil Man: An Evolutionary Journey. St. Louis: C.V. Mosby Company.
10. Poirier, F. E. 1974. In Search of Ourselves: An Introduction to Physical Anthropology.

Minneapolis: Burgess and Company.
11. Stein P. L. and Row, B. M. 1989. Physical Anthropology. New York: McGraw-Hill Book Company.
12. Camilo.J, Cela – Conde and Fransisco J, 2007 – Human Evolution trails from the past – Ayola oxford Uni press.
13. David.W Cameron & Collin.P, Goves- Elsevier In.2004.
14. Russel Tuttel 2007 The functional and Evolutionary biology of primates.
15. B.A. Wooded, L.B. Martin, Peter Andrues 2009 Manor topics in primate in Human evolution

ANB : 302 – Core Theory : HUMAN GENETICS

Course Objectives :

1. To understand the scope and development of human genetics. Methods of studying heredity
2. To understand the human cytogenetics and prenatal diagnosis of chromosomal abnormalities
3. To understand the human biochemical genetic variations
4. To learn about structure of DNA, genetic engineering and genome project

Unit I: Human Genetics, its Meaning, Scope and Development. Difficulties in Subjecting Man for Genetic Investigations, Methods of Studying Heredity: Pedigree Method, Twin method, Population, Family, Linkage Studies, Karyotyping, Cytogenetic and Biochemical, DNA Techniques.

Unit II: Human Cytogenetics: Chromosome Nomenclature and Mapping; Methods of Studying Human Chromosomes; Numerical and Structural Chromosomal Abnormalities. Prenatal Diagnosis of Chromosomal Abnormalities. Sex Determination: Bar Body; Inactivation of X chromosome and Lyon's Hypothesis.

Unit III: Human Biochemical Genetic Variation: Red Cell and Serum Proteins and Enzymes Hb, G6PD, PGM and Tf. Haemoglobinopathies; Gene-Enzyme Hypothesis; Inborn errors of Metabolism - Protein, Carbohydrate, Lipid Metabolites, HLA System.

Unit IV: Structure of DNA, Concept of Gene and its Expression. Replication, Transcription, Translation. Genetic Code. Recombinant DNA Molecules; Genetic Engineering; Genome Project and Ethical Issues.

Course Outcomes:

a. understand the meaning and scope of human genetics
b. know methods of studying human chromosomes and chromosomal abnormalities
c. depict Inborn errors of metabolism with typical examples and human human ABO blood group system and its fundamentals
d. know the concept of "one-gene-one-enzyme hypothesis" which explains development of genetic diseases/disorders caused by defective genes controlling the functions of enzymes in metabolic pathways

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	3	2	2	2	--	--	--	--	--	3
CO_2	3	3	2	1	2	2	--	--	--	--	--	3
CO_3	3	2	3	2	2	2	--	--	--	--	--	3
CO_4	3	3	2	1	2	2	--	--	--	--	--	3

e. High -3, Medium – 2 , Low -1

Recommended Readings

1. Bodmer, W. F. and Cavalli-Sforza, L. L. 1976. Genetics, Evolution and Man. San Francisco: W. H. Freeman and Company.
2. Brock, D. J. H. and Mayo, O. (Eds.). 1972. The Biochemical Genetics of Man. New York: Academic Press.
3. Crawford, M. H. and Workman, P. L. (Eds.). 1973. Methods and Theories of Anthropological Genetics. Albuquerque: University of New Mexico Press.
4. Giblett, E. R. 1969. Genetic Markers in Human Blood. Oxford: Blackwell Publications.
5. Harris, H. 1980. The Principles of Human Biochemical Genetics. Amsterdam: North-Hall

and Publishing Company.
6. Harrison, G. A., Tanner, J. M., Pilbeam, D. R. and Baker, P. T. 1988. Human Biology: An Introduction to Human Evolution, Variation, Growth and Adaptability. Oxford: Oxford Science Publications.
7. Kan, Y. W. 1982. Haemoglobin Abnormalities: Molecular and Evolutionary Studies. Harvey Lecture Series. 76. Academic Press Inc.
8. Livingstone, F. B. 1967. Abnormal Hemoglobins in Human Populations. Chicago: Aldine.
9. Rothwell, N. V. 1977. Human Genetics. London: Prentice-Hall International.
10. Stern, C. 1973. Principles of Human Genetics. London: W. H. Freeman & Company.
11. Yunis, J. J. (Ed). 1969. Biochemical Methods in Red Cell Genetics. New York: Academic Press.

ANB : 303- 3(a) - Generic Elective: - : ANTHROPOLOGICAL DEMOGRAPHY

Course Objectives :

1. To learn the definition and concept of demography, theories of population growth
2. To learn the basic demographic variables and life tables
3. To understand the factors regulating population growth
4. To understand the different demographic models

Unit I: Definition and Concept of Anthropological Demography. Population Growth: Theories – Biological and Socio-Cultural.

Unit II: Basic Demographic Variables - Age, Sex, Marriage, Sex ratio, Fertility, Mortality, Migration and Population Growth. Factors Affecting Demographic Variables - Life tables – Their Construction and Uses.

Unit III: Factors Regulating Population Growth - Fertility Rate, Birth rate, Age-Specific Fertility Rates, Net Reproductive Rate, Mortality Rate, Migration Rates, Intrinsic Rate of Natural Increase;

Unit IV: Demographic and Genetic Consequences of Family Planning and Family Welfare. Demographic Models: Mathematical and Migration Models. Demographic Studies in Anthropology.

Course Outcomes:

a. Know about the different population growth theories

b. Learn the basic demographic variables
c. Understand how the different factors regulates the population growth
d. Understand the different demographic models
e. Learn the genetic consequences of family planning

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	1	---	---	2	--	--	--	--	--	3
CO_2	3	2	2	--	---	3	--	--	--	--	--	3
CO_3	3	3	2	--	1	2	--	--	--	--	--	3
CO_4	3	--	2	1	--	3	--	--	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Baker, P. T. and Sanders, W. T. 1972. Demographic Studies in Anthropology. In. Annual Reviews in Anthropology, Volume I, (Ed.). Siegel, B. Palo Alto: Annual Reviews, Inc. pp. 151-178.
2. Bhende, A. and Kanitkar, T. Principles of Population Studies. Bombay: Himalaya Publishing House.
3. Bogue, D. 1969. Principles of Demography. New York: John C. Wiley & Sons, Inc.
4. Cavalli-Sforza, L. L. and Bodmer, W. F. 1971. The Genetics of Human Population. San Francisco: W. H. Freeman and Company.
5. Crawford, M. H. and Workman, P. L. (Eds.). 1973. Methods and Theories of Anthropological Genetics. Albuquerque: University of New Mexico Press.
6. Harrison G.A. and Boyce, J. (Eds.). 1972. The Structure of Human Populations. Oxford: Clarendon Press.

7. Hauser G. A. and Duncan, O. D. 1959. The study of Population. Chicago: The University of Chicago.
8. Malhotra, K.C. (Ed). 1988. Statistical Methods in Human Population Genetics. Calcutta: IBRAD, ISI and ISHG Publication.
9. Nag, M. 1962. Factors Affecting Human Fertility in Non-Industrial Societies: A Cross-Cultural Study. Yale University Publication in Anthropology. No. 66.
10. Swedlund, A. C. and Armelagos, G. J. 1976. Demographic Anthropology. Dubuque: WM. C. Brown Company Publishers.
11. Thomlinson, R. 1976. Population Dynamics: Causes and Consequences of World Demographic Change. New York: Random House.
12. Weiss, K.M. and Ballonoff, P. A. (Eds.). 1975. Demographic Genetics. Pensylvania: Hutchinson & Ross.

ANB : 303 - 3 (b)-Generic Elective: - : FORENSIC ANTHROPOLOGY

Course Objectives :

1. To Understand the crime types, crime scene and methods of investigation
2. To know use of Dermatoglyphics in Forensic Anthropology and Somatoscopic characters in personal identification
3. To understand the skeletal remains in Forensic Anthropology
4. To learn the Modern methods in Crime Investigation

Unit I: Meaning and Scope of Forensic Anthropology, Crime types, Crime scene, Methods of Investigation; Death- Modes of Death, Assessment of time since death

Unit II: Dermatoglyphics in Forensic Anthropology, Poroscopy, Dead body finger printing, Somatoscopic characters in personal identification; Body fluids- Blood, Semen, Nasal secretion,Sweat, Hairs and Fibers in Personal Identification. Hand Writing, Foot and Tire marks in Criminal Investigation

Unit III: Skeletal remains in Forensic Anthropology: Age, Sex and Stature estimation; Forensic Odontology, Superimposition, Facial Physiognomy

Unit IV: Modern methods in Crime Investigation: DNA Finger Printing, Iris Image, Biometry, Polygraph and Lie Detection Tests

Course Outcomes:

a. able to know about forensic anthropology, a specialized, applied branch of physical/biological anthropology which deals with the crime investigation
b. understand how dermatoglyphic, somatoscopic characteristics and body fluids helpful in crime investigation
c. know the use of skeletal remains in forensic investigations
d. know the importance of modern methods in crime investigation

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	--	--	2	3	2	2	2	2	--	3
CO_2	3	3	2	--	3	3	3	2	2	1	--	3
CO_3	3	2	--	--	2	2	2	1	--	--	--	3
CO_4	3	3	2	2	2	2	--	2	2	2	--	3

High -3, Medium – 2 , Low -1

Recommended readings

1. Cherril, F. R. Finger Print Systems at Scotland.
2. EI-Najjer, M. Y. and McWilliams, R. 1978. Forensic Anthropology. Springfield: Charles C. Thomas Publishers.
3. Kind, S. and Micheal. Science Against Crime.
4. Krik, P. L. Crime Investigation.
5. Lewis, Rick. 2001. Human Genetics: Concept and Applications. London: McGraw Hill.
6. Lundguist, F. and Curry, A. S. Methods in Forensic Sciences.
7. Steward, T. D. Forensic Anthropology.
8. Stewart, T. D. 1979. Essentials of Forensic Anthropology. Springfield: Charles C. Thomas and Company.

9. Surinder Nath. 1984. Finger Print Identification. Delhi: Department of Anthropology, Delhi University.
10. Surinder Nath. 1989. An Introduction to Forensic Anthropology. New Delhi: Gain Publishing House.
11. Symans, J. Crime and Detection.
12. Turner. Forensic Science and Labaratory Techniques.
13. Yunis, J. J. (Ed.). 1969. Biochemical Method in Red Cell Genetics. New York; Academic Press.

ANB : 303- 3(c) - Generic Elective: - : EPIDEMIOLOGY AND PUBLIC HEALTH

Course Objectives :

1. To understand the Meaning and Scope, Methods, Rates, Indices, Genetic Epidemiology, Clinical Epidemiology
2. To understand the Complex Diseases
3. To know about human obesity and its complications
4. To learn the Major Communicable and Non-communicable diseases

UNIT I: Epidemiology: Meaning and Scope, Methods, Rates, Indices, Genetic Epidemiology, Clinical Epidemiology

UNIT II : Complex Diseases: Concept, Genetic Factors, Environmental Impact, Etiology, Diagnosis, Prevalance; Prevention and Control of Diabetics, Cardio-Vascular Diseases and HIV/AIDS

UNIT III: Human Obesity : Characteristics, Types, Reasons and Complications on Individual Health, Prevention and Control.

UNIT IV : Major Communicable and Non-communicable diseases : Global and Indian Scenario; Malaria, and Tuberculosis : Etiology, Prevalance, Prevention and Management.

Course Outcomes:

a. Exposed to the basic concepts in epidemiology with examples of epidemiology in different areas of public health.
b. Understand the global burden of health outcomes and diseases by assessing measures and interpret the prevalence, risk, rate, and odds within the context of epidemiology
c. Know about Complications of obesity on health its prevention and control

d. Understand the complex web of biological, behavioral, cultural and environmental factors towards the prevalence of communicable infections and chronic infections

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	3	2	---	---	2	--	1	--	--	--	3
CO_2	3	2	2	---	2	3	3	2	--	1	--	3
CO_3	3	3	2	---	---	2	--	1	--	--	--	3
CO_4	3	2	2	---	2	3	3	2	--	1	--	3

a. High -3, Medium – 2 , Low -1

Recommended readings :

1. Robert H. Fletcher, Suzanne W Fletcher. Clinical Epidemiology : The Essentials
2. Robert C. E. Ston, Jare M Olson, Lyce Palmes. Biostatistical Genetics and Genetic Epidemiology
3. Ron Stall, Sandra m Cifford, Croing R Jeans. Anthropology and Epidemiology : Inter Disciplinary Approaches to the study of Health and Disease
4. Gary D Friedman. Primer of Epidemiology
5. Sackett et al., 1991. Clinical Epidemiology : A Basic Science for Clinical Medicine
6. Penny Webb, Chris Bain, Sandi Pirozzo. Essential Epidemiology : An Introduction for students and Health Professionals
7. JH. Abramson, Z.H. Abramson. Survey Methods in Epidemiological research, Programme Evaluation and Community Medicine

ANB : 304 - Practical- : Dermatoglyphics and Human Osteometry

Unit I: Techniques and Procedures of taking Finger, and Palm.

Unit II: Finger Dermatoglyphics: Pattern Identification; Finger Ridge Counts, Total and Absolute Finger Ridge Counts; Pattern Intensity Index, Furuhata's and Dankmeijer's Indices.

Unit III: Palmar Dermatoglyphics: Configurational Areas, Palmar Patterns, Main Line Formula, Main line Index, Palmar Ridge Counts, atd Angle and Palmar Flexion Creases and types.

Unit IV: Osteometry: Take the following linear and angular measurements on Clavicle, Scapula, and Limb Bones.

Recommended Readings:

1. Bartsocas, C. S. (Ed.). Progress in Dermatoglyphics. New York: Alan R. Liss, Inc.
2. Cummins, H. and Midlo, C. 1962. Finger Prints, Palms and Soles. New York:
3. Dover Press.
4. Galton, F. 1892. Finger Prints. London: Macmillan.
5. Holt, Sarah B. 1978. The Genetics of Epidermal Ridges. Springerfield: Charles C. Thomas and Company.
6. Loesch, D. Z. 1983. Quantitative Dermatoglyphysics: Classification, Genetics and Pathology. Oxford: Oxford University Press.
7. Loesch, D. Z. (Ed.). 1982. Quantitative Dermatoglyphics: Normal Variation, Genetics and Pathology. London: Oxford University Press.
8. Wortelecki, W. and Plato, C. C. (Eds.). 1979. Dermatoglyphics – Fifty Years Later. New York: Alan R. Liss, Inc.

ANB : 305 - Skill Oriented Course : BIOSTATISTICS AND COMPUTER APPLICATIONS

Course Objectives :

1. To understand the concept, definition and development of biometry.
2. To understand the different statistical tools in data analysis
3. To know about the Calculation of Gene Frequencies
4. To understand the personal computer operating system

Unit I: Biometry: Concept and Definition, Development of Biometry. Data in Biological Anthropology, Variables in biological anthropology. Variables: Continuous and discontinuous variables, attributes and derived variables. Accuracy and precision of the data: Error groups.

Unit II: Statistical tools: Descriptive statistics, Paried independent sample tests Chi square test, one way analysis of variance, Correlation and regression.

Unit III: Calculation of Gene Frequencies – Autosomal Dominat, Recessive, Codominat Multiple Allelic, and Sex linked systems:

Unit IV: Inbreeding coefficient, effective population size and genetic load.

Unit V: Personal computer operating system – MS office –creating a document using word, editing and formatting text Use of computers in the analysis of the data. A note on statistical software's packages: Excel and SPSS charts and graphs and interpretation of the out put. Power point presentation.

Course Outcomes:

a. To understand the concept of research and its purpose
b. To enlighten the process of research and conceptual structure of a research design
c. Understand the disease outcomes through measurement of descriptive, analysis of variance and regression models through computer applications
d. Know the use of computers in the analysis data and power point presentation

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	3	2	2	---	1	--	--	--	--	--	3
CO_2	3	3	3	2	3	--	--	--	--	--	--	3
CO_3	3	3	2	2	2	2	--	--	--	--	--	3

CO_4	3	3	3	2	3	2	--	--	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Bryman, A and Cramer, D. 1977. Quantitative Data Analysis with SPSS for windows: A Guide for social Scientists London: Routeledge.
2. Bryman, A. and Cramer, D.1999. Quantitative Data Analysis with SPSS Release : 8 for windows: For Social Scientists. London: Routeledge.
3. Foster, J. J. 2001. Data Analysis Using SPSS for Windows Versions 8.0-10.0: A Beginner's Guide. Sage Publications India Pvt. Ltd. New Delhi.
4. Gilbert, N. 1989. Biometrical Interpretation, Making Sense of Statistics in Biology. Oxford: Oxford Science Publications.
5. Johnson, R. A. and Wichern, D. W. 1988. Applied Multivariate Statistical Analysis. London: Prentice-Hall International.
6. Kempthrone, O. 1957. An Introduction to Genetic Statistics. New York: Wiley.
7. Khan, I. And Atiya, K. 1994. Fundamentals of Biostatistics. Ukaaz Publications.
8. Kinnear, P. R. and Gray, C. D. 1999. SPSS for Windows Made Simple. 3rd Edition. London: Psychology Press.
9. Malhotra, K. C. (Ed.). 1988. Statistical Methods in Human Population Genetics. Calcutta: IBRAD, ISI and ISHG Publication.
10. Mather, K. and Jinks, J. L.1977. Introduction to Biometrical Genetics. London: Chapman and Hall.
11. Morrison, D. F. 1984. Multivariate Statistical Methods. Singapore: McGraw Hill.
12. Neibauer, A. L. 2000. Office 2000 – The Basics and Beyond 2000. New Delhi: Tata McGraw-Hill Publishing Company.
13. Rao, C. R. 1965. Advanced Statistical Methods in Biometric Research. New York: John-Wiley & Sons Inc.
14. Sarkar, S. K. and Gupta, A. K. 1998. Elements of Computer Science. New Delhi: S. Chand & Company. (Selected Chapters)
15. Sarma, K.V.S (2000), Statistics Made Simple, Do it Yourself on PC, Prentice Hall of India.
16. Siegel, S. 1956. Non-Parametric Statistics for the Behavioural Sciences. New York: McGraw-Hill.
17. Snedecor and Cochran. 1967. Statistical Methods. Oxford: Oxford Press.
18. Sokal, R. R. and Rholf, F. J. 1973. Biometry. San Francisco: W. H. Freeman and Company.

19. Sokal, R. R. and Rholf, F. J. 1973. Introduction to Biostatistics. San Francisco: W. H. Freeman and Company.
20. Sundar Rao, P. S. S. and Richard, J. 1996. An Introduction to Biostatistics. New Delhi: Prentice-Hall of India.

ANB : 306 - 6(a) - Open Elective : PALEO ANTHROPOLOGY

Course Objectives :

1. To understand Pleistocene epoch
2. To understand the tool typology and technology
3. To know above different dating methods
4. To know the cultural chronology of Paleolithic, Mesolithic and Neolithic cultures

Unit I: A brief outline on the origin of earth and life and geological time scale; Pleistocene epoch chronology, Pleistocene Glaciations' of Europe, Evidences and Causes of Great Ice Age.

Unit II: Typology and technology: tool making techniques, tool types.

Unit III: Dating methods: absolute and relative dating: stratigraphy, river terraces, dendrochronology, thermoluminescence dating, pollen dating, Glacial varve analysis, potassium-argon method, fluorine dating, C-14 dating.

Unit IV: Cultural chronology: Paleolithic, Mesolithic and Neolithic cultures in India: special salient features of environment, sites and areas, typo-technology, distribution, artifacts and their physical forms. Copper, Iron age, features and distribution.

Course Outcomes:

a. understand the geological time scale and Pleistocene epoch
b. know about tool making techniques and tool types
c. gain knowledge about dating methods
d. learn about Paleolithic, Mesolithic and Neolithic cultures in India

CO- Po MAPPING :

Cours	PO_1	PO_2	PO	PO_4	PO	PO	PO_7	PO_8	PO	PO_{10}	PO_{11}	PO_{12}

e	Knowledge	Analysis	3 Design	development	5 Modern tolls	6 Society	Environment	Ethics	9 Team work	Communication	Programme Management	Life Long Leering
CO_1	3	1	--	--	--	2	3	1	--	--	--	3
CO_2	3	3	1	1	2	2	2	--	--	-	--	3
CO_3	3	3	2	2	2	--	3	1	2	--	--	3
CO_4	3	2	2	--	---	3	3	--	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings:

1. Agrawal, D.P. The Archaeology of India, Curzon Press.
2. Allchin, B. & Allchin, F.R. The Rise of Civilization of India and Pakistan. Cambridge University Press.
3. Ashley, Montague. Physical Anthropology and Archaeology.
4. Barmown, Victor. Physical Anthropology and Archaeology, Illinois, The Dorse Press Home Wood.
5. Banerjee. Iron Age in India. Munshiram Manoharlal.
6. Bordes, F. Old stone Age. Weidenfeld and Nicolson.
7. Brothwell D. & Higgs E. (ed.). Science in Archaeology. Thames and Hudson.
8. Budtzer, K.W. Environment and Archaeology.
9. Clark, D.L. Analytical Archaeology. Methuen and Co. Ltd.
10. Coles, J.M. & Higs, E.S. The Archaeology of Early Man. Faber and Faber.
11. Das, B.M., Outlines of Physical Anthropology. Kitab Mahal.
12. James, J. Hester, Introduction to Archaeology. Holt, Rinehart and Winston.
13. Michel, J.W., Dating Methods in Archaeology. Seminar Press.
14. sankalia, H.D., New Archaeology – Its Scope and Application to India, Ethnographic and Folk Culture Society.
15. Sankalia, H.D. Stone Age Tools, Families and Techniques. Pune, Deccan College.
16. Sankalia, H.D. Pre- and Proto-history of India and Pakistan. Pune, Deccan College.
17. Zeuner, F.E. Pleistocene Period. Hutchinson.

ANB : 306 (b) - Open Elective : FUNDAMENTALS OF ANTHROPOLOGY

Course Objectives :

1. To understand the Meaning, Scope of Biological Anthropology and man placing animal kingdom
2. To understand the socio cultural anthropology
3. To know about the archeological anthropology
4. To understand the concepts of race racism and classification of races

Unit I: Meaning, Scope of Biological Anthropology. Relations with other Branches of Anthropology and with Biological, Social and Medical Sciences; Its historical development. Man's Place in the Animal Kingdom.

Unit II : Social-Cultural Anthropology: Meaning, Scope and Specializations; Basic Approaches: Holistic, Comparative, Historical, Nomothetic and Idiographic; Relationship to History, Psychology, Economics, Sociology, Management, Medical and Nutritional sciences.

Unit III: Meaning, definition and scope of archeological anthropology. Relationship to other Branches of Anthropology, Earth Sciences, Physical Sciences, Life Sciences and Social Sciences. Define environmental Archaeology and ethno-archaeology.

Unit IV: Race, Ethnicity and Populations: Concepts: Race, Racism; Classification of Races – Major Races of the World; Racial Criteria used for Racial Classification - Morphological, Serological and Genetic; Racial Classification of world population – Hooton, Coon, Garn and Boyd Racial Classification India Populations – Risley, Guha and Sarkar.

Course Outcomes:

a. Understand the meaning, scope and relation with other branches of Biological Anthropology.
b. Understand the meaning, scope and relation with other branches of Socio-Cultural Anthropology.
c. Understand the meaning, scope and relation with other branches of Archeological Anthropology
d. Exposed to race, ethnicity and racial classification

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	1	--	--	2	3	--	--	--	--	3
CO_2	3	--	1	--	--	3	1	--	--	-	--	3
CO_3	3	--	--	--	--	3	3	1	--	--	--	3
CO_4	3	2	--	--	---	3	2	2	--	2	--	3

High -3, Medium – 2 , Low -1

Recommended Readings:

1. Buettner-Janusch, J. 1966. Origins of Man: Physical Anthropology. John Wiley & Sons, New York.
2. Buettner-Janusch, 1973. Physical Anthropology: A Perspective. New York: John Wiley and Sons.
3. Chiareelli, A.B. 1973. Evolution of the Primates: An Introduction to the Biology of Man. London: Academic Press.
4. Clark, Le Gross. W. E. 1962. The Antecedents of Man: An Introduction to the Evolution of the Primates. Edinburgh: Edinburgh University Press.
5. Clark, Le Gross, W. E. 1964. The Fossil Evidences of Human Evolution: An Introduction to the Study of Paleoanthropology. Chicago: University of Chicago Press.
6. Beals, R. and Hoijer, H. 1971. An Introduction to Anthropology. London: Collier McMillan Company Ltd.
7. Bohannan, Paul. 1963 Social Anthropology. New York: Holt, Rinehart and Winston.
8. Child, A. B. and Child, I. I. 1975. Religion and Magic in the Life of Traditional People. Englewood Cliffs: Prentice-Hall, Inc.
9. Ember, C. R., Ember, M. and Peregrine, P. N. 2002. Anthropology. Delhi: Pearson Education Asia.

10. Evans-Pritchard, E. E. 1965. Theories of Primitive Religion. Oxford: Clarendon Press.
11. Firth, Raymond.1956 Elements of Social Organization. London : Watts and Co.,
12. Fox, Robin. 1971. Kinship and Marriage: An anthropological Perspective. Harmondsworth: Penguin Books.
13. Herskovits, M. J.1959.Cultural Anthropology. New Delhi:
14. Oxford & IBH Publications Co.
15. Agrawal, D.P. 1982. The Archaeology of India. London: Curzon Press
16. Barnouw, V. 1978. Physical Anthropology and Archaeology. Homewood: The Dorsey Press.
17. Bhattacharya, D. K. 1990. An Outline of Indian Prehistory. Delhi: Palaka Prakashan
18. Bordes, J. 1970. Tools of the O1d and New Stone Age. New York: Natural History Press.
19. Bordes, F. 1968. The Old Stone Age. London: Weidenfeld & Nicholson.
20. Coles, J. M. and Higgs, E. S. The Archaeology of Early Man. London: Faber & Faber.
21. Shukla, B. R. K. and Rastogi, S. 2000. Physical anthropology and Human Genetics - An Introduction. Delhi: Palaka Prakash
22. Stein P. L. and Row, B. M. 1989. Physical Anthropology. New York: McGraw-Hill Book Company.
23. Turnbaugh, W. A., Nelson, H., Jurmain, R. and Kilgone, L. 1996. Understanding Physical Anthropology and Archaeology. New York: West Publishing House.
24. Weiss, M. L. and Mann, A. E. 1978. Human Biology and Behavior: An Anthropological Perspective. Boston: Little Brown.
25. Relethford, J.H. 2002. An Introduction to Biological Anthropology. Boston: Mc. Graw Hill.
26. Ember,C. Ember,M. and Peregrine,P. 2008 Anthropology (12th Edition] New Delhi:Prentice Hall of India.
27. Jurmain R, L.Kilgore and Trevathan, W 2010 Essentials of Physical Anthropology. 8th Edition New York, Wiley- Blackwell.

SEMESTER – IV

(SPECIALIZATION IN BIOLOGICAL ANTHROPOLOGY)

ANB : 401 – Core Theory : BIOLOGICAL ANTHROPOLOGY

Course Objectives:

1. To understand the human biology and biological anthropology

2. To understand the Variation in Modern Human Populations
3. To understand the Human Adaptability
4. To understand the Bio-Cultural Aspects of Health and Disease

Unit I: Meaning, Scope of Biological Anthropology; Human Biology and Biological Anthropology; Methods and Approaches: Anthropometric, Serological, Biochemical, Physiological and Molecular.

Unit II: Biological Variation in Modern Human Populations: Causes of Human Variation; Size, Shape of the Body, Pigmentation, Blood Groups and Natural Selection, Biochemical Variations.

Unit III: Human Adaptability: Human Ecology and Ecosystems, Human Adaptation (Biological and Cultural) to Heat, Cold and Altitude. Human Energetics. Impact of urbanization and Industrialization on Man.

Unit IV: Bio-Cultural Aspects of Health and Disease: Concepts of Health and Disease; Determinants of Health; Genetic, Communicable and Non-Communicable Diseases – Causes and Impact; Co-Evolution of People and Disease; Population Aging and its Implications.

Course Outcomes:

a. Understand the basic concept, meaning and scope of Biological Anthropology
b. Know the biological variation in modern human populations
c. Understand the human adaptability and impact of urbanization on humans
d. Bio-cultural aspects of health and disease

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team	PO_{10} Communication	PO_{11} Programme Manage	PO_{12} Life Long Leering

					toll s				work		ment	
CO_1	3	2	1	1	2	3	--	--	--	--	--	3
CO_2	3	2	2	2	2	3	3	--	--	-	--	3
CO_3	3	1	--	--	--	3	3	2	--	1	--	3
CO_4	3	3	2	--	2	3	2	1	--	--	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Anderson, R. M. and May, R. M. (Eds.). 1982. Population Biology of Infectious Diseases. Berlin: Springer-Verlag.
2. Damon, A. (Ed.). 1975. Physiological Anthropology. New York: Oxford University Press.
3. Emery, A. E. H. 1983. Elements of Medical Genetics. Edinburgh: Churchill.
4. Frisancho, R. A. 1981. Human Adaptation: A Functional Interpretation. Ann Arbor: The University of Michigan Press.
5. Harrison, G. A., Tanner, J. M., Pilbeam, D. R. and Baker, P. T. (Eds.). 1988. Human Biology: An Introduction to Human Evolution, Variation, Growth and Adaptability. Oxford: Oxford University Press.
6. Lewis, R. 2001. Human Genetics: Concepts and Applications. London: McGraw Hill.
7. Little, M. A. and Haas, J. D. 1989. Human Population Biology: A Transdisciplinary Science. New York: Oxford University Press.
8. Morton, N. E. 1982. Outline of Genetic Epidemiology. New York: S Krager.
9. Nussbaum, Robert L., Mclinnes, Roderick R. and Willard, Huntington F. 2001. Thompson and Thompson's Genetics in Medicine. Philadelphia: W. B. Saunders Company.
10. Overfield, T. 1985. Biologic Variation in Health and Illness: Race, Age and Sex Differences. Menlo Park: Addison-Wesley Publishing Co.
11. Park, J. E. and Park, K. 1985. Textbook of Preventive and Social Medicine. Jabalpur: M/s Banarasidas Bhanot.
12. Schutkowski, H. Berlin 2006 Human Ecology: Bio- Cultural adaptations in human communities-Springer Verlag.
13. Brown D E. 2010 Human Biological Diversity- An introduction to human biology.
14. Stanford C, Allen J.S. and Anton S.C 2011 Biological Anthropology [3rdEdition]

ANB : 403 -3(a)– Generic Elective :HUMAN GROWTH, PHYSIQUE AND NUTRITION

Course Objectives :

1. Students will be able to learn about various stages and environmental factors involved in human growth and development which help them in understanding growth monitoring of a child.
2. To know about different methods for studying growth
3. To understand analysis of Human Physique and constitution or Body composition
4. They will understand the role played by balance diet in leading a healthy

Unit I: Human Growth: Definition and Concept of Growth, Development, Differentiation and Maturation. Concept of Age and its Ascertainment: Chronological, Dental, Skeletal and Morphological. Stages of Growth: Infancy, Childhood, Juvenile, Adolescence, Adulthood and Senescence.

Unit II: Methods of Studying Growth: Cross-Sectional, Longitudinal and Semi-Longitudinal Studies and their Relative Merits and Demerits; Factors Affecting Growth: Genetic, Environmental and Hormonal. Growth Curves - Universal Curves: Lymphoid, Neural, General and Genital. Basic (Data) Curves: Distance, Velocity, Incremental and Percentile.

Unit III: Analysis of Human Physique and constitution or Body composition : Viola, Kretschemer, Sheldon and Health Carter. Human Physique and its Relation of Function, Disease and Behavior.

Unit IV: Human nutrition Basics Terms and Concept : Nutrients and Nutrition, Malnutrition, Under nutrition over nutrition and Obesity; Socio-Cultural Aspects of Nutrition; Functions and uses of Nutrients in Health and Disease. Groups at Risk. Infants growing children pregnant women and lactating mothers and aged people. Determinants of nutritional levels Anthropometric clinical sings and Biochemical diet and nutrition through diet surveys. Concept of References standards of Growth status. Secular trends of Growth and Nutrition.

Course Outcomes:

a. Know about the Differentiate the term growth, maturation and development

b. To learn the methods of studying growth and the factors affecting the growth
c. To understand the Human Physique and its Relation of Function, Disease and Behavior.
d. Know the socio-cultural aspects of nutrition and nutrients in health and diseases

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 development	PO_5 Modern tolls	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	2	--	--	3	2	1	--	--	--	3
CO_2	3	2	2	--	1	3	2	2	--	-	--	3
CO_3	3	3	2	2	2	2	2	--	--	--	--	3
CO_4	3	2	2	2	2	3	---	1	--	2	--	3

e. High -3, Medium – 2 , Low -1

Recommended Readings

1. Barry Bogin, Patterns of Human Growth, 2nd ed. (1991) Cambridge University, London.
2. J.M. Tanner, Growth at Adolescence, 2nd ed. (1962) Oxford ; Blackwell Scientific..
3. Kaushik Bose Concept of Human physical growth and development (03-10-2007) URL No. http://nsdl.niscair.res.in/jspui/handle/123456789/243
4. Harrison, G. A., Tanner, J. M., Pilbeam, D. R. and Baker, P. T. (Eds.). 1988. Human Biology: An Introduction to Human Evolution, Variation, Growth and Adaptability. Oxford: Oxford University Press.
5. Garm, S.M. and Zvishamir. 1958. Methods for Research in Human Growth Charless. C. Thomas publishers, Springfield, Illlinois.
6. Indian Council for Medical Research, 1989. Growth and Physical Development of Indian infants and children. Tech. Rep. ser.,18. New Delhi.

7. Singh, I.P. and Bhasin, M.K. 1968 Anthropometry, Bharathi Bhavan Delhi.
8. Watson, E.H. and Lowrey, G.H. 1954. Growth and development of children. The year book publishers, Inc. Chicago, pp.296.

ANB : 403- 3 (b)– Generic Elective : APPLIED BIOLOGICAL ANTHROPOLOGY

Course Objectives :

Students will learn

1. The applications of Anthropometry
2. Relevance of forensic anthropology in crime investigations
3. Uses of bio- medical anthropology
4. Genetic counseling, genetic screening, Genetic engineering and Gene therapy

Unit I: Applications of Anthropometry: Assessment of Nutritional Status; Clinical Applications of Anthropometry; Kinanthropometry – Body Proportionality in Relation to Sports; Applications in the Fields of Defense and Air Force, Artificial Limbs, Readymade Garments, Shoe Making and Furniture Industries, etc.

Unit II: Forensic Anthropology: Definition, Aims and Scope; Establishment of Identity through Skeletal Remains – Age, Sex and Reconstruction from Skeletal Remains; Dermatoglyphics in Forensic Anthropology; Personal Identification – Identification through Somatometry and Somatoscopy; Identification through Hair and Body Fluids in Personal Identification; Blood Location, Semen, Saliva and Urine Collection and Evaluation, Medico-Legal Aspects; Questioned Paternity; DNA Finger Printing.

Unit III: Genetic and Society: Congenital Malformations; Genetic Counseling – Genetical, Medical and Social Concepts and Essential Qualities of Genetic Counseling; Genetic Screening and Prenatal Diagnosis of Genetic Diseases; Genetic Engineering. Ethical Aspects of Genetic Counseling; Human Genome Project; Treatment of Genetic Diseases and Gene Therapy.

Unit IV: Bio-Medical Anthropology: Physical Anthropological Approaches to the study of Diseases: Goiter, Kuru and Sickle-Cell Anaemia. Blood Groups and Disease Associations. Concept of Race and Racism, UNESCO Statement, Race Relations Racial Fallacies.

Course Outcomes:

a. Know about various applications of anthropometry and kinanthropometry in various fields

b. Understand about the importance of forensic anthropology in crime investigations
c. Know the importance genetic counseling, genetic screening, Genetic engineering, treatment of genetic diseases and Gene therapy
d. Learn about the human geno project

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	2	2	2	3	2	--	--	1	--	3
CO_2	3	2	2	2	2	3	2	2	2	1	--	3
CO_3	3	3	2	2	3	3	2	3	--	3	--	3
CO_4	3	3	2	2	3	3	2	2	--	--	--	3

a. High -3, Medium – 2 , Low -1

Recommended Readings

1. Croney, J. 1981. Anthropometry for Designers. New York: Von Nostrand Reinhold Company.
2. El-Najjer, M. Y. and McWilliams, R. 1978. Forensic Anthropology. Springfield: Charles C. Thomas Publishers.
3. Emery, A. E. H. 1983. Elements of Medical Genetics. Edinburgh: Churchill.
4. Kitano, H. H. L. 1974. Race Relations. Englewood Cliffs: Prentice-Hall, Inc.
5. Lewis, Rick. 2001. Human Genetics: Concepts and Applications. London: McGraw Hill.
6. Lohman, T. G., Roche, A. F. and Martorell R. 1988. Anthropometric Standardization Reference Manual. Illinois: Human Kinetic Books.
7. Mueller, R. F. and Young, I. D. 1998. Emery's Elements of Medical Genetics. Livingstone: Churchill.

8. Nussbaum, Robert L., Mclinnes, Roderick R. and Willard, Huntington F. 2001. Thompson and Thompson Genetics in Medicine. Philadelphia: W. B. Saunders Company.
9. Safe, P. 1993. Sociology. (Chapter 21: Race Relations). McMillan.
10. Singh, S. P. and Malhotra, P. 1989. Kinanthropometry. Patiala: Lunar Publications.
11. Sodhi, H. S. 1991. Sports Anthropometry. Mohali: Anova Publications.
12. Stevenson, A. C. and Davidson, B. C. 1976. Genetic Councelling. London: Heinmann.
13. Stewart, T. D. 1979. Essentials of Forensic Anthropology. Springfield: Charles C. Thomas and Company.
14. Surinder Nath. 1984. Finger Print Identification. Delhi: Department of Anthropology, Delhi University.
15. Surinder Nath. 1989. An Introduction to Forensic Anthropology. New Delhi: Gian Publishing House.

ANB : 403-3(c)– Generic Elective : MEDICAL GENETICS

Course Objectives :

Students will **:**

1. Understand Medical Genetics vis-à-vis Medical Sciences and Genetics
2. Understand Onset and possible causation of Genetic Disease/Syndrome defects /Disorders / and the Congenital Deformities having adverse bearing on community level
3. To know about the Genetic classification of the disease and their variations with reference to syndrome
4. To know about the society and genetic disease

Unit – I : Medical Genetics vis-à-vis Medical Sciences ad Genetics ; Anthropology and Genetics , Anthropology and Medicine (Discases) overplanting areas and their relevance; Formal Genetics and Medical Genetics: Identification and Distinguishing of their boundaries.

Unit – II : Onset and possible causation of Genetic Disease/Syndrome defects /Disorders / and the Congenital Deformities having adverse bearing on community level; methods of identification of Genetics Diseases: Pedigree Method, Twin Method, Cytogenetic, Biochemical, Molecular

Gene and Prenatal Diagnosis.

Unit – III : Genetic classification (Autosomal, sex-linked etc.,) of the disease and their variations with reference to syndrome; Racial / population variations – Epidemiology; Demographic, Socio-Cultural and Ecological dimensions of Genetic diseases, Perception knowledge and attitude towards such diseases Ethno-Medicinal aspects of Diagnosis; control and treatment.

Unit – IV : Society and Genetic Disease: knowledge, attitude and practice (KAP) and curing practices; genetic counseling approaches.

Course Outcomes:

a. Understand the overplanting areas of anthropology and genetics, anthropology and medicine (Disease)
b. Understand the different methods of identification genetic diseases
c. Know about epidemiology, socio cultural and ecological dimensions of genetic diseases control and treatment
d. Learn the knowledge, attitude and currying practices of genetic diseases

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	--	---	---	2	2	--	--	--	--	3
CO_2	3	2	2	---	3	3	2	2	--	2	--	3
CO_3	3	2	--	---	1	3	3	2	-	--	--	3
CO_4	3	1	2	---	2	3	3	2	--	--	--	3

a. High -3, Medium – 2 , Low -1

Recommended Readings

1. Conor,J.M. Essential Medicl Genetics.

2. Emery A. E.H. 1976 Methodology in Medical Genetics, New York: Chruchill, Lingstone.
3. Emery A. E.H. 1983 Elements of Medical Genetics, New York: Chruchill, Lingstone
4. Mueller, R.F and Young I.D 1998 Emery's Elements of Medicinal Genetics Chruchill, Lingstone.
5. Nussbaum, Robert L., Melinners, Roderick R. and Willard , Huntington F. 2001. Thompson and Thompson's Genetics in Medicine. Philadelphia: W.B Saunders company.
6. Thompson and Thompson's M.W. 1966 Genetics in Medicine. Philadelphia: W.B Saunders company.
7. Harper, P.S. Practical Genetic counseling.
8. Morton, N.E 1982 outlines of Genetic Epidemiology New York: S Kraager.
9. Landy, D. Culture, Disease and Healing.

Foster, G.M. et at., Medical anthropology

ANB : 404 – Practical : ADVANCED BIOLOGICAL ANTHROPOLOGY

Unit I: Serology: Techniques and Procedures in Blood Grouping of A1A2BO, Rh (D), MN Systems.

Unit II: Other Genetical Traits: Techniques and Procedures in determining the Tasting Ability to Phenyl Thio-carbamide and Identifying the Colour Blindness using the Ishihara Colour Plates.

Unit III: Techniques and Procedures of Quantitative Estimation of Haemoglobin and the Determination of Blood Pressure. Sickle cell Na2S205 slide test.

Recommended Readings :

1. Boorman, K. E., Dodd, B. and Lincoln, P. J. 1977. Blood Group Serology. Edinburgh: Churchill Livingstone.
2. Ishihara, I. Test for Colourblindness. Tokyo: Kanehara.
3. Kalmus, H. 1965. Diagnosis and Genetics of Defective Colour Vision. Oxford: Pergamon Press.
4. Race, R. R. and Sanger, R. 1975. Blood Groups in Man. Oxford: Blackwell Scientific.
5. Wiener, J. S. and Lourie J. A. 1969. Human Biology: A Guide to Field Methods. London: Academic Press.
6. Weiner, J. S. and Lourie, J. A. 1981. Practical Human Biology. London: Academic Press.
7. Yunis, J. J. (Ed). 1969. Biochemical Methods in Red Cell Genetics. New York: Academic Press.

ANB : 405 – Multi Disciplinary Course / Project work :

FIELD WORK, DISSERTATION AND VIVA VOCE

Unit I: Field Work: The Student has to undertake Field Work Programme for a Period of 15 days under the Supervision of Teachers in the Field on the Specified Research Topic chosen in consultation with the Research Supervisor concerned.

Unit II: Preparation of Dissertation: The Student has to prepare the Dissertation on the basis of Statistical Analysis of the Data collected in the Field and the same be submitted to the Department for Evaluation at least 10 days before the commencement of the Fourth Semester Examinations.

Recommended Readings :

1. Boorman, K. E., Dodd, B. and Lincoln, P. J. 1977. Blood Group Serology. Edinburgh: Churchill Livingstone.
2. Garn and Shamir. Methods of Research in Human Growth
3. Ishihara, I. Test for Colour blindness. Tokyo: Kanehara.
4. Jelliffe, D. B. 1966. The Assessment of the Nutritional Status of the Community. WHO Monograph Series No. 53. Geneva: WHO.
5. Race, R. R. and Sanger, R. 1975. Blood Groups in Man. Philadelphia: Davis.
6. Wiener, J. S. and Lourie J. A. 1969. Human Biology: A Guide to Field Methods. London: Blackwell Scientific Publications.
7. Weiner, J. S. and Lourie, J. A. 1981. Practical Human Biology. London: Academic Press.

ANB : 406-6 (a) - Open Elective : EPIDEMIOLOGY

Course Objectives :

1. To understand the Meaning and Scope, Methods, Rates, Indices, Genetic Epidemiology, Clinical Epidemiology
2. To understand the Complex Diseases
3. To know about human obesity and its complications
4. To learn the Major Communicable and Non-communicable diseases

UNIT I: Epidemiology: Meaning and Scope, Methods, Rates, Indices, Genetic Epidemiology, Clinical Epidemiology

UNIT II : Complex Diseases: Concept, Genetic Factors, Environmental Impact, Etiology, Diagnosis, Prevalance; Prevention and Control of Diabetics, Cardio-Vascular Diseases and HIV/AIDS

UNIT III: Human Obesity : Characteristics, Types, Reasons and Complications on Individual Health, Prevention and Control.

UNIT IV : Major Communicable and Non-communicable diseases : Global and Indian Scenario; Malaria, and Tuberculosis : Etiology, Prevalance, Prevention and Management.

Course Outcomes:

a. Exposed to the basic concepts in epidemiology with examples of epidemiology in different areas of public health.
b. Understand the global burden of health outcomes and diseases by assessing measures and interpret the prevalence, risk, rate, and odds within the context of epidemiology
c. Know about Complications of obesity on health its prevention and control
d. Understand the complex web of biological, behavioral, cultural and environmental factors towards the prevalence of communicable infections and chronic infections

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	3	2	---	---	2	--	1	--	--	--	3
CO_2	3	2	2	---	2	3	3	2	--	1	--	3
CO_3	3	3	2	---	---	2	--	1	--	--	--	3
CO_4	3	2	2	---	2	3	3	2	--	1	--	3

b. High -3, Medium – 2 , Low -1

Recommended readings

1. Robert H. Fletcher, Suzanne W Fletcher. Clinical Epidemiology : The Essentials
2. Robert C. E. Ston, Jare M Olson, Lyce Palmes. Biostatistical Genetics and Genetic Epidemiology
3. Ron Stall, Sandra m Cifford, Croing R Jeans. Anthropology and Epidemiology : Inter Disciplinary Approaches to the study of Health and Disease
4. Gary D Friedman. Primer of Epidemiology
5. Sackett et al., 1991. Clinical Epidemiology : A Basic Science for Clinical Medicine
6. Penny Webb, Chris Bain, Sandi Pirozzo. Essential Epidemiology : An Introduction for students and Health Professionals
7. JH. Abramson, Z.H. Abramson. Survey Methods in Epidemiological research, Programme Evaluation and Community Medicine

ANB : 406 -6(b) - Open Elective : APPLIED BIOLOGICAL ANTHROPOLOGY

Course Objectives :

Students to understand the

1. Applications of Anthropometry
2. Forensic Anthropology its application in crime investigation
3. Genetic and Society
4. Bio-Medical Anthropology its applications

Unit I: Applications of Anthropometry: Assessment of Nutritional Status; Clinical Applications of Anthropometry; Kinanthropometry – Body Proportionality in Relation to Sports; Applications in the Fields of Defense and Air Force, Artificial Limbs, Readymade Garments, Shoe Making and Furniture Industries, etc.

Unit II: Forensic Anthropology: Definition, Aims and Scope; Establishment of Identity through Skeletal Remains – Age, Sex and Reconstruction from Skeletal Remains; Dermatoglyphics in Forensic Anthropology; Personal Identification – Identification through Somatometry and Somatoscopy; Identification through Hair and Body Fluids in Personal Identification; Blood Location, Semen, Saliva and Urine Collection and Evaluation, Medico-Legal Aspects; Questioned Paternity; DNA Finger Printing.

Unit III: Genetic and Society: Congenital Malformations; Genetic Counseling – Genetical, Medical and Social Concepts and Essential Qualities of Genetic Counseling; Genetic Screening and Prenatal Diagnosis of Genetic Diseases; Genetic Engineering. Ethical Aspects of Genetic Counseling; Human Genome Project; Treatment of Genetic Diseases and Gene Therapy.

Unit IV: Bio-Medical Anthropology: Physical Anthropological Approaches to the study of Diseases: Goiter, Kuru and Sickle-Cell Anaemia. Blood Groups and Disease Associations. Concept of Race and Racism, UNESCO Statement, Race Relations Racial Fallacies.

Course Outcomes:

a. Know about various applications of anthropometry and kinanthropometry in various fields
b. Understand about the importance of Forensic anthropology in crime investigations
c. Know about the Congenital Malformations, Genetic Counseling Genetic Screening and Prenatal Diagnosis of Genetic Diseases; Genetic Engineering. Ethical Aspects of Genetic counseling; Human Genome Project; Treatment of Genetic Diseases and Gene Therapy.
d. Understand about the importance of biological anthropology in study of various diseases

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	2	2	2	3	2	2	--	1	--	3
CO_2	3	2	2	1	2	3	2	2	--	1	--	3
CO_3	3	2	2	---	2	3	2	2	--	1	--	3
CO_4	3	2	2	---	--	3	2	2	--	1	--	3

a. High -3, Medium – 2 , Low -1

Recommended Readings :

1. Croney, J. 1981. Anthropometry for Designers. New York: Von Nostrand Reinhold Company.
2. El-Najjer, M. Y. and McWilliams, R. 1978. Forensic Anthropology. Springfield: Charles C. Thomas Publishers.
3. Emery, A. E. H. 1983. Elements of Medical Genetics. Edinburgh: Churchill.
4. Kitano, H. H. L. 1974. Race Relations. Englewood Cliffs: Prentice-Hall, Inc.
5. Lewis, Rick. 2001. Human Genetics: Concepts and Applications. London: McGraw Hill.
6. Lohman, T. G., Roche, A. F. and Martorell R. 1988. Anthropometric Standardization Reference Manual. Illinois: Human Kinetic Books.
7. Mueller, R. F. and Young, I. D. 1998. Emery's Elements of Medical Genetics. Livingstone: Churchill.
8. Nussbaum, Robert L., Mclinnes, Roderick R. and Willard, Huntington F. 2001. Thompson and Thompson Genetics in Medicine. Philadelphia: W. B. Saunders Company.
9. Safe, P. 1993. Sociology. (Chapter 21: Race Relations). McMillan.
10. Singh, S. P. and Malhotra, P. 1989. Kinanthropometry. Patiala: Lunar Publications.
11. Sodhi, H. S. 1991. Sports Anthropometry. Mohali: Anova Publications.
12. Stevenson, A. C. and Davidson, B. C. 1976. Genetic Councelling. London: Heinmann.
13. Stewart, T. D. 1979. Essentials of Forensic Anthropology. Springfield: Charles C. Thomas and Company.
14. Surinder Nath. 1984. Finger Print Identification. Delhi: Department of Anthropology, Delhi University.
15. Surinder Nath. 1989. An Introduction to Forensic Anthropology. New Delhi: Gian Publishing House.

SEMESTER – III

(SPECIALIZATION IN SOCIAL CULTURAL ANTHROPOLOGY)

ANS : 301 - Core Theory : THEORIES OF CULTURE

Course Objectives :

Aimed to understand the students

1. Culture and Cultural Evolution
2. Diffusion and Diffusions

3. Culture and Personality
4. Historical Approach

Unit I: Culture and Cultural Evolution: Meaning; Culture as Adaptive System; Ideational Theory of Culture (Culture as Cognitive, Structural and Symbolic Systems). Conceptual Contributions of E. B. Tylor, B. Malinowski, A. L. Kroeber, L. White, Unilineal Evolution (L. H. Morgan and E. B. Tylor); Multilineal Evolution (J. Steward); Universal Evolution (L. White); General and Specific Evolution (Sahlins and Service).

Unit II: Diffusion and Diffusions: British School; German-Austrian School; American – Distribution School.

Unit III: Culture and Personality; Patterns of Culture (R. Bendict); Basic Personality, Model Personality (Kardiner, Linton, Cora Dubois); Selfhood (Murphy); Symbolic (G. Obeysekere)

Unit IV: Historical Approach: History and Social Anthropology; Relevance of Historical Approach; Historical Particularism (F. Boas).

Course Outcomes:

a. Understand the Conceptual Contributions of E. B. Tylor, B. Malinowski, A. L. Kroeber, L. White, Unilineal Evolution (L. H. Morgan and E. B. Tylor); Multilineal Evolution (J. Steward); Universal Evolution (L. White)
b. To know the British School; German-Austrian School; American – Distribution School of culture
c. Know the Patterns of Culture (R. Bendict); Basic Personality, Model Personality (Kardiner, Linton, Cora Dubois); Selfhood (Murphy); Symbolic (G. Obeysekere)
d. understand the historical approaches of culture

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	1	--	--	2	3	--	--	--	--	3
CO_2	3	--	1	--	--	3	1	--	--	-	--	3

CO_3	3	--	--	--	--	3	3	1	--	--	--	3
CO_4	3	2	--	--	---	3	2	2	--	2	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Carneiro, Robert L. 1973. The Four Faces of Evolution: Unilinear, Universals
2. Keesing, R. M. Theories of Culture. Annual Review of Anthropology. 12: 73-94.
3. Harris, M.1968. The Rise of Anthropological Theory: A History of Theories of Culture. London: Routledge and Kegan Paul, (Chapters 6,7,9,10,14 and 22.)
4. Harold, R. S. and Naroll, F. 1973. Main Currents in Cultural Anthropology. New York: Appleton Century Crofts. (Chap.3: pp. 47-122 Chap 5: pp 157-184 and Chap.8: pp. 247-280)
5. Harris, M. 1969. Cultural Materialism: The Struggle for a Science of Culture. New York: Random House.
6. Kroeber, A. L. 1952. The Nature of Culture. Chicago: University of Chicago Press.
7. Lowie, R. H. 1973. History of Ethnological Theory. New York: Holt, Rinehart and Winston. (Chapters 9,10 and 11 pp 128-195
8. Manners, R. A and Kaplan, D. (Eds.). 1969. Theory in Anthropology. London: Routledge and began Paul,
9. Malinowski, B. 1960. A Scientific Theory of Culture and other Essays. New York: Oxford University Press.
10. Sahlins, M. D. and Service, E. R. (Eds.). 1960. Evolution, Specific and General, In Sahlins M. D. and Service E.R. (Eds.) Evolution and Culture. Ann Arbor: University of Michigan Press (PP 12-44)
11. Steward, J. H.1955. Theory of Culture Change: The Methodology of Multilineal Evolution. Illinois: University of Urbana, (Chap.1: PP 11-29)
12. Tylor, E. B. 1958. Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Language, Art and Custom. Revised Fourth edition. New York: Harper Torch Books (TB-33-4) (Originally Published by J. Murray and Company in 1871) Vol. 1, Chapter 1: pp. 1-25)
13. White, L. A. 1969. The science of Culture: A Study of Man and Civilization. New York: Farrer Strauss and Ciroux, (Chapter13: pp. 363-396)
14. White, L. A. 1959. The Concept of Culture. American Anthropologist. 6: 227-251.

ANS : 302 - Core Theory : SOCIAL ANTHROPOLOGY OF COMPLEX SOCIETIES

Course Objectives :

Students will learn

1. Meaning and approach of complex societies
2. Peasant societies
3. Complex cultures in western societies
4. Urban anthropology and complex organizations

Unit I: Complex Societies: Meaning and Approach, Folk-Urban Continuum (R. Redfield); Great and Little Traditions (R. Redfield and Singer); Text and Context (Singer);

Unit II: Peasant Societies: Contributions of Redfield, Shanin and Eric Wolf; Peasants and Tribes; Peasants and Workers; The Image of Limited Good (G. M. Foster). Contemporary Peasant Communities.

Unit III: Complex Cultures in Western Societies: Social Class in Western Societies; Culture of Poverty (O. Lewis); Institutions in Complex Societies: Family and Kinship; Study of Culture at a Distance and National Character.

Unit IV: Urban Anthropology and Complex Organizations: Urban Anthropology: Meaning and Scope; Urban Problems and Anthropological Interventions; Urbanization and Social Change (Harshad R. Trivedi); Global problems and culture of capitalism.

Course Outcomes:

a. Learn the meaning and approach of great and little traditions
b. learn about the peasant societies and contemporary peasant societies
c. know the culture of poverty, institution and complex societies
d. understand problems of urbanization and social changes

CO- Po MAPPING :

Cours	PO_1	PO_2	PO	PO_4	PO	PO	PO_7	PO_8	PO	PO_{10}	PO_{11}	PO_{12}

e	Knowledge	Analysis	3 Design	development	5 Modern tolls	6 Society	Environment	Ethics	9 Team work	Communication	Programme Management	Life Long Leering
CO_1	3	1	--	--	--	2	--	1	--	--	--	3
CO_2	3	--	--	1	--	3	2	1	--	1	--	3
CO_3	3	--	--	--	--	3	1	1	--	--	--	3
CO_4	3	1	--	--	---	3	1	1	--	1	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Banton, M. (Ed.). 1966. Social Anthropology of Complex Societies. London: Tavistock Publications.
2. Basham, R. and Degroot, D. 1977. Current Approaches to the Anthropology of Urban and Complex Societies. American Anthropologist. 79: 414-440.
3. Beidelman, T. O. 1959. A Comparative Analysis of the Jajmani System. Locust Valley, New York: Monograph of the Association for Asian Studies, No.8.
4. Betteille, A. 1974. Six Essays in Comparative Sociology. Delhi: Oxford University Press.
5. Blanter. 1976. Anthropological Study of Cities. ARA.
6. Eisenstadt, S. N. 1961. Anthropological Studies of Complex Societies, Current Anthropology, Vol.2, 201-210.
7. Foster, G. M. 1965. Peasant Society and the Image of the Limited Good. American Anthropologist. 63: 293-315.
8. Fox, R. G. 1977. Urban Anthropology: Cities in their Cultural Setting. New York: Prentice-Hall.
9. Halperin, R. 1977. Peasant Livelihood: Studies in Economic Anthropology and Cultural Ecology. New York: St. Martins.
10. Kothari, R. 1970. Caste in Indian Politics. New Delhi: Orient Longmans.
11. Marriott, M. (Ed.). 1972. Village India: Studies in the Little Community. Chicago: The University of Chicago Press.
12. Redfield, R. 1956. Peasant Society and Culture: An Anthropological Approach to Culture. Chicago: university of Chicago Press.
13. Rudolph, K. and Rudolf, L. 1960. The Political Role of India's Caste Associations. Pacific

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14. Shanin, T. (Ed). 1970. Peasant and Peasant Societies. New York: Penguin Books.
15. Shah, A. M. Baviskar, B. S. and Ramaswamy, E. A.1996. Social Structure and Change. Vol. 3. Complex Organizations and Urban Communities. New Delhi: Sage Publications. Chapters 1, 4, 5 and 10.
16. Sharma, K. L. 1972. 'Modernization and Rural Stratification: An Application at the Micro-Level. Economic and Political weekly, Vol. 37.
17. Singer, M. When a Great Tradition Modernizes: An Anthropological Approach to Indian Civilization. New York: Praeger.
18. Sober, G. 1960. The Pre-Industrial Society. New York:
19. Srinivas, M. N. 1964. Caste in Modern India and Other Essays. Bombay: Asia Publishing House.
20. Wolf, E. R. 1966. Peasants. Englewood Cliffs: Prentice Hall.

ANS : 303-3 (a) – Generic Elective : ECOLOGICAL ANTHROPOLOGY

Course Objectives :

Students will be understand

1. Ecological Anthropology: Meaning and Scope
2. Theoretical Formulations of ecology
3. Ecological Issues
4. Environmentalism

Unit I: Ecological Anthropology: Meaning and Scope; Concepts: Ecology, Ecosystem, Homeostasis of the Ecosystem, community and Population, Habitat and Ecological Niche, Ecosystem Development (or Ecological Succession), Environment, Adaptation, Culture Core.

Unit II: Theoretical Formulations: Environmental Determinism (Meggars); Environmental Possibilism (C. Wisler, A. L. Kroeber, D. Forde); Cultural Ecology (J. Steward); Techno-Economic and Techno-Environmental Determinism (M.Harris) Cognitive Ecology (H. Conklin, C. Frake and A. Beals); Single Unified Ecology (Vayda and Rappaport); Nature-Culture Dualism; Ethno-ecology.

Unit III: Ecological Issues: Forest and Tribes; Traditional Resources Management; NTFP; Sacred Grooves. Biodiversity for Sustainable Development; Community based Conservation (CBC): Issues and Prospects; Development Projects (Hydro-electric, Irrigation Projects and

Industries) and Displacement.

Unit IV: Environmentalism: Meaning and Issues for Debate; Role of Anthropology; Ecological Protest Movements (Chipko and Narmada Bachao Andolan (NBA)); Environmental Policy and NGOs.

Course Outcomes:

a. Understand the environment and ecosystem in understanding the cultural modifications
b. Know about the cultural ecology, cognitive ecology, single unified ecology, and ethno ecology.
c. Learn issues and prospects on development projects and displacement
d. Understand Biodiversity for sustainable development
e. Know about Ecological protest movements (Chipko and Narmada Bachao Andolan (NBA));

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	2	--	--	3	3	2	-	1	--	3
CO_2	3	--	--	1	--	3	2	1	--	1	--	3
CO_3	3	2	2	1	--	3	1	1	--	2	--	3
CO_4	3	2	--	--	---	3	3	2	--	1	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Frake, C. D. 1962. Cultural Ecology and Ethnography. American Anthropologist. 64: 53-60.
2. Harris, M. 1968. The Rise of Anthropological Theory. New York: Thoma Y. Crusell. (Chapter 23. pp. 654-687.
3. Meggars, B. J. 1954. Environmental Limitation to the Development of Culture. American Anthropologist. 56: 801-824.
4. Hardesty, D. L. 1977. Ecological Anthropology. New York: Wiley and Sons.
5. Kothari, A. et al. 1998. Communities and Conservation. New Delhi: Sage Publications.
6. Moran, E. R. 1971. Human Adaptability: An Introduction to Ecological Anthropology. Colorado: Westview Press.
7. Netting, R. Mc, C. 1971. The Ecological Approach in Cultural Study. New York: Addison Wesley Modules in Anthropology. Module – 6 Sand Hill; Road, Menlo Park: Cummings Publishing Company.
8. Odum, E. P. 1991. Fundamentals of Ecology. Delhi: Nataraj Publishers.
9. Poffenberger, M. and McGean. 1998. Village Voices, Forest Choices: JFM in India. New Delhi: Oxford (Selected Chapters).
10. Ramakrishna, P. S. 1989. Managing Biodiversity for Sustainable Development. Ahmadabad: IIMA.
11. Ramakrishna, P. S. 1998. Conserving the Sacred: Ecological and Policy Implications. In. Ashish K. et al. (Ed.). Communities and Conservation. Sage Publications, New Delhi. Chapter 11. pp. 239-251.
12. Sahins, M. 1966. Culture and Environment: The Study of Cultural Ecology. In, Sol Tax (Ed.). Anthropology. Higginbotham, Madras.
13. Steward, J. H. 1968. Cultural Ecology. In. David Sills (Ed.). International Encyclopedia of Social Sciences. The Macmillan Co., The Free Press, N. Y.
14. Tiwari, D. D. 1994. Developing and Sustaining Non-timber Forest Products: Policy Issues and Concerns with Special Reference to India. Journal of World Forest Resource Management. 7: 151-178.
15. Vayda, A. P. (Ed.). 1969. Ecological Studies in Cultural Anthropology. Natural History Press, Garden City, N.Y.
16. Vayda A. P. and Rappaport, R. A. 1968. Ecology: Cultural and Non-Cultural. In. J. A. Clifton (Ed.). Introduction to Cultural Anthropology. Boston: Houghton Mifflin. pp. 477-497.
17. Viswandha Reddy, K 2002 Cultural Ecology of Indian Tribes. Delhi, M/S Raj

Publications.

ANS : 303-3(b) - Generic Elective : APPLIED ANTHROPOLOGY AND INDIGENOUS COMMUNITIES

Course Objectives :

Aims to understand

1. Applied and Action Anthropology
2. Social-Cultural Change–Innovation
3. Applications of Anthropology in different fields
4. Tribal Welfare – Planning and Administration

Unit I: Applied and Action Anthropology – Meaning and Scope; Similarities and Differences between Applied and Action Anthropology . Indigenous communities and applied anthropology. Indigenous rights.

Unit II: Social-Cultural Change–Innovation; Diffusion; Acculturation; Assimilation; Trans-acculturation; Socialization; Cultural Lag; Cultural Shock; Barriers to Change: Social, Cultural and Psychological Barriers; Agents of Change; Chain Reaction; Promoters of Change.

Unit III: Applications of Anthropology in – Agriculture; Public Health; Medicine and Nutrition; Industry; Education; Environment and Bio-Diversity; Administration and Planning; Poverty Eradication (Rural-Urban).

Unit IV: Tribal Welfare – Planning and Administration: History and Approaches (British, Ghurye, Area Approach/MADA; ITDP; Sub-Plan); Tribal Problems: Forest and Property Rights; Shifting Cultivation; Displacement; Education; Indebtedness and Land Alienation; Health; Tribal Movements and National Integration: Nativistic and Revitalization Movements with Examples.

Course Outcomes:

a. Know the Similarities and Differences between Applied and Action Anthropology, Indigenous communities and applied anthropology. Indigenous rights.
b. Know the process of acculturation and assimilation, socialization
c. Know about applications of Anthropology in the management of health, agriculture, education and biodiversity and poverty eradication

d. Gain the knowledge on tribal welfare, tribal problems, forest and property rights, shifting cultivation and tribal movements

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	--	--	--	2	2	1	--	1	--	3
CO_2	3	--	--	1	--	3	2	1	--	1	--	3
CO_3	3	--	--	--	--	3	2	1	--	1	--	3
CO_4	3	1	--	--	---	3	2	1	--	1	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Barnett, H.G. 1956. Anthropology in Administration Illinois: Row Peterson.
2. Chaudhuri, B. 1984. Tribal Development: Problems and Prospects. New Delhi: Inter India Publications.
3. Clifton, J .A. (Ed.). 1970. Applied Anthropology: Readings in the use of the Science of Man. Boston: Houghton-Mifflin.
4. Foster, G. M. 1969 Traditional Cultures and the impact of Technological Change. Bombay: Allied Publishers.
5. Hogbin, I. H. 1958. Social Change. London: Watts and Co.
6. Mair, L.P. 1955. Studies in Applied Anthropology. London School of Economics Monograph. London: London University.
7. Mead, M. 1955. Cultural Patterns and Technological Change. New York: Mentor Books.
8. Vidyarthi, L.P. 1968. Applied Anthropology in India. Allahabad: Kitab Mahal.
9. Varma, R.C. 1990 Indian Tribes through the Ages. Publication Divisions, Govt. of India, New Delhi.

10. Viswanadha Reddy, K. 2002, Cultural Ecology of India n Tribes Delhi, M/s. Raj Publications.

ANS : 303-3 (c) – Generic Elective : ANTHROPOLOGY OF RELIGION- SACRED COMPLEX IN INDIA

Course Objectives :

1. To understand the role of sacred complexes in cultural modifications in contemporary society
2. To understand the Anthropological theories or religion
3. To know the Analytical studies on religion
4. To learn the Contemporary issues of religion

Unit – I : Anthropology of Religion : Meaning scope and relation with power and political leverage, ethic identity and other aspects of culture in traditional and modern societies; elements of religion : Ritual ceremony, myth, taboo, sacred and profane, Rites of passage; van Gennep (separation, Liminality and incorporation); Witchcarft; sacrifice (Hicks and Gwywne); purity and pollution (Pauline kolenda).

Unit – II : Anthropological theories or religion; Durkheims theory of religion; functional school of religion symbolism anthropological conceptualization of pilgrimage; sacred space; sacred time and sacred knowledge; man-nature-sprit complex and sacred complex as a dimension of Indian civilization (vidyarthi, sinha and saraswathi) conceptual contributions concerning civilization (primary-secondary of Robert redfield); universalization and parocholozation of Marriot cultural Media and cultural performance of singer.

Unit – III : Analytical studies on religion ; Mini-Readings-The imagined landscape; Patters in the construction of Hindu sacred Geography (Diana L. Eck); The issue of Right of Food among the Hindu – Notes and comments (R S Khare); Moharam (A R Saiyid); Five symbols of sikh identity (J.P.S Uberoi); Aspects of sarora ritual and Shamansism (victor tuner); Ritual Regulation of environmental relations among a new guinea people (Ray A Rapport) and Christianity in India (K.N. Sahey).

Unit – IV : Contemporary issues of religion; the logic of religious violence (M. Juergensmeyer); Secularism (Brass and Madan) and fundamentalism; Religious conversion; Religious tourism;

management and ecological issues.

Course Outcomes:

a. Know about meaning and relation with power and political leverages, ethnic identity and other aspects of culture in tradition and modern societies
b. Know the different anthropological theories of religion
c. Know the issues of right of food among by Hindus, five symbols of sikh identity, Aspects of sarora ritual and Shamansism, and Christianity in India
d. To understand Contemporary issues of religious violence, secularism and fundamentalism

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	--	--	--	--	3	2	1	--	2	--	3
CO_2	3	--	--	--	--	3	2	1	--	2	--	3
CO_3	3	--	--	--	--	3	2	1	--	1	--	3
CO_4	3	--	--	--	---	3	2	1	--	1	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Cole B. J. Ed.1982. Anthropology of Eighties introductory readings (chapter 23). The free press, New York. Pp371-385.
2. Das V. et. Al 1999 eds. Tradition pluralism and identify. Sage publications India Pvt Ltd., New Delhi (chapter 6) pp.111-136.
3. De Waal M.A. 1968. Religion and culture; An Introduction to Anthropology of Religion. New York: The McMillan Company.
4. Dube, S.C. 1965. The study of complex cultures in towards the sociology of culture in

India. T.K.N. Unnithan, I and Yogendra Singh, New Delhi: Prentice Hall of India Pvt. Ltd.

5. Evans-Pritchard, E.E. 1965. Theories of Primitive Religion. Oxford: Clarendon Press.
6. Jha,M (Ed). 1991. Social Anthropology of Pilgrimage. New Delhi Inter-India Publications.
7. Madan, T.N. Ed 1977. Religion in India; 4th Edition. Oxford University Press, New Delhi, Chapters by P. Kolenda, A.R. Saiyid and J.P.S. Uberoi Stephen Fuchs, Origin of Religion.
8. Redfeild, Robert, 1956. Peasant society and culture; An Anthropological Approach to civilization. Chicago: University of Chicago Press.
9. Sahay, K.N. 1976 under the shadow of the cross. Calcutta; Institute of Social Science and Action Anthropology.
10. Singh, Yogendra 1973 Modernization of Indian tradition: New Delhi: Thomson press.
11. Siner, Milton 1972 When a great tradition modernizers? An Anthropological approach to Indian civilization. New York; Praeger publishers .
12. Srinivas M.N. 1952. Religion and society among the Coorgs if South India, Oxford: Clarendon press (chapters 3 & 4).
13. Tuner, V.W. 1967, Aspects of Saora ritual and shamanism: An approach to the Data of Ritual. In A.L. Epstein (Eds). 1967. The crafts of social Anthropology, London: Tavistock publications.
14. Vidyarthi, L.P. 1961. Sacred complex of Hindu-Gaya, Bombay Asia publishing house.

ANS : 304 - Practical : Participatory Research Methods in Community Development Process

Unit I: Participatory Rural Appraisal (PRA): Conventional Research Methodology; Genesis of PRA; Critical Appraisal of PRA; Prerequisites for PRA.

Unit II: Social Mobilization and Extension: Meaning and Nature; Development of Tourism: A Critique; Demand Driven Approach.

Unit III: Tools and Techniques of PRA: Identification of the Knowledge. Interviews: Focus group Discussion; Group Interviews; Chain of Interviews; Sequence of Interviews; Ethno-history; Case Study. Mapping: Village Mapping; Social Mapping; Resource Mapping; Concept Mapping; Need Assessment (100 Seeds Method); Food Security Mapping. Ranking, Scoring and Rating: Weather Ranking; Pair-wise Ranking; Social Ranking; Wealth Ranking; Livelihood Analysis. Diagram: Venn Diagram; Seasonality Diagram Miscellaneous: Transect Walk; Problem Analysis; Time-Line. Health PRA: Seasonality; Intensity; Curative. Gender PRA: Decision-Making; Division of Labour. Micro plan.

Unit IV: Applications of Participatory Research Techniques. Note: The student has to write a record and present one PRA Technique after applying the same in Rural Context. Duplication of PRA Technique is to be avoided to the extent possible. In Case two or more Students were to apply one PRA Technique, the Context and Subject for which the Specific PRA Applied may be Suitably Different.

Recommended Readings:

1. Bernard, H. R. 1988. Research Methods in Cultural Anthropology. London: Sage.
2. Chambers, R. 1994. Participatory Rural Appraisal: Analysis of Experience. World Development Volume 22 (7).
3. Riley, J. M. 2002. Stakeholders in Rural Development. New Delhi: Sage Publications.
4. Sivaram, P. N.D. PRA: Techniques and Applications. Hyderabad: NIRD.
5. Somesh Kumar. 2002. Methods for Community Participation. Delhi: Vistar (Sage).
6. White, W. F. 1991. Participatory Action Research. New Delhi: Sage Publications.

ANS : 305 - Skill Oriented Course : Data Management and Computer Applications

Course Objectives :

1. To understand the Data: Concept and Definition, Development of Data. Data in Anthropology and Variables
2. To know about the Personal computer operating system
3. To know the SPSS package
4. To learn the Excel

Unit I: Data: Concept and Definition, Development of Data. Data in Anthropology, Variables: Continuous and discontinuous variables, attributes and derived variables. Data collection methods; types of data, Accuracy and precision of the data, choosing appropriate scale and measurements to the data; preparing code book.

Unit II: Personal computer operating system – MS office –creating a document using word, editing and formatting text. Use of computers in the analysis of the data.

Unit III: SPSS: Getting to know SPSS, Preparing the Data, Screening and cleaning data, Manipulation of Data, preliminary analysis, Descriptive statistics: Correlation , Multiple Linear regression, one sample and two independent sample t test. Independent Chi Square Test, Logistic

Regression and Discriminant Analysis. Factor Analysis, Cluster Analysis.

Unit – IV : Excel: Introduction manage workbook options and settings : Format worksheets and work books : Customize options and views for worksheets and work books: Create Tables: Manage Table styles and options : Filter sort a Table perform operations with formulas and functions: create charts and objects: Apply custom data formats and layouts : create advanced formulas:

Course Outcomes:

a. Know about data Collection entry and management.
b. Understand the M.S. Office.
c. Exposed in using the SPSS in preparing charts and various advanced statistics
d. Understand the excel package in using data analysis

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	3	1	2	--	--	--	2	2	--	3
CO_2	3	3	--	1	2	--	--	--	2	2	--	3
CO_3	3	1	2	1	2	1	--	--	2	1	--	3
CO_4	3	2	2	2	2	--	--	--	2	1	--	3

High -3, Medium – 2 , Low -1

Recommended Readings:

1. Bryman, A and Cramer, D. 1977. Quantitative Data Analysis with SPSS for windows: A Guide for social Scientists London: Routeledge.
2. Bryman, A. and Cramer, D.1999. Quantitative Data Analysis with SPSS Release : 8 for windows: For Social Scientists. London: Routeledge.

3. Foster, J. J. 2001. Data Analysis Using SPSS for Windows Versions 8.0-10.0: A Beginner's Guide. Sage Publications India Pvt. Ltd. New Delhi.
4. Gilbert, N. 1989. Biometrical Interpretation, Making Sense of Statistics in Biology. Oxford: Oxford Science Publications.
5. Johnson, R. A. and Wichern, D. W. 1988. Applied Multivariate Statistical Analysis. London: Prentice-Hall International.

ANS : 306-6 (a) - Open Elective : ANTHROPOLOGY & CAREER PROMOTION

Course Objective :

Students will learn

1. Basic fundamental of Anthropology
2. To learn the overview of anthropology subject matter
3. To know the Indian Anthropology
4. Learn the Preparation and the art of answering questions

Unit – I : Introduction to Anthropology : Branches specializations; relation with other subjects; Anthropology in competition examinations.

Unit – II : An Overview of Anthropology subject matter

Basic concepts of definitions

Institutions and organization

Medical Anthropology

Anthropology and Development

Field work and PRA, RRA

Globalization : Anthropological theories

Unit – III : Indian Anthropology

Prehistoric protohistoric cultures Ancient Civilizations, video and post Vedic cultures

Enthenic, Linguistics classifications of Indian populations

Caste, Scs, Traditions and Socio cultural processes

Tribes and Tribal welfare; problems; Administrations; tribal and rural development

Unit – IV : Preparation and the art of answering questions

Books to be consulted

Review of questions

Scheme of valuation

Course Outcomes:

a. Understand the anthropology in competitive examinations
b. Know about participatory research appraisal
c. Exposed to the issues in tribes, tribal problems and cast populations
d. Learn the books to be consulted, review of questions and scheme of valuation

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	--	--	--	3	2	1	--	1	--	3
CO_2	3	3	1	2	--	3	2	1	--	2	--	3
CO_3	3	1	--	--	--	3	2	1	--	2	--	3
CO_4	3	2	2	--	---	3	--	1	--	1	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Bohanman, P.1963 Social Anthropology
2. Ember C.R., Ember M Peregrime, P.N. 2002. Anthropology Delhi, Pearson Education.
3. Manumdar, DN and T.N. Madan, 1997, An Introduction to Social Anthropology, Mayoor paperback Nodia.
4. L.P. Vidyarthi 1968. Applied Anthropology in India Allahabad. Kitab Mahal.

ANS : 306-6 (b) - Open Elective : TRIBAL STUDIES

Course Objectives

1. To understand the Concept of tribe, Characteristics of tribe, Tribes in India
2. To learn the Problems of tribes
3. To know the Tribal Economy
4. To understand the Tribal policies

Unit- I : Concept of tribe, Characteristics of tribe, Tribes in India: classification and distribution of tribes based on economic, cultural, linguistics and racial, Tribal situation of Orissa.

Unit- II : Problems of tribes: Land Alienation, Indebtedness, Migration, and Cultural Degradation.

Unit- III : Tribal Economy : Shifting cultivation, Forest and tribe, Deforestation and its impact on tribal, Tribal education, Problems and prospects, Tribal health, Tribal craft.

Unit- IV : Tribal policies : Fifth and Sixth Schedules Constitutional safeguards.

Course Outcomes:

a. Understand the classification and distribution of tribes
b. Know the tribal problems like Land Alienation, Indebtedness, Migration, and Cultural Degradation.
c. To know the shifting cultivation, tribal education and tribal health
d. To know the Fifth and Sixth Schedules Constitutional safeguards

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Desi	PO_4 development	PO 5 Modern	PO 6 Soci	PO_7 Environment	PO_8 Ethics	PO 9 Team	PO_{10} Communicati	PO_{11} Programme Manage	PO_{12} Life Long

			gn		toll s	ety			work	on	ment	Leering
CO_1	3	1	--	-	--	3	--	--	--	2	--	3
CO_2	3	--	--	--	--	3	-2	1	--	2	--	3
CO_3	3	--	--	2	--	3	2	1	--	2	--	3
CO_4	3	--	--	--	--	3	--	--	--	2	--	3

a. High -3, Medium – 2 , Low -1

Recommended Readings :

1. Behara, D.K and Georg prefer, Contemporary Society Tribal Studies, Volume 1 to VI. New Delhi: concept publishing company.
2. Georg pfeffer. Hunters, Tribes and Peasant : cultural crisis and comparison Bhubaneswar: Niswas.
3. Vidarthy, L.P and Rai. Applied Anthropology in India.
4. Vidarthy, L.p and B. N. Sahay. Applied Anthropology and Development in India, New Delhi: National publishing House.
5. Vidarthy, L. P. Tribal Cultural in India
6. A. K. Pandey, Tribal situation in India. New Delhi, Manak
7. Vidyut Joshi, Tribal situation in India, New Delhi, Rawat
8. A. K. Singh Tribal Development in India.
9. Choudhury b. Tribalm Development in India
10. Hassnain, Nadim. Tribal India.

SEMESTER – IV

(SPECIALIZATION IN SOCIAL CULTURAL ANTHROPOLOGY)

ANS : 401 - Core Theory : STRUCTURAL ANTHROPOLOGY

Course Objectives :

1. Students to understand structure and function
2. To know about the Social Structure and Social Organization
3. To learn the Structuralism (Levi-Straus)
4. To understand the Symbols and Meanings

Unit I: Structure and Function: Organism Analogy; Social Structure and Function (A. R.Radcliffe-Brown); Functionalism and the Theory of Needs; Institution; Primitive Exchange and Religious Motivations; Psycho-Analytical and Bio-Cultural Interpretations (B. Malinowski)

Unit II: Social Structure and Social Organization: Ideal and Real (E. R. Leech); Social Organization (R. Firth); Status and Role (S. F. Nadal)

Unit III: Structuralism (Levi-Straus): General Notion of Structuralism; Surface Structure and Deep Structure; Binary Opposition; Model; Structural Approach and Myth.

Unit IV: Symbols and Meanings: Symbols and Structure (V. Turner and M. Douglas); Interpretative Anthropology (C. Geertz); Post-Modernism.

Course Outcomes:

a. Know the social structure and function of culture
b. Understand about the ideal and real social structure and social organization
c. Know the general notion of structuralism
d. Learn the symbols and structure

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	--	--	--	3	1	-	--	2	--	3
CO_2	3	--	--	--	--	3	1	1	--	2	--	3
CO_3	3	2	1	--	--	3	---	1	--	--	--	3

CO_4	3	2	2	--	---	3	--	1	--	1	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Firth, R. W. 1972. Elements of Social Organization. London: Tavistock Publications.
2. Hatch, E. 1973. Theories of Man and Culture. New York: Columbia University Press.
3. Kaplan, D. and Manners, R. A. 1972. Culture Theory. Englewood Cliffs: Prentice-Hall, Inc.
4. Kuper, A. J. 1975. Anthropologists and Anthropology. England: Peregrine Books.
5. Leach, E. R. 1970. Levi-Strauss. Fontana Modern Masters Series. London: William Collins.
6. Leach, E. R. 1965. Political Systems of Highland Burma: A Study of Kachin Social Structure.
7. Moore, J. A. 1997. Visions of Culture. London: Alta Mira Press.
8. Radcliffe-Brown, A. R. 1973. Structure and Function in Primitive Society: Essays and Addresses. London: Routeledge and Kegan Paul.

ANS : 402 - Core Theory – DEVELOPMENTAL ANTHROPOLOGY

Course Objectives :

1. To understand the meaning and scope of Development Anthropology
2. To learn the various Steps in Planning Development Project
3. To know the different Agencies of Development
4. To learn the Model Project (Intensive Study)

Unit I: Development Anthropology: Meaning and Scope; Concept of Development and Sustainable Development; Relevance of Anthropological Knowledge in Role of Values and Institution in Development); Indices and Measurement of Development; Models and Theories in Development.

Unit II: Steps in Planning Development Project: Concept of Planning; The Logical Framework-Project Planning and Management Technique; Project Preparation and Defining of Goals; Process of Implementation; Monitoring and Evaluation; Social Assessment and Stake Holder Analysis.

Unit III: Agencies of Development: Role of Government Agencies; Non-Governmental

Organizations; Community Based Organizations; Peoples Participation in Development.

Unit IV: Model Project (Intensive Study): Case Studies on Forestry; Watershed Management and Irrigation (Relegoan Siddi); Resettlement (Narmada); Poverty Alleviation (Velugu); Primary Education (VECs)

Course Outcomes:

a. Know about the Concept of Development and Sustainable Development
b. Understand the steps in project preparation, goals, process of implementation and monitoring.
c. Role of government, NGOs and peoples participation in development
d. Know the watershed management and irrigation, resettlement,(Narmada) poverty Alleviation (Velugu); Primary Education (VECs)

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	1	1	--	1	--	--	--	--	--	3
CO_2	3	3	3	1	1	3	2	2	1	2	--	3
CO_3	3	2	-	--	--	3	2	1	--	2	--	3
CO_4	3	2	2	2	---	3	1	1	--	1	--	3

High -3, Medium – 2 , Low -1

Recommended Readings

1. Cochrane, G. 1971. Development Anthropology. New York: Oxford University Press
2. Dalton, G. 1967. Economic Anthropology and Development: Essays on Tribal Peasant Economies. New York: Natural History Press.
3. Dube, S. C. 1989. Tradition and Development. New Delhi: Vikas Publishing Home.
4. Kurien, C. T. 1978. Poverty, Planning and Social Transformation. Bombay: Allied: Publishers.
5. Long, N. 1977. An Introduction to Sociology of Rural Development. London: Tavistock Publications
6. Mair, Lucy P. 1957. Studies in Applied in Anthropology. London: Athlona Press.
7. Mair. Lucy P. 1984. Anthropology and Development. London: Macmillan and company.
8. Mathur, H. M.1990. Ed. The Human Dimensions of Development: Perspectives from Anthropology. New Delhi: Concept Publishing Company.
9. Mathur, H. M. and Haimendorf, C. V. F. 1977. Anthropology in the Development Process. New Delhi: Vikas Publishing House.
10. Myrdal, G. 1970. The Challenges of World Poverty: A World Anti-Poverty Programme in Outline. Harmondsworth: Penguin Books.
11. Pitt D. C. 1967. Ed. Development from Below-Anthropologists and Development Situations. The Hague: Monton.
12. Spicer, E. H. (Ed.). Human Problems in Technological Change. A Case Book. New York: Russell Sage Foundation

ANS : 403- 3 (a) - Generic Elective : MEDICAL ANTHROPOLOGY

Course Objectives :

1. To understand the scope, meaning and Basic Premises in Medical Anthropology
2. To understand the Epidemiology, Ecology, culture and diseases, Infectious and non-infectious diseases
3. To understand the Ethno medicine
4. To know about the Modern Medical systems and Health care delivery services

UNIT – I

1) Meaning and scope
2) Basic Premises in Medical Anthropology
3) Central concepts
4) Major theoretical frameworks

UNIT-II

1) Epidemiology: Definition and Components of study in epidemiology, rates and ratios used in epidemiology

2) Epidemiology and Medical Anthropology.
3) Ecology, culture and diseases
4) Infectious and non-infectious diseases

UNIT-III: Ethno medicine

1. Aetiology, disease classification
2. Diagnosis and treatment : Folk methods
3. Cultural context of health and illness behavior: illness behavior – definition models of illness behavior

UNIT – IV: Modern Medical systems and Health care delivery services

1. Medical pluralism
2. Factors influencing health programmes
3. Medical practitioners and patients
4. Health Research: Anthropological methods critical medical and social economy approaches to health and illness.

Course Outcomes:

a. Exposed to the basic concepts in epidemiology with examples of epidemiology in different areas of public health.
b. Understand the etiology, control of infections and non-infections diseases
c. Understand the ethno-medicine in the management of health and illness behavior
d. Understand the modern medical systems and health care delivery services

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Desi	PO_4 development	PO 5 Mod	PO 6 Soci	PO_7 Environment	PO_8 Ethics	PO 9 Tea	PO_{10} Communicati	PO_{11} Programme	PO_{12} Life Long

			gn		ern toll s	ety			m work	on	Manage ment	Leering
CO_1	3	--	--	--	--	1	--	--	--	2	--	3
CO_2	3	3	1	1	2	3	3	2	--	2	--	3
CO_3	3	3	1	1	2	3	3	2	--	2	--	3
CO_4	3	2	2	--	---	3	1	1	--	1	--	3

High -3, Medium – 2 , Low -1

References Readings :

Unit – I

1. Brown, Peter, 1998 understanding and Applying Medical Anthropology, London: Mayfield Publishers.
2. Leiban R W (1974): Medical Anthropology In Hand Book of Social and Cultural Anthropology (Ed) Honnigman; Chicago, Rand Mc Nally & Co (pages 1031 -1071)
3. Brown J Peter, Ronanld L. Barret, Mark B Padilla (1998) Medical Anthropology: An Understanding to the Fields; In Understanding and Applying Medical Anthropology (Ed) Brown J Peter
4. Joshi PC & Anil Mahajan (1990):Medical Anthropology: an Over View, In Medical Anthropology (Ed) P.C Joshi and Anil Mahajan, New Delhi, Reliance Publishing House.
5. Joshi PC & Anil Mahajan (Ed) (1990): Medical Anthropology, New Delhi, Reliance Publishing House.
6. Foster M George & Anderson B G (1977): Medical Anthropology, New York, John Wiley & Sons pp (1 – 10)
7. Baer A Hans et al (2000): Medical Anthropology and the World systems; PP 1 -53
8. Johnson T.M & Sargent FG (Ed)(1990): Medical Anthropology: A Hand Book of Theory and Method; New York, Green wood Press

Unit – II

1. Park JE and K Park (1977): Text Book of Social and Preventive Medicine, Jabalpur, Banarasi Das Bhanot
2. Trostle A James and Johannes Sommerfield (1996): Medical Anthropology and Epidemiology, Annual Review of Anthropology 25, PP 253 - 74
3. Janes RC Craig et al (Ed.) (1986): Anthropology and Epidemiology: Interdisciplinary Approaches to the Study of Health and Disease, Boston, D. Reidel Publishing Company
4. Dubos Rene(1977): Determinants of Health and Disease In Culture, Disease and Healing (Ed), David Landy, New York, Mac Millan Pub.

Unit – III

2. Johnson T.M & Sargent FG (Ed) (1990): Medical Anthropology: A Hand Book of Theory and Method; New York, Green wood Press

3. Foster M. Goerge & Anderson BG (1978): Medical Anthropology, New York, John Wiley & Sons; PP 51-79.

4. Banarjee B G and Ritual J(1988): Folk Illness and Ethno medicine, New Delhi, Northern Book Centre
5. Loudon JB (Ed) (1976): Social Anthropology and Medicine, London, Academic Press.
6. Salil Basu (Ed) (1994): Tribal Health in India, Delhi, Manak Publications
7. Joshi PC & Anil Mahajan (Ed)1990) Medical Anthropology , New Delhi, Reliance Publishing House.

Unit – IV

1. David Mechanic (1978): Medical Sociology, New York, Free Press PP 249 – 286
2. Rodney M Coe (1978): Sociology of Medicine, New York, Mac Graw Hill Book Comp, PP 95 – 114
3. Denton (1978): Medical Sociology Houston Moffillin Company PP 73-85
4. Ignu U A (1979: Stages in Health Seeking: A descriptive Model social sciences and Medicine. Vol. 13A

5. Logan HM et al (1978) Health and Human condition: Perspectives on Medical Anthropology; Massachusetts, Durabury Press.

6. Foster M George& Anderson BG (1978): Medical Anthropology New York, John Wiely & sons.

7. Lesile C (Ed)(1980): Medical Pluralism in world Perspectives, social Sciences and Medicine, VOl.14B 191.

ANS : 403-3 (b) - Generic Elective - CULTURE AND MANAGEMENT

Course Objectives :

1. To learn the Basic concepts of culture and management
2. To understand the Organization theory and comparative management
3. Understand the management and culture
4. To know the Methodological issues in cross-cultural management research

Unit :I Basic concepts : Culture; institutions, organizations, values, norms and behaviours. National character. Small groups and networks. The concept of organizational culture. Its links with cultural anthropology Organizational ethnography. Anthropology of work

Unit-II Organization theory and comparative management. Theories of organizational culture. Different anthropological traditions (cognitive, structuralist, symbolic schools) Functionalist paradigm vs. interpretive paradigm in organization theory.

Unit_III Introducing management and culture. Management in East and West. Concepts of effectiveness and efficiency: Collectivism, Individualism, Uncertainty avoidance. Decision making, Communication. Knowledge management. How culture affect management Changes in management styles Future outlook.

Unit-IV Methodological issues in cross-cultural management research. The interpretive paradigm. Ethno methodological approaches. Phenomenology and the study of organizational activities. Organizational symbolism. Integration, differentiation and fragmentation as three perspective approaches to organizational culture analysis Basic assumptions and characteristics of the three approaches. Areas of application.

Course Outcomes:

a. Know the concept of organizational culture. Its links with cultural anthropology Organizational ethnography. Anthropology of work
b. Understand the Theories of organizational culture. Different anthropological traditions
c. Know the How culture affect management Changes in management styles Future outlook.

d. To understand the Ethno methodological approaches, Organizational symbolism. Integration, differentiation and fragmentation as three perspective approaches to organizational culture.

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	1	--	--	--	3	1	--	--	--	--	3
CO_2	3	--	--	--	--	3	1	--	--	--	--	3
CO_3	3	2	-	--	--	3	2	1	--	2	--	3
CO_4	3	2	-	--	--	3	2	1	--	2	--	3

e. High -3, Medium – 2 , Low -1

Recommended Readings

1. Jean-Claude Usunier "International and Cross-Cultural Management Research"
2. Geert Hofstede "Culture's Consequences: International Differences in Work-Related Values"
3. Geert Hofstede Cultures and organisations: Software for the mind
4. Fons Trompenaars and Charles Hampden Turner "Riding the Waves of Culture: Understanding Cultural Diversity in Business"
5. Kim S. Cameron, Robert E. Quinn Diagnosing and Changing Organizational Culture: Based on the Competing Values Framework
6. Yvan Allaire, Mihaela E. Firsirotu "Theories of Organizational Culture", Organizational Studies, 3, 1984
7. Gareth Morgan "Paradigm diversity in organizational research" in "The theory and philosophy of organizations" (edited by J. Hassard, D Pym), 1990,
8. G. Burrell, G Morgan,"Sociological Paradigms and Organizational Analysis", 1979
9. Mats Alvesson "Cultural Perspectives on Organizations", 1993
10. G. Burrell, G Morgan,"Sociological Paradigms and Organizational Analysis", 1979

11. G. Hofstede, “Cultures and Organizations”, 1994.
12. Berger,Luckmann “The social construction of reality”, 1966
13. Smircich L. “Organizations as shared meanings” in “Organizational symbolism”, (1983), Greenwich, CT: JAI Press (pp. 55-65)
14. Garfinkel, H. “Studies in ethnomethodology”, 1967
15. Pondy, L., Frost, P., Morgan, G “Organizational symbolism”, (1983), Greenwich, CT: JAI Press
16. Martin, J., Meyerson, D, “Integration, differentiation and ambiguity”,1991
17. Helen Schawartzman, “Ethnography in Organizations”, 1993, SAGE University paper
18. M. Schultz, M.J. Hatch, “Living with multiple paradigms”, Academy of Management Review, 1996, Vol. 21, No 2, 529-557
19. J. Martin, P. Frost, “The Organizational Culture War Games: a Struggle for Intellectual Dominance”

ANS : 403-3(c) - Generic Elective: - **ANTHROPOLOGY OF DISPLACED POPULATIONS**

Course Objectives :

1. Students to know about development and displacement
2. Understand about Displacement, Resettlement and Rehabilitation
3. To know the Policy issues relating to development and displacement in India
4. To learn the Socio-Cultural effects of displacement, Socio disorganization

Unit – I : Development and Displacement ; Concept conceptual variation between displacement up-rooted, refuges, costees, evacuees, forced migration, involuntary migration; displaced populations due to various development projects in India and abroad people’s perception towards development and displacement.

Unit – II : Displacement, Resettlement and Rehabilitation: Conceptual relationship, preparation of estimates, notification and declaration Emsveration payment of compensation process of displacement, rehabilitation and resettlement, role of government and non-government agencies in the process of displacement, resettlement and rehabilitation.

Unit – III : Policy issues relating to development and displacement in India. Government Orders and Policies of states and Central Governments. Legal implications of displacement and rehabilitation.

Unit – IV : Socio-Cultural effects of displacement, Socio disorganization, process of disintegration and reintegration, occupational diversity, Ecological effects of large dama.

Course Outcomes:

a. Know the peoples perception towards development and displacement
b. Understand the role of government and non-government agencies in the process of displacement, resettlement and rehabilitation.
c. Understand policy issues relating development and displacement in legal implications of displacement and rehabilitation
d. Learn the Socio-Cultural effects of displacement, Socio disorganization, process of disintegration and reintegration.

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern tolls	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering
CO_1	3	2	1	2	--	3	2	--	--	2	--	3
CO_2	3	2	2	1	--	3	1	--	--	--	--	3
CO_3	3	1	-	--	--	3	2	1	--	2	--	3
CO_4	3	2	-	--	--	3	2	1	--	2	--	3

a. High -3, Medium – 2 , Low -1

Recommended Readings

1. Joshi B.L. 1982 Displacement and Rehabilitation : A study of a Dam affected village community, Aurangabad, Parimal Prakasan.

2. Michael Cernea., 1991 Involuntary Resettlement: Social Research, Policy and planning in Michael Cernea (ed) putting people first (second Edition) New York.
3. Morse, B and T. Berger, 1992 Sardar Sarovar, The report of the Independent Review, Resource futures International , Ottawa.
4. Parasuraman,1996 Development projects displacement and outcomes for displaced; Two case studies, Economic and Political weekly, June 15 Mumbai.
5. J.J. Roy Burman and Bipin Das 1992 Development projects and Tribal exploitation in Buddha ded Chaudary (ed) Tribal Transformation in India, New Delhi.
6. Sudhakara Reddy P 2002 Displacement and Social-Cultural change common wealth publishers new delhi.

ANS : 404 - Practical : Non-Governmental Organizations and Extension Studies

Unit I: Non Government Organization (NGO) and its Role: The Concept of NGO; Voluntarism; The Organization of NGO; Role and Intervention.

Unit II: Awareness and Access to Development Resources: The Idea of Development Resources; Constraints in Availing Development Resources.

Unit III: Development Programmes and People's Participation: Monitoring and Evaluation; Social Mobilization; People's Participation.

Unit IV: Community Based Organizations: SHG, CIG, Federation (VO, MS, DS), Youth Organizations and Grama Sabhas; Models of Federation: UNDP Model; CARE Model, DHAN Model, Outreach Model, DPIP Model.

Recommended Readings:

1. Ackerman, K. J. 1973. Ways of Being Poor. Culture and Development. 5: 243-277.
2. Cernea, M. M. 1991. Using Knowledge from Social Sciences in Development Projects. World Bank Discussion Paper No. 114. Washington DC: World Bank
3. Cernea, M. M. 1991. Putting People First: Sociological Variables in Development. New York: Oxford University Press.
4. Goldschmidt, W. 1980. Anthropology as a Policy Science. In. W. Goldschmidt. (Ed.). Public Policy: A Dialogue. American Anthropological Association. No. 21.
5. Mohan, H. M. 1989. Anthropology and Development in Traditional Societies. Delhi: Vikas Publishing House.

ANS : 405 – Multi Disciplinary course / Project work : Field Work, Dissertation and Viva-Voce

Unit I: Field Work: The Student has to undertake Field Work Programme for a Period of 15 days under the Supervision of Teachers in the Field on the Specified Research Topic chosen in consultation with the Research Supervisor concerned.

Unit II : Preparation of Dissertation: The Student has to prepare the Dissertation on the basis of the Data collected in the Field and the same be submitted to the Department for Evaluation at least 10 days before the commencement of the Fourth Semester Examinations.

Recommended Readings :

1. Bernard, H. R. 1988. Research Methods in Cultural Anthropology. London: Sage Publications.
2. Cohen, L. 1963. Statistical Methods of Social Scientists: An Introduction. New Delhi: Prentice - Hall of India (p) Ltd.
3. Danda, A. Research Methodology in Anthropology. Inter-India New Delhi
4. Kothari, C. R. 1997. Research Methods: Methods and Techniques. Delhi: Wishwa Prakashan.
5. Madge, J. 1952. Tools of Social Science. New York: Free Press of Glencoe
6. Royal Anthropological Institute. 1967. Notes and Queries on Anthropology. London: Routledge and began Paul
7. Thomas, D. H. 1976. Figuring Anthropology: First Principles of Probability and Statistics. New York: Holt, Rinehart and Winston.
8. Werner, O. and Schoepfle. G. M. 1987. Systematic Field Work (Vo1.1) Foundations of Ethnography and Interviewing. Newbury Park: C.A. Sage Publications.
9. Elective Papers or Optional Papers:

ANS : 406 – 6(a) Open Elective : – VISUAL ANTHROPOLOGY

Course Objectives :

Students will understand

1. Concept and scope of Visual Anthropology
2. Functional and strategies of Ethnographic film
3. Problems of Method and Strategy

4. Ethnographic of film in India

Unit – I : Visual Anthropology : concept and scope; Visual Anthropology as a discipline history and Development ethnography and Film; Material expression of culture non-material structural expressions; Typology of Ethnographic film – Monographic Biographic, film complex structure Militant, Archie films of expression, film d ambiente, documentary (Exotic documentary) Scientific film.

Unit – II : Functional and strategies of Ethnographic film: scientific film and its function in ethnographic film as a preserver of vanishing cultures; Ethnographic film as a means of communication; Ethnographic film and socio-cultural anthropological research.

Unit – III : Problems of Method and Strategy; Description, Interpretation or Reproduction? Objectivity and subjectivity in Ethnographic film and the problem of reconstruction; scientific tradition and rules in making Ethnographic film; The concept of participant film as an Audi-visual counter-gift; Documentation of Human society and culture Ethical issues and Ethnographic reality; the nature of visual reality and constructed observational reality.

Unit – IV : Ethnographic of film in India; Social cultural Anthropology, Ethnology and Demology (study of popular traditions) some introductory considerations; Analysis of some Ethnographic films and still photos and critical appraisal; shooting s film script editing and commentary.

Course Outcomes:

a. Know about the concept, scope and Historical Development of visual anthropology
b. Know about the appraisal of ethnographic films in cultural context
c. Knowledge about descriptive studying of Visual data produced by Cultures
d. To understand the ethnographical films, still photos film shootings and commentary

CO- Po MAPPING :

Course	PO_1 Knowledge	PO_2 Analysis	PO 3 Design	PO_4 development	PO 5 Modern toll	PO 6 Society	PO_7 Environment	PO_8 Ethics	PO 9 Team work	PO_{10} Communication	PO_{11} Programme Management	PO_{12} Life Long Leering

					s							
CO_1	3	2	2	1	2	2	1	1	1	2	--	3
CO_2	3	2	2	--	1	3	1	--	--	2	--	3
CO_3	3	2	1	1	1	1	2	1	--	2	--	3
CO_4	3	2	2	1	2	2	1	--	1	2	--	3

a. High -3, Medium – 2 , Low -1

Recommended Readings

1. To Edoavdo 1989 reflections on Ethnographic film visual Anthropology
2. Coller.J. Jr.1978 Visual Anthropology , Photography as a Research method
3. Debrigard E 1971. The Cinema and Racial sciences; A survey of stenographic and sociological films reports and papers in the social science (UNESCO) Paris UNESCO publication.
4. Gianfrenco B. 1978 the language and technique of the film
5. Hockings P (ed) 1963 principles of visual anthropology. The Hague Montana publications.
6. Indian national trust for Art and cultural heritage. 1987. A Portrayal of peoples in essays on visual Anthropology in India. ASA New Delhi; Inter – India publications.
7. Mead M.1963 Anthropology and the camera. Encyclopedia of photography (ed) W.D. Morgan.
8. Sahay, K.N. 1982 A brief history of ethnography films in India visual Anthropology Bulletin IV: (1) June.
9. Vaudev, A and Phillippe L. 1983 Indian Cinema super bazaar.

ANS : 406 – 6(b)- Open Elective : – ENVIRONMENTAL ANTHROPOLOGY

Course Objectives :

1. To understand Concept of Eco system, hebetate ecological Niche and eco system development
2. To know about the Theoretical Formulations of ecology
3. To understand Ecological Issues
4. To learn about Environmentalism:

Unit I: Concept of Eco system, Historical background of the Idea of Eco system in Anthropology, Pioneers of the Eco system concept in Anthropology, Notable contribution on application of concept of Eco system in Anthropology, Ecological Anthropology: Meaning and

Scope; Concepts: Ecology, Ecosystem, Homeostasis of the Ecosystem, community and Population, Habitat and Ecological Niche, Ecosystem Development (or Ecological Succession), Environment, Adaptation, Culture Core.

Unit II: Theoretical Formulations: Environmental Determinism (Meggars); Environmental Possibilism (C. Wisler, A. L. Kroeber, D. Forde); Cultural Ecology (J. Steward); Techno-Economic and Techno-Environmental Determinism (M.Harris) Cognitive Ecology (H. Conklin, C. Frake and A. Beals); Single Unified Ecology (Vayda and Rappaport); Nature-Culture Dualism; Ethno-ecology.

Unit III: Ecological Issues: Forest and Tribes; Traditional Resources Management; NTFP; Sacred Grooves. Biodiversity for Sustainable Development; Community based Conservation (CBC): Issues and Prospects; Development Projects (Hydro-electric, Irrigation Projects and Industries) and Displacement.

Unit IV: Environmentalism: Meaning and Issues for Debate; Role of Anthropology; Ecological Protest Movements (Chipko and Narmada Bachao Andolan (NBA)); Environmental Policy and NGOs.

Course Outcomes:

a. Know the meaning and scope eco-system of homeostases, ecological niche and ecosystem development
b. Understand the various theoretical formulations
c. Understand Biodiversity for Sustainable Development; Development Projects (Hydro-electric, Irrigation Projects and Industries) and Displacement.
d. Exposed to the different ecological issues and environmentalism towards development

CO- Po MAPPING :

Cours	PO_1	PO_2	PO	PO_4	PO	PO	PO_7	PO_8	PO	PO_{10}	PO_{11}	PO_{12}

e	Knowledge	Analysis	3 Design	development	5 Modern tolls	6 Society	Environment	Ethics	9 Team work	Communication	Programme Management	Life Long Leering
CO_1	3	2	--	2	--	2	3	2	--	2	--	3
CO_2	3	--	--	--	--	3	3	2	--	2	--	3
CO_3	3	2	--	2	--	1	3	2	--	2	--	3
CO_4	3	2	--	--	--	2	3	2	--	2	--	3

a. High -3, Medium – 2 , Low -1

Recommended Readings :

1. Barth, F. 1956. Ecological Relationships of Ethnic Groups in Swat, Northern Pakistan. American Anthropologist, 58: 79.
2. Beals, A. R. 1974. Village Life in South India: Cultural Design and Environmental Variation. Aldine Publishing Company, Chicago.
3. Conklin, H. C. 1954. An Ecological Approach to Shifting Agriculture. Transactions of the New York Academy of Sciences Series 2. 17: 133-142.
4. Fikret B. (Ed.). Common Property Resources: Ecology and Community Based Sustainable Development. London: Belhaven Press - A Division of Printer Publishers. (Chapter 3: Natural Resources: Access Rights-to-Use and Management. Pp. 33-54).
5. Frake, C. D. 1962. Cultural Ecology and Ethnography. American Anthropologist. 64: 53-60.
6. Harris, M. 1968. The Rise of Anthropological Theory. New York: Thoma Y. Crusell. (Chapter 23. pp. 654-687.
7. Meggars, B. J. 1954. Environmental Limitation to the Development of Culture. American Anthropologist. 56: 801-824.
8. Hardesty, D. L. 1977. Ecological Anthropology. New York: Wiley and Sons.
9. Kothari, A. et al. 1998. Communities and Conservation. New Delhi: Sage Publications.
10. Moran, E. R. 1971. Human Adaptability: An Introduction to Ecological Anthropology. Colorado: Westview Press.
11. Netting, R. Mc, C. 1971. The Ecological Approach in Cultural Study. New York: Addison Wesley Modules in Anthropology. Module – 6 Sand Hill; Road, Menlo Park: Cummings Publishing Company.

12. Odum, E. P. 1991. Fundamentals of Ecology. Delhi: Nataraj Publishers.
13. Poffenberger, M. and McGean. 1998. Village Voices, Forest Choices: JFM in India. New Delhi: Oxford (Selected Chapters).
14. Ramakrishna, P. S. 1989. Managing Biodiversity for Sustainable Development. Ahmadabad: IIMA.
15. Ramakrishna, P. S. 1998. Conserving the Sacred: Ecological and Policy Implications. In. Ashish K. et al. (Ed.). Communities and Conservation. Sage Publications, New Delhi. Chapter 11. pp. 239-251.
16. Sahins, M. 1966. Culture and Environment: The Study of Cultural Ecology. In, Sol Tax (Ed.). Anthropology. Higginbotham, Madras.
17. Steward, J. H. 1968. Cultural Ecology. In. David Sills (Ed.). International Encyclopedia of Social Sciences. The Macmillan Co., The Free Press, N. Y.
18. Tiwari, D. D. 1994. Developing and Sustaining Non-timber Forest Products: Policy Issues and Concerns with Special Reference to India. Journal of World Forest Resource Management. 7: 151-178.
19. Vayda, A. P. (Ed.). 1969. Ecological Studies in Cultural Anthropology. Natural History Press, Garden City, N.Y.
20. Vayda A. P. and Rappaport, R. A. 1968. Ecology: Cultural and Non-Cultural. In. J. A. Clifton (Ed.). Introduction to Cultural Anthropology. Boston: Houghton Mifflin. pp. 477-497.
21. Viswandha Reddy, K 2002 Cultural Ecology of Indian Tribes. Delhi, M/S Raj Publications.
22.Harris. M. 1966, The Cultural Ecology of India, scared cattle, Current Anthropology

B – 244-01-04

M.SC., DEGREE EXAMINATION,

SEMESTER - I

Branch : ANTHROPOLOGY

ECONOMIC AND POLITICAL ANTHROPOLOGY

(Under C.B.C.S.)

Time: 3 Hrs **Max. Marks: 80**

Section – A

Answer any **FOUR** questions, All questions carry **equal** marks **4 x 5 = 20**

1. Property
2. Market Economy
3. Shifting cultivation
4. Power and Authority
5. Leadership
6. Panchayats
7. Factions
8. Peasants and Tribes

Section – B

Answer **ALL** questions, All questions carry **equal** marks **4 x 15 = 60**

1. What is economic Anthropology ? Explain the scope of economic Anthropology.

   OR

   Discuss controversy between formalist and substantivist.

2. Examine the salient features of economic organization of pastoralism.

   OR

   Explain the Horticultural economy.

3. Discuss the meaning and scope of Political Anthropology.

   OR

   Describe about the Eskimo law.

4. What are the difference between State and Stateless political organization.

OR

Critically examine the Nuer's law.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF BIOCHEMISTRY



Course

M.Sc. BIOCHEMISTRY

Choice Based Credit System (CBCS)

Academic Year 2023 –24

Amended as per

NEP-2020

M.Sc. BIOCHEMISTRY programme CBCS pattern (with effect from 2021-2022)

About the Department:

- The department of Biochemistry was started in 1978 to fulfil the demand and needs of the student community in general and of the Rayalaseema region in particular. The department has an independent building with in an area of 12000 s ft in two floors. The department has celebrated its silver jubilee in 2003. To its credit the department started M.Sc. Immunology in 2008. The course content is designed to cover all aspects of Biochemistry and practical orientation for biochemical methods. Further to strengthen the above, project work was introduced in the curriculum. The exhaustive training in biochemical methods and sound theoretical background is intended to make the student an appropriate candidate not only to take up teaching or pursuing doctoral research but also competent enough to work in pharmaceutical R&D and diagnostic labs, agricultural research institutions and various medical and allied institutions and industries. The department also invites Emeritus professors/ Scientists/ researchers from various institutions to deliver special lectures in order to encourage and motivate the students to take up research programme. The students who have successfully completed the M.Sc/ PhD, course have been working in India and abroad in various capacities in research institutions, biotech industries and universities.

Vision:

- To develop scientific tempo in understanding the importance of Biochemistry in the field of Life sciences, especially in Medicine, Agriculture and Environment for well being of humans.

Mission:

- By providing required training to the students of Biochemistry with latest tools, techniques and teaching methods. So as to enable them to do advanced research for finding solution to various problems encountered with respect to Human health, Agriculture and Environment.

Programme Specific Outcomes:

- after completion of the M.Sc. Immunology, the students will be able to understand the pathogenesis of various human diseases and plant diseases.
- The students will have the ability to develop innovative and efficient therapeutic regimes for human and plant diseases by applying their knowledge in molecular biology, genetics, immunology etc.
- Students will have the technical expertise to analyse and identify the causative factors to the diseases.

Programme Objectives:

- The main objective of M.Sc. Biochemistry is to impart knowledge to the students in the advanced fields of life sciences such as Biochemistry, Molecular Biology, Immunology, Biotechnology and Bioinformatics so as to enable the student to get the expertise and skills to carry out research in the fields of Medicine, Agriculture and other allied life sciences and make the learner fit to be employed in the Government sector and private sector and organizations such as research institutions, pharma and Biotech industries. The programme enables the students to procure entrepreneurship capabilities to establish research institutions and industries in the fields of Biotechnology, Medicine and other advanced fields of life sciences.

Programme Outcomes:

S.No	Program Outcomes
PO1	Students acquire knowledge in the chemistry of different biomolecules, which constitute living organisms including humans. Students also will have knowledge on the different physiological systems and their functions and disorders.
PO2	Students will get the ability and expertise to analyse the different biological, molecules, compounds at cellular and molecular level to understand their functions.
PO3	After completion of this program students will able to investigate the causative factors of various diseases and disorders, pollutants, etc
PO4	The student will enable to design innovative protocols and devices which will

	have applicability in various fields of life sciences.
PO5	Students acquire knowledge in latest techniques and tools that are used for investigating different types of problems related to plant, animal and humans.
PO6	The students will have the skills, knowledge and enthusiasm for solving different issues arising in the society scientifically.
PO7	Students will enable to understand the importance of environment and necessary to maintain pollution free environment.
PO8	To understand ethical principles, professional ethics and responsibilities and apply them to solve societal problems.
PO9	Students will have the efficiency to carry out the projects individually, as a team leader and as a team member.
PO10	Students will acquire communications skills to dissipate the scientific knowledge to the society
PO11	Students will acquire knowledge to carry out project and maintain financial requirements as per the guidelines of funding agency.
PO12	The students being lifelong learners will be enthusiastic to update their knowledge for improving the human life.

Programme Educational Objectives:

To enable the students to learn,

- Applied aspects of life sciences with specific reference to human health and diseases.
- Develop effective therapeutic, and nutritional regimes for the wellbeing of humans.
- Pursue research to improve the quality of agricultural products, reduce the use of peroxides and chemicals that effect humans' health.

SRI VENKATESWARA UNIVERSITY TIRUPATI

S.V.U. COLLEGE OF SCIENCES; DEPARTMENT OF BIO-CHEMISTRY

(Syllabus common for SV University College and affiliated by SVU Area

Academic Years (2016-2017); M.Sc. Biochemistry

SCHEME OF INSTRUCTION AND EXAMINATION

Semester	Code	Title of the course	Credit Hrs/ week	No. of Credits	Core/ Elective	Uni. Exams (Hours	IA	Seme-ster end exam	Total Marks
FIRST	BCH101	Biochemical and Biophysicalmethods	**6**	**4**	**Core**	**3**	**20**	**80**	**100**
	BCH 102	Molecular Physiology andcommunity nutrition	**6**	**4**	**Core**	**3**	**20**	**80**	**100**
	BCH 103P	Practical related to BiochemicalPreparations and Analysis	**6**	**4**	**--**	**4**			**100**
	BCH 104P	Practical related to Analyticalmethods	**6**	**4**	**--**	**4**			**100**
	BCH 105	Human values and Professionalethics-I	**6**	**4**	**Compul. Founda**	**3**	**20**	**80**	**100**
	BCH 106	Cell and Biomolecules	**6**	**4**	**Elective foundati**	**3**	**20**	**80**	**100**
		TOTAL	**36**	**24**					**600**

SECOND	BCH 201	Energy metabolism	**6**	**4**	**Core**	**3**	**20**	**80**	**100**
	BCH 202	Metabolism of Nitrogen basedmolecules	**6**	**4**	**Core**	**3**	**20**	**80**	**100**
	BCH 203P	Practical related to Enzymology	**6**	**4**	**--**	**4**			
	BCH 204P	Practical related to MolecularBiology	**6**	**4**	**--**	**4**			
	BCH 205	Human values and Professionalethics-II	**6**	**4**	**Compu Founda**	**3**	**20**	**80**	**100**
	BCH 206	Enzymology	**6**	**4**	**Elective foundat**	**3**	**20**	**80**	**100**
		TOTAL	**36**	**24**					**600**

Semester	**Code**	**Title of the course**	**Hrs/ week**	**No. of Credits**	**Core/ Elective**	**Uni Exams (Hours**	**IA**	**Seme-ster end exam**	**Total Marks**
THIRD	BCH 301	Microbial Biochemistry andGenetics	**6**	**4**	**Core**	**3**	**20**	**80**	**100**
	BCH 302	Molecular Biology	**6**	**4**	**Core**	**3**	**20**	**80**	**100**
	BCH 303P	Practical related to Microbiology	**6**	**4**	**--**	**--**			**100**
	BCH 304P	Practical related to ClinicalBiochemical Analysis	**6**	**4**	**--**	**--**			**100**

	BCH 305 **Generic Elective (Two papersout of three)**	a) Molecular Endocrinology b) Clinical Biochemistry c) Cell and Developmental Biology	**6** **6**	**4** **4**	**elective**	**3** **3**	**20** **20**	**80** **80**	**100** **100**
	BCH 306 Open Elective to others	a) General Biochemistry b) Environmental Biochemistry c) Experimental aspects related to analytical methods	**6** **6**	**4** **4**	**Elective Other dept**	**3** **3**	**20** **20**	**80** **80**	**100** **100**
		TOTAL	**36**	**32**					**800**
FOURTH	BCH 401	Genetic Engineering	6	4	Core	3	20	80	100
	BCH 402	Technical Writing, Biostatistics and Bioinformatics	6	4	Core	3	20	80	100
	BCH 403P	Practical related to Immunology and Hematology	6	4	--	--			100
	BCH 404P	Practical/Project work	6	4	--	--			100
	BCH 405 Generic Elective	a) Immunology b) Applied Biochemistry c) Plant Biochemistry	6 6	4 4	elective	3 3	20 20	80 80	100 100
	BCH 406 Open Elective to others (For other departmen t students)	a) Research Methodology b) Biochemistry of diseases c) Nutritional Biochemistry	6 6	4 4	elective	3 3	20 20	80 80	100 100
		TOTAL	36	32					800

M.Sc. BIOCHEMISTRY

SEMESTER-I

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
BCH-101	Biochemical and biophysical methods	06	4
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To study about the biological relevance of P^H, importance of buffers in biological system and basic principle, instrumentation and applications of microscopy and centrifugation techniques.
2. Knowledge about radioactivity measuring method and their applications in biochemical investigations.
3. To explore the theoretical principles, methodology and biochemical applications of chromatography and electrophoresis techniques.
4. To Understand the importance and applications of spectroscopy techniques in research field.

Course Content:

Unit I

Biological relevance of pH, measurement of pH, pKaof functional groups inbiopolymers such as proteins and nucleic acids. Importance of buffers in biological systems, ion selective electrodes, and oxygen electrode. Donnan membrane equilibrium. Significance of osmotic pressure in biological systems, viscosity and determination of molecular weight using viscometers.

Microscopy: Basic principles of light microscopy, phase contrast microscopy,electron microscopy, and fluorescence microscopy.

Sedimentation methods: Basic principles of centrifugation, preparative, differential and density gradient centrifugations, analytical, ultra centrifugation, applications in the determination of molecular weight, purity of biomolecules and detection of conformational changes of biomolecules. Flow cytometry.

Unit II

Radioactivity: half-life, decay constant, average life, units of radioactivity, Radioactivity measuring techniques, and correction factors. Statistics of counting operations, Radiation dose units, Roentgen, REP, REM maximum permissible dose, Dosimetry and dosimeters; radiation monitoring hazards, Biological effects of radiation, Isotope dilution technique and its application in biochemical investigations. Radioisotopes in biochemistry and medicine. RIA.

Unit III

Theoretical principles, methodology and biochemical applications of separation methods: Counter current distribution, Paper, Thin layer, Reverse phase, absorption, ion exchange, and gas chromatography, affinity chromatography, Gel filtration, HPLC.

Electrophoresis: Paper, agar, immune-electrophoresis, high voltage electrophoresis, SDS-PAGE and isoelectric focusing, Capillary electrophoresis, iso-tachophoresis, Northern blot, Southern blot, Western blot Analyses and development of blots. 2D electrophoresis, Pulse-field gel electrophoresis.

Unit IV

Spectroscopy: Electromagnetic radiations, Beer-Lamberts law principles and applications of colorimetry, spectrophotometry. Concept and biological application of UV, fluorimetry, flame photometry. AAS, AES, Infrared, ESR, NMR spectroscopy, Polarimetry, CD & ORD. Principles and applications of X-ray Diffraction. MALDI- LCMS, Biosensors.

Recommended Books

1. Principles and Techniques of practical Biochemistry. Eds. Williams and Wilson.
2. Techniques in Molecular biology Ed. Walker &Gastra, Croom Helm, 1983.
3. Principles of instrumental analysis, 2nd Ed, Holt-Sanders, 1980.
4. An introduction to spectroscopy for Biochemistry. Ed. Brown S.N., Academic press.
5. Analytical Biochemistry, Holmes and Hazel peck, Longman, 1983.

6. An introduction to practical biochemistry. David T. Plummer, Tata MacGrew-Hill.
7. Biophysical chemistry, Edshall& Wyman, Academic press Vol II & I.
8. A textbook of quantitative inorganic analysis including elementary instrumental analysis, Vogel ELBS.
9. Biochemical calculations Seigel, IH, 2nd Edit, John Wiley &sons Inc., 1983.
10. Analytical Biochemistry by Friefelder David.

Course outcomes: After the completion of this course, the student will be able to

1. Understand the principle, Instrumentation of different types of Light microscopy, electron microscopy, and techniques of Centrifugation and its applications in various fields of research.
2. Learn about basic Radioactivity principles, measurement method and its biological applications.
3. Acquire knowledge about the basics and latest developments in the instrumentation techniques of Electrophoresis (IEF, 2D PAGE) and Chromatography and their applications in various research fields.
4. Demonstrate skill to explain about principle, Bioinstrumentation and applications of spectroscopy techniques.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	-	2	2	3	3
CO_2	3	3	3	3	3	3	3	-	2	2	3	3
CO_3	3	3	3	3	3	3	3	-	2	2	3	3
CO_4	3	3	3	3	3	3	3	-	2	2	3	3

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
BCH-102	Molecular Physiology & Community Nutrition	06	4
Sessional Marks: 20			End Semester Exam Marks: 80

Course Objectives:

1. To study the physiological aspects of circulatory and excretory system.
2. To describe the structure, function and mechanism of muscular system and nervous system.
3. To describe the importance of proteins, lipids in the maintenance of health and gives information about various methods of calculations of protein quality and their deficiency.
4. To explore the knowledge about Nutritional importance in different ages of human health.

Course Content:

Unit I

Circulatory system: Formation and composition of blood. Total and differential counts in blood. Development of erythrocytes, and leukocytes. Platelets. Plasma proteins Blood clotting mechanism. Erythrocyte Sedimentation Rate.

Circulation of blood. Cardiac cycle, Capillary and venous blood flow. Blood pressure Electrocardiogram Blood gas transport and gaseous exchange in tissues. Acid-base balance in lungs. The value of blood pH, PO2, PCO2, Measurements.

Excretory system structure and function of Nephrons. Urine formation; GFR, reabsorption and secretion. Composition. Normal Inorganic and organic constituents' abnormal constituents of urine. Acid-base balance equilibrium maintained by the Kidney.

Unit II

Muscular system: Types of Muscular tissue; structure of striated muscle fiber molecular organization of contractile systems, mechanism of muscle contraction, Regulation and energetics of contraction. Role of calcium.

Nervous system: Outlines of organization of nervous system; blood-brain barrier; Nerve growth factor. Origin of membrane potential. Mechanisms of propagation of nerve impulse of synaptic transmission. Myelin sheath – composition and function; biogenic amines amino acids and Peptides; Neurotransmitters. Transmission at cholinergic adrenergic nerve endings. Electrophysiological methods: PET, MRI, CAT, Sense organs and thermoregulators.

Unit III

Body weight and the body composition. Determination of body fat and body water. Body composition during growth and energy requirements. Measurement of energy expenditure, direct and indirect calorimetry, Respiratory quotient and BMR. Protein nutrition. Essential and non- essential amino acids. Nitrogen balance, methods of calculation of biological value of proteins protein calorie deficiency. Kwashiorkor and Marasmus. Fats as component of diet, measurement of energy value of fats. Essential fatty acids and phospholipids in nutrition.

Unit IV

Vitamins and Minerals: Sources of the vitamins, Requirement of fat-soluble and water-soluble vitamins and their deficiency symptoms. Macro and trace elements in nutrition. Deficiency symptoms and recommended dietary allowances. Special aspects of Nutrition for the infants, children, pregnant and lactating woman and in old age, Importance of Nutrition under stress conditions.

Community Nutrition and Health: Assessment of Nutritional status of community. Anthropometric measurements, clinical examination, Biophysical and Biochemical techniques.

Recommended Books

1. Harper'sBiochemistry.
2. Trace elements by Underwood.
3. Nutrition byM.S.Swaminathan.
4. The book of Human Nutrition (1996) MS. Bamji, N.PrahladRao and V.Reddy.
5. Text Book OF Medical physiology by A.C.Guyton (2001).

Course Outcomes: After the completion of this course, the student will be able to

1. Gain the knowledge about circulatory and excretory systems.
2. Know the importance of muscular and nervous system.
3. Health benefits and malnutrition of proteins and fats.
4. Know the importance of nutrition in maintenance of health and diseases.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	2	2	1	3	2	1	2	2	2	3
CO_2	3	1	2	2	1	3	2	1	2	2	2	3
CO_3	3	1	2	2	1	3	3	1	2	3	3	3
CO_4	3	1	2	2	1	3	3	1	2	3	3	3

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
BCH-103P	Practical's related to Biochemical preparations and Analysis	06	04
End Semester Examination Marks: 100			

Course Objectives:

1. Exposure to basic reactions of biomolecules.
2. To analyse the presence of biomolecules like carbohydrates, proteins, lipids, etc. in known and unknown samples qualitatively.
3. To estimate the proteins, present in biological samples.
4. Isolation studies of biological samples.

Course Content:

PRACTICALS

BCH 103P: BIOCHEMICAL PREPARATIONS AND ANALYSIS-PRACTICALS

1. General reactions of carbohydrates. Specific reactions of different sugars: arabinose, xylose, fructose, galactose, sucrose, maltose and lactose.
2. General reactions of proteins and amino acids. Precipitation reactions of albumins and globulins.
3. General reactions of lipids and cholesterol.
4. Isolation and estimation of cholesterol frombrain.
5. Isolation and estimation of glycogen/starch.
6. Preparation of Casein from milk.
7. Crystallization of albumin.
8. Estimation of proteins in biological samples:
    a. Biuret method.
    b. Folin-Lowry method.
    c. UV method.
    d. Bradford's dye binding method.
9. Titration curve of amino acid and calculation of PK and PI value.

10. Estimation of amino acids by formal titration.
11. Estimation of amino acid by Ninhydrin method.
12. Estimation of tyrosine by Million's –reaction.
13. Identification of N-terminal group of proteins by Sanger's method.
14. Estimation of fructose in Fruit-juice.

Recommended Books

1. Practical Biochemistry by T Plummer
2. Practical Biochemistry by J Jayaraman
3. Klemir and others: practical biological chemistry.
4. A manual of laboratory techniques by NIN, Hyderabad.

Course Outcomes: After the completion of this course, the student will be able to

1. Learn safety and precautionary measures for working in a laboratory.
2. Develop skill and proficiency in preparation of laboratory reagentsand Use of handling of glass wares, minor equipment for conducting experiments
3. Acquire practical training for qualitative and quantitative analysis of biological materials/molecules and their estimation using multiple methods.
4. Gain the knowledge about isolation studies of biological samples.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	2	2	2	3
CO_2	3	3	3	3	3	3	3	1	2	2	2	3
CO_3	3	3	3	3	3	3	3	1	2	2	2	3
CO_4	3	3	3	3	3	3	3	1	2	2	2	3

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
BCH-104P	Practical related to Analytical Methods	06	04
End Semester Exam Marks: 100			

Course Objectives:

1. To understand the concepts of preparation of buffers.
2. The students will obtain hands-on training in basic separation techniques in biochemistry like electrophoresis, chromatography, etc.
3. To Develop competence in handing various centrifugation techniques and apply them in isolating and characterizing different biological molecules.
4. Understanding the applications of centrifugation and chromatography in biological investigations in order to create scientific interest.
5. Gain expertise in the isolation of various biomolecules and organelles.

Course Content:

PRACTICALS

BCH 104P: BIOCHEMICAL & BIOPHYSICAL METHODS

1. Effect of solvent system on the Rf value of two solutes usingTLC.
2. Separation of purines and pyrimidines by Paper Chromatography.
3. Separation of amino acids by Paper Chromatography.
4. Separation of sugars byTLC.
5. Isolation & Characterization of Brain Lipids by Solid phase extraction andTLC.
6. Separation of amino acids by Paper Electrophoresis (Demonstration).
7. Separation of amino acids by Ion-exchange Chromatography (Demonstration).
8. Separation of Serum proteins by PaperElectrophoresis.
9. Measurement of pH of a biological fluid using pH meter.
10. Absorption spectra of phenol red, amino acids and nucleicacid.

11. Verification of Beer's law and determination of molar extinction coefficient using p-nitro phenol.
12. Isolation and spectrophotometric characterization of plantpigments.
13. Isolation of Mitochondria from Rat liver by density gradient centrifugation (Demonstration).
14. Viscosity measurement of Bovine serumalbumin.
15. Measurement of inversion of sucrose by Polarimetry.
16. Measurement of refractive index of biologicalsample.
17. Dialysis.

Recommended Books:

1. Hawk's Physiological chemistry
2. Practical Biochemistry by T Plummer
3. Practical Biochemistry by J Jayaraman
4. Klemir and others: practical Biologicalchemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell.
6. Practical Biochemistry-Sawhney (2000)
7. Varley's Practical clinical Biochemistry–Ed.AlanW. Gowenlock (Heinemann Medical Books).

Course Outcomes:

1. Learn how to standardize various biomolecules.
2. Separate biomolecules by paper chromatography and thin layer chromatography
3. Demonstrate separation of protein by electrophoresis.
4. Isolation and spectrophotometric characterization of plant pigments.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	1	3	3	3	3	3
CO_2	3	3	3	3	3	3	1	3	3	3	3	3
CO_3	3	3	3	3	3	3	1	3	3	3	3	3
CO_4	3	3	3	3	3	3	1	3	3	3	3	3

CourseCode	Semester-I, Course Title	No of Hours Per week	No of Credits
BCH 105	Human values and professional ethics-I	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course objectives:

1. To study the Ethics and its relation with Religion, Politics, Business, Law, Medicine and Environment.
2. Gives information about Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values.
3. To understand the structure Ahimsa, Satya, Brahmacharya, Asteya and Aparigraha etc.
4. To Explore the Bhagavad Gita.
5. To know about Crime and Theories of punishment.

Course content:

Unit I

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics- Goals- Ethical Values in various Professions.

Unit II

Nature of Values – Good and Bad, Ends and Means , Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right , ought, duty, obligation, justice, responsibity and freedom , Good behavior and respect for elders, Character and Conduct.

Unit III

Individual and Society: Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non- stealing). Purusharthas (Cardinal virtues) – Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).

Unit IV

Bhagavad Gita- (a) Niskama Karma (b) Buddhism- The Four Noble Truths- Arya astanga marga,(c) Jainism- mahavratas and anuvratas. Values Embeded in various Religions, ReligiousTolerance, Gandhian Ethics.

Unit V

Crime and Theories of punishment (a) Reformative , Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study

1. John S Mackenjie: A manual of ethics.
2. The Ethics of Management" by Larue Tone Hosmer, Richard .D. Irwin Inc.
3. Management Ethics-integrity at work" by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
4. Ethics in management" by S.A.Sherlekar, Himalaya Publishing House. Harold H. Titus:Ethics for Today.
5. Maitra,S.K: Hindu Ethics.
6. William Lilly : Introduction to Ethics.
7. Sinha : A Manual of Ethics
8. Manu : Manu Dharma Sastra or the Institute of Manu : Comprising the Indian System of Duties: Religious and Civil (ed.) G.C. Haughton.

9. Susruta Samhita : Tr. Kaviraj Kunjalal ,Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varanasi, Vol 1 OO, 16-20, 21-32 and 74- 77 only.

10. Caraka Samhita : Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office , Varanasi Vol 100, 16-20,21-32 and 74-77 only.

11. Ethics:Theory and Contemporary Issues, Barbara Mackinnon Wadsworth/Thomson Learning ,2001.

12. Analysing Moral Issues, Judith A. Boss, Mayfield Publishing Company ,1999.

13. An Introduction to Applied ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications. Text Book for Intermediate logic, Ethics and Human Values .Telugu Academic Hyderabad.

14. I.C.Sharma Ethical Philosophy of India, Nagin & Co Julundhar.

Course Outcomes: After the completion of this course, the student will be able to

1. Easily understand the Need and Importance of Professional Ethics- Goals- Ethical Values in various Professions.
2. Analyse the basic moral concepts- right , ought, duty, obligation, justice, responsibity and freedom.
3. Know about Purusharthas, Dharma, Artha, Kama, Moksha.
4. Understand the Four Noble Truths- Arya astanga marga, Jainism- mahavratas and anuvratas.
5. Gain the knowledge about views on Manu and Yajnavalkya.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	1	1	1	1	1	1	2	3	2	1	1	2
CO_2	1	1	1	1	1	1	2	3	2	1	1	2
CO_3	1	1	1	1	1	1	2	3	2	1	1	2
CO_4	1	1	1	1	1	1	2	3	2	1	1	2
CO_5	1	1	1	1	1	1	2	3	2	1	1	2

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
BCH-106	Cell and Biomolecules– Theory	06	04
Sessional Marks: 20		**End Semester Examination Marks: 80**	

Course Objectives:

1. To study the cell organelles in prokaryotic and eukaryotic cells.
2. Gives information about classification, physico-chemical properties of amino acids and structural organization of proteins.
3. To understand the structure, properties and biological importance of carbohydrates and lipids.
4. Explore the composition and structure of nucleic acids.

Course Content:

Unit I

Prokaryotic and Eukaryotic cells: Cell organelles Structure, Composition and functions of nucleus, mitochondria plastids, endoplasmic reticulum, Golgi, lysomes, vacuole, micro bodies, ribosomes, cytoskeleton. Biomembranes, structure and mechanisms of transport.

Cell division, cell cycle and its regulation, cell signaling, stress response, cell communication, cell adhesion, Apoptosis, Senesence, extracellular matrix, integrins.

Unit II

Origin of basic Biomolecules. Amino acids & Proteins: Classification of amino acids, acid-base properties of amino acids, chemical reactions of amino acids, non-protein amino acids, Peptide bond – Structure and conformation. Naturally occurring peptides.

Classification of proteins – purification and isolation of proteins, criteria of purity of proteins, physico-chemical properties, structural organization of proteins, Elucidation of primary structure, secondary structure,Tertiary structure Quaternary structure, Denaturation & renaturation of proteins. Outlines of Proteomics.

Unit III

Carbohydrates: Definition and classification of carbohydrates, nomenclature, Reaction of Mono- saccharides, Acid derivatives of Monosaccharides amino-sugars, Oligo saccharides, structure, properties and importance of Homo & Hetero polysaccharides.

Lipids: Classification, Physical and chemical properties of fatty acids. Characterization of natural fats & oils, structure and biological role of triaceyl glycerol, phospolipids, sphingolipids, Gangliolipids, Prosta-glandins, Thromboxanes, Leukotrienes and steroids. Killer fat (*Staphylococcu*s killer).

Unit IV

Nucleic acids: Purine and pyramidine bases, nucleosides, nucleotides, polynucleotides, Structure of nucleic acids primary secondary & Tertiary structure of DNA. DNA denaturation and renaturation kinetics

Structure of RNAs – Secondary and Tertiary structure; Analysis of stability to nucleic acid structures, Nucleic acid sequencing –Higher orders of DNA & RNA Structure, chromatin structure; Gene analysis – southern blot technique and its variance. Porphyrins; Types, chemistry and structure of porphyrins. Vitamins, structures and chemistry.

Recommended Books:

1. The biochemistry of Nucleic acids; Adams et al., Chapman and Hall, 1986.
2. Proteins: A guide to study by physical & chemical methods, Haschemeyer and Haschemeyer,
3. Proteins: Structure, function and evolution. Dickerson & Geis, 2ndEdn, Benjamin/Cummings.
4. Biochemistry - Zubay C, Addison – Wesley, 1986.
5. Biochemistry, A problem Approach, 2ndEdn. Wood, W.B. Addison Wesley1981.
6. Biochemistry, Lehninger A. H.
7. Textbook of Biochemistry West, E.S., Todd, Mason &Vanbruggen, Macmillian& Co.
8. Principles of Biochemistry White-A, Handler, PandSmith E.L. Mc Grew Hill.
9. Organic chemistry, I.L. Finar, ELBS. (1985).
10. Organic Chemistry by Morrison and Boyd (2000) PrenticeHall.
11. Fundamentals of Biochemistry by Donald Voet (1999).

Course Outcomes: After the completion of this course, the student will be able to

6. Easily understand the difference between prokaryotic and eukaryotic cells, and the concept of cell division.
7. Understand the classification, structure and biochemical reactions of aminoacidsand proteins.
8. Describe the classification, structure and biochemical reactions of carbohydrates and lipids.
9. Understand the concept of structural organization of nucleic acids.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	1	3	3	1	2	2	3	3
CO_2	3	3	3	2	1	3	3	1	2	2	3	3
CO_3	3	3	3	2	1	3	3	1	2	2	3	3
CO_4	3	3	3	2	1	3	3	1	2	2	3	3

M.Sc. BIOCHEMISTRY

SEMESTER-II

Course Code	Semester-II, Course Title	No of Hours Per week	No of Credits
BCH-**201**	Energy Metabolism	06	4
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To acquire knowledge related to the intermediary metabolism and the role of TCA cycle in central carbon metabolism.
2. To learn basic concepts of Bioenergetics, the importance of high energy compounds, electron transport chain, synthesis of ATP, mechanisms of oxidative phosphorylation and photophosphorylation.
3. To understand the fundamentals of cellular metabolism of carbohydrates their association with variousmetabolic diseases.
4. To learn biosynthesis and degradation of Lipids, fattyacids and cholesterol, Metabolism of lipoproteins and Ketone bodies.

Course Content:

Unit I

Broad outlines of Intermediary metabolism, methods of investigation, in vivo studies such as analysis of excretion, Respiratory exchange, Removal of organs and perfusion studies, in vitro studies such as tissue slice techniques; Homogenates and purified enzyme systems; isotope tracer studies, use of inhibitors and antimetabolites.

Metabolism of carbohydrates: Glycolysis, Fermentation, Feeder path ways (of fructose, galactose and mannose), TCA cycle, HMP shunt, Regulation of glycolysis, pyruvate dehydrogenase complex, and TCA cycle.

Unit II

Bioenergetics: Thermodynamic principles – Chemical equilibria; free energy, enthalpy (H), entropy (S). Free energy change in biological transformations in living systems; High energy

compounds. Energy, change, oxidation-reduction reactions. Organization of electron carriers and enzymes in mitochondria. Classes of electron-transferring enzymes, inhibiters of electron transport.

Oxidative phosphorylation. Uncouplers and inhibitors of oxidative phosphorylation. Mechanism of oxidative phosphorylation. Miotrochondrial transport system. Microsomal electron transport; Photorespiration, cyclic and non-cyclic reactions; photochemical events associated with pigment system – II and I. Utilization of oxygen by oxygenases, Superoxide dismutase and catalase.

Unit III

Uronic acid pathway, metabolism of amino sugars, metabolism of glycogen, starch, sucrose, lactose, glycoproteins. Gluconeogenesis, glyoxylate cycle. Regulation of glycogen metabolism and gluconeogenesis.

Futile cycles in carbohydrate metabolism. Disorders of carbohydrate metabolism – Glycogen, lactose, Fructose.

Unit IV

Biosynthesis and degradation of fatty acids (Saturated and unsaturated) regulation, metabolism of TAG, Glycerol and sphingolipids, cholesterol, prostaglandins.

Biosynthesis and degradation of cholesterol and its regulation. Metabolism of lipoproteins and Ketone bodies.

Recommended Books:

1. Principles of Biochemistry, White. A, Handler, P and Smith.
2. Biochemistry, Lehninger A. L.
3. Biochemistry, David E. Metzler.
4. Biochemistry, LubertStryer.
5. Review of physiological chemistry, Harold A.Harper.
6. Text of Biochemistry, West andTodd.
7. Outlines of Biochemistry, Conn and Stummf.
8. Metabolic pathways –Greenberg.
9. Mitochondria, Munn.
10. Biochemistry, 2nd Edition, G. Zubay.

Course Outcomes: After the completion of this course, the student will be able to

1. Explain the broad outlines of intermediary metabolism and importance of carbohydrate metabolism in life.
2. Describe the importance of Electron transport and ATP production mechanism.
3. Gain in knowledge in Carbohydrate metabolism and their associated disorders.
4. Describe the details of lipid metabolism.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	2	3	2	1	3	2	2	3
CO_2	3	3	3	3	2	3	2	1	2	2	2	3
CO_3	3	3	3	3	2	3	2	1	3	2	2	3
CO_4	3	3	3	3	2	3	2	1	2	2	2	3

Course Code	Semester-II, Course Title	No of Hours Per week	No of Credits
BCH-202	Nitrogen Metabolism	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To study the metabolism of proteins and aminoacids.
2. To learn about aminoacids as biosynthetic precursors.
3. To learn about biosynthesis and degradation of nucleic acids.
4. To understand the effect of toxic chemicals in the environment and concept of carcinogenicity.

Course Content:

Unit I

Metabolism of proteins and amino acids: Introduction, General metabolic reactions of amino acids. Degradation and biosynthesis of individual amino acids in animal, plant, and microbial systems.End products of amino acid metabolism – Krebs Haslett urea cycle.

Biosynthesis and Regulation of amino acids and disorders related to amino acid metabolism. Nitrogen cycle, Non-biological and biological nitrogen fixation, Nitrogenase system, Nif genes.

Unit II

Amino acids as biosynthetic precursors-Formation of creatine, seratonine, histamine, polyamines, melatonine, GABA, melanine, catecholamines. Non-ribosomal peptide synthesis-glutathione, cyclic antibiotics (gramicidin).

Unit III

Metabolism of Nucleic Acids: Biosynthesis and degradation of Purines and regulation of path ways. Biosynthesis and degradation of Pyrimidines and regulation of pathways. Interconversion of nucleotides, Metabolic disorders related to nucleic acid metabolism.

Unit IV

Toxic chemicals in the environment, Mode of entry of toxic substance, Insecticides, MIC

effects, Pesticides, biotransformation of xenobiotics, detoxification. Carcinogens in air, chemical carcinogenicity, mechanism of carcinogenicity, Environmental carcinogenicity testing.

Recommended Books:

1. Principles of Biochemistry, White. A, Handler, P andSmith.
2. Biochemistry, Lehninger A. L.
3. Biochemistry, David E.Metzler.
4. Biochemistry, LubertStryer.
5. Review of physiological chemistry, Harold A.Harper.
6. Outlines of Biochemistry, Conn and Stumpf.
7. Metabolic pathways –Greenberg.
8. Mitochondria, Munn.
9. Biochemistry, 2nd Edition, G. Zubay.
10. Environmental hazards & human health R.B. Philip
11. Toxicology – Principles & applications –Niesink& Jon devries.

Course Outcomes: After the completion of this course, the student will be able to

1. Understand the anabolic and catabolic reactions of proteins and aminoacids.
2. Gain knowledge in the importance of aminoacids as biosynthetic precursors.
3. Know the biosynthesis and degradation of purine and pyramidined and their associated disorders.
4. How toxic chemicals metabolised by the body through detoxification and the mechanism of carcinogenicity.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	3	2	1	2	2	2	3
CO_2	3	3	3	2	2	3	2	1	2	2	2	3
CO_3	3	3	3	2	2	3	2	1	2	2	2	3
CO_4	3	3	3	2	2	3	2	1	2	2	2	3

Course Code	Semester-II, Course Title	No of Hours Per week	No of Credits
BCH-203P	Practical related to Enzymology	06	04
End Semester Exam Marks: 100			

Course Objectives:

1. The lab is designed to train the students in basic techniques of Analytical Biochemistry likeestimation of enzymes from various sources, Enzyme purification and enzyme kinetics.
2. It also deals with the assay of clinically important enzymes and determinationof factor affecting enzyme activity.
3. To demonstrate the Immobilization of enzymes.

Course Content:

BCH 203P: ENZYMOLOGY PRACTICAL

1. Amylase from Saliva.
2. Urease from Horse-gram.
3. Acid phosphatase from Potato.
4. Alkaline phosphatase from Serum.
5. Cholinesterase from Blood.
6. SDH from Liver.
7. Invertase from yeast.
8. Trypsin
9. LDH from Serum (Isoenzymes).
10. Enzyme purification and enzyme kinetics (Determination of Vmax, Km and Ki).
11. Effect of pH, Temperature, Activators, Inhibitors.
12. Immobilization of enzymes (demonstration only).

Recommended Books:

1. Hawk's Physiological chemistry
2. Practical Biochemistry by T Plummer
3. Practical Biochemistry by J Jayaraman
4. Klemir and others: practical Biological chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell
6. Practical Biochemistry-Sawhney (2000)
7. Varley's Practical clinical Biochemistry – Ed. Alan W.Gowenlock (Heinemann, London)

Course Outcomes: After the completion of this course, the student will be able to

1. Learnabout estimation of various enzymes in biological sample.
2. Learn to perform assay of clinically importantenzyme: serum acid and alkaline phosphatase, serum LDH.
3. Learn aboutthe factors affecting enzymeactivity and determination of Km.
4. Demonstrate the Immobilization of enzymes.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	3	2	3	3
CO_2	3	3	3	3	3	3	2	1	3	2	3	3
CO_3	3	3	3	3	3	3	2	1	3	2	3	3
CO_4	3	3	3	3	3	3	2	1	3	2	3	3

Course Code	Semester-II, Course Title	No of Hours Per week	No of Credits
BCH-204P	Molecular biology Practicals	06	04
End Semester Examination Marks: 100			

Course Objectives:

The lab is designed to train the students in basic methods of molecularbiology.

1. To isolate DNA and RNA from bacterial, plant and animal cells.
2. To estimate the DNA and RNA by suitable methods.
3. Transfection studies.
4. Purity determination of DNA by UV absorption method.
5. Detection and differentiation of open circular, linear and closed covalent circular plasmid DNA by submarine gel electrophoresis.
6. Determination of melting temperature (Tm).

Course Contents:

204P: MOLECULAR BIOLOGY PRACTICALS

7. Isolation of DNA from bacterial, plant and animal cells.
8. Estimation of DNA by Diphenylamine method.
9. Isolation RNA from yeast cells.
10. Estimation of RNA BY Orcinol method.
11. Estimation of DNA and purity determination by UV absorption method.
12. Determination of melting temperature (Tm).
13. Isolation of plasmid DNA from E. coli.
14. Detection and differentiation of open circular, linear and closed covalent circular plasmid DNA by submarine gel electrophoresis.
15. Transformation of E. coli with ampicillin resistant plasmid.
16. Trasfection of M13 DNA into E. coliJM103.
17. Isolation of phageM13.
18. Isolation of single and double standard M13DNA.
19. Conjugation: Use of broad host range plasmid RP in demonstrating

conjugation transfer of plasmid bacteria.

20. Catabolite repression: Evidence of B-Galactosidase induction in presence of lactose in E .coli lac strains.

Recommended Books*:*

1. Hawk's Physiological chemistry
2. Practical Biochemistry by T. Plummer
3. Practical Biochemistry by J. Jayaraman
4. Klemir and others: practical Biological chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell
6. Practical Biochemistry-Sawhney (2000)
7. Varley's Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London)

Course Outcomes: The student will be able to

1. Isolate nucleic acids from various sources.
2. Estimate the nucleic acids quantitatively.
3. Determine the melting temperature.
4. Determine the purity of DNA by UV method.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	3	3	3	3
CO_2	3	3	3	3	3	3	3	1	3	3	3	3
CO_3	3	3	3	3	3	3	3	1	3	3	3	3
CO_4	3	3	3	3	3	3	3	1	3	3	3	3

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
BCH 205	Human values and professional ethics-II	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To study about Concept of Human Values like self introspection, self esteem, Family Values etc.
2. Gives information about Medical ethics and moral responsibility of medical practitioners.
3. To understand the Business ethics - Immoral and illegal practices and their solutions.
4. Explore the Environment ethics and Environmental health.
5. To know Ethics of media- Impact of Newspaper, Television, Movies and Internet.

Course Contents:

Unit I

Value Educattion- Defination- relevance to present day- Concept of Human Values- self introspection- Self esteem- Family Values – Components, Structure and responsibilities of family- Neutralization of anger- Adjustability- Treats of famiy life – Status Of women in family and society- Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Unit II

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and Health care professionals. Euthanasia, Ethical obligation to animals, Ethics issues in relation to health care professionals and patients. Social justice in health care, Human cloning, Problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit III

Business ethics- Ethical standards of business- Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit IV

Environment ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justie and Environmental health.

Unit V

Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/ pregnancy. Ethics of media- Impact of Newspaper, Television, Movies and Internet.

Recommended Books:

1. John S Mackenjie: A manual of ethics.
2. The Ethics of Management" by Larue Tone Hosmer, Richard .D. Irwin Inc.
3. Management Ethics-integrity at work" by Joseph A. Petrick and John F. Quinn, Response Books: NewDelhi.
4. Ethics in management" by S.A.Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today.
6. Maitra, S.K: Hindu Ethics.
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu : Comprising the Indian System of Duties:Religious and Civil (ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjalal ,Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II andIII, Varanasi, Vol 1 OO, 16-20, 21-32 and 74- 77 only.
11. Caraka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit SeriesOffice , Varanasi Vol 100, 16-20,21-32 and 74-77 only.

12. Ethics: Theory and Contemporary Issues., Barbara Mackinnon Wadsworth/ Thomson Learning ,2001.
13. Analysing Moral Issues, Judith A. Boss, Mayfield Publishing Company ,1999.
14. An Introduction to Applied ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text Book for Intermediate logic, Ethics and Human Values , board of intermediate Education &Telugu Academic Hyderabad.

Course Outcomes: After the completion of this course, the student will be able to

1. Easily understand the Components, Structure and responsibilities of family and status of women in family and society.
2. To get an idea on Ethical issues in relation to health care professionals and patients and genetic engineering, Social justice in health care, Human cloning.
3. To know about Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.
4. Understand the Ethical theory, Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population.
5. Gain the knowledge about Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/ pregnancy.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	2	2	2	1	1	2	2	3	2	2	2	2
CO_2	2	2	2	1	1	2	2	3	2	2	2	2
CO_3	2	2	2	1	1	2	2	3	2	2	2	2
CO_4	2	2	2	1	1	2	2	3	2	2	2	2
CO_5	2	2	2	1	1	2	2	3	2	2	2	2

CourseCode	Semester-II, Course Title	No of Hours Per week	No of Credits
BCH 206	ENZYMOLOGY	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To study the basic concept of enzymes and their kinetics.
2. Knowledge about different types of enzyme inhibition and Chemical nature of enzyme catalysis.
3. To describe the importance of coenzymes in living organism.
4. To study the allosteric regulation of enzymes.

Course Content:

Unit I

Nomenclature and classification of enzymes according to I.U.B. Convention, specificity and active site. Fundamentals of enzyme assay – enzyme units, coupled kinetic assay. Enzyme localization, Isolation, purification and criteria of purity. Profile of enzyme purification by different separation techniques.

Elements of kinetics – Reaction rates transition state theories free energy change. Methods used in the investigation of kinetics of enzyme-catalyzed reactions – Initial velocity studies and rapid reaction techniques (Continuous flow and Stopped flow). Enzyme kinetics of single substrate reactions, study state assumption, Michales-Menten (Briggs-Haldane), Lineweavar Burk, Eadie Hofstee, and Hanes plots. Pre- steady state kinetics. Effect of pH and temperature.

Unit II

Enzyme inhibition: Types of reversible inhibitors – competitive, non-competitive, un-competitive mixed inhibition and partial inhibition. Substrate inhibition, Feedback inhibition and allostearic inhibition.

Irreversible inhibition. Bisubstrate reactions, Sequential mechanism compulsory order and random order mechanism, non-sequential mechanism, Ping-pong mechanism. Chemical nature of enzyme catalysis: General acid – base catalysis, electrostatic catalysis, covalent catalysis, intermolecular-catalysis, metal ion catalysis, and proximity and orientation.

Unit III

Mechanism of reactions catalyzed by the following enzymes – Chymotrypsin, Trypsin, Carboxypeptidase, Ribonuclease and Lysozyme.

Co-enzymes – the mechanistic role of the following co-enzymes in enzyme catalyzed reactions – Nicotinamide nucleotides, Flavin nucleotides, Co-enzymes A, Lipoic acid, Thiamine pyrophosphate, Biotin, Tetrahydrofolate and Co-enzyme B12. Modern concepts of evaluation of catalysis-catalytic RNA (Ribozyme), abzymes (catalytic antibodies), Synzymes (Synthetic enzymes), Site-directed mutagenesis.

Unit IV

Monomeric enzymes – the Serine proteases, Zymogen activation, Oligomeric enzymes – Isoenzymes (LDH) and multienzyme complexes (pyruvate dehydrogenase complex).Covalent modification (Glycogen phosphorylase, Glutamine synthase, Chymotrypsin).

Allosteary of enzyme action; Binding of ligands to proteins Co-operativity, the Hill Plot for Myoglobin and Hemoglobin, Sigmoidal kinetics: The MWC and KNF models. Significance of sigmoidal behavior. Study of ATCase a typical allostearic enzyme.

Recommended Books:

1. Enzyme structure and mechanism. Alan Fersht, Freeman & Co.1997
2. Principles of enzymology for food sciences: Whitaker Marc Dekker1972.
3. Methods in enzymology Ed. Colowick and Kaplan, Academic Pr (Continuing series)
4. Text book of Biochemistry with clinical correlations (4th edition)-Thomas M. Devlin.
5. Biological chemistry; H.R. Mehler& E.H CordesHarper&Rev.
6. Enzyme kinetics Siegel interscience – Wiley1976.
7. Biochemistry chemical reactions of living cells (2001) David E. Matzler. Vol. I.

Course Outcomes: After the completion of this course, the student will be able to

1. Distinguish the fundamentals of enzyme properties, nomenclatures, characteristics and mechanisms.
2. Describe the concepts of enzyme inhibition and mechanism of enzyme catalysis.
3. Students will acquaint with mechanism of enzyme action and various coenzymes involved in the biochemical reactions taking place in living systems.
4. Describe the concepts of co-operative behavior and allosteric regulation.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	2	2	3	1	1	2	1	1	2
CO_2	3	3	2	2	2	3	1	1	2	1	1	2
CO_3	3	3	2	2	2	3	1	1	2	1	1	2
CO_4	3	3	2	2	2	3	1	1	2	1	1	2

M.Sc. BIOCHEMISTRY

SEMESTER-III

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-301	Microbial Biochemistry andGenetics	06	04
Sessional Marks: 20		**End Semester Examination Marks: 80**	

Course Objectives:

1. The objective of the course is learning and understanding the fundamentals of Microbiology like important characteristics and biology of bacteria, fungi, mycoplasma, viruses etc. and to learn basic knowledge about control methods of microorganisms and industrial application of microbes for water and sewage treatment.
2. Designed to learn nutritional requirements in microorganisms and virus classification, morphology and Methods of culturing of viruses, Isolation, purification and characterization.
3. The objectives of the course are to learn and understand the fundamentals of genetics like DNA as genetic material, chromosome and gene and understand the gene arrangement in prokaryotes and eukaryotes.
4. To learn and understand the concept of bacterial genetics and detailed information about Mutation

Course Content:

Unit I

Microorganisms and their place in the living World; Historical developments of microbiology (Spontaneous generation, Germ theory of disease and Koch's postulates). Nomenclature and broad classification of bacteria as per Bergey's manual of systematic bacteriology; General characteristics of Actinomycetes, Rickettsiae, Mycoplasms, Spirochetes. Difference between prokaryotic and eukaryotic cells. Ultra structure of bacterium and endospore. Nucleic acid and

16s RNA based classification.

Nutritional requirements in microorganisms: Modes of nutrition – phototrophy, chemotrophy, methylotrophy, organotrophy, mixotrophy, saprophytic, symbiotic and parastitic modes of nutrition. Isolation of microorganisms – Direct and indirect Methods of maintenance of culture. Growth and kinetics of bacterial cells; Normal and biphasic growth curve, batch and continuous cultures, chemostats. Preservation of cultures (glycerol stocks, freeze drying), Culture collection centers in India.

Unit II

Control of microorganisms: Fundamentals of control, control by physical and chemical agents. Antibiotics and other chemotherapeutic agents. Microbiology of Food, Water, Sewage and Biogas. Water and Sewage treatment. Food and water-borne infections, Bacteriological and Viral standards of water. Estimation of BOD and COD and their importance. Outlines of the Ames Test.

Introduction to Virology: Classification, Morphology, size, ultra structure and life cycle of some representative viruses (ØX 174, T4, SV40, λ-Phase, M13 and HIV). Methods of culturing of viruses, Isolation, purification and characterization. Biology of subviral agents – Viroids, Prions, Satellite viruses.

Unit III

Genetic material – Direct and Indirect evidences of DNA as genetic material, experimental proof. Evidences of RNA as genetic material – eg. Virus.

Chromosome - Chromosome and genes, chromosomal replication, genetic mapping of chromosomes, structure of chromatin - nucleosomes and higher orders of organization, chromosome banding, transposition in human chromosome and chromosomal abnormalities.

Gene – arrangements in prokaryotes and eukaryotes. Gene structure in eukaryotic organisms, introns, exons, pseudogenes, and gene clusters, spacers, repetitive sequences. Single and multiple copy genes in eukaryotes, eg – Histones, Alu, copia, satellite. Mapping of human genes – techniques used, assignment of important genes. Gene regulatory mechanisms and cell memory. Mechanism of recombination, extra nuclear inheritance. Non-coding explosion, cell fate determination and reprogramming. Genetic technique for Archea. New gene evolution, Tiniest genome of proteobacteria and bacteriodates.

Unit IV

Bacterial genetics – Bacterial chromosomes, plasmids – fertility, resistance, colicinogenic and other, PBR322 and other synthetic plasmids - isolation and uses. Transposable genetic elements, transformation, transduction, and conjugation in bacteria. Linkage map of bacterial chromosome. Recombination in bacteria.

Structure of Bacteriophages and their use in the study of molecular genetics – lytic cycle-replication of T-phages, Lysogeny and its regulation. Transduction – specialized, generalized and abortive. Transfection and cosmids. Fine structure analysis of T- phages, Benzers work and concept of cistrons. Bacterial defence (CRISPR- Gene turning on)

Mutation – Types of mutations, mutagens, mechanism of mutation, Mutagenesis, induction and isolation of mutants. Haploid genetic tools. Radiation effects on human heredity. Phylogenetic inheritance. Heretability and its measurements and mapping .gene duplication and self incompatibility.

Recommended Books:

1. Microbiology by Pelczar, Chan and Krieg 5th edn. 1995 Mc Grew- Hill.
2. General Microbiology: Boyd, R.F., Times Mirror/ Mosby College, 1984.
3. A Textbook of Microbiology, R.C.Dubey and D.K.Maheswari, S.Chand Co (2001).
4. Pharmaceutical Microbiology, By Hugo and Russell, Blackwell Scientific (1987).
5. An Introduction to Viruses by S.B.Biswas, Vikas Publishing house.
6. Microbiology 4th edition, Prescott, Harley, Klein (Mc grew Hill)
7. Fundamentals of Microbiology – M. Frebisher.
8. Text book of Microbiology – William Burrows.
9. Biology of Microorganisms – Sandes T. Lyles
10. Microbial Ecology – Atlas (2001).
11. Molecular Genetics by D Friefelder
12. Cell molecular biology, Albert Bruce
13. Gene VII by Lewin
14. Molecular cloning by Maniatis and Co Vol I, II, III
15. Genetics by Gardner

Course Outcomes: After the completion of this course, the student will be able to

1. Understand the basics of microbiology like nomenclature and classification of microorganisms, understand the various biological and non-biological method to control microorganisms
2. The student will learn about different mode of nutrition in microorganisms and about viruses - Isolation, purification and characterization.
3. Understand the basics of genetics and the gene arrangement in prokaryotes and eukaryotes.
4. Gain knowledge in bacterial genetics includes the different types plasmids, recombination in bacteria, bacteriophages and bacterial defense mechanism(CRISPR) and Describe the various types of mutations and its effect.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	2	2	3	1	2	2	2	3
CO_2	3	3	3	3	2	3	3	1	2	2	3	3
CO_3	3	3	3	3	2	2	3	1	2	2	3	3
CO_4	3	3	3	3	2	2	3	1	2	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-302	Molecular Biology	06	04
Sessional Marks: 20		**End Semester Examination Marks: 80**	

Course Objectives:

1. The objective of the course is learning and understanding the fundamentals of DNA replication and its mechanism.
2. Complete information about RNA synthesis in prokaryotes and eukaryotes.
3. To understand the genetic code.
4. Detailed accounts on the biosynthesis and mechanism of protein synthesis.

Course Content:

Unit I

Isolation, fractionation, characterization of nucleic acids, properties of nucleic acids in solution. DNA synthesis and repair - Topology of DNA, conservative, semi conservative and discontinuous synthesis of DNA, DNA primer for DNA synthesis. DNA polymerases I, II, III – their role in DNA synthesis. DNA ligase - mechanism of its action and its role in DNA synthesis. Inhibition of DNA synthesis, fidelity of replication. Alternate lengthening of telomere. Nearest neighbor frequency analysis.

Mechanism of replication of *E. coli* DNA. Role of DNA binding proteins – Histones in Eukaryotes, SSB in prokaryotes. Replication of lambda phage DNA, phage T-7 and single stranded DNA, the rolling circle model of replication of DNA. Mitochondrial replication, transcriptional switch.

Unit II

RNA synthesis and processing: RNA polymerases in prokaryotes and eukaryotes. Molecular composition of prokaryote RNA polymerase. Mechanism of transcription. Role of various compounds on RNA polymerases. Inhibitors of RNA synthesis. Biosynthesis of prokaryotic and Eukaryotic m-RNA, r-RNA, and t-RNA.

Processing of RNA- post transcriptional modifications, capping, adenylation and splicing.

Role of the hn RNA, sn RNA and sn RNP in processing of RNA. Functions and information content of DNA methylation, Transcriptional transcript RNA, template DNA, recombination

and silencing repair in yeast, sRNA and gene regulation.

Unit III

Genetic code: General features of the code, Deciphering of the genetic code – Nirenberg and Khorana's work. Central dogma in the molecular biology and its verification.

Colinerarity of gene and protein. Wobble hypothesis and deviation from wobble hypothesis. Mitochondrial genetic code and evolution of genetic code. RNA editing and evolution.

Unit IV

Biosynthesis and mechanism of protein synthesis: Different stages and components of protein synthesis, m RNA and t RNA. Amino acid activation, protein chain initiation, elongation, and termination. Ribosomes and types, molecular components of ribosomes. Assembly and dissociation of subunits

Inhibitors of prokaryotic translation. Post – translational modification of proteins. Synthesis of secretory and membrane proteins – signal sequence hypothesis. Mechanism of translation control. Proteins local synthesis and disposal.

Recommended Books:

1. Molecular Biology of the gene by Watson.
2. Genetics by G Zubay.
3. Molecular Biology of the Cell by Albert Bruce.
4. Cell molecular Biology by Baltimore.
5. Molecular Biology by D Friefelder.
6. Molecular Genetics by D Friefelder.
7. Genes VII Benjamin Lewin (2000). Oxford Univ. Press. London.
8. Cell and Molecular Biology 2ndEdit. (2002) By P. K. Gupta, Rastogi Publ.

Course Outcomes: After the completion of this course, the student will be able to

1. The students will learn about the Possible modes of replication, and roles of helicase, primase, gyrase, topoisomerase, DNA Polymerase, DNA ligase, and Regulation of replication.
2. Learnabout the mechanism and regulation of transcription in prokaryotes

and eukaryotes.

3. Learnabout genetic code and their evolution.
4. Gain knowledge in Different stages and components of protein synthesis.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	3	2	2	3
CO_2	3	3	3	3	3	3	2	1	3	2	2	3
CO_3	3	3	3	3	3	3	2	1	3	2	2	3
CO_4	3	3	3	3	3	3	2	1	3	2	2	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-303P	Practical related to Microbiology	06	04
End Semester Examination Marks: 100			

Course Objectives:

1. The lab is designed to train the students in handling of microscope.
2. It also deals with microbial techniques of isolation, purification and maintenance of microbial cultures.
3. To learn Staining techniques for bacteria and yeast.
4. To Prepare wine from Grapes.
5. Production and estimation of alcohols, citric acid, lactic acid etc..

Course Content:

BCH 303P: MICROBIOLOGY PRACTICALS

1. Handling of Microscopes: Calibration of Microscopes.
2. Sterilization techniques: Autoclaving (Moistened-heat), Oven sterilization (dry-heat), Filtration,
3. UV irradiation and Chemical.
4. Preparation of media: For Bacteria and Fungi.
5. Isolation and cultivation of pure cultures: Serial dilution, Pour plate method, Spread plate method and streak plate method.
6. Methods for the estimation of Growth (Growth rate and generation time in bacteria).
7. Staining techniques for bacteria and yeast: Gram Staining and Spore staining for bacteria; Methylene blue staining for Yeast.Antibiotic sensitivity test.
8. Starch hydrolysis assay for the identification amylase-producing microorganisms.

9. Gelatin hydrolysis assay for the identification protease-producing microorganisms.
10. Preparation of wine from Grapes.
11. Production of Alcohol from molasses and its estimation by specific gravity method.
12. Production of Citric acid and its estimation by Marrier and Boulet method.
13. Production of Lactic acid and its estimation by Barker and Summerson method.
14. Induction of mutation in bacteria using physical and chemical mutagens.
15. Water analysis for bacteria and determination of BOD and COD of water.
16. Observation of Rizobium from root nodules of ground nut plant.
17. Isolation of phages from sewage and quantification by plaque assay.

Recommended Books

1. Hawk's Physiological chemistry
2. Practical Biochemistry by T Plummer
3. Practical Biochemistry by J Jayaraman
4. Klemir and others: practical Biological chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell
6. Practical Biochemistry-Sawhney (2000)
7. Varley's Practical clinical Biochemistry – Ed. Alan W.Gowenlock (Heinemann Medical Books)

Course Outcomes: After the completion of this course, the student will be able to

1. Handle the microscope.
2. Learn Methods of sterilization and preparation of various culture media, Purification techniques.
3. Identification of isolated bacteria, and Growth curve of microorganism.

4. Learn Staining techniques for bacteria and yeast.
5. Gain knowledge in the Preparation of wine from Grapes.
6. Production and estimation of alcohols, citric acid, lactic acid etc.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	2	2	3	3
CO_2	3	3	3	3	3	3	3	1	2	2	3	3
CO_3	3	3	3	3	3	3	3	1	2	2	3	3
CO_4	3	3	3	3	3	3	3	1	2	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-304P	Clinical biochemistry practicals	06	04
			End Semester Exam Marks: 100

Course Objectives: The lab is designed to train the students

1. To collect and maintain the biological samples for clinical assays.
2. Estimation of clinical enzymes.
3. To analyze urine sample qualitatively to identify the abnormalities.
4. Demonstration of diagnostic kits.

Course Contents:

BCH 304P: CLINICAL BIOCHEMISTRY PRACTICALS

1. Estimation of blood glucose.
2. Estimation of blood urea.
3. Estimation of creatine in serum.
4. Estimation of uric acid in serum.
5. Estimation of serum total protein.
6. Estimation of Serum albumin.
7. Estimation of Serum cholesterol.
8. Determination of SGOT.
9. Determination of SGPT.
10. Estimation of serum calcium.
11. Estimation of serum phosphate.
12. Estimation of serum bilirubin.
13. Determination of urine ascorbic acid.
14. Tests for abnormal constituents in urine.
15. Use of diagnostic kits.

Recommended Books:

1. Practical Biochemistry by T. Plummer
2. Practical Biochemistry by J. Jayaraman
3. Klemir and others: practical Biological chemistry.
4. Practical Biochemistry – Koch and Hank Dunn and Drell
5. Microbiology laboratory Manual (2001) by Aneja, K.M
6. Laboratory Manual in Microbiology by P. Gunasekaran (1996), New Age Publ.
7. Microbiology laboratory Manual (2001) by Aneja, K.M

Course Outcomes: The student will be able to

1. Collect and maintain the biological samples for clinical assay.
2. Estimate the blood and serum enzymes for diagnosis of diseases.
3. Qualitatively analyse the abnormal constituents in urine.
4. Work with diagnostic kits.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	3	3	3	3
CO_2	3	3	3	3	3	3	3	1	3	3	3	3
CO_3	3	3	3	3	3	3	3	1	3	3	3	3
CO_4	3	3	3	3	3	3	3	1	3	3	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-305a	Endocrinology (Generic Elective)	06	4
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To impart knowledge on structure and hormones secreted by hypothalamus, pituitary and pineal glands.
2. To familiarize the concepts of biosynthesis and regulation of secretion of thyroid, parathyroid and calcitonin hormones.
3. To make them understand the chemistry, biosynthesis, secretion, regulation of Hormones of Pancreas and Gastro intestinal hormones.
4. To impart knowledge of Sex hormones, hcg, Miscellaneous hormones and Insect molting hormones.

Course Contents:

Unit I

History and Introduction to Endocrinology, Classification, chemistry, biosynthesis, secretion, regulation, transport and general mechanisms of actions of Hormones, bio-assay, chemical, RIA, ELISA.

Hormones of the pituitary, hypothalamus and pineal body: Growth hormone. Adrenocorticotropic hormone, Thyroid stimulating hormone, leutinizing hormone, Follicular stimulating hormone, prolactin, oxytocin, antidiuretic hormone. Their structure, storage, regulation of secretion, mechanism of action and their actions. Structure secretion and actions of hypothalamic releasing hormones and inhibitory hormones. Pineal hormones: Melatonin and serotonin.

Unit II

Hormones of the Thyroid and parathyroid gland: Iodine metabolism, Biosynthesis of thyroid hormones, regulation of secretion. Possible mechanism of action and general functions.

Metabolism at target cells and excretion.

Calcitonin and parathyroid hormone. Role of calcitonin in calcium and phosphate homeostasis in blood. Disorders of thyroid and parathyroid.

Unit III

Hormones of Pancreas and Gastro intestinal hormones: Chemistry, biosynthesis and secretion of insulin and glucagon. Actions of insulin and glucagon on Carbohydrate, lipid and protein metabolism.Gastrin, secretin, pancreozymin Cholecystokinin etc Adrenal hormones, Structure, biosynthesis metabolism, excretion and actions of adrenaline and noradrenaline.

Corticosteroids: Biosynthesis, secretion, actions, metabolism and excretion of cortisone Cortisol, corticosterone, deoxycorticosterone and aldosterone. Disorders of pancreas and adrenal glands.

Unit IV

Sex hormones (Hormones of Reproduction): Testosterone and inhibin. Estrogens, Progesterone and relaxin Human chorionic gonadotropin; Human placental lactogen, Hormonal regulation of menstrual cycle, contraceptions. Disorders associated with Gonadal hormones.

Miscellaneous hormones: Thymosin – synthesis and actions. Insect molting hormones – (ecdysone) Plant hormones – Auxins, gibberellins, ethylene, and abscissic acid, Pheromones.

Recommended Books:

1. Text book of biochemistry and human biology. Talwar G. P. Prentice Hall India.
2. Human physiology and mechanism of distance–Guyton 3rdedn. Igkushoen /Seunders.
3. Clinical Biochemistry Vols. 1 and 2: Williams et al Heinemann Medical 1978.
4. Lynchs Medical Laboratory Technology Raphael, S.S., 4thedn. Igkushoe /Saunders.
5. Text book of Endocrinology – William.
6. General endocrinology –Turner.

7. Biochemical endocrinology of the vertebrates by E. Fruden and H.Lines.
8. Foundation of modern Biochemical series, prentice Hall Inc.1971.
9. Metabolic and endocrine physiology: By Jay Teppermann.
10. Metabolic pathways –Greenberg.
11. Intermediary metabolism and its regulation –Larner.
12. Principles of Biochemistry, White, A, Handler, P and Smith.
13. Receptors and hormone action 1977.
14. Receptors and recognition series.

Course Outcomes: The student will be able to

1. Know about the mechanism of action of different hormones secreted by hypothalamus, pituitary and pineal glands.
2. Familiar with Iodine, Calcium metabolisms and disorders related to thyroid and parathyroid glands.
3. Know about the mechanism of action of insulin, glucagon and many gastro intestinal hormones.
4. Acquire knowledge on Hormonal regulation of menstrual cycle and disorders associated with Gonadal hormones.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	3	2	3	3
CO_2	3	3	3	3	3	3	2	1	3	2	3	3
CO_3	3	3	3	3	3	3	2	1	3	2	3	3
CO_4	3	3	3	3	3	3	2	1	3	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-305b	Clinical Biochemistry	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. The main objective of this skill oriented course is to learn and understand the fundamentals of clinical biochemistry, Collection and preservation of specimens and Assays of Carbohydrate Metabolism associated clinical conditions/diseases.
2. To impart knowledge of Inborn errors of amino acid metabolism, investigation of lipid metabolism and functioning of renal system.
3. To understand Clinical application of plasma enzyme assays and Disorders of Gastrointestinal Tract.
4. To acquire knowledge of biochemical aspects of Liver diseases.

Course Contents:

Unit I

Introduction to Clinical Biochemistry: Introduction and maintenance of clinical biochemistry laboratory; azards in clinical biochemistry laboratory; units; 'normal range', reference values. Factors affecting reference values quality control in laboratory – use of external and internal standards; use of WHO standards. Selection of analytical methods. Automation in clinical laboratory. Collection and preservation of specimens.

Disorders of Carbohydrate Metabolism: Importance of extra cellular glucose; blood glucose homeostasis– role of tissues and hormones; hyperglycemia and hypoglycemia. Diabetes mellitus – classification, etiology, clinical and laboratory features. Diagnosis of diabetes mellitus – glucose tolerance test, random fasting and post- prondial glucose levels, glycosuria, ketone bodies, glycosylated hemoglobin, plasma insulin. Metabolic complications – diabetic hyperglycemic coma and nonketotic coma; lactic acidosis; atherosclerosis, neuropathy. Hypolycemia – fasting and provoked; diagnosis – stimulation tests (I.V. glucagon and leucine test); extended G.T.T; hypoglycemia in children – neonatal and early infancy. Investigation of glycogen storage diseases, galactosemia, hereditary fructosuria,

lactose intolerance.

Unit II

Inborn errors of amino acid metabolism – Phenylketonuria, alkaptonuria, Hartnup's maple-syrup urine disease, Plasma proteins in health and changes in diseases; paraproteinaemias; proteinuria. Lipid metabolism: Plasma lipids and lipoproteins and their functions. Hyperlipo-proteincmias; Classification – primary and secondary. Investigation of lipoproteinemias and lipidemias.

Renal function: Glomerular and tubular functions. Tests for evaluation – concentration, dilution, excretion, clearance tests, nephritic syndrome.

Unit III

Clinical Enzymology: Plasma enzyme in diagnosis and prognosis – aminotransferases, creatine kinase, LDH, alpha amylase, phosphatases, choline esterase, glucose 6-phosphate dehydrogenase, Gama glutamyl transferase. Isozymes of LDH alkaline phosphatase. Clinical application of plasma enzyme assays in myocardial infraction, liver disease, and muscle disease.

Disorders of Gastrointestinal Tract: Gastric function. Stimulation of gastric secretion. Composition of gastric secretion. Test for gastric function – fractional test meal. Pentagastrin test, insulin stimulation tests; hyperchlorohydria, achlorohydria, achyliagastrica. Pancreatic exocrine secretion – composition.Duodenal contents – collection, examination following stimulation of pancreas; analysis; malabsorption syndrome due to intestinal disease and pancreatic dysfunction, differential diagnosis.Disaccharides deficiency.

Unit IV

Biochemical aspects of Liver disease: Bile acid metabolism and bile formation.Bilirubin metabolism: biosynthesis, transport, hepatic uptake and transport, conjugation and excretion, enterohepatic circulation. Liver function tests related to protein, carbohydrate, lipid, pigment metabolism, detoxification and excretion. Serum enzymes in liver disease. Jaundice – classification and differential diagnosis. Kermicterus. Hydrogen ion homeostasis: Blood buffers, bicarbonate-buffering system. Role of Kidney. Red cells, lungs, acidosis and alkalosis.

Recommended Books:

1. Essentials of Food and Nutrition, Vol. I & II, M. S. Swaminathan.
2. Text Book of Biochemistry with clinical correlations. Thomas M. Devlin (JohnWily).
3. Harper's Review of Biochemistry, Murray et al. (Longman).
4. Biochemical aspects of human disease – R.S. Elkeles and A.S. Tavil. (Blackwell ScientificPublications).
5. Clinical chemistry in diagnosis and treatment–JoanF.Zilva and P.R.Pannall (Lloyd-Luke Medical Books.
6. Varley's Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London, 1988).
7. Clinical diagnosis and management by Lab methods (John Bernard Henry, W.B. Salunders Company, 1984).
8. Clinical Biochemistry – S. Ramakrishnan and Rajiswami.
9. Chemical Biochemistry (Metabolic and clinical aspects) by W. J. Marshall & S. K. Bangert.
10. Text book of clinical Biochemistry by Tietz et al.

Course Outcomes: The student will be able to

1. Maintain clinical biochemistry laboratory, biological specimen collection for clinical assay and investigation of disorders associated with carbohydrates.
2. Learn and understand the Inborn errors of amino acid metabolism, Lipid metabolism and Renal function system.
3. Gain knowledge in clinical enzymology and Disorders of Gastrointestinal Tract.
4. Investigate the serum enzymes in liver diseases.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	1	3	3	3	3
CO_2	3	3	3	3	3	3	3	1	3	3	3	3
CO_3	3	3	3	3	3	3	3	1	3	3	3	3
CO_4	3	3	3	3	3	3	3	1	3	3	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-305c	Cell and Developmental Biology	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To explore the knowledge and awareness of the basic principles and concepts of Developmental Biology.
2. To familiarize with the concepts Gametogenesis, fertilization and early development.
3. To impart knowledge about Morphogenesis and organogenesis in animals and in plants.
4. To understand the concept of biomembranes and membrane transport.

Course Contents:

Unit I

Origin of cells and unicellular evolution. Prokaryotic and Eukaryotic cells: Structure, Composition and functions of nucleus, mitochondria plastids, endoplasmic reticulum, golgi, lysomes, vacuole, micro bodies, ribosomes, cytoskeleton.

Cell division, cell cycle and its regulation, cell signaling, stress response, cell communication, cell adhesion, Apoptosis, Senesence, extracellular matrix, integrins.

Unit II

Basic concepts of development: Potency, commitment, specification, induction, competence, determination and differentiation; morphogenetic gradients; cell fate and cell lineages; stem cells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development.

Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination.

Unit III

Morphogenesis and organogenesis in animals: Cell aggregation and differentiation *Drosophila*, amphibia and chick; organogenesis limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development-larval formation, metamorphosis; environmental regulation of normal development; sex determination.

Morphogenesis and organogenesis in plants: Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum.*

Unit IV

Biomembranes: Chemical composition of Membranes, Composition of plasma and organelle membranes of animal and plant cells. Lipids, proteins and Carbohydrates of membranes Distribution of membrane lipids. Assembly of membrane components. Molecular structure of membranes: Miscelle, and liposomes, biological membrane; Symmetry of the membrane; Membrane fluidity; fluid mosaic model of biological membranes. Nanomaterilas and their applications.

Membrane Transport: Donnan membrane equilibrium, Diffusion across cellular membranes Mediated transport; Energetics of transport systems; Passive transport anion exchange proteins; Active transport; Active transport of Na+ K+ (Sodium potassium ATPase) Ca_2+ (Ca_2+-ATPase). Active transport of sugars coupled to Phosphorylation; group translocation (Y-Glutamyl cycle). Proton motive force in bacterial transport processes. Ionophores Gap junctions; Endocytosis, Exocytosis. Nature of receptors.

Recommended Books:

1. Molecular Biology of the cells by Alberts *et al* (1994).
2. Cell and Molecular Biology (2001) by EDP de Robertis and EMF de Robertis.
3. Text Book OF medical physiology by A.C.Guyton (2001).
4. Cell and Molecular Biology 2nd Edit. (2002) By P.K.Gupta, Rastogi Publ.

Course Outcomes: The student will be able to

1. Acquire knowledge on basic concepts of Developmental Biology.
2. Gain the proficient knowledge about zygote formation, blastula formation, gastrulation and many events in early development.
3. Understand Organogenesis, limb development and regeneration in vertebrates, and post embryonic development in animals and Plant tissue culture,

Protoplast fusion and Production of transgenic plants.

4. Acquire knowledge about biomembrane concept and various membrane transport systems.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	2	3	2	3	3
CO_2	3	3	3	3	3	3	2	2	3	2	3	3
CO_3	3	3	3	3	3	3	2	2	3	2	3	3
CO_4	3	3	3	3	3	3	2	2	3	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-306a (Open elective)	General biochemistry	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. Gives information about classification, physico-chemical properties of amino acids and structural organization of proteins.
2. To understand the structure, properties and biological importance of carbohydrates and lipids.
3. Explore the composition and structure of nucleic acids.
4. Structure of porphyrins, Chemistry and functions of water and fat soluble vitamins.

Course Content:

Unit I

Amino acids & Proteins: Classification of amino acids, acid-base properties of amino acids, chemical reactions of amino acids, non-protein amino acids, Peptide bond –Structure and conformation. Naturally occurring peptides. Classification of proteins – purification and isolation of proteins, criteria of purity of proteins, physico-chemical properties, structural organization of proteins, Elucidation of primary structure, secondary structure, , Tertiary structure Quaternary structure, Denaturation & renaturation of proteins. Outlines of Proteomics.

Unit II

Carbohydrates: Definition and classification of carbohydrates, nomenclature, Reaction of Mono- saccharides, Acid derivatives of Monosaccharides amino-sugars, Oligo saccharides, structure, properties and importance of Homo & Hetero polysaccharides

Lipids: Classification, Physical and chemical properties of fatty acids. Characterization of natural fats & oils, structure and biological role of triaceyl glycerol, phospolipids, sphingolipids, Gangliolipids, Prosta- glandins, Thromboxanes, Leukotrienes and steroids. Killer fat (Staphylococcus killer)

Unit III

Isolation, fractionation, characterization of nucleic acids, properties of nucleic acids in solution. Structure of nucleic acids – primary – purine and pyramidine bases, nucleosides, nucleotides, polynucleotides; secondary & Tertiary structure of DNA; structure of RNAs – Secondary and Tertiary structure; Analysis of stability to nucleic acid structures. DNA denaturation and renaturation kinetics, Nucleic acid sequencing –Higher orders of DNA & RNA Structure, chromatin structure; Gene analysis – southern blot technique and its variance. Proteomics and genomics.

Unit IV

Structure of porphyrins; Protoporphyrin, porphobilinogen properties Identification of Porphyrins, Structure of metalloporphyrins – Heme, cytochromes and chlorophylls. Chemistry and functions of water and fat soluble vitamins. Circadian clock.

Recommended Books:

1. Glycoproteins by Hughes R.C., Chapman & Holl, 1983.
2. Biochemistry – Mechanisms of metabolism Cunningham, E.B., Mc Grew – Hill, 1978.
3. Nucleic acid – Chargaff & Davidson Vol. II.
4. The biochemistry of Nucleic acids; Adams et al., Chapman and Hall, 1986.
5. Proteins: A guide to study by physical & chemical methods, Haschemeyer and Haschemeyer, Wiley, New York, 1973.
6. Proteins: Structure, function and evolution. Dickerson & Geis, 2nd Edn, Benjamin / Cummings, Menlo Park, California 1983.
7. The proteins: Neurath and Hill, 3rd Edn. Academic New York, 1977.
8. Biochemistry - Zubay C, Addison – Wesley, 1986.
9. Biochemistry, A problem Approach, 2nd Edn. Wood, W.B. Addison Wesley1981.
10. Biochemistry of Lipids and Membranes - Vance D, Addison-Wesley, 1985.

Course Outcomes: After the completion of this course, the student will be able to

1. Understand the classification, structure and biochemical reactions of aminoacidsand proteins.
2. Describe the classification, structure and biochemical reactions of carbohydrates and lipids.
3. Understand the concept of structural organization of nucleic acids.
4. Describe the Structure of porphyrins, Chemistry and functions of water and fat soluble vitamins.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	1	3	3	1	2	2	3	3
CO_2	3	3	3	2	1	3	3	1	2	2	3	3
CO_3	3	3	3	2	1	3	3	1	2	2	3	3
CO_4	3	3	3	2	1	3	3	1	2	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-306b (Open elective)	Environmental biochemistry	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To differentiate between renewable and non-renewable resources and conservation of natural resources.
2. To Describe the different types of ecosystems.
3. Explore the details about various types of environmental pollution.
4. Importance of environment in human population.

Course Contents:

Unit I

Renewable and non-renewable resources. Definition, scope and importance, need for public awareness Forest resources: Use and over-exploitation, deforestation, case studies.

Water resources, Mineral resources, Food resources, Food resources, Energy resources, Role of an individual in conservation of natural resources.

Unit II

Ecosystems, Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems and Biodiversity and its conservation

Unit III

Environmental Pollution Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution,

Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.

Unit IV

Human Population and the Environment, Population growth, variation among nations, Population explosion –Family Welfare Programme.

Environment and human health, Human Rights, Value Education HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

Reference books

1. Environmental Biochemistry - NeelimaRajvaidya, Dilip Kumar Markandey(2005).
2. EnvironmentalandEcologicalBiochemistry- P.W.HochachkaT.P.Mommsen
3. Environmental Biochemistry Hardcover – 2005 by D. K. Markandey, N.Rajvaida

Course outcomes: After the completion of this course, the student will be able to

1. Students will be able to know how to conserve natural resources for future.
2. Students will be able to describe differing types of ecosystems and their characteristic features.
3. Gain the knowledge about different types of pollution in the environment.
4. Know the Relation between human population and environment.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	2	2	3	3	2	3	2	2	3
CO_2	3	3	3	2	2	3	3	2	3	2	2	3
CO_3	3	3	3	2	2	3	3	2	3	2	2	3
CO_4	3	3	3	2	2	3	3	2	3	2	2	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
BCH-306c (Open elective)	Experimental aspects related to analytical methods	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To study about the biological relevance of P^H, importance of buffers in biological system and basic principle, instrumentation and applications of microscopy and centrifugation techniques.
2. Knowledge about radioactivity measuring method and their applications in biochemical investigations.
3. To explore the theoretical principles, methodology and biochemical applications of chromatography and electrophoresis techniques.
4. To Understand the importance and applications of spectroscopy techniques in research field.

Course Contents:

Unit I

Biological relevance of pH, measurement of pH, pKa of functional groups in biopolymers such as proteins and nucleic acids. Importance of buffers in biological systems, ion selective electrodes, and oxygen electrode. Donnan membrane equilibrium. Significance of osmotic pressure in biological systems, viscosity and determination of molecular weight using viscometers.

Microscopy: Basic principles of light microscopy, phase contrast microscopy, electron microscopy, and fluorescence microscopy. Sedimentation methods: Basic principles of centrifugation, preparative, differential and density gradient centrifugations, analytical, ultra centrifugation, applications in the determination of molecular weight, purity of biomolecules and detection of conformational changes of biomolecules. Flow cytometry.

Unit II

Radioactivity: half-life, decay constant, average life, units of radioactivity, Radioactivity measuring techniques, and correction factors. Statistics of counting operations, Radiation dose units, Roentgen, REP, REM maximum permissible dose.

Dosimetry and dosimeters; radiation monitoring hazards, Biological effects of radiation, Isotope dilution technique and its application in biochemical investigations. Radioisotopes in biochemistry and medicine. RIA.

Unit III

Theoretical principles, methodology and biochemical applications of separation methods: Counter current distribution, Paper, Thin layer, Reverse phase, absorption, ion exchange, and gas chromatography, affinity chromatography, Gel filtration, HPLC.

Electrophoresis: Paper, agar, immune-electrophoresis, high voltage electrophoresis, SDS-PAGE and isoelectric focusing, Capillary electrophoresis, isotachophoresis, Northern blot, Southern blot, Western blot Analyses and development of blots. 2D electrophoresis, Pulse-field gel electrophoresis.

Unit IV

Spectroscopy: Electromagnetic radiations, Beer-Lamberts law principles and applications of colorimetry, spectrophotometry. Concept and biological application of UV, fluorimetry, flame photometry.

AAS, AES, Infrared, ESR, NMR spectroscopy, Polarimetry, CD & ORD. Principles and applications of X-ray Diffraction. MALDI- LCMS, Biosensors.

Recommended Books

1. Principles and Techniques of practical Biochemistry. Eds. Williams and Wilson.
2. Techniques in Molecular biology Ed. Walker &Gastra, Croom Helm, 1983.
3. Principles of instrumental analysis, 2nd Ed, Holt-Sanders, 1980.
4. An introduction to spectroscopy for Biochemistry. Ed. Brown S.N., Academic press
5. Analytical Biochemistry, Holmes and Hazel peck, Longman, 1983.
6. An introduction to practical biochemistry. David T. Plummer, Tata Mac Grew-Hill.
7. Biophysical chemistry, Edshall& Wyman, Academic press Vol II & I.

8. A textbook of quantitative inorganic analysis including elementary instrumental analysis, Vogel ELBS.
9. Biochemical calculations Seigel, IH, 2nd Edit, John Wiley & sons Inc., 1983.
10. Analytical Biochemistry by Friefelder David

Course outcomes: After the completion of this course, the student will be able to

1. Understand the principle, Instrumentation of different types of Light microscopy, electron microscopy, and techniques of Centrifugation and its applications in various fields of research.
2. Learn about basic Radioactivity principles, measurement method and its biological applications.
3. Acquire knowledge about the basics and latest developments in the instrumentation techniques of Electrophoresis (IEF, 2D PAGE) and Chromatography and their applications in various research fields.
4. Demonstrate skill to explain about principle, Bioinstrumentation and applications of spectroscopy techniques.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	-	2	2	3	3
CO_2	3	3	3	3	3	3	3	-	2	2	3	3
CO_3	3	3	3	3	3	3	3	-	2	2	3	3
CO_4	3	3	3	3	3	3	3	-	2	2	3	3

M.Sc. BIOCHEMISTRY

SEMESTER-IV

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
BCH-401	Genetic Engineering	06	04
Sessional Marks : 20		**End Semester Examination Marks : 80**	

Course Objectives:

1. To impart knowledge about major events in the development of rDNA technology and to acquire skills on techniques of construction of recombinant DNA - Cloning vectors and isolation of gene of interest.
2. To familiarize with the concepts different operons and regulation of gene expressions in prokaryotes and eukaryotes.
3. To acquaint them with the different gene transfer methods and mappings.
4. To explain the applications of genetic engineering in biotechnology.

Course Contents:

Unit I

Cloning and amplification of DNA: Introduction, choice of the organism, use of restriction endonucleases for the production of DNA fragments. Vehicles for cloning - plasmids, phage vectors and cosmids.

RNA isolation, preparation and use of cDNAs. Screening and determination ofnucleotide sequences. Application of recombinant DNA technology. Oncogenes andtheir mode of action.

Unit II

Isolation, sequencing and synthesis of genes: Isolation of genes, sequencing of genes, synthesis of genes, Cloning of specific eukaryotic genes and their expression in bacteria. Operon model: Isolation and chemical nature of repressor. Catabolite repression and role of cAMP and cAMP receptor protein (CRP) in the expression of glucose – sensitive operons. Lac operon, His operon, Trp operon of E. coli. Stringent and relaxed control.

Regulation of gene expression in prokaryotes and eukaryotes: Transcriptional control, enzyme induction and repression. Constitutive synthesis of enzymes. Genes involved in regulation, regulatory gene, promoter gene, operator gene and structural genes. Genome imprint.

Unit III

Gene transfer methods and transgenic organisms: Gene transfer methods for animals and plants, Agro bacterium mediated gene transfer, electroporation and particle gun. Trasgenic animals, and transgenic plants.

Restriction maps and molecular genetic maps: Restriction mapping, restriction fragment length polymorphisms (RFLP) Linkage and recombination between molecular and phenotypic markers, Random amplified polymorphic DNA (RAPDs) using PCR, Chromosome walking. Organic genome engineering and cell molecular memory/ Biosensors

Unit IV

Applications of genetic engineering in biotechnology: Genome imprint, Dynamic genome engineering and cell molecular memory. Plant, animal cell and Tissue culture methods.

Biosensors: Genetically Modified Organism - Market potential, Diet, Leash, Potato, Rice BT.

Recommended Books

1. Genes and Probes, A Practical Approach Series (1995) by Hames and SJ Higgins; Oxford Univ. Press.
2. Gel Electrophoresis of Nucleic Acids, A practical Approach (1990) by D Rickwood and BD Hames.
3. Oxford Univ. Press.

Course Outcomes: The student will be able to

1. Familiar with the tools and techniques for isolation and purification of genes, vector construction.
2. Understand the mechanisms of regulation of gene expression in different operons.

3. Know the techniques for transfer and expression of cloned gene and
4. Apply the knowledge of genetic engineering in biological research.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	2	3	2	3	3
CO_2	3	3	3	3	3	3	3	2	3	2	3	3
CO_3	3	3	3	3	3	3	3	2	3	2	3	3
CO_4	3	3	3	3	3	3	3	2	3	2	3	3

Course Code	Semester-IV,Course Title	No of Hours Per week	No of Credits
BCH-402	Research methodology and bioinformatics	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To choose the appropriate research design and develop appropriate research hypothesis for a research project
2. To describe the appropriate statistical methods required for a particular research design.
3. To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
4. To provide knowledge about the basics of sequence alignment and analysis.

Course Contents:

Unit I

Research Methodology: Meaning and scope, steps of Research, Article and thesis writing. Funding agencies, Project proposal preparation, Preparation of proposal, Experimental design and implementation of project, submission of progress report (year wise), statement of expenditure (SE), Utilization certificate (UC). Research ethics, Plagiarism.

Introduction of computation: Computers components, storage devices, graphic devises, concepts of hardware and software, methods and types of networks. Basics of operating systems and types python, cython, Information and Communication Technology (ICT), online methods of teaching (MOOCS).

Unit II

Bio-Statistics: Data - Data types, collection of data, classification, tabulation and

interpretation. Measures of central tendencies. Mean, median and mode. Measures of variation - Range, quartile deviation, mean deviation and standard deviation. Coefficient of variation.

Probability. Addition and multiplication theories, conditional probability and probability distributors. Binomial, poission and normal distribution. Correlation and linear regression. Regression: Regression coefficients and properties. Small sample tests- t, F and chi square tests. ANOVA - one way and two-way classifications.

Unit III

Bio-Informatics–I: Origin of bioinformatics biological data (genome projects), Disciplines of bioinformatics, transcriptomics, functional genomics, structural genomics, metabolomics, pharmaco- genomics, structure prediction, drug design and Microarrays.

Genome projects - General introduction to genome projects (rice and Mycobacterium tuberculosis genome project). Special emphasis on Human Genome Project (HGP). Science behind HGP, benefits of HGP, ELSI of HGP in use of genetic information, genetic testing standard, quality and commercialization.

Biological database - Introduction of database (DB), need, organization, search of DB. An over view of biological databases - NCBI, EMBL, DDBJ, SWISS-PROT, PDB, KEGG. Decoding of the genome (Nathan blow study), Ribosomal bar codes, Molecular signatures.

Unit IV

Bio-Informatics–II Sequence alignment - Introduction, significance of sequence alignments and use of dot matices. Pair wise and multiple sequence alignment (MSA) using Clustal programs.

Sequence analysis - concepts of sequence analysis and their importance. BLAST and FASTA. Proteomics- Introduction, principle, technique, 2-D data base. Gel analysis, post gel analysis, MALDI- TOF. Significance and applications of proteomics in modern biology.

Recommended Books

1. Statistical methods. S.P.Gupta
2. Fundamentals of mathematical statistics. S.C Gupta &Kapoor
3. Statistical methods in biological and Health Science. J. S. Milton

&J.O.Tsokan.

4. Primrose SB. Principles of Genome Analysis: a guide to mapping and sequencing DNA from different organisms. 2nd Ed. 1998. Blackwell Science: Oxford. ISBN0-632-04983-9.
5. Genome Mapping: A practical approach. Dear P (Editor). 1st Ed. 2000. Oxford University Press.
6. Developing Bioinformatics Skills. Alfonso Valencia and Blaschke. L (2005) Oreilles Publication.
7. Bioinformatics sequence, structure and data banks ed. By Des Higgins Willie Taylor (2006).
8. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins" (Andreas D. Baxevanis, B. F. Ouellette), Paperback, 2nd ed., 470 pp., ISBN: 0471383910, Publisher: Wiley, John & Sons, Inc.,Pub.
9. David W. Mount, Bioinformatics: Sequence and Genome Analysis, 2nd edition, Cold SpringHarbor Laboratory, 2004, ISBN0-87969-687-7.
10. Introduction to Bioinformatics by T.K.Altwood and D.J Parry-Smith (Pearson Education Asia1999).

Course Outcomes: The student will be able to

1. Discuss the various steps involved in conducting research.
2. Learn to apply hypothesis testing via some of the statistical distributions.
3. Develop understanding about biological data and database search tools.
4. Acquire hands on training on various computational tools and techniques employed in biological sequence analysis.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	2	1	1	3	3	3	3
CO_2	3	3	3	3	3	2	2	1	3	3	3	3
CO_3	3	3	3	3	3	2	1	1	3	3	3	3
CO_4	3	3	3	3	3	2	1	1	3	3	3	3

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
BCH-403-P	Practical related to immunology and hematology	06	04
End Semester Exam Marks: 100			

Course Objectives:

1. The lab is designed to train the students in basic techniques of immunology and electrophoresis.
2. Gain knowledge in collection of biological sample and handling of microscope.
3. To determine the blood samples like RBC and WBC count.
4. To determine the Human Blood grouping.
5. To determine the Ag and Ab reactions by immunodiffusion and immunoelectrophoresis techniques.

Course Contents:

BCH 403P: IMMUNOLOGY AND HAEMATOLOGY PRACTICALS

1. RBCcount.
2. Total WBC count.
3. WBC Differential count.
4. Erythrocyte Sedimentation Rate (ESR).
5. Packed Cell Volume (PCV).
6. Estimation of Haemoglobin(Hb).
7. Mean Cell Haemoglobin and Mean Cell RBC volume.
8. Colour Index and Volume Index of RBC.
9. Osmotic fragility of RBC.
10. Raising of antibodies to soluble antigen in rabbits.
11. Immunodiffusion.

12. Single Radial Immunodiffusion.
13. Rocket immune electrophoroesis.
14. Cross over Immunoelectrophoresis.
15. Graber and WilliamsImmunoelectrophoresis.
16. Detection of HCG by latex agglutination inhibition test.
17. Haemeagglutination tests for identification of human blood groups.
18. Detection by viral fever by slide agglutinationtests.

Recommended Books:

1. Hawk's Physiological chemistry.
2. Practical Biochemistry by TPlummer.
3. Practical Biochemistry by JJayaraman.
4. Klemir and others: practical Biological chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell.
6. Practical Biochemistry-Sawhney(2000)
7. Varley's Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann, London, 1988).

Course Outcomes: The student will be able to

1. Collect the blood samples and handle the microscope.
2. Analyze the blood samples.
3. Expert in immunodiffusion and immunoelectrophoresis techniques.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	3	3	3	3
CO_2	3	3	3	3	3	3	3	1	3	3	3	3
CO_3	3	3	3	3	3	3	3	1	3	3	3	3
CO_4	3	3	3	3	3	3	3	1	3	3	3	3

BCH 404P: PROJECT WORK (100 MARKS)

Marks allotted to thesis preparation-80 (40 marks for the progress performed by the student in laboratory will be awarded by project research supervisor and another 40 marks for content of the thesis). Marks allotted to viva presentation-20

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
BCH 405a	Immunology	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To provide knowledge on essential features of antigens and antibodies and their types and different theories of Antibody formation.
2. To acquire knowledge on types of immunity, phagocytosis, interferons and complement system.
3. To explain the concept of hypersensitivity, auto immunity and transplantation.
4. To provide knowledge on immune deficiencies and several immunological techniques.

Course Contents:

Unit I

Introduction: Scope of Immunology, Historical background of Immunology, Biological aspects of Immunology, Self and non-self-recognition, specificity, memory of immune system.

Antigens: Essential features of Ag, haptens, Carrier molecule, Immunological valence, Antigenic determinants. Adjuvants: Freund's complete and incomplete.

Antibodies: Nature, Primary structure of immunoglobulins, light chain, heavy chain, variable

region, constant region, Hinge region; Enzymatic fragmentation of Ig. Domain structure of Ig and significance; Classification of Immunoglobulins: Types –IgG (G1, G2, G3 & G4), IgM, IgA, IgD and IgE (Origin, structural functions). Theories of Ab formation-Instructive, selective, clonal selection theories and evidences; Immunological memory.

Antibody diversity: Mini gene theory, Mutation theory, Germ line theory, Somatic recombination, V (D) J recombination, Combinatorial diversity, Junctional diversity.

Unit II

Immunity: Types: Active and passive immunity. Cell mediated immunity, humoral immunity, immune response; primary and secondary response. Phagocytosis, mechanism of phagocytosis. Interferon: Types of Interferons. Null cells: Natural Killer cells. Complement system: Nature, components of compliment.Pathways: Classical and alternative pathways. Compliment fixation tests.

Unit III

Hypersensitivity (HS): Type I: Allergies and anaphylaxis – IgE, Mast cell degranulation, biologically active agents released in reactions, Clinical manifestations.

Type II: Antibody mediated HS reactions; Mechanism, pathogenicity and cases of type II reactions; Haemolytic-disease of new born (HDN).

Type III: Immune complex mediated HS reactions: Mechanism &pathogenicity of type III reactions. Soluble immune complexes and insoluble immune complex mediated reactions. Arthus reaction, Serum sickness.

Type IV: Delayed type (or) cell-mediated HS reactions; Mechanisms and pathogenicity,Tuberculin reaction.

Type V: Stimulatory HS reactions. Mechanism and pathogenicity, Grave's disease.

Blood groups: AB, Rh system, Lewis-Luthern systems, significance, practical application of immuno methodology in blood transfusions, Erythroblastosisfetalis.

Auto immunity: Introduction, Auto recognition, classes of auto immuno diseases. (Hashimoto disease, thyrotoxicosis, Systemic lupus erythematosus, Autoimmune haemolyticanaemia, Rheumatoid arthritis).

Transplantation: Terminology, Auto graft, Isograft, Allograft, Xenograft, Immunological basis of transplantation reactions, GVH reaction, Immuno suppression, General mechanisms of Immune suppression, Immune suppression, drugs (azothioprine, methotrexate,

cyclophosphamide, cyclosporin-A, Steroids).

Unit IV

Immune Deficiencies: Introduction, primary and secondary deficiencies. T-cell, B-cell and combined immunedeficiencies, Compliment system deficiency. Acquired immuno deficiency syndrome. SCID.

Major Histocompatibility Complex: MHC in mice and HLA in man-fine structure and functions only.

Immunological techniques: Precipitin curve, Immuno diffusion, one and two dimensional, single radial immuno diffusion, Ouchterlonyimmuno diffusion.

Immuno-electrophoresis: Rocket immuno-electrophoresis; CIE, Graber and William technique.

Agglutination: Direct and Indirect, Widal test, VDRL test.

Radioimmunoassay: ELISA – Principle, Methodology and applications.

Immuno-fluorescence: Direct, indirect and Sandwich, *in situ* localization by techniques such as FISH and GISH.

Recommended Books:

1. Essential immunology- Ivan M. Roitt.
2. Introduction to Immunology – John W.Kinball.
3. Immunology – D.M. Weir.
4. Immunology – Janis Kuby.

Course Outcomes: The student will be able to

1. Gain knowledge on different types of antigens, antibodies and how different types of antibodies are produced.
2. Out line, compare and contrast the key mechanism of innate and adaptive immunity.
3. Gain knowledge on undesirable immunological reactions and their complication in health management.
4. Apply knowledge in disease diagnosis through serological tests.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
BCH 405b	Generic Elective**:** Applied Biochemistry	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives: This course is designed to

1. Introduce Fermentation Technology and industrial production of chemicals.
2. Importance of Enzyme Technology in industries.
3. Gain knowledge in Applications of hybridoma technology.
4. To understand the Applications of genetic engineering in biotechnology and Genetically Modified Organisms.

Course Contents:

Unit I

Fermentation Technology: Batch, continuous culture techniques, principle types of fermentors. Industrial production of chemicals- alcohol, acids (citric, lactic and acetic acids), solvents (acetone and butanol). Antibiotics (penicillin and streptomycin), Vitamins (Riboflavin and Vitamin B12), amino acids (lysine and glutamic acid), Single Cell Protein (SCP) and Biopesticides (Toxins of Bacillus thuringenesis and its mode of action).

Unit II

Enzyme Technology: Immobilization of enzymes and cells, different methods.

Industrial applications (Production of glucose from starch, Use of glucose isomerase in confectionary industry, Use of lactase in Dairy Industry, Production of invert sugar from sucrose, Use of protease in food, detergent and leather Industries, Medical applications of enzymes). Low calorie sweeteners.

Unit III

Immunotechnology: Hybridoma technique, monoclonal antibodies production, myeloma cell

lines, fusion of myeloma cells, selection of hybridomas, protoplast fusion and HAT medium. Screening, purification and application (biochemical research, clinical diagnosis and treatment) of monoclonal antibodies.

Subunit vaccines-against Herpes Simplex virus. Foot and Mouth disease, Live recombinant vaccines- attenuated (Cholera, Salmonella), Vector vaccines directed against viruses and bacteria.

Unit IV

Applications of genetic engineering in biotechnology: Genome imprint, Dynamic genome engineering and cell molecular memory. Biosensors:

Genetically Modified Organisms - Market potential, Diet, Leash, Potato, Rice BT. Intellectual property rights (IPRs).

Recommended Books:

1. Fermentation Technology (2nd ed.) Standury (Pergmanpress)
2. Biotechnology: Textbook of Industrial microbiology 2nd Edit. By Crueger and Crueger (2000).
3. Principles of Gene manipulation: An Introduction to genetic Engineering (5th). R.V.Old and S. B. Primrose (Blackwell Scientific Publications).
4. Principles of Biotechnology (1985) Alen Weisman (Surrey UniversityPress).
5. Concepts in Biotechnology (1996) Ed., D.Balasubramaian, K.Dharmalingam, J.Green and K.Jayaraman.
6. Industrial Microbiology, Miller and Litsky, McGraw- Hill, 1976.
7. Industrial Microbiology, L.E.Casida, JR. New Age International (1995).
8. Industrial Microbiology (Prescott & Dunn), Ed by G.Reed, CBS Publishers.
9. Immobilized enzymes (1978) by Ichiro Chibata, Halsted PressBook.

Course Outcomes: The student will be able to

1. Gain knowledge in Fermentation Technology and industrial production of chemicals.

2. Learn Industrial application of Enzyme Technology.
3. Gain knowledge in Applications of hybridoma technology.
4. Understand the applications of genetic engineering in biotechnology and Genetically Modified Organisms.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	3	3	3	3
CO_2	3	3	3	3	3	3	3	1	3	3	3	3
CO_3	3	3	3	3	3	3	3	1	3	3	3	3
CO_4	3	3	3	3	3	3	3	1	3	3	3	3

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
BCH-405c	Plant Biochemistry	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives: The main objective of this course is

1. To impart students an understanding of plant biochemistry includes Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins;
2. The course includes special features of secondary plant metabolism.
3. Gain knowledge in evolutionary studies Origin of basic biological molecules.
4. To understand the Concepts of natural evolution and population genetics.

Course Contents:

Unit I

Biosynthesis, Storage, breakdown and transport; physiological effects and mechanisms of action. Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins; stomatal movement; photoperiodism and biological clocks.

Uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates.

Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles. Structure and biochemical aspects of specialized plant cell organelles, cell plates, primary and secondary cell walls, plasmodesmata importance of vacuolar, characteristic of meristematic cells.

Unit: II

Role of water absorption, adsorption, conduction, transpiration, guttation water balance and stress. Role of different minerals absorption and translocation of inorganic and organic substances.

Special features of secondary plant metabolism, formation and functions of phenolic acids, tannins, lignin, flavonoid pigments, surface walls, cutin and suberin plant protective walls,

Terpenes, Embryogentics growth and development, Defence system in plants, Photosynthesis in microbes, bacteria, fungi, algae and yeast.

Unit III

Lamarck; Darwin–concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis.

Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiment of Miller (1953); The first cell; Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism.

The evolutionary time scale; Eras, periods and epoch; Major events in the evolutionary time scale; Origins of unicellular and multi cellular organisms; Major groups of plants and animals; Stages in primate evolution including Homo.

Unit IV

Concepts of natural evolution, molecular divergence and molecular clocks; Molecular tools in phylogeny, classification and identification; Protein and nucleotide sequence analysis; origin of new genes and proteins; Gene duplication and divergence.

Population genetics – Populations, Gene pool, Gene frequency; HardyWeinberg Law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution.

Reference books:

1. Plant Biochemistry (Fourth Edition): Hans-Walter Heldt and Birgit Piechulla
2. Plant Biochemistry - by Dr. V.Arunkumar, Dr.K.Siva Kumar, Dr. N. Senthil Kumar (2010).
3. Origin of Species – Charles Darwin
4. Evolution: The Triumph of an Idea by Carl Zimmer

Course outcomes: The student will be able to

1. Understand the Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins;
2. Gain knowledge in special features of secondary plant metabolism.
3. Know the evolutionary studies Origin of basic biological molecules.
4. Understand the Concepts of natural evolution and population genetics.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	2	2	2	2	1	2	2	2	2
CO_2	3	3	2	2	2	2	2	1	2	2	2	2
CO_3	3	3	2	2	2	2	2	1	2	2	2	2
CO_4	3	3	2	2	2	2	2	1	2	2	2	2

Course Code	Semester-IV,Course Title	No of Hours Per week	No of Credits
BCH 406a	Research Methodology-Open elective	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To choose the appropriate research design and develop appropriate research hypothesis for a research project
2. To describe the appropriate statistical methods required for a particular research design.
3. To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
4. To provide knowledge about the basics of sequence alignment and analysis.

Course Contents:

Unit I

Technical writing: Sentence writing, paragraph writing, story writing, review writing, various types of letters writing, critical comments writing. Project proposal preparation: Preparation of informal proposal, modified proposal and formal proposal.

Experimental design and Collection of results, submission of progress report (year wise) and submission of technical report (Format: Title page, Introduction, Aims of the proposal/research, methodology, results, references, acknowledgments, budgetary preparation). Submission of final technical Report. Patenting and intellectual property rights.

Unit II

Introduction of computation: Computers components, storage devices, graphic devises, concepts of hardware and software, methods and types of networks.

Basics of operating systems and types python, cython, Information and communication technology (ICT).

Unit III

Bio-Statistics: Data - Data types, collection of data, classification and tabulation. Measures of central tendencies. Mean, median and mode. Measures of variation - Range, quartile deviation, mean deviation and standard deviation. Coefficient of variation.

Probability. Addition and multiplication theories, conditional probability and probability distributors. Binomial, poission and normal distribution. Correlation and linear regression. Regression: Regression coefficients and properties. Small sample tests- t, F and chi square tests. ANOVA - one way and two way classifications.

Unit IV

Research Aptitude: Meaning and scope of research, steps of Research, Article and thesis writing. Funding agencies.

Project proposal preparation, Preparation of proposal, Experimental design and implementation of project, submission of progress report (year wise), statement of expenditure (SE), Utilization certificate (UC).Research ethics, Plagiarism.

Recommended Books

1. Statistical methods. S.P.Gupta
2. Fundamentals of mathematical statistics. S.C Gupta &Kapoor
3. Statistical methods in biological and Health Science. J. S. Milton &J.O.Tsokan.

Course Outcomes: The student will be able to

1. Discuss the various steps involved in conducting research.
2. Learn to apply hypothesis testing via some of the statistical distributions.
3. Develop understanding about Biological data and database search tools.
4. Acquire hands on training on various computational tools and techniques employed in Biological sequence analysis.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	2	1	1	3	3	3	3
CO_2	3	3	3	3	3	2	2	1	3	3	3	3
CO_3	3	3	3	3	3	2	1	1	3	3	3	3
CO_4	3	3	3	3	3	2	1	1	3	3	3	3

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
BCH-406b	Biochemistry of diseases	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. The main objective of this skill oriented course is to learn and understand the fundamentals of clinical biochemistry, Collection and preservation of specimens and Assays of Carbohydrate Metabolism associated clinical conditions/diseases.
2. To impart knowledge of Inborn errors of amino acid metabolism, investigation of lipid metabolism and functioning of renal system.
3. To understand Clinical application of plasma enzyme assays and Disorders of Gastrointestinal Tract.
4. To acquire knowledge of biochemical aspects of Liver diseases.

Course Contents:

Unit I

Introduction to Clinical Biochemistry: Introduction and maintenance of clinical biochemistry laboratory; azards in clinical biochemistry laboratory; units; 'normal range', reference values. Factors affecting reference values quality control in laboratory – use of external and internal standards; use of WHO standards. Selection of analytical methods. Automation in clinical laboratory. Collection and preservation of specimens.

Disorders of Carbohydrate Metabolism: Importance of extra cellular glucose; blood glucose homeostasis– role of tissues and hormones; hyperglycemia and hypoglycemia. Diabetes mellitus – classification, etiology, clinical and laboratory features. Diagnosis of diabetes mellitus – glucose tolerance test, random fasting and post- prondial glucose levels, glycosuria, ketone bodies, glycosylated hemoglobin, plasma insulin. Metabolic complications – diabetic hyperglycemic coma and nonketotic coma; lactic acidosis; atherosclerosis, neuropathy. Hypolycemia – fasting and provoked; diagnosis – stimulation tests (I.V. glucagon and leucine test); extended G.T.T; hypoglycemia in children – neonatal and early

infancy. Investigation of glycogen storage diseases, galactosemia, hereditary fructosuria, lactose intolerance.

Unit II

Inborn errors of amino acid metabolism – Phenylketonuria, alkaptonuria, Hartnup's maple-syrup urine disease, Plasma proteins in health and changes in diseases; paraproteinaemias; proteinuria. Lipid metabolism: Plasma lipids and lipoproteins and their functions. Hyperlipo-proteincmias; Classification – primary and secondary. Investigation of lipoproteinemias and lipidemias.

Renal function: Glomerular and tubular functions. Tests for evaluation – concentration, dilution, excretion, clearance tests, nephritic syndrome.

Unit III

Clinical Enzymology: Plasma enzyme in diagnosis and prognosis – aminotransferases, creatine kinase, LDH, alpha amylase, phosphatases, choline esterase, glucose 6-phosphate dehydrogenase, Gama glutamyl transferase. Isozymes of LDH alkaline phosphatase. Clinical application of plasma enzyme assays in myocardial infraction, liver disease, and muscle disease.

Disorders of Gastrointestinal Tract: Gastric function. Stimulation of gastric secretion. Composition of gastric secretion. Test for gastric function – fractional test meal. Pentagastrin test, insulin stimulation tests; hyperchlorohydria, achlorohydria, achyliagastrica. Pancreatic exocrine secretion – composition.Duodenal contents – collection, examination following stimulation of pancreas; analysis; malabsorption syndrome due to intestinal disease and pancreatic dysfunction, differential diagnosis.Disaccharides deficiency.

Unit IV

Biochemical aspects of Liver disease: Bile acid metabolism and bile formation.Bilirubin metabolism: biosynthesis, transport, hepatic uptake and transport, conjugation and excretion, enterohepatic circulation. Liver function tests related to protein, carbohydrate, lipid, pigment metabolism, detoxification and excretion. Serum enzymes in liver disease. Jaundice – classification and differential diagnosis. Kermicterus. Hydrogen ion homeostasis: Blood buffers, bicarbonate-buffering system. Role of Kidney. Red cells, lungs, acidosis and alkalosis.

Recommended Books:

11. Essentials of Food and Nutrition, Vol. I & II, M. S. Swaminathan.
12. Text Book of Biochemistry with clinical correlations. Thomas M. Devlin (JohnWily).
13. Harper's Review of Biochemistry, Murray et al. (Longman).
14. Biochemical aspects of human disease – R.S. Elkeles and A.S. Tavil. (Blackwell ScientificPublications).
15. Clinical chemistry in diagnosis and treatment–JoanF.Zilva and P.R.Pannall (Lloyd-Luke Medical Books.
16. Varley's Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London, 1988).
17. Clinical diagnosis and management by Lab methods (John Bernard Henry, W.B. Salunders Company, 1984).
18. Clinical Biochemistry – S. Ramakrishnan and Rajiswami.
19. Chemical Biochemistry (Metabolic and clinical aspects) by W. J. Marshall & S. K. Bangert.
20. Text book of clinical Biochemistry by Tietz et al.

Course Outcomes: The student will be able to

5. Maintain clinical biochemistry laboratory, biological specimen collection for clinical assay and investigation of disorders associated with carbohydrates.
6. Learn and understand the Inborn errors of amino acid metabolism, Lipid metabolism and Renal function system.
7. Gain knowledge in clinical enzymology and Disorders of Gastrointestinal Tract.
8. Investigate the serum enzymes in liver diseases.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	1	3	3	3	3
CO_2	3	3	3	3	3	3	3	1	3	3	3	3
CO_3	3	3	3	3	3	3	3	1	3	3	3	3
CO_4	3	3	3	3	3	3	3	1	3	3	3	3

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
BCH-406c	Nutritional Biochemistry-Open Elective	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives: The objective of this course is

1. To learn and understand the basic concepts of nutritional biochemistry which comprises the determination of body composition and body weight and Measurement of energy expenditure by direct and indirect calorimetry.
2. To know the importance of proteins and fats in the diet to maintain health and also their malnutrition.
3. To learn nutritional significance of vitamins and minerals.
4. This course is also focus on the Special aspects of Nutrition for the infants, children, pregnant and lactating woman and in old age and community nutrition.

Course Contents:

Unit-I

Body weight and the body composition. Determination of body fat and body water. Body composition during growth and energy requirements.

Measurement of energy expenditure, direct and indirect calorimetry, Respiratory quotient and BMR. Protein nutrition.

Unit-II

Essential and non-essential amino acids. Nitrogen balance, methods of calculation of biological value of proteins protein calorie deficiency. Kwashiorkor and Marasmus.

Fats as component of diet, Energy value of fats. Essential fatty acids and phospholipids in nutrition.

Unit-III

Requirement of fat-soluble and water-soluble vitamins and their deficiency symptoms, sources of the vitamins.

Macro and trace elements in nutrition as regards to dietary sources. Deficiency symptoms and recommended dietary allowances.

Unit-IV

Special aspects of Nutrition for the infants, children, pregnant and lactating woman and in old age, Importance of Nutrition under stress conditions.

Community Nutrition and Health: Assessment of Nutritional status of community. Anthropometric measurements, clinical examination. Radiological, Biophysical and Biochemical techniques.

Course Outcomes: After completion of the course, a student will be able to

1. Determine the body composition and body weight by using various methods.
2. To describe the importance of protein and fats.
3. Gain knowledge on vitamins and minerals to maintain health.
4. Aquire knowledge on nutritional importance in different ages in the life

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	2	3	1	2	2	3	3
CO_2	3	3	3	2	2	2	3	1	2	2	3	3
CO_3	3	3	3	2	2	2	3	1	2	2	3	3
CO_4	3	3	3	2	2	2	3	1	2	2	3	3

MOOCS (UGC) to be approved by DDC.

Note:

1. Open elective will be selected by our students from other department course syllabus depending on their interest.
2. Open electives offered by Biochemistry Department will be for students of life sciences other than Biochemistry.

MSc Biochemistry :: Model Question paper

Semester I/II/III/IV Title of the Paper

Time3HrsMax marks: 80

Attempt any **FOUR** from part A (5 x 4=20 marks) and all from part B (4 x 15=60 marks)

SECTION A (5 x 4=20 marks)

1. Unit 1

2. Unit 1

3. Unit 2

1. Unit 2

2. Unit 3

3. Unit 3

4. Unit 4

5. Unit 4

SECTION-B (4X 15= 60 MARKS)

6. Unit 1 a or b

10. Unit 2 a or b

11. Unit 3 a or b

12. Unit 4 a or b

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF BIOCHEMISTRY



Course

M.Sc. IMMUNOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

M.Sc. BIOCHEMISTRY(IMMUNOTECHNOLOGY) programme CBCS pattern (with effect from 2016)

About the Department:

The department of Biochemistry was started in 1978 to fulfil the demand and needs of the student community in general and of the Rayalaseema region in particular. The department has an independent building with in an area of 12000 s ft in two floors. The department has celebrated its silver jubilee in 2003. To its credit the department started M.Sc. Immunology in 2008. The course content is designed to cover all aspects of Biochemistry and practical orientation for biochemical methods. Further to strengthen the above, project work was introduced in the curriculum. The exhaustive training in biochemical methods and sound theoretical background is intended to make the student an appropriate candidate not only to take up teaching or pursuing doctoral research but also competent enough to work in pharmaceutical R&D and diagnostic labs, agricultural research institutions and various medical and allied institutions and industries. The department also invites Emeritus professors/ Scientists/ researchers from various institutions to deliver special lectures in order to encourage and motivate the students to take up research programme. The students who have successfully completed the M.Sc/ PhD, course have been working in India and abroad in various capacities in research institutions, biotech industries and universities.

Vision:

- To develop scientific tempo in understanding the importance of Immunology in the field of Life sciences, especially in Medicine, Agriculture and Environment for well being of humans.

Mission:

- By providing required training to the students of Immunology with latest tools, techniques and teaching methods. So as to enable them to do advanced research for finding solution to various problems encountered with respect to Human health, Agriculture and Environment.

Programme Specific Outcomes:

- After completion of the M.Sc. Immunology, the students will be able to understand the pathogenesis of various human diseases and plant diseases.
- The students will have the ability to develop innovative and efficient therapeutic regimes for human and plant diseases by applying their knowledge in molecular biology, genetics, immunology etc.
- Students will have the technical expertise to analyse and identify the causative factors to the diseases.

Programme Objectives:

- The main objective of M.Sc. Immunology is to impart knowledge to the students in the advanced fields of life sciences such as Immunology, Biochemistry, Molecular Biology, Biotechnology and Bioinformatics so as to enable the student to get the expertise and skills to carry out research in the fields of Medicine, Agriculture and other allied life sciences and make the learner fit to be employed in the Government sector and private sector and organizations such as Research institutions, Pharma and Biotech industries. The programme enables the students to procure entrepreneurship capabilities to establish Research institutions and Industries in the fields of Biotechnology, Medicine and other advanced fields of life sciences.

Programme Outcomes:

S.No	Program Outcomes
PO1	Students acquire knowledge in the chemistry of different biomolecules, which constitute living organisms including humans. Students also will have knowledge on the different physiological systems and their functions and disorders.
PO2	Students will get the ability and expertise to analyse the different biological, molecules, compounds at cellular and molecular level to understand their functions.
PO3	After completion of this program students will able to investigate the causative factors of various diseases and disorders, pollutants, etc
PO4	The student will enable to design innovative protocols and devices which will

	have applicability in various fields of life sciences.
PO5	Students acquire knowledge in latest techniques and tools that are used for investigating different types of problems related to plant, animal and humans.
PO6	The students will have the skills, knowledge and enthusiasm for solving different issues arising in the society scientifically.
PO7	Students will enable to understand the importance of environment and necessary to maintain pollution free environment.
PO8	To understand ethical principles, professional ethics and responsibilities and apply them to solve societal problems.
PO9	Students will have the efficiency to carry out the projects individually, as a team leader and as a team member.
PO10	Students will acquire communications skills to dissipate the scientific knowledge to the society
PO11	Students will acquire knowledge to carry out project and maintain financial requirements as per the guidelines of funding agency.
PO12	The students being lifelong learners will be enthusiastic to update their knowledge for improving the human life.

Programme Educational Objectives:

To enable the students to learn,

- Applied aspects of life sciences with specific reference to human health and diseases.
- Develop effective therapeutic, and nutritional regimes for the wellbeing of humans.
- Pursue research to improve the quality of agricultural products, reduce the use of peroxides and chemicals that effect humans' health.

SRI VENKATESWARA UNIVERSITY TIRUPATI

S.V.U. COLLEGE OF SCIENCES; DEPARTMENT OF BIO-CHEMISTRY

(Syllabus common for SV University College and affiliated by SVU Area

Academic Years (2016-2017); M.Sc. Biochemistry

(IMMUNOTECHNOLOGY)

SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER-I

S. No	Components of Study	Title of the Paper	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	**Core 1**	Biochemical and Biophysical methods	6	4	20	80	100
2	**Core 2**	Molecular Physiology and community nutrition	6	4	20	80	100
3	**Core 3**	Practical related to Biochemical Preparations and Analysis	6	4	-	-	100
4	**Core 4**	Practical related to Analytical methods	6	4	-	-	100
5	**Compulsory Foundation**	Cell and Biomolecules	6	4	20	80	100
6	**Elective foundation**	Human values and Professional ethics-I	6	4	20	80	100
	Total		36	24	-	-	600

SEMESTER-II

S. No	Components of Study	Title of the Paper	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	**Core 1**	Energy metabolism	6	4	20	80	100
2	**Core 2**	Metabolism of Nitrogen based molecules	6	4	20	80	100
3	**Core 3**	Practical related to Enzymology	6	4	-	-	100
4	**Core 4**	Practical relatedto MolecularBiology	6	4	-	-	100
4	**Compulsory Foundation**	Enzymology	6	4	20	80	100
5	**Elective foundation**	Human values and Professional ethics- II	6	4	20	80	100
	Total		36	24	-	-	600

SEMESTER-III

S. No	Components of Study	Title of the Paper	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	**Core 1**	Microbial Biochemistry and Genetics	6	4	20	80	100
2	**Core 2**	Immunology	6	4	20	80	100
3	**Core 3**	Practical related to Microbiology	6	4	-	-	100
4	**Core 4**	Practical related to Immunology	6	4	-	-	100
4	**Generic Elective (Two papers out of three)**	a) Molecular Biology b)Molecular Endocrinology c) Cell and Developmental Biology	6 6	4 4	20 20	80 80	100 100
5	**Open Elective to others (For other department students)**	a) Basics of Immunology b) Immunotechniques	6	4	20	80	100
	Total		36	24	-	-	600

SEMESTER-IV

S. No	Components of Study	Title of the Paper	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exam Marks	Total
1	**Core 1**	Genetic Engineering	6	4	20	80	100
2	**Core 2**	Technical Writing, Biostatistics and Bioinformatics	6	4	20	80	100
3	**Core 3**	Practical related to Clinical Immunology, biostatistics and bioinformatics	6	4	-	-	100
4	**Core 4**	Project work	6	4	-	-	100
4	**Generic Elective (Two papers out of three)**	a) Clinical Immunology b) Applied and molecular immunology c) Immuno pharmacology	6 6	4 4	20 20	80 80	100 100
5	**Open Elective to others(For other department students)**	a) Research Methodology b) Immunological diseases and therapeutics	6	4	20	80	100
	Total		36	24	-	-	600

M.Sc. BIOCHEMISTRY(IMMUNOTECHNOLOGY)

SEMESTER-I

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
Core 1	Biochemical and biophysical methods	06	4
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To study about the biological relevance of P^H, importance of buffers in biological system and basic principle, instrumentation and applications of microscopy and centrifugation techniques.
2. Knowledge about radioactivity measuring method and their applications in biochemical investigations.
3. To explore the theoretical principles, methodology and biochemical applications of chromatography and electrophoresis techniques.
4. To Understand the importance and applications of spectroscopy techniques in research field.

Course Content:

Unit I

Biological relevance of pH, measurement of pH, pKaof functional groups inbiopolymers such as proteins and nucleic acids. Importance of buffers in biological systems, ion selective electrodes, and oxygen electrode. Donnan membrane equilibrium. Significance of osmotic pressure in biological systems, viscosity and determination of molecular weight using viscometers.

Microscopy: Basic principles of light microscopy, phase contrast microscopy,electron microscopy, and fluorescence microscopy.

Sedimentation methods: Basic principles of centrifugation, preparative, differential and density gradient centrifugations, analytical, ultra centrifugation, applications in the determination of molecular weight, purity of biomolecules and detection of conformational changes of biomolecules. Flow cytometry.

Unit II

Radioactivity: half-life, decay constant, average life, units of radioactivity, Radioactivity measuring techniques, and correction factors. Statistics of counting operations, Radiation dose units, Roentgen, REP, REM maximum permissible dose, Dosimetry and dosimeters; radiation monitoring hazards, Biological effects of radiation, Isotope dilution technique and its application in biochemical investigations. Radioisotopes in biochemistry and medicine. RIA.

Unit III

Theoretical principles, methodology and biochemical applications of separation methods: Counter current distribution, Paper, Thin layer, Reverse phase, absorption, ion exchange, and gas chromatography, affinity chromatography, Gel filtration, HPLC.

Electrophoresis: Paper, agar, immune-electrophoresis, high voltage electrophoresis, SDS-PAGE and isoelectric focusing, Capillary electrophoresis, iso-tachophoresis, Northern blot, Southern blot, Western blot Analyses and development of blots. 2D electrophoresis, Pulse-field gel electrophoresis.

Unit IV

Spectroscopy: Electromagnetic radiations, Beer-Lamberts law principles and applications of colorimetry, spectrophotometry. Concept and biological application of UV, fluorimetry, flame photometry. AAS, AES, Infrared, ESR, NMR spectroscopy, Polarimetry, CD & ORD. Principles and applications of X-ray Diffraction. MALDI- LCMS, Biosensors.

Recommended Books

1. Principles and Techniques of practical Biochemistry. Eds. Williams and Wilson.
2. Techniques in Molecular biology Ed. Walker &Gastra, Croom Helm, 1983.
3. Principles of instrumental analysis, 2nd Ed, Holt-Sanders, 1980.
4. An introduction to spectroscopy for Biochemistry. Ed. Brown S.N., Academic press.
5. Analytical Biochemistry, Holmes and Hazel peck, Longman, 1983.

6. An introduction to practical biochemistry. David T. Plummer, Tata MacGrew-Hill.
7. Biophysical chemistry, Edshall& Wyman, Academic press Vol II & I.
8. A textbook of quantitative inorganic analysis including elementary instrumental analysis, Vogel ELBS.
9. Biochemical calculations Seigel, IH, 2nd Edit, John Wiley &sons Inc., 1983.
10. Analytical Biochemistry by Friefelder David.

Course outcomes: After the completion of this course, the student will be able to

1. Understand the principle, Instrumentation of different types of Light microscopy, electron microscopy, and techniques of Centrifugation and its applications in various fields of research.
2. Learn about basic Radioactivity principles, measurement method and its biological applications.
3. Acquire knowledge about the basics and latest developments in the instrumentation techniques of Electrophoresis (IEF, 2D PAGE) and Chromatography and their applications in various research fields.
4. Demonstrate skill to explain about principle, Bioinstrumentation and applications of spectroscopy techniques.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	-	2	2	3	3
CO_2	3	3	3	3	3	3	3	-	2	2	3	3
CO_3	3	3	3	3	3	3	3	-	2	2	3	3
CO_4	3	3	3	3	3	3	3	-	2	2	3	3

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
Core 2	Molecular Physiology & Community Nutrition	06	4
Sessional Marks: 20			End Semester Exam Marks: 80

Course Objectives:

1. To study the physiological aspects of circulatory and excretory system.
2. To describe the structure, function and mechanism of muscular system and nervous system.
3. To describe the importance of proteins, lipids in the maintenance of health and gives information about various methods of calculations of protein quality and their deficiency.
4. To explore the knowledge about Nutritional importance in different ages of human health.

Course Content:

Unit I

Circulatory system: Formation and composition of blood. Total and differential counts in blood. Development of erythrocytes, and leukocytes. Platelets. Plasma proteins Blood clotting mechanism. Erythrocyte Sedimentation Rate.

Circulation of blood. Cardiac cycle, Capillary and venous blood flow. Blood pressure Electrocardiogram Blood gas transport and gaseous exchange in tissues. Acid-base balance in lungs. The value of blood pH, PO2, PCO2, Measurements.

Excretory system structure and function of Nephrons. Urine formation; GFR, reabsorption and secretion. Composition. Normal Inorganic and organic constituents' abnormal constituents of urine. Acid-base balance equilibrium maintained by the Kidney.

Unit II

Muscular system: Types of Muscular tissue; structure of striated muscle fiber molecular organization of contractile systems, mechanism of muscle contraction, Regulation and energetics of contraction. Role of calcium.

Nervous system: Outlines of organization of nervous system; blood-brain barrier; Nerve growth factor. Origin of membrane potential. Mechanisms of propagation of nerve impulse of synaptic transmission. Myelin sheath – composition and function; biogenic amines amino acids and Peptides; Neurotransmitters. Transmission at cholinergic adrenergic nerve endings. Electrophysiological methods: PET, MRI, CAT, Sense organs and thermoregulators.

Unit III

Body weight and the body composition. Determination of body fat and body water. Body composition during growth and energy requirements. Measurement of energy expenditure, direct and indirect calorimetry, Respiratory quotient and BMR. Protein nutrition. Essential and non- essential amino acids. Nitrogen balance, methods of calculation of biological value of proteins protein calorie deficiency. Kwashiorkor and Marasmus. Fats as component of diet, measurement of energy value of fats. Essential fatty acids and phospholipids in nutrition.

Unit IV

Vitamins and Minerals: Sources of the vitamins, Requirement of fat-soluble and water-soluble vitamins and their deficiency symptoms. Macro and trace elements in nutrition. Deficiency symptoms and recommended dietary allowances. Special aspects of Nutrition for the infants, children, pregnant and lactating woman and in old age, Importance of Nutrition under stress conditions.

Community Nutrition and Health: Assessment of Nutritional status of community. Anthropometric measurements, clinical examination, Biophysical and Biochemical techniques.

Recommended Books

1. Harper'sBiochemistry.
2. Trace elements by Underwood.
3. Nutrition byM.S.Swaminathan.
4. The book of Human Nutrition (1996) MS. Bamji, N.PrahladRao and V.Reddy.
5. Text Book OF Medical physiology by A.C.Guyton (2001).

Course Outcomes: After the completion of this course, the student will be able to

1. Gain the knowledge about circulatory and excretory systems.
2. Know the importance of muscular and nervous system.
3. Health benefits and malnutrition of proteins and fats.
4. Know the importance of nutrition in maintenance of health and diseases.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	2	2	1	3	2	1	2	2	2	3
CO_2	3	1	2	2	1	3	2	1	2	2	2	3
CO_3	3	1	2	2	1	3	3	1	2	3	3	3
CO_4	3	1	2	2	1	3	3	1	2	3	3	3

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
Core 3	Practical's related to Biochemical preparations and Analysis	06	04
End Semester Examination Marks: 100			

Course Objectives:

1. Exposure to basic reactions of biomolecules.
2. To analyse the presence of biomolecules like carbohydrates, proteins, lipids, etc. in known and unknown samples qualitatively.
3. To estimate the proteins, present in biological samples.
4. Isolation studies of biological samples.

Course Content:

PRACTICALS

BIOCHEMICAL PREPARATIONS AND ANALYSIS-PRACTICALS

1. General reactions of carbohydrates. Specific reactions of different sugars: arabinose, xylose, fructose, galactose, sucrose, maltose and lactose.
2. General reactions of proteins and amino acids. Precipitation reactions of albumins and globulins.
3. General reactions of lipids and cholesterol.
4. Isolation and estimation of cholesterol frombrain.
5. Isolation and estimation of glycogen/starch.
6. Preparation of Casein from milk.
7. Crystallization of albumin.
8. Estimation of proteins in biological samples:
    a. Biuret method.
    b. Folin-Lowry method.

c. UV method.
d. Bradford's dye binding method.

9. Titration curve of amino acid and calculation of PK and PI value.
10. Estimation of amino acids by formal titration.
11. Estimation of amino acid by Ninhydrin method.
12. Estimation of tyrosine by Million's –reaction.
13. Identification of N-terminal group of proteins by Sanger's method.
14. Estimation of fructose in Fruit-juice.

Recommended Books

1. Practical Biochemistry by T Plummer
2. Practical Biochemistry by J Jayaraman
3. Klemir and others: practical biological chemistry.
4. A manual of laboratory techniques by NIN, Hyderabad.

Course Outcomes: After the completion of this course, the student will be able to

1. Learn safety and precautionary measures for working in a laboratory.
2. Develop skill and proficiency in preparation of laboratory reagentsand Use of handling of glass wares, minor equipment for conducting experiments
3. Acquire practical training for qualitative and quantitative analysis of biological materials/molecules and their estimation using multiple methods.
4. Gain the knowledge about isolation studies of biological samples.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	2	2	2	3
CO_2	3	3	3	3	3	3	3	1	2	2	2	3
CO_3	3	3	3	3	3	3	3	1	2	2	2	3
CO_4	3	3	3	3	3	3	3	1	2	2	2	3

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
Core 4	Practical related to Analytical Methods	06	04
End Semester Exam Marks: 100			

Course Objectives:

1. To understand the concepts of preparation of buffers.
2. The students will obtain hands-on training in basic separation techniques in biochemistry like electrophoresis, chromatography, etc.
3. To Develop competence in handing various centrifugation techniques and apply them in isolating and characterizing different biological molecules.
4. Understanding the applications of centrifugation and chromatography in biological investigations in order to create scientific interest.
5. Gain expertise in the isolation of various biomolecules and organelles.

Course Content:

PRACTICALS

BIOCHEMICAL & BIOPHYSICAL METHODS

1. Effect of solvent system on the Rf value of two solutes usingTLC.
2. Separation of purines and pyrimidines by Paper Chromatography.
3. Separation of amino acids by Paper Chromatography.
4. Separation of sugars byTLC.
5. Isolation & Characterization of Brain Lipids by Solid phase extraction andTLC.
6. Separation of amino acids by Paper Electrophoresis (Demonstration).
7. Separation of amino acids by Ion-exchange Chromatography (Demonstration).
8. Separation of Serum proteins by PaperElectrophoresis.
9. Measurement of pH of a biological fluid using pH meter.
10. Absorption spectra of phenol red, amino acids and nucleicacid.

11. Verification of Beer's law and determination of molar extinction coefficient using p-nitro phenol.
12. Isolation and spectrophotometric characterization of plantpigments.
13. Isolation of Mitochondria from Rat liver by density gradient centrifugation (Demonstration).
14. Viscosity measurement of Bovine serumalbumin.
15. Measurement of inversion of sucrose by Polarimetry.
16. Measurement of refractive index of biologicalsample.
17. Dialysis.

Recommended Books:

1. Hawk's Physiological chemistry
2. Practical Biochemistry by T Plummer
3. Practical Biochemistry by J Jayaraman
4. Klemir and others: practical Biologicalchemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell.
6. Practical Biochemistry-Sawhney (2000)
7. Varley's Practical clinical Biochemistry–Ed.AlanW. Gowenlock (Heinemann Medical Books).

Course Outcomes:

1. Learn how to standardize various biomolecules.
2. Separate biomolecules by paper chromatography and thin layer chromatography
3. Demonstrate separation of protein by electrophoresis.
4. Isolation and spectrophotometric characterization of plant pigments.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	1	3	3	3	3	3
CO_2	3	3	3	3	3	3	1	3	3	3	3	3
CO_3	3	3	3	3	3	3	1	3	3	3	3	3
CO_4	3	3	3	3	3	3	1	3	3	3	3	3

CourseCode	Semester-I, Course Title	No of Hours Per week	No of Credits
Elective foundation	Human values and professional ethics-I	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course objectives:

1. To study the Ethics and its relation with Religion, Politics, Business, Law, Medicine and Environment.
2. Gives information about Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values.
3. To understand the structure Ahimsa, Satya, Brahmacharya, Asteya and Aparigraha etc.
4. To Explore the Bhagavad Gita.
5. To know about Crime and Theories of punishment.

Course content:

Unit I

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics- Goals- Ethical Values in various Professions.

Unit II

Nature of Values – Good and Bad, Ends and Means , Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right , ought, duty, obligation, justice, responsibity and freedom , Good behavior and respect for elders, Character and Conduct.

Unit III

Individual and Society: Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non possession) and Aparigraha (Non- stealing). Purusharthas (Cardinal virtues) –

Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).

Unit IV

Bhagavad Gita- (a) Niskama Karma (b) Buddhism- The Four Noble Truths- Arya astanga marga,(c) Jainism- mahavratas and anuvratas. Values Embeded in various Religions, ReligiousTolerance, Gandhian Ethics.

Unit V

Crime and Theories of punishment (a) Reformative , Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study

1. John S Mackenjie: A manual of ethics.
2. The Ethics of Management" by Larue Tone Hosmer, Richard .D. Irwin Inc.
3. Management Ethics-integrity at work" by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
4. Ethics in management" by S.A.Sherlekar, Himalaya Publishing House. Harold H. Titus:Ethics for Today.
5. Maitra,S.K: Hindu Ethics.
6. William Lilly : Introduction to Ethics.
7. Sinha : A Manual of Ethics
8. Manu : Manu Dharma Sastra or the Institute of Manu : Comprising the Indian System of Duties: Religious and Civil (ed.) G.C. Haughton.
9. Susruta Samhita : Tr. Kaviraj Kunjalal ,Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varanasi, Vol 1 OO, 16-20, 21-32 and 74- 77 only.
10. Caraka Samhita : Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office , Varanasi Vol 100, 16-20,21-32 and 74-77 only.

11. Ethics:Theory and Contemporary Issues, Barbara Mackinnon Wadsworth/Thomson Learning ,2001.

12. Analysing Moral Issues, Judith A. Boss, Mayfield Publishing Company ,1999.

13. An Introduction to Applied ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications. Text Book for Intermediate logic, Ethics and Human Values .Telugu Academic Hyderabad.

14. I.C.Sharma Ethical Philosophy of India, Nagin & Co Julundhar.

Course Outcomes: After the completion of this course, the student will be able to

1. Easily understand the Need and Importance of Professional Ethics- Goals- Ethical Values in various Professions.
2. Analyse the basic moral concepts- right , ought, duty, obligation, justice, responsibity and freedom.
3. Know about Purusharthas, Dharma, Artha, Kama, Moksha.
4. Understand the Four Noble Truths- Arya astanga marga, Jainism- mahavratas and anuvratas.
5. Gain the knowledge about views on Manu and Yajnavalkya.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	1	1	1	1	1	1	2	3	2	1	1	2
CO_2	1	1	1	1	1	1	2	3	2	1	1	2
CO_3	1	1	1	1	1	1	2	3	2	1	1	2
CO_4	1	1	1	1	1	1	2	3	2	1	1	2
CO_5	1	1	1	1	1	1	2	3	2	1	1	2

Course Code	Semester-I, Course Title	No of Hours Per week	No of Credits
Compulsory Foundation	Cell and Biomolecules– Theory	06	04
Sessional Marks: 20		**End Semester Examination Marks: 80**	

Course Objectives:

1. To study the cell organelles in prokaryotic and eukaryotic cells.
2. Gives information about classification, physico-chemical properties of amino acids and structural organization of proteins.
3. To understand the structure, properties and biological importance of carbohydrates and lipids.
4. Explore the composition and structure of nucleic acids.

Course Content:

Unit I

Prokaryotic and Eukaryotic cells: Cell organelles Structure, Composition and functions of nucleus, mitochondria plastids, endoplasmic reticulum, Golgi, lysomes, vacuole, micro bodies, ribosomes, cytoskeleton. Biomembranes, structure and mechanisms of transport.

Cell division, cell cycle and its regulation, cell signaling, stress response, cell communication, cell adhesion, Apoptosis, Senesence, extracellular matrix, integrins.

Unit II

Origin of basic Biomolecules. Amino acids & Proteins: Classification of amino acids, acid-base properties of amino acids, chemical reactions of amino acids, non-protein amino acids, Peptide bond – Structure and conformation. Naturally occurring peptides.

Classification of proteins – purification and isolation of proteins, criteria of purity of proteins, physico-chemical properties, structural organization of proteins, Elucidation of primary structure, secondary structure,Tertiary structure Quaternary structure, Denaturation & renaturation of proteins. Outlines of Proteomics.

Unit III

Carbohydrates: Definition and classification of carbohydrates, nomenclature, Reaction of Mono- saccharides, Acid derivatives of Monosaccharides amino-sugars, Oligo saccharides, structure, properties and importance of Homo & Hetero polysaccharides.

Lipids: Classification, Physical and chemical properties of fatty acids. Characterization of natural fats & oils, structure and biological role of triaceyl glycerol, phospolipids, sphingolipids, Gangliolipids, Prosta-glandins, Thromboxanes, Leukotrienes and steroids. Killer fat (*Staphylococcu*s killer).

Unit IV

Nucleic acids: Purine and pyramidine bases, nucleosides, nucleotides, polynucleotides, Structure of nucleic acids primary secondary & Tertiary structure of DNA. DNA denaturation and renaturation kinetics

Structure of RNAs – Secondary and Tertiary structure; Analysis of stability to nucleic acid structures, Nucleic acid sequencing –Higher orders of DNA & RNA Structure, chromatin structure; Gene analysis – southern blot technique and its variance. Porphyrins; Types, chemistry and structure of porphyrins. Vitamins, structures and chemistry.

Recommended Books:

1. The biochemistry of Nucleic acids; Adams et al., Chapman and Hall, 1986.
2. Proteins: A guide to study by physical & chemical methods, Haschemeyer and Haschemeyer,
3. Proteins: Structure, function and evolution. Dickerson & Geis, 2ndEdn, Benjamin/Cummings.
4. Biochemistry - Zubay C, Addison – Wesley, 1986.
5. Biochemistry, A problem Approach, 2ndEdn. Wood, W.B. Addison Wesley1981.
6. Biochemistry, Lehninger A. H.
7. Textbook of Biochemistry West, E.S., Todd, Mason &Vanbruggen, Macmillian& Co.
8. Principles of Biochemistry White-A, Handler, PandSmith E.L. Mc Grew Hill.
9. Organic chemistry, I.L. Finar, ELBS. (1985).
10. Organic Chemistry by Morrison and Boyd (2000) PrenticeHall.
11. Fundamentals of Biochemistry by Donald Voet (1999).

Course Outcomes: After the completion of this course, the student will be able to

6. Easily understand the difference between prokaryotic and eukaryotic cells, and the concept of cell division.
7. Understand the classification, structure and biochemical reactions of aminoacidsand proteins.
8. Describe the classification, structure and biochemical reactions of carbohydrates and lipids.
9. Understand the concept of structural organization of nucleic acids.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	1	3	3	1	2	2	3	3
CO_2	3	3	3	2	1	3	3	1	2	2	3	3
CO_3	3	3	3	2	1	3	3	1	2	2	3	3
CO_4	3	3	3	2	1	3	3	1	2	2	3	3

SEMESTER-II

Course Code	Semester-II, Course Title	No of Hours Per week	No of Credits
Core-1	Energy Metabolism	06	4
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To acquire knowledge related to the intermediary metabolism and the role of TCA cycle in central carbon metabolism.
2. To learn basic concepts of Bioenergetics, the importance of high energy compounds, electron transport chain, synthesis of ATP, mechanisms of oxidative phosphorylation and photophosphorylation.
3. To understand the fundamentals of cellular metabolism of carbohydrates their association with variousmetabolic diseases.
4. To learn biosynthesis and degradation of Lipids, fattyacids and cholesterol, Metabolism of lipoproteins and Ketone bodies.

Course Content:

Unit I

Broad outlines of Intermediary metabolism, methods of investigation, in vivo studies such as analysis of excretion, Respiratory exchange, Removal of organs and perfusion studies, in vitro studies such as tissue slice techniques; Homogenates and purified enzyme systems; isotope tracer studies, use of inhibitors and antimetabolites.

Metabolism of carbohydrates: Glycolysis, Fermentation, Feeder path ways (of fructose, galactose and mannose), TCA cycle, HMP shunt, Regulation of glycolysis, pyruvate dehydrogenase complex, and TCA cycle.

Unit II

Bioenergetics: Thermodynamic principles – Chemical equilibria; free energy, enthalpy (H), entropy (S). Free energy change in biological transformations in living systems; High energy compounds. Energy, change, oxidation-reduction reactions. Organization of electron carriers and enzymes in mitochondria. Classes of electron-transferring enzymes, inhibiters of electron

transport.

Oxidative phosphorylation. Uncouplers and inhibitors of oxidative phosphorylation. Mechanism of oxidative phosphorylation. Miotrochondrial transport system. Microsomal electron transport; Photorespiration, cyclic and non-cyclic reactions; photochemical events associated with pigment system – II and I. Utilization of oxygen by oxygenases, Superoxide dismutase and catalase.

Unit III

Uronic acid pathway, metabolism of amino sugars, metabolism of glycogen, starch, sucrose, lactose, glycoproteins. Gluconeogenesis, glyoxylate cycle. Regulation of glycogen metabolism and gluconeogenesis.

Futile cycles in carbohydrate metabolism. Disorders of carbohydrate metabolism – Glycogen, lactose, Fructose.

Unit IV

Biosynthesis and degradation of fatty acids (Saturated and unsaturated) regulation, metabolism of TAG, Glycerol and sphingolipids, cholesterol, prostaglandins.

Biosynthesis and degradation of cholesterol and its regulation. Metabolism of lipoproteins and Ketone bodies.

Recommended Books:

1. Principles of Biochemistry, White. A, Handler, P and Smith.
2. Biochemistry, Lehninger A. L.
3. Biochemistry, David E. Metzler.
4. Biochemistry, LubertStryer.
5. Review of physiological chemistry, Harold A.Harper.
6. Text of Biochemistry, West andTodd.
7. Outlines of Biochemistry, Conn and Stummf.
8. Metabolic pathways –Greenberg.
9. Mitochondria, Munn.
10. Biochemistry, 2nd Edition, G. Zubay.

Course Outcomes: After the completion of this course, the student will be able to

1. Explain the broad outlines of intermediary metabolism and importance of carbohydrate metabolism in life.
2. Describe the importance of Electron transport and ATP production mechanism.
3. Gain in knowledge in Carbohydrate metabolism and their associated disorders.
4. Describe the details of lipid metabolism.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	2	3	2	1	3	2	2	3
CO_2	3	3	3	3	2	3	2	1	2	2	2	3
CO_3	3	3	3	3	2	3	2	1	3	2	2	3
CO_4	3	3	3	3	2	3	2	1	2	2	2	3

Course Code	Semester-II, Course Title	No of Hours Per week	No of Credits
Core -2	Nitrogen Metabolism	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To study the metabolism of proteins and aminoacids.
2. To learn about aminoacids as biosynthetic precursors.
3. To learn about biosynthesis and degradation of nucleic acids.
4. To understand the effect of toxic chemicals in the environment and concept of carcinogenicity.

Course Content:

Unit I

Metabolism of proteins and amino acids: Introduction, General metabolic reactions of amino acids. Degradation and biosynthesis of individual amino acids in animal, plant, and microbial systems.End products of amino acid metabolism – Krebs Haslett urea cycle.

Biosynthesis and Regulation of amino acids and disorders related to amino acid metabolism. Nitrogen cycle, Non-biological and biological nitrogen fixation, Nitrogenase system, Nif genes.

Unit II

Amino acids as biosynthetic precursors-Formation of creatine, seratonine, histamine, polyamines, melatonine, GABA, melanine, catecholamines. Non-ribosomal peptide synthesis-glutathione, cyclic antibiotics (gramicidin).

Unit III

Metabolism of Nucleic Acids: Biosynthesis and degradation of Purines and regulation of path ways. Biosynthesis and degradation of Pyrimidines and regulation of pathways. Interconversion of nucleotides, Metabolic disorders related to nucleic acid metabolism.

Unit IV

Toxic chemicals in the environment, Mode of entry of toxic substance, Insecticides, MIC

effects, Pesticides, biotransformation of xenobiotics, detoxification. Carcinogens in air, chemical carcinogenicity, mechanism of carcinogenicity, Environmental carcinogenicity testing.

Recommended Books:

1. Principles of Biochemistry, White. A, Handler, P andSmith.
2. Biochemistry, Lehninger A. L.
3. Biochemistry, David E.Metzler.
4. Biochemistry, LubertStryer.
5. Review of physiological chemistry, Harold A.Harper.
6. Outlines of Biochemistry, Conn and Stumpf.
7. Metabolic pathways –Greenberg.
8. Mitochondria, Munn.
9. Biochemistry, 2nd Edition, G. Zubay.
10. Environmental hazards & human health R.B. Philip
11. Toxicology – Principles & applications –Niesink& Jon devries.

Course Outcomes: After the completion of this course, the student will be able to

1. Understand the anabolic and catabolic reactions of proteins and aminoacids.
2. Gain knowledge in the importance of aminoacids as biosynthetic precursors.
3. Know the biosynthesis and degradation of purine and pyramidined and their associated disorders.
4. How toxic chemicals metabolised by the body through detoxification and the mechanism of carcinogenicity.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	3	2	1	2	2	2	3
CO_2	3	3	3	2	2	3	2	1	2	2	2	3
CO_3	3	3	3	2	2	3	2	1	2	2	2	3
CO_4	3	3	3	2	2	3	2	1	2	2	2	3

Course Code	Semester-II, Course Title	No of Hours Per week	No of Credits
Core-3	Practical related to Enzymology	06	04
End Semester Exam Marks: 100			

Course Objectives:

1. The lab is designed to train the students in basic techniques of Analytical Biochemistry likeestimation of enzymes from various sources, Enzyme purification and enzyme kinetics.
2. It also deals with the assay of clinically important enzymes and determinationof factor affecting enzyme activity.
3. To demonstrate the Immobilization of enzymes.

Course Content:

ENZYMOLOGY PRACTICAL

1. Amylase from Saliva.
2. Urease from Horse-gram.
3. Acid phosphatase from Potato.
4. Alkaline phosphatase from Serum.
5. Cholinesterase from Blood.
6. SDH from Liver.
7. Invertase from yeast.
8. Trypsin
9. LDH from Serum (Isoenzymes).
10. Enzyme purification and enzyme kinetics (Determination of Vmax, Km and Ki).
11. Effect of pH, Temperature, Activators, Inhibitors.
12. Immobilization of enzymes (demonstration only).

Recommended Books:

1. Hawk's Physiological chemistry
2. Practical Biochemistry by T Plummer
3. Practical Biochemistry by J Jayaraman
4. Klemir and others: practical Biological chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell
6. Practical Biochemistry-Sawhney (2000)
7. Varley's Practical clinical Biochemistry – Ed. Alan W.Gowenlock (Heinemann, London)

Course Outcomes: After the completion of this course, the student will be able to

1. Learnabout estimation of various enzymes in biological sample.
2. Learn to perform assay of clinically importantenzyme: serum acid and alkaline phosphatase, serum LDH.
3. Learn aboutthe factors affecting enzymeactivity and determination of Km.
4. Demonstrate the Immobilization of enzymes.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	3	2	3	3
CO_2	3	3	3	3	3	3	2	1	3	2	3	3
CO_3	3	3	3	3	3	3	2	1	3	2	3	3
CO_4	3	3	3	3	3	3	2	1	3	2	3	3

Course Code	Semester-II, Course Title	No of Hours Per week	No of Credits
Core-4	Molecular biology Practicals	06	04
End Semester Examination Marks: 100			

Course Objectives:

The lab is designed to train the students in basic methods of molecularbiology.

1. To isolate DNA and RNA from bacterial, plant and animal cells.
2. To estimate the DNA and RNA by suitable methods.
3. Transfection studies.
4. Purity determination of DNA by UV absorption method.
5. Detection and differentiation of open circular, linear and closed covalent circular plasmid DNA by submarine gel electrophoresis.
6. Determination of melting temperature (Tm).

Course Contents:

MOLECULAR BIOLOGY PRACTICALS

7. Isolation of DNA from bacterial, plant and animal cells.
8. Estimation of DNA by Diphenylamine method.
9. Isolation RNA from yeast cells.
10. Estimation of RNA BY Orcinol method.
11. Estimation of DNA and purity determination by UV absorption method.
12. Determination of melting temperature (Tm).
13. Isolation of plasmid DNA from E. coli.
14. Detection and differentiation of open circular, linear and closed covalent circular plasmid DNA by submarine gel electrophoresis.
15. Transformation of E. coli with ampicillin resistant plasmid.
16. Trasfection of M13 DNA into E. coliJM103.
17. Isolation of phageM13.

18. Isolation of single and double standard M13DNA.
19. Conjugation: Use of broad host range plasmid RP in demonstrating conjugation transfer of plasmid bacteria.
20. Catabolite repression: Evidence of B-Galactosidase induction in presence of lactose in E .coli lac strains.

Recommended Books*:*

1. Hawk's Physiological chemistry
2. Practical Biochemistry by T. Plummer
3. Practical Biochemistry by J. Jayaraman
4. Klemir and others: practical Biological chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell
6. Practical Biochemistry-Sawhney (2000)
7. Varley's Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London)

Course Outcomes: The student will be able to

1. Isolate nucleic acids from various sources.
2. Estimate the nucleic acids quantitatively.
3. Determine the melting temperature.
4. Determine the purity of DNA by UV method.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	3	3	3	3
CO_2	3	3	3	3	3	3	3	1	3	3	3	3
CO_3	3	3	3	3	3	3	3	1	3	3	3	3
CO_4	3	3	3	3	3	3	3	1	3	3	3	3

CourseCode	Semester-II, Course Title	No of Hours Per week	No of Credits
Elective foundation	Human values and professional ethics-II	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To study about Concept of Human Values like self introspection, self esteem, Family Values etc.
2. Gives information about Medical ethics and moral responsibility of medical practitioners.
3. To understand the Business ethics - Immoral and illegal practices and their solutions.
4. Explore the Environment ethics and Environmental health.
5. To know Ethics of media- Impact of Newspaper, Television, Movies and Internet.

Course Contents:

Unit I

Value Educattion- Defination- relevance to present day- Concept of Human Values- self introspection- Self esteem- Family Values – Components, Structure and responsibilities of family- Neutralization of anger- Adjustability- Treats of famiy life – Status Of women in family and society- Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Unit II

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and Health care professionals. Euthanasia, Ethical obligation to animals, Ethics issues in relation to health care professionals and patients. Social justice in health care, Human cloning, Problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit III

Business ethics- Ethical standards of business- Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit IV

Environment ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justie and Environmental health.

Unit V

Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/ pregnancy. Ethics of media- Impact of Newspaper, Television, Movies and Internet.

Recommended Books:

1. John S Mackenjie: A manual of ethics.
2. The Ethics of Management" by Larue Tone Hosmer, Richard .D. Irwin Inc.
3. Management Ethics-integrity at work" by Joseph A. Petrick and John F. Quinn, Response Books: NewDelhi.
4. Ethics in management" by S.A.Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today.
6. Maitra, S.K: Hindu Ethics.
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu : Comprising the Indian System of Duties:Religious and Civil (ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjalal ,Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II andIII, Varanasi, Vol 1 OO, 16-20, 21-32 and 74- 77 only.
11. Caraka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit SeriesOffice , Varanasi Vol 100, 16-20,21-32 and 74-77 only.

12. Ethics: Theory and Contemporary Issues., Barbara Mackinnon Wadsworth/ Thomson Learning ,2001.
13. Analysing Moral Issues, Judith A. Boss, Mayfield Publishing Company ,1999.
14. An Introduction to Applied ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text Book for Intermediate logic, Ethics and Human Values , board of intermediate Education &Telugu Academic Hyderabad.

Course Outcomes: After the completion of this course, the student will be able to

1. Easily understand the Components, Structure and responsibilities of family and status of women in family and society.
2. To get an idea on Ethical issues in relation to health care professionals and patients and genetic engineering, Social justice in health care, Human cloning.
3. To know about Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.
4. Understand the Ethical theory, Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population.
5. Gain the knowledge about Organ trade, human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/ pregnancy.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	2	2	2	1	1	2	2	3	2	2	2	2
CO_2	2	2	2	1	1	2	2	3	2	2	2	2
CO_3	2	2	2	1	1	2	2	3	2	2	2	2
CO_4	2	2	2	1	1	2	2	3	2	2	2	2
CO_5	2	2	2	1	1	2	2	3	2	2	2	2

CourseCode	Semester-II, Course Title	No of Hours Per week	No of Credits
Compulsory foundation	ENZYMOLOGY	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To study the basic concept of enzymes and their kinetics.
2. Knowledge about different types of enzyme inhibition and Chemical nature of enzyme catalysis.
3. To describe the importance of coenzymes in living organism.
4. To study the allosteric regulation of enzymes.

Course Content:

Unit I

Nomenclature and classification of enzymes according to I.U.B. Convention, specificity and active site. Fundamentals of enzyme assay – enzyme units, coupled kinetic assay. Enzyme localization, Isolation, purification and criteria of purity. Profile of enzyme purification by different separation techniques.

Elements of kinetics – Reaction rates transition state theories free energy change. Methods used in the investigation of kinetics of enzyme-catalyzed reactions – Initial velocity studies and rapid reaction techniques (Continuous flow and Stopped flow). Enzyme kinetics of single substrate reactions, study state assumption, Michales-Menten (Briggs-Haldane), Lineweavar Burk, Eadie Hofstee, and Hanes plots. Pre- steady state kinetics. Effect of pH and temperature.

Unit II

Enzyme inhibition: Types of reversible inhibitors – competitive, non-competitive, un-competitive mixed inhibition and partial inhibition. Substrate inhibition, Feedback inhibition and allostearic inhibition.

Irreversible inhibition. Bisubstrate reactions, Sequential mechanism compulsory order and random order mechanism, non-sequential mechanism, Ping-pong mechanism. Chemical nature of enzyme catalysis: General acid – base catalysis, electrostatic catalysis, covalent

catalysis, intermolecular-catalysis, metal ion catalysis, and proximity and orientation.

Unit III

Mechanism of reactions catalyzed by the following enzymes – Chymotrypsin, Trypsin, Carboxypeptidase, Ribonuclease and Lysozyme.

Co-enzymes – the mechanistic role of the following co-enzymes in enzyme catalyzed reactions – Nicotinamide nucleotides, Flavin nucleotides, Co-enzymes A, Lipoic acid, Thiamine pyrophosphate, Biotin, Tetrahydrofolate and Co-enzyme B12. Modern concepts of evaluation of catalysis-catalytic RNA (Ribozyme), abzymes (catalytic antibodies), Synzymes (Synthetic enzymes), Site-directed mutagenesis.

Unit IV

Monomeric enzymes – the Serine proteases, Zymogen activation, Oligomeric enzymes – Isoenzymes (LDH) and multienzyme complexes (pyruvate dehydrogenase complex).Covalent modification (Glycogen phosphorylase, Glutamine synthase, Chymotrypsin).

Allosteary of enzyme action; Binding of ligands to proteins Co-operativity, the Hill Plot for Myoglobin and Hemoglobin, Sigmoidal kinetics: The MWC and KNF models. Significance of sigmoidal behavior. Study of ATCase a typical allostearic enzyme.

Recommended Books:

1. Enzyme structure and mechanism. Alan Fersht, Freeman & Co.1997
2. Principles of enzymology for food sciences: Whitaker Marc Dekker1972.
3. Methods in enzymology Ed. Colowick and Kaplan, Academic Pr (Continuing series)
4. Text book of Biochemistry with clinical correlations (4th edition)-Thomas M. Devlin.
5. Biological chemistry; H.R. Mehler& E.H CordesHarper&Rev.
6. Enzyme kinetics Siegel interscience – Wiley1976.
7. Biochemistry chemical reactions of living cells (2001) David E. Matzler. Vol. I.

Course Outcomes: After the completion of this course, the student will be able to

1. Distinguish the fundamentals of enzyme properties, nomenclatures, characteristics and mechanisms.
2. Describe the concepts of enzyme inhibition and mechanism of enzyme catalysis.
3. Students will acquaint with mechanism of enzyme action and various coenzymes involved in the biochemical reactions taking place in living systems.
4. Describe the concepts of co-operative behavior and allosteric regulation.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	2	2	3	1	1	2	1	1	2
CO_2	3	3	2	2	2	3	1	1	2	1	1	2
CO_3	3	3	2	2	2	3	1	1	2	1	1	2
CO_4	3	3	2	2	2	3	1	1	2	1	1	2

SEMESTER-III

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
Core-1	Microbial Biochemistry andGenetics	06	04
Sessional Marks: 20		**End Semester Examination Marks: 80**	

Course Objectives:

1. The objective of the course is learning and understanding the fundamentals of Microbiology like important characteristics and biology of bacteria, fungi, mycoplasma, viruses etc. and to learn basic knowledge about control methods of microorganisms and industrial application of microbes for water and sewage treatment.
2. Designed to learn nutritional requirements in microorganisms and virus classification, morphology and Methods of culturing of viruses, Isolation, purification and characterization.
3. The objectives of the course are to learn and understand the fundamentals of genetics like DNA as genetic material, chromosome and gene and understand the gene arrangement in prokaryotes and eukaryotes.
4. To learn and understand the concept of bacterial genetics and detailed information about Mutation

Course Content:

Unit I

Microorganisms and their place in the living World; Historical developments of microbiology (Spontaneous generation, Germ theory of disease and Koch's postulates). Nomenclature and broad classification of bacteria as per Bergey's manual of systematic bacteriology; General characteristics of Actinomycetes, Rickettsiae, Mycoplasms, Spirochetes. Difference between prokaryotic and eukaryotic cells. Ultra structure of bacterium and endospore. Nucleic acid and 16s RNA based classification.

Nutritional requirements in microorganisms: Modes of nutrition – phototrophy, chemotrophy,

methylotrophy, organotrophy, mixotrophy, saprophytic, symbiotic and parastitic modes of nutrition. Isolation of microorganisms – Direct and indirect Methods of maintenance of culture. Growth and kinetics of bacterial cells; Normal and biphasic growth curve, batch and continuous cultures, chemostats. Preservation of cultures (glycerol stocks, freeze drying), Culture collection centers in India.

Unit II

Control of microorganisms: Fundamentals of control, control by physical and chemical agents. Antibiotics and other chemotherapeutic agents. Microbiology of Food, Water, Sewage and Biogas. Water and Sewage treatment. Food and water-borne infections, Bacteriological and Viral standards of water. Estimation of BOD and COD and their importance. Outlines of the Ames Test.

Introduction to Virology: Classification, Morphology, size, ultra structure and life cycle of some representative viruses (ØX 174, T4, SV40, λ-Phase, M13 and HIV). Methods of culturing of viruses, Isolation, purification and characterization. Biology of subviral agents – Viroids, Prions, Satellite viruses.

Unit III

Genetic material – Direct and Indirect evidences of DNA as genetic material, experimental proof. Evidences of RNA as genetic material – eg. Virus.

Chromosome - Chromosome and genes, chromosomal replication, genetic mapping of chromosomes, structure of chromatin - nucleosomes and higher orders of organization, chromosome banding, transposition in human chromosome and chromosomal abnormalities.

Gene – arrangements in prokaryotes and eukaryotes. Gene structure in eukaryotic organisms, introns, exons, pseudogenes, and gene clusters, spacers, repetitive sequences. Single and multiple copy genes in eukaryotes, eg – Histones, Alu, copia, satellite. Mapping of human genes – techniques used, assignment of important genes. Gene regulatory mechanisms and cell memory. Mechanism of recombination, extra nuclear inheritance. Non-coding explosion, cell fate determination and reprogramming. Genetic technique for Archea. New gene evolution, Tiniest genome of proteobacteria and bacteriodates.

Unit IV

Bacterial genetics – Bacterial chromosomes, plasmids – fertility, resistance, colicinogenic and other, PBR 322 and other synthetic plasmids - isolation and uses. Transposable genetic

elements, transformation, transduction, and conjugation in bacteria. Linkage map of bacterial chromosome. Recombination in bacteria.

Structure of Bacteriophages and their use in the study of molecular genetics – lytic cycle-replication of T-phages, Lysogeny and its regulation. Transduction – specialized, generalized and abortive. Transfection and cosmids. Fine structure analysis of T- phages, Benzers work and concept of cistrons. Bacterial defence (CRISPR- Gene turning on)

Mutation – Types of mutations, mutagens, mechanism of mutation, Mutagenesis, induction and isolation of mutants. Haploid genetic tools. Radiation effects on human heredity. Phylogenetic inheritance. Heretability and its measurements and mapping .gene duplication and self incompatibility.

Recommended Books:

1. Microbiology by Pelczar, Chan and Krieg 5th edn. 1995 Mc Grew- Hill.
2. General Microbiology: Boyd, R.F., Times Mirror/ Mosby College, 1984.
3. A Textbook of Microbiology, R.C.Dubey and D.K.Maheswari, S.Chand Co (2001).
4. Pharmaceutical Microbiology, By Hugo and Russell, Blackwell Scientific (1987).
5. An Introduction to Viruses by S.B.Biswas, Vikas Publishing house.
6. Microbiology 4th edition, Prescott, Harley, Klein (Mc grew Hill)
7. Fundamentals of Microbiology – M. Frebisher.
8. Text book of Microbiology – William Burrows.
9. Biology of Microorganisms – Sandes T. Lyles
10. Microbial Ecology – Atlas (2001).
11. Molecular Genetics by D Friefelder
12. Cell molecular biology, Albert Bruce
13. Gene VII by Lewin
14. Molecular cloning by Maniatis and Co Vol I, II, III
15. Genetics by Gardner

Course Outcomes: After the completion of this course, the student will be able to

1. Understand the basics of microbiology like nomenclature and classification of microorganisms, understand the various biological and

non-biological method to control microorganisms

2. The student will learn about different mode of nutrition in microorganisms and about viruses - Isolation, purification and characterization.
3. Understand the basics of genetics and the gene arrangement in prokaryotes and eukaryotes.
4. Gain knowledge in bacterial genetics includes the different types plasmids, recombination in bacteria, bacteriophages and bacterial defense mechanism(CRISPR) and Describe the various types of mutations and its effect.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	2	2	3	1	2	2	2	3
CO_2	3	3	3	3	2	3	3	1	2	2	3	3
CO_3	3	3	3	3	2	2	3	1	2	2	3	3
CO_4	3	3	3	3	2	2	3	1	2	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
Core-2	Immunology	06	04
Sessional Marks: 20		**End Semester Examination Marks: 80**	

Course Objectives:

1. To provide knowledge on essential features of antigens and antibodies and their types and different theories of Antibody formation.
2. To acquire knowledge on types of immunity, phagocytosis, interferons and complement system.
3. To explain the concept of hypersensitivity, auto immunity and transplantation.
4. To provide knowledge on immune deficiencies and several immunological techniques.

Course Contents:

Unit I

Introduction: Scope of Immunology, Historical background of Immunology, Biological aspects of Immunology, Self and non-self-recognition, specificity, memory of immune system.

Antigens: Essential features of Ag, haptens, Carrier molecule, Immunological valence, Antigenic determinants. Adjuvants: Freund's complete and incomplete.

Antibodies: Nature, Primary structure of immunoglobulins, light chain, heavy chain, variable region, constant region, Hinge region; Enzymatic fragmentation of Ig. Domain structure of Ig and significance; Classification of Immunoglobulins: Types –IgG (G1, G2, G3 & G4), IgM, IgA, IgD and IgE (Origin, structural functions). Theories of Ab formation-Instructive, selective, clonal selection theories and evidences; Immunological memory.

Antibody diversity: Mini gene theory, Mutation theory, Germ line theory, Somatic recombination, V (D) J recombination, Combinatorial diversity, Junctional diversity.

Unit II

Immunity: Types: Active and passive immunity. Cell mediated immunity, humoral immunity, immune response; primary and secondary response. Phagocytosis, mechanism of phagocytosis. Interferon: Types of Interferons. Null cells: Natural Killer cells. Complement system: Nature, components of compliment.Pathways: Classical and alternative pathways. Compliment fixation tests.

Unit III

Hypersensitivity (HS): Type I: Allergies and anaphylaxis – IgE, Mast cell degranulation, biologically active agents released in reactions, Clinical manifestations.

Type II: Antibody mediated HS reactions; Mechanism, pathogenicity and cases of type II reactions; Haemolytic-disease of new born (HDN).

Type III: Immune complex mediated HS reactions: Mechanism &pathogenicity of type III reactions. Soluble immune complexes and insoluble immune complex mediated reactions. Arthus reaction, Serum sickness.

Type IV: Delayed type (or) cell-mediated HS reactions; Mechanisms and pathogenicity,Tuberculin reaction.

Type V: Stimulatory HS reactions. Mechanism and pathogenicity, Grave's disease.

Blood groups: AB, Rh system, Lewis-Luthern systems, significance, practical application of immuno methodology in blood transfusions, Erythroblastosisfetalis.

Auto immunity: Introduction, Auto recognition, classes of auto immuno diseases. (Hashimoto disease, thyrotoxicosis, Systemic lupus erythematosus, Autoimmune haemolyticanaemia, Rheumatoid arthritis).

Transplantation: Terminology, Auto graft, Isograft, Allograft, Xenograft, Immunological basis of transplantation reactions, GVH reaction, Immuno suppression, General mechanisms of Immune suppression, Immune suppression, drugs (azothioprine, methotrexate, cyclophosphamide, cyclosporin-A, Steroids).

Unit IV

Immune Deficiencies: Introduction, primary and secondary deficiencies. T-cell, B-cell and combined immunedeficiencies, Compliment system deficiency. Acquired immuno deficiency syndrome. SCID.

Major Histocompatibility Complex: MHC in mice and HLA in man-fine structure and functions only.

Immunological techniques: Precipitin curve, Immuno diffusion, one and two dimensional, single radial immuno diffusion, Ouchterlonyimmuno diffusion.

Immuno-electrophoresis: Rocket immuno-electrophoresis; CIE, Graber and William technique.

Agglutination: Direct and Indirect, Widal test, VDRL test.

Radioimmunoassay: ELISA – Principle, Methodology and applications.

Immuno-fluorescence: Direct, indirect and Sandwich, *in situ* localization by techniques such as FISH and GISH.

Recommended Books:

1. Essential immunology- Ivan M. Roitt.
2. Introduction to Immunology – John W.Kinball.
3. Immunology – D.M. Weir.
4. Immunology – Janis Kuby.

Course Outcomes: The student will be able to

1. Gain knowledge on different types of antigens, antibodies and how different types of antibodies are produced.
2. Out line, compare and contrast the key mechanism of innate and adaptive immunity.
3. Gain knowledge on undesirable immunological reactions and their complication in health management.
4. Apply knowledge in disease diagnosis through serological tests.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
Core-3	Practical related to Microbiology	06	04
End Semester Examination Marks: 100			

Course Objectives:

1. The lab is designed to train the students in handling of microscope.
2. It also deals with microbial techniques of isolation, purification and maintenance of microbial cultures.
3. To learn Staining techniques for bacteria and yeast.
4. To Prepare wine from Grapes.
5. Production and estimation of alcohols, citric acid, lactic acid etc..

Course Content:

MICROBIOLOGY PRACTICALS

1. Handling of Microscopes: Calibration of Microscopes.
2. Sterilization techniques: Autoclaving (Moistened-heat), Oven sterilization (dry-heat), Filtration,
3. UV irradiation and Chemical.
4. Preparation of media: For Bacteria and Fungi.
5. Isolation and cultivation of pure cultures: Serial dilution, Pour plate method, Spread plate method and streak plate method.
6. Methods for the estimation of Growth (Growth rate and generation time in bacteria).
7. Staining techniques for bacteria and yeast: Gram Staining and Spore staining for bacteria; Methylene blue staining for Yeast.Antibiotic sensitivity test.
8. Starch hydrolysis assay for the identification amylase-producing

microorganisms.

9. Gelatin hydrolysis assay for the identification protease-producing microorganisms.
10. Preparation of wine from Grapes.
11. Production of Alcohol from molasses and its estimation by specific gravity method.
12. Production of Citric acid and its estimation by Marrier and Boulet method.
13. Production of Lactic acid and its estimation by Barker and Summerson method.
14. Induction of mutation in bacteria using physical and chemical mutagens.
15. Water analysis for bacteria and determination of BOD and COD of water.
16. Observation of Rizobium from root nodules of ground nut plant.
17. Isolation of phages from sewage and quantification by plaque assay.

Recommended Books

1. Hawk's Physiological chemistry
2. Practical Biochemistry by T Plummer
3. Practical Biochemistry by J Jayaraman
4. Klemir and others: practical Biological chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell
6. Practical Biochemistry-Sawhney (2000)
7. Varley's Practical clinical Biochemistry – Ed. Alan W.Gowenlock (Heinemann Medical Books)

Course Outcomes: After the completion of this course, the student will be able to

1. Handle the microscope.
2. Learn Methods of sterilization and preparation of various culture media, Purification techniques.

3. Identification of isolated bacteria, and Growth curve of microorganism.
4. Learn Staining techniques for bacteria and yeast.
5. Gain knowledge in the Preparation of wine from Grapes.
6. Production and estimation of alcohols, citric acid, lactic acid etc.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	2	2	3	3
CO_2	3	3	3	3	3	3	3	1	2	2	3	3
CO_3	3	3	3	3	3	3	3	1	2	2	3	3
CO_4	3	3	3	3	3	3	3	1	2	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
Core-4	Practical related to Immunology and haemotology	06	04
End Semester Examination Marks: 100			

Course Objectives:

1. To perform RBC, WBC counts.
2. To estimate Hb, ESR, PCV, Mean Cell Haemoglobin, Osmotic fragility of RBC.
3. To perform different types of Immunodiffusions.
4. To demonstrate different types of Immunoelectrophoresis

Course Content:

HAEMATOLOGY PRACTICALS

1. RBC count.
2. Total WBC count.
3. WBC Differential count.
4. Erythrocyte Sedimentation Rate (ESR).
5. Packed Cell Volume (PCV).
6. Estimation of Haemoglobin (Hb).
7. Mean Cell Haemoglobin and Mean Cell RBC volume.
8. Colour Index and Volume Index of RBC.
9. Osmotic fragility of RBC.
10. Raising of antibodies to soluble antigen in rabbits.
11. Immunodiffusion.
12. Single Radial Immunodiffusion.
13. Rocket immunoelectrophoroesis.
14. Cross over Immunoelectrophoresis.
15. Graber and Williams Immunoelectrophoresis.
16. Detection of HCG by latex agglutination inhibition test.
17. Haemeagglutination tests for identification of human blood groups.
18. Detection by viral fever by slide agglutination tests.

Recommended Books:

1. Hawk's Physiological chemistry.
2. Practical Biochemistry by T Plummer.
3. Practical Biochemistry by J Jayaraman.
4. Klemir and others: practical Biological chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell.
6. Practical Biochemistry-Sawhney (2000)
7. Varley's Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann, London).

Course Outcomes: The student will be able to

1. Perform RBC, WBC count and differential count.

2. Do all haematological tests that will be done in clinical labs.

3. Have an idea on Rocket immunoelectrophoroesis, Cross over Immunoelectrophoresis etc.

4. Do Heme agglutination tests for identification of different antigens.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	3	2	3	3
CO_2	3	3	3	3	3	3	3	1	3	2	3	3
CO_3	3	3	3	3	3	3	3	1	3	2	3	3
CO_4	3	3	3	3	3	3	3	1	3	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
Generic elective-a	Molecularbiology	06	04
Sessional Marks: 20		**End Semester Examination Marks: 80**	

Course Objectives:

1. The objective of the course is learning and understanding the fundamentals of DNA replication and its mechanism.
2. Complete information about RNA synthesis in prokaryotes and eukaryotes.
3. Tounderstand the genetic code.
4. Detailed accounts on the biosynthesis and mechanism of protein synthesis.

Course Content:

Unit I

Isolation, fractionation, characterization of nucleic acids, properties of nucleic acids in solution. DNA synthesis and repair - Topology of DNA, conservative, semi conservative and discontinuous synthesis of DNA, DNA primer for DNA synthesis. DNA polymerases I, II, III – their role in DNA synthesis. DNA ligase - mechanism of its action and its role in DNA synthesis. Inhibition of DNA synthesis, fidelity of replication. Alternate lengthening of telomere. Nearest neighbor frequency analysis.

Mechanism of replication of *E. coli* DNA. Role of DNA binding proteins – Histones in Eukaryotes, SSB in prokaryotes. Replication of lambda phage DNA, phage T-7 and single stranded DNA, the rolling circle model of replication of DNA. Mitochondrial replication, transcriptional switch.

Unit II

RNA synthesis and processing: RNA polymerases in prokaryotes and eukaryotes. Molecular composition of prokaryote RNA polymerase. Mechanism of transcription. Role of various compounds on RNA polymerases. Inhibitors of RNA synthesis. Biosynthesis of prokaryotic and Eukaryotic m-RNA, r-RNA, and t-RNA.

Processing of RNA- post transcriptional modifications, capping, adenylation and splicing.

Role of the hn RNA, sn RNA and sn RNP in processing of RNA. Functions and information

content of DNA methylation, Transcriptional transcript RNA, template DNA, recombination and silencing repair in yeast, sRNA and gene regulation.

Unit III

Genetic code: General features of the code, Deciphering of the genetic code – Nirenberg and Khorana's work. Central dogma in the molecular biology and its verification.

Colinerarity of gene and protein. Wobble hypothesis and deviation from wobble hypothesis. Mitochondrial genetic code and evolution of genetic code. RNA editing and evolution.

Unit IV

Biosynthesis and mechanism of protein synthesis: Different stages and components of protein synthesis, m RNA and t RNA. Amino acid activation, protein chain initiation, elongation, and termination. Ribosomes and types, molecular components of ribosomes. Assembly and dissociation of subunits

Inhibitors of prokaryotic translation. Post – translational modification of proteins. Synthesis of secretory and membrane proteins – signal sequence hypothesis. Mechanism of translation control. Proteins local synthesis and disposal.

Recommended Books:

1. Molecular Biology of the gene by Watson.
2. Genetics by G Zubay.
3. Molecular Biology of the Cell by Albert Bruce.
4. Cell molecular Biology by Baltimore.
5. Molecular Biology by D Friefelder.
6. Molecular Genetics by D Friefelder.
7. Genes VII Benjamin Lewin (2000). Oxford Univ. Press. London.
8. Cell and Molecular Biology 2ndEdit. (2002) By P. K. Gupta, Rastogi Publ.

Course Outcomes: After the completion of this course, the student will be able to

1. The students will learn about the Possible modes of replication, and roles of helicase, primase, gyrase, topoisomerase, DNA Polymerase, DNA ligase, and Regulation of replication.

2. Learnabout the mechanism and regulation of transcription in prokaryotes and eukaryotes.
3. Learnabout genetic code and their evolution.
4. Gain knowledge in Different stages and components of protein synthesis.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	3	2	2	3
CO_2	3	3	3	3	3	3	2	1	3	2	2	3
CO_3	3	3	3	3	3	3	2	1	3	2	2	3
CO_4	3	3	3	3	3	3	2	1	3	2	2	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
Generic elective-b	Endocrinology	06	4
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To impart knowledge on structure and hormones secreted by hypothalamus, pituitary and pineal glands.
2. To familiarize the concepts of biosynthesis and regulation of secretion of thyroid, parathyroid and calcitonin hormones.
3. To make them understand the chemistry, biosynthesis, secretion, regulation of Hormones of Pancreas and Gastro intestinal hormones.
4. To impart knowledge of Sex hormones, hcg, Miscellaneous hormones and Insect molting hormones.

Course Contents:

Unit I

History and Introduction to Endocrinology, Classification, chemistry, biosynthesis, secretion, regulation, transport and general mechanisms of actions of Hormones, bio-assay, chemical, RIA, ELISA.

Hormones of the pituitary, hypothalamus and pineal body: Growth hormone. Adrenocorticotropic hormone, Thyroid stimulating hormone, leutinizing hormone, Follicular stimulating hormone, prolactin, oxytocin, antidiuretic hormone. Their structure, storage, regulation of secretion, mechanism of action and their actions. Structure secretion and actions of hypothalamic releasing hormones and inhibitory hormones. Pineal hormones: Melatonin and serotonin.

Unit II

Hormones of the Thyroid and parathyroid gland: Iodine metabolism, Biosynthesis of thyroid hormones, regulation of secretion. Possible mechanism of action and general functions.

Metabolism at target cells and excretion.

Calcitonin and parathyroid hormone. Role of calcitonin in calcium and phosphate homeostasis in blood. Disorders of thyroid and parathyroid.

Unit III

Hormones of Pancreas and Gastro intestinal hormones: Chemistry, biosynthesis and secretion of insulin and glucagon. Actions of insulin and glucagon on Carbohydrate, lipid and protein metabolism.Gastrin, secretin, pancreozymin Cholecystokinin etc Adrenal hormones, Structure, biosynthesis metabolism, excretion and actions of adrenaline and noradrenaline.

Corticosteroids: Biosynthesis, secretion, actions, metabolism and excretion of cortisone Cortisol, corticosterone, deoxycorticosterone and aldosterone. Disorders of pancreas and adrenal glands.

Unit IV

Sex hormones (Hormones of Reproduction): Testosterone and inhibin. Estrogens, Progesterone and relaxin Human chorionic gonadotropin; Human placental lactogen, Hormonal regulation of menstrual cycle, contraceptions. Disorders associated with Gonadal hormones.

Miscellaneous hormones: Thymosin – synthesis and actions. Insect molting hormones – (ecdysone) Plant hormones – Auxins, gibberellins, ethylene, and abscissic acid, Pheromones.

Recommended Books:

1. Text book of biochemistry and human biology. Talwar G. P. Prentice Hall India.
2. Human physiology and mechanism of distance–Guyton 3rdedn. Igkushoen /Seunders.
3. Clinical Biochemistry Vols. 1 and 2: Williams et al Heinemann Medical 1978.
4. Lynchs Medical Laboratory Technology Raphael, S.S., 4thedn. Igkushoe /Saunders.
5. Text book of Endocrinology – William.
6. General endocrinology –Turner.

7. Biochemical endocrinology of the vertebrates by E. Fruden and H.Lines.
8. Foundation of modern Biochemical series, prentice Hall Inc.1971.
9. Metabolic and endocrine physiology: By Jay Teppermann.
10. Metabolic pathways –Greenberg.
11. Intermediary metabolism and its regulation –Larner.
12. Principles of Biochemistry, White, A, Handler, P and Smith.
13. Receptors and hormone action 1977.
14. Receptors and recognition series.

Course Outcomes: The student will be able to

1. Know about the mechanism of action of different hormones secreted by hypothalamus, pituitary and pineal glands.
2. Familiar with Iodine, Calcium metabolisms and disorders related to thyroid and parathyroid glands.
3. Know about the mechanism of action of insulin, glucagon and many gastro intestinal hormones.
4. Acquire knowledge on Hormonal regulation of menstrual cycle and disorders associated with Gonadal hormones.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	3	2	3	3
CO_2	3	3	3	3	3	3	2	1	3	2	3	3
CO_3	3	3	3	3	3	3	2	1	3	2	3	3
CO_4	3	3	3	3	3	3	2	1	3	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
Generic elective-c	Cell and Developmental Biology	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To explore the knowledge and awareness of the basic principles and concepts of Developmental Biology.
2. To familiarize with the concepts Gametogenesis, fertilization and early development.
3. To impart knowledge about Morphogenesis and organogenesis in animals and in plants.
4. To understand the concept of biomembranes and membrane transport.

Course Contents:

Unit I

Origin of cells and unicellular evolution. Prokaryotic and Eukaryotic cells: Structure, Composition and functions of nucleus, mitochondria plastids, endoplasmic reticulum, golgi, lysomes, vacuole, micro bodies, ribosomes, cytoskeleton.

Cell division, cell cycle and its regulation, cell signaling, stress response, cell communication, cell adhesion, Apoptosis, Senesence, extracellular matrix, integrins.

Unit II

Basic concepts of development: Potency, commitment, specification, induction, competence, determination and differentiation; morphogenetic gradients; cell fate and cell lineages; stem cells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development.

Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of

symmetry in plants; seed formation and germination.

Unit III

Morphogenesis and organogenesis in animals: Cell aggregation and differentiation *Drosophila*, amphibia and chick; organogenesis limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development-larval formation, metamorphosis; environmental regulation of normal development; sex determination.

Morphogenesis and organogenesis in plants: Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum.*

Unit IV

Biomembranes: Chemical composition of Membranes, Composition of plasma and organelle membranes of animal and plant cells. Lipids, proteins and Carbohydrates of membranes Distribution of membrane lipids. Assembly of membrane components. Molecular structure of membranes: Miscelle, and liposomes, biological membrane; Symmetry of the membrane; Membrane fluidity; fluid mosaic model of biological membranes. Nanomaterilas and their applications.

Membrane Transport: Donnan membrane equilibrium, Diffusion across cellular membranes Mediated transport; Energetics of transport systems; Passive transport anion exchange proteins; Active transport; Active transport of Na+ K+ (Sodium potassium ATPase) Ca_2+ (Ca_2+-ATPase). Active transport of sugars coupled to Phosphorylation; group translocation (Y-Glutamyl cycle). Proton motive force in bacterial transport processes. Ionophores Gap junctions; Endocytosis, Exocytosis. Nature of receptors.

Recommended Books:

1. Molecular Biology of the cells by Alberts *et al* (1994).
2. Cell and Molecular Biology (2001) by EDP de Robertis and EMF de Robertis.
3. Text Book OF medical physiology by A.C.Guyton (2001).
4. Cell and Molecular Biology 2nd Edit. (2002) By P.K.Gupta, Rastogi Publ.

Course Outcomes: The student will be able to

1. Acquire knowledge on basic concepts of Developmental Biology.
2. Gain the proficient knowledge about zygote formation, blastula formation, gastrulation and many events in early development.
3. Understand Organogenesis, limb development and regeneration in vertebrates,

and post embryonic development in animals and Plant tissue culture, Protoplast fusion and Production of transgenic plants.

4. Acquire knowledge about biomembrane concept and various membrane transport systems.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	2	3	2	3	3
CO_2	3	3	3	3	3	3	2	2	3	2	3	3
CO_3	3	3	3	3	3	3	2	2	3	2	3	3
CO_4	3	3	3	3	3	3	2	2	3	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
Open elective-a	Basics of Immunology	06	04
Sessional Marks : 20		**End Semester Examination Marks : 80**	

Course Objectives:

1. To provide knowledge on essential features of antigens and antibodies and their types.

2. To acquire knowledge on types of immunity, phagocytosis, interferons and complement system.

3. To explain the concept of different types of hypersensitivity, and transplantation.

4. To provide knowledge on immune deficiencies and several immunological techniques.

Course Content:

Unit I

Introduction: Scope of Immunology, Historical background of Immunology, Biological aspects of Immunology, Self and non-self-recognition, specificity, memory of immune system. Antigens: Essential features of Ag, haptens, Carrier molecule, Immunological valence, Antigenic determinants. Adjuvants: Freund's complete and incomplete.

Antibodies: Nature, Primary structure of immunoglobulins, light chain, heavy chain, variable region, constant region, Hinge region; Enzymatic fragmentation of Ig. Domain structure of Ig and significance; Classification of Immunoglobulins: Types –IgG (G1, G2, G3 & G4), IgM, IgA, IgD and IgE (Origin, structural functions).

Unit II

Immunity: Types: Active and passive immunity. Cell mediated immunity, humoral immunity, and immune response; primary and secondary response. Phagocytosis, mechanism of phagocytosis. Interferon: Types of Interferons. Null cells: Natural Killer cells. Complement system: Nature, components of compliment. Pathways: Classical and alternative pathways. Compliment fixation tests.

Unit III

Hypersensitivity (HS), Types, clinical diseases. Blood groups: AB, Rh system, Lewis-Luthern systems, significance, practical application of immuno methodology in blood

transfusions, Erythoblastosis faetalis.

Auto immunity: Introduction, Auto recognition, classes of auto immuno diseases. Transplantation: Terminology, Auto graft, Isograft, Allograft, Xenograft, Immunological basis of transplantation reactions, GVH reaction, Immuno suppression, General mechanisms of Immune suppression, Immune suppression, drugs (azothioprine, methotrexate, cyclophosphamide, cycosporin-A, Steroids).

Unit IV

Immune Deficiencies: Introduction, primary and secondary deficiencies. T-cell, B-cell and combined immune deficiencies, Compliment system deficiency. Acquired immuno deficiency syndrome. SCID. Major Histocompatability Complex: MHC in mice and HLA in man-fine structure and functions only.

Immunological techniques. Radioimmunoassay: ELISA – Principle, Methodology and applications. Immuno-fluorescence: Direct, indirect and Sandwich, *in situ* localization by techniques such as FISH and GISH.

Recommened books

1. Essential immunology- Ivan M. Roitt.
2. Introduction to Immunology – John W. Kinball.
3. Immunology – D. M. Weir.
4. Immunology – Janis Kuby

Course Outcomes:

1. Gain knowledge on essential features of different types of antigens, antibodies.

2. Out line, compare and contrast the key mechanism of innate and adaptive immunity.

3. Gain knowledge on undesirable immunological reactions and their complications in health management and transplantation.

4. Apply knowledge in disease diagnosis through serological tests.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

Course Code	Semester-III, Course Title	No of Hours Per week	No of Credits
Open elective-b	Immunotechniques	06	04
Sessional Marks : 20		**End Semester Examination Marks : 80**	

Course Objectives:

1. To acquire knowledge on antigens and antibody preparation.

2. To gain insights in Techniques used in immunology.

3. To use antisera in detection of diseases.

4. To impart knowledge on antibody immunotherapy.

Course Content:

Unit I

Methods used in immunology: Preparation of antigens and antibodies, purification of antibodies, analysis of antibodies and antigens, preparation and uses of various types of vaccines.

Unit II

Techniques used in immunology: Types of immunodiffusion methods, ELISA, RIA, Western blot analysis, Electrophoresis and Hybridization techniques, immunohistochemistry, Immunoflowcytometry, Immunofluoroscence.

Unit III

Applications of antisera in the detection of various diseases. Examples: syphilis and lyme, typhoid, streptococci infections, HIV, various types of Hepatitis

Unit IV

Antibody engineering, Catalytic antibodies, antibody immunotherapy, productions of drugs to allergies.

Recommended Books:

1. Harper's Biochemistry (Latest edition)

2. Immunology by Carpenter (Latest edition)

3. Kubay's Immunology (Latest edition)

4. Biotechnology by RC Dubay (2001) S Chand and Company, New Delhi.

Course Outcomes: The student will be able to

1. To purify and analyse the antigens and antibodies.

2. To apply different Hybridization techniques and ELISA, RIA.

3. To detect various diseases by application of antiisera.

4. To engineer antibodies and catalytic antibodies and produce drugs to allergies.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

SEMESTER-IV

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
Core-1	Genetic Engineering	06	04
Sessional Marks : 20		**End Semester Examination Marks : 80**	

Course Objectives:

1. To impart knowledge about major events in the development of rDNA technology and to acquire skills on techniques of construction of recombinant DNA - Cloning vectors and isolation of gene of interest.
2. To familiarize with the concepts different operons and regulation of gene expressions in prokaryotes and eukaryotes.
3. To acquaint them with the different gene transfer methods and mappings.
4. To explain the applications of genetic engineering in biotechnology.

Course Contents:

Unit I

Cloning and amplification of DNA: Introduction, choice of the organism, use of restriction endonucleases for the production of DNA fragments. Vehicles for cloning - plasmids, phage vectors and cosmids.

RNA isolation, preparation and use of cDNAs. Screening and determination ofnucleotide sequences. Application of recombinant DNA technology. Oncogenes andtheir mode of action.

Unit II

Isolation, sequencing and synthesis of genes: Isolation of genes, sequencing of genes, synthesis of genes, Cloning of specific eukaryotic genes and their expression in bacteria. Operon model: Isolation and chemical nature of repressor. Catabolite repression and role of cAMP and cAMP receptor protein (CRP) in the expression of glucose – sensitive operons. Lac operon, His operon, Trp operon of E. coli. Stringent and relaxed control.

Regulation of gene expression in prokaryotes and eukaryotes: Transcriptional control, enzyme induction and repression. Constitutive synthesis of enzymes. Genes involved in regulation, regulatory gene, promoter gene, operator gene and structural genes. Genome imprint.

Unit III

Gene transfer methods and transgenic organisms: Gene transfer methods for animals and plants, Agro bacterium mediated gene transfer, electroporation and particle gun. Trasgenic animals, and transgenic plants.

Restriction maps and molecular genetic maps: Restriction mapping, restriction fragment length polymorphisms (RFLP) Linkage and recombination between molecular and phenotypic markers, Random amplified polymorphic DNA (RAPDs) using PCR, Chromosome walking. Organic genome engineering and cell molecular memory/ Biosensors

Unit IV

Applications of genetic engineering in biotechnology: Genome imprint, Dynamic genome engineering and cell molecular memory. Plant, animal cell and Tissue culture methods.

Biosensors: Genetically Modified Organism - Market potential, Diet, Leash, Potato, Rice BT.

Recommended Books

1. Genes and Probes, A Practical Approach Series (1995) by Hames and SJ Higgins; Oxford Univ. Press.
2. Gel Electrophoresis of Nucleic Acids, A practical Approach (1990) by D Rickwood and BD Hames.
3. Oxford Univ. Press.

Course Outcomes: The student will be able to

1. Familiar with the tools and techniques for isolation and purification of genes, vector construction.
2. Understand the mechanisms of regulation of gene expression in different operons.

3. Know the techniques for transfer and expression of cloned gene and
4. Apply the knowledge of genetic engineering in biological research.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	2	3	2	3	3
CO_2	3	3	3	3	3	3	3	2	3	2	3	3
CO_3	3	3	3	3	3	3	3	2	3	2	3	3
CO_4	3	3	3	3	3	3	3	2	3	2	3	3

Course Code	Semester-IV,Course Title	No of Hours Per week	No of Credits
Core-2	Research methodology and bioinformatics	06	04
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To choose the appropriate research design and develop appropriate research hypothesis for a research project
2. To describe the appropriate statistical methods required for a particular research design.
3. To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
4. To provide knowledge about the basics of sequence alignment and analysis.

Course Contents:

Unit I

Research Methodology: Meaning and scope, steps of Research, Article and thesis writing. Funding agencies, Project proposal preparation, Preparation of proposal, Experimental design and implementation of project, submission of progress report (year wise), statement of expenditure (SE), Utilization certificate (UC). Research ethics, Plagiarism.

Introduction of computation: Computers components, storage devices, graphic devises, concepts of hardware and software, methods and types of networks. Basics of operating systems and types python, cython, Information and Communication Technology (ICT), online methods of teaching (MOOCS).

Unit II

Bio-Statistics: Data - Data types, collection of data, classification, tabulation and

interpretation. Measures of central tendencies. Mean, median and mode. Measures of variation - Range, quartile deviation, mean deviation and standard deviation. Coefficient of variation.

Probability. Addition and multiplication theories, conditional probability and probability distributors. Binomial, poission and normal distribution. Correlation and linear regression. Regression: Regression coefficients and properties. Small sample tests- t, F and chi square tests. ANOVA - one way and two-way classifications.

Unit III

Bio-Informatics–I: Origin of bioinformatics biological data (genome projects), Disciplines of bioinformatics, transcriptomics, functional genomics, structural genomics, metabolomics, pharmaco- genomics, structure prediction, drug design and Microarrays.

Genome projects - General introduction to genome projects (rice and Mycobacterium tuberculosis genome project). Special emphasis on Human Genome Project (HGP). Science behind HGP, benefits of HGP, ELSI of HGP in use of genetic information, genetic testing standard, quality and commercialization.

Biological database - Introduction of database (DB), need, organization, search of DB. An over view of biological databases - NCBI, EMBL, DDBJ, SWISS-PROT, PDB, KEGG. Decoding of the genome (Nathan blow study), Ribosomal bar codes, Molecular signatures.

Unit IV

Bio-Informatics–II Sequence alignment - Introduction, significance of sequence alignments and use of dot matices. Pair wise and multiple sequence alignment (MSA) using Clustal programs.

Sequence analysis - concepts of sequence analysis and their importance. BLAST and FASTA. Proteomics- Introduction, principle, technique, 2-D data base. Gel analysis, post gel analysis, MALDI- TOF. Significance and applications of proteomics in modern biology.

Recommended Books

1. Statistical methods. S.P.Gupta
2. Fundamentals of mathematical statistics. S.C Gupta &Kapoor
3. Statistical methods in biological and Health Science. J. S. Milton

&J.O.Tsokan.

4. Primrose SB. Principles of Genome Analysis: a guide to mapping and sequencing DNA from different organisms. 2nd Ed. 1998. Blackwell Science: Oxford. ISBN0-632-04983-9.
5. Genome Mapping: A practical approach. Dear P (Editor). 1st Ed. 2000. Oxford University Press.
6. Developing Bioinformatics Skills. Alfonso Valencia and Blaschke. L (2005) Oreilles Publication.
7. Bioinformatics sequence, structure and data banks ed. By Des Higgins Willie Taylor (2006).
8. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins" (Andreas D. Baxevanis, B. F. Ouellette), Paperback, 2nd ed., 470 pp., ISBN: 0471383910, Publisher: Wiley, John & Sons, Inc.,Pub.
9. David W. Mount, Bioinformatics: Sequence and Genome Analysis, 2nd edition, Cold SpringHarbor Laboratory, 2004, ISBN0-87969-687-7.
10. Introduction to Bioinformatics by T.K.Altwood and D.J Parry-Smith (Pearson Education Asia1999).

Course Outcomes: The student will be able to

1. Discuss the various steps involved in conducting research.
2. Learn to apply hypothesis testing via some of the statistical distributions.
3. Develop understanding about biological data and database search tools.
4. Acquire hands on training on various computational tools and techniques employed in biological sequence analysis.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	2	1	1	3	3	3	3
CO_2	3	3	3	3	3	2	2	1	3	3	3	3
CO_3	3	3	3	3	3	2	1	1	3	3	3	3
CO_4	3	3	3	3	3	2	1	1	3	3	3	3

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
Core-3	Practical related to Clinical Immunology, Biostatistics and bioinformatics	06	04
End Semester Exam Marks: 100			

Course objectives:

1. To learn how to raise antibodies to soluble antigen in Rabbits.
2. To perform different types of Immunodiffusions.
3. To demonstrate different types of Immunoelectrophoreses.
4. To perform different types of slide agglutination tests.

Course content

1. Use of diagnostickits.
2. Preparation of animal to raiseantibodies.
3. Inoculation of antigen to animal to raiseantibodies
4. Collection of serum from animal and separation of antiserum fromblood.
5. Analysis of titer ofantiserum.
6. Demonstration of antigen-antibody interaction: Ouchterlonymethod
7. Direct agglutination reaction: Determination of human blood group antigens.
8. Demonstration of immunofluorescence technique
9. Purification of IgG from bovineserum

10. Rocketimmunoelectrophoresis.

11. Enzyme linked immunosorbant assay: Antibody captureassay

12. Polyacrylamide gelelectrophoresis

13. Western blot analysis.

14. Determination of antibody content by Lowrymethod.

15. Demonstration ofImmunoelectrophoresis

Course Outcomes: The student will be able to

1. Prepare Rabbit for performance of immunological studies.
2. Perform Single Radial Immunodiffusion.
3. Have an idea on Rocket immunoelectrophoroesis, Cross over Immunoelectrophoresis etc.
4. Do Heme agglutination tests for identification of different antigens.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	3	1	3	2	3	3
CO_2	3	3	3	3	3	3	3	1	3	2	3	3
CO_3	3	3	3	3	3	3	3	1	3	2	3	3
CO_4	3	3	3	3	3	3	3	1	3	2	3	3

Semester-IV: Core-4:PROJECT WORK (100 MARKS)

Marks allotted to thesis preparation-80 (40 marks for the progress performed by the student in laboratory will be awarded by project research supervisor and another 40 marks for content of the thesis). Marks allotted to viva presentation-20

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
Generic elective-a	Clinical Immunology	06	4
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1.To inculcate the etiquette to be maintained in Immunology lab.

2. To impart knowledge about different types of immunodeficiencies and autoimmune diseases.

3. To equip with the knowledge on transplantation and immunosuppression.

4. To understand the fundamentals of cancer biology , the Principles of carcinogenesis and immunotherapies.

Course Content:

Unit I

Introduction to Clinical Immunology: Introduction and maintenance of clinical Immunology/ biochemistry laboratory; hazards in clinical laboratory; units; 'normal range', reference values. Factors affecting reference values quality control in laboratory – use of external and internal standards; use of WHO standards. Selection of analytical methods. Automation in clinical laboratory. Collection and preservation of specimens. Natural Immunity, a. First Line of Defense innate / nonspecific immunity b. Adaptive / specific immunity, c. Factors associated with immunologic disease,Components of the Immune System. Immune response to various infectious diseases.

Unit II

Primary immune deficiencies, AIDS and other acquired or Secondary immune deficiencies, Auto immune diseases,

Animal model for autoimmune diseases. Proposed mechanism for induction of autoimmunity.

Treatment of autoimmune diseases.

Unit III

Transplantation, Types of grafts, Graft acceptance and rejection, Clinical manifestation of graft rejection.

General immunosuppressive therapy, immune tolerance to allografts, clinical transplantation.

Unit IV

Cancer origin and terminology, malignant transformation of cells, oncogenes and cancer induction, tumors of the immune systems, tumor antigens, tumor evasion of the immune system and cancer immunotherapy.

Psycho immunology: Psychoneuroimmunology, Immuno mediators, Immune system neuro anatomy, Neuroimmuno modulation,

References:

1. Turgons "Immunology and serology" by Mosby Latest Edition 2007
2. Immunology by Irwin Roitt Latest edition
3. Immunology by Kubay.
4. Varley's Practical clinical Biochemistry – Ed. Alan W.Gowenlock (Heinemann medical).
5. Clinical diagnosis and management by Laboratory methods (John Bernard Henry, W.B. Salunders Company, 1984).
6. Hand Book of Human stress and immunity by Glaser R and Glaser K (1994)
7. Psychoimmunology by Schedlowski M (2000).

Course Outcomes: The student will be able to

1. Maintain the Clinical Immunology lab with all required standards.

2. Gain knowledge on different types of immunodeficiencies, their treatment and about autoimmune disorders.

3. Familiar with Clinical manifestation in graft acceptance or rejection and how immunosuppressive therapy is useful.

4. To understand cancers, the mechanisms involved from theory concept, experimental, research, cancer immunotherapy and human health-care perspectives and Psycho immunology.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}

CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
Generic elective-b	Applied And Molecular Immunology	06	4
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To acquaint them with the hybridoma technique and its clinical applications
2. To impart knowledge on Immobilization of enzymes.
3. To make them understand the concept of Vaccines and Subunit vaccines.
4. To impart knowledge about intellectual property rights.

Course Content:

Unit I

Immunodiagnostics and preparation of tools: Hybridoma technique, monoclonal antibodies production, myeloma cell lines, fusion of myeloma cells, selection of hybridomas, Screening, purification and application (biochemical research, clinical diagnosis nd treatment) of monoclonal antibodies

Unit II

Immobilization of enzymes, Examples and their industrial and clinical applications. Production of DNA antigens.

Unit III

Vaccines and Subunit vaccines-against Herpes Simplex virus, Foot and Mouth disease, live recombinant vaccines-attenuated (Cholera, Salmonella), Vector vaccines directed against viruses and bacteria. Purified vaccines. DNA vaccines. Antifertility vaccines.

Unit IV

Transgenic organisms and their uses, Patenting, General Agreement on Trade and Tariff {GATT} and Intellectual Property Rights.

Recommended Books:

1. Harper's Review of Biochemistry.
2. Leninger's principles of Biochemistry

3. Biochemistry – Lubert Stryer.

4. Fermentation Technology (2nd Ed.) Standury (Pergman press)

5. Biotechnology: Textbook of Industrial microbiology 2nd Edit. By Wulf Crueger and Anneliese Crueger (2000).

6. Molecular biotechnology: Principles and Applications of Recombination DNA. (1996) Bernard R. Glick and Jack. J. Pasternak (Panima Publishing Corporation)

7. Principles of Gene manipulation: An Introduction to genetic Engineering (5th) R.V. Old and S. B. Primrose (Blackwell Scientific Publications).

8. Principles of Biotechnology (1985) Alen Weisman (Surrey University Press).

9. Concepts in Biotechnology (1996) Ed., D.Balasubramaian, K.Dharmalingam, J.Green and K. Jayaraman (University Press).

10. Industrial Microbiology, Miller and Litsowky, Mc Graw- Hill, 1976.

11. Industrial Microbiology, L.E.Casida, JR. New Age International. (1995).

12. Industrial Microbiology (Prescott & Dunn), Ed by G.Reed, CBS Publishers.

13. Immobilized enzymes (1978) by Ichiro Chibata, Halsted Press Book.

Course Outcomes:

1. Develop skill in production of monoclonal antibodies.

2. How better enzyme immobilization enhances its activity and their industrial and clinical applications.

3. Familiar with different types of vaccines and how they help in prevention of diseases.

4. Acquire the knowledge on IPR and procedures for patent filing.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

Course Code	Semester-IV, Course Title	No of Hours Per week	No of Credits
Generic elective-c	Immunopharmacology	06	4
Sessional Marks: 20		End Semester Exam Marks: 80	

Course Objectives:

1. To impart knowledge about drugs, their receptors and kinetics.

2. To develop understanding about vasoactive amines and immunosuppressive drugs.

3. To extend comprehensive knowledge on Eicosanoid related compounds and NSAIDS.

4. To make them understand about drugs used in asthma.

Course Content:

Unit I

Drugs, Drug receptors, pharmacodynamics, pharmacokinetics, drug biotransformation, development and regulation of drug, Cholino and adreno receptor drugs.

Unit II

Histamines, Serotonins, vasoactive peptides and ergot alkaloids, Immunomodulation therapy, infiltration of cells and their diseases, Immunosuppressive drugs and antibodies, glucocorticoid drugs,malignancy therapy, role of TNFa, Immunoglobulin genes.

Unit III

The Eicosanoids, Prostaglandins, thromboxanes, leukotrienes and related compounds, and inhibitors of these molecules formation.

Unit IV

Nitric oxide and its immunological effects, Drugs used in asthma.

Reference Books:

Basic and Clinical pharmacology by BT Katzung, 10th Edn, McGraw Hill Edn, Oxford, 2008

Course Outcomes: The student will be able to

1. Understand about drug receptors, pharmacodynamics, pharmacokinetics, drug biotransformation.

2. Acquire knowledge on Immunomodulation therapy, malignancy therapy.

3. Gain knowledge on Prostaglandins, thromboxanes, leukotrienes and inhibitors of these molecules formation.

4.Familiar with Nitric oxide and its immunological effects.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

Course Code	Semester-IV,Course Title	No of Hours Per week	No of Credits
Open elective-a	Research Methodology	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To choose the appropriate research design and develop appropriate research hypothesis for a research project
2. To describe the appropriate statistical methods required for a particular research design.
3. To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
4. To provide knowledge about the basics of sequence alignment and analysis.

Course Contents:

Unit I

Technical writing: Sentence writing, paragraph writing, story writing, review writing, various types of letters writing, critical comments writing. Project proposal preparation: Preparation of informal proposal, modified proposal and formal proposal.

Experimental design and Collection of results, submission of progress report (year wise) and submission of technical report (Format: Title page, Introduction, Aims of the proposal/research, methodology, results, references, acknowledgments, budgetary preparation). Submission of final technical Report. Patenting and intellectual property rights.

Unit II

Introduction of computation: Computers components, storage devices, graphic devises, concepts of hardware and software, methods and types of networks.

Basics of operating systems and types python, cython, Information and communication technology (ICT).

Unit III

Bio-Statistics: Data - Data types, collection of data, classification and tabulation. Measures of central tendencies. Mean, median and mode. Measures of variation - Range, quartile deviation, mean deviation and standard deviation. Coefficient of variation.

Probability. Addition and multiplication theories, conditional probability and probability distributors. Binomial, poission and normal distribution. Correlation and linear regression. Regression: Regression coefficients and properties. Small sample tests- t, F and chi square tests. ANOVA - one way and two way classifications.

Unit IV

Research Aptitude: Meaning and scope of research, steps of Research, Article and thesis writing. Funding agencies.

Project proposal preparation, Preparation of proposal, Experimental design and implementation of project, submission of progress report (year wise), statement of expenditure (SE), Utilization certificate (UC).Research ethics, Plagiarism.

Recommended Books

1. Statistical methods. S.P.Gupta
2. Fundamentals of mathematical statistics. S.C Gupta &Kapoor
3. Statistical methods in biological and Health Science. J. S. Milton &J.O.Tsokan.

Course Outcomes: The student will be able to

1. Discuss the various steps involved in conducting research.
2. Learn to apply hypothesis testing via some of the statistical distributions.
3. Develop understanding about Biological data and database search tools.
4. Acquire hands on training on various computational tools and techniques employed in Biological sequence analysis.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	2	1	1	3	3	3	3
CO_2	3	3	3	3	3	2	2	1	3	3	3	3
CO_3	3	3	3	3	3	2	1	1	3	3	3	3
CO_4	3	3	3	3	3	2	1	1	3	3	3	3

Course Code	Semester-IV,Course Title	No of Hours Per week	No of Credits
Open elective-b	Immunological diseases and therapeutics	06	04
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To inculcate the etiquette to be maintained in Clinical Immunology lab.

2. To provide knowledge on the types of immunity and the immune organs.

3. To impart knowledge about different types of immunodeficiencies and autoimmune diseases.

4. To equip with the knowledge on transplantation and immunosuppression and tumors of the immune systems.

Course Content:

Unit I

Introduction to Clinical Immunology: Introduction and maintenance of clinical Immunology laboratory; hazards in clinical laboratory; units; 'normal range', reference values. Factors affecting reference values quality control in laboratory – use of external and internal standards; use of WHO standards. Collection and preservation of biological samples.

Unit II

Natural Immunity (a) First Line of Defense innate / nonspecific immunity (b) Adaptive / specific immunity, (c) Factors associated with immunologic disease, Components of the Immune System. Immune response to various infectious diseases

Unit III

Primary immunodeficiencies, AIDS and other acquired or Secondary immunodeficiencies, Auto immune diseases, Animal model for autoimmune diseases. Proposed mechanism for induction of autoimmunity. Rheumatoid Arthritis, Scleroderma, Vitiligo, Systemic Lupus Erythematosus, Graves' disease, Myasthenia gravis, Multiple sclerosis, Diabetes (type 1) Psoriasis, Treatment of autoimmune diseases.

Unit IV

Transplantation, Types of grafts, Graft acceptance and rejection, Clinical manifestation of graft rejection, general immunosuppressive therapy, immune tolerance to allografts, clinical

transplantation. Tumors of the immune systems, tumor antigens, tumor evasion of the immune system and cancer immunotherapy.

Recommended Books:

1. Varley's Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books).

2. Clinical diagnosis and management by Lab methods (John Bernard Henry, W.B. Salunders Company).

3. Clinical Biochemistry – S.Ramakrishnan and Rajiswami.

4. Chemical Biochemistry (Metabolic and clinical aspects) by W.J.Marshall & S.K.Bangert.

5. Text book of clinical Biochemistry by Tietz et al.

6. Turgons "Immunology and serology" by Mosby Latest Edition 2007 Immunology by Irwin Roitt Latest

7. Immunology by Kubay.

8. Hand Book of Human stress and immunity by Glaser R and Glaser K (1994).

Course Outcomes: The student will be able to

1. Maintain the Clinical Immunology lab with all required standards.

2. Out line, compare and contrast the key mechanism of innate and adaptive immunity.

3. Gain knowledge on different types of immunodeficiencies, their treatment and about autoimmune disorders.

4. Familiar with Clinical manifestation in graft acceptance or rejection and how immunosuppressive therapy is useful. And about cancer immunotherapy.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

M.Sc. Immunotechnology:: Model Question paper

Semester I/II/III/IVTitle of the Paper

Time 3 Hrs **Max marks 80**

Attempt any five from part A (5 x 4=20 marks) and all from part B (4 x 15=60 marks)

PART A (5 x 4=20 marks)

1. Unit 1
2. Unit 1
3. Unit 2
4. Unit 2
5. Unit 3
6. Unit 3
7. Unit 4
8. Unit 4

PART B (4 x 15=60 marks)

9. Unit 1 a or b
10. Unit 2 a or b
11. Unit 3 a or b
12. Unit 4 a or b

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF BOTANY



Course

M.Sc. BOTANY

Choice Based Credit System (CBCS)

Academic Year 2023– 24

Amended as per

NEP-2020

About the Department

- The Department of Botany was established with a regular Post Graduate program during the year 1959 Subsequently, with the able leadership of Prof. V. S. Rama Das, the Department was recognized as a strong centre for Plant Physiology both at National and International levels, and became one of the International centres for photosynthesis research under UNEP program. So far, the Department has published nearly 2000 research papers in reputed National and International journals including Nature.
- The Department has received special assistant grants from UGC-COSIST, SAP (DRS) and DST-FIST. The Department is equipped with Fluorescence and phase contrast microscope, Leaf Chamber Analyser-3 Photosynthesis Measuring System, U.V. Visible Spectrophotometers, Gel Documentation System, PCR Machines, High Speed Centrifuge, Deep Freezers etc., The facilities include Herbarium, Library, Museum, two botanical gardens, glasshouse, fern house, two tissue culture labs, computer lab and seminar hall
- The Department has MoU with St. Laurent Institute, The George Washington University, USA (2008-2018); Yunnan Academy of Forestry, Kunming, China (2010-2020); University of of Malaysia, Kelantan (2015-2020), University of Colombo, Sri Lanka (2012-2022). The current focus of research includes Molecular Plant Physiology, Biodiversity conservation and sustainable utilization of plant resources.

Vision

- To improve Internationally recognized status of the Department through excellence in higher education and application-oriented basic research in the field of plant science
- To perceive and disseminate the importance of plant diversity, its conservation and sustainable utilization
- To inspire intellectual pursuit and experimental skills through innovative teaching and research in basic processes of Plant life.

Mission

- Development of advanced infrastructural and technological facilities to strengthen quality education and research,
- To promote and foster collaborative research with scientific institutes and industry for enhanced scientific thinking and generating new ideas.

- To expand academic activity by offering new multidisciplinary courses and updating programs to suit to a wider spectrum of students and researchers.

The CBCS permits students to:

i. Choose electives from a wide range of elective courses offered by the Departments of the University.
ii. Undergo additional courses of interest
iii. Adopt an inter-disciplinary approach in learning
iv. Make the best use of expertise of the available faculty

- Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
- The courses are evaluated following the grading system as followed uniformly in higher educational Institutions in India. The uniform grading system will benefit the students to move across institutions and also enable potential employers in assessing the performance of the candidates. The guidelines of UGC will be followed for computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations.

Programme Specific Outcomes

- Students acquire enhanced knowledge of the fundamental concepts of Botany and diverse groups of plants that differentiate them from each other.
- Explain the general characters, classification, external and internal morphology, reproduction, life cycles, economic importance of different phylogenic plant groups including algal forms to Angiosperms.
- Understand the principles and practices of advanced plant taxonomy and gain expertise in the field of Plant Identification
- Understand in detail the physiological and metabolic processes of plants viz Plant development and growth, absorption and translocation of water and mineral elements, transpiration, photosynthesis, respiration.
- Understand the symptoms of abiotic and biotic stress and molecular basis of tolerance and resistance respectively, and apply the knowledge in plant protection.
- Understand the genetic basis of plant traits, gene expression and interaction, regulation in controlling plant development, reproduction, metabolic processes environmental interaction and Evolution.

- Students will be able to relate the physical and chemical components of the environment to the morphological and anatomical structures and adaptation of plant populations, communities, and ecosystems.
- Understand the Phytogeographical regions of India and Plant diversity, plant resources and their management and sustainable utilization.
- Understand the advanced aspects of plant tissue culture, genetic engineering and genomics and their use in plant improvement
- Acquire practical skills to learn about microscopic plant structures and perform experiments to demonstrate physiological, ecological processes and biochemical analysis of Macromolecules and Metabolites
- Demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization viz., Pathology, Physiology, Phyoto-medicine, Mushroom cultivation, Hydrophonics and Horticulture.
- Students are well aware of the latest research and innovations in basic and applied aspects of Plant sciences
- Prepares students for further advanced studies, gain careers in academics, Research and Development, and Entrepreneurship in the plant field.

Department Objectives

- To disseminate the Knowledge of Botany (Plant Sciences) and its relevance for the welfare of modern society, as a renewable source for primary human needs and sustainable development.
- To develop knowledgeable and skilled human resource to serve in Academic and Research Institutes, and Industry.
- To generate quality research output in basic and applied aspects of plant biology
- To educate and sensitize the students to community problems and train the students to participate in extension and outreach activities as a responsible citizen.

Program Objectives

A broad, up-to-date Programme suits to both students and the future generation of research scholars,

- To impart knowledge on diverse plant groups from Microbial flora to Angiosperms, their economic and ecological importance.
- To provide comprehensive and thorough scientific knowledge of core subjects to understand developmental, structural, functional and process diversity of plant systems.
- To enable the student to understand molecular basis of fundamental life processes of plant systems.
- To develop Plant Taxonomists by imparting skills through in house and extensive field trips for .the identification of flora, to fill the current dearth of plant taxonomists.
- To train in fundamental disciplines of future-oriented plant biology research like Plant taxonomy, Pathology, plant Physiology Biochemistry and Environmental Botany.
- Considering the popularity for Natural products, Organic farming and Gardening, to train the students in skill oriented courses like Horticulture, Agriculture Biology, Gardening, Nursery, Mushroom cultivation and Hydroponics for employability and become a skilled Entrepreneur
- To make student aware of the latest research & innovations in Botany through modern education.
- To inspire the student to select research in plant biology as a profession and train them in all aspects of project work.
- To educate students to practice ethics and moral values in academics, research, use of plant resources and as a citizen

Programme Outcome

- PO1 : **Scientific knowledge:** Apply the advanced knowledge on plant diversity, their processes, environmental relationships, role in Global ecosystems, and fundamentals of other Life Sciences and Phytochemistry to solve the scientific problems of plant systems and their applications

- PO2: **Problem analysis:** Identify the problems in plant systems functioning and their applications, formulate objectives, review literature, and analysis of scientific problems in reaching conclusions using principles of Botany and other related sciences viz., Biochemistry and Biophysics.

- PO3: **Investigation:** Apply the knowledge based on research and other related investigative skills, including design of experiments, excution, data collection, analysis and interpretation to provide scientifically valid conclusions
- PO4: **Design & Development:** Plan, design and develop methodologies using plant systems to solve food, health and environmental issues taking the safety and Eco-friendly conditions.
- PO5: **Modern tool usage:** Design and select appropriate advanced tools for investigating the identified problem with an understanding of its working, applications and limitations
- PO6: The **Botanist & Society:** Asses educate and solve the problems related to societal, Health, Agriculture and Environmental safety issues using the professional skills learned
- PO7: **Environmental and sustainability:** Demonstrate the knowledge acquired for understanding the environmental issues and evolve methods for their sustainable management using plant systems
- PO8: **Ethics:** Understand ethical principles, professional ethics and responsibilities, and apply them to solve societal problems, while using plant systems and Genetic modification
- PO9: **Individual & Team work:** Function effectively as an individual / member of team/ team leader in solving different issues and efficient delivery of goods and services.
- PO10: **Communication:** Effectively communicate on various scientific problems/ issues with in society, particularly with Botanists/peer group, related scientists, academicians and administrators, and writing of reports and design of presentations.
- PO11: **Project management & finance:** Demonstrate acquired knowledge and skills and apply them to generate external funding and to manage the projects within the budget limitations
- PO12: **Lifelong learning**: Recognize the importance of continuous learning process throughout this life in view of rapid updating of Knowledge in Plant Biology and Technological changes that occur from time-to-time to reveal/manipulate plant processes.

Program Educational Objectives

- The aim of the programme is to highlight the role played by the Science of Botany in modern society and its relevance to sustainable development.
- To enable the student to understand basic principles and recent advances in Botany through modern educational tools
- To enable the students successful in NET/SLET/GATE/IFS/IAS/ARS examination and other National and Global level positions through curricular enrichment and updating.
- To train the students in Plant Taxonomy and Biodiversity analysis through field studies and hands on training
- To impart advance training in laboratory techniques and modern tools used in Botany
- To provide in-depth knowledge and skills in applied courses through participative learning for employability and entrepreneurship
- To advance education and research in Plant Biology and explore sustainable solutions for agriculture, Primary health, environment and energy sectors.

SRI VENKATESWARA UNIVERSITY, TIRUPATI

CHOICE BASED CREDIT SYSTEM

M.Sc. BOTANY DEGREE COURSE

(w.e.f. 2021-2022)

TITLES OF PAPERS

SEMESTER – I

Core - I	BOT-101	Algae, Bryophytes, Pteridophytes and Gymnosperms
Core - II	BOT-102	Taxonomy of Angiosperms
Compulsory Foundation	BOT-103	Microbiology
Elective Foundation	BOT-104	Plant Development and Reproduction
Practical – I	BOT-105 PI	Theory papers : Bot-101 & 102
Practical - II	BOT-106 PII	Theory papers : Bot-103 & 104

SEMESTER – II

Core - I	BOT-201	Plant Biochemistry and Metabolism
Core - II	BOT-202	Phytobiodiversity and Conservation
Compulsory Foundation	BOT-203	Plant Ecology
Elective Foundation	BOT-204	Cell Biology, Genetics and Evolution
Practical – I	BOT-205 PI	Theory Papers : Bot-201 & 202
Practical - II	BOT-206 PII	Theory Papers : Bot-203 & 204

SEMESTER – III

Core - I	BOT-301	Molecular Plant Physiology
Core - II	BOT-302	Molecular Biology and Techniques
Skilled Oriented Course	BOT-303A	Mushroom Cultivation
External/Open Elective	BOT-304A BOT-304B BOT-304C	Plant Resource and Human Welfare Gardening and Nursery Techniques Organic Farming
Core Practical - I	BOT-305 PI	Theory papers : Bot-301 & 302
Skilled Oriented Course Practical - II	BOT-306 PII	Theory Paper : Bot-303A Mushroom Cultivation

SEMESTER – IV

Core - I	BOT-401	Genomics and Proteomics
Core - II	BOT-402	Plant Biotechnology
Generic Elective/Internal Elective; Choose any one Paper	BOT-403A BOT-403B	Phytomedicine Horticulture
Core & Generic Practical	Bot-401 & 402 BOT – 403A/403B	--
Project Work	--	Dissertation, Presentation & Viva
External Elective / Open Elective	BOT-404A BOT-404B BOT-404C	Nanobiotechnology Ethnobotany and Plant Drugs Forest Management

SRI VENKATESWARA UNIVERSITY, TIRUPATI

TWO YEAR M.Sc. BOTANY DEGREE COURSE

Amended as per NEP-2020

CHOICE BASED CREDIT SYSTEM

(From the batch of students admitted during the academic year 2021-'22)

SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER – I

Sl. No.	**Components of Study**	**Course Code**	**Title of the Paper**	**No. of contact hours**	**No. of credits**	**IA Marks**	**Sem. End Exam marks**	**Total**
1.	Core	Bot-101	Algae, Bryophytes, Pteridophytes and Gymnosperms	4	4	20	80	100
2.	Core	Bot-102	Taxonomy of Angiosperms	4	4	20	80	100
3.	Compulsory Foundation	Bot-103	Microbiology	4	4	20	80	100
4.	Elective Foundation	Bot-104	Plant Development and Reproduction	4	4	20	80	100
5.	Practical – I	Bot-105P	Bot – 101 & 102	4	2	-	-	100
				4	2	-	-	

6.	Practical - II	Bot-106P	Bot – 103 & 104	4 4	2 2	- --	- --	100
			Total :	**32**	**24**	**--**	**--**	**600**
	Audit Course						**100**	

SEMESTER – II

Sl. No.	Components of Study	Course Code	Title of the course	No. of hours	No. of credits	IA Marks	Sem. End Exam marks	Total
1.	Core Theory	Bot-201	Plant Biochemistry and Metabolism	4	4	20	80	100
2.	Core Theory	Bot-202	Phytodiversity and Conservation	4	4	20	80	100
3.	Compulsory Foundation	Bot-203	Plant Ecology	4	4	20	80	100
4.	Elective Foundation	Bot-204	Cell Biology, Genetics and Evolution	4	4	20	80	100
5.	Practical–I	Bot-205P	Bot – 201 & 202	4 4	2 2	--	--	100
6.	Practical - II	Bot-206P	Bot – 203 & 204	4 4	2 2	--	--	100
			Total :	**32**	**24**	**--**	**--**	**600**
7.	Audit Course			**0**	**0**	**0**	**100**	**0**

SEMESTER – III

Components of Study	Course Code	Title of the course	No. of hours	No. of credits	IA Marks	Sem. End Exam marks	Total
Core Theory	Bot-301	Molecular Plant Physiology	4	4	20	80	100
Core Theory	Bot-302	Molecular Biology and Techniques	4	4	20	80	100
Skilled Oriented Course	Bot-303A	Mushroom Cultivation	4	4	20	80	100
External Elective/ Open Elective; Choose any one paper	Bot-304A	Plant Resource and Human Welfare	4	4	20	80	100
	Bot-304B	Gardening and Nursery Techniques					
	Bot-304C	Organic Farming					
Core Practical– I	Bot-305P	Theory Papers : Bot – 301 & 302	4 4	2 2	--	--	100
Skilled Oriented Course Practical	Bot-306P	Theory Paper : Bot – 303A	4 4	2 2	--	--	100
		Total :	**32**	**24**	**--**	**--**	**600**

SEMESTER – IV

Components of Study	Course Code	Title of the course	No. of hours	No. of credits	IA Marks	Sem. End Exam marks	Total
Core Theory	Bot-401	Genomics and Proteomics	4	4	20	80	100
Core Theory	Bot-402	Plant Biotechnology	4	4	20	80	100
Generic Elective/Internal Elective ; Choose any one paper	Bot-403A	Phytomedicine	4	4	20	80	100
	Bot-403B	Horticulture					
Practical (Core & Generic)	-	Theory Papers Bot-401 & 402 and Bot-403A/403B	4	4	-	-	100
Project work	--	Dissertation, Viva	4	4	-	-	100
External Elective/ Open Elective Choose any one paper	Bot-404A	Nanobiotechnology	4	4	20	80	100
	Bot-404B	Ethnobotany and Plant Drugs	4				
	Bot-404C	Forest Management	4				
		Total :	**32**	**24**			**600**

SRI VENKATESWARA UNIVERSITY, TIRUPATI

CHOICE BASED CREDIT SYSTEM – NEP 2020

(From the batch of students admitted during the academic year 2021-'22)

M.Sc. BOTANY DEGREE COURSE - SYLLABUS

SEMESTER-I

BOT-101: ALGAE, BRYOPHYTES, PTERIDOPHYTES & GYMNOSPERMS

Course Objectives

1. To create awareness on classification and description of lower plants.
2. To create the knowledge about lower plants and their utilization in different methods.
3. Economic importance of lower plants.
4. To provide basic distribution pattern and structural organization of lower plants.

UNIT- I

Phycology: Classification of Algae; Cell ultra structure; general characters; Algae in diverse habitats (Terrestrial, Fresh water, Marine water and In Association); Thallus organization (Range of thallus structure and interactions in evolution; pigmentation, reserve food and reproduction (veg,) of different groups of Cyanphyceae, Chlorophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae & Rhodophyceae. Economic importance of Algae (Algal blooms, Algal Biofertilizers, Algae as food, Feed and Medicines; Algae in Industry; Algae as Biodiesel source; Single cell proteins.

UNIT- II

Bryophytes: Origin, Distribution, Morphology, Structure, Reproduction and Evolution of Sporophyte; Life History, Classification. Fossil Bryophytes. General account of Marchantiales, Jungermaniales and Polytrichales; Economic and Ecological importance.

Lichens: Types of Lichens, Anatomy, Biology and Ecological importance.

UNIT- III

Pteridophytes: Origin, Morphology, Anatomy and Reproduction; Classification of Pteridophytes. Evolution of Stele. Heterospory and Origin of Seed habit; Apogamy and Apospory; Ecological and economic importance, chemical factors controlling Gametophyte; Antheridia, Archegonia. Strobilus and Evolution of Sorus.

Fossil Pteridophytes: Brief account on Psilophytopsida, Psilopsida, Lycopsida, Sphenopsida and Pteropsida.

UNIT- IV

Gymnosperms: Introduction, Classification and Distribution of Gymnosperms. Structure and Reproduction in Cycadales, Ginkgoales, Coniferales, Ephedrales, Welwitschiales, and Gnetales. Evolution of Gymnosperms.

Fossil Gymnosperms: Brief account of families Pteridospermales (Lyginopteridaceae, Medulloaceae, Caytoniaceae and Glossopteridaceae) General account of Cycadeodiales and Cordaitales. Economic importance of Gymnosperms.

Course Outcomes

1. Discuss the importance of morphological structure, classification, reproduction and economic importance of Algae. Study and impart knowledge about the general Characteristics, structure, reproduction, life history and economic importance of fungi. Understand the features of Lichens.
2. Know the control measures of plant diseases. Students are able to explain about structure, classification, reproduction, life cycle and economic importance of Bryophytes.
3. Study and impart knowledge about the Structure, reproduction, life cycle, fossil, fossilization and geological time scale.
4. Students able to explain about structure, classification, reproduction, life cycle and economic importance of Gymnosperms.

Suggested Books:

1. Kumar H. D. 1988. Introductory Phycology. Affiliated East-West Press Ltd., New Delhi.
2. Morries, I. 1986. An Introduction to the Algae. Cambridge University Press, U.K
3. Puri, P. 1980. Bryophytes. Atma Ram & Sons, Delhi.
4. Round, F.E.1986. The Biology of Algae, Cambridge University Press, Cambridge.
5. Sporne, K.R.1991. The Morphology of Pteridophytes, B.I. Publishing Pvt. Ltd., Bombay.
6. Stewart, W. N. and Rathwell, G. W. 1993. Paleobotany and the evolution of Plants. Cambridge University Press.

7. Bhatnagar, S.P. and Mitra, A. 1996. Gymnosperms, new Algae International Pvt. Ltd., New Delhi.

PAPER – I (BOT-101) : ALGAE, BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_1** Prog Man
CO_1	3	-	2	1	-	2	2	1	-	2	-
CO_2	3	-	2	1	-	1	1	1	2	1	-
CO_3	3	-	2	1	2	1	1	1	-	1	2
CO_4	3	-	2	1	-	1	1	1	-	1	-

BOT-102: TAXONOMY OF ANGIOSPERMS

Course Objectives

1. To create awareness in Classification of Plants and its arrangements.
2. To train the students to naming (create new names) the newly identified plants.
3. Recognize the plants with the scientific names.
4. To develop skills in identifiying the pants for research work to other departments.

UNIT- I

Systems of Angiosperm classification: Historical development of Phenetic versus Phylogenetic systems of classification. Merits and demerits of Bentham and Hooker (Natural system), Engler and Prantle, Bessey, Hutchinson, Cronquist, Thorne, Dahlgren, and APG classification (Phylogenic) systems.

UNIT II

Taxonomic hierarchy, Identification and Speciation: Groups, Categories and Ranks; Species, Genus, Family and other categories; Principles used in assessing relationships; Delimitations of taxa and attribution of Rank. Plant identification and Taxonomic keys; Herbarium methodology, Important Herbaria, Botanical gardens and arboreta in India and World. Floras and Manuals; Monographs and revisions.

UNIT III

Origin and Phylogeny of Angiosperms: Origin and Evolution of Angiosperms; Angiosperms Phylogeny; Age and Place of origin, Biphyletic origin, Theories of origin; Origin of Monocots and Evolutionary lines of Angiosperms.

International code of Nomenclature for Plants: Salient features of Binomial Nomenclature, Brief history of botanical codes; Principles, Rules and Recommendation of ICN Ranks of taxa; generic names; species epithet; Typification, Nyms, Rule of Priority, Effective and Valid publication; Author citation; Retention, choice and Rejection of names. Nomen-nudum and Nomen-novo. Hortus malabaricus; General taxonomic Indices.

UNIT IV

Systematic study: Attribution of different systems of classification; orders: Magnoliales, Centospermae, Tubiflorae, Amentiferae, Helobiales and Glumiflorae.

Salient features, diversity, phylogeny of the following groups (based on APG classification):

Magnoliids (Magnoliales); Monocots (Asparagales); Commelinids (Poales); Fabids (Malphigiales); Malvids (Caryophyllales); Lamiids (Gentianales); Campanulids (Asterales).

Course Outcomes:

1. Classify the plants based on the Morphological variation for experimental work.
2. Every student able to create new name to the innovative plant species as per the rules formulated by ICN.
3. Student can help to other Scientists for identification of plants for their research fields.
4. He can learn the preparation of Herbaria for identification purpose.

Suggested Books:

1. Battacharya, B and Johri, B. M.1998. Flowering Plant taxonomy and Phylogeny. Narosa Publishing House, New Delhi.
2. Cronquist, A. 1981. An integrated system of classification of Flowering Plants. Columbia University Press, New York.
3. Davis, P.H. and Heywood, V.H. 1963. Principles of Angiosperm Taxonomy, Oliver and Boyed.
4. Gifford, E.M. and Foster, A.S. 1998. Morphology and Evolution of Vascular Plants. W.H.freemen & Co., New York.
5. Singh, Gurucharan. 2012. *Plant Systematics*: *Theory and Pactise*. Oxford & IBH. New Delhi.
6. Heywood, V.H. and Moore, D.M. (Eds.).1984. Current Concepts in Plant taxonomy. Acad. Press, London.
7. Hutchinson, J. 1973. Families of Flowering Plants (3rd Ed.) oxoford Univ. Press, New York.
8. Jeffrey, E. 1982. An introduction to plant Taxonomy. Cambridge.
9. Jones, S.B. Jr. and Luchsinger, A.E. 1986. Plant systematics (2nd Ed.). Mc Graw Hill. Book Co., New York.
10. Mayr, E. 1942. Systematic and Origin of Species. Columbia Univ. Press, New York.
11. Pullaiah, T. 1997. Taxonomy of Angiosperms. Regency Publications, New Delhi.
12. Radford, A.E. 1986. Fundamentals of Plant Taxonomy. W. H. Freemen and Company, San Francisco.
13. Stebbins, G. L. 1974. Flowering plants Evolution above the Species level. Academic Press London.
14. APG III (2009) An update of the Angiosperm Phylogeny Group classification for the orders and

families of flowering plants: APG III. *Bot. J. Linnaean Soc.* 161: 105-121.

15. Gamble & Fischer 1915-1935. *Flora of Presidency of Madras*. 3 vols. BSMS, Dehradun.

16. Heywood, V.H., RK Brummitt, A. Culham, O. Seberg 2007. *Flowering Plant Families of the World.* Firefly books Ltd. New York.

17. Judd, W.S, Christopher S. Campbell, Elizabeth A. Kellogg, Peter F. Stevens, and Michael J. Donoghue. 2016. *Plant Systematics: A Phylogenetic Approach*, 4rd ed. Sinauer.

PAPER – II (BOT-102) : TAXONOMY OF ANGIOSPERMS

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Design	**PO4** Development	**PO5** Modern Tools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Team work	**PO10** Communication	**PO11** Programme Management	**PO12** Lifelong Leering
CO1	3	1	2	1	-	2	2	2	2	2	2	2
CO2	3	1	2	1	-	1	1	2	2	2	2	2
CO3	3	1	2	1	-	1	1	2	2	2	2	2
CO4	3	1	2	1	-	1	1	2	2	2	2	2

BOT-103: MICROBIOLOGY

Course Objectives

1. To impart the knowledge on basic principles and techniques of microbiology.
2. To provide understanding on antigen-antibody interactions and scope of vaccines.
3. To give an insight on Fungal/Bacterial and Viral diseases to plants.
4. To describe the structure and isolation of different Viruses.

UNIT-I

Viruses: General account of Viruses: Definition, occurrence, discovery, prokaryotic & eukaryotic viruses, chemistry, symmetry, ultra structure of bacteriophage, plant and animal viruses, purification of viruses, replication-lytic and lysogenic cascades, transmission and economic importance of viruses.

Principles of immunology: Immunity**,** types, antigens, general characteristics, antibody, types, antigen & antibody interactions.

UNIT-II

Bacteria: General characters and classification of Archaea and Eubacteria, Ultra structure, Nutrition ~~and~~ reproduction, and economic importance of Eubacteria. Salient features, biological importance of harmful and useful bacteria; Reproduction and Economic importance of bacteria.

UNIT-III

Classification of Fungi: Recent trends in Classification, Phylogeny of Fungi; General account of Myxomycota; Eumycota: general account of Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, and Deutoromycotina.

Mycology: General characters of Fungi, Cell structure, Unicellular and Multicellular organization. Cell wall composition, Nutrition (Saprobic, Biotropic and Symbiotic):

Reproduction, (Vegetative, Asexual, and Sexual); Heterothalism: Heterocaryosis and Para sexuality. Economic importance of Fungi (Food-, Industry and Medicine); fungal diseases in plants and humans, Fungi as biocontrol agents. Mycorrihizae and Mushroom cultivation.

UNIT- IV

General principles of plant pathology: infection, disease development, Symptomology and Epidemiology of plant diseases incited by Fungi, Bacteria, Viruses, Viroids and Phytoplasmas. Principles of plant disease control. Physical, chemical and biological control of plant diseases- a general account

Course Outcomes

1. Develop the skill of isolation and identification of Pathogenic and Non-Pathogenic micro-organisms.
2. To prepare different media for cultivation of industrially important microorganisms.
3. Equip with the methods to control Plant Pathogens.
4. Understands the Ag-Ab mechanism

Suggested Books

1. Alexopoulos, C.J., Mims, C.W. and Blackwel, M. 1996. Introductory mycology. John Wiley & Sons Inc.
2. Mandahar, C.L. 1978. Introduction to Plant viruses. Chand & Co., Ltd., Delhi.
3. Mehrotra, R.S. and Aneja, K.R. 1998. An introduction to mycology. New Age Internation al Press.
4. Mehrotra, R.S. 1980. Plant Pathology. Tata Mcgraw hill, India.
5. Sharma, P.D. 2000. Plant Pathology. Narosa Publishing House, India.

PAPER – III (BOT-103) : MICROBIOLOGY

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	2	2	2	2	2	2	2	-	-	1	2
CO_2	3	2	1	-	2	2	2	2	-	2	-	2
CO_3	3	2	-	-	2	2	2	-	2	2	-	2
CO_4	3	2	2	-	2	2	2	-	2	2	2	-

Elective Foundation

BOT-104: PLANT DEVELOPMENT AND REPRODUCTION

Course Objectives

1. Making the students acquainted with the fundamentals and present understanding of development differentiation and internal structure of root and shoot, and vascular tissue differentiation.
2. Enable the students to know present understanding of leaf development and tissue differentiation, Transition to flowering, Floral Organ differentiation and development.
3. Making the students familiar with basic and present understanding of reproductive processes: Male and female gametophyte development, gametogenesis, pollination and fertilization.
4. Making the students familiar with basic and present understanding of Endosperm, Dicot and Monocot embryo development, fruit growth and Seed Development.

UNIT I

Root and Shoot development: Organization of root apical meristem and root development. Differentiation of root; vascular tissue, root hair and Lateral roots formation. Organization of shoot apical meristem and Tissue differentiation in the shoot; xylem regeneration and Phloem differentiation; Secondary growth of root and shoot; Formation and types of wood.

UNIT II

Leaf and flower development: Leaf development and phyllotaxy; Specialized cells and tissue differentiation and organization in leaf. Transition to flowering, inflorescence and floral meristems. Floral Organ differentiation and development in *Arabidopsis* and *Antirrhinum*

UNIT III

Sexual reproduction: Microsporangium, **Microsporogenesis and Male gametophyte development:** Role of Tapetum,; Pollen storage.

Female Gametophyte and fertilization: Megasporangium, Megasporogenesis, Development and Organization of female gametophyte, ultra structure of the Embryo sac cells.

Fertilization: Pollination mechanisms and Vectors, Pollen germination, Pollen tube growth and Guidance, Pollen- Stigma Interactions, Double Fertilization

UNIT IV

Post-fertilization developments: Sexual Incompatibility, Endosperm development, types and functions, Embryogenesis- Dicot embryo development & types; Monocot embryo; Polyembryony; Apomixis; Parthenocarpy. Fruit growth and Seed Development.

Course Outcome

1. Describe the organization of shoot and root apices and development of shoot and root; Differentiation of vascular tissue and wood formation
2. Describe development and differentiation of leaf, transition to flowering and flower development
3. Describe the formation of male and female gametophytes, pollination, pollen tube germination and Double fertilization.
4. Describe development of endosperm, embryogenesis, seed and fruit development.

Suggested Books:

1. Burgess, J. 1985. An introduction to Plant Cell development. Cambridge Univ. Press, Cambridge.
2. Fahn, A. 1982. Plant Anatomy (3^{rd}Ed.), Pergamon Press, Oxford.
3. Fosket, D.E. 1994. Plant growth and Development. A molecular approach, Academic Press, San Diego, USA.
4. Howell, S.H. 1998. Molecular Genetics of Plant Development, Cambridge Univ. Press, Cambridge.
5. Lyndon, R.F. 1990. Plant Development. The Cellular Basis, Unnin Hyman, London.
6. Murphy, T.M. and Thompson, W.F. 1988. Molecular Plant Development, Prentice Hall, New Jersey.
7. Pullaih, T., Naidu, K. C., Lakshminarayana, K. & Hanumantha Rao, B. 2007. Plant Development. Regency Publications, New Delhi.
8. Raghavan, V. 1999. Developmental Biology of Flowering Plants, Springer-Verlag, New York.
9. Steeves, T.A. and Sussex, TM. 1989. Patterns in Plant Development (2^{nd}Ed.). Cambridge Univ Press, Cambridge.
10. Waisel, Y., Esnel, A, and Kafkaki U. (Eds.). 1996. Plant Roots. The Hiden Hall (2nd Ed.), New York, USA.
11. Bhojwani, S. S. and Bhatnagar, S.P. 2000. The embryology of Angiosperms (4th Revised and

Enlarged Ed.). Vikas Publishing House, New Delhi.

12. The plant cell. Special issue on Reproductive Biology of Plants, Vol. 5. 1993. The American Society of plant physiologist, Rockville, Maryland, USA.
13. Pullaiah, T. Lakshiminarayana, K. & Hanumantha rao, B. 2008.plant reproduction. Scientific publishers, Jodhpur.
14. Raghavan, V. 1997. Molecular embryology of Flowering plants, Cambridge Univ. Press, Cambridge.
15. Shivanna, K.R. and Johri, B.M. 1985. The Angiosperm pollen: the Structure and function. Wiley Eastern Ltd., New York.
16. Shivanna, K.R. and Sawhney, V.K. (Eds). 1997. Pollen Biotechnology for Crop Production and Improvement. Cambridge Univ. Press, Cambridge.

PRACTICAL PAPER II: BOT-104 (Plant Development and Reproduction)

Suggested Laboratory Exercises

Plant Development

1. Representative types of roots - Diarch, Triarch, polyarch types — transverse sections with double staining, ex. *Vicia*, *Ficus*, *Tinospora* (aerial root), vanda (velamen root).
2. Types of Stems: for transverse sections with double staining methods — showing Primary and Abnormal Secondary Growth. Ex. *Aristolochia*, *Citrullus*, *Cucurbita*, *Polyanthus*, *Sorghum*, *Strychnos*, *Cocculus*, *Bignonia*, *Amaranthus*, *Achyranthus*, *Piper*, *Peperomia*, *Bouganvilla*, *Boerhaavia*, *Dracaena*.
3. Maceration of wood: For observation of Individual Xylem elements with single staining.
4. Leaf types: Dorsiventral leaf, lsobilateral leaf, Xeromorphic leaves-*Muehlenbeckia*, *Nerium*, *Casuarina*, *Peperomia*, and *Ficus* leaves, *Nymphaea*, *Typha* leaves. *Sorghum* and *Saccharum* leaves for C4 anatomy.
5. Nodal anatomy — types.

Plant Reproduction

1. Study of Microsporogenesis in sections of Anthers.
2. Examination of Modes of Anther Dehiscence and collection of Pollen grains for microscopic examination (Maize, Grasses, *Cannabis sativa*, *Crotalaria*, *Tradescantia*, *Brassica*, *Petunia*, *Solanum melongena* etc.
3. Tests for Pollen Viability using stains and in vitro Germination. Pollen Germination using Hanging drop and Sitting drop cultures, Suspension culture and Surface culture.
4. Estimation of Percentage and Average Pollen tube Growth *in vitro*.
5. Study of ovules in cleared preparations; Study of Monosporic, Bisporic and Tetrasporic types of Embryo Sac development through examination of permanent stained serial sections.
6. Field study of several types of flowers with different pollination mechanisms (Wind Pollination, Thrips pollination, Bee / Butterfly Pollination, Bird Pollination).
7. Study of Nuclear and Cellular endosperm through dissections and staining.
8. Isolation of Zygotic Globular, Heart-shaped, Torpedo stage and mature embryos from suitable seeds.
9. Polyembryony in Citrus, Jamun (*Syzygium cumin*) etc. by Dissections

PAPER – IV (BOT-104) : PLANT DEVELOPMENT AND REPRODUCTION

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	1	3	3	2	-	-	1	1	2	2	2
CO_2	3	-	1	1	1	-	-	1	2	1	2	2
CO_3	2	1	2	1	-	3	-	-	-	-	1	2
CO_4	3	-	1	2	-	2	-	-	-	-	1	-
CO_5												

Suggested Books for laboratory exercises

1. Chopra, V.L. 2001. Plant breeding: Theory and Practice. Oxford IBH Pvt. Ltd. New Delhi.
2. Chopra, V.L. 2001. Plant breeding: Field Crops, Oxford IBH Pvt. Ltd., New Delhi.
3. Shivanna, K.R. and Rangaswamy, N.S. 1992. Pollen Biology: A laboratory Manual. Springer verlag, Berlin Heidelberg.
4. Shivanna, K.R. and Sawhney, V.K. (Eds.) 1997. Pollen Biotechnology for Crop Production and Improvement. Cambridge University Press, Cambridge

PRACTICAL PAPER: BOT-CPI-105-(BOT101 & BOT102) Algae, Bryophytes, Pteridophytes & Gymnosperms & Taxonomy of Angiosperms)

1. Micro preparations, culture identification, section cuttings of the members of Cyanophycaae, Cholorophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae. Raising and maintenance of algal cultures.
2. External and internal morphology and identification of the members in Marchantiales, Jungermaniales, Anthocrotales, Sphagnales, Funariales and Polytrichales.
3. External and internal morphology, reproductive organs, anatomy of stem, root and fructifications of Lycopsida, Sphenopsida and Pteropsida.
4. Examination of Fossils.
5. Comparative study of the anatomy of vegetative and reproductive organs of *Cycas, Thuja, Cedrus, Cupressus, Araucaria, Cryptomaria, Taxodium, Podocarpus* and *Gnetum*.
6. Study of important fossil Gymnosperms from prepared sides and specimens.

Suggested Books for Laboratory Experiments

1. Sporne, R. K. 1997v (2nd Ed). The Morphology of Gymnosperms. Hutchinson University Library.
2. Bernard Goffinet & A. Jonathan Shaw. 2008. *Bryophyte Biology*. 2nd ed. Cambridge.
3. Van den Hoek, Christian, D.Mann & H.M.Jahns *et al*. 1995. *Algae, An introduction to phycology*. Cambridge University Press.
4. Sporne K.R. 1965. *Morphology of Gymnosperms*. HUP, London.
5. Sporne K.R. 1976. *Morphology of Pteridophytes*. HUP, London.

BOT--102(Taxonomy of Angiosperms)

1. Preparation of floral diagrams, floral formulae and determination of taxonomic positions of 30 local plants up to family level.
2. Identification of genus and species following dichotomous keys (Flora of Madras Presidency by Gamble and Fischer)
3. Construction of keys for Families, Genera and Species based on morphological characters.
4. Nomenclature Exercises: Synonyms, Tautonyms, Basionyms.
5. Numerical Taxonomic Methods.
6. Botanical Study Tours, Preparation of Herbaria, Field Note Books & Tour Reports.

Suggested Books for Laboratory Experiments

1. Bailey, L.H. 1949. Manual of Cultivated Plants Macmilan, New York.
2. Bentham, G. & Hooker, J.D. Genera Plantarum, London, 3 Volumes.
3. Gamble, J.S. & Fischer. 1957. Flora of presidency of Madras. BSI, Calcutta.
4. Lawrence, G.H.M. 1951, taxonomy of vascular plants, Macmillan, New York.
5. Matew, K.M. 1983. The Flora of Tamilnadu Carnatic. Vol.1 Part 1 & 2. Tiruchirapalli.
6. Pullaiah, T. & Suryaprakash Babu, P. 1998. Flora of Andhra Pradesh. Vol. 1- 4, Scientific Publishers, New Delhi.
7. Willies, J. C. 1973. Dictionary of Flowering Plants and Ferns. 8th Ed. Cambridge Univ. Press, U. K.

PRACTICAL PAPER: BOT-PI-106 (BOT-103: Microbiology & BOT-104 : Plant Development and Reproduction)

1. Symptomology of some Diseased specimens: White rust, Downy mildew, powdery mildew, Rusts, Smuts, Ergot, Ground nut leaf spot, Red rot of Sugarcane, Wilts, Paddy Blast, Citrus canker, Bacterial blight of paddy, Angular leaf spot of Cotton, Tobacco mosaic, little leaf of Brinjal, Sesame Phyllody, Mango malformation, Canker.
2. Section cutting of infected materials of *Albugo, Peranospora, Plasmospora, Scerospora, Taphrina, Phyllochora, Claviceps, Xylaria, Peziza, Puccinia, Uromyces, Ravanelia,Ustilago, Tolyposporium, Macrophoma, Colletotrichum, Fusarium, Rhizoctonia.*
3. Sterilization methods, Preparation of media and stains, Isolation and Maintenance of cultures. Gram staining of Bacteria.

Suggested Books for Laboratory Experiments

1. Susila, S.B. and Shantharam, S. 2000. General Microbiology. Oxford & IBH Publ., New Delhi.
2. Webster, J 1985. Introduction to Fungi. Cambridge Univ. Press.
3. Willey, J. L. Sherwood, C.J. Woolverton. 2016. Prescott's Microbiology. TataMcGraw Hill.
4. Rangaswamy, G. and Madhaven, A. 1999. Diseases of Crop Plants in India (4th Ed.) Prentice hall of India Pvt. Ltd., New Delhi.

SEMESTER – II

BOT-201 : PLANT BIOCHEMISTRY AND METABOLISM

Course Objectives

1. To study the method of respiration in plants
2. To study HMP pathway in plants
3. To study importance of growth regulators
4. To study the fat metabolism in plants

UNIT I

Biochemistry of Carbohydrates and Proteins:

Carbohydrates: Classification, D and L designation, open chain and cyclic structures, epimers and anomers, maturation, reactions of carbohydrates (due to functional groups-hydroxyl, aldehyde and ketone), amino sugars, glycolysis, mono, di, tri and polysaccharides, glycosaminoglycons, glycolproteins.

Amino acids: Classification, structure stereochemistry, chemical reactions of amino acids (due to carbonyl and amino groups), pK value, peptide bond-nature and conformation.

Proteins: General properties, denaturation and renaturation, structural organization of proteins primary, secondary, tertiary and quaternary structures.

UNIT II

Respiration and Lipid Metabolism: Over view of plant respiration, Glycolysis, TCA cycle, Electron transport and ATP synthesis, Pentose Phosphate Pathway. Regulation and significance of Photo respiration. Structure and functions of Lipids, Glyoxylate cycle, Fatty acid biosynthesis; Synthesis of Membrane, Structural and storage lipids; Catabolism of lipids.

Nitrogen and Sulphur metabolism: Biological Nitrogen Fixation, Mechanism of Nitrate uptake and reduction, Ammonia assimilation; Sulphate uptake and assimilation.

UNIT – III

Thermodynamic Concepts: Free energy, Chemical potential, Redox potential.

Translocation of Water and Solutes: Plant cell water relations, Mechanism of water uptake and transport in plants; SPAC concept; Stomatal movements, Phloem transport of organic substances Phloem loading and unloading; Passive and active solute transport; Membrane transport proteins.

Fundamentals of Enzymology: General concepts, Allosteric mechanism, Mode of Enzyme action, Regulator and Active sites, Isozymes.

UNIT IV

Plant growth regulators and elicitors: Synthesis, physiological effects and mechanism of action of Auxins, Gibberellins, cytokinins, Ethylene, Abscissic acid, Brassinosteroids, Polyamines, Jasmonic acid and Salicylic acid.

Couse Outcomes

1. Explain what a Plant Physiologists does.
2. Describe how cell, tissue and whole-plant structures are related to their function.
3. Describe the physiological processes in plants, with an emphasis on water, energy, and mineral relations in higher plants.
4. Understand the fundamental processes of metabolism in plants and describe how a plant obtains and uses energy. Understanding of the functioning of plants as organisms.

Suggested Books:

1. Buchanan, B.B. Grussem, W. and Jones, RL. 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists, Maryland, USA.
2. Dennis, D.T. Turpin, D.H., Lefebvre, D.D. and Layzell, D.B. (Eds.) 1997. Plant Metabolism (2nd Ed.) Longman, Essex, England.
3. Galston, A.W. 1989. Life Processes in Plants. Scientific American Library, Springer-Verlag. New York, USA.
4. Hooykaas, P.J.J., Hall, M.A. and Libbeng, K.R. (Eds.). 1999 Biochemsitry and Molecular biology of plant Hormones. Elsevier, Amsterdam, The Netherlands.
5. Hopkins, W.G. 1995. Introduction to Plant Physiology. John Wiley & Sons, New York, USA.
6. Lodish, H., Berk, A., Zipursky, SL., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology (4tt Ed.). W.H. Freeman and Company, New York, USA.
7. Moore, T.C. 1989. Biochemistry and Physiology of plant Hormones (2nd Ed.). Springer-Verlag, New York, USA.
8. Nobel, P.S. 1999. Physiochemical and Environmental Plant Physiology (2 Ed.). Academic Press, San diego, USA.
9. Salisbury, F.B. and Ross, C.W. 1992. Plant Physiology (4thEd.). Wadswroth Publishing Co., California, USA.
10. Singhal, G.S., Renger, G., Sopory, S.K. lrrgang K.D. and Govindjee 1999. Concepts in Photobiology: Photosynthesis and Photomorphogenesis. Narosa Publishing Houses, New Delhi.
11. Taiz, L. and Zeigler, E. 1998.Plant Physiology (2nd Ed.). Sinauer Associates, Inc., Publishers, Massachusetts, USA.

12. Thomas, B. and Vince-Prue, D. 1997. Photoperiodism in plants (2nd Ed.). Academic Press, San Diego, USA
13. Westhoff, P. Jeske, H. Jurgens, G. Kloppstech, K. Link, G. 1998. Molecular Plant Development: From Gene to Plant. Oxford University Press, Oxford, UK.

PAPER – I (BOT-201) : PLANT BIOCHEMISTRY AND METABOLISM

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	-	3	2	2	2	3	2	2	2	2	2
CO_2	3	2	2	2	2	2	2	-	1	1	1	3
CO_3	3	2	1	2	-	1	3	-	2	1	2	2
CO_4	3	2	1	2	-	-	2	2	-	1	1	3
CO_5												

BOT-202 : PHYTODIVERSITY AND CONSERVATION

Course Objectives

1. To create awareness in the biodiversity on globe.
2. To create interest in identifying the available resources in the world.
3. To inculcate interest to conserve the natural resources on the Earth.
4. To identify the endangered species in Hotspots.

UNIT I

Concept and Importance of Phytodiversity: Status in India, World Centers of Primary Diversity, Types of Biodiversity, Causes for Rarity, loss of Species, *Extinction*, Red data book, Exploration. Introduction of species, Status species-based on IUCN; and Genetic Diversity in crops, Sustainable Agriculture in Biodiversity; Global Warming and its effect on Bio diversity.

Nature of biodiversity-genetic, species and ecosystem diversity. Values of biodiversity-anthropocentric and ecocentric. Magnitude and global distribution of biodiversity. India as a mega diversity center; Agrodiversity-centers of origin; Biodiversity Act.

UNIT II

Remote Sensing applications in phytodiversity conservation Status and Analysis of Species Diversity: Remote sensing-Concept, Principles, Applications and Role in study and Identification of Phyto Diversity and Natural Resources. GIS, Application of Microwaves and Radiation; Phytogeographical regions and forest types of India.

UNIT III

Principles of Phytogeography: Concepts of Phytogeography, generic cycles, theories of Phytogeography, Phyto geographical areas in India and Plant Diversity. Continental drift, plate tectonics of World and India, Endemism, Hotspots, Species rarity and Extinction.

UNIT – IV

Strategies for Conservation of Diversity: *In situ* Conservation – Sanctuaries, National Parks, Biosphere Reserves, MPCA, MPDA, Mangroves, Coral Reefs, Sacred Groves, *Ex-situ* Conservation. Botanical Gardens. Arborata and Palmata; Herbaria, Gene Banks, Seed Banks, Traditional Role of National and International Organizations – WWF, IPGN, IUCN, NBPGR, BSI, ICAR, CSIR, DBT, DST, NGOs and Role of Indigenous people in Biodiversity conservation.

Course Outcomes

1. Students achieve knowledge on variations in living organisms.
2. They can also know the availability of natural resources on Earth.
3. Once they know the degradation of biodiversity, they will contribute to the protection of nature (Plants/Animals/Minerals/Air/Water).
4. They got awareness in endemic, threatened species and par;ticipate in protection of the Taxa.

Suggested Books:

1. Chandel, K. P. S., Shukla, G. and Sharma, N: 1996. Biodiversity in Medicinal and Aromatic Plants in India: Conservation and Utilization. National Bureau of Plant Genetic Resources, New Delhi.
2. Chaudhuri, A. B. & Sarkar, D. D. 2002. Biodiversity Endangered. Scientific Publishers, New Delhi.
3. Clive Hambler, 2004. Conservation. Cambridge University Press, Cambridge, UK.
4. Chuvieco, E. and Uete, A.H. 2010. Fundamentals of Satellite Remote sensing.
5. Frankel, O.H., Brown, A.HD. & Burdon, J.J. 1995. The Conservation of Plant Diversity. Cambridge University Press, Cambridge, U.K.
6. Gabriel Melchias. 2001. Biodiversity and Conservation. Oxford IBH Publishers, New Delhi.
7. Christopher, D., Cook, K. 1996. Aquatic and Wet Land Plants of India Oxford University Press, New Delhi, India.
8. Mehra, K. L., Arora, R. K. 1982. Plant Genetic Resources of India -Their Diversity & Conservation, Vol III, Chapman Hall ,U. K.
9. Manilal, K. S. 1988. Flora of Silent Valley, Mathrubhumi Press, Calicut.
10. Nayar, M. P. 1996. Hot Spots of Endemic Medicinal Plants of India, Nepal & Bhutan, Tropical Botanical Garden & Research institute, Palode, Tiruvananthapuram, Kerala.
11. Negi, S. S. 2005. Biodiversity & Its Conservation in India. Indus Publishing Company. New Delhi.
12. Prasad, B. N. 2000. Biotechnology & biodiversity in Agriculture / Forestry. Oxford University Press.

13. Pullaiah, T. 2002. Biodiversity in India. Vol. I -IV. Regency Publications, New Delhi.
14. Rajiv K. Sinha. 1996. Global Biodiversity, INA, Shree Publications, Jaipur, India.
15. Santapau, H. 1970. Endangered Plant Species and their Habitat Status. IUCN Publications, Switzerland.
16. Sinha, R. K. Biodiversity -Global Concerns.1996. Commonwealth Publishers, New Delhi.
17. Supriva Chakraborthy. 2004. Biodiversity Pointer Publishers, Jaipur.
18. Walter, K.S. and Gillett, H.J. 1998. 1997 IUCN Red List of Threatened Plants. IUCN, the World conservation Union. IUCN, Gland, Switzerland, and Cambridge, U.K.
19. *Kevin J. Gaston & John I. Spicer. 2004. Biodiversity, an introduction. Blackwell* Christian Leveque, Jean-claude Mounolou and Vivien Reuter. 2004. *Biodiversity*. John Wiley
20. Given, D.R. 1995. *Principles and practice of plant conservation*. Timber Press, Oregon.
21. *Jensen*, John R. 2007. *Remote Sensing of the Environment: An Earth Resource Perspective.*PHI.
22. Krishnamurthy, K.V. 2004. Advanced Textbook On Biodiversity: Principles And Practice. Oxford Lillesand. T.M. & R.W.Kiefer. 2015.
23. Remote Sensing and Image Interpretation. 7th ed. Wiley. Ravi Prasad Rao, B. 2005.
24. Pullaiah, T. (ed.) Taxonomy of Angiosperms. Regency Pub.
25. Sharma, P.D. 2015. Ecology and Environment. 12th ed. Ratogi Publications, Meerut.

PRACTICAL BOT-202 (PHYTODIVERSITY AND CONSERVATION)

Suggested Laboratory Exercises related to BOT- 202

1. Study of the Species Diversity in Fields and Forests.
2. Study of phytodiversity of identical areas.
3. Study of Mangroves and Sacred groves.
4. Study of Endemic, Rare, Extinct species of Seshachalam hill range.
5. Genetic Diversity of species / varieties of *Vinca*, *Oscimum*, *Gomphrena*, *Portulaca*, *Plumbago*, *Amaranthus* etc.
6. Screening of Plant species for Secondary metabolites.
7. Extraction of Plant Dyes from various parts.
8. Saponification and Iodine Number of Different Plant oils.
9. Study on Distribution of Genera and Species of Indigenous (Endemic) and World.
10. Endemic plant diversity and Distribution in India.
11. Study on Forest types of India. 12. Identification of Hotspots, National parks and Sanctuaries of India

and World. 13. Study of FCC and TCC related to remote sensing.

Suggested Books for Laboratory Exercises

1. Bajracharya, D. 1999. Experiments in Plant Physiology: A laboratory manual. Narosa Publishing House, New Delhi.
2. Cooper, T.G. 1977, Tools in Biochemistry. John Wiley, New York, USA.
3. Copeland, R,A. 1996. Enzymes: A practical introduction to Structure, Mechanism, and Data analysis. VCH Publishers, New York.
4. Dennison, C. 1999. A guide to protein isolation. Kluwer Academic Publsihers, Dordrecht, The Netherlands.
5. Devi, P. 2000. Principles and methods of plant molecular biology, Biochemistry and Genetics, Agrobios, Jodhpur. India.
6. Dryer, R.L. and Lata, G.G. 1989. Experimental Biochemistry, Oxford University Press, New York.
7. Hames, B.D. (Ed). 1998. Gel Electrophoresis of proteins: A Practical approach. (3rd Ed.). RA,S Oxford University Press. Oxford UK
8. Harborne, J. B. 1981. Phytochemical methods: A guide to modern techniques of plant analysis. Chapman & Hall, London.
9. Meidner, H. 1984. Class experiments in Plant physiology, George Allen & Unwin Publishers, Boston, USA.
10. Moore, T.C. 1974. Research Experiences in Plant Physiology: A Laboratory manual. Springer Verlag, Berlin.
11. Ninfa A.J. and Ballou, D.P. 1998. Fundamental Laboratory Approaches for Biochemistry and Biotechnology, Fitzgerald Science Press, Inc., Maryland, USA.
12. Plummer, D.T. 1988. An Introduction to Practical Biochemistry. Tata McGraw Hill Publisf, iriCo. Ltd., New'Delhi.
13. Scott R.P.W. 1995. Techniques and Practice of Chromatography. Marcel Dekker, Inc., New York.
14. Wilson, K. and Goulding, K.H. (Eds.). 1986. A Biologists guide to principles and ltechniques of practical biochemistry. Edward Arnold, London, UK.
15. Wilson, K. and Walker, J. 1994. Practical Biochemistry: Principles and Techniques, (4th Ed.). Cambridge University Press, Cambridge, UK.

PAPER – II (BOT-202): PHYTODIVERSITY AND CONSERVATION

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	-	3	2	2	2	3	2	2	2	2	2
CO_2	3	2	2	2	2	2	2	-	1	1	1	3
CO_3	3	2	1	2	-	1	3	-	2	1	2	2
CO_4	3	2	1	2	-	-	2	2	-	1	1	3
CO_5												

Compulsory Foundation

BOT-203: PLANT ECOLOGY

Course Objectives

1. To understand the geographical distribution of organisms.
2. To know the inter-relationship between population and communities.
3. To learn the management of natural resource and pollution.
4. To develop the concept of Pollution and its Control.

UNIT I

Soil, Climate and Vegetation 5 patterns: Soil profile, Types, Texture, Physical and Chemical properties, Organic matter and Micro flora- microbe interactions-Mutualism, Commensalism and parasitism.

Biomes: Concept, types, distribution of Tropical, Temperate, Alpine, Grass land, Aquatic and Desert Biomes.

UNIT II

a) Concept of Ecosystem: Earth Atmosphere system; ecosystem components; Physical and chemical sub system; Ecosystem dynamics, Energy flow, cycling nutrients, food webs, community dynamics substaturm.

b) Community Development: Succession process, quality establishment, dominance, dynamic equilibrium, climax successtion, types of succession, hydrarch, xerorch, secondary succession convergence, modification, species diversity, selection process, bioenergetics in ecological successtion.

c) Community organization and Stratification: Fresh water, horixantal, terrestrial, mountains, marine stratification, trophic structure, food chains, ecological pyramids, niche segregation, third level of organization, niche overlap, characters of niche, microclimate, niche phenology.

d) Association and interaction among organisms: Intra and inter specific association, Association, competition, predation, mutualism, insect-pant interactions, figs-fig wasps. Impact of Biota on the environment, microclimate, temperature, light intensity, and quality, moisture wind flow, gases and nutrient substratum.

UNIT III

a) Ecosystem Dynamics: Biogeochemical cycles; Water, Carbon, Nitrogen, Phosphorous and Oxygen cycles. Elements and distribution, cycling process, interaction of biotic and abiotic components. Role of decomposers; Man's interferences on the BGC Cycles.

b) Evaporation-Precipitation and Water Cycle: Parameters controlling water cycle, Hydrological cascade system; local ctcling, global evaporation, precipitation and water budget, Impact of water cycle on environment, biota, impact of man on hydrological cycle.

c) Ecosystem energetic: Productivity in ecosystem; Primary productivity, secondary productivity, factors affecting primary and secondary production.

d) Energy flow and ecosystem budgets: Light energy laws of thermodynamics, energy fixation and production, flow through food chain, energy flow-models, energetic relations of ecosystem detritus food chain, trophic interaction with microbial food web, loss of energy of different trophic levels, community food web, scale and structure of natural food webs, energetic and decomposition.

UNIT IV

Environmental Hazards and Management: Pollutants: kinds- Air, Water, Soil, Sound, Radiation, Heavy Metals and Atomic Pollution, Effects on Plants and Ecosystems, strategies for pollution waste water treatment.

Climatic Changes: Green House Gases and Global Warming; Ozone hole, Impact on Plant and Ecosystem, Restoration.

Waste management and bio-energy: Conventional, Non conventional energy resources, Environmental impacts, biogas digester, design and methanogenesis.

Course Outcomes:

1. Students will know about the factors leading to environmental degradation and their impact.
2. Develop concern about the environment protection and conservation.
3. Evolve the relation between biotic and abiotic factors in an ecosystem.
4. Understand the concepts of biome and its importance.

Suggested Books:

1. Brady, N.C. 1990. The Nature and Properties of Soils. MacMillan.
2. Chapman, J.L. and Reiss, M.J. 1988. Ecology Principles and Application. Cambridge University Press. Cambridge, U.K.
3. Hill, M.K. 1997. Understanding environmental Pollution. Cambridge University press.
4. Kormondy, E.J. 1996. Concepts of Ec1ology, Prentice-Hall of India Pvt. Ltd., New Delhi
5. Kumar, H. D. 1998. Modern Concepts of Ecology, Vikas Publishing, New Delhi.
6. Ludwig. J. and Reynolds, J. F. 1988. Statistical Ecology. A Primer on Methods and Computing. John Wiley & sons.
7. Mason, C.F. 1991. Biology of Freshwater Pollution Longman.
8. Moldan, B. and Billharz, S. 1997. Sustainability Indications, John Wiley & Sons New York.
9. Mukherjee, B. 1997.Environmental Biology, Mc. Graw Hill, New Delhi.
10. Muller-dombois, D. and Ellenberg, H. 1974. Aims and Methods of Vegetation Ecology, Wiley, New York.
11. Odum, E.P. 1971 Fundamentals of Ecology, Saunders, Philadelphia.
12. Smith R.L. 1996 Ecology and Filed Biology. Harper Collins, New York.
13. Treshow, M. 1985. Air Pollution and Plant Life. Wiley lnterscience.
14. *Alan beebay & Anne-Maria Brennan. 2008.* First Ecology. 3rd ed. Oxford University Press.
15. *Begon M., Colin, T. & John L. Harper.* 2005. Ecology, From Individuals to Ecosystems. *4th ed. Black well.*
16. Dash, M.C.2009. *Fundamentals of Ecology*. Tata Mc GrawHill Pub.New Delhi.
17. Manuel C. Molles Jr. 2013. *Ecology-concepts and applications*. 6th ed. Mc GrawHill.
18. Ricklefs, R,E. &Gary L. Miller. 2000.*Ecology*. 4th ed. W.H. Freeman and Company. New York.
19. Sharma, P.D. 2015. *Ecology and Environment*. Rastogi Publications, Meerut.
20. Stiling, P. 2002. *Ecology*, *Theory and applications*. Prentice-Hall of India, New Delhi.
21. Tom Hennigan & Jean Lightner. 2013. *The Ecology Book*. Master Books.
22. Ernst-Detlef Schulze, Erwin Beck, Klaus Müller-Hohenstein. 2010. *Plant Ecology*. Springer, Berlin.

PAPER – III (BOT-203): PLANT ECOLOGY

CO-PO Mapping Matrix/ Programme Articulation Matrix: BOT-202

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	2	-	2	3	-	3	3	-	3	-	-
CO_2	3	2	2	-	1	-	2	-	3	2	1	3
CO_3	3	-	2	2	1	2	1	2	2	1	2	2
CO_4	3	-	2	-	2	2	1	2	2	2	-	-

Elective Foundation

BOT – 204 : CELL BIOLOGY, GENETICS AND EVOLUTION

Course Objectives

1. To make the students to understand structure and functions of major plant cell organelles, chromatin organization, cytoskeletion and cell cycle regulation
2. To make the students to understand basis and process of inheritance of genes and their mapping in eukaryotes and microbes
3. To make the students to understand the processes of organic evolution and speciation.

Unit - I

Structural Organization of Plant Cells: Structure and Function of Cell wall, Plasmodesmata, Plasma Membrane; Structure and Functions of Endoplasmic Reticulum, Golgi Apparatus, Lysosomes, Vacuoles, Chloroplast and Mitochondria. Cytoskeleton - elements, organization and function.

Unit - II

Nucleus: Interphase Nucleus, Nuclear membrane. Nucleosome structure and levels of Chromatin organization in Chromosomes, Euchromatin and heterocromatin, Structural organization of Centromere and Telomere. Sex chromosomes in plants. Cell cycle and its regulation.

Unit – III

Eukaryotic Genetics: Mendelian principles, complementation test, Epistatic Gene interactions; Linkage and Crossing over, Gene Mapping using three point test cross, Cytoplasmic Inheritance.

Microbial genetics: Mapping of genes using Transformation, Conjugation and Transduction. Tetrad Analysis,

Mutations: Gene Mutations - Types, Physical and Chemical Mutagens, Molecular basis of Gene Mutations.

Unit - IV:

Principles of Evolution : Origin of Life, Theories of organic evolution, Synthetic theory, Natural selection, Mechanisms of Speciation. Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Hardy – Weinberg Law, factors influencing equilibrium and gene frequencies; Centres of genetic diversity, Origin and Evolution of Wheat & Maize.

Course Outcomes

1. Students will be able to describe the function and structure of major plant cell organelles and Cytoskeleton,
2. Student will be able to describe the structure of nuclear pore complex, Levels of chromatin organization and chromosomes, cell cycle regulation
3. Student will be able to Explain the process of inheritance of genes and interactions, Mapping of eukaryotic and microbial genes and mutagenesis
4. Students will be able to explain the origin of life and processes for the evolution of species and their diversity.

Suggested Readings : BOT-204

1 Alberts, B., Bray, D., Lewis, J. Raff, M., Roberts, K., and Watson. J.D. 1999. Molecular Biology of the cell. Garland Publishing Inc., New York.

2. Buchanan, B.B., Gruissem, W. and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. American Soc. of pl. physiologist, Maryland, USA.

2 Elrod, S. and Stansfield, W.2002. Genetics, Schaum's Outlines. Tata Mc Graw Hill, New Delhi.

3 Griffiths, A. J. F., Miller, J.H., Suzuki, D. T., Lewontin, R. C., and Galbert, W. M. 2000. An Introduction to Genetic Analysis. W. H. Freeman Publishers, New York.

4 Rastogi,.V. B. 1997.Organic Evolution. Pitambar Publishing, India

5 Russel, P.J. 1998. Genetics (5th Ed.) The Benjamin / Cummings Publishing Co., Inc., USA.

6 Snustad, D.P. and Simmons, M.J. 2000. Principles of Genetics (2nd Ed.) John Wiley & Sons Inc., USA.

7 Stebbins, G. L., 1973. Process of Organic Evolution. Prentice – Hall Pvt. Ltd., New Delhi.

8 Tamarin, R. H. 1999. Principles of Genetics. Mc Graw Hill, New Delhi

9 De Robertis, E. D. P. and De Robertis, E.M.F. Jr. 2001. Essentials of cell and Molecular Biology, Holt lea and Febiger, New York.

10 Lodish, H, Berk, A. Zipursky, S.L., Matsudaira, P.Baltimore, D. and Dernll, J. 2000. Molecular cell Biology (4th Ed.), W. H. Freeman and Co., New York, USA.

Practical paper – II : BOT 204

Suggested laboratory exercises: Cell Biology, Genetics and Evolution

1. Determination of mitotic index.
2. Study of Chromosomal Behavior during Mitosis in root tips of Onion.
3. Study of chromosomal behavior during meiosis with special emphasis on Prophase-I using flower buds of Onion.
4. Study on the effect of Colchicine on Mitosis.
5. Study on Structural hybrids in *Rhoeo discolor*.
6. Study of problems with specific examples in Eukaryotic and Microbial Genetics
7. Genetics spotters.

Suggested Readings for Laboratory exercises BOT- 204

1. Elrod, S. and Stansfield, W. 2002. Genetics, Schaum's Outlines. Tata Mc Graw Hill, New Delhi.
2. Griffiths, A. J. F., Miller, J.H., Suzuki, D. T., Lewontin, R. C., and Galbert, W. M. 2000. An Introduction to Genetic Analysis. W. H. Freeman Publishers, New York.
3. Russel, P.J. 1998. Genetics (5th Ed.) The Benjamin / Cummings Publishing Co., Inc., USA.

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PAPER – IV (BOT-204) : CELL BIOLOGY, GENETICS AND EVOLUTION

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	-	2	2	3	2	-	-	1	1	2	1
CO_2	2	2	1	2	-	2	2	1	-	2	2	2
CO_3	2	3	2	-	1	-	-	-	1	1	1	1
CO_4	3	-	-	2	2	2	2	1	1	-	-	-
CO_5												

SEMESTER – III

BOT-301 : MOLECULAR PLANT PHYSIOLOGY

Course Objectives

1. To inculcate awareness among the students regarding Plant Production (Photosynthesis)
2. To create awareness regarding the response of plants for environmental changes.
3. To develop knowledge in identify the saline soils and environmental fluctuations.
4. To inculcate interest in Nanotechnology.

UNIT- I

Signal transduction: Overview, Receptors and G-Proteins, Phospholipid signaling, Role of cyclic nucleotides, Calcium-Calmodulin Cascade, Protein kinases, MPK and Phosphates. Specific signaling mechanisms- Two component ***sector*** regulatory system in plants, sucrose-senesing mechanism. Hormone receptors, signal transduction pathways and gene expression. Senescence: Physiological, molecular and genetic changes associated with leaf senescence and signaling.

UNIT II

Photosynthesis: Photosynthetic pigments, Photosyste 0.ms & Light harvesting complexes. Regulation of PS I and PS II activities; Photo-oxidation of Water, Oxygen evolving complex, Water oxidation clock, Mechanism of Photosynthetic electron and Proton transport; Energy spill over mechanisms; ATPase and Photophosphorylation; Rubisco activation and its mechanism of action; Light Activation of Photosynthetic enzymes; Chloroplast Protein Phosphorylation and Enzyme regulation of Photosynthetic carbon Assimilation; Mechanism of C_4 cycle and CAM Pathway.

UNIT-III

Nanotechnology: Nanotechnology in Biology, Chemical and Physical synthesis and Bio-synthesis of Nano particles. Characterization and Diversity of Nano particles; Nano sensors, Nano probes, Nano shells, Nano tubes; Application in Agriculture, Medicine and Industry; Quantam dots (Properties, Synthesis, Solubilization & Bioconjugation, Diversity, Binding specificity and application)

UNIT -IV

Stress Physiology: Concept of Stress, Plant Molecular Responses and Tolerance Mechanism to Abiotic Stress such as Water, Salt, Heavy Metal, and Temperature and cold Stresses. Heat shock proteins, LEA Proteins, miRNA involved in stress response in plants.

Molecular Physiology of Flowering: Photoperiodism, Photoinduction and Evocation; Endogenous Clocks and Regulation; Physiological Signals of Floral Induction; Genetic and Molecular analysis, Vernalization.

Course Outcomes

1. After completion of the course, the student can aware, how the plants can prepare human food and how different plants utilize efficiently the same natural sources like sunlight and Carbon dioxide and water and produce food in effective manner.
2. Students get knowledge regarding the response of the plants in stressed conditions i.e., in less or more availability of water, salts, sunlight, heat, cold and pathogens.
   They are also aware how plants can respond to environmental changes like human beings. All this knowledge will be helpful to students for production of efficient plants (Crops) in Agriculture.
3. They identify the soil types, mineral deficiency in plants and suitability of Crops to concern environmental conditions.
4. Students can understand the role and functions of Nanotechnology in Medicine, Agriculture, Urban and Environmental applications. Apart from traditional methods using to reduce pollution, they can use nano devices noval applications in reudicng the pollution.

Suggested Books:

1. Buchanan, B.B. Grussem, W. and Jones, RL. 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists, Maryland, USA.
2. Dennis, D.T. Turpin, D.H., Lefebvre, D.D. and Layzell, D.B. (Eds.) 1997. Plant Metabolism (2nd Ed.) Longman, Essex, England.
3. Galston, A.W. 1989. Life Processes in Plants. Scientific American Library, Springer-Verlag. New York, USA.
4. Hooykaas, P.J.J., Hall, M.A. and Libbeng, K.R. (Eds.). 1999 Biochemsitry and Molcular biology of plant Hormones. Elsevier, Amsterdam, The Netherlands.
5. Hopkins, W.G. 1995. Introduction to Plant Physiology. John Wiley & Sons, New York, USA.
6. Lodish, H., Berk, A., Zipursky, SL., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology (4tt Ed.). W.H. Freeman and Company, New York, USA.
7. Moore, T.C. 1989. Biochemistry and Physiology of plant Hormones (2nd Ed.). Springer- Verlag, New York, USA.
8. Nobel, P.S. 1999. Physiochemical and Environmental Plant Physiology (2 Ed.). Academic Press, San

diego, USA.

9. Salisbury, F.B. and Ross, C.W. 1992. Plant Physiology (4th Ed.). Wadswroth Publishing Co., California, USA.
10. Singhal, G.S., Renger, G., Sopory, S.K. lrrgng K.D. and Govindje 1999. Concepts in Photobiology: Photosynthesis and Photornorphogenesis. Narosa Publishing Houses, New Delhi.
11. Taiz, L. and Zeigler, E. 1998.Plant Physiology (2 Ed.). Sinauer Associate, Inc., Publishers, Massachusetts, USA.
12. Thomas, B. and Vince-Prue, D. 1997. Photoperiodism in plants (2 Ed.). Academic Press, San Diego, USA
13. Westhoff, P. 1998. Molecular Plant Development: From Gene to Plant. Oxford University Press, Oxford, UK.
14. Tuanvo, Dinh Eds. Nanotechnology in Biology and Medicine; CRC Press, USA.
15. Subbaiah balaji, 2010. Nanobiotechnology; MJP Publishers, Chennai.
16. Chandrabhanu, T. K. and Bhatnagar, V. 2009. Nano science and Technology. Published by Campus Books international, New Delhi.

17. Charles P. Poole, Jr. Frank, J. Owens. Introduction to Nanotechnology. John Wiley & Sons Publications.
18. ODED Shoscyov & I Lan Levy. Nano Biotechnology, Bioinspired devices and materials of the future. Humana press, Totowa, New Jersey.
19. Nanobiotechnology: inorganic nanoparticles Vs Organic Nanoparticles. Elsevier.
20. Gerhard wilde. Nano standard materials. Elsevier.
21. M.N.V. Prasad, Salt stress.
22. Paras N. Prasad. Introduction to Nanomedicine and Nano bioengineering. Wiley series in.
23. Harry F. Tiffals. Medical Nanotechnology and Nanomed icine. University of Texas south western medical centre, Dallar, USA, CRC Press.

PRACTICAL - BOT-301 : MOLECULAR PLANT PHYSIOLOGY

Suggested laboratory exercises

1. Extraction and Estimation of Chlorophyll pigments.
2. Substrate Inducebility of the enzyme Nitrate Reductase.
3. Preparation of Standard Curve of Proteins and Estimation of Protein content in the Extracts of Plant materials using Lowry's or Brodfords method.
4. Preparation of Standard Curve of Glucose and Estimation of Carbohydrate in the extracts of Plant materials using Anthrone reagent.
5. Studies on hormonal regulation of senescence.
6. Effect of Salt and Water stress on the Accumulation of Proline.
7. Seed viability test using Tetrazolium chloride and Seedling vigour.
8. Temperature, Seed germination and Acid Phosphatase activity.
9. De-repression of Dwarf Characters of plants by Gibberellins.
10. Separation of Isozymes of Peroxidase by native Polyacrylamide Gel Electrophoresis.
11. Extraction and separation of soluble plant proteins by SDS PAGE.

Suggested Books for Laboratory Exercises

1. Sambrook, J., Fritsch, EF & Maniatis, T. 1989. Molecular cloning, A laboratory Manual. (2nd Ed.), Cold spring harbor laboratory press, New York.
2. Schuler, M.A. & Zielinski, R.E. 1989. Methods in plant molecular biology. Academic press Inc., San Diego, CA, USA.
3. Dixon, R.A. (Ed). 1987. Plant cell culture: A practical approach. IRL. Press, oxford.
4. Becker, J.M. Caldwell, G.A., 1990. Biotechnology- A laboratory course. Academic press, New York, USA.

PAPER – I (BOT-301) : MOLECULAR PLANT PHYSIOLOGY

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	-	1	3	3	1	2	3	2	3	2	2
CO_2	2	2	-	-	1	1	2	1	-	-	-	1
CO_3	3	-	3	-	1	-	-	-	-	2	3	-
CO_4	2	2	-	2	2	-	1	2	3	1	-	2

BOT-302: MOLECULAR BIOLOGY AND TECHNIQUES

Course Objectives:

1. To make the students to understand the DNA structure, properties, replication, damage repair and organization of genetic material in chromosomes.
2. To make the students to understand organization, mechanism of gene expression and processing of gene products in Prokaryotes and Eukaryotes.
3. To make the students to understand mechanisms of gene expression regulation in Prokaryotes and Eukaryotes
4. To make the students to understand basic principles of microscopy and techniques for separation and analysis of nucleic acids and proteins.

UNIT – 1

Structure and Replication of DNA:

Nature of genetic material, and structure of DNA and polymorphism (A, B, and Z DNA). Biochemical and physical properties of DNA and RNA; DNA replication in prokaryotes and eukaryotes. Unit of replication, enzymes involved, replication origin and replication fork, fidelity of replication, DNA damage and repair mechanisms, Nucleosome structure and levels of Chromatin organization in Chromosomes; Cell cycle and its regulation.

UNIT – II

Gene expression:

Structure of prokaryotic and eukaryotic genes; RNA synthesis and processing: Transcription factors and machinery, formation of initiation complex, RNA polymerases, capping, elongation, and termination, RNA processing, RNA editing, splicing, and polyadenylation, RNA transport.

Protein synthesis and processing: Elucidation and features of genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, translational proof-reading, Post-translational modification of proteins. Secondary structure, domains, motif and folds.

UNIT – III

Regulation of gene Expression

Regulation of phage and viral gene expression Prokaryotes - Organization of Lac and Tryptophan operons; Negative and Positive Control and Attenuation mechanisms.

Eukaryotes: *Cis*-acting elements and Trans-acting factors in gene regulation

Role of Chromatin remodeling and histone code in gene expression.

DNA methylation in gene regulation and gene imprinting. RNAs in gene silencing

UNIT – IV

Techniques for analysis of Molecules:

Microscopic techniques: Resolving powers, microscopy of living cells, Scanning and Transmission Electron microscopes & specimen preparation, Image processing methods.

Molecular separation techniques; Centrifugation: Sedimentation - RCF, Differential & Density Gradient centrifugation, Chromatography- Basic Principles, Types of Chromatography.

Electrophoresis: Principles and Types of electrophoretic techniques. Spectroscopy: UV/visible and Mass spectrometry; Labeled tracers.

Course Outcomes:

1. Describe Nucleic acids structure, properties and mechanism of DNA replication and damage repair pathways, and Chromatin organization Cell Cycle regulation
2. Describe gene organization, mechanism of Transcription and Translation, and processing of gene products in Prokaryotes and Eukaryotes
3. Explain the mechanisms of regulation of gene expression in Prokaryotes and Eukaryotes.
4. Explain the basic principles of Microscopy, Nucleic acid and protein separation and identification Techniques and methods

Suggested Readings: BOT – 302

1. Adams, R. L. P., Knowler, J. T. and Leader, D. P. 1994.The Biochemistry of the Nucleic acids. Chapman & Hall.
2. Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K., and Watson, J. D. 1999. Molecular Biology of the Cell. Garland Publishing Inc., New York.

3. Brown, T. A. 1999. Genomes 3. John Wiley & Sons, New York, USA.
4. *Watson JD, Baker TA, Bell SP, Gann A, Levine M, Losick R. 2004 Molecular biology of the Gene* (5th Ed.) Benjamin Cummings.
5. Robert F. Weaver.2008. Molecular Biology. Mc Graw Hill Higher Education.
6. Buchanan, B. B., Gruissem, W. and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. Am. Society of Plant Physiologists, Maryland, USA.
7. Lewin, B. 2006. Genes VIII. Oxford University Press, New York.
8. Upadyaya, A., Upadyaya, K., and Nath, N. Biophysical Chemistry-Principle and Techniques, Himalya Publishing House, New Delhi
9. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology (4th Ed.), W.H. Freeman and Co., New York, USA
10. Keith Wilson and John Walker (Editors) 2005.Principles and Techniques of Biochemistry and Molecular Biology (6th Ed.) Cambridge University Press, New York.

Practical BOT-CP-302 (Molecular Biology and Techniques)

Suggested Laboratory Exercises related to 301

1. Isolation of plant DNA
2. Determination of λ max of DNA.
3. Estimation of DNA quantity by Diphenylamine method
4. Isolation of RNA
5. Determination of λ max of RNA
6. Estimation of RNA quantity by Orcenol method
7. Effect of pH and temperature on DNA and RNA
8. Determination of λ max of Proteins.
9. Estimation of Protein quantity
10. Assignments on DNA structure, Replication and Gene expression.

Suggested Books for Laboratory exercises

1. A.K. Sharma and A. Sharma, Chromosome techniques, Butterworth's Publications

2. Glick, B.R. and Thompson, J.E. 1993. Methods in Plant Molecular Biology Biotechnology. CRC Press, Boca Raton, Florida.
3. Sadasivam, S. & Manikam, A. 1992. Biochemical methods. Wiley Eastern Ltd.
4. Sawhney, S. K. and Ranbir Singh (Eds).2000.lntroductory Practical Biochemistry, Narosa Publishers, New Delhi.
5. Shaw, C.H. (Ed.). 1988. Plant Molecular Biology: A Practical Approach, IRL Press, Oxford.
6. An Introduction to practical biochemistry by D.T. Plummer (Mc Graw Hill).
7. Lab Manual in Biochemistry by J. Jayaraman (Wiley Eastern Limited).Gelvin, S. V. and Schilperoort, R. A. (Eds.) 1994. Plant Molecular Biology Manual, (2nd Ed.), Kluwer Academic Publishers, Dordrecht, The Netherlands
8. Biochemistry by Lubert Stryer (5th Ed.) (Freeman-Toppan)
9. Griffiths, A.J.F., Miller, J.H., Suzuki, D. T., Lewontin, R.C., and Galbert, W.M.2000. An introduction to Genetic Analysis, W.H. Freeman Publishers, New York.
10. Frank, H. Stephenson. 2008: Calculations in Molecular Biology and Biotechnology-A Guide to Mathematics in the Laboratory, Academic Press

PAPER – II (BOT-302) : MOLECULAR BIOLOGY AND TECHNIQUES

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	2	1	3	2	-	2	3	2	1	3	2
CO_2	3	2	1	2	1	2	2	2	2	1	2	-
CO_3	3	1	-	1	1	-	1	3	-	2	1	-
CO_4	3	1	2	1	2	1	1	2	-	1	1	1

Skilled Oriented Course

BOT-303A : MUSHROOM CULTIVATION

Course Objectives

1. To study methods of growing edible mushrooms and isolation of Mushroom culture and Culture maintenance.
2. To study basic mushroom substrate preparation, composting and study spawn generation techniques, inoculation methods.
3. To study method of harvesting of Mushrooms.
4. To study diseases and pests of mushrooms; disease and pest management of mushrooms.

UNIT – I

History of Mushroom, cultivation, mushroom status in Andhra Pradesh and other states of India; Biology and Ecology of mushrooms; Wild mushroom collection.

UNIT – II

Introduction to mushrooms, morphology, classification, edible mushrooms and poisonous mushrooms. Life cycle of *Valverellia* sp., *Pleauritus* sp., *Agaricus* sp., *Calocybe* sp. and *Leutinus* sp.

UNIT – III

Spawn preparation : Facilities required for spawn preparation, Preparation of spawn substrate; Preparation of pure culture, culture maintenance, storage of spawn.

UNIT – IV

Mushroom Cultivation – Conditions of mushroom cultivation, isolation, spawn production, growth media, spawn running, harvesting and storage of mushrooms. Medical and nutritional value of mushrooms. Mushrooms diseases and management.

Course Outcomes

1. An ability to know types of edible and poisonous mushrooms.
2. An ability to know method of cultivation of mushrooms.

3. An ability to have self employment.
4. Able to prepare Organic fertilizers and apply it to field level.

Suggested Books

1. Nita Bhal (2000). Hand book on Mushrooms, 2nd ed. Vol.I & II. Oxford and IBH publishing Co Pvt Ltd., New Delhi.
2. Tripathi, D.P. (2005) Mushroom Cultivation, Oxford & IBH publishing Co Pvt Ltd., New Delhi.
3. Pandey, E.K.S.K. Ghosh, 1996 A hand book on mushroom cultivation, Emkey Publications.
4. Tewari Pankaj Kapoor, S.S. (1988). Mushroom Cultivation, Mittal Publications, New Delhi
5. Tavina Rehman Borah, Akoijam Ratankumar Singh, Pampi Paul et al. (2020). Spawn production and mushroom cultivation technology, ICAR, Meghalaya.
6. V.N.Pathak, Nagendra Yadav and Maneesha Gaur (2000). Mushroom Production and Processing Technoogy / Vedams Ebooks Pvt Ltd, New Delhi.
7. Pathak, V.N. and Yadav, N (1998). Mushroom production and processing technology. Agrobios.

PRACTICAL BOT-303 IE : MUSHROOMS

Suggested laboratory exercises

1. Maintenance of mushroom cultivation labs.
2. Sterilization of substrate material
3. Spawn preparation
4. Preparation of mushroom beds
5. Treatment of Casins material
6. Process of Casins
7. Management of Spawn-run
8. Harvesting of mushrooms.

Suggested Books for laboratory exercises

1. Hand book of Mushroom Cultivation, Processing and Packaging by Eiri Staff.
2. Mushroom Cultivation in India Hardcover – 2007 by Suman and Sharma

Skilled Oriented Course

PAPER – III (BOT-303A) : MUSHROOM CULTIVATION

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	2	3	2	3	2	3	2	3	2	3	1
CO_2	3	-	1	1	2	1	2	1	1	1	2	2
CO_3	1	-	-	-	-	1	1	1	2	1	1	1
CO_4	3	1	2	2	-	-	1	2	1	2	2	2

External Elective/Open Elective

BOT-304A : PLANT RESOURCE AND HUMAN WELFARE (EE)

Course Objectives

1. To understand the preparation and development of herbal formulation; Describe about herbs or natural origin drugs as raw materials for preparation of cosmetics, excipients, conventional herbal formulation and novel dosage forms like phytosomes.
2. Explain method for identification and authentication of herbal drugs; To be familiar with the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents.
3. To carryout isolation and identification of phytoconstituents; The pharmaceutical legislations and their implications in the development and marketing.
4. Acquire an understanding of the importance of plants in tribal lives; Describe rules and regulation for assessment of herbal drugs, patenting of natural products and manufacture of herbal formulations based on traditional medicinal system.

UNIT-I

Diversity of plants: Food Yielding Plants (Major & Minor crops- Cereals, Pulses, Oil seeds, Vegetables and Fibers); Wood and Timber Yielding plants and their utilization in day to day human life.

UNIT-II

Plants in Medicine: Medicinal and Aromatic Plants (Ethno medicinal or Traditional Medicinal plants); Poisonous plants; Medicinal plants used to cure human diseases, Insect bites/ Snake bites; Veterinary diseases (Live stock); plants used in Ayurvedic; Homeopathy, Allopathy, Sidha and Unani Medicines.

UNIT-III

Non wood forest products: Spices and condiments ; beverages, Sweetening's, Starch, Honey, Bio vitamins; Bamboos, Rattans, Gums, Waxes, Resins, Tannins, Dyes, Fruits, Nuts, Cork, Paper, Pulp, Rubber, Volatile oils; Petroleum substitutes.

UNIT-IV

Preparation and application of plants as Bio fertilizers (N_2 fixers; Zeevamrutham, Vermi compost); Bio pesticides (For Fungal, Bacterial and viral diseases); Bio insecticides (mosquitoes repellents; Book worms; Beatles, mushroom cultivation, plants as preservatives.

Suggested Books:

1. Economic Botany, S.N Panday, Ajanta Chadha, Vikas Publishing House Pvt Ltd.1996.
2. Economic Botany, B.P. Panday. S.Chand & Company Ltd.1984.
3. A Phyto chemical approach to Economic Botany S.D. Sabis, M.Daniel, Kalyani Publishing 1990.
4. A Text Book of Ecomonic Botany, A.V.S.S. Sambamurty, N.S Subrahmanyam Eiley Eastern Ltd. 1989.
5. Econic Botany- A Text Book of useful Plants and plant products by Algert F. Hill.
6. The Medicinal and Poisonous Plants of India by J.F.Caius Scientific Publishers Journal dept.5th Revised edition- 2003.
7. Poisonous Plans of India by R.N. Chopra. New Delhi, Indian council of Agricultural Research- 1965.
8. Plants used as Veterinary Medicine in Chittoor District of Andhra Pradesh, India Pharmaceutical biology, January-1987
9. Veterinary Medicinal Plants by Ramesh Handan-2015.
10. Veterinary Herbal medicine by Susan G. Wynn, Barbanafongene . 2016.

External Elective/Open Elective

PAPER – IV (BOT-304A) : PLANT RESOURCE AND HUMAN WELFARE

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	-	-	-	-	-	-	1	-	3	-	-
CO_2	2	3	2	-	-	-	2	3	-	-	1	3
CO_3	-	-	1	-	2	2	-	-	-	-	2	2
CO_4	-	1	2	1	1	1	1	1	1	2	1	-

External Elective/Open Elective

(BOT-304B) : GARDENING AND NURSERY TECHNIQUES (EE)

Course Objectives

1. Analyze the greenhouses based on shape, utility, construction, covering materials and cost.
2. Study of Plant Propagation and Nursery Management.
3. Study about tissue culture methods and applications are extensively studied with application point of view
4. Knowledge Production technology of medicinal and plantation crops; Awareness of basics of fruit, ornamental and medicinal plants nurseries.

Unit-I

GARDENING AND NURSERY: Importance of Nursery, Role of Nurseries in Horticulture Development, Components of Nursery-, Layout, Physical Resources Inputs, Management, Propagation Structures, Planning and Scheduling of Nursery Activities.Garden designing with annuals, biennials and Perennials

Unit-II

PLANT PROPAGATION METHODS: Sexual Propagation - Seed Production and Seed Propagation, Methods of Breaking Dormancy; Asexual Propagation- Division and Separation, Cuttings, Grafting, Budding, Layering and Tissue Culture; Advantages and disadvantage of Sexual and asexual propagations.

Unit-III

PLANT NUTRITION AND MANAGEMENT IN NURSERY: Plant Nutrition, Macro and Micronutrients and their role, Nutrient Deficiency Symptoms in Plants; Manures and Fertilizers; Types of Growth Media and Media Preparation; Water Quality and Irrigation methods; Pest and Weed Management and Control.

Unit-IV

TYPES OF GARDENS AND NURSERIES- Types of gardens: Formal, Informal, Egyptian, Roman, Chinese, Hindu- Buddhist Mughal and Japanese. Types of Nurseries: Fruit Plant Nurseries, Vegetable Nurseries, Ornamental Plant Nurseries, Medicinal and Aromatic Plant Nurseries, Forest Plant Nursery, Hi-Tech Nurseries.

Course Outcomes

1. Provide basic knowledge about tools, equipment and growing structures used in nurseries for plant production.
2. Management practices of nursery practices record keeping, nursery standards; Plant nutrition and its management in nursery
3. Propagation by cuttings, layering, grafting, budding, specialized structures, and micropropagation; Acquire knowledge regarding the theory and practice of cultural and production techniques and methods.
4. To learn management practices for nutrition, water management, pest management, pruning and training, storage and handling, shipping.

Suggested Readings:

1. Fundamentals of Horticulture, Edmond, J.B., Sen., T.L., Andrews, F.S and Halfacre R.G, 1963. Tata McGraw Hill Publishing Co., New Delhi.
2. Introduction to Horticulture, Kumar, N. 1990. Rajyalakshmi Publications, Nagarcoil, Tamilnadu.
3. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
4. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
5. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil. institution)
6. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.
7. Christopher Brickell, 1992, The Royal Horticultural Society Encyclopedia of Gardening.Dorling Kinderlsey, London.
8. Plant Propagation. Principles and Practices, Hartman, HT and Kester, D.E.1976, Prentice Hall of India Pvt. Ltd. Bombay.

9. Plant Propagation. Sadhu, M.K. 1996. New Age International Publishers,New Delhi.

Open Elective

PAPER – IV (BOT-304B) : GARDENING AND NURSERY TECHNIQUES

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	-	3	3	-	3	3	-	3	-	3	-
CO_2	3	2	3	1	3	-	2	-	3	3	2	-
CO_3	3	-	2	2	1	1	1	2	3	3	-	3
CO_4	2	-	2	1	3	2	2	1	2	2	-	-

External Elective/Open Elective

BOT-304C : ORGANIC FARMING (EE)

Course Objectives

1. To reduce the toxicity of Chemical Fertilizers.
2. To save soil health and promote soil fertility.
3. To popularize the importance of organic fertilization.
4. To bring awareness about organic foods.

UNIT-I

Concept of organic farming: Principles, types and benefits of organic farming. Conventional farming versus Organic farming. Types of compost, Green manure, Farmyard manure, Vermicompost, Methods of compost preparation. Processing, packing and storage of vermicompost. Nutritive value of compost. Panchagavya; collection, processing, advantages and disadvantages

UNIT-II

Biofertilizers: Production, processing and storage of biofertilizers and organic preparations. Cost of production system. Benefit cost ratio. Marketing: export and import. Maintenance of records, farm management system and role of NGOs.

UNIT-III

Panchagavya – Collection, processing, advantages and disadvantages, preparation, types, maintenance, cowdung micro flora, liquid and solid Panchagavya – chemical nature of cow urine.

UNIT-IV

Vermicompost Technology : Production, types of tubs, construction of tubs, preparation, processing, watering of raw material, casting collections, drying, sieving, packing and marketing. Chemical composition of vermin compost – different species of earth worms - vermi wash and its applications.

Course Outcomes

1. Understands the importance of organic fertilizers in preventing environmental pollution.
2. Able to prepare Organic fertilizers and apply it to field level.
3. Develop the skill of preparing farmyard compost.
4. Learn the techniques of isolation and maintenance of biofertilizers.

Suggested Books:

1. Handbook of organic farming and Biofertilizers by M.K. Gupta.
2. The Organic Farmer's Business Handbook by Richard Wiswal.
3. Practical Handbook of Agricultural Science by Hanson.
4. Year Round Vegetables, Fruits and Flowers by Bob Randall.
5. Organic Management for the Professional by Howard Garrett.
6. Handbook of organic farming and Biofertilizers by M.K. Gupta.
7. Biofertilizer Technology by R. Shankara Reddy, Biofertilizer

a. Technology by Kannaiyan. S

Open Elective

PAPER – IV (BOT-304C) : ORGANIC FARMING

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	2	2	2	1	-	-	2	-	-	-	-	-
CO_2	3	-	2	2	-	2	3	-	-	-	3	-
CO_3	2	-	3	2	3	2	1	-	3	-	-	2
CO_4	3	-	3	3	-	1	1	2	2	3	-	-

SEMESTER – IV

BOT-401: GENOMICS AND PROTEOMICS

Course Objectives:

1. To enable the students to understand the principles of Molecular marker techniques and construction of genetic and physical maps with emphasis on plants.
2. To enable students to understand Plant genome organization, Whole genome sequencing strategies, and structural and functional annotation.
3. To enable the students to understand principles and methods of Transcriptome and Proteome analysis.
4. To enable the students to understand mechanisms of genome evolution and construction of Phylogenetic trees; the students to understand key features of Arbidopsis and rice genomes and applications of genome projects.

Unit-I

Structural Genomics: Isolation and purification of plant DNA, Generation of BAC and YAC libraries. DNA marker systems and construction of molecular genetic maps and Physical maps. DNA sequencing methods:Maxim & Gilbert, Sanger and New generation sequencing methods. Whole genome sequence alignment strategies: clone by clone and shot gum sequencing. Contig assembly strategies and finished sequences. DNA sequence data bases.

Unit-II

Genes and Transcriptomics: Genome annotation, in silico methods for gene identification and prediction of function: Experimental techniques for functional identification of genes: Insertional mutagenesis, Targeted induced local lesions (TILLING), RNA interference (RNAi) and gene knockout.

Functional genomics: Transcript profiling – DNA Micro array, Serial analysis of gene expression (SAGE) and Massively parallel signature sequencing (MPSS)

Unit-III

Proteomics: Protein sample preparation and separation techniques - 2D-analysis, Multidimensional liquid chromatography. Characterization of proteins by Mass spectrometry, protein sequencing, Protein structures, Protein data bases and In silico characterization, protein micro arrays. Methods for

protein-protein interaction analysis: yeast hybrid systems, phage display and protein complexes.

Unit-IV

Comparative genomics and Applications: DNA/protein sequence homologies - analogy, orthology and paralogy. Gene duplication and divergence, Evolution of novel genes and proteins, DNA quantities and non- coding sequences in plant genome evolution, Molecular clocks, Molecular phylogenetics and construction of phylogenetic trees and their applications.

Salient features of Arbidopsis and rice genome projects, Applications of plant genomics in agriculture and industry.

Course Outcomes

1. Explain the principles of DNA marker systems and methods for the construction of Molecular genetic and Physical maps, and their applications
2. Describe the organization of plant genomes and explain principles of DNA sequencing methods and whole genome sequence assembly strategies; Describe the organization of DNA Databases, and structural and functional annotation of finished genomes
3. Explain the principles and describe methods for Transcriptome and proteome analysis; Explain the mechanisms which underlie evolution of genomes/genes/proteins at the molecular level and Construct of Phylogenetic tree.
4. Describe Key features of Arabidopsis and rice genomes, and applications of plant genome projects result

Suggested Readings : BOT - 402.

1. Genomes, T. A. Brown (3rd Ed.), John Wiley Publications.
2. Principle of Genome analysis and Genomics, 7th edition, Primrose, S. B. Blockwilley.
3. Brown, T.A.2001. gene cloning and DNA Analysis- An introduction (5th Ed.), Blackwell Scientific Publications, Oxford, U.K.
4. Plant functional genomics, Daria Leister.
5. Gustafson, J. P. 2000. Genomes, Kluwer Academic plenum publishers, New York, USA.
6. Jolls, O. and Jornvall, H. (eds.) 2000. Proteomics in Functional Genomics. Birkhauser Verlag, Basel, Switzerland.
7. Introduction to Bioinformmatics, 2001 by T. A. Attwood & D. J. Parrys-smith, Pearson Education Asian Publishers.
8. Bioinformatics: methods and Protocols, Edited by Stephen Misener and Stephen A. Krawetz. 2000. Methods in Molecular Biology Series, Human Press.

9. Bioinformatics: A Practical guide to the analysis of genes and proteins 1998, Edited by A. D. Baxevanis and B.F.

10. Computer Applications in Biotechnology, 1998, by T. Yosida

11. Aurther, M. Lesk. 2002. Introduction to Bioinformatics. Oxford University Press, USA.

12. Durbin, R. Eddy S. R. Krogh, A., Mitchison, G. 1998. Biological Sequence Analysis: Probabilistic models of Proteins and Nucleic acids. Amazon Publications.

13. Gustafson, J. P. 2000. Genomes, Kluwer Academic plenum publishers, New York, USA.

14. Henry, R. J. 1997. Practical application of Plant Molecular Biology. Chapman & Hall, London. U.K.

15. Jolls, O. and Jornvall, H. (eds.) 2000. Proteomics in Functional Genomics. Birkhauser Verlag, Basel, Switzerland.

16. Mount, D., 2004. Bioinformatics: Sequence and Genome Analysis. (2nd Ed.) Cold Spring Harbor Laboratory Press.

Suggested Laboratory Exercises related to BOT- 401: Core practical -405p .

1) Isolation of genomic DNA; Purification and Quantification by Spectrophotometry.
2) Preparation of DNA denaturation curve
3) Determination of genome size
4) Restriction digestion of the Plant Genomic DNA.
5) Agarose Gel Electrophoresis of DNA fragments and size determination
6) PCR amplification of DNA. and RAPD analysis.
7) Isolation of plant RNA and Quantification by Spectrophotometry.
8) Solubilization and Precipitation of proteins.
9) Estimation of protein.
10) Determination of Isoelectric Point of proteins
11) Separation of proteins by SDS-PAGE and size determination
12) Problems related to genomics, proteomics and molecular evolution

Suggested Readings for Laboratory exercises BOT- 401

1. Gelvin, S.B. and Schilperoort, R. A. (Eds). 1994. Plant Molecular biology Manual, (2nd Ed.), Kluwer Academic Publishers, Dordrecht, The Netherlands.
2. Glover, D.M. and Hames, B.D. (Eds.). 1995. DNA cloning 1: A Practical approach; Core Techniques, (2nd Ed.), PAS IRL Press, Oxford.
3. Mickloss, D. A. and Freyer, G. A. 1990. DNA science. A First Course in Recombinant Technology. Cold Spring Harbour Laboratory Press, New York, USA.
4. Sambrook, J., Fritsch, EF & Maniatis, T. 1989. Molecular Cloning, A Laboratory Manual. (2nd Ed.). Cold Spring Harbor Laboratory Press, New York.
5. Schuler, M.A. & Zielinski, R.E. 1989. Methods in Plant Molecular Biology. Academic Press Inc., San Diego, CA, USA.
6. Frank H. Stephenson.2008: Caliculations in Molecular Biology and Biotechnology-A Guide to Mathematics in the Laboratory, Academic Press.

PAPER – I (BOT-401) : GENOMICS AND PROTEOMICS

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	-	3	3	3	3	3	3	3	3	2	3
CO_2	2	3	-	2	3	2	3	1	2	3	3	2
CO_3	3	2	1	-	2	1	1	2	1	1	3	3
CO_4	2	1	-	-	1	1	2	1	2	2	2	2

BOT-402 : PLANT BIOTECHNOLOGY

Course Objectives

1. The course would provide the students with understanding of Principles and Techniques of Plant Tissue Culture.
2. Know the concept and importance of genetically modified crops.
3. Understand the molecular mechanism of r-DNA technology.
4. To develop the skill on Cell Culture Technique.

UNIT I

Basic concept of regeneration: Concept of Cellular Totipotency and Differentiation. Fundamental aspects of Morphogenesis. Organogenesis-direct & indirect. Role of plant growth regulators and factors governing *in vitro* behavior of cultures.

Propagation and variation

Modes, stages and Application of Micropropagation. Production of Pathogen free plants and their application.. Somatic embryogenesis, role of physical and chemical factors in the induction; synthetic seeds-production and uses. Origin, Molecular basis and application of Somaclonal variation.

UNIT II

Applications of Plant Tissue culture: Production of Haploids and its significance in Crop improvement. Secondary metabolite production through Cell and Organ cultures-Hairy roots. Shikonin production. Cryo preservation, methods and *in vitro* conservation of Germplasm.

Somatic hybridization: Protoplast isolation, Fusion and culture, Hybrid selection and characterization of hybrids. Symmetric, Asymmetric hybrids and Cybrids, significant achievements and limitations of Protoplast research, production of test tube plants.

UNIT III

Principles of Gene Cloning and Analysis: Enzymology of rDNA technology**.** Cloning vectors-Plasmids, Phages, Cosmids, Phagemids and strategies of cloning, expression vectors. Bacterial

transformation and transfection. Genomic and c DNA libraries construction. Selection and analysis of cloned genes and its products.

UNIT IV

Genetic engineering of plants: Plant Gene Isolation-Transposons and T-DNA tagging and map based cloning. Ti and Ri plasmids-mechanism of T- DNA transfer; Viral and other vectors. Physical methods of gene transfer; PEG mediated gene transfer, Electroporation, Biolistics, Micro injection and other techniques. Chloroplast transformation, Production and application of transgenic plants (Drought tolerance, Golden rice, Edible Vaccines). Regulations of release and concerns of genetically modified crops; intellectual property rights.

Course Outcomes

1. Develop skill to produce tissue culture plants of economic importance.
2. Acquire knowledge on production of transgenic plants.
3. Learn the molecular technique for Crop improvement.
4. Able to establish Cell Culture systems for production of Secondary Metabolites.

Suggested Books: BOT-401

1. Bhojvani, S.S. and Razdan, M.K. 1996. Plant tissue Culture: theory and Practice. Elsevier, New York, USA.
2. Bhojvani, S.S. 1990. Plant Tissue Culture: Applications and Limitations. Elsevier, New York, USA.
3. George, E.F., Vol-I (1986) and Vol II (1993) Plant propagation by Tissue culture.
4. Kartha, K.K. 1985. Cryopreservation of plant cells and organs. CRC Press, Boac Raton, Florida, USA.
5. Razdan, M.K. 1993. An Introduction to Plant Tissue culture. (2nd Ed.). oxford IBH, New Delhi.
6. Reinert, J. Bajaj, YPS (Eds.). 1977. Applied and fundamental aspects of plant cell, tissue, and organ culture. Springer-Verlag, New York.
7. Vasil, I.K. and Thorpe, T.A. 1994. Plant cell and Tissue culture, Kluner Academic Publishers, The Netherlands.
8. Altman, A. 2001. Gene cloning and DNA Analysis- An introduction. (5th Ed.). Blackwell Scientific Publication, Oxford, U.K.

9. Brown, T.A. 1999. Genomes. John Wiley & Sons (Asia) Pvt. Ltd., Singapore.
10. Chrispeels, M.J. and Sadava, D.E. 1994. Plants, Genes and Agriculture. Jones and Bartlett Publishers, Boston, USA.
11. Copping, L.G. and Rodgers, P. (Eds.). 1989. Biotechnology and its application to Agriculture. British Crop Protection Council.
12. Glazer, A.N. and Nikaido, H. 1995. Microbial Biotechnology, W.H. Freeman & Company, New York, USA.
13. Glick, B.R. & Pasternak, J.F. 1994. Molecular Biotechnology. Principles and applications of Recombinant DNA. Panima Publishing Corporation, New Delhi.
14. Old, R.W. and Primose, S.B.1989. Principle of Gene Manipulation Blackwell Scientific Publications, Oxford, UK.
15. Primrose,S.B. & Twyman, R.M. 2003.Principles of Genomic analysis and Genomics. (7^{th}Ed.) Blackewll Science.
16. Sandhya Mitra. 1996. Genetic Engineering: principles and Practice. Macmillan India Ltd.
17. Santharam, S. and Montgomery, J.F. 1999. Biotechnology, Biosafety, and Bio0diversity, oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
18. Slater, A. Scott, N. W. and Fowler, M.R. 2003. Plant Biotechnology. The Genetic Manipulation of Plants. Oxford University Press.
19. Winnacker, E.L. 2003. From Genes to Clones- Introduction to Gene Technology. Panima Publishing Corporation, New Delhi.

PRACTICAL-BOT-CP-402 (PLANT BIOTECHNOLOGY)

1. Suggested Laboratory Exercises
2. Preparation of Stock solutions and Media.
3. Production of Aseptic seedlings.
4. Isolation and culture of embryos of Maize, Crotalaria, Cyamopsis etc.
5. Induction of callus and histological/cytological studies of callus.
6. Direct organogenesis and somatic embryogenesis from Tobacco explants.
7. Androgenesis and production of haploids from *Datura flower* buds.
8. Establishment of Cell cultures and determination of plating efficiency.
9. Enzymatic isolation and culture of protoplasts.
10. Fusion of protoplasts using PEG.
11. Preparation of synthetic seeds using sodium alginate. Estimation of IAA using Salkowski reagent.
12. Isolation of Genomic DNA.
13. Agarose Gel Electrophoresis of DNA and Southern Blotting.
14. Isolation of Yeast RNA and Quantification by Spectrophotometry.
15. Isolation of Plasmid DNA.
16. Restriction digestion of the plasmid DNA.
17. Ligation of DNA fragments.
18. Bacterial Transformation and Identification of Transformants.
19. Co-cultivation of the plant material (e.g. leaf discs) with *Agrobacterium* and study of GUS activity histochemically.
20. Problems related to R-DNA technology.

Suggested Books for Laboratory Exercises

1. Gamborg, O. L. & Philips, G.C. (Eds.) 1995. Plant cell, Tissue and Organ culture. Fundamental methods. Narosa publishing house, New Delhi.
2. Hall, R.D. (Ed.) 1999. Plant cell culture protocols, Humana press aInl., New Jersey, USA.
3. Reinert, J. and Yoeman, M.M. 1982. Plant cell and Tissue culture: A laboratory manual. Springer-Verlag.
4. Mascarenhas, A.F. 1991. Hand book of plant tissue culture, ICAR publications, New Delhi.
5. Smith, R.H.2000. Plant tissue culture: techniques and Experiments. Academic press, New York.
6. Gelvin, S.B. and Schilperoort, R.A. (Eds.). 1994. Plant molecular biology manual, (2nd Ed.), Kluwer Academic Publishers, Dordrecht, The Netherlands.
7. Glover, D.M. and Hames, B.D. (Eds.) 1995. DNA cloning 1: A practical approach; Core techniques, (2nd Ed.), PAS IRL Press, oxford.
8. Mickloss, D.A. and Freyer, G.A. 1990. DNA science. A first course in Recombinant Technology. Cold spring harbor laboratory press, New York.
9. Frank, H. Stephenson. 2008: calculations in molecular biology and Biotechnology-A guide to mathematics in the laboratory, Academic press.

PAPER – II (BOT-402) : PLANT BIOTECHNOLOGY

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	1	2	2	3	--	-	-	-	1	1	-
CO_2	3	3	1	1	-	-	-	2	-	1	2	3
CO_3	3	-	3	3	-	2	2	2	-	-	-	-
CO_4	3	1	`1	1	1	-	-	1	1	-	-	2

Generic/Internal Elective

BOT-403A PHYTOMEDICINE (IE)

Course Objectives

1. Study the interactions of people and plants ; Learn plant names, both scientific and local name ; Learn the structures, life cycles, and unique characteristics of the tribals.
2. Acquire an understanding of the importance of plants in our daily lives.
3. Identify local ethnobotanically useful species ; Patterns of human plant selection for food, medicine, poison, ritual and religion.
4. Physiology and biochemistry of useful plants ; Qualitative chemical analysis ; Intellectual property rights protocol.

UNIT I

Ethnobotany: Scope and importance, inter disciplinary approaches in Ethnobotany, tribals of Andhra Pradesh and their traditional usage of plants in medicine, food and other purposes. Applications of Ethnobotany. Study of medicinal plants from the following groups: Gymnosperms, Angiosperms (Ranunculaceac, Leguminosae, Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Liliaceae and Zingeberaceae, etc)

UNIT II

Cultivation, Multiplication, Collection, Processing and Marketing: Macro and Micro Propagation and cultivation of medicinal plants; Multiplication of Medicinal Plants and Production of Specific Biologically Active Molecules through Tissue culture; Methods of collection, Processing, Storage, Market Potential and Trade of Plant Medicines. Adoption of GATT and TRIP, Intellectual Patent (property) Rights (IPR) & Intellectual Property Protection (IPP) for the plant medicines.

UNIT III

Phytomedicine: Systems of medicine, brief history, origin and scope of plant medicines, identification of locally available medicinal plants. Vitamins, Various secondary metabolites and Biosynthesis; Adulteration and Alternations of the Drugs. Macroscopy and microscopy of medicinally useful plant parts such as leaves, stems, underground parts, flowers, fruits and seeds (Senna, Datura, Cinnamon, Cinchona, Ginger, Clove, Fennel, Nux-vomica & Ipecacuanha).

UNIT IV

Formulations, Diagnostic features and Biological activity of Plant Medicines: Formulations and dosage forms of plant medicines; Pharmacology and Pharmacognosy; Study of the important Diagnostic Features of Active Constituents, Quality, Purity; and Pharmaceutical uses of important Plant Medicines. Biological Active Principles of Established Herbal Medicines. Herbal Cosmetics and Dietetics.

Course Outcome

1. Definition, history and scope of ethnomedicine ; Difference between folk and traditional medicines.
2. Use of some routinely used Ayurvedic drugs and formulations.
3. About drug adulteration and methods of detecting the same.
4. Phytochemical and biological screening of herbal drugs ; Preparation of some herbal formulations mentioned in the syllabus.

Suggested Books:

1. Jain, S.K. 1968. Medicinal Plants National Book Trust of India, New Delhi.
2. Jain, S.K. 1981. Glimpses of Indian Ethnobotany, Oxford and IBH Publishing Co., New Delhi.
3. Rao, P.S. Venkaiah, K. & Padmaja, R. 1999. Field guide on Medicinal Plants. A. P. Forest Department.
4. Sinha, R.K. 1997. Global Biodiversity, INA Shree Publications, Jaipur, India.
5. Trivedi, P.C. 2002. Ethnobotany, Avishkar Publishers, Jaipur, India.
6. Arber, A. 2008. Herbal Plants & Drugs. Agro Science Book Centre, New Delhi.
7. Cutler. S.J. & Cutler. H.G. 1999. Biologically Active Natural Products – Pharmaceuticals, Agro Science Book Centre, New Delhi.
8. Harborne, J.B. 1948. Phytochemical methods. Chapman and Hall, London.
9. Kokate, C.K. Purohit, A.P. Gauchely, S.B. 1990. Pharmacognosy, (Narial Prakashan).
10. Khare, C.P. 2000. Indian herbal therapies. Delhi Book Co., Connaught, Circle, New Delhi.
11. Mukherjee, B. 1998.The Wealth of Indian Alchemy & its Medicinal Uses.
12. Nadkarni, K. M.2004. Indian plants & Drugs with their Medicinal Properties. Agro Sci. Publ. Centre, New Delhi.
13. Panda, H. 2003.Medicinal Herbs & Their Uses with Formulations. Daya Publi. House, New Delhi.
14. Sharma, R. 2003. Medicinal plants of India – An Encyclopedia

15. Trease, G.E. and Evans, W.C. 1983. Pharmacognosy. (12th Ed.), Bailine, London.

16. Wallis, T.E. 1999. Text Book of Pharmacognosy, (5th Ed.) CBS Publishers & Distributions, New Delhi.

PRACTICAL BOT- 403C : PHYTOMEDICINE

Laboratory Exercises related to BOT- 304C

1. Visits to tribal habitats and field Study of medicinal plants used by tribal people.
2. Recording medicinal practices and herbal formulations of tribal medicine.
3. Collection and identification of herbal medicinal plants. Preservation and submission of herbal medicinal samples.
4. Preparation and submission of herbal practice centre tour report. Development of medicinal plant nurseries in botanical garden.
5. Identification of important Medicinal plants and study of Morphological features of the Medicinal plant parts.
6. Field trip to study and identify locally occurring Medicinal plants.
7. Practical Methods of Cultivation, Propagation, Conservation and Protection of important Medicinal plants to develop familiarity.
8. Micro-propagation of Medicinal plants and Production of Callus from different Explants for Specific Biologically active Ingredients.
9. Practical demonstration of collection, processing and storage of Plant Medicines.
10. Microscopic study of locally available Medicinal plant parts such as leaves, stems, underground parts, flowers, fruits and seeds (Senna, Datura, Cinnamon, Cinchona,. Ginger, Clove, Fennel, Nux-vomica & Ipecauanha).
11. Demonstration of drug adulteration, identification of locally available Plant Medicines.
12. Antibiotic sensitive test of crude drugs.
13. Demonstration of drug Formulation and Herbal cosmetics.
14. Organolepitc examination and physical and chemical properties.

Suggested Books for Laboratory Experiments

1. Jain, S.K. 1968. Medicinal plants. National book trust of India, New Delhi.
2. Rao, P.S. Venkaiah, K. & Padmaja, R. 1999. Field guide on medicinal plants. A. P. Forest department.
3. Trivedi, P.C. 2002. Ethnobotany. Avishkar Publishers, Jaipur, India.
4. Document files creation using MS word. Creating document style.

5. Internet – E-mail and mail attachment i. Downloading webpage; Saving a web page; Printing the web page; Document; ii. Search engine; Image
6. Visit to genebank database; NCBI; EMBL
7. Visit to protein database; Swis prot; PDb
8. Use of literature database i. Virtual library; Agricola; Pub med
9. Use of similarity search tools: NBLAST; PBLAST

Generic / Internal Elective

PAPER – III (BOT-403A) : PHYTOMEDICINE

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	2	2	3	-	3	3	3	2	3	1	3
CO_2	3	1	-	-	-	2	1	2	-	1	2	1
CO_3	3	1	-	2	3	3	3	1	-	-	-	-
CO_4	3	-	1	-	1	1	2	1	1	-	-	-

Generic/Internal Elective

BOT-403B : HORTICULTURE (IE)

Course Objectives

1. To impart basic knowledge and develop skills about propagating different types of plants by seed, cuttings, budding and grafting, separation, division, layering as well as micro-propagation.
2. Deals with soil science and fertility management for horticultural crops.
3. Study of Plant Propagation.
4. Deals with seed production technology of horticultural crops.

UNIT I

Introduction, Scope and importance of Horticulture, Branches of Horticulture; Soil types and preparation and treatment; Outdoor garden types and arrangements annuals, biennials. Perennials with common examples and culture: influence of environment, training, pruning and transplanting.

UNIT II

Scope and Importance of Plant Propagation, Role of Nurseries in Horticulture Development, Types of Plant Propagation Nurseries, Physical and Financial Resources for Nursery, Mother Plants: Selection and Maintenance.

Sexual and Asexual Propagation, Seed Production and Seed Propagation, Vegetative Propagation, Cutting, Budding, Layering and Grafting in Horticultural Plants, Micro-Propagation and Hardening of Nursery Plants

UNIT III

Sanitation, Drainage; Training and Pruning in Nursery, Potting, Re-potting, De-potting and Mulching in Nursery; Plant Growth Regulators in Nursery: Types, Role, Methods of applications and preparation; Packing and Transport of Nursery Plants, Customer Services in Nursery Plants.

UNIT IV

Selection and Collection of Regional Ornamental Plants; Regional Demand and Supply Situation in Ornamental Plants; Selection and Preparation of Library Plants; Location Specific Library Plant Arrangement; Bonsai: History, styles, plant selection, pruning, nipping, wiring and maintenance.

Course Outcomes

1. Demonstrate a fundamental understanding of plant identification, selection, use and maintenance of plant material best suited for conventional and sustainable landscapes ; Demonstrate a working knowledge and appreciation of the diversity of plants, their culture and utilization.
2. To impart basic knowledge and develop skills about propagating different types of plants by seed, cuttings, budding and grafting, separation, division, layering as well as micro-propagation; Recognize and apply ethical professional practices to horticultural Crops.
3. Apply horticultural principles to the successful growth and production of horticultural plants ; Demonstrate technical competence in their concentration by identifying the majority of globally important food, and/or ornamental plants and demonstrating applications of theoretical sciences to their production, maintenance and post-harvest handling.
4. Identify and prescribe sustainable options in horticulture that benefit the environment while maintaining productivity and economic viability ; Bonsai making and maintenance.

Suggested Books:

1. Al David – A complete guide to gardens.
2. Vishnu Swarup – Garden flowers
3. Readers digest – Complete library of gardens (3 volumes) Kissan world.

PROJECT WORK – Dissertation, Viva

External Elective/Open Elective

BOT-404A: NANOBIOTECHNOLOGY (EE)

Course Objectives

1. To inculcate the awareness in the production of nano scale devices.
2. To create interest in the utilization of nano devices in medicinal and agricultural field.
3. To study the nano biofertilizers and nanobiopesticides and their applications.
4. To know the role of nanoparticles in the field of Medicines and Engineering.

UNIT I

Nanotechnology: Concepts, definition, origin, Milostones and opportunities; Preparation – Chemical synthesis (wet, Mechanical, Form-in place and Gas phase) Biological synthesis (Green and Microbial synthesis). Diversity of Metal nanoparticles (Gold, Silver, Nickle, Silicon, Cobalt, Calcium, Iron, Magnesium); Characterization; Tools and techniques (UV-Visible spectra; SEM; EDAX, TEM, AFM, FTIR AND MNR) Lithographing techniques (Photo, Electron beam and Dip-Pen methods).

UNIT II

Nanotechnology and Biometerial sciences: Generation of Bio-metals (I, II, III) General Characters; Micro and Nano fabrications; Scientific applications: nanomaterials , Nanostructures and Nano-tools (Nano-scales, dendrimers, Quantum dots) and its applications, Molecular manufacturing: Electronic, information and communication technology. Nano Biotechnology & health**:** Nanomaterial in the body (Routes of entry intestinal tract, Skin and Lungs.

UNIT III

Nano Biotechnology and Nanomedicine: Biomedical applications**;** Drug delivery; importable devices; Biomedical sensors and Biosensors; Quantum dot technology in cancer diagnosis and treatment; DNA based Nano materials; Nanoparticle probes for Bioimaging; Novel drug delivery systems; Micropheres and microcapsules; polymer therapeutics; dendrimeers; Hydrogels and Orthopedic biomaterials. Environmental Impacts: Toxic mechanisms integrated concept of risk Assessment of Nanoparticles.

UNIT IV

Nano Biotechnology in Agriculture: Nano Bio-fertilizers ($Ca^{2+,}$ $Mg^{2+,}$ Fe^{2+} & Zn Nanoparticles) Nano Pesticides; control of plant diseases; fungal diseases (Blast diseases of Rice; Smut of maize; Leaf spots of groundnut; Late blight of potato; Downy mildew of grapes); Bacterial diseses (Citrus caker, Leaf blight of rice; Blight of Bean; Spot of tomato) and Viral diseases (Tungro of rice; Sugarcane Mosoic; Yellow leaf curl of tomato; Bentch top of banana; Mosoic of ground nut) Nano boosters and applications in seed dormancy, Germination for plant growth and developments.

Course Outcomes

1. The students are able to know the production of nanoscale devices through different ways like physical, chemical and biological. Hence, he can choose the non toxic way of nano device synthesis.
2. After getting knowledge in the best way of preparation of nano devices in a cost effective and environmentally benign manner, he can utilize his knowledge in medicine as well as in improvement of Crop production by using less pesticides and less fertilizers.
3. They gain knowledge in the preparation of bio-agricultural products.
4. They can learn the applications of nano material in Medicinal and Engineering fields.

Open Elective

PAPER – IV (BOT-404A) : NANOBIOTECHNOLOGY

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	2	3	3	2	-	-	3	2	-	2	3
CO_2	3	1	2	1	1	-	3	2	2	-	-	2
CO_3	3	-	-	2	3	2	1	1	-	3	2	1
CO_4	3	-	1	-	1	2	-	-	-	2	1	-

External Elective/Open Elective

BOT-404B : ETHNOBOTANY AND PLANT DRUGS (EE)

Course Objectives

1. Study the interactions of people and plants ; Learn plant names, both scientific and local name ; Learn the structures, life cycles, and unique characteristics of the tribals.
2. Acquire an understanding of the importance of plants in our daily lives.
3. Identify local ethnobotanically useful species ; Patterns of human plant selection for food, medicine, poison, ritual and religion.
4. Physiology and biochemistry of useful plants ; Qualitative chemical analysis ; Intellectual property rights protocol.

UNIT I

Ethnobotany: Scope and importance, inter disciplinary approaches in Ethnobotany, tribals of Andhra Pradesh and their traditional usage of plants in medicine, food and other purposes. Applications of Ethnobotany. Study of medicinal plants from the following groups: Gymnosperms, Angiosperms (Ranunculaceac, Leguminosae, Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Liliaceae and Zingeberaceae, etc)

UNIT II

Cultivation, Multiplication, Collection, Processing and Marketing: Macro and Micro Propagation and cultivation of medicinal plants; Multiplication of Medicinal Plants and Production of Specific Biologically Active Molecules through Tissue culture; Methods of collection, Processing, Storage, Market Potential and Trade of Plant Medicines. Adoption of GATT and TRIP, Intellectual Patent (property) Rights (IPR) & Intellectual Property Protection (IPP) for the plant medicines.

UNIT III

Phytomedicine: Systems of medicine, brief history, origin and scope of plant medicines, identification of locally available medicinal plants. Vitamins, Various secondary metabolites and Biosynthesis; Adulteration and Alternations of the Drugs. Macroscopy and microscopy of medicinally useful plant parts

such as leaves, stems, underground parts, flowers, fruits and seeds (Senna, Datura, Cinnamon, Cinchona, Ginger, Clove, Fennel, Nux-vomica & Ipecacuanha).

UNIT IV

Formulations, Diagnostic features and Biological activity of Plant Medicines: Formulations and dosage forms of plant medicines; Pharmacology and Pharmacognosy; Study of the important Diagnostic Features of Active Constituents, Quality, Purity; and Pharmaceutical uses of important Plant Medicines. Biological Active Principles of Established Herbal Medicines. Herbal Cosmetics and Dietetics.

Course Outcomes

1. Definition, history and scope of ethnomedicine ; Difference between folk and traditional medicines.
2. Use of some routinely used Ayurvedic drugs and formulations.
3. About drug adulteration and methods of detecting the same.
4. Phytochemical and biological screening of herbal drugs ; Preparation of some herbal formulations mentioned in the syllabus.

Suggested Books:

1. Jain, S.K. 1968. Medicinal Plants National Book Trust of India, New Delhi.
2. Jain, S.K. 1981. Glimpses of Indian Ethnobotany, Oxford and IBH Publishing Co., New Delhi.
3. Rao, P.S. Venkaiah, K. & Padmaja, R. 1999. Field guide on Medicinal Plants. A. P. Forest Department.
4. Sinha, R.K. 1997. Global Biodiversity, INA Shree Publications, Jaipur, India.
5. Trivedi, P.C. 2002. Ethnobotany, Avishkar Publishers, Jaipur, India.
6. Arber, A. 2008. Herbal Plants & Drugs. Agro Science Book Centre, New Delhi.
7. Cutler. S.J. & Cutler. H.G. 1999. Biologically Active Natural Products – Pharmaceuticals, Agro Science Book Centre, New Delhi.
8. Harborne, J.B. 1948. Phytochemical methods. Chapman and Hall, London.
9. Kokate, C.K. Purohit, A.P. Gauchely, S.B. 1990. Pharmacognosy, (Narial Prakashan).
10. Khare, C.P. 2000. Indian herbal therapies. Delhi Book Co., Connaught, Circle, New Delhi.
11. Mukherjee, B. 1998.The Wealth of Indian Alchemy & its Medicinal Uses.
12. Nadkarni, K. M.2004. Indian plants & Drugs with their Medicinal Properties. Agro Sci. Publ.

Centre, New Delhi.

13. Panda, H. 2003.Medicinal Herbs & Their Uses with Formulations. Daya Publi. House, New Delhi.
14. Sharma, R. 2003. Medicinal plants of India – An Encyclopedia
15. Trease, G.E. and Evans, W.C. 1983. Pharmacognosy. (12th Ed.), Bailine, London.
16. Wallis, T.E. 1999. Text Book of Pharmacognosy, (5th Ed.) CBS Publishers & Distributions, New Delhi.

Open Elective

PAPER – IV (BOT-404B) : ETHNOBOTANY AND PLANT DRUGS

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	3	2	2	3	-	3	3	3	2	3	1	3
CO_2	3	1	-	-	-	2	1	2	-	1	2	1
CO_3	3	1	-	2	3	3	3	1	-	-	-	-
CO_4	3	-	1	-	1	1	2	1	1	-	-	-

External Elective/Open Elective

BOT-404C : FOREST MANAGEMENT (EE)

Course Objectives

1. To inculcate the awareness to students related to forest and its importance.

2. To create the interest among students regading regeneration of forest plants.

3. To aware the economic importance of forest.

4. To train in the methods of preservation of forest for future generation.

UNIT – I

Florestic regions - Forest types of India – Different agroclimatic zones of India – Geographical distribution of Trees – Native and Exotic trees, Endemism and Endemic Trees – Impact of Global Warming and Climatic Change on Forest Plants – Forest Degradation – Natural calamities affects the forst and bioportified trees – Biovitamins of forest, Medicinal trees.

UNIT – II

Forest Biometry – Infuence of Forest on Environment – Climate, Edaphic, Physiographic and Biotic factors – Regeneration of Forest Plants; Concept and Objectives of Regeneration – Methods of Regeneration – Advantages and Disadvantages – Preparation, Maintenance and Management of site – Factors affecting Regeneration – Natural and Artificial Regeneration – Forest Plantation

UNIT – III

Timber Harvesting – Production and Productivity of Forests – Non Wood Forest Products – Harvesting, Post Harvesting, Handling, Marketing of Agroforestry Products – Timber Yielding Trees – Apiculture - Technology used to save Forests (NDRS) – Watershed Management and Improvement of Water availiability – Forest Research Institutes and their objectives.

UNIT – IV

Forest Conservation and Protection; and Laws – Definition and Concept of Conservation – *In situ* and *Ex situ* Conservation – National Forest Policy – Forest Conservation Rules and Amendments – Quarantine Laws –

Forest Resource Exchange – Forest Fires – Prevention and Management of Social Forestry – Diseases for Forest and Controlled Measures.

Course Outcomes

1. By studying this course student get awareness regarding the forest types and distribution and natural calamities affect the forest.
2. After completion of this course, student knows how to multiply the forest through regeneration of forest trees.
3. Student well aware related to forest products, produced by the forest, hence he/she also know how to collect the products to improve economic status.
4. Once student got the knowledge on forest economy, he try to conserve the forest by learning the methods and aquaintain the information by preventing diseases to the forest from this course.

Suggested Books

1. Forest Management 2015 by Davis L.S, CBS Publishers & Distributors.
2. The Hidden Magic of Forest – Rs.849-00
3. Hand Book on Forest Biology, Rs.669-00
4. Indian Forest and Forestry by Rohit Balyani 2011, Pointer Publishers.
5. Forest Management by C.K. Sreedharam, Rs.872—00
6. A Text Book on Economic Botany by AVSS Sambamurthy, N.S.Subramanyam (1989) published by Wiley Eastern Limited, New Delhi – 2
7. Forest Trees of South India (2020) by S.G. Neginhal Notion Press Publishers.
8. The Hidden Life of the Trees: What they feel and how they communicate by Petr Woilenben and Pradip Krishen (2016) Penguin Random House India Pvt. Ltd.

Open Elective

PAPER – IV (BOT-404C) : FOREST MANAGEMENT

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Leering
CO_1	2	-	-	-	-	2	3	2	-	3	-	2
CO_2	2	-	-	2	2	2	3	2	-	2	-	2
CO_3	2	-	-	2	2	2	3	2	-	2	-	2
CO_4	2	-	-	2	2	2	3	2	-	2	-	2

DEPARTMENT OF BIOTECHNOLOGY

S.V.U. COLLEGE OF SCIENCES

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Course

M.Sc. BIOTECHNOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS)

THE ACADEMIC YEAR 2023-2024

About the Department

The Department of Biotechnology was established in 1995 as a research and teaching facility under the School of Biological and Earth Sciences and is currently under the College of Sciences. Its goal has been to train manpower in the area of Biotechnology to cater the needs of the country. The department provides rich educational experience to the students that include rigorous theoretical courses and practicals to understand the concepts of biotechnology. The interdisciplinary research programme envisages performing research of national and international prominence.

Vision:

- The vision is to become a leader and Centre of excellence in technology based training and innovative research in the fields of Plant, Agriculture, Animal and Medical Biotechnology.

Mission:

- The Department's academic and research programmes offer the students and research scholars value based, technology oriented education in a trusting and caring environment. The faculty strive to equip the students with technical expertise and knowledge to keep pace with the changes in technology and meet the new challenges in Life Sciences.

No.	Programme Specific Outcomes (PSOs)
PSO1	Acquire knowledge on the fundamentals of biotechnology for sound and solid base which enables them to understand the emerging and advanced biotechnology concepts in life sciences
PSO2	Acquire knowledge in domain of biotechnology enabling their applications in industry and research

Programme Objectives

- To gain necessary knowledge and develop specialized skills in the different areas of Biotechnology.
- To think critically and creatively about the use of biotechnology to address local and global problems.
- To implement the scientific skills for development of industrial applications and entrepreneurship

Programme Outcomes

Upon completion of the M.Sc. Biotechnology programme, the candidate should be able to:

No.	Programme Outcomes (POS)
PO1	Demonstrate knowledge for in-depth analytical and critical thinking to identify, formulate and solve the issues related to Biotechnology Industry, Pharma industry, Medical or hospital related organizations, Regulatory Agencies & Academia.
PO2	Develop an ability to solve, analyze and interpret data generated from experiments done in project work or practical courses in reaching conclusions.
PO3	Apply the knowledge based on research and other related methods to investigate the problem and provide valid conclusions
PO4	Design and develop methods to measure experimental data by following ethical principles
PO5	Demonstrate skills to use modern analytical tools/ software/ equipments to design & develop experiments and analyze and solve problems in various courses of biotechnology.
PO6	Appreciate and execute their professional roles in society as biotechnology professionals, employers and employees in various industries, regulators, researchers, educators and managers.
PO7	Augment and demonstrate the knowledge acquired to address environmental issues and evolve methods for sustainable development

PO8	Adopt code of ethics in professional and social context and demonstrate exemplary professional, ethical and legal behaviours in decision making.
PO9	Execute responsibilities efficiently in solving different issues as an individual/ member of team/ team leader
PO10	Apply written and oral communication skills to communicate effectively in healthcare, industry, academia and research
PO11	Acquire basic and advance skills in in various fields of biotechnology for self-employment and entrepreneurship
PO12	Develop skills, attitude and values required for self-directed, lifelong learning and professional development.

Programme Educational Objectives (PEOs)

- To make our students competent in the field of biotechnology and its allied areas.
- To inculcate the capability to work as entrepreneurs and techno managers with strong ethics and communication skills.
- To equip the students to pursue higher education and research in reputed institutes at national and international level.
- To develop a working knowledge of biotechnology product and processes.

SRI VENKATESWARA UNIVERSITY

SVU COLLEGE OF SCIENCES, TIRUPATI

M.Sc. Biotechnology programme

Amended as per NEP – 2020

(With effect from the batch admitted in the academic year 2021-22)

CHOICE BASED CREDIT SYSTEM (CBCS)

Semester –I

S. No.	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	BTH 101	Structure and Functions of Biomolecules	6	4	20	80	100
2	Core	BTH 102	Advanced Tools and Techniques	6	4	20	80	100
3	Compulsory Foundation	BTH 103a	Microbiology and diseases	6	4	20	80	100
		BTH 103b	Microbial physiology & Genetics					
4	Elective Foundation	BTH 104a	Cell biology and genetics	6	4	20	80	100
		BTH 104b	Molecular Genetics					
5	Practical -I	BTH 105P	Bio-molecules and Advanced Tools and Techniques	6	4	--	--	100
6	Practical - II	BTH 106P	Microbiology and Cell Biology	6	4	--	--	100
	Total			36	24	120	480	600
7	Audit course	BTH 107	Human Values& Professional ethics	0	0	100	0	0

Semester - II

S. No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	BTH 201	Enzymes and Intermediary Metabolism	6	4	20	80	100
2	Core	BTH 202	Molecular Biology	6	4	20	80	100
3	Compulsory Foundation	BTH 203a	Immunology	6	4	20	80	100
		BTH 203b	Cancer Biology					
4	Elective Foundation	BTH 204a	Research Methodology, Biostatistics and Bioinformatics	6	4	20	80	100
		BTH 204b	Biostatistics					
5	Practical -I	BTH 205P	Enzymology, metabolism and Molecular Biology	6	4	--	--	100
6	Practical - II	BTH 206P	Immunology, Biostatistics and Bioinformatics	6	4	--	--	100
	Total			36	24	120	480	600
7	Audit course	BTH 207	Human Values& Professional ethics	0		0	100	0

Semester – III

S. No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	BTH 301	Genetic Engineering	6	4	20	80	100
2	Core	BTH 302	Food and Industrial Biotechnology	6	4	20	80	100
3	Generic Elective	BTH 303a	Bioprocess Engineering and Technology	6	4	20	80	100
		BTH 303b	Legal, Ethical and Implications of Biotechnology					
		BTH 303c	Emerging technologies in Biotechnology					
4	Practicals	BTH 304 P	Genetic Engineering, Food and Industrial Biotechnology and Generic Elective	6	4	--	--	100
5	Skill Oriented Course	BTH 305	Plant Tissue Culture	6	4	10	90 (40+50)	100
6	Open Elective	BTH 306a	Bioethics	6	4	20	80	100
		BTH 306b	Bioinformatics					
	Total			36	24	120	400	600

Semester – IV

S. No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credits	IA Marks	Sem End Exam Marks	Total
1	Core	BTH 401	Environmental Biotechnology	6	4	20	80	100
2	Core	BTH 402	Plant Biotechnology	6	4	20	80	100
3	Generic Elective	BTH 403a	Animal Biotechnology	6	4	20	80	100
		BTH 403b	Applications of Biotechnology					
		BTH 403c	Pharmaceutical Biotechnology					
4	Practicals	BTH 404P	Environmental Biotechnology, Plant Biotechnology	6	4	--	--	100
5	Multi-Disciplinary Course/ Project Work	BTH405	MOOCS/Project	6	4	--	--	100
6	Open Elective	BTH 406a	Applications of Biotechnology	6	4	20	80	100
		BTH 406b	Tools in Biotechnology					
	Total			36	24	120	400	600

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 101	**Structure and functions of Biomolecules**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Semester – I

Course Objectives:

1. To explore the knowledge and awareness of the basic principles and concepts of Biomolecules.
2. To acquaint the classification of carbohydrates, proteins, lipids and nucleic acids
3. To know the characteristic features of biomolecules
4. To understand the structure and functions of biomolecules

UNIT-I

Chemistry of carbohydrates - Definition and classification of carbohydrates. Outlines of structures and properties of important mono- (Glucose & Fructose), di- (Lactose, Sucrose, Maltose) and polysaccharides (Starch, Glycogen, Cellulose, Chitin). Physical and Chemical reactions of carbohydrates. Analysis of carbohydrates- Qualitative and Quantitative.

UNIT-II

Chemistry of amino acids and proteins - Classification of amino acids, Structures of amino acids, Chemical reactions of amino acids. Peptide bond - Nature of peptide bond, pi/φ rotation. Ramachandran plot, Secondary structure predictions, helices and beta-sheets, Determination of primary structure. Proteins and their classification, properties of proteins, determination of amino acid sequences (N and C terminus) Tertiary/quaternary structure of proteins (myoglobin/ hemoglobin model). Structural organization of proteins - Outline structures and biological functions. Protein folding and significance.

UNIT-III

Chemistry of lipids - Classification of lipids, Properties of lipids, Outline structures of saturated and unsaturated fatty acids, fats and waxes, phospholipids, glycolipids, cholesterol, prostaglandins, leukotrienes. Lipids as signaling molecules. Structure and functions of, heterocyclic molecules, porphyrins and vitamins.

UNIT-IV

Chemistry of nucleic acids - Structure of purines and pyrimidines, modified bases nucleosides and nucleotides; Properties of nitrogen bases and nucleotides, Structure, variation and properties of DNA and RNA. DNA denaturation and renaturation kinetics, Determination of DNA complexity, Hyperchromacity, Tm, cot curves and their significance.

Reference Books

1. Lehninger, A. L. (2012). Principles of Biochemistry (6th ed.). New York, NY: Worth.
2. Rodwell, V., Bender, D., Botham, K. M., Kennelly, P. J., & Weil, P. A. (2015). Harpers illustrated Biochemistry (30th ed.). McGraw Hill Professional.
3. Stryer, L. (2015). Biochemistry. (8th ed.) New York: Freeman.
4. Voet, D., & Voet, J. G. (2016). Biochemistry (5th ed.). Hoboken, NJ: J. Wiley & Sons.

Course outcomes:

The student will be able to

1. Understand the classification of carbohydrates and their biochemical functions.
2. Correlate the reactions of amino acids that are basis for identification tests and biochemical pathways.
3. Know the structure of different classes of lipids and their roles in biological systems.
4. Comprehend the structure and functions of nucleic acids

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	3	2	1	-	-	1	-	1	1	1	-	2	2
CO_2	3	3	2	1	2	-	1	-	1	1	1	-	2	
CO_3	2	2	2	1	-	-	1	-	1	1	1	-	1	1
CO_4	3	2	3	2	-	-	1	-	1	1	1	1		2

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 102	Advanced Tools and Techniques	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To impart knowledge about the various analytical and biophysical techniques.
2. To make the student to be able to carry out purification and characterization of various biomolecules.
3. To educate the student to characterize the separated biomolecules by electrophoresis and spectroscopic techniques.
4. To familiarize with the concepts and the techniques of Radioactivity

UNIT-I

Isolation techniques - Cell disruption techniques - sonication, french press, enzymatic, non-enzymatic techniques. Isolation of proteins - salting in/out, ammonium sulphate fractionation. Nucleic acids - polar solvents precipitation. Lipids - extraction by differential solubility. Concentration of macromolecules flash evaporation, lyophilization, pressure dialysis, reverse dialysis, hollow fiber membrane filters and reverse osmosis. Microscopic studies (principles and applications): Light, compound, phase contrast, confocal and SEM and TEM.

UNIT-II

Principles and applications of gel-filtration, ion-exchange and affinity chromatography. TLC, GLC and HPLC. Basic principles of sedimentation, Types of centrifuges -Microcentrifuge, High speed & Ultracentrifuges; Preparative centrifugation; Differential & density gradient centrifugation; Applications (Isolation of cell components); Analytical centrifugation; Determination of molecular weight by sedimentation velocity & sedimentation equilibrium methods. General principles of electrophoretic techniques. Poly Acryl amide Gel Electrophoresis. Isoelectric focusing. Isotachophoresis. 2-D Electrophoresis. Capillary electrophoresis. Agarose gel electrophoresis of DNA and RNA. Blotting techniques. DNA fingerprinting.

UNIT-III

Electromagnetic spectrum of light. Principles, instrumentation and applications of UV-Visible, infrared, Raman, fluorescence, flame photometry, atomic absorption, plasma emission, ESR, ORD, CD, NMR spectroscopy. Spectrofluorimetry and mass spectrometry, X-ray diffraction. Flow cytometry.

UNIT-IV

Radioisotope tracer techniques - Nature and types of radioactivity, Preparation of labeled biological compounds. Labeling of carbohydrates (C^{14} acetate), proteins (S^{35} methionine, I^{125} aminoacid) and nucleic acids (P^{32} dATP). Detection and measurement of radioactivity. Autoradiography, Biological uses of radioisotopes, Safety guidelines.

Reference Books

1. D. Holme & H. Peck, Analytical Biochemistry, 3rd Edition, Longman, 1998.
2. Freifelder D., Physical Biochemistry, Application to Biochemistry and Molecular Biology, 2nd Edition, W.H. Freeman & Company, San Fransisco, 1982.
3. Keith Wilson and John Walker, Principles and Techniques of Practical Biochemistry, 5th Edition, Cambridge University Press, 2000.
4. Biophysical chemistry principles and techniques by Upadyay, Upadyay and Nath (Himalaya publishing).

Course outcomes:

The student will be able to

1. Learn about various techniques for isolation and concentration of macromolecules. They will also understand the principles and applications of different Microscopes
2. Understand the techniques of chromatography, centrifugation and electrophoresis
3. Achieve a basic understanding of characterization of biomolecules by different Spectroscopic techniques
4. Familiarize with the various radioisotope tracer techniques and their role in biology. Eventually they learn safety measures in handling radio-isotopes.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	3	3	3	3	1	3	1	3	3	1	2	1	-
CO_2	3	3	2	2	2	1	3	1	3	2	1	1	1	-
CO_3	3	3	2	3	2	1	2	1	3	3	1	1	1	-
CO_4	3	3	2	2	2	1	2	2	3	3	1	1	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 103a	Microbiology and diseases	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Course objectives:

1. To impart the knowledge on discovery and classification of microorganisms
2. To develop understanding on microbial nutrition, cultivation and growth pattern of microorganisms
3. To understand the concept of gene and its transfer mechanism in microbes.
4. To know about viral, bacterial, fungal and protozoan diseases in plants and animals

UNIT - 1: Introduction to Microbiology

Discovering the microbial world. Classification of microorganisms up to order level - bacteria, algae, fungi, protozoa.

Structure of prokaryotic and eukaryotic microorganisms. General and distinctive characteristics of the major groups of microorganism bacteria, mycoplasma, chalmidae, rickettsias, actinomycetes, fungi, algae, protozoa Prions and viruses.

Isolation, cultivation and enumeration of microorganisms - direct and indirect methods, Maintenance of culture.

Outlines of characterization and identification of common bacteria, fungi, algae and protozoa.

UNIT - II: Microbial nutrition, growth and regulation

Nutritional requirements to microorganisms - Mode of nutrition - phototrophy, chemotrophy - methylotrophy organotrophy, mixotrophy, saprophytic, symbiotic and parasitic, Interaction of microbes. Growth of microorganism (bacteria) - normal and biphasic growth curve, batch and continuous cultures, chemostats, shift up and shift down. Growth determination, Microbial metabolism - energy yielding and energy requiring processes. Control of microorganisms - principles, physical and chemical

agents, Assay of antimicrobial action. Batch and continuous sterilization .of media and air. Viruses - nature, cultivation and assay methods, structure, physico-chemical properties, classification, pathogenicity, Replication of viruses. Microbes of biotechnological importance - examples of bacteria, yeast, algae and viruses.

UNIT-III: Microbial Genetics

Chemical nature of gene, Concept of gene, operon, mosaic genes/split genes. Plasmids incompatibility. Classification: copy number, control and its significance. Structure and functions of insertion elements (IS) - transposable elements. Mechanism of transposition. Catabolic transposons and their significance. Horizontal transfer of genome among the microbial community - transformation, conjugation transduction - generalized transduction, specialized transduction - cotransduction. Benzer's classical studies on II locus. Cistron complementation - Elucidation of co-linearity between DNA and protein sequence. Genetics of viruses – bacteriophage, lambda, SV 40, retroviral genome (HIV), replication, lytic and lysogenic cascades.

Unit IV: Diseases caused by microorganisms

Viral diseases: Flu, Dengue fever, Hepatitis, Bacterial diseases: Cholera, tuberculosis, anthrox, Fungal diseases: Athlets foot, Dutch Elm disease, ergotism, Protozoa diseases (Protoctista): Malaria, Sleeping sickness, dysentery and Plant Pathogens: TMV, Rust

REFERENCES:

1. Microbiology: concepts and Applications. Michael J. Pelczar, Jr., E.C.S., Chan, Noel R. Krieg, 1993. Me. Graw Hill, Inc.
2. Introductory Microbiology. 1995, by Trevor Gross.
3. Fundamentals of Microbiology. 4ltled. 1994. I.E.AIcamo. Scientific Publication,
4. Microbiology, 1990. 4th Ed.B.D. Davis, R. Dulbeco, H.N. Eisen and H.S. Ginsberg and J.B. Lippincott Company.
5. Fundamental Principles of Bacteriology. 1994. A.J. Sake. Tata McGraw Hill.
6. Laboratory Experiments in Microbiology. 3rd ed. Brief Version. 1992. T.R. Johnson and C.L. Case. Addision Wesley International Publications. PP 350.
7. Microbiological Applications: A Laboratory Manual in General Microbiology.

5lh ed. 1990. H.J. Benson. Panima Publications. PP 459.

8. Microbes in Action: A Laboratory manual of Microbiology. 4'hed. 1991. H.W. Seeley, Jr. P.I. Van Denmark and J.J. Lee., W.H. Freeman and Co. New York, PP 450.
9. Microbiology: Concepts and Applications. 1988, P.A. Ketchum. Wiley Publication, New York.
10. Manual of Clinical Microbiology. 5lfl ed. 1991. A. Balows. Ed. American Society of Microbiology, PP 1, 364. Practical Course
11. Sherman, N.B.D. A guide to the identification of the Genera of Bacteria.
12. Bergey's Manual of Determinative Bacteriology.
13. Industrial Microbiology by Cassida

Course outcomes:

The student will be able to

1. Acquire the knowledge on classification and structure of different microorganisms
2. Understand the microbial techniques for isolation, cultivation and maintenance of pure cultures
3. Learn structure, function of gene and its transfer methods
4. Develop understanding on cause, spread and control of diseases caused by different microorganisms

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	3	3	3	2	1	3	2	1	1	2	1	-	-
CO_2	3	2	3	3	3	-	3	1	2	3	3	3	1	-
CO_3	3	2	3	-	3	2	3	2	-	2	2	-	1	-
CO_4	3	3	3	2	2	3	3	3	3	3	3	-	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 103b	Molecular Plant physiology	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

This course enables the students to:

1. To understand about photosynthesis and detailed mechanism involved in the CO2 fixation by plants
2. To learn about Respiration and photorespiration
3. To impart knowledge about the structure and functionality of chloroplast protein and their encoding genes.
4. To know molecular mechanism of plant hormones action and molecular aspect of growth and development processes

Unit 1: Photosynthesis**:** Anatomy of chloroplasts, photosynthetic pigments, Structure of photosystems I and II and their coding genes, Molecular oxygen evolving complex, Photolysis of water; mechanisms of electron transport; Calvin cycle and its light/dark regulation. RuBisCO activities, C3, C4 and CAM pathways.

Unit 2: Photorespiration and Respiration: Photorespiration, Gross and net photosynthesis, Glycolysis, Citric acid cycle; Electron transport and ATP synthesis; Pentose phosphate pathway, Mitochondrial ATP synthase, Engineering or genetic modification of photorespiration

Unit 3: Photo morphogenesis: Molecular structure of phyto chrome, Photo conversion, Nuclear translocation of Pfr and modification of gene expression, Family of PHY genes and multiplicity of responses. Structure and function of Cryptochromes. Photoperiodism and biological clocks.

Unit 4: Plant Hormones: Overview about various plant hormones, Molecular mechanism of plant hormones action, Hormone receptors and signal transduction,

Gene expressions at developmental stages and stresses, Phytohormone signalling in plant defense mechanism, Cross-talk and molecular aspect of growth and development processes.

Book Recommended:

Text book:

1. Plant Physiology, 5th Edition by Lincoln Taiz and Eduardo Zeiger, Sinauer Associate (2010). ISBN: 978-0878938667
2. Plant Physiology, 4th Edition, by Salisbury F. B. and Ross C. W. (2004), Wadsworth Publisher, ISBN: 9788131501658, 8131501655

REFERENCE BOOK:

1. The Molecular Life of Plants by Russell L. Jones, Helen Ougham, Howard Thomas, Susan Waaland (2012) Wiley-Blackwell. ISBN: 978-0-470-87011-2
2. Plant Hormones under Challenging Environmental Factors by Ahammed, Golam Jalal, Yu, Jing-Quan (2016) ISBN 978-94-017-7758-2

Course Outcomes:

The student will be able to

1. Explain the detailed characteristics of chloroplast and mechanism of photosynthesis

2. Engineer photorespiration as well as apply other approaches to increase plant biomass

3. Gain the proficient knowledge about structure and functionality chloroplast protein and encoding genes as well as hormonal response on plants

4. Correlate phytohormone signalling in plant defense mechanism

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PS01**	**PS02**
CO1	2	2	3	1	2	-	3	-	1	-	1	-	-	-
CO2	2	2	3	1	2	-	3	-	1	-	1	-	-	-
CO3	2	2	1	1	2	-	3	-	1	-	1	-	-	-
CO4	3	3	3	3	2	2	1	-	1	1	-	-	-	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 104a	Cell Biology and Genetics	04	4
Sessional Marks: 20			End Semester Examination Marks: 80

Course objectives:

1. To know the structure and functions of prokaryotic and eukaryotic cells and understand cell membrane composition and its functions
2. To impart knowledge on organization of genetic material
3. To develop understanding on mechanism of cell division and chromosomal abnormalities
4. To gain awareness on Mendelian genetics and role of mutations in evolution

UNIT -1: Cell and Cell membrane composition

Organization of prokaryotic and eukaryotic cell. Plasma membrance - Molecular organization, current model and function, Cytoskeleton - microtubules, cilia and flagella, Structure and function of cytoskeleton. Structure and function of endoplasmic reticulum, Golgi apparatus, Structure and function of lysosomes, peroxisomes. Structure and function of mitochondria and chloroplast.

UNIT - II: Nucleus and Chromosome organization

Nucleus - structure and function of nuclear membrane, nucleolus. Eukaryotic chromosome and its high resolution organization, DNA-histone interactions - formation of chromatin fibers - Hetero/Eu chromatin - structural transition - Histone-H1-significance in regulation of expression. Polytene and lamp brush chromosomes.

UNIT - III: Cell division and chromosomal variations

Mechanism of cell division - mitiotic apparatus, cytokinesis, chromosome movement - present concept – Regulation of eukaryotic cell cycle - Over view of cell cycle. Mutation causing cell cycle control. Meiotic process - stages, chromosome pairing,

chiasma formation molecular mechanisms of recombination, synaptonemal complex. Nondysjunction, Chromosomal abnormalities - euploidy, haploidy - their fundamental and practical significance. Polypliody - induction - Aneuploidy - type and genetic significance. Tumor biology - cell to cell interaction, cell adhesion, cell transformation mechanism and oncogenesis.

UNIT IV: Principles of genetics

Mendelian genetics, Linkage and gene mapping, Quantitative genetics and problems, Hardy Weinberg Law, Sex chromosomes and sex determination. Inbreeding, Mutagenesis - Types of mutations, mutagens, Molecular mechanisms of mutations, Spontaneous, induced mutations, reversion, suppression, and analysis of mutants. Role of mutagenesis in evolution, chromosomal deletions, duplications, inversions.

REFERENCES:

1. Cell Biology - De Robertes & De Robertes
2. Cell and Molecular Biology -Baltimore.L
3. The cell - Hooper
4. Cell and Molecular Biology - P.K.Gupta
5. Cell Biology- Verma and Agarwal
6. Cell Biology- Rastogi
7. Cell Biology-twyn

Course outcomes:

The student will be able to

1. Differentiate prokaryotic and eukaryotic cell
2. Understand the organization of genetic material in lower and higher organisms
3. Appreciate the mechanism of mitotic and meiotic process and identify the abnormalities
4. Understand the molecular mechanisms of mutations and its importance in in evolution

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PS01**	**PS02**
CO1	3	3	3	3	3	3	-	2	1	2	1	1	-	-
CO2	3	3	3	3	3	3	-	2	1	2	1	-	1	-
CO3	3	3	3	3	3	3	3	2	3	2	3	3	1	-
CO4	3	3	3	3	3	3	2	2	3	2	-	3	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 104b	Molecular Genetics	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Course objectives:

1. To know the Principles of Segregation
2. To impart knowledge on sex determination in drosophila, birds, man
3. To develop understanding on modern concept of gene and transposons
4. To gain awareness on mechanism of genetic transfer in bacteria

UNIT – I: Recapitulation of Mendelian Principles

Principles of Segregation; Laws of inheritance dominance, recessiveness, laws of segregation, Dihybrid and trihybrid ratios- laws of independent assortment-test cross and back cross. Incomplete dominance- eg: flower colour, chromosomal theory of inheritance.

Extension to Mendel's laws- Multiple allelism eg. Coat colour in rabbits, eye colour in drosophila, ABO blood groups, incompatibility and pseudoallelism

UNIT-II: XY-chromosomes

Sex determination in drosophila, birds, man. X-linked inheritance, haemophilia, colour blindness, Y-linked inheritance- holandric genes. Mechanisms of sex determination – Simple Mechanisms, The balance concept of Sex determination. Mosaics and Gynandromorphs. Sex differentiation. Sex-influenced dominance; Sex-linked inheritance- Morgan's discovery of sex linkage in drosophila. Patterns of inheritance of Sex-linked genes.

Unit- III: Gene as a unit of expression

Modern concept of gene, co-linearity of gene and polypeptide, types of genes (constitutive, structural, regulatory, luxury, overlapping, split genes etc.,)

Biology of plasmids: Types of plasmids, incompatibility grouping, control of copy

number replication of Col E1 and F plasmid.

Transposons: Transposable elements in prokaryotes and eukaryotes, types of bacterial transposons - insertional sequences, complex transposons, Mechanisms of transposition (Replicative and Non replicative), Transposable viruses and retroposons. Complex transposons-Tn10, Tn5, Tn9 and Tn3 as examples. Mechanisms, control consequences and applications of transposition by simple and complex elements.

UNIT-IV: Mechanism of genetic transfer in bacteria

Transformation, Transduction, Conjugation. Mapping of bacterial chromosome. Genetic recombination in bacteria, models and mechanism, role of rec A proteins.

Homologous Recombination, Holiday junction, gene targeting, gene disruption, FLP/FRT and Cre/Lox recombination, Rec A and other recombinases.

Viral genetics: Organisation of genome in Lambda, T4 phage, φx174 and M13.

REFERENCES

1. Benjamin Lewin. Gene VII. Oxford University Press, U.K., 2000
2. William H Elliott and D C.Elliolt., Biochemistry & Molecular biology, Oxford
3. S.R. Maloy, J.E. Cronon, and D. Freifelder., Microbial Genetics Jones & Bartlet 1996.
4. Streips U.N. and Yasbin R.E , Modern Microbial Genetics. Wiley-liss, 1991.
5. Stent G.S.Calender R., Molecular Genetics. CBS publishers, 1986.
6. E.J.Gardner,D.P.Simmons,M.J.Snustad, Principles of Genetics , 8th ed.
7. John wiley private Ltd., Singapore.2003.
8. David Freifelder, Microbial Genetics. Narosa Publishing House,New
9. Delhi 2000.
10. David freifelder and G.M.Malacinik, Essentials of molecular biology 1996,
11. David J Sheratt, Mobile Genetic Elements, Oxford University Press. 1995
12. J.W. Dale, “Molecular Genetics of Bacteria” Wiley & Sons 1994.
13. D.L.G. Hartl , “Basic Genetics” Jones Publ., 1991.
14. M. P. Arora, “Fundamental of Genetics”, Himalaya Publishing House, Mumbai, 2004.
15. C.B. Powar, “Genetics”, Volume 1, Himalaya Publishing House, Mumbai,

16. 2003.

Course outcomes:

The student will be able to

1. recapitulation of Mendelian Principles
2. Understand the mechanisms of sex determination
3. Gain knowledge about types of genes
4. Understand the viral genetics

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	2	3	2	1	1	-	-	-	1	1	-	-	-	-
CO_2	2	3	2	1	1	-	-	-	1	1	-	2	-	-
CO_3	3	3	2	3	1	-	-	-	1	1	-	-	1	-
CO_4	3	2	2	1	1	-	-	-	1	1	-	-	1	-

Course Code	**Course Title**	**No of Hours Per**	**No of Credits**

		week	
BTH 105 P	Bio-molecules and Advanced Tools and Techniques	04	4
Sessional Marks: 20			End Semester Examination Marks: 80

Course objectives:

1. To know the technique of analysis of carbohydrates and proteins
2. To know the technique of analysis of lipids
3. To know the technique of separation of pigments and amino acids
4. To know the technique of separation of proteins and nucleic acids using electrophoresis

Practical –I: BIO-MOLECULES AND ADVANCED TOOLS AND TECHNIQUES

1. Estimation of reducing sugars by benedict's titrimetric method
2. Estimation of total carbohydrates by anthrone method
3. Estimation of proteins by Lowry and biuret methods
4. Estimation of cholesterol
5. Separation of chlorophyll pigments by paper chromatography
6. Separation of amino acids/ sugars/ lipids by thin layer chromatography
7. Ultra violet absorption spectra of nucleic acids and proteins
8. Polyacrylamide gel electrophoresis of proteins
9. Agarose gel electrophoresis of nucleic acids
10. Determination of isoelectric point of glycine

Reference Books

1. An introduction to practical biochemistry by D.T. Plummer (Mc Graw Hill).
2. Biochemical methods by Sadasivam and Manikam (Wiley Eastern limited).
3. Biochemistry-- a laboratory courses by J.M. Beckar (Academic Press).
4. Hawk's physiological chemistry Ed. by Oser (Mc Graw Hill).
5. Laboratory manual in Biochemistry by J. Jayaraman (Wiley Eastern limited).

Course outcomes:

The student will be able to learn the

1. technique of analysis of carbohydrates and proteins
2. technique of analysis of lipids
3. technique of separation of pigments and amino acids
4. technique of separation of proteins and nucleic acids using electrophoresis

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	1	3	-	-	-	-	-	-	1	1	-	-	-	-
CO_2	1	3	-	-	-	-	-	-	1	1	-	2	-	-
CO_3	1	3	-	-	1	-	-	-	1	1	-	-	1	-
CO_4	-	2	-	-	1	-	-	-	1	1	-	-	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 106 P	Microbiology and Cell Biology	04	4
Sessional Marks: 20			End Semester Examination Marks: 80

Practical – II: Microbiology and Cell Biology

Course objectives:

1. To know the technique of preparation of media
2. To know the skill of Isolation and enumeration of microorganisms
3. To know the technique of staining of microorganisms
4. To gain knowledge about cell division

1. General laboratory rules and regulations.
2. Preparation of culture media.
3. Isolation and enumeration of microorganisms from soil by the serial dilution-agar plating method.
4. Methodology for obtaining pure culture of microorganisms.
   a) Streak plate method.
   b) Spread plate method.
   c) Pour plate method.
5. Simple staining.
6. Grams staining.
7. Determination of bacterial growth turbidity measurements (Spectrophotometric method).
8. Antibiotic sensitivity testing by disc diffusion method
9. Mitosis in onion root tip cells: All phases (Squash method).

10. Meiosis in onion flower buds: All phases including zygotene, diplotene and diakinesis of

    Prophase I (Smear method).

Reference Books

1. Laboratory Manual in Microbiology by P. Gunasekaran (1996), New Age Publ.
2. Manual of clinical laboratory immunology by Rose NR.
3. Microbiology laboratory Manual (2001) by Aneja, K.M
4. Microbiology laboratory Manual 4th Edit. By Cappuccino
5. The experimental foundations of modern immunology by Clark W.R.
6. Cell Biology - De Robertes & De Robertes

Course outcomes:

The student will be able to learn the

1. To learn the technique of preparation of media
2. To learn the skill of Isolation and enumeration of microorganisms
3. To know the technique of staining of microorganisms
4. To gain knowledge about cell division

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	-	1	-	-	-	-	-	-	1	1	-	-	-	-
CO_2	1	2	-	-	-	-	-	-	1	1	-	2	-	-
CO_3	1	1	-	-	1	-	-	-	1	1	-	-	1	-
CO_4	-	2	-	-	1	-	-	-	1	1	-	-	1	-

Semester - II

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 201	Enzymes and Intermediary Metabolism	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To provide knowledge on classification, nomenclature, isolation, and purification of enzymes
2. To educate them to understand the importance of energy relationships and its transformation in living organisms
3. To explain the metabolic pathways involved in biosynthesis of macromolecules
4. To impart awareness on the types and symptoms of metabolic diseases and their inheritance

UNIT-I

Classification of enzymes and their significance - Isolation and purification of enzymes - assay of enzyme activity. Determination of KM, Vmax and K cat. Enzyme inhibition - competitive, non-competitive, uncompetitive allosteric regulation and irreversible enzyme inhibition. Enzyme action, Active site determination. Isoenzymes - detection, characterization and significance. Ribozymes, Abzymes, multicomplex and multifunctional enzymes.

UNIT-II

Bioenergetics - Free energy change in biological transformations, thermodynamic principles in biology, Redox potential, high energy compounds. Glycolysis - Biochemical steps involved in glycolytic pathway, TCA cycle and their Regulatory mechanisms. Glyoxalatye cycle, gluconeogenesis, HMP shunt, interconversion of hexoses and pentoses, amylogenesis, glycogen metabolism.

Brief account of enzymes and co-enzymes involved in biological oxidations, Organization of respiratory electron transport system. Mechanism of oxidative phosphorylation. Biological energy transducers, Chemiosmotic regeneration of ATP.

UNIT-III

Biosynthesis, degradation and regulation of saturated fatty acids. Degradation of lipids from membranes, Oxidation of unsaturated fatty acids and synthesis of UFA by enzymatic (synthesis of prostaglandin and leukotrines) and non-enzymatic (free radicals and lipid peroxidations) mechanisms. Cholesterol and ketone bodies. Metabolism and regulation. Metabolism of triglycerides, phospholipids, glycolipids.

UNIT-IV

Metabolism of amino acids and proteins - Hydrolysis of proteins, proteases, Biosynthesis of essential amino acids and their catabolism (deamination, decarboxylation, and transamination), Coordinated control of metabolism, Formation of ammonia and urea. Nitrogen fixation by bacteria. Metabolism of purines and pyrimidines, Biosynthesis and catabolism of Nucleosides and nucleotides, role of DNases and RNases on nucleic acids. Outlines of biosynthesis of porphyrins (Chlorophyll and Haeme). Inborn errors in metabolism - Phenylketonuria, Alkaptonuria, Sickle cell anaemia, Fructosaemia, galactosuria, Gaucher's and Krabbe's disease.

Reference Books

1. Principles of Biochemistry: White. A, Handler, P., and Smith.
2. Biochemistry, Lehninger A.L.
3. Biochemistry, David E. Metzler.
4. Biochemistry, Lubert Stryer.
5. Review of Physiological Chemistry: Harold A. Harper.
6. Outlines of Biochemistry, Conn and Stummf.

7. Text of Biochemistry, West and Todd.
8. Metabolic Pathways - Greenberg,
9. Biochemistry, 2na Edition, G. Zubay (1988). Practical Course
10. Practical Biochemistry - H. Varley.
11. Methods in Enzymology S.P. Colowick & N.O. Kapalan, Academic Press.
12. Methods in Biochemical analysis.

Course outcomes:

Students will be able to

1. Gain knowledge on different enzymes and their significance
2. Correlate how the living organisms exchange energy and matter with the surroundings for their survival, and store free energy in the form of energy-rich compounds
3. Recognize how the catabolic breakdown of the substances is associated with release of free energy; whereas, free energy is utilized during synthesis of biomolecules i.e., anabolic pathways
4. Apply the knowledge of metabolic pathways to biotechnological and biochemical research.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	3	3	3	3	2	3	-	1	3	-	-	1	-
CO_2	3	3	3	2	2	2	2	-	1	2	-	-	-	-
CO_3	3	3	3	2	2	2	2	-	1	2	-	2	-	-
CO_4	3	3	3	3	3	2	3	-	1	3	3	3	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 202	Molecular Biology	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To provide comprehensive background of Salient features of Nucleic acids, DNA models and its replication to the course learners.
2. To impart detailed understanding of key events of transcription and post transcriptional modifications
3. To develop understanding of translational process in protein biosynthesis in prokaryotic and eukaryotic organisms
4. To make them understand the regulation of catabolic and anabolic gene expression

UNIT-I

DNA replication - Enzymes involved in DNA replication. Accessory proteins. Structures of oriC. Replisome – oriC - accessory protein interactions - Mechanism of formation of oriC open complex. Replication initiation – elongation - Okazaki fragments synthesis and processing - Direction of replication fork movement. Termination - Nature of termination sequences - Interactions between polymerase III and ter sequences. Mode of DNA replication Messelson and Stahl experiments. Replication of single stranded DNA -ØX174. Replication of bacteriophage lambda DNA (rolling circle). Replication of closed covalent circular DNA (θ model of DNA replication). Problems associated with replication of linear DNA molecules - Structure and synthesis of telomere sequences. Cell cycle and its regulation - Interplaying of cell cycle and DNA replication.

UNIT-II

Prokaryotic RNA polymerase - σ factors: -σ 70, σ32, σ54 , σ28 promoter elements- Structural differences between E σ 70, σ54 dependent promoters - Promotor

polymerase interaction - Foot printing assays - Mapping of transcription start point (TSP). Gene structure, Upstream activating sequences and their role in regulation of transcription. Transcription elongation and termination. Eukaryotic RNA polymerases - Transcription factors – transcription. Structure and functions of RNA pol I, II and III dependent promoters. Enhancer sequences. Post transcriptional modification of RNA and its regulation, Mechanism of tissue specific transcription.

UNIT-III

Translation - Central dogma theory and flow of genetic information, Genetic code and its elucidation, Wobble hypothesis, Structure and composition of prokaryotic and eukaryotic ribosomes, Structures of mRNA and tRNA. Events of protein synthesis (amino acid activation, initiation, elongation and termination) in prokaryotes and eukaryotes. Post-translational modification of proteins, Inhibitors of translation. Protein trafficking - Concept of signal peptide - transport and membrane targeting of proteins - Sec pathway - Alternative protein transport mechanisms.

UNIT-IV

Regulation of gene expression. Constitutive and inducible gene expression, Use of mutants in gene expression. P and O site determination. Regulation of catabolic gene expression Eg: lac operon, ara operon and gal operon. Regulation of anabolic gene expression Eg: Trp and His operons. Hormonal regulation of genes.

Reference Books

1. Molecular Biology. 2"13 ed. 1994. D. Freifelder. Springer.
2. Molecular Biology by G. Padmanabhan, K. Sivaram Sastry, C. Subramanyam, 1995, Mac Millan.
3. Molecular Biology and Biotechnology 2na ed. J.M. Walker and E.B. Gingold. Panima Publications. PP 434.
4. Dictionary of microbiology and molecular biology. 2nd ed. 1994. Sigleton. P. and Sainsbury, D. Sciential Publication.
5. Molecular Biology of the Gene, 1S87. 4th Ed. J.D. Watson, N.H.Hopkins, J.W. Roberts, J.A. SteitzandA.M. Weiner, 2 Vol. Benjmin/Cummings.

Course outcomes:

1. Understand the biochemical composition and genome organization in living cells
2. Learn about the mechanism of tissue specific transcription and role of RNA polymerases
3. Appreciate the correlation of genetic code with protein synthesis in prokaryotic and eukaryotic cells.
4. Gain insights of mechanism of gene expression and regulations

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	2	2	2	2	-	-	-	1	1	-	1	1	-
CO_2	3	2	2	2	2	-	-	-	1	1	-	1	1	-
CO_3	3	2	2	2	2	-	-	-	1	1	-	1	1	-
CO_4	3	2	2	2	2	-	-	-	1	1	-	1	-	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 203 a	Immunology	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To provide knowledge on the types of immunity and the immune organs
2. To demonstrate the structure of antibody types and their interaction with antigen
3. To acquaint them with the hybridoma technique and its clinical applications
4. Explain the concept of hypersensitivity, auto immunity and tumer immunology

UNIT-I

Types of immunity – innate, acquired, passive and active. Organization and structure of Lymphoid organs – bone marrow, thymus, spleen and lymph nodes. Cells of the immune System – B-Lymphocytes, T-Lymphocytes. T-cell receptor – structure and function.

Macrophages. Types of cell mediated immunity and lymphocyte activated killer cells. Clonal nature of immune response, Immunological memory. Immuno regulation. Adjuvants and immunological tolerance.

UNIT-II

Nature of antigens and antibodies. Structure and function of antibodies. Isotypes, Allotypes and Idiotypes. Antigen – antibody interactions. The generation of antibody diversity, antigen receptors on B & T lymphocytes. Major Histocompatibility Complex (MHC). Human leukocyte antigens (HLA), MHC restriction and typing. Lymphokines, effector cell mechanisms, genetic control of immune response. Complement system.

UNIT-III

Immunological techniques - ELISA, RIA, Western Blot, Immunoblot and Immuno fluorescent techniques. FACS. Hybridoma technology - production and applications of monoclonal antibodies. Antibody engineering, chimeric antibodies.

UNIT-IV

Hypersensitivity - types of hypersensitivity - immediate and delayed hypersensitivity,

autoimmune diseases, transplantation and immunity, immunity to infectious agents. Vaccines and Vaccination, types of vaccines including new generation vaccines. Tumor immunology.

Reference Books

1. Essentials of Immunology by Roit (ELBS).
2. Immunology by Roit et.al (Harper Row).
3. Text book of Immunology by S.T,Barrot (Mosby).
4. Immunology by Kubay.
5. Principles of Microbiology and Immunology by Davis et.al., (Harper).

Course outcomes:

The student will be able to

1. Out line, compare and contrast the key mechanism of innate and adaptive immunity
2. Apply knowledge in disease diagnosis through serological tests
3. Develop skill in production of monoclonal antibodies
4. Gain knowledge on undesirable immunological reactions and their complications in health management

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	3	3	3	2	-	-	-	2	1	2	2	1	-
CO_2	3	3	3	3	2	-	-	-	2	1	2	2	-	-
CO_3	3	3	3	3	2	-	-	-	2	1	2	2	1	-
CO_4	3	3	3	3	2	-	-	-	2	1	2	2	-	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 203b	Cancer Biology	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Course Objectives:

1. To understand the fundamentals of cancer biology
2. to understand the Principles of carcinogenesis
3. To gain knowledge about Principles of molecular cell biology of cancer
4. Understand the c Principles of cancer metastasis and ddifferent forms of therapy

Unit I

Fundamentals of cancer biology: Introduction to Cancer Biology, Tumor suppressor genes, modulation of cell cycle in cancer, Different forms of cancers, Cancer screening and early detection, Detection using biochemical assays, tumor markers, molecular tools for early diagnosis of cancer

Unit II

Principles of carcinogenesis: Theory of Carcinogenesis, Chemical carcinogenesis, principles of physical carcinogenesis, X-ray radiation-mechanisms of radiation carcinogenesis, Diet and cancer.

Unit III

Principles of molecular cell biology of cancer: Signal targets and cancer, activation of kinases; Oncogenes, identification of oncogenes, retroviruses and oncogenes, detection of oncogenes, Oncogenes/proto oncogene activity, Growth factors related to transformation, Telomerases.

Unit IV

Principles of cancer metastasis: Clinical significances of invasion, Metastatic cascade, Basement membrane disruption, proteinase and tumor cell invasion. New molecules for cancer therapy: Different forms of therapy, chemotherapy, radiation therapy, detection of cancers, prediction of aggressiveness of cancer, advances in cancer detection. Use of signal targets towards therapy of cancer; Gene therapy

REFERENCES:

1. Daniel, Waynew, Biostatistics a foundation for analysis in the health sciences, John Wiley and Sons, New Delhi, 1983.
2. Visweswara Rao K, Biostatistics: A manual of statistical methods for use in Health, Nutrition and Anthropology, Jaypee brothers medical publishers (p) ltd., 1996
3. Sundar Rao.P.S.S, and Richard.J, Introduction to biostatistics and research methods, Prentice –Hall of India, 2006
4. K.V.S.Sarma, Statistics Made Simple Do it yourself on PC, Second Edition, Prentice Hall, 2010.
5. Indrayan.A and Satyanarayana. L, Biostatistics for medical, nursing and pharmacy students, Prentice-Hall of India, 2006.
6. Armitage.P, Statistical methods in Medical Research, London: Blackwell Scientific Publications, 1989
7. Statistical concepts and applications in Medicine Monographs on statistics and Applied Probability series. 1994. J.Aitchison.
8. Introduction to Biostatistics. 1995. R.N.Forthafter and E.S.Lee. Academic Press**.** PP 656
9. Statistics with application to the biological and health sciences. 1985. R.D.Remington and M.A. Schork, Prentice –Hall.
10. Zar, Jerrold, H., Biostatical Analysis, Engel Wood Cliffs Prentice Hall, 1974.
11. Lewis, Alvin, E, Biostatistics, Affiliated East West Press (P) Ltd., New Delhi, 1971.
12. Goldstein, Avrom, Biostatistics an introductory text, New York, The Mac Millian Company, 1971.
13. Ingelfinger, Joseph A and Others : Biostatistics in Clinical Medicine, 1983.
14. Bemstein, L and Weatherall, M. Statistics for Medical and other Biological;

students, edenberg, E & S Livingstone, 1952

15. Schelfer, William C, Statistics for the Biological sciences, Reading Addition Wesley, 1969.

Course outcomes:

The student will be able to

1. To understand cancers, the mechanisms involved from theory concept, experimental, research and human health-care perspectives
2. To acquire the required experimental skills in cancer biology from research and human healthcare perspectives

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 204a	Research methodology, Biostatistics and Bioinformatics	04	4
Sessional Marks: 20			End Semester Examination
Marks: 80			

1. To develop understanding about principles of carcinogenesis
2. Acquire knowledge on signal targets towards therapy of cancer and Gene therapy

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	3	3	3	3	1	-	1	3	3	3	3	-	-
CO_2	3	3	3	3	3	1	-	1	3	3	3	3	-	-
CO_3	3	3	3	3	3	1	-	1	3	3	3	3	1	-
CO_4	3	3	3	3	3	1	-	1	3	3	3	3	1	-

Course Objectives:

1. To choose the appropriate research design and develop appropriate research hypothesis for a research project
2. To describe the appropriate statistical methods required for a particular research design
3. To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis
4. To provide knowledge about the basics of sequence alignment and analysis.

UNIT-I

Preparation of informal proposal, modified proposal and formal proposal. Experimental design

and Collection of results, submission of progress report (year wise) and submission of technical

report (Format: Title page, Introduction, Aims of the proposal/research, methodology,

results, references, acknowledgments, budgetary preparation). Submission of final technical report. Patenting and intellectual property rights.

UNIT-II

Brief description and tabulation of data and its graphical representation. Measures of central tendency and dispersion - mean, median, mode, range, standard deviation, variance. Simple linear regression and correlation. Types of errors and level of significance. Tests of significance – F & t tests, chi-square tests, ANOVA.

UNIT-III

Introduction to Bioinformatics – Genomics and Proteomics. Bioinformatics – Online tools and offline tools. Biological databases. Types of data bases – Gen bank, Swiss port, EMBL, NCBL, and PDB. Database searching using BLAST and FASTA.

UNIT-IV

Multiple sequence alignment and Dynamic programming. Gene and Genome annotation – Tools used. Physical map of genomes. Molecular phylogeny - Concept methods of tree construction. Protein secondary structure prediction. Protein 3D structure prediction. Protein docking. Introduction to homology modeling, Computer Aided Drug Design (CADD) in Drug discovery.

Reference Books:

1.Bioinformatics – D.Mount

2.Programming in C by Balaguru Swamy.

3.Introduction to Bioinformatics by Arthur M.Lesk, Oxford.

4.Biostatistics – Daniel. (Wiley).

5.Statistics by S.C.Gupta.

6.Statistical Methods by G.W.Snedecor & W.G.Cochran.

7.Fundamentals of Biostatistics – Khan & Khanum.

8.Fundamentals of Biostatistics by U.B.Rastogi (Ame Books Ltd).

Course outcomes:

The student will be able to

1. Discuss the various steps involved in conducting research
2. Learn to apply hypothesis testing via some of the statistical distributions
3. Develop understanding about Biological data and database search tools
4. Acquire hands on training on various computational tools and techniques employed in Biological sequence analysis

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	2	3	2	2	1	-	2	1	1	1	1	-	1
CO_2	3	2	3	2	3	1	-	-	1	1	1	-	-	-
CO_3	3	2	3	2	3	1	-	-	1	1	1	1	1	1
CO_4	3	2	3	2	3	1	-	-	1	1	1	1	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 204b	Proteomics	04	4
Sessional Marks: 20 Marks: 80		End Semester Examination	

Course Objectives:

This course enables the students to:

1. To organize protein in four structural levels: Primary, Secondary, Tertiary and Quaternary, study on post translational modifications, structural determination and folding
2. Extend comprehensive knowledge about characterization, tools and techniques in determination of abundance of protein in particular tissue and its quantification.
3. Obtain information about atomic mass, amino acid sequence and basic physical and chemical properties of protein, the technology used in determining these informations.
4. Gain knowledge about the production of industrial important proteins and enzymes, designing new proteins with special functions and storage and use of proteomics database.

UNIT-I:

Protein Basics: Proteomics basics, Forces that determine protein structure and physicochemical properties, Mechanisms of protein folding, Molten globule structure, Characterization of folding pathways.

UNIT-II:

Protein isolation and profiling: Method for protein isolation and purification, Profiling by Native-PAGE, SDS-PAGE, 2-D/IEF SDS-PAGE, staining and de-staining, imaging and analysis of 1-D and 2-D gels.

UNIT III: Protein characterization: Protein sequencing using various methods, Protein identification by mass spectrometry, Determination of post translation

modification, Proteomics tools and databases, Thermal, enzymatic, physical, pressure, solvents, interactions effect on protein, Application of DSC, Protein denaturation, aggregation and gelation.

UNIT IV: Protein structure: Background and basic principles of various spectroscopic techniques used for protein structure determination, Absorption and fluorescence, Circular dichroism, FT-Raman, FT-IR, NMR, Protein crystallization and X-ray crystallography, MALLS.

Development of novel proteins**:** Basic concepts for design of a new protein, Site directed mutagenesis for specific protein function, Specific examples of novel engineered proteins. 8L

Reference Books:

1. Carl, Branden and Tooze, John. Introduction to Protein Structure, Garland Publishing (Taylor and Francis Group). New York.
2. Yada, R. Y.; Jackman, R. L.; Smith, J. L. Protein Structure-Function Relationships Blakie Academic and Professional: London
3. Clark, R. J. H and Hester, R. E. Spectroscopy of Biological Systems, John Wiley and Sons, New York
4. Nakai, S. and Modler, H. W. Food Proteins: Properties and Characterization, VCH Publishers, New York.

Course outcomes:

At the end of the course, a student should be able to:

1. Handle a proteins and its characterization.
2. Know the principles of proteome quantification.
3. Demonstrate how various types of mass spectrometers (e.g. Orbitrap, triple-quad, Q-TOF) can be used for proteome quantification, structure determination of proteins by various methods.
4. Use software tools to analyse various quantitative proteomic data types, Principles of statistical analysis of proteomic data, how quantitative proteomics can be applied in biology, clinical research and drug discovery and

designing novel proteins.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PS01**	**PS02**
CO1	2	2	3	1	2	-	-	-	1	1	-	-	1	-
CO2	2	2	2	1	2	-	-	-	1	1	-	-	-	-
CO3	2	2	3	1	3	-	-	-	1	1	-	1	1	-
CO4	2	2	3	2	3	-	-	-	1	1	-	1	-	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 205 P	Enzymology, metabolism and Molecular Biology	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Practical –I: Enzymology, metabolism and Molecular Biology

Course Objectives:

This course enables the students to:

1. To organize protein in four structural levels: Primary, Secondary, Tertiary and Quaternary, study on post translational modifications, structural determination and folding
2. Extend comprehensive knowledge about characterization, tools and techniques in determination of abundance of protein in particular tissue and its quantification.
3. Obtain information about atomic mass, amino acid sequence and basic physical and chemical properties of protein, the technology used in determining these informations.
4. Gain knowledge about the production of industrial important proteins and enzymes, designing new proteins with special functions and storage and use of proteomics database.

1. Assay of amylase from Saliva.
2. Assay of urease from Horse-gram.
3. Assay of acid phosphatase from Potato.
4. Determination of optimal conditions for SDH activity.
5. Determination of effect of substrate concentration on SDH activity.
6. Determination of effect of enzyme concentration on SDH activity.
7. Determination of effect of temperature on SDH activity.

8. Determination of effect of P^H on SDH activity.
9. Estimation of activity of SGOT.
10. Estimation of activity of SGPT.
11. Isolation of DNA from bacterial, plant and animal cells.
12. Estimation of DNA by Diphenylamine method.
13. Isolation RNA from yeast cells.
14. Estimation of RNA by Orcinol method.
15. Estimation of DNA and purity determination by UV absorption method.
16. Determination of melting temperature (Tm).
17. Isolation of plasmid DNA from E. coli.
18. Transformation of E. coli with ampicillin resistant plasmid.

Reference Books

1. Hawk's Physiological chemistry.
2. Practical Biochemistry by T Plummer.
3. Practical Biochemistry by J Jayaraman.
4. Klemir and others: practical Biological chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell.
6. Practical Biochemistry-Sawhney (2000).
7. Varley's Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London).
8. Techniques in molecular biology. Vol.2. 1987. ed. J.M. Walker and Wim Gaestra. Panima Publications. PP 332.
9. Methods in Plant Molecular Biology. 1989. M.A. Schuler and R.E. Zielinski. Academic Press.

10. Methods for cloning and Analysis of eukaryotic genes. 1990. ABothwell, G.D. yancoponlos and F.W.Alt: Jones and Bartlett Publishers. PP 1990.
11. PCR; A Practical approach. 1991. M.J. McPherson. P. Quirke and GR. Taylor. Eds. IRL Press, PP 253.
12. Short Protocols in Molecular Biology. 1992. P.M. Ansubel et al., Academic Press, PP 800.
13. Essential molecular biology: A Practical approach, Vol. I, II. 1991. T.A. Brown. Ed. IRL Press, PP 318-. PP 320.

Course outcomes:

At the end of the course, a student should be able to:

1. Handle a proteins and its characterization.
2. Know the principles of proteome quantification.
3. Demonstrate how various types of mass spectrometers (e.g. Orbitrap, triple-quad, Q-TOF) can be used for proteome quantification, structure determination of proteins by various methods.
4. Use software tools to analyse various quantitative proteomic data types, Principles of statistical analysis of proteomic data, how quantitative proteomics can be applied in biology, clinical research and drug discovery and designing novel proteins.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	1	1	-	-	-	-	-	-	-	-	-	-	1	-
CO_2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO_3	1	1	-	-	-	-	-	-	1	-	-	1	1	-
CO_4	1	1	-	-	-	-	-	-	1	-	-	1	-	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 206 P	Immunology, Biostatistics and Bioinformatics	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Practical –II: Immunology, Biostatistics and Bioinformatics

Course Objectives:

This course enables the students:

1. To gain knowledge about Determination of A, B, O and Rh blood groups in human beings
2. To gain knowledge about immunological techniques
3. Extend comprehensive knowledge about different biostatistical analysis
4. Obtain information about bioinformatic methods of analysis of proteins and nucleic acids

1. Determination of A, B, O and Rh blood groups in human beings.
2. Ouchterloney double diffusion.
3. Radial immunodiffusion.
4. Immunoelectrophoresis.
5. Enzyme Linked Immunosorbent Assay (ELISA).
6. Diagnostic test for typhoid fever by Widal test.
7. Measures of Location.
8. Measures of Dispersion.
9. Correlation Analysis.
10. Regression Analysis.
11. Student Paired t-Test.

12. X^2- Test of Independence of Attributes.
13. Introduction and use of various genome databases.
14. Sequence information resource: Using NCBI, EMBL, Genbank, Entrez, Swissprot/
15. TrEMBL, UniProt.
16. Similarity searches using tools like BLAST and interpretation of results.
17. Multiple sequence alignment using ClustalW.
18. Use of various primer designing and restriction site prediction tools.
19. Phylogenetic analysis of protein and nucleotide sequences.
20. Sequence alignments.
21. Sequence and structure visualization

Reference Books

1. Laboratory Immunology by Bradshaw LJ.
2. Laboratory manual in Biochemistry by J. Jayaraman (Wilety Eastern limited).
3. Laboratory Manual in Microbiology by P. Gunasekaran (1996), New Age Publ.
4. Manual of clinical laboratory immunology by Rose NR.
5. Microbiology laboratory Manual (2001) by Aneja, K.M
6. Microbiology laboratory Manual 4th Edit. By Cappuccino
7. The experimental foundations of modern immunology by Clark W.R.
8. Bioinformatics – D.Mount
9. Introduction to Bioinformatics by Arthur M.Lesk, Oxford.
10. Biostatistics – Daniel. (Wiley).
11. Statistics by S.C.Gupta.

12. Statistical Methods by G.W.Snedecor & W.G.Cochran.

13. Fundamentals of Biostatistics – Khan & Khanum.

14. Fundamentals of Biostatistics by U.B.Rastogi (Ame Books Ltd).

Course outcomes:

At the end of the course, a student should be able to:

1. Handle blood group analysis in human beings
2. Perform immunological techniques for analysis of antigen and antibody interactions.
3. Perform bio statistical analysis
4. Use software tools to analyse proteins and nucleic acids

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO_2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO_3	1	1	-	-	-	-	-	-	1	-	-	1	1	-
CO_4	1	1	-	-	-	-	-	-	1	-	-	1	-	-

SEMESTER –III

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 301	Genetic Engineering	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To impart knowledge about major events in the development of rDNA technology
2. To acquire skills on techniques of construction of recombinant DNA - Cloning vectors and isolation of gene of interest.
3. To familiarize with the concepts of constructing genomic DNA library and cDNA library
4. To understand the principles and applications of Polymerase Chain Reaction (PCR).

UNIT-I

Requirements and steps involved in gene cloning, Isolation of gene/DNA fragments. Purification of genes. Enzymes used in gene cloning: Restriction endonucleases – types, nomenclature and properties. DNA polymerases-I, polynucleotide kinase, DNA ligases, terminal nucleotide transferases, Reverse transcriptase, alkaline phosphatases, S_1 nucleases. Production of DNA fragments with cohesive ends and blunt ends and their significance, vectors and hosts.

UNIT-II

Vectors for construction of genomic libraries - cosmids, bacterial artificial chromosomes (BACs), yeast artificial chromosomes (YACs) - vectors for construction of cDNA libraries - lamda ZAP. Multipurpose vectors - pUC 18/19, Blue script vectors - multiple cloning site - Strategies for unidirectional deletion of cloned DNA fragments - Generation of sequence of cloned DNA fragments. Site directed

mutagenesis.

Expression vectors – structure - promoters used in expression vectors - *lac, tac, λpL*, T7 promoters and their significance in constructing expression vectors. Promoter-probe vectors – Structure promoter probe vector - Reporter genes (*lacZ*, *gf*p, gus, luciferase) and strategies used to assay promoter activity. Vectors used for cloning in to mammalian cells - SV40. Vectors - Cloning in plants by Ti and Ri vectors.

UNIT-III

cDNA synthesis - Mechanism of cDNA synthesis, Strategies used to obtain full length cDNA. 5' and 3' RACE. Chemical synthesis - solid phase synthesis of oligonulceotides - Designing of gene from amino acid sequences, *In vitro* synthesis of gene. Ligation of foreign DNA to vectors – cohesive and blunt ends methods –linkers, homopolymer tailing and adaptors.

UNIT-IV

Cloning stratergies – cloned gene transfer techniques – transformation, transfection, electroporation, lipofection, microinjection and biolistics. Screening of cloned genes and their expression – nucleic acid probes, colony and fluorescent in-situ hybridization, DNA micro array technology. PCR – concept and technology – types (real time, inverse and multiplex) and its significance. Analysis of DNA polymorphism: RFLP, RAPD, AFLP techniques. Applications of genetic engineering.

Reference Books

1. DNA replication, 2nd ed. 1991. A. Kornberg and T.A. baker. W.H. Freeman and Company, New York. Ny. PP931.
2. Gene transfer and expression protocols: Methods in Molecular Biology, Vol.7,1991. E.J. Murray Ed. Human Press, Clifton, NJ. PP 439.
3. Genes IV, 1990. B. Lewin. Oxford University Press. PP 857.
4. Microbial genetics. 1994. Freifelder, D. Springer.
5. Gene regulation, 2nd ed. 1994. D, latchman. Sciential Publication.

6. Bacterial and Bacteriophage genetics. 1994. E.A. Birge. Springerscan Publication.
7. Genetics: A molecular approach. 2nd ed. 1992. T.B. Brown. Panima Publications. PP 496.
8. Principles of Gene Manipulation. 1991. R.W. Old and S.B. Prim-Rose. 2nd ed. Blackwell Scientific.

Course outcomes:

The student will be able to

1. Familiar with the tools and techniques for isolation and purification of genes
2. Acquire knowledge on vectors for construction of genomic libraries and cDNA libraries
3. Understand the mechanism of cDNA synthesis
4. Know the techniques for transfer and expression of cloned gene and applications of genetic engineering in biological research.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	3	3	3	2	-	1	2	1	1	2	2	1	-
CO_2	3	3	3	3	2	-	1	2	1	1	2	2	-	-
CO_3	3	3	3	3	2	-	1	2	1	1	2	2	1	-
CO_4	3	3	3	3	2	-	1	2	1	1	2	2	1	-
PO Attainment														

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 302	Food and Industrial Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To impart knowledge about the principles of food preservation and processing
2. To make the student to be learn about various aspects of the Nitrogen fixation and mass production of bio fertilizers
3. To educate the student about bioenergy and its production.
4. To give insight on role of microorganisms in environment and their applications in food and dairy Industry

UNIT-I

Scope of biotechnology in the food and drink industry: Contamination of foods by pesticides, fertilizers, industrial waste and chemical contaminants. Principles under lying food spoilage - chemical, physical and physiological changes caused by microorganisms. Control measures for food poisoning. Principles of food preservation, foods produced by microorganisms. Milk and Dairy products, Cereal products, Brewing, Protein products, Food additives and ingredients, Fruits and vegetables, large scale cultivation of edible mushrooms, meat and sausage products.

UNIT-II

Nitrogen fixation and mass production of biofertilizers - diazotrophic microorganisms, Biochemical aspects of diazotrophy. Genetics of free living and symbiotic diazotrophs. Blue Green Algae and Azolla, Micorrhizae, Vermiculture, Mass cultivation of commercially valuable macro and micro algae for agar agar, alginates, single cell protein and other products.

UNIT-III

Energy and Biotechnology: Biomass, solar energy technology, Agriculture and forestry, conversion to fuel, bio fuel cells and other devices. Biogas production – design and types of biogas digesters. Production of biohydrogen. Microbial leaching, Metal transformation, accumulation and immobilization by microbes. Application of microbes in mining and petroleum industry. Microbial enhanced oil recovery. Biodegradation of xenobiotic compounds, Hazards from xenobiotics.

UNIT-IV

Materials and Biotechnology: Biomolecules production - microbial polysaccharides, organic acids, amino acids, vitamins, antibiotics, enzymes, alcohols, food flavors, significance of Agrobacterium in enhancing food quality and yield Microbial toxins. Pharmaceuticals - vaccines, hormones, diagnostics. Applications of enzymes in industry and medicine; immobilized enzymes - their preparation and applications. Use of microbes in biodegradation of organic wastes. Industrial production of fungal, bacterial and viral biopesticides.

Reference Books

1. Fermentation: A Practical approach. 1990. B. Me Neil and L.M. Harvey. IRL Press. PP 226.
2. Biofertilizers in Agriculture and Agroforestry. 3ed. 1994. Subbarao. Oxford & IBH Publications.
3. Manual of Industrial Microbiology and Biotechnology. 1986. Edited by Arnold L. Demain and Nadine. A. Solomon. PP 466.
4. Bioreactors in Biotechnology-A Practical Approach. AR. Seregg.
5. Downstream Process: Equipment and Techniques. Advances in Biotechnological Process. Vol. 8, 1988. Ed. A. Mizrahi, Alan R. Liss. Ince.
6. Biotechnology and the Food Industry. 1989. Ed.P.L.Rogers and G.H. Plat, Gordon & Breach. Sci. Publication.
7. Principles of fermentation technology. 1984. P.F. Stanbury and A. Witaker. Perman Press.

8. Biochemsitry and genetic regulation of commercially important antibiotics. 1983. L.C. Ving,

9. Enzymes in industry and Medicine. 1987. G.F. Bickerstaff. Edward Arnold Publishers.

10. Biotechnology: Principles and Applications, 1994, by J. Hrggins, D.J. Best and J. Jones.

11. Fundamentals of Biotechnology, 1987. P. Prave, V. Paust, W. Sitting and D.A. Sukatsch (eds). VCH.

12. Crueger, W., and Crueger: Biotechnology; A Textbook of Industrial Microbiology, 2nd ed. Sinauer Associates. Inc. Sunderiand Mass/1990.

13. Demain, A.L., and N.A. Solomon, eds., Manual of Industrial Microbiology and Biotechnology, American Society for Microbiology. Washington. D.C.1986.

14. Frazier, W.C.,.and D.C. Esthoff: Food Microbiology, 4!h ed., Me Graw-Hill, New York, 1988.

15. U.S. Congress, Office of Technology Assessment: "Biotechnology in a Global Economy" OTA-BA-494, Government Printing Office, Washington, D.C., 1991.

16. Industrial microbiology, Prescott and Dunn. 1997. Ed. Gerald Reed.

Course outcomes:

The student will be able to

1. Acquire knowledge on food preservation, processing and control measures for food poisoning
2. Establish indoor and outdoor cultivation units for algal cultivation
3. Learn effective management of solid waste for energy production.
4. Appreciate the industrial role of microorganisms in production of biomolecules

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	2	3	3	2	-	-	-	1	1	1	-	1	-
CO_2	3	2	3	3	2	-	-	-	1	1	1	-	-	-
CO_3	3	2	3	3	2	-	-	-	1	1	2	-	1	-
CO_4	3	2	3	3	2	-	-	-	1	1	2	-	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 303 a	Bioprocess Engineering and Technology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To impart knowledge about Isolation, screening and maintenance of industrially important microbes
2. To make the student to learn about fermentation technology
3. To educate the student to gain knowledge in reaction kinetics, kinetics of enzyme catalyzed reactions
4. To familiarize with the concepts and the techniques of bio separation

UNIT-I

Isolation, screening and maintenance of industrially important microbes; microbial growth and death kinetics (an example from each group, particularly with reference to industrially useful microorganisms); Strain improvement for increased yield and other desirable characteristics.

UNIT-II

Bioreactor designs; types of fermentation and fermenters; Concepts of basic modes of fermentation – batch, fed batch and continuous; conventional fermentation v/s biotransformation; Solid substrate, surface and submerged fermentation; Fermentation economics; Fermentation media; Fermenter design - mechanically agitated; pneumatic and hydrodynamic fermenters; Large scale animal and plant cell cultivation and air sterilization: Upstream processing; media formulation; sterilization; aeration and agitation in bioprocess; Measurement and control of bioprocess parameters; Scale up and scale down process.

UNIT-III

Kinetics of Enzyme catalyzed reactions - immobilization - Kinetics of immobilized

enzyme catalyzed reactions - Kinetics of balanced growth - Transient growth kinetics. Gas-liquid mass transfer in cellular systems - Aeration – Agitation - Estimation of oxygen transfer rates.

UNIT-IV

Bioseparation - filtration, centrifugation, sedimentation, flocculation; cell disruption; Liquid-liquid extraction; Purification by chromatographic techniques; reverse osmosis and ultra filtration; drying; crystallization; Storage and packaging; Treatment of effluent and its disposal. Large scale production and purification of recombinant therapeutics (streptokinase, epidermal growth factor, insulin).

Reference Books

1. Bio processing Engineering principles. 1995. P.M.Doran. Har court Brace. PP 464
2. Biochemical engineering. 1992. James.M. Lee Prentice -Hall.
3. Biochemical engineering Fundamentals, 2ed 1986 J.E. Bailey and D.F.Oilis. Me Graw-Hill Publication.
4. Chemical Process Control: An Introduction to theory and practice. 1984.G. Stephanopoulos, Prentice-hall.
5. Modeling and controlling of fermentation Process. Ed. J.R. Leigh.
6. Biochemical Engineering by S. Aiba, AE Humphery, NF Millis, University, of Tokyo Press.
7. Chemical Engineering by JM Coulson and JF Richarson, Pergamen Press.
8. Fundamentals of Biotechnology by P. Prave, U. Faust W.Sitting and DASukatsch, VCH.
9. A Text Book on Biotechnology by HD Kumar, Affliated East West Press Private Ltd.

Course outcomes:

The student will be able to

1. Handle the axenic cultures of industrially important microbes and appreciate the relevance of microorganisms from industrial context.

2. Gain an overview on design, operations and types of fermentation systems
3. Calculate yield and production rates in a biological production process, and also interpret data
4. Apply knowledge on separation and purification of end products of fermentation

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	3	3	3	3	-	-	-	1	1	-	-	-	1
CO_2	3	3	3	3	2	-	-	-	1	1	-	-	-	-
CO_3	3	3	3	3	2	-	-	-	1	1	-	-	1	-
CO_4	3	3	3	3	3	-	-	-	1	1	-	-	1	1
PO Attainment														

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 303 b	Legal, Ethical and Implications of Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To make them understand the concept of intellectual property rights and its importance in biotechnology
2. To acquaint them to identify legal and ethical issues raised in Biotechnology
3. To make them know the social and moral implications in biotechnology research.
4. To impart knowledge on pros and cons of genetically modified foods and microbes

UNIT-I

Intellectual property rights - Definition - types -patents - copy rights-trademarks: essential requirements for IPR, procedures of filing patents-provisional and complete specifications-Pan-Co-operation treaty (PCT)-application: GATT and IPR: WTO Act - Global and Indian Biodiversity Act- Indian Patent Act and their revised versions.

UNIT-II

Legal and Ethical aspects of Biotechnology -Prenatal diagnosis - Genetic screening - Surrogate mothers and exploitation of women - designing of plants and animals- gene therapy - cloning - Manipulation of human genome -Technology transfer.

UNIT-III

Social and Moral aspects of Biotechnology -Biotechnology and International trade - Privatization and patenting of Biotechnology products - Role of Government, Industries and society in promoting, accepting and regulating the rDNA research.

UNIT-IV

Environmental and Health aspects of Biotechnology - Generally engineered organisms - Introduction of novel species and natural equilibrium - Environmental security and safety -Precautionary measures - Genetically modified foods - health safety.

Reference Books

1. Gene Cloning – Brown.
2. Concepts in Biotechnology- Balasubramanyam.D.
3. Basic Biotechnology - Colin Rotledge and Kristainsen.
4. Gene Biotechnology – Jogdand.
5. From Genes to Clones, Introduction to Gene Technology-Winnacker, Ernst.L.
6. Safety, Moral, Social and Ethical issues related to genetically modified foods - Smith J.E.
7. Molecular Biology and Biotechnology - Meyer R.A.
8. Environmental Biotechnology- Forster and wase.
9. Biotechnological Innovations in Environmental Management - Leach and Van Dam-mieras.
10. Industrial Microbiology and Biotechnology- Demain and Solomon.

Course outcomes:

The student will be able to

1. Develop awareness on types IPR and patenting process
2. Understand legal and ethical controversies in biotechnological innovations
3. Apply knowledge in providing safety of food, water and environment
4. Gain overview of GM crops and microbes and their impact on environment

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	2	2	3	1	2	-	-	-	1	1	-	-	1	-
CO_2	2	2	3	1	2	-	-	-	1	1	-	-	-	-
CO_3	2	2	3	1	2	-	-	-	1	1	-	-	1	-
CO_4	2	2	3	2	2	-	-	-	1	1	-	-	1	-
PO Attainment														

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 303 c	Emerging technologies in Biotechnology	**04**	**4**
Sessional Marks: 20		**End Semester Examination Marks: 80**	

Course Objectives:

1. To impart knowledge about role of stem cells and its importance.
2. To make the student to learn about nanoscience and applications in different fields
3. To educate the student about applications of biosensors
4. To familiarize with RNAi Technology

UNIT - I

Stem cell technology: Unique properties of stem cells, embryonic stem cells, Adult stem cells: occurrence and functions, tests, cell differentiation and stem cell plasticity and transdifferntiation, medical applications of stem cells, Advantages and disadvantages of stem cell technology, Recent trends in stem cell technology.

UNIT - II

Introduction to Nanoscience: Definition of Nanoscience and its applications, Nanotechnology – History – Kinds of nanomatter, Biosynthesis of nanomaterials. Safety aspect of Nanobiotechnology. Nano biochips and devices. Biomedical applications of Nanomaterials. Nanoparticles in food and cosmetic application.

UNIT – III

The role of transducer and its applicability. Role of antibodies in biosensing; Nano biosensors applications of biosensors in medicine, food industry and environmental monitoring.

UNIT – IV

RNAi Technology: History and discovery, Cellular mechanism- dsRNA cleavage,

micro RNA, RNA induced silencing complex (RISC), activation and catalysis, transcriptional silencing, variation among organisms, biological functions, technological applications- gene knock down, functional genomics, medicine, and biotechnology

REFERENCE BOOK

1. Sasidhara R, Animal Biotechnology, MJP Publishers, Chennai, 2006.
2. M.M. Ranga, Animal Biotehnology, Student Edition, Chennai.
3. Geoferey M. Cooper, The Cell, A molecular approach, 3rd Edition, ASM press, Washington, D.C. 2004.
4. Gregory J. Hannon, RNAi – A guide to gene silencing, Cold Spring Harbor Press, 2003.

Course outcomes:

The student will be able to

1. Acquire the knowledge about recent trends in stem cell technology and medical applications of stem cells
2. Understand the Biosynthesis of nanomaterials and biomedical applications of nanomaterials.
3. Learn role of antibodies in biosensing and applications of Nano biosensors in medicine, food industry and environmental monitoring.
4. Develop understanding on RNAi Technology and its technological applications

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	3	2	2	1	1	-	-	-	-	1	1	1	-	1
CO_2	3	2	2	1	1	-	-	-	-	1	1	1	-	-
CO_3	3	2	2	1	1	-	-	-	-	1	1	1	1	-
CO_4	3	2	3	2	1	-	-	-	-	1	1	1	1	-
PO Attainment														

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 304 P	Genetic Engineering, Food and Industrial Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Practicals: GENETIC ENGINEERING, FOOD AND INDUSTRIAL BIOTECHNOLOGY

Course Objectives:

1. To know the technique of plasmid Isolation
2. To know the different genetic engineering techniques
3. To educate the student about different PCR techniques
4. To make the student to learn about technique of microbial enzyme production

1. Plasmid Isolation
2. Restriction digestion of DNA.
3. Elution of DNA from Agarose gel.
4. Ligation of DNA into linearized plasmid.
5. Preparation of competent Cells
6. Transformation
7. Isolation of RNA from yeast.
8. Polymerase chain reaction (PCR)
9. RFLP
10. RAPD
11. Isolation of Lactobacillus from curd.
12. Isolation of surface flora of vegetables.

13. Determination of quality of a milk sample by methylene blue reduction test.
14. Production pectinase enzyme from a pathogen.
15. Estimation of amylase activity produced by Bacillus subtilis.
16. Estimation of protein content in spirulina.
17. Estimation of vit-c from different fruit samples.

Reference Books

1. Molecular Biology, Vol. 7, 1991. E.J. Murray ed. Humana Press. Clifton, NJ. PP 439. Genes IV. 1990. B. Lewin. Oxford University Press. PP 857.
2. Guide to molecular cloning techniques: Methods in enzymology. Vol. 152. 1987. S.L. Berger and A.R. Kimmel Ed. Academic Press. PP812.
3. Methods in molecular genetics: Molecular microbiology techniques Vol.3. 1994, Kenneth W. Adolph. Ed, Academic Press. PP 2150.
4. Laboratory Manual in Molecular genetics. 1994. Z.F. Burton and J.M.Kaguni. Harcourt Brace. PP 224.
5. Methods in Molecular Genetics. Vol.5, 1994. Kenneth. W. Adolph. Harcourt Brace. PP 425.

Course outcomes:

The student will be able

1. To learn the technique of plasmid Isolation
2. To learn the skill of performing different genetic engineering techniques
3. To learn about different PCR techniques
4. To perform microbial enzyme production

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**

CO_1	1	1	-	-	1	-	-	-	-	1	1	1	-	1
CO_2	1	1	-	-	1	-	-	-	-	1	1	1	-	-
CO_3	1	1	-	-	1	-	-	-	-	1	1	1	1	-
CO_4	1	2	-	-	1	-	-	-	-	1	1	1	1	-
PO Attainment			-	-										

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 305	**Skill Oriented Course** Plant Tissue Culture	**04**	**4**
Sessional Marks: 10			**End Semester Examination Marks: 90(40+50)**

Course Objectives:

1. To impart knowledge about the organization of Plant Tissue Culture Lab.
2. To give insight of nutrient requirements and factors influencing plant tissue culture.
3. To develop skill on micropropagation of forest trees, medicinal plants and endangered plants.
4. To educate the student to learn methods to in vitro germplasm conservation and production of secondary metabolites through cell culture.

UNIT-I

Introduction to plant tissue culture: Preparatory techniques - cleaning, sterilization, sterile handling tissue culture lab requirements. Media - Composition, preparation and sterilization.

Genetic manipulation through tissue culture techniques - Concepts of differentiation and dedifferentiation. Callus - growth pattern/characteristics, Organogenesis and plant regeneration.

UNIT-II

Somatic embryogenesis. Anther, endosperm and pollen cultures, Significance and advantages of haploid plants. Production of virus-free plants by meristem tip and other tissue culture techniques.

UNIT-III

Cell culture techniques for micropropagation of elite plants - Food and fruit crops, forest trees, fiber crops, ornamental plants, medicinal plants and endangered plants. Cell culture techniques for production of useful compounds - Hairy root cultures - transformed roots using Agro bacterium rhizogenesis - Production of secondary metabolites of commercial importance - Elicitors - factors affecting their yield,

immobilized cell systems, bioreactors.

UNIT-IV

Selection of clones for nutritional, disease resistance, salt and drought resistance. Germplasm preservation by tissue technology, artificial synthetic seeds. Protoplast culture -isolation of protoplasts, culture and fusion methods, Somatic hybrids and cybrids.

PRACTICALS: PLANT TISSUE CULTURE

1. Organizing Plant tissue culture Laboratory.
2. Preparation of Tissue Culture Media.
3. Callus Induction.
4. Shoot tip culture.
5. Embryo / Endosperm Culture.
6. Organogenesis.
7. Somatic Embryogenesis.
8. Cell suspension culture.
9. Anther and Pollen cultures.

Reference Books

1. Plant tissue culture – theory and practice by Bhojwani S.S.
2. Plant cell culture – A practical approach by Dixion R.A.
3. Plant Cell, Tissue and Organ Culture, By Reinert, J. and YPS Bajaj (Springer – Verlag).
4. Plant tissue and cell culture, by Street, HE (Blackwell).
5. Introduction to Plant Biotechnology, Chawla, H. S. (2000), Enfield, NH: Science.
6. Introduction to Plant Tissue Culture, Razdan, M. K. (2003), Enfield, NH: Science.
7. Plant Biotechnology: an Introduction to Genetic Engineering, Slater, A., Scott, N. W., & Fowler, M. R. (2008), Oxford: Oxford University Press.
8. Biochemistry & Molecular Biology of Plants, Buchanan, B. B., Gruissem, W., & Jones, R. L. (2015), Chichester, West Sussex: John Wiley & Sons.

Course outcomes:

The student will be able to

1. Learn important milestones in the plant tissue culture and understand the concepts and principles of Plant tissue culture.
2. Learn different pathways of plant regeneration under in vitro conditions – organogenesis, somatic embryogenesis, synthetic seeds and applications.
3. Understand techniques of establishing cell suspension culture, techniques of virus elimination by meristem and shoot tip culture.
4. Acquire skill of propagation of elite medicinal and economically important plants and establish micropropagation unit for commercialization.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PS01	PS02
CO_1	3	2	3	3	-	-	-	-	2	-	-	-	-	-
CO_2	3	2	3	3	-	-	-	-	2	-	-	-	-	1
CO_3	3	2	3	3	-	-	-	-	2	-	2	-	1	-
CO_4	3	2	3	3	-	-	-	-	2	-	2	-	1	1
PO Attainment														

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 306 a	Bioethics	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To impart knowledge about intellectual property rights
2. To make the student to learn about legal and ethical aspects of Biotechnology
3. To educate the student about Social and Moral aspects of Biotechnology
4. To train students on Environmental risk assessment and food and feed safety assessment.

UNIT-I

Intellectual property rights - Definition - types -patents - copy rights-trademarks: essential requirements for IPR, procedures of filing patents-provisional and complete specifications-Pan-Co-operation treaty (PCT)-application: GATT and IPR: WTO Act - Global and Indian Biodiversity Act- Indian Patent Act and their revised versions.

UNIT-II

Legal and Ethical aspects of Biotechnology -Prenatal diagnosis - Genetic screening - Surrogate mothers and exploitation of women - designing of plants and animals- gene therapy - cloning - Manipulation of human genome -Technology transfer.

UNIT-III

Social and Moral aspects of Biotechnology -Biotechnology and International trade - Privatization and patenting of Biotechnology products - Role of Government, Industries and society in promoting, accepting and regulating the rDNA research.

UNIT-IV

Environmental and Health aspects of Biotechnology - Generally engineered organisms - Introduction of novel species and natural equilibrium - Environmental security and safety -Precautionary measures - Genetically modified foods - health

safety.

Reference Books

1. Gene Cloning – Brown.
2. Concepts in Biotechnology- Balasubramanyam. D.
3. Basic Biotechnology - Colin Rotledge and Kristainsen.
4. Gene Biotechnology – Jogdand.
5. From Genes to Clones, Introduction to Gene Technology-Winnacker, Ernst.L.
6. Safety, Moral, Social and Ethical issues related to genetically modified foods - Smith J.E.
7. Molecular Biology and Biotechnology - Meyer R.A.
8. Environmental Biotechnology- Forster and wase.
9. Biotechnological Innovations in Environmental Management - Leach and Van Dam-mieras.
10. Industrial Microbiology and Biotechnology- Demain and Solomon.

Course outcomes:

The student will be able to

1. Acquire the knowledge on IPR and procedures for patent filing
2. Understand the Legal and Ethical aspects of gene therapy - cloning - Manipulation of human genome -Technology transfer.
3. Learn role of Government, Industries and society in promoting, accepting and regulating the rDNA research
4. Develop understanding on Environmental and Health aspects of Biotechnology

	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO$_1$**	**PO$_1$**	**PO$_1$**	**PS0**	**PS0**	**PS0**	**PS0**

	1	2	3	4	5	6	7	8	9	0	1	2	1	2	1	2
CO_1	2	2	3	1	2	1	1	3	1	1	-	-	-	-	-	-
CO_2	2	2	3	1	2	1	1	3	1	1	-	-	-	-	-	-
CO_3	2	2	3	1	2	1	1	3	1	1	-	-	-	-	1	-
CO_4	2	2	3	2	2	1	1	3	1	1	-	-	-	-	1	-
PO Attainment																

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 306 b	Bioinformatics	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To gain working knowledge on computational tools and methods
2. To gain knowledge about various Biological databases that provide information about nucleic acids and protein
3. To get exposed to computational methods, tools and algorithms employed for Biological Data Interpretation
4. To provide knowledge about the basics of sequence alignment and analysis.

UNIT-I

Concept of programming languages, hardware and software. The basics of operating system. Windows operating systems commands to create and handle directory and files, creation of biological data bases and MS access. MS office: introduction and facilities available, shortcut bar, customizing tool bars, starting an office file, MS word, Excel, Power point

UNIT-II

Introduction to internet and biologists: Basics on internet, getting into the internet, email, file transfer protocols, gopher, www, browsing and downloading from the sites

Networking of computers and overview of networks: Virtual library I, II, III and information networks: www, http, html, URLs, EMB net, NCBI net, Virtual tourism.

UNIT-III

Primary information resources for proteins and genes, biological databases for protein and DNA sequences, Specialized genomic resources, DDBJ, Gen Bank, and EMBL public DNA sequence databases, SWISSPORT data base, information retrieval from biological data bases, the NCBI data model, submitting the DNA sequence to the

database and updating.

Sequence Analysis: Wisconsin GCG, DNASIS, DNASTAR, CLONE Manager, packages for nucleotide sequence analysis, sequence alignment and database searching, practical aspects of multiple sequence alignment.

UNIT-IV

Phylogenetic analysis: phylogenetic models, multiple alignment procedures, (CLUSTAL, ALIGN, PHYLIP), tree building methods, trees evaluation, rooting trees, phylogenetic software. Predictive methods: Detecting regulatory elements in the DNA, Physical properties of proteins based on proteins based on sequences, differential protein structural motifs, RNA binding domains and folding classes, transcription factors and their DNA binding, protein structure predictions.

Reference Books

1. Robert B Northrop, Anne N Connor: Introduction to Molecular Biology, Genomics and Proteomics for Biomedical Engineers, CRC Press.
2. Brown TA, Genomes, 3rd Edition, Garland Science, 2006.
3. Voet D, Voet JG & Pratt CW, Fundamentals of Biochemistry, 2nd Edition. Wiley 2006.
4. Discovering Genomics, Proteomics and Bioinformatics, 2nd edition-A. Malcolm Campbell and Laurie J. Heyer (ISBN 0-8053-4722-4)-Cold Spring Harbor Laboratory press and Benjamin Cummings, 28 Feb 2006.
5. Campbell AM & Heyer LJ, Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition, Benjamin Cummings, 2007.
6. Primrose S & Twyman R, Principles of Gene Manipulation and Genomics, 7th Edition, Blackwell, 2006.

Course outcomes:

The student will be able to

1. Develop understanding about Biological data and database search tools
2. Acquire hands on training on various computational tools and techniques employed in Biological sequence analysis
3. Learn about pathway and enzyme databases, Sequence submission tools
4. Develop understanding on protein folding and its significance

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**	**PS01**	**PS02**
CO_1	2	2	2	1	-	-	-	-	1	1	-	-	-	-	-	-
CO_2	2	2	2	1	-	-	-	-	1	1	-	-	-	1	-	-
CO_3	2	2	2	1	-	-	-	-	1	1	1	1	1	-	1	-
CO_4	2	2	2	1	-	-	-	-	1	1	1	1	1	1	1	1

Semester – IV

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 401	Environmental Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. Make them understand the concept, organization and energy flow in an ecosystem
2. Impart knowledge on the process of biodegradation and bioremediation
3. Equip with the knowledge on biological control and scope of bio fertilizers in agriculture
4. Educate about different types of wastes and their ecofriendly management

UNIT-I

Structure of model ecosystem - terrestrial, aquatic ecosystems - Energy flow - Degradation of ecosystem. Consequences - Ecosystem managements - Energy conservation - Alternative energy sources - Biofuels: Production of bioethanol, boibutanol from agriculture waste - Problems and perspectives - Biodiesels: mass cultivation of *Jatropa* and use of *Jatropa*, marine algae for production of biodiesel.

UNIT-II

Nature of recalcitrant compounds - Anthropogenic activities generating recalcitrant chemical waste - BHC, DDT, nitro phenols, polycyclic aromatic carbons. Biodegradation - microbial conversion of recalcitrant toxic compounds into TCA cycle intermediates eg: *Pseudomonas putida*. Bioremediation, Degradation pathways - naphthalene, BHC, and nitro phenols. Use of microbes for reconstruction of ecosystems - Genetics of biodegradation. Microbes as biosensors for detecting pollution. Superbug – cleaning of oil spills.

UNIT-III

Biological methods of pest management - Role of Juvenile hormones, pheromones and its analogues for pest management, Chromosomal manipulation and androgenesis of pest , sterile male technology, Biological control of weeds. Bacterial (BT), viral, fungal insecticides - Technology for mass production and formulation of biopesticides - Problems and prospects.

Biofertilizers - Important diazotropic, microbes - mechanism of symbiotic and asymbiotic biological nitrogen fixation - Regulation of nitrogen fixing genes (Nif genes). Manipulation of Nif genes for constitutive expression of nitrogenase - Ammonia transport and its significance. Mass production of biofertilizers - *Rhizobium, Azolla.*

UNIT-IV

Waste management - Nature and classification of agriculture, domestic and industrial waste - Recycling methods. Solid waste treatment. Biological and non-biological methods of waste water treatment. Reclamation of treated waste water.

Reference Books

1. Environmental Biotechnology: Concepts and Application by Jordening H J and Winter J.
2. Environmental Biotechnology: Theory and Application by Evans G M and Furlong J C.
3. Environmental Biotechnology by Bhattacharya B C and Banerjee R.
4. Environmental Biotechnology: Basic Concepts and Applications by Indu Shekhar Thakur.
5. Environmental Biotechnology by V Kumaresan and N Arumugam.
6. Environmental Biotechnology by Perry L McCarty and Bruce E Rittmann.
7. Textbook of Environmental Biotechnology by P K Mohapatra.
8. Environmental Biotechnology by T Srinivas.

9. Environmental Biotechnology by S K Agarwal.

Course outcomes:

The student will be able to

1. Learn the relation between biotic and abiotic factors in different ecosystem models and predict how changes in free energy availability affect ecosystems.
2. Appreciate the role of microorganisms in biodegradation and pollution detection
3. Develop skill on large scale production and applications of bio pesticides and bio fertilizers fin agriculture
4. Apply knowledge on solid waste management and reclamation of waste water

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**	**PS01**	**PS02**
CO_1	3	2	3	3	2	1	3	-	1	1	-	-	1	-	-	1
CO_2	3	2	3	3	2	1	3	-	1	1	-	-	-	1	-	1
CO_3	3	2	3	3	2	1	3	-	1	1	-	-	1	-	-	-
CO_4	3	2	3	3	2	1	3	-	1	1	-	-	1	1	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 402	Plant Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To impart knowledge about transgenic plants: herbicide, pest and disease resistant, abiotic stress resistant, nutritional enhancement and traits for improved quality
2. Impart knowledge on biosynthesis of plant compounds
3. Improve understanding on the role of algae as food, feed and medicine
4. Train in identification of plant pathogens using immunological and molecular techniques

UNIT-I

Concepts and scope of plant biotechnology -Application of genetic engineering technology for crop improvement - production of transgenic plants resistant to herbicides, pathogens, pests and abiotic stresses (drought, salt, frosts); production of transgenic plants with improved yields and nutritional quality; transgenic plants for production of viral antigens.

UNIT-II

Industry and Plant Biotechnology: Biosynthesis of plant compounds – Selection of cell lines for high yields of secondary metabolites – Enzymes from plants – Food and food additives from plants – Breeding strategies for enhancing the active principles in plants.

UNIT-III

Algae as a source of food, feed, single cell proteins, biofertilizers, industrial uses of algae. Mass cultivation of commercially valuable marine microalgae for agar agar, alginates and other products of commerce and their uses. Mass cultivation of macroalgae as a source of protein and feed. Indoor and outdoor cultivation of economic important algae – Use of algae in waste water treatment.

UNIT-IV

Nutrient film culture techniques - plant diseases – Physiology of infection in plants – disease resistance in plants - phytodiagnostics based on immunological and molecular techniques. Biological control of pests and diseases of crop plants and weeds - biopesticides - predators, parasites, insect viruses, antagonistic fungi and bacteria, antifeedants, and insecticidal activities of the compounds of Botanicals.

Reference Books

1. Molecular approaches to crop improvement. 1991. Dennnis and Li Welly eds. PP. 164.
2. Plant cell and Tissue culture. A Laboratory Manual. 1994. Reinert. J. and Yeoman, M.M. Spring.
3. Plant biotechnology, 1994. Prakash and Pierik. Oxford & IBH Publishing Co.
4. Gene transfer to plants. 1995. Potrykus-l and Spangenberg, G. Des. Springer Scan.
5. Methods in Plant Molecular Biology and biotechnology, 1993. R. Bernard Click and Joh. E.; Thompson, CRC, Press, PP. 384.
6. Genetic engineering with plant viruses. 1992. T. Michale. A. Wilson and J.W. Davies. CRC Press Inc, PP 384.
7. Plant cell Biotechnology. 1988. Borocoitzka M.A. and Borocoitzka L.J. Cambridge University Press.
8. Microaigal Biotechnology. 1988. Borocotizka M.A. and Borocoitzka L.J. Cambridge University Press.
9. Algal and Cyanobacterial biotechnology, 1989. Cresswell. R.C, Rees, T.A.V. and Shah, N.Eds. Longman Scientific and Technical, Essex, London.

Course outcomes:

The student will be able to

Students will be able to

1. Develop skill in production of transgenic plants resistant to biotic and abiotic stress

2. Apply knowledge for industrial production of plant metabolites

3. Cultivate the micro and macro algae of commercial importance on large scale

4. Identify different plant pathogens and apply biological control methods

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**	**PS01**	**PS02**
CO_1	2	2	3	3	3	-	-	-	3	-	-	-	-	-	-	1
CO_2	2	2	2	1	2	-	-	-	-	-	-	-	-	1	-	1
CO_3	1	1	-	1	1	-	2	-	-	-	-	-	1	-	1	-
CO_4	3	3	3	3	2	-	3	-	3	-	-	1	1	1	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 403 a	Animal Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. Develop understanding on the structure and functions of male reproductive system and methods of contraception
2. Make them learn the principle and methods of animal cloning
3. Provide knowledge on gene cloning and production of transgenic animals
4. Impart the knowledge on role of biotechnology in health care system

UNIT-I

Structure and function of male reproductive system - Hormonal regulation of spermatogenesis and spermatogenesis; Inhibin and androgen binding proteins; Capacitation of spermatozoa. Structure and function of female reproductive system - influence of hormones on development of ovarian follicles and oogenesis; Reproductive cycles; estrus and menstrual cycle; Ovulation, atresia and corpus luteum formation; Pregnancy and lactation; Implantation and placentation. Contraception in males and females; Hormonal and chemical; Recent advances in contraception research. Artificial insemination (AI) techniques and their development; Estrus synchronization; Semen collection, evaluation, storage, *in vitro* fertilization, Embryo transfer - ICSI and preservation of endangered species.

UNIT-II

Animal cloning and application in wild life and life stock: Overview; Challenges in human therapeutic cloning; Somatic cell nuclear transfer in humans; pronuclear early embryonic development. Nuclear transfer technology: Transfer of nuclei into eggs; development potential of transplanted nuclei; reprogramming a nucleus. Development of transgenic mice and other animal models: by injection of foreign DNA/gene into zygote; optimization of construct for *in vivo* expression. Generation of chimeric, transgenic and knockout mice and other animals and their characterization. Potential

application of transgenic animals: Models for various diseases/disorders, Production of peptides and proteins of biopharmaceutical interest (molecular pharming), transgenic fishes, transgenic poultry and transgenic insects as bioreactors.

UNIT-III

Animal cell culture: brief history of animal cell culture; cell culture media and reagents; culture of mammalian cells, tissues and organs; primary culture, secondary culture, continuous cell lines, suspension cultures. The biology of stem cells – Different types of stem cells – embryonic stem cells, fetal tissue stem cells, adult stem cells; stem cell differentiation, stem cell plasticity – Differentiation versus stem cell renewal. Isolation and propagation of embryonic stem cells; chimeras; generation of knockout mice and knock-in technology.

UNIT-IV

Application of animal cell culture for virus isolation and in vitro testing of drugs, testing of toxicity of environmental pollutants in cell culture, application of cell culture technology in production of human and animal viral vaccines and pharmaceutical proteins. Stem cell therapies: Clinical applications of stem cell therapy; Neurodegenerative diseases-Parkinson's disease, Alzeimer's, spinal cord injury, other brain syndromes; tissue systems failures - diabetes, cardiomyopathy, kidney failure, liver failure - hemophilia, lymphoma and leukemic malignancies requiring stem cell therapy.

Reference Books

1. Culture of animal cell: A Manual of Basic techniques. 3rd ed. 1994. R.I. Reshnery, Alan R. liss. Inc. New York, NY, 397.
2. Recombinant and synthetic vaccines 1994. G.P. 1 Taiwan K.V.S. Rao, V.S. Chauhan, Eds. PP. 528. Springer Scan Publication.
3. Animal Cell Biotechnology, Vol.6, 1994, R.E. Spier, J.B. Griffiths, Eds. Harcourt Brace. PP.

Course outcomes:

The student will be able to

1. Understand the organization of reproductive organs and advances in contraception research
2. Learn the techniques of In Vitro Fertilization and artificial insemination
3. Develop skill in molecular techniques for production of transgenic animals
4. Apply knowledge on molecular farming for production of vaccines and hormones

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**	**PS01**	**PS02**
CO_1	1	2	1	1	-	-	-	-	1	1	-	-	-	-	-	-
CO_2	2	2	1	1	2	-	-	-	1	1	-	-	-	1	-	1
CO_3	2	2	2	1	1	-	-	-	1	1	-	-	1	-	1	1
CO_4	3	2	2	2	2	-	-	-	1	1	1	1	1	1	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 403 b	Applications of Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To provide understandng on different areas of biotechnology
2. Impart knowledge on the role of biotechnology in agriculture
3. Develop skill on the cell & tissue culture system for vaccine production
4. Give insight on the xenobiotic environmental pollution and methods of degradation of toxic compounds

UNIT-I

History and scope of Biotechnology, Definition of Biotechnology, Old & Modern Biotechnology, Different areas of Biotechnology.

UNIT-II

Biotechnology and Agricultural, Micro propagation, (Cell and Tissue culture) Transgenic plants, Biofertilization, organic farming, Biopesticides.

UNIT-III

Application of Biotechnology in Animal sciences, Animal cell and tissue culture, production of transgenic animals, cloning of animals (IVF & ET) cryopreservation somatic production of animals, application of human vaccines in improving productivity.

UNIT-IV

Biotechnology and Environment: Microbial agents and Biochemical methods of xenobiotic degradation, OEMs, Waste water and solid waste management.

Reference Books

1. Gene Cloning – Brown.
2. Concepts in Biotechnology- Balasubramanyam.D.
3. Basic Biotechnology - Colin Rotledge and Kristainsen.
4. Gene Biotechnology – Jogdan.
5. From Genes to Clones, Introduction to Gene.
6. Technology- Winnacker, Ernst.L.
7. Safety, Moral, Social and Ethical issues related to genetically modified foods - Smith J.E.
8. Molecular Biology and Biotechnology - Meyer R, A.
9. Environmental Biotechnology- Forster and wase.
10. Biotechnological Innovations in Environmental.
11. Management - Leach and Van Dam-mieras.
12. Industrial Microbiology and Biotechnology- Demain and Solomon.

Course outcomes:

The student will be able to

1. Acquire the knowledge on applications of plant, animal and environmental biotechnology
2. Develop skill on organic farming and preparation of bio pesticides and bio fertilizers
3. Establish and maintain cell lines for vaccine production
4. Apply knowledge on waste management and recycling for environmental protection

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	2	2	3	1	-	-	-	-	1	-	-	1	-	1
CO_2	2	2	3	1	-	-	-	-	1	-	-	1	-	1
CO_3	2	2	1	1	-	-	-	-	1	-	-	-	-	-
CO_4	2	2	3	2	-	-	1	-	1	-	-	1	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 403 c	Pharmaceutical Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To impart knowledge on production of pharmaceutical products by biotechnological applications
2. Provide training in clinical testing of pharmaceutical products
3. Give insight on the drug designing and development
4. Explain the comprehensive overview on the conventional and recombinant vaccines and bioethical issues

UNIT-I

Definition - History of development of Pharmaceutical Products by biotechnological methods like genetic recombinant vaccines, microbial and non-microbial products - scope of biotech products and biochemical in pharmaceutical industry. Need to design a drug, drug receptor interactions, antagonisms, biological activity, efficacy and stimulus, receptors and ion channels, ion gating co-operatively effect of solvent on drug - receptor interactions, drug docking.

UNIT-II

Methods of testing products for anti-microbial potentials, pharmacological activities and biopesticidal properties -conventional and rapid enzyme inhibitor techniques; in vivo methods - use of animals models for confirmation of in vitro properties - transgenic systems - preclinical, toxicological studies, Acute, sub acute, chronic studies. Clinical trials -definition - design - specific objectives - types of clinical trials -phase I, II & II - randomized controlled clinical trials - multicentric double blind clinical trials - pharmaceutical/drug regulations for commercializing new biotech products for human use - PDA and Indian regulations.

UNIT-III

Biotech products as medicines and pharmaceutical products: Biochemical's - enzymes like proteases - chemical like ethanol, vinegar, citric acid and glutamic acid; vitamins like B12; drugs for infection and metabolic, immunomodulatory -insulin - interferon's, B-cell growth factors, Tissue plasminagen activator. r-DNA based production of regulatory proteins, blood products, hormones, vaccines, Application of RELP in forensic, disease prognosis, genetic counseling, pedigree, and variation.

UNIT-IV

Vaccines - cell culture-based vaccines - genetic recombinant vaccines - recombinant vector-based vaccines -live and subunit - their production model - fermentation technology - expression systems - guideline for the production of genetic recombinant vaccines - Eg. Hepatitis B vaccine, HIV vaccine and other vaccines in pipeline. Application of biotechnology to Animal health and disease diagnosis, Development of kits and their application in disease diagnosis. Gene therapy, vector engineering, strategies of gene deliver, gene replacement, augmentation, gene correction, gene regulation and silencing safety and bioethical issues in biotechnology.

Reference Books

1. Biopharmaceuticals- Walsh, John Willey and Sons, New York 1998 Pharmaceutical Biotechnology- Daan J.A. Crommelin, RobestD. Sindelar, Daan JACrommelinAmazon.
2. Physical Methods to characterize Pharmaceutical Proteins- James. N.Herron, Wim Jiskoor and Daan J.A.Crommelin Amazon. Wm From clone to clinic (Developments in Biotherapy)-Daan J.A.Crommelin and H.Schellekom Amazon.Wm.
3. Hand Book of Pharmaceutical Biotechnology- Jay P.Rho, Starlonie the Haworth press.
4. Alice Sr. Bringhamtpn, NY13904 US Drug discovery, Tamas bartifai, Harold L.Dorn's The Scientific world Ltd., Newburry, U.K.

Course outcomes:

The student will be able to

1. Gain knowledge on preparation and formulations of different drugs
2. Develop skill on commercial production of pharmaceutical products for human welfare
3. Learn the techniques of drug validation and vaccine production
4. Understand the bioethical principle, values, concepts and social and judicial implications of pharmaceutical biotechnology

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	2	2	1	1	-	-	-	-	1	1	-	-	-	1
CO_2	2	2	1	1	-	-	-	-	1	1	-	-	-	1
CO_3	2	2	1	1	-	-	-	-	3	1	3	-	1	-
CO_4	3	2	3	2	2	1	1	1	1	1	-	-	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 404 P	Environmental Biotechnology,Plant Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

PRACTICALS: ENVIRONMENTAL BIOTECHNOLOGY, PLANT BIOTECHNOLOGY

Course Objectives:

1. To impart knowledge on determination of total dissolved solids of water and
2. dissolved oxygen (DO) of water
3. Provide training in testing of biological and chemical oxygen demand of water.
4. Give insight on preparation and transformation of competent cells
5. To gain skill of *Agrobacterium tumefaciens*-mediated plant transformation

ENVIRONMENTAL BIOTECHNOLOGY

1. Determination of total dissolved solids of water.
2. Determination of dissolved oxygen (DO) of water.
3. Determination of biological oxygen demand (BOD) of water.
4. Determination of chemical oxygen demand (COD) of water.
5. Determination of total bacterial population by standard plate count technique.

PLANT BIOTECHNOLOGY

1) Preparation of competent cells of E. coli for harvesting plant transformation vector.
2) Transformation of competent cells of E. coli with plant transformation vectors.

3) Mobilization of recombinant Ti plasmid from common laboratory host (E. coli) to an *Agrobacterium tumefaciens* strain.

4) Agrobacterium tumefaciens-mediated plant transformation.

Course outcomes:

The student will be able to

1. Learn skill of determination of total dissolved solids of water and
2. dissolved oxygen (DO) of water
3. Gain skill in testing of biological and chemical oxygen demand of water.
4. Perform preparation and transformation of competent cells
5. To do *Agrobacterium tumefaciens*-mediated plant transformation

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	1	1	-	-	-	-	1	-	-	1	-	-	-	1
CO_2	1	1	-	1	-	-	2	-	-	1	-	-	-	1
CO_3	1	1	-	-	-	-	-	-	-	1	-	-	1	-
CO_4	2	3	-	-	-	-	1	-	-	1	-	-	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 405	MOOCS/Project	**04**	**4**
End Semester Examination Marks: 100			

Marks allotted to thesis preparation-80 (40 marks for the progress performed by the student in laboratory will be awarded by project research supervisor and another 40 marks for content of the thesis) & Marks allotted to viva presentation-20

Course Objectives:

1. To impart knowledge about the various analytical and biophysical techniques.
2. To make the student to be able to carry out purification and characterization of various biomolecules.
3. To educate the student to characterize the separated biomolecules by electrophoresis and spectroscopic techniques.
4. To familiarize with the concepts and the techniques of Radioactivity

Course outcomes:

The student will be able to

5. Acquire the knowledge on classification and structure of different microorganisms
6. Understand the microbial techniques for isolation, cultivation and maintenance of pure cultures
7. Learn structure, function of gene and its transfer methods
8. Develop understanding on cause, spread and control of diseases caused by different microorganisms

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	2	2	1	1	-	-	-	-	1	1	-	-	-	1
CO_2	2	2	1	1	-	-	-	-	1	1	-	-	-	1
CO_3	2	2	1	1	-	-	-	-	3	1	3	-	1	-
CO_4	3	2	3	2	2	1	1	1	1	1	-	-	1	-

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 406 a	Applications of Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To provide understanding on different areas of biotechnology
2. Impart knowledge on the role of biotechnology in agriculture
3. Develop skill on the cell & tissue culture system for vaccine production
4. Give insight on the xenobiotic environmental pollution and methods of degradation of toxic compounds

UNIT-I

History and scope of Biotechnology, Definition of Biotechnology, Old & Modern Biotechnology, Different areas of Biotechnology.

UNIT-II

Biotechnology and Agricultural, Micro propagation, (Cell and Tissue culture) Transgenic plants, bio fertilization, organic farming, bio pesticides.

UNIT-III

Application of Biotechnology in Animal sciences, Animal cell and tissue culture, production of transgenic animals, cloning of animals (IVF & ET) cryopreservation somatic production of animals, application of human vaccines in improving productivity.

UNIT-IV

Biotechnology and Environment: Microbial agents and Biochemical methods of xenobiotic degradation, OEMs, Waste water and solid waste management.

Reference Books

1. Gene Cloning – T.A. Brown.
2. Concepts in Biotechnology- Balasubramanyam.D.
3. Basic Biotechnology - Colin Rotledge and Kristainsen.
4. Gene Biotechnology – Jogdan.
5. From Genes to Clones, Introduction to Gene Technology- Winnacker, Ernst.L.
6. Safety .Moral, Social and Ethical issues related to genetically modified foods - Smith J.E.
7. Molecular Biology and Biotechnology - Meyer R, A.
8. Environmental Biotechnology- Forster and wase.
9. Biotechnological Innovations in Environmental Management - Leach and Van Dam-mieras.
10. Industrial Microbiology and Biotechnology- Demain and Solomon.

Course outcomes:

The student will be able to

1. Acquire the knowledge on applications of plant, animal and environmental biotechnology
2. Develop skill on organic farming and preparation of bio pesticides and bio fertilizers
3. Able to establish and maintain cell lines for vaccine production
4. Apply knowledge on waste management and recycling for environmental protection

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**gE**	**PS02**
CO_1	2	2	3	1	-	-	-	-	1	-	-	-	-	1
CO_2	2	2	3	1	-	-	-	-	1	-	-	-	-	1
CO_3	2	2	1	1	-	-	-	-	1	-	-	-	-	-
CO_4	2	2	3	2	-	-	1	-	1	-	-	-	1	1
PO Attainment														

Course Code	Course Title	No of Hours Per week	No of Credits
BTH 406 b	Tools in Biotechnology	**04**	**4**
Sessional Marks: 20			**End Semester Examination Marks: 80**

Course Objectives:

1. To improve understanding on replication initiation point mapping.
2. To gain knowledge on use of DNA microarrays to analyze origin activation patterns
3. To build knowledge on Electron microscopic methods for identifying DNA replication intermediates.
4. To give insight on replication dynamics of gene

UNIT-I

Replication initiation point mapping: Approach and implications, purification of restriction fragments containing replication intermediates, Topological analysis of plasmid DNA replication intermediates, Analysis of telomeric DNA replication using neutral alkaline 2D gel electrophoresis, chromatin immunoprecipitation of replication factors moving with replication fork, density transfer as a method to analyze the progression of DNA replication fork, High resolution mapping of points of site specific replication, DNA replication in nucleus

UNIT-II

Chip-chip to analyze the binding of replication proteins to chromatin using oligonucleotides DNA microarrays, analyzing origin activation patterns by changing experiments. Detection of replication origins using comparative genomics and recombination ARS assay. Isolation of restriction fragments containing origin of replication from complex genomes. Application of alkaline sucrose degradation and analysis of DNA replication after DNA damage.

UNIT-III

Isolation of recombinant DNA elongation proteins *In vitro* assays for studying helicase activities, the use of two amino fluorescence to study DNA polymerase function, Single molecule observation of prokaryotic DNA replication, The FAST-HALO assay for the assessment of DNA damage for the single cell level. Electron microscopic methods for studying In vivo DNA replication intermediates.

UNIT-IV

Visualization of DNA replication sites in mammalian nuclei, measuring of DNA content by flow cytometry in Fission Yeast. Assays used to study replication check point in Fission Yeast. Use of DNA combining to study SNA replication in genus and in human cell free systems. Determining the replication dynamics of specific gene loci by single molecule analysis of replicated DNA.

Reference Books

1. DNA replication methods and protocols in Methods in Molecular Biology Edited by John N walker coedited by Soniya and Jacob Gelgard 2009. Humana press, New York.
2. General biochemistry and biophysics methods books.

Course outcomes:

The student will be able to

1. Acquire the knowledge on analysis of DNA replication to map site specific points of replication
2. Learn to apply DNA microarrays to detect replication origins
3. Understand the functions of helicase and polymerase in DNA replication
4. Acquire knowledge on sophisticated programmed of genome replication

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PS01**	**PS02**
CO_1	2	2	1	1	1	-	-	-	-	-	-	-	-	1
CO_2	2	2	2	1	1	-	-	-	-	-	-	-	-	1
CO_3	1	1	1	1	1	-	-	-	-	-	-	-	-	-
CO_4	2	1	1	1	1	-	-	-	-	-	-	-	1	1
PO Attainment														

M.Sc. Biotechnology:: Model Question paper

Semester I/II/III/IV Paper

Time 3 Hrs **Max marks 80**

Attempt any five from part A (4 x 5=20 marks) and all from part B (4 x 15=60 marks)

PART A (5 x 4=20 marks)

1. Unit 1
2. Unit 1
3. Unit 2
4. Unit 2
5. Unit 3
6. Unit 3
7. Unit 4
8. Unit 4

PART B (4 x 15=60 marks)

9. Unit 1 A or B
10. Unit 2 A or B
11. Unit 3 A or B
12. Unit 4 A or B

SRI VENKATESWARA UNIVERSITY

DEPARTMENT OF BIOTECHNOLOGY

Eligibility criteria for Open elective offering in Department of Biotechnology

Semester	**Title of the Paper - Open Elective**	**Eligibility**
III	6a Bioethics	Students of all biological Science departments
	6b Bioinformatics	
IV	6a Applications of Biotechnology	
	6b Tools in Biotechnology	

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

SVU COLLEGE OF SCIENCES

DEPARTMENT OF CHEMISTRY

1. ANALYTICAL CHEMISTRY (Specialization)



Syllabus for M.Sc. CHEMISTRY

Choice Based Credit System (CBCS)

Amended as per NEP-2020

(Academic Year 2023-2024)

About the Department

The Department of Chemistry is one of the first six departments started during the year 1954 when the university was founded. The Department offers M.Sc. course in Chemistry with specializations in Analytical, Environmental, Inorganic, Organic and Physical Chemistry besides Self Supporting Courses in Organic and Analytical Chemistry. Choice Based Credit System is followed and the courses are categorized as per the guidelines of the statutory authorities. Ability enhancement and skill development courses are part of the curriculum. Almost 15% of the students are qualifying in National Entrance Test conducted by UGC-CSIR. Also the Department offers quality research and training experience leading to Ph.D., Degrees for the students in the areas of synthesis of pharmacologically potential molecules analogous to drugs, application of green methodologies for the synthesis of complex molecules, development of new hybrid sorbents for monitoring toxic metals in environmental samples, fabrication of novel electrochemical sensors and biosensors towards the detection of organic molecules and pollutants. Over the last sixty five years the department has trained about 650 students for their Doctoral degrees. Most of the research scholars are doing Post-Doctoral research in abroad and in India. The faculty published more than 3000 research papers in reputed National and International journals. The Department organizes National and International conferences / seminars/ workshops on regular basis. The Department has well equipped laboratories for research and teaching besides a DST funded computer lab and a Department library. All the faculty members are having individual research laboratories with internet facility.

At present the Department is flourished with 10 faculty members and most of the faculty members have Post Doctoral research and training experience abroad. Some of the faculty worked as Visiting Professors and Visiting Fellows in prestigious universities abroad. Majority of faculty members have undertaken major research projects funded by agencies like UGC, CSIR, DST, BRNS, DBT and MOES and have successfully completed the tasks with a budget outlay of Rs. 250.00 lakhs. Most of the faculty members have developed collaboration with Indian Institute of Sciences, Bangalore, Indian Institute of Chemical Technology, Hyderabad, AVRA Laboratories, EPR Laboratories, Hyderabad, Amara Raja Batteries, Tirupati, RRL, Trivandrum and Birla Institute of Technology & Science, Pilani – Hyderabad campus and have approved patents. Some of the faculty and Alumni are the recipients of JSPS Fellowship, UGC Raman Fellowship, Common wealth Academic Fellowship, State Best Teacher Award etc., Recognizing the excellence in teaching and research in the Department, the University Grants Commission and Department of Science Technology have provided funding under DRS and FIST programmes. The Alumni of the department served in coveted positions as Vice-chancellors, Registrars, CEO of pharma industries etc. The former students of the Department have established leading International pharmaceutical industries in India and abroad. Some of them are actively engaged in the manufacture of COVID 19 vaccine. The ultimate goal of the Department is to achieve excellence in fundamental research as well as the development of innovative technologies for the future.

Vision

- Impart quality education & training in the field of chemistry to enable successful careers for the post graduate students in the field of research, education & industry applications of chemical sciences.

Mission

The Department of Chemistry strives:

- To get an ideal balance between knowledge creation and knowledge dissemination in the chemical sciences with a focus to train and mentor students to become responsible scientists and scientifically literate professionals to attain National and International impact.
- To contribute to the improvement of scientific and technological literacy, and the development of critical-thinking and problem-solving skills of all students in order to compete for the world of work and responsible citizenship

Program Specific Outcomes: At the end of the program, the student will be able to:

PSO1	**Scientific Problem solving skills**: Deep knowledge of the topic which can develop the problem solving skills using chemical principles.
PSO2	**Analytical skills**: Develop analytical skills such as synthesizing, separating, characterizing chemical compounds and chemical reactions with the help of sophisticated instruments
PSO3	**Research skills**: Develop research skills through dissertation/project work in different fields of chemistry such as organic, inorganic, analytical, physical and environmental.
PSO4	**Learning skills on life processes**: Acquire advanced level of knowledge in natural products as well as biological systems from the chemistry point of view.

Program Objectives

PO1	To divulge an advance level of theoretical and practical knowledge in the major fields of Chemistry- Analytical, Environmental, Inorganic, Organic and Physical.
PO2	To engage in research projects for acquiring wide spectrum of subject knowledge and

	research experience in respective fields.
PO3	To enlighten on skill enhancement in the core chemistry with practical expertise hands this will make students employable in academia and industries
PO4	To mould as responsible citizens to serve the nation

Program Outcomes: On completion of M.Sc. Chemistry programme, graduates will be able to –

PO1	Have a firm foundation in the fundamentals and application of current chemical and scientific theories in different areas of chemistry *viz*., Analytical, Environmental, Inorganic, Organic and Physical.
PO2	Understands the background of organic reaction mechanisms, complex chemical structures, and instrumental methods of chemical analysis, molecular rearrangements and separation techniques.
PO3	Familiarize with the importance of various elements present in the periodic table, coordination chemistry and structure of molecules, properties of compounds, structural determination of complexes using theories and instruments.
PO4	Understand about the physical aspects of atomic structure, dual behavior, reaction pathways with respect to time, various energy transformations, molecular assembly in nano-level, significance of electrochemistry, molecular segregation using their symmetry.
PO5	Create awareness and sense of responsibilities towards environment and apply knowledge to solve the issues related to Environmental pollution.
PO6	Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in the subject concerned. Ability to identify unethical behavior such as fabrication, falsification or misrepresentation of data and adoptive objective, unbiased and truthful actions in all aspects.
PO7	Be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
PO8	Clearly communicate the results of scientific work in oral, written and electronic formats.
PO9	Explore new areas of research in both chemistry and allied fields of science and technology.

PO10	Design, analyze and carry out scientific experiments and interpret data to provide solutions to different industrial problems.
PO11	Independently carry out research to solve practical problems and present a substantial technical report.
PO12	Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning throughout life, through self- paced and self-directed learning aimed at personal development, and adapting to change academic demands of work place through knowledge/ skill development/ reskilling.

Program Educational Objectives:

At the end of the program, the student wills be able to:

PEO1	To demonstrate broad knowledge of descriptive chemistry.
PEO2	To impart basic analytical and technical skills to work effectively in various fields of chemistry.
PEO3	To motivate critical thinking and analysis skills to solve complex problems viz., analysis of data, synthetic logistics, spectroscopy, structure and modeling, team based problem solving etc.
PEO4	To demonstrate an ability to conduct experiments in the above sub disciplines with mastery of appropriate techniques and proficiency using core chemical instrumentation and modeling method
PEO5	To develop laboratory competence in relating chemical structure to spectroscopic phenomena.
PEO6	To demonstrate the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment and modern instrumentation.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

DEPARTMENTOF CHEMISTRY

ANALYTICAL CHEMISTRY

TWO YEAR M.Sc. COURSE IN CHEMISTRY

(2021-2022) SCHEME

Semester -I

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-101	Core-Theory	Inorganic Chemistry- I	6	4	20	80	100
2	CHE-102	Core-Theory	Organic Chemistry I	6	4	20	80	100
3	CHE-103	* Compulsory Foundation	a)Physical Chemistry- I b)Chemistry of Nano materials	6	4	20	80	100
4	CHE-104	* Elective Foundation	a)General Chemistry- I b)Green Chemistry	6	4	20	80	100
5	CHE-105	Practicals (Core & Comp.)	a)Inorganic Practical-I b) Physical Chemistry-I	3 3	2 2	- -	- -	50 50
6	CHE-106	Practicals (Core & Elective)	a) OrganicChemistry- I b)General Chemistry-I	3 3	2 2	- -	- -	50 50
7	CHE-107	Audit Course	Human Values and Professional Ethics – I	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

SEMESTER-II

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-201	Core-Theory	Inorganic Chemistry- II	6	4	20	80	100
2	CHE-202	Core-Theory	Organic Chemistry -II	6	4	20	80	100
3	CHE-203	* Compulsory Foundation	(a)Physical Chemistry- II (b) Advanced Thermodynamics and Biophysical chemistry	6	4	20	80	100
4	CHE-204	* Elective Foundation	a)General Chemistry- II b)Chemistry of contemporary society	6	4	20	80	100
5	CHE-205	Practicals (Core & Comp.)	a)Inorganic Practical-II b) Physical Chemistry-II	3 3	2 2	- -	- -	50 50
6	CHE-206	Practicals (Core & Elective)	a)OrganicChemistry- II b)General Chemistry-II	3 3	2 2	- -	- -	50 50
7	CHE-207	Audit Course	Human Values and Professional Ethics – II	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

M Sc., (ANALYTICAL CHEMISTRY)

SEMESTER-III

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-AC-301	Core-Theory	Inorganic Spectroscopy & Thermal Methods of Analysis	6	4	20	80	100
2	CHE-AC -302	Core-Theory	Organic Spectroscopy	6	4	20	80	100
3	CHE-AC-303	*Generic Elective	(a) Organic Chemistry III (b) Physical Chemistry III	6	4	20	80	100
4	CHE-AC-304	Core& Gen. Practical	Classical Methods of Analysis	6	4	-	-	100
5	CHE –AC-305 A	Skill Oriented Course (theory)	Chemotherapy and drug analysis	3	2	10	40	50
	CHE –AC-305 B	Skill Oriented Course (Practicals)	Instrumental methods of analysis	3	2	-	-	50
6	CHE- 306	Open Elective **(For other departments)**	(a) Spectral Techniques (b) Chromatographic Techniques	6	4	20	80	100
		Total		**36**	**24**			**600**

***Among the Generic Elective a student shall choose any one.**

SEMESTER-IV

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-AC-401	Core-Theory	Quality control and General principles	6	4	20	80	100
2	CHE-AC-402	Core-Theory	Instrumental Methods of Analysis	6	4	20	80	100
3	CHE-AC-403	Generic Elective* **(Related to subject)**	(a) Aapplied and Environmental aspects (b)Bioinorganic, Bioorganic & Biophysical Chemistry	6	4	20	80	100
4	CHE-AC-404	Core& Gen. Practical	Instrumental Methods of Analysis	6	4	-	-	100
5	CHE-AC-405	Core-Practicals/ Project work	Project work	6	4	-	-	100
6	CHE-406	Open Elective **(For other departments)**	(a)Drug Chemistry or (b) Electroanalytical Techniques	6	4	20	80	100
		Total		**36**	**24**			**600**

***Among the Generic Elective a student shall choose any one.**

(Mandatory Core)

CHE-101	INORGANIC CHEISTRY I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Comprehend the key features of coordination compounds, Crystal Field Theory, different properties and bonding by spectroscopic techniques
- Study the polymorphic forms of non-transition elements and their synthesis and properties
- Understand the basics of reaction mechanism and the mechanistic concepts of Dissociative (Id) and Associative interchange Mechanism (Ia), Taube's classification, Trans effect and Electron Transfer Reactions
- Familiarize with the methods of synthesis of metal carbonyls and metal nitrosyls, Synergistic effect, EAN and 18-electron rule

Course Outcomes: At the end of the course, the student will be able

CO1	To understand the key features of coordination compounds, Crystal Field Theory, magnetic properties and bonding in transition metal complexes.
CO2	To learn about the polymorphic forms of Carbon, Sulphur and Phosphorus, synthesis and properties of sulphur-nitrogen compounds, boranes, carbides, silicates and to know Wades rules.
CO3	To explain the reactivity of complexes in terms of Valence bond and Crystal Field theories, Taube's classification, Trans effect and Electron Transfer Reactions.
CO4	To gain knowledge on synthesis and structures of different metal carbonyls, synergistic effect and 18 electron rule.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	1	-	1	-	2	-	1
CO2	3	1	-	3	-	2	2	2	2	1	-	2
CO3	3	2	-	3	2	-	-	1	-	1	2	1
CO4	3	1	1	3	-	2	2	2	1	-	1	1

CHE 101: INORGANIC CHEISTRY I

UNIT-I: CO-ORDINATION COMPOUNDS **15 Hrs**

Introduction to Crystal field Theory, CFSE and its calculation, Paring energy, Splitting of 'd' orbitals in Trigonal bi pyramidal, square planar, square pyramid and pentagonal bipyramidal geometries, Jahn –Teller

effect, Application of CFT, OSSE, site Selection in Spinels, Short comings of CFT, Evidence for covalency – Nephelauxetic effect. MOT of co-ordinate bonds –M.O. Diagrams for octahedral, tetrahedral and square planar complexes. Experimental evidences for π- bonding – Crystallography, Infrared spectroscopy and Photoelectron spectroscopy.

UNIT-II: CHEMISTRY OF NON-TRANSITION ELEMENTS 15 Hrs

General characteristics of the non- transition elements special features of individual elements ; Synthesis' properties and structure of their Halides and Oxides, Polymorphism of Carbon, Phosphorus and Sulphur, Synthesis, properties and structure of boranes, Carboranes, borazines, Silicates, Carbides, Sulphur-nitrogen compounds. Electron counting in boranes, Wades rules (Poly hedral skeletal electron pair theory), Isopopoly and hetero poly acids.

UNIT-III: REACTION MECHANISMS IN COMPLEXES 15 Hrs

Reactivity of metal complexes. Inert and Labile complexes. Concept of Labile and Inert complexes in terms of Valence bond and Crystal Field theories. Taube's classification of complexes as labile and inert complexes. Dissociative (D) and Dissociative interchange Mechanism (Id) & Associative (A) and Associative interchange Mechanism (Ia). Substitution reactions in octahedral complexes- Acid Hydrolysis -factors affecting Acid Hydrolysis - Base Hydrolysis-conjugate Base Mechanisms - Anation Reactions -Substitution Reactions in Square Planar complexes- Trans effect – Mechanisms of Trans effect: polarization and π-bonding theories.Electron Transfer Reaction-Inner Sphere and outer Sphere Mechanisms- Marcus theory.

UNIT-IV: METAL πCOMPLEXES-I 15 Hrs

Nature of π bonding, Classification of π ligands, π donor ligands and π -acceptor ligands.

Metal Carbonyls: Synthesis of metal carbonyls, Structures of metal carbonyls of the types M(CO)n (M= Cr, Fe, Ni; n=4-6), $M_2(CO)n$ (M=Co, Fe, Mn; n=8-10), $M_3(CO)_{12}$ (M=Fe, Ru and Os), $M_4(CO)_{12}$ (M=Co, Rh, Ir). IR Spectraof metal carbonyls (i) Detection of bridging and terminal CO ligand, (ii) Synergistic effect, EAN and 18-electron rule. Electron counting methods (i) Oxidation state method and (ii) Neutral Atom method.

Metal Nitrosyls: Synthesis of metal Nitrosyls, bonding, Electron donation by nitric oxide, Models for NO bonding (i) Covalent model and (ii) Ionic models, Structures of metal nitrosyls (1) $[Fe_4S_3(NO)]$ (2)$[Fe_2(NO)_2I_2]$ (3) $[(\phi_3P)_2Ir(CO)Cl(NO)]^+$ (4) $[(\phi_3P)_2Ru(NO)_2Cl]$, Detection of bridging NO ligand, Applications of metal nitrosyls.

Books Suggested

1. F.A.Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999.John wiley & sons. Inc., New York.

2. James E. Huheey, Inorganic chemistry- Principles of structure and reactivity, VI Edition 1993. Harper Collins College Publishers, New York.
3. J.D. Lee: Concise Inorganic Chemistry (Blackwell)
4. Gary Wolfsburg: Inorganic Chemistry (5th Ed. (Viva Books)
5. W.L. Jolly: Modern Inorganic Chemistry (McGraw-Hill)
6. B.N Figgis: Introduction to Ligand Fields (John-Willey)
7. S.F.A. Kettle: Coordination compounds.
8. Coordination Chemistry. Bassalo & Jahnson.

(Mandatory Core)

CHE-102	Organic Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Organic Chemistry

Course Objectives:

- Classify molecules based on stereo chemical aspects study on optical and geometrical isomerism by the application of Cahn-Ingold-Prelog rules.
- Familiarize with different types of substitution reactions, able to predict products, including stereochemistry in aliphatic and aromatic nucleophilic substitution reactions, effect of neighboring group participation
- Understand thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects in reactive intermediates
- Study about occurrence, isolation, structure establishment and synthesis of natural products-terpenoids.

Course Outcomes: At the end of the course, the student will be able

CO1	To detect stereochemical structures of the molecules, stereoselective and stereocontrolled reactions.
CO2	To ascertain the stereochemistry of the products with the effect of neighbouring group participation and to familiarize the various types of aromatic substitution reactions, their mechanism and the effect of substituents.
CO3	To know the concept of isotope effects, potential energy diagrams and transition states in different intermediates
CO4	To familiarize with stereospecific synthesis of naturally occurring terpenoids and degradation products of terpenoids

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	2	-	1	1	-	1	-	-
CO2	3	2	1	3	-	1	2		-	2	1	1
CO3	3	1	2	3	-	1	1	2	1	-	1	-
CO4	3	2	2	3	2	1	1	1	-	1	1	1

CHE102: Organic Chemistry I

UNIT-I: **Stereochemistry**

Sereoisomerism-Stereoisomers Classification – Configuration and conformation.

Molecular Three dimensional representations: Wedge, Fischer, Newman and Saw-horse formulae, their description and interconversions.

Molecular Symmetry & Chirality: Symmetry operations and symmetry elements (Cn & Sn). Criteria for Chirality. Dissymmetrization.

Optical isomerism: Molecular Symmetry and Chirality-Cahn-Ingold-Prelog rules R, S-nomenclature, stereoisomerism resulting from more than one chiral center, meso and pseudoasymmetric compounds - **Axial Chirality** - Stereochemistry of allenes spiranes - biphenyl derivatives and atropisomerism - **Planar chirality** - Ansa compounds and trans - Cycloalkenes - **Helicity**. Helically chiral compounds

Geometrical isomerism - E, Z - nomenclature - Physical and Chemical methods of determining the configuration of geometrical isomers-Stereoisomerism in 3, 4 and 5-membered cyclic compounds.

UNIT-II: Substitution Reactions

i) Aliphatic Nucleophilic substitutions: The S_N2, S_N1, mixed S_N1 and S_N2, SET mechanisms. Reactivity- effects of substrates, attacking nucleophiles, leaving groups and reaction medium.Common carbocation rearrangements – primary, secondary and tertiary. The neighbouring group participation (NGP) -anchimeric assistance, NGP by σ and π- bonds, phenonium ions, norbornyl and norbornenyl systems, Classical and nonclassical carbocations, NGP by halogens and heteroatoms (O,N,S)

The S_N^i and S_N2' mechanisms. Nucleophilic substitution at an allylic, and vinylic carbons.

ii. Aromatic Nucleophilic Substitution: The S_NAr, S_N1, benzyne and $S_{RN}1$mechanisms. Reactivity - effect of substrate, structure, leaving group and attacking nucleophile. The von Richter, Sommelet - Hauser and Smiles rearrangements.

UNIT-III: Reactive intermediates

Types of reactions, types of bond cleavage mechanisms, generation, structure, stability and reactivity of carbocations, carbanions, free radicals, carbenes, nitrenes and arynes. Thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects**.**

UNIT-IV: Terpenoids

Classification of terpenoids, occurrence, isolation, general methods of structure determination. Isoprene and special isoprene rule. Structure determination and synthesis of the following representative molecules: Farnesol, Zingeberine, Cadinene and Abietic acid.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
6. Stereochemistry, P.S. Kalsi, Wiley Eastern.
7. Text book of Organic Chemistry, M.C. Murry
8. Organic Chemistry, Vol I, I.L. Finar, ELBS Eds.

(Mandatory Core)

CHE-103	Physical Chemistry I	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Acquire knowledge in Quantum Chemistry, postulates of Quantum Mechanics., Applications of Schrodinger wave equation and Born-Oppenheimer approximation
- Study on Chemical Dynamics and theories in unimolecular, chain and fast reactions and determination of reaction rates.
- Familiarize with concepts of Thermodynamics and statistical thermodynamics, Gibbs- Duhem equation and Sackur-Tetrade equation
- Know about Thermodynamic and Kinetic concept of Electrochemistry and conductance, conductivity of electrolytes

Course Outcomes At the end of the course, the student will be able to

CO1	To know the concepts such as Operator algebra, Eigen values and Eigen functions, Degeneracy, Schrodinger wave equation and the postulates of Quantum Mechanics.
CO2	To learn about theories of reaction rates, Lindemann, Lindemann-Hinshel wood, and RRKM theories.
CO3	To know about Thermodynamic concepts and entropy change in reversible process and irreversible process, Gibbs- Duhem equation, calculation of thermodynamic properties.
CO4	To study the Thermodynamic and Kinetic Derivation of Nernst Equation and the derivation of Debye-Huckle Equation and its Verification

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	3	2	1	--	1	2	---	1	1
CO2	3	1	2	3	1		1		1	1	-	1
CO3	3	-	1	3	2	1	-	1		-	2	-
CO4	3	1	2	3	-	1	1	-	2	1	-	1

CHE-103: Physical Chemistry I

UNIT-I: Quantum Chemistry-I

(A)**Introduction to Exact Quantum Mechanical Results**

Operator algebra, Eigen values and Eigen functions, Operators for momentum and energy, Degeneracy, Linear combination of Eigen functions of an operator, well behaved wave functions, Normalized and

orthogonal functions, The schrodinger wave equation and the postulates of Quantum Mechanics, (B) **Applications of Schrodinger wave equation:** Particle in one dimensional and three dimensional box, harmonic oscillator, rigid rotor, hydrogen atom and its applications. Hydrogen like wave function, hydrogen like orbitals and their representation, polar plots, contour plots and boundary diagram. (C)**Approximate Methods:** The variation Theorem, Linear variation principle, perturbation Theory (first Order and non-degenerate), Application of variation Method and perturbation theory to the helium atom, The Born-Oppenheimer approximation.

UNIT-II: Chemical Dynamics

(A)**Theories of reaction rates:** Collision theory, steric factor. Theory of Absolute Reaction Rates-Reaction coordinate, activated complex and the transition state. Thermodynamic formiulation of reacton rates.

(B) **Unimolecular reactions:** Lindemann, Lindemann-Hinshel wood, and RRKM theories. Termolecular reactions. Complex reactions-Rate expressions for opposing, parallel and consecutive reaction (all first order type) (C) **Chain reactions:** Dynamic chain, hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane, photochemical reactions- H_2-Br_2, H_2-Cl_2 reactions, Autocatalysis, H_2-O_2 reaction explosion limits. (D) **Fast Reactions:** Flow system – Temperature and pressure Jump Methods – Relaxation Techniques.

UNIT – III : Thermodynamics

(A) **Brief review of Thermodynamic concepts:** Enthalpy, entropy, free energy. Concept of Entropy – Entropy as a state function –Entropy change in reversible process and irreversible process – Temperature – Entropy diagrams – Entropy change and phase change – Entropy of mixing – Entropy and disorder. (B) **Statistical thermodynamics:** Partial molar properties: their significance and determination of partial molar properties, fugacity and its determination. Concept of distribution, thermodynamic probability and most probable Distribution, Ensemble averaging, postulates of ensemble averaging, canonical, grand canonical and micro- canonical ensembles, partition functions, translational, rotational, vibrational and electronic partition functions, Gibbs- Duhem equation, calculation of thermodynamic properties in terms of partition functions, Entropy of monatomic gases (Sackur-Tetrade equation)

UNIT-IV : Electrochemistry I

(A) **Thermodynamic and Kinetic concept of Electrochemistry**

Thermodynamic and Kinetic Derivation of Nernst Equation, Chemical and Concentration Cells with and

without Transference, Liquid Junction Potential, Derivation of the Expression for Liquid Junction Potentials-its determination and elimination, Applications of EMF Measurements: (i)Solubility product, (ii)pH Determination, (iii) Potentiometric Titrations.; (B)**Conductivity:** Theory of Electrolytic Conductance, Derivation of Debye-Huckle Equation and its Verification, Debye- Falkenhagen Effect, and Wein Effect, kohlrausch law. Calculation of Solubility of Sparingly soluble Salt from Conductance Measurements.

Conductometric Titrations : Titration of Strong Acid Vs Strong Base (HCl vs NaoH) ; Titration of Weak Acid Vs Strong Base (AcoH vs NaoH); Titration of mixture of Strong and Weak Acids vs Strong Base ; Precipitation Titrations.

Books Suggested

1. physical chemistry, P. W. Atkins (ELBS)
2. Quantum Chemistry, Ira N. Levine (Prentice Hall)
3. Atomic Structure and Chemical bond, Manas Chandra.
4. Chemical Kinetics, K.J. Laidler (Mc Graw Hill)
5. Kinetics and Mechanism of Chemical Transformations, J. Rajaraman and J. Kuriacose (Mcmilan)
6. Thermodynamics for chemists, S. Glasstone
7. Chemical thermodynamics, I.M. Klotz
8. Statistical Thermodynamics, M. Dole
9. Modern Electrochemistry, Vol. I & II, J.O. M. Bockris and A.K.N. Reddy (plen
10. An Introduction to Electrochemistry (3rded.), S. Glasstone (Affiliated East-West).

(Compulsory Foundation)

CHE-104 (A)	General Chemistry I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on precision and accuracy, Limit of detection, Limit of determination, Sensitivity and selectivity, statistical evaluation of data
- Familiarize with principles and concepts of flame emission spectroscopy and atomic absorption spectroscopy and their applications.
- To know about ecosystem, nutrient cycle and dessert ecosystem and forest ecosystem and aquatic ecosystem.
- Gain knowledge on air pollution, water pollution, soil pollution, marine pollution, noise pollution and solid waste management.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about mean and median values, standard deviation and coefficient of variation.
CO2	To acquire knowledge on principle and instrumentation of AAS and difference between flame AAS and furnace AAS.
CO3	To know about the principle and concept of ecosystem and their functioning
CO4	To have an idea on environmental pollution and environmental impact assessment.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	-	-	2	1	1
CO2	3	2	-	3	1	-	2	1	-	1	1	-
CO3	3	3	2	3	2	1		1	2	1	1	2
CO4	3	2	1	2	3	1	1	1	-	2	1	1

CHE104-A: General Chemistry I

UNIT-I: TREATMENT OF ANALYTICAL DATA 15 Hrs

Precision and accuracy –mean and median values –Standard deviation – coefficient of variation, Types of errors: Determinate and indeterminate errors, confidence limits, significant figures, computations, minimization of errors, statistical evaluation of data –T-test ,F- test , and X^2 –test. Correlation coefficient and coefficient of determination; Limit of detection (LOQ); Limit of determination(LOD) Sensitivity and selectivity of an analytical method.

UNIT-II: FLAME EMISSION AND ATOMIC ABSORPTION SPECTROSCOPY 15 Hrs

(a) **Flame Emission Spectroscopy**: Principles, chemical reactions in flames, Interferences, evaluation methods, flame photometer and experimental technique, procedure for determinations, limitations and disadvantages. Applications

(b)**Atomic Absorption Spectroscopy: Flame AAS:** Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT-III: ECOSYSTEMS 15 Hrs

Concept of an ecosystem (Abiotic and biotic environment), structure and function of an ecosystem Producers, Consumers and decomposers. Energy flow in the ecosystem, (Nutrient cycle in the ecosystem) Ecological succession Food Chain, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystems, Forest ecosystem, Grassl and ecosystem, Desert ecosystems aquatic ecosystems [ponds, streams, lakes, rivers, ocean estuaries].

UNIT-IV: ENVIRONMENTAL POLLUTION 15 Hrs

Definition a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear pollution Solid waste management : Causes, effects and control measures of urban and industrial wastes. Environmental impact assessment.

Books Suggested

1. H.W. Willard, LL. Merritt and J.A. Dean: Instrumental Methods of Analysis
2. Vogel's Text book of Quantitative Inorganic Analysis.
3. Analytical Chemistry
4. Instrumental Methods of Analysis H. Kaur

CHE 104B	General Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To familiarize with the significance of green chemistry and assessment of the impact.
- To gain knowledge on biocatalyst in oxidation, reduction and hydrolytic reactions
- To have an idea on solvent free reactions and modern reaction techniques.
- To familiarize with the use of ionic liquids as green solvents.

Course Outcomes: At the end of the course, the student will be able

CO1	To get knowledge on green reaction conditions and their impact on environment.
CO2	To know about use of different biocatalysts as environmentally friendly reagents.
CO3	To acquire knowledge on the use of modern techniques like ultrasound, microwave etc.
CO4	To have an idea on the use of ionic liquids in different reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	2	1	1	-	1	-	1	1
CO2	3	1	1	3	1	-	1	1	-	1	-	1
CO3	3	3	2	3	2	1		2	-	1	1	1
CO4	3	2	1	2	3	1	1	1	1	-	1	1

CHE 104B: General Chemistry I

UNIT-I

Fundamentals and significance of Green Chemistry: Discussion of the current state of chemistry and the environment and the definition of green chemistry. Assessment of the impact of chemistry in the environment and definition of risk hazard. An introduction to the tools of green chemistry and its fundamental principles.

Principles of Green Chemistry: Prevention of waste / by-products, Hazardous products- Designing of safer chemicals- Selection of appropriate solvents and starting materials- Use of protecting groups and catalysis- Designing of biodegradable products.

UNIT-II

Catalysis for Green Chemistry: Use of biocatalysts- Biochemical Oxidation, Biochemical Reduction, Enzyme Catalyzed Hydrolytic Process, Modified biocatalysis- transition metal catalysis- Reformatsky reaction, Wurtz reaction, Pinacol coupling, Simmons-Smith reaction,

Mukaiyama reaction, Heak reaction, Ullmann's coupling.

UNIT-III

Solvent Free Reactions: Solvent free techniques- Reactions on solid mineral supports, Phase Transfer Catalysis- C-alkylation, N-alkylation, S-alkylation, Darzen's reaction, Wittig reaction. Ultrasound assisted green synthesis- Oxidation, Reduction, Hydroboration, Bouveault reaction, Strecker reaction, Microwave assisted green synthesis- Biginelli reaction, Aza-Michael reaction, Suzuki reaction, Stille reaction, Sonogashira reaction.

UNIT-IV

Ionic liquids: Definition- Types of Ionic Liquids-Synthesis of Ionic Liquids- Selection of ionic liquids- physical properties- Application in organic synthesis- alkylation, allylation, oxidation, reduction, polymerization, hydrogenation, hydroformylation, alkoxycarbonylation, carbon-carbon bond forming reactions, alkene metathesis.

1. Trends in Green Chemistry by V.K. Ahluwalia, M. Kidwai.
2. Green Chemistry: Environment Friendly Alternatives by Rashmi Sanghi, M M Srivastava
3. Green Solvents for Organic Synthesis by V.K. Ahluwalia, Rajender S. Varma
4. Green Analytical Chemistry by Mihkel Koel and Mihkel Kaljurand

105 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Basic laboratory techniques of titration and analysis.
- Quantitative estimation of inorganic compounds through volumetric techniques.
- Calibration of volumetric apparatus and statistical analysis of the data.
- Determination of critical solution temperature of phenol-water system.

Course Outcomes: At the end of the course, the student will be able

CO1	To demonstrate mastery of basic semi-micro qualitative analysis of simple salts and interprets analytical data and will make scientific claims that are supported by the observations.
CO2	To familiarize with techniques of titration and calculation of errors.
CO3	To study the determination of critical solution temperature, eutectic composition, distribution coefficient, adsorption of different systems.
CO4	To calibrate the statistical data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	1	2	1	2	-
CO2	3	2	2	2	-	2	1	1	-	2	2	1
CO3	3	2	1	2	2	1	-	2	1	1	2	1
CO4	3	2	2	1	2	1	-	2	2	1	1	1

CHE 105 A & B: Core practical I: Inorganic & Physical Chemistry

CHE 105 A : Core practical I: Inorganic Chemistry

Semi Micro Qualitative Analysis

Qualitative Analysis of a mixture containing four cations including two less common cations (viz., W, Mo, Se, Te, V, Ce, Th, Zr, Li and U).

CHE 105 B : Core practical I: Physical Chemistry

1. Determination of critical solution temperature, eutectic composition and temperature of binary

system.

2. Calibration of volumetric apparatus and statistical analysis of the data.
3. Determination of critical solution temperature of phenol-water system and study the effect of electrolyte on CST.
4. Determination of Eutectic composition and temperature of binary system
5. Determination of distribution coefficient of benzoic acid between water and benzene.
6. Study the adsorption of acetic acid on charcoal and analysis of the data on the basis of Langmuir and Freundlich adsorption isotherms.
7. Determination of rate constant of acid hydrolysis of an ester and investigate the effect of catalyst concentration, reactant concentration and temperature.

CHE 106A & B	Core practical I: Organic & General Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.

Course Objectives:

- Identification of single organic component by systematic qualitative analysis
- Preparation of derivatives and purification process
- Single step preparations
- Calibration of spectral analysis to this structures

Identification of single organic component by systematic qualitative analysis.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the systematic procedures of analysis of organic components.
CO2	To know the conformational tests for various functional groups.
CO3	To understand the mechanisms and familiarize with methodologies to prepare biologically important molecules.
CO4	Purification of compounds by different process

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	1	2	-	1	-	1	1	-
CO2	3	2	2	3	-	2	-	1	1	-	1	2
CO3	2	2	2	1	2	1	2	1	-	1	-	2
CO4	1	2	2	1	1	1	1	-	1	1	1	2

CHE : 106 A : PRACTICAL – I : ORGANIC CHEMISTRY

Identification of single components by Qualitative Analysis method

1. Aromatic acids
2. Aromatic amines
3. Aromatic phenols
4. Aromatic estors
5. Aromatic hydrocarbons
6. Carbohydrates
7. Aromatic carobohydrates compounds

CHE : 106 B : PRACTICAL – I : GENERAL CHEMISTRY

Single step preparations

1. Preparation of aspirin
2. Preparation of p-nitroacetanilide
3. Preparation of p-bromoacetanilide

CHE 107	Human Values and Professional Ethics-I	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of graduate level Human Values and professional ethics

Course Objectives:

- Analyze values in various ethical professions
- Understand moral concepts, character and conduct multiple
- Concept of ethical values with respect to individual and society
- ethical interests at stake in areal-world situation or practice and assess own ethical values with respect to social context and problems

Course Outcomes: At the end of the course, the student will be able to

CO1	To know about the needs and importance of professional ethics.
CO2	To analyze nature of Values, basic Moral Concepts character and Conduct.
CO3	To gain knowledge on individual and society ethical values, ahimsa, satya and brahmacharya.
CO4	To understand values of Bhagavd Gita, various religions, religious tolerence, Gandhian ethics.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	2	-	1	2	3	1	1	2
CO2	3	2	2	3	1	1	1	2	3	-	-	2
CO3	3	1	2	3	2	-	1	-	-	1	1	3
CO4	3	1	1	3	-	1	2	2	2	2	-	3

CHE 107: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS – I)

Chapter I: Definition and Nature of Ethics – Is relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics – Goals – Ethical Values in Various Professions.

Chapter II: Nature of Values – Good and Bad, Ends and Means, Actual and Potential Values, Objective and Subjective Values, Analysis of Basic Moral Concepts – Right, Ought, Duty, Obligation, Justice, Responsibility and Freedom, Good Behavior and Respect for Elders, Character and Conduct.

Chapter III: Individual and Society: Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non Possesion) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues) - Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation), Crime and

Theories of Punishment – (a) Reformative, Retributive and Deterrent, (b) Views on Manu and Yajnavalkya

Chapter IV: Bhagavd Gita – (a) Niskama Karma, (b) Buddhism – The Four Nobel Truths – Arya astanga marga, (c) Jainism - Mahavratas and Anuvratas. Values Embedded in Various Religions, Religious Tolerence, Gandhian Ethics.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
4. Harold H. Titus: Ethics for Today
5. Maitra, S.K: Hindu Ethics
6. William Lilly: Introduction to Ethics
7. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
8. Sasruta Samhita: Tr. Kaviraj Kunjanlal, Kunjanlal Brishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
9. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
10. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
11. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
12. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Mandatory Core)

CHE - 201	Inorganic Chemistry II	L-5, T-1, P-0	4 Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Understand magnetic properties of transition metal complexes and various reactions on ligands with respect to synthesis.
- Gain knowledge on electronic spectra of complex molecules of octahedral and tetrahedral geometry
- Understand magnetic properties viz., diamagnetism and paramagnetism and other related properties of complex molecules
- Familiarize with different catalytic reactions of complex molecules and factors effecting the reactions.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize with the general methods of complex preparations and properties, nature of bonding and structural features of metal complexes.
CO2	To know about Russel-Saunders coupling, splitting of energy levels in octahedral field and differentiate between Orgel diagrams and Tanabe-Sugano diagrams.
CO3	To understand about the laws of Hunds, Curie and Weiss, magnetism and magnetic susceptibility determination by Gouy's and Farady methods.
CO4	To gain knowledge on Induced reactions, Free radical reactions, Thermal decomposition reactions, Chain reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	2	1	-	1
CO2	3	2	-	3	1	2	1	-	1	2	1	1
CO3	3	-	2	3	-	2	1	1	-	1		1
CO4	3	1	1	3	-	2	-	1	1	1	1	-

CHE 201: INORGANIC CHEISTRY II

UNIT – I: TRANSITION METAL II – COMPLEXES II 15 Hrs

Transition metal π – complexes with unsaturated organic molecules – alkenes, alkynes, diene, dienyl and Cyclopentadienyl complexes and arene complexes-general methods of preparation, properties, nature of bonding and structural features – Important reactions relating to Nucleophilic and Electrophilic attack on

ligands and to organic synthesis.

UNIT – II: ELECTRONIC SPECTRA OF COMPLEXES 15 Hrs

Russel-Saunders coupling – Spectroscopic term symbols- Derivation of term symbols of p^2 and d^2 configuration, Hole Formulation, Energy ordering of terms (Hund's Rules), Splitting of energy levels and spectroscopic states in Octahedral field, Selection rules – Break – down of selection rules, Orgel diagrams, Definition and utility–Orgel Diagrams for d^1 to d^9 configurations in Octahedral and tetrahedral fields. Interpretation of electronic spectra of high spin octahedral and tetra hedral complexes of Ti(III), V(III), Cr(III), Mn(III), Mn(II), Fe(II), Fe(III), Co(III), Co(II), Ni(II) and Cu(II) complexes, Calculation of Dq and B^1 parameters for Cr(III) and Ni(II) complexes. Tanabe – Sugano diagrams, Differences between Orgel diagrams and Tanabe – Sugano diagrams, Tanabe – Sugano diagrams of d^2 to d^6 and d^8 configurations. Charge transfer spectra- LMCT and MLCT.

UNIT – III: MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES 15 Hrs

Diamagnetism and paramagnetism-orbital and spin contributions, spin-orbit coupling, Hunds third rule and Energies of J levels – Curie law and Curie – Weiss law- Ferromagnetism and antiferromagnetism – Temperature independent magnetism Magnetic susceptibility and its determination by Gouy's and Faraday methods.Calculation of magnetic moment from magnetic susceptibility, spin-only formula, Orbital contribution to magnetic moment (Oh and Td Complexes) –Paramagnetism and crystalline fields – Ti (III), V (III), VO^{2+}, Cr (III), Mn (II), Fe (III), Co(II), Ni (II) and Cu (II). Magnetic Exchange in copper acetate and other dimmers – spin cross over in complexes.

UNIT –IV: CATALYSIS 15 Hrs

Homogeneous catalysis, Metal ion catalyzed reactions – Redox potentials and processes – Mechanism of redox processes involving ligands – Factors affecting redox potentials - other types of metal catalyzed reactions – Reactions involving Ag (I) , Cu (II) and Os (VIII) – Reactions of Oxyanions – Factors affecting rate (General discussion only) – Induced reactions – Free radical reactions – Thermal decomposition of peroxy disulphate – Fe(III) $–S_2O_8$ reactions – chain reactions – H-Br reactions, H_2O_2 $–S_2O_8$reactions.

Books Suggested

1. Inorganic Chemistry principles of Structure and Reactivity 6th Edition. James E. Huheey.
2. Organometallic Chemistry: R.C. Mehrotra and Singh.
3. R. S. Drago: Structural methods in Inorganic Chemistry.
4. H. H. Willard, L. L. Merritt, Jr., J. A. Dean and F. A. Settle, Jr.: Instrumental Methods of Analysis (CBS Publishers).
5. R. L. Carlin: Magnetic Chemistry. R. L. Datta and A. Syamal: Elements of Magnetic Chemistry.

(Mandatory Core)

CHE-202	Organic Chemistry II	L-3, T-1, P-2	4 Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives:

- Able to recognize, classify, explain, and apply fundamental organic reactions such as E2, E1, E1CB.
- Familiar with molecular rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom.
- Provide Hantzsch-Widmann nomenclature for the three and four membered heterocycles. Be able to predict synthetic routes and chemical reactions of these heterocycles.
- Be familiar with occurrence, isolation, structural elucidation and synthesis of natural products-alkaloids

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the mechanisms of E_1, E_2 and E_{1CB} reactions, steroselectivity and synpyrolytic eliminations and use of isotopes, chemical trapping and crossover experiments.
CO2	To learn the rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom and familiarize with the limitations and applications of reactions.
CO3	To learn the synthesis of three and four membered heterocycles, mechanism of ring opening reactions and the effect of electron donating and withdrawing substituents in selectivity of ring opening reactions.
CO4	To understand the structural elucidation and synthesis of alkaloids using specific reagents.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	1	1	1	-
CO2	3	2	2	3	2	2		1	1	-	1	1
CO3	3	2	2	3	2	2	1	1	-	1	-	1
CO4	3	2	2	3	-	2	-	1	-	1	1	1

CHE- 202 : ORGANIC CHEMISTRY II

UNIT-I: Reaction mechanism-I **15 Hrs**

Electrophilic addition to carbon carbon double bond: Stereoselective addition to carbon carbon double

bond; anti addition- Bromination and epoxidation followed by ring opening. Syn addition of OsO_4 and $KMnO_4$.

Elimination reactions Elimination reactions E_2, E_1, E_{1CB} mechanisms. Orientation and stereoselectivity in E_2 eliminations. Pyrolytic syn elimination and α-elimination, elimination Vs substitution. Facors influencing the elimination reactions

Determination of reaction mechanism: Determination of reaction mechanism: Energy profiles of addition and elimination reactions, transition states, product isolation and structure of intermediates, use of isotopes, chemical trapping, crossover experiments. Use of IR and NMR in the investigation of reaction mechanism.

UNIT-II: Molecular Rearrangements: **15 Hrs**

Rearrangements to electron deficient Carbon atom:

Pinacol-Pinacolone, Wagner-Meerwein, Dienone-Phenol and Demjonove Rearrngements

Rearrangements to electron deficient Nitrogen atom:

Hofmann, Curtius, Schimidt and Beckmann Rearrangements.

Rearrangements to electron deficient Oxygen atom: Baeyer-Villiger and Dakins Rearrangements

Rearrangements to electron rich Carbon atom: Favorski and Neber Rearrangements

Aromatic and Sigmatropic Rearrangements: Fries and Claisen Rearrangements

UNIT III: Three and four membered heterocycles: 15 Hrs

Systematic nomenclature (Hantzsch-Widmann system) and Replacement nomenclature for monocyclic heterocycles (Three and four membered rings). Synthesis and chemical reactions of aziridines, oxiranes, thiiranes, azetidines, oxetanes, and thietanes.

UNIT-IV: Alkaloids 15 Hrs

Occurrence, isolation, general methods of structure elucidation and physiological action, degradation, classification based on nitrogen heterocyclic ring, structure elucidation and synthesis of the following: Atropine, Papaverine and Quinine.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.

5. Modern Organic Reactions, H.O. House, Benjamin.
6. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
7. Stereochemistry, P.S. Kalsi, Wiley Eastern.
8. Text book of Organic Chemistry, M.C. Murry
9. Text book of Organic Chemistry, Fessendon and Fessendon.
10. Text book of Organic Chemistry, T.W. Solomon,
11. Organic Chemistry, Vol II, I.L. Finar, ELBS Eds.
12. Heterocyclic chemistry T.L Gilchrist, Longman Scientific Technical
13. An Introduction to the Heterocyclic compounds, R M Acheson, John Wiley.

(Mandatory Core)

CHE -203	Physical chemistry II	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Learn Angular momentum and Molecular Orbital Theory and application of Huckel theory to organic molecules.
- Know about concepts in Surface Chemistry, concept of electric double layer model and Micelles.
- Get knowledge on symmetry and group theory their use in spectroscopy, Mulliken character tables.
- Understand Irreversible Electrode phenomenon controlled potential electrolysis and polarography.

Course Outcomes At the end of the course, the student will be able

CO1	To know about Pauli Exclusion principle and Slater determinant, atomic orbitals, Simple molecular orbitals and Huckel theory of conjugated systems.
CO2	To learn Gibbs adsorption isotherm, BET equation and correlate limitations, critical micellar concentration (CMC) and factors affecting the CMC of surfactants.
CO3	To identify Relation between order of a finite group and its sub-group, conjugacy, Symmetry point group (MLS, MHS and MSS) and orthogonality theorem.
CO4	To acquire knowledge on DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, to derive equation for Tafel plots, half-wave potentials for reversible system.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	2	-	1	1	1	2	-
CO2	3	2	2	3	2	2	-	1	1	1	-	1
CO3	3	2	2	3	-		1	-	-	1	1	-
CO4	3	2	-	2	1	1	-	1	1	1	1	-

CHE-AC-203 Physical Chemistry III

UNIT-I: Quantum Chemistry-II **15 Hrs**

(A) Angular momentum: Angular momentum, Rotations and angular momentum, Eigen functions and Eigen values of angular momentum, Ladder operator, addition of angular momenta, spin, antisymmetry and pauli Exclusion principle. Slater determinant. ;

(B) Molecular Orbital TheoryAtomic Orbitals, Simple Molecular Orbitals, Hybrid Atomic Orbitals, Shapes and energies of Molecular Orbital, Systems of Organic Molecules (Ex: Methane, Ethylene,

Acetylene). Huckel theory of conjugated systems, Π-bond order and charge density calculations, application of Huckel theory to ethylene, butadiene and benzene.

UNIT-II: Surface Chemistry **15 Hrs**

Surface tension, capillary action, pressure difference across curved surface, (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, BET adsorption isotherm, derivation of BET equation , limitations of BET equation, estimation of surface area from BET equation, Surface films on liquids. Concept of electric double layer model- Helmholtz perrin, Gouy- Chapman and stern models (no derivation)

Micells: Surface active agents, classification of surface active agents micellisation, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants, thermodynamics of micellisation, emulsions, reverse micelles.

UNIT-III: SYMMETRY AND GROUP THEORY **15 Hrs**

Definition of a group, rules that are set for a group, sub-group, order of a group, Relation between order of a finite group and its sub-group, conjugacy relation and class of a group, symmetry elements and symmetry operation. Symmetry point group (MLS, MHS and MSS), Schoenflies symbols - Representation of groups by matrices (representation for C_n, C_{nv}, D_{nh} etc. groups to be worked out explicitly), character of a representation, group multiplication tables, reducible - irreducible representations The great orthogonality theorem (without proof) - character tables (H_2O,NH_3) and their use in spectroscopy, Mulliken character tables.

UNIT-IV: ELECTROCHEMISTRY- II **15 Hrs**

Irreversible Electrode phenomenon: Reversibility and irreversibility, Dissolution and deposition potentials, Decomposition voltage, overvoltage, diffusion overvoltage, charge transfer overvoltage, concentration overvoltage-hydrogen and oxygen overvoltages, Tafel plots, Exchange current density and Transfer coefficient, Butler-Volmer equation for one electron transfer processes.

Polarography: Theory, classification , principle , Instrumentation of Polarography, DME, HMDE diffusion current, Ilkovic equation, DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, Millicoulometry, Equation for half-wave potentials, for reversible system when oxidant alone, reductant alone and both are present.

Books Suggested

1. P.W. Atkins: Physical Chemistry (ELBS).
2. Ira N. Levine: Quantum Chemistry (Prentice Hall).
3. R. Mcweeny: Coulson's Valence (ELBS).

4. J.O.M. Bockris and A.K.N. Reddy, Modern Electrochemistry, vol.I & II (Plenum).
5. S. Glasstone; An Introduction to Electrochemistry (3rd ed.)(Affiliated East-West).
6. V. Moroi: Micelles, theoretical and applied aspects (Plenum).
7. Maron and prutton: principles of physical Chemistry.
8. Silbey, Alberty, Bawendi. Physical Chemistry.Jhon-Wiley & Sons. 4th edition-2006.
9. D.N. Bajpai: Advanced physical Chemistry: S. Chand & Company, 1998.

(COMPULSORY FOUNDATION)

CHE-204 A	General Chemistry II	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on the principles of different electro analytical methods
- Familiarize with chromatographic techniques.
- To study on biodiversity and conservation of biodiversity
- To know about natural resources and non-renewable resources

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge on ion selective electrodes, solid membrane electrodes and glass electrodes and principles of amperometric titrations.
CO2	To learn general principles and classifications of chromatographic separations and applications of TLC, GLC and HPLC.
CO3	To know about biodiversity, ecosystem diversity and conservation of biodiversity.
CO4	To acquire knowledge on natural resources related to food, water, mineral, energy and land.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2		1	-	1	1	2
CO2	3	-	2	3	-	2	1	-	2	1	1	1
CO3	3	3	2	2	1	2	-	1	-	-	1	2
CO4	3	3	2	2	2	2	1	1	-	1	1	1

CHE 204-A: General Chemistry II

UNIT-I: ELECTRO ANALYTICAL METHODS

Theory of potentiometry, calculation electrode potential at the equivalence. Finding of equivalence volume, derivative and linear titration plots. Ion-sensitive electrodes –types of ion sensitive electrodes – metal based cation and anion sensitive electrodes, solid membrane electrodes, glass electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes, Amperometric titrations - Anodic stripping voltammetry, chronoamperometry, chronopotentiometry, Cyclic Voltammetry, Differential Pulse Polarography, linear sweep voltammetry, square wave voltammetry.

UNIT-II: CHROMATOGRAPHY

General principles and classifications of chromatographic separations

Thin layer chromatography: Classification, principle, experimental technique, sample application, development of plate, retardation factor.

Gas liquid chromatography: Gas liquid chromatography - instrumentation (columns and detectors), retention time and retention volume. Chromatographic behaviour of solutes, column efficiency and resolution, column processes and band broadening, time of analysis and resolution, Van-Deemter equation.

High performance liquid chromatography: Theory and instrumentation-column performance, gradient elution, delivery system, sample introduction, separation columns, detectors and applications of HPLC.

Unit – III : Biodiversity

Conservation introduction definition genetic species and ecosystem diversity, hot spots of biodiversity, threats to biodiversity habitat loss poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India, conservation of biodiversity in – situ an ex-situ conservation of biodiversity.

Unit – IV Natural resources and non-renewable resources

An overview of natural resources and associated problems with references to a) Forest resources b) Water resources c) Mineral resources d) Food resources e) Energy resources f) Land resources.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A.Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery J. Bassett, J. Mendham and R.C. Denny. Vogel"s Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (McGraw Hill).
5. D. Midgley and K. Torrance : potentiometric Water Analysis (John Wiley).
6. Silbey, Alberty, Bawendi. Physical chemistry. Jhon-Wiley & sons. 4th edition-2006.

CHE 204B	Chemistry in Contemporary Society	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To know about quality control and impurities in Pharmaceuticals.
- To have an idea on body fluids, blood, enzymes and forensic.
- To gain knowledge on composition of milk, oil, fats etc.
- To familiarize with different types of fuels, soils and its ingredients.

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge in pharmaceutical chemicals
CO2	To familiarize with blood fluids, blood, enzymes and forensic
CO3	To know about fermentation, detection of purity, beverages
CO4	To acquire knowledge on gaseous fuels, soil ingredients and analysis of trace elements

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	2	2	-	1	1
CO2	3	1	2	3	1	2	1	-	2	2	1	-
CO3	3	2	2	3	1	2	2	1	-	2	1	1
CO4	3	2	3	2	1	2	1	2	-	1	1	1

CHE 204B: Chemistry in Contemporary Society

UNIT – I : PHARMACEUTICALS 15 Hrs

Pharmaceuticals : Importance of quality control, drugs and pharmaceuticals, sources of impurities in pharmaceutical chemicals, analytical quality control in finished / final products, common methods of assay.

Common drugs and their uses: Analgesics – aspirin, paracetamol; Antheimentics – mebendazole ; Antiallergies – chlorpenneramine malleate; Antibiotics-pencillin, chloromecytin; Anti-inflammatory agents-oxyphenbutazone; **Antimalarials** – primaquine phosphate; Antituberculosists – INH; Narcotics – nicotine, morphine; Expectorants – Benadryl; Sedatives – diazepam; Vitamins – B**1**, B**2**, B**6**, niacin and folic acid.

UNIT – II : FORENSIC AND BIOMEDICALS **15 Hrs**

Body fluids: Composition and detection of abnormal level of certain constituents leading to diagnosis, sample collection and preservation of physiological fluids, analytical methods for the constituents of physiological fluids (blood, urine).

Blood: Estimation of glucose, cholesterol, urea, haemoglobin and bilirubin.

Urine: Urea, uric acid, creatinine, calcium phosphate, sodium, potassium and chloride.

Enzymes: Biological significance, assay of enzymes (pepsin, tyrasinase), vitamins (thiamine ascorbic acid, vitamin A) and harmones (progesterone, oxytocin, insulin), chemical, instrumental and biological assays to be discussed wherever necessary.

Forensic : General discussion of poisons with special reference to mode of action of cyanide organophosphates and snake venom, poisonous materials such as lead, mercury and arsenic in biological materials.

UNIT – III : FOOD AND BEVERAGES **15 Hrs**

Milk and milk products : Composition, alcohol test, fermentation, dye reduction-methylene blue and resazurin tests, analysis of fat content, minerals in milk and butter, estimation of added water in milk.

Oils and fats: General composition of edible oils, detection of purity, tests for common edible oils and groundnut oil, cottonseed oil and mustard oil, tests for adulterants like argemone oil and mineral oils,

Beverages: Soft drinks, alcoholic drinks, tea, coffee and fruit juice, analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, food preservatives like benzoates, propionates, sorbates, bisulphites, artificial sweetners, like saccharin, dulcin and sodium cyclamate, flavours – vanillin, esters (fruit flavours) and monosodium glutamate, artificial food colourants-coal tar dyes and non-permitted colours and metallic salts, control of food quality – codex alimentarices, Indian standards.

UNIT – IV : FUEL AND SOIL **15 Hrs**

Fuels : Definition, classification and characteristics of fuels, sampling, determination of calorific value. Liquid fuels-determination of flash point, fire point, aniline point. Knocking of petrol and diesel – octane and cetere numbers carbon residue. **Gaseous fuels** : Coal gas, waste gas, producer gas, gober gas and blast furnace gas, calorific value determination by Junker's gas calorimeter, relatice merits of solid, liquid and gaseous fules. **Soil** : Ingradiants of soil-organic matter, nitrogen, sulphur, sodium, potassium and calcium, analysis of trace elements, copper, molybdenum, zinc and boron.

Reference Books :

1. Pharmaceutical Analysis, T. Higuchi and E.B. Hanseen, John Wiley and Sons, New York.

2. Quantitative Analysis of drugs, P.D. Sethi, 3rd edition, CBS Publishers, New Delhi, 1997.
3. Practical Clinical biochemistry methods and interpretations, R. Chawala, J.P. Brothers Medical Publishers (P) Ltd., 1995.
4. Laboratory manual in biochemistry, J. Jayaraman. New Age International Publishers, New Delhi, 1981.

CHE 205 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Separation and determination of the two component mixtures
- Preparation of metal complexes
- Familiarize with conductometric, potentiometric and redox methods of analysis
- colorometric and pHmetric methods of analysis

Course Outcomes: At the end of the course, the student will be able

CO1	To separate and determine the two component mixtures
CO2	To acquire knowledge in the preparation of metal complexes
CO3	To study the determination of cell constant and verification of Onsagar equation, strength of strong acid by Titration of a strong acid with a strong base and vice versa
CO4	To get knowledge on the applications of conductometry, potentiometry, coulometry and pHmetry.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	3	1	-	2		1	1	-
CO2	3	2	2	3	2	2	1	-	1	-	1	2
CO3	3	2	2	3	3	1	1	2	-	1	1	-
CO4	3	2	2	3	2	-	1	-	1	1	-	2

CHE 205 A & B: Core practical I: Inorganic & Physical Chemistry

CHE 205 A : Core practical I: Inorganic Chemistry

I . Quantitative Analysis:

Separation and determination of two component mixtures:

(i) Separation of Al(III) and Determination of Fe (III)

(ii) Separation of Cu(II) and Determination of Zn (II)

(iii) Separation of Ca(II) and Determination of Mg (II)

(iv) Separation of Cu(II) and Determination of Ni (II)

(v) Determination of Ferrocyanide and Ferricyanide

CHE 205 B: Core practical I: Physical Chemistry

1. Conductometry:
   (a) Determination of cell constant
   (b) Verification of Onsagar equation
   (c) Determination of dissociation constant of a weak acid
   (d) Titration of a strong acid with a strong base
   (e) Titration of a weak acid with a strong base
2. Potentiometry:
   (a) Titration of a strong acid with a strong base
   (b) Titration of a weak acid with a strong base
   (c) Redox titration
3. Coulometry: Estimation of Manganese
4. pHmetry: Strong acid, Strong base titrations.

CHE 206A & B	Core practical I: Organic & General Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.

Course Objectives:

- Familiarize with two component mixture separation and identification.
- Preparation of derivatives.
- Purification by components by different methods.
- Calibration of products by spectral methods.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize with binary mixture separation
CO2	To gain hands-on-experience in purification of the components, preparation of derivatives.
CO3	To get knowledge about the chemical behavior of different components and mechanisms
CO4	Purification and calibration of data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	1	-	3	3	1
CO2	3	2	2	3	-	1	-	2	1	3	3	-
CO3	3	2	2	3	1	1	2	1	-	2	-	2
CO4	3	2	2	3	1	2		1	1	2	1	2

CHE 206 A & B: Core practical I: Organic & General Chemistry

CHE-206 A : PRACTICAL – I : ORGANIC CHEMISTRY

Separation and Identification of two component organic mixture by systematic qualitative analysis.

1.Acid + Neutral 2. Base + Neutral 3. Phenol + Neutral 4. Ether insoluable component + acid / phenol / base.

CHE-206 B : PRACTICAL – I : GENERAL CHEMISTRY

Preparation of Metal Complexes:

(i) Tetra(ammine) copper (II) sulphate.

(ii) Mercury tetra(thiocyanato) cobaltate(II).

(iii) Hexa(ammine) Nickel (II) chloride.

(iv) Tris(acetylacetonato) Manganese (III) chloride.

(v) Tris (ethylenediammine) Nickel (II) thiosulpha

CHE 207	Human Values and professional ethics-II	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of Human Values and professional ethics

Course Objectives:

- Gain knowledge on value education, family values and adjustability
- Develop ethics towards medical, health care professionals and ethical issues in genetic engineering
- Understand the importance of social ethics towards organ trade, human traffic king human rights violation and social disparities.
- Know about environmental ethics, ecological crises, pollution and protection of environment

Course Outcomes: At the end of the course, the student will be able to

CO1	To understand the concepts of human values, responsibilities of family values and status of women in family and society.
CO2	To acquire knowledge on different medical ethics the views of charaka and sushruta on moral responsibilities of medical practitioners.
CO3	To gain knowledge on social ethics and understand the characteristics of ethical problems in management.
CO4	To familiarize environmental ethics, ethical theory and ecological crisis.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	1	2	2	2	3	1	1	1
CO2	3	1	2	3	1	2	2	3	3	1	1	1
CO3	3	2	1	3	-	2	1	2	2	3	-	1
CO4	3	1	1	3	1	2	1	1	2	3	1	1

CHE 207: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS-II)

Chapter I: Value Education – Definition – Relevance to present day – Concept of human values - Self introspection – Self-esteem. Family values-Components, Structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Chapter II: Medical ethics – Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical

obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problem of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Chapter III: Social ethics – Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media – Impact of Newspapers, Television, Movies and Internet, Business ethics – Ethical standards of business – Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, Ethical abuses and work ethics.

Chapter IV: Environmental ethics – Ethical theory, man and nature - Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and pollution, Justice and environmental health.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. Management Ethics – Integrity at work by Joseph A. Petrick and John F. Quinn, Response Books, New Delhi.
4. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
10. Sasruta Samhita: Tr. KavirajKunjanlal, KunjanlalBrishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
11. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Eduction – Telugu Academy, Hyderabad.
14. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Mandatory Core)

CHE-AC- 301	Inorganic Spectroscopy and Thermal Methods of Analysis	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Basic Inorganic Spectroscopy and Thermal Methods of Analysis

Course Objectives:

- Gain knowledge on thermal methods of analysis and principles and applications to inorganic materials.
- Familiarize with basics of Mossbauer and NQR spectroscopy.
- Learn the properties like g-factor, nuclear spin, hyperfine coupling constants.
- Study the ESR instrumentation, various applications and photoelectron spectroscopy.

Course Outcomes : At the end of the course, the student will be able

CO1	To know about TG and DTA and applications of different scanning calorimetry.
CO2	To gain knowledge on Doppler shift and chemical shift, basic principles and applications of NQR spectroscopy.
CO3	To learn zero field splitting and Kramer's degeneracy, relaxation processes, instrumentation and applications of ESR.
CO4	To know about photoelectric effect and Koopmans theorem and impart the applications of X-ray and UV photoelectron spectroscopy.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	2	-	2	-	2	1
CO2	3	2	2	3	2	2	1	2	1	2	2	1
CO3	3	2	2	3	2	2	-	2	1	2	-	-
CO4	3	2	2	3	2		1	1	-	-	2	2

CHE-AC- 301: Inorganic Spectroscopy and Thermal Methods of Analysis

UNIT –I: THERMAL METHODS OF ANALYSIS 15 Hrs

Thermo gravimetry –Principle, Factors affecting the results, instrumentation. Application with special reference to $CuSO_4 5H_2O$, $CaC_2O_4\ 2H_2O$. Different thermal analysis – principle, instrumentation, difference between TG and DTA, applications with special reference to the clays and minerals.Different scanning calorimetry –principle, and applications to inorganic materials like chlorates and perchlorates, ammonium nitrate.

UNIT –II: MOSSBAUER SPECTROSCOPY and NQR **15 Hrs**

Mossbauer spectroscopy: Basic principles, Recoil energy, Doppler shift, Chemical shift, Quadrapole effects, Magnetic effects. Instrumentation, spectral parameters and spectrum display.

Aapplication of the technique to the studies of (1) bonding and structures of Fe^{2+} and Fe^{3+} compounds, (2) Sn^{2+} and Sn^{4+} compounds.

NQR spectroscopy: Basic principles of NQR spectroscopy, quadrupole nuclei, quadrupole moments, electric field gradient, coupling constant and applications.

UNIT –III: ELECTRON SPIN RESONANCE SPECTROSCOPY **15 Hrs**

Basic Principles, Hyper fine splitting, Factors affecting the 'g' value. Isotropic and anisotropic hyperfine coupling constants, Hamiltonian and spin densities. Zero field splitting and Kramer's degeneracy, Relaxation process and line widths. Instrumentation and Applications.The EPR spectrum of bis(salicylidimine)-copper(II) complex, study of inorganic free radicals, biological applications of Electron Spin Resonance (Study of free radicals and Iron-sulfur proteins)

UNIT –IV: PHOTO ELECTRON SPECTROSCOPY **15 Hrs**

Photoelectric effect, Koopmans's theorem, ionization energy.

X-ray photoelectron spectroscopy (ESCA): Principle, Binding energies, Chemical shift, Applications of XPES to Qualitative analysis , to surface studies and structural analysis. Ultraviolet photoelectron spectroscopy- Principle, application of UPES in studying the molecular orbitals of O_2 and N_2 molecules. Block diagram of photoelectron spectrophotometer. Sources of radiation, detectors. Auger spectra – Principle, Applications of Auger spectra to surface studies and use of Auger spectra as a finger print tool.

Books Suggested

1. F.A. Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999. John wiley & sons. Inc., New York.
2. J.E. Huheey, E.A. Keiter and R.L. Keiter: Inorganic Chemsitry, Principles of Structure and Reactivity (4th Ed.) (Addison-Wesley)
3. Gary Wulfsberg: Inorganic Chemistry (5th Ed. (Viva Books)
4. J.D. Lee: Concise Inorganic Chemistry (Blackwell)
5. W.L. Jolly: Modern Inorganic Chemsitry (McGraw-Hill)
6. R.L. Carlin: Magneto-chemsitry (Springer-Verlag)
7. R.L. Dutta and A. Syamal: Elements of Magnetochemsitry (Affiliate East-West).
8. K. Hussain Reddy – Text book of Bioinorganic chemistry

(Mandatory Core)

CHE-AC 302	**Organic Spectroscopy and Applications**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Understanding of Organic Spectroscopy and Applications

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands
- Study on the applications of NMR spectroscopy in ascertaining the stereochemical structures of the molecules.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy

Course Outcomes: At the end of the course, the student will be able to

CO1	To get experience to calculate λ max values for dienes, enones, polyenes, aromatic and heteroaromatic compounds.
CO2	To familiarize with the absorption bands of the molecules with specific functional groups
CO3	To interpret the data to different types of protons and carbons present in a molecule so as to ascertain the structure of the molecule based on the data provided
CO4	To acquire knowledge about specific fragmentation rules of different molecules which are unique.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	-	1	-	2	2	1
CO2	3	2	2	3	2	2	1	-	1	2	2	1
CO3	3	2	2	3	2	2	-	1	-	2	2	2
CO4	3	2	2	3	2	2	1	2	1	2	2	-

CHE 302: CORE THEORY: ORGANIC SPECTROSCOPY AND APPLICATIONS

UNIT-I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY: 15Hrs

Various electronic transitions (185-800 nm), effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fisher-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds. Steric effect in biphenyls.

UNIT – II: INFRARED SPECTROSCOPY 15Hrs

Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ether, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and fermi resonance, FT-IR

UNIT –III: NMR SPECTROSCOPY: 15Hrs

^{1}H NMR spectroscopy: Magnetic properties of nuclei, Principles of NMR. Instrumentation, CW and pulsed FT instrumentation, equivalent and nonequivalent protons, enantiotopic and diastereotopic protons, Chemical shifts, factors affecting the chemical shifts, electronegativity and anisotropy, shielding and deshielding effects, Signal integration, Spin-spin coupling: vicinal, germinal and long range, Coupling constants and factors affecting coupling constants.

Applications of ^{1}H NMR spectroscopy: Reaction mechanisms (cyclic bromonium ion, electrophilic and nucleophilic substitutions, carbocations and carbanions), E, Z isomers, conformation of cyclohexane and decalins, keto-enol tautomerism, hydrogen bonding, proton exchange processes (alcohols, amines and carboxylic acids), C-N rotation. Stereochemistry, hindered rotation, Karplus curve variation of coupling constant with dihedral angle. Simplification of complex spectra, nuclear magnetic double resonance, contact shift reagents, nuclear Overhauser effect (NOE).

^{13}C NMR spectroscopy: General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimensional NMR spectroscopy-COSY.

UNIT-IV: MASS SPECTROMETRY 15Hrs

Introduction, ion production, type of ionization, EI, CI, FD, and FAB-factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular-ion peak, metastable peak, Mc. Lafferty rearrangement. Nitrogen rule, isotope

labeling. High resolution mass spectrometry, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Books suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS
2. Spectroscopy of organic compounds, RM Silversteen and others, 5th Ed,John Wiley
3. Spectroscopy of organic compounds, P.S. Kalsi, Wiley, 1993.
4. NMR in chemistry-A multi nuclear introduction, William Kemp, Mc Millan, 1986.
5. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmi

(Mandatory Core)

CHE-AC-303A	Organic Chemistry III	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives: Course Objectives:

- Familiarize with the applications of different reagents in organic synthesis, Mechanisms and stereochemistry.
- Study the methods of preparation and applications of organometallic reagents.
- Understand topocity, prochirality, auxillary and reagent-controlled methods in asymmetric synthesis.
- Applications of different oxidizing and reducing agents in organic synthesis with region and stereo controlled products.

Course Outcomes: At the end of the course, the student will be able to

CO1	To familiarize with the specific functions of the reagents particularly diazomethane, N-bromosuccinimide, Ziegler Natta catalyst, 1,3-dithianes and Merrifield resin in the synthesis of a variety of complex molecules.
CO2	To gain knowledge in the synthesis of different organometallic reagents and also stereo and regio specificity and selectivity of reactions with organometallic reagents
CO3	To understand diastereoselectivity, stereoselectivity and substrate controlled auxillary controlled reactions
CO4	To acquire knowledge about the reagents which causes oxidation in various compounds and also the reagents that causes selective and complete reductions to synthesize various compounds.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	1	2	2	2	2	1
CO2	3	2	2	2	2	2	1	2	1	1	2	-
CO3	3	2	2	3	2	2	-	1	-	1	-	2
CO4	3	2	2	3	2	2	1	2	1	2	2	1

CHE-AC-303A Core-Theory Organic Chemistry III

UNIT I: REAGENTS IN ORGANIC SYNTHESIS 15 Hrs

Use of the following reagents in organic synthesis: Anhydrous $AlCl_3$, Boran trifluoride,

N-Bromosuccinimide, Diazomethane, Dicyclohexylcarbodiimide, Lead tetraacetate, Zieglar-Natta catalysts, DDQ, Dithianes, Merrifield resin.

UNIT-II: ORGANOMETALLIC REAGENTS **15 Hrs**

Synthesis and applications of Grignard reagents, Organolithium, Zinc, Copper, Mercury, Palladium and Rhodium compounds in Organic Synthesis, Homogeneous catalytic hydrogenation and hydroformylation reactions

UNIT III: ASYMMETRIC SYNTHESIS **15 Hrs**

Topocity - Prochirality- Substrate selectivity - Diastereoselectivity and enantioselectivity-Substrate controlled methods-use of chiral substrates - examples

Auxiliary controlled methods-Use of chiral auxiliaries-Chiral enolates-alkylation of chiral imines – Stereoselective Diels-Alder reaction

Reagent controlled methods-Use of chiral reagents-Asymmetric oxidation-Sharpless epoxidation-Asymmetric reduction-Use of lithium aluminium hydride and borate reagents.

UNIT IV: METHODS OF ORGANIC SYNTHESIS **15 Hrs**

i). ***Oxidations:*** **(a)** Alcohols to carbonyls-Chromium (iv) oxidants-Dimethylsulfoxide oxidation, periodate xidation, Oppenauer oxidation, oxidation with manganese dioxide, oxidation with silver carbonate **(b)** Alkenes to epoxides-peroxide induced epoxidations. **(c)** Alkenes to diols-oxidation with potassium permanaganate, osmium tetraoxide, Prevost reaction **(d)** Ketones to esters-Bayer-Villiger oxidation **(e)** Oxidative bond cleavage-cleavage of alkenes by transition metals. **(f)** Oxidation of alkyl or alkenyl fragments-selenium dioxide and chromium trioxide oxidations.

ii). ***Reductions*** **:** Reduction with lithium aluminium hydride, sodium borohydride, alkoxides, bis-methoxy ethoxy aluminium hydride, Boran aluminium hydride and derivatives-catalytic,hydrogenation-dissolving metal reductions, Non-Metallic reducing agents including enzymatic and microbial reductions.

Suggested Books

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry, C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Name reactions and reagents in organic synthesis, B.P. Muway and M.G Ellord, John Wiley.
6. Principles of Organic Synthesis, R.O.C Norman and J.M Coxon, Blackie Academic & Professional.
7. Reaction Mechanism in Organic Chemistry, P.S. Kalsi, New Age International.

8. Principles of organometallic chemistry, P. Powell, ELBS.
9. Organo transition metal chemistry-Applications to organic synthesis, S.G. Davis, Pergmon.
10. Stereochemistry to Organic Compounds, D. Nasipuri, New Age International.
11. Stereochemistry, P.S. Kalsi, Wiley Eastern.

CHE-AC-303B	Physical Chemistry III	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Physical Chemistry

Course Objectives:

- Learn applications of Group Theory, symmetry criteria and symmetry restrictions
- Applications of X-ray Diffraction and Electron Diffraction on solid state chemistry
- Familiarize with the applications of Microwave spectroscopy, infrared spectroscopy and Raman spectroscopy
- Get knowledge on concept of Thermodynamics of polymer dissolution and Flory-Huggins theory of polymer solutions

Course Outcomes: At the end of the course, the student will be able to

CO1	To know the determination of Character Co-ordinate of C_2V point group based on 3N Coordinates and to learn the Mutual exclusion Principle.
CO2	To learn the Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals.
CO3	To study the rigid rotator model, stark effect, vibration-rotation spectroscopy, PQR branches, selection rules and Vibrational- rotational Raman spectroscopy.
CO4	To study the concepts on heat of dissolution, regular solution theory, Hildebrand solubility parameter, concept of Flory-Huggins theory of polymer solutions

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	1	-	1	2	1
CO2	3	2	2	2	2	2	2	-	2	2	1	-
CO3	3	2	2	3	2	2		2	-	1	1	2
CO4	3	2	2	3	1	2	1	-	1	2	-	2

CHE-AC-303B CORE-THEORY PHYSICAL CHEMISTRY III

UNIT-I Applications of Group Theory 15 Hrs

Construction of reducible and irreducible representations, Determination of Character Coordinate of C_2V point group based on 3N Coordinates. Standard reduction formula, Determination of normal modes of vibrations of SO_2, NH_3, $POcl_3$, $Ptcl_4^{2-}$, H_2O_2 molecules. Mutual exclusion Principle, Direct Product, Accidental Degeneracy and Fermi resonance Group Theory and Spectroscopy: IR Spectral activity of NH_3 molecule, selection rules, symmetry Criteria for optical activity, symmetry restrictions on dipole moments, symmetry and stereo isomerism. Prediction of IR and Raman Spectral activity of

H_2O and CO_2.

UNIT-II: X-ray Diffraction: 15 Hrs

(A) Solid State Chemistry: Dislocation of Solids, Schottky and Frenkel defects, insulaters, a, d semiconductors, Band theory of solids, solid state reactions.

(B) Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals. Index reflections, identification of unit cells from systematic absences in diffraction pattern- structure of simple lattices and X-ray intensities- structure factor and its relation to intensity and electron density- Description of procedure for X-ray structure analysis (NaCl and KCl)

(C) Electron Diffraction: Scattering intensity Vs scattering angle, Wierlequation,and its importance.Measurement techniques, Elucidation of structures of simple gas phase molecules, Low energy electron diffraction (LEED) for the study of surfaces.

UNIT-III: SPECTROSCOPHY 15 Hrs

Microwave spectroscopy: classification of molecules, rigid rotator model, effect of isotopic substitution on the transition frequencies, intensities- stark effect.

Infrared spectroscopy: Linear harmonic oscillator, zero point energy, anharmonity, Mores potential energy diagram, fundamental and overtone transitions, hot bands and combinations bands. Vibration-rotation spectroscopy, PQR branches, selection rules, factors affecting the band positions and intensities for IR region. **Raman spectroscopy:** Classical and quantum theories of Raman effect, pure rotational, pure vibrational Raman spectroscopy, selection rules, mutual exclusion principle, resonance Raman spectroscopy and coherent antistokes Raman spectroscopy. Vibrational- rotational Raman spectroscopy.

UNIT-IV: POLYMER SOLUTIONS 15 Hrs

Thermodynamics of polymer dissolution, effect of molecular weight on solubility, solubility of crystalline and amorphous polymer, heat of dissolution, regular solution theory, Hildebrand solubility parameter, Flory-Huggins theory of polymer solutions, conformational entropy, osmotic pressure and viscosity of polymer solutions. Molecular weight determination by light scattering, ultra-centrifugation and sedimentation equilibrium method. Liquid Crystals- synthesis and applications

Books Suggested

1. F.A. Cotton : Introduction to Group theory for chemists.
2. Geroge Davidson Elsevier : Introductory Group Theory for Chemists.
3. Gurdeep Raj , Ajay Bhagi&Vinod Jain : Group Theory and Symmetry in Chemistry
4. Instrumental methods of analysis – M.H. Willard, Meritt Jr. and J.A. Dean
5. Principles of instrumental analysis – Skoog and West

6. F. W. Billmeyer, Jr.: Text Book of Polymer Science. Wiley Interscience.
7. V. R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar: Polymer Science. New Age international Publishers.

CHE AC 304	Core practical I: Analytical Chemistry- Practical	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Analytical Chemistry- Practical.

Course Objectives:

- Gain knowledge on synthesis of inorganic complexes.
- Analysis of ores, alloys and water.
- Acquire knowledge on working principle of colorimetry.
- Estimation of metal ions by complex metric and colorimetric method.

Course Outcomes: At the end of the course, the student will be able

CO1	To know the basic principles of instrumental methods of analysis.
CO2	To gain knowledge on chemistry of alloys.
CO3	To Understand the complexity, theory and working principle of colourimetry
CO4	To familiarize with laws of colorimetric titrations.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	1	2	3	2	-	2	1	1
CO2	3	2	2	3	2	2	3	2	2	1	-	2
CO3	3	-	1	3		2	2	2	-	1	1	-
CO4	3	2	2	3	1	-	2	2	1	1	-	2

CHE -AC -304: Core-Practical Classical Methods of Analysis Practical –I

I. Analysis of ores and alloys:

a) Brass/Bronze
b) Cement
c) Illmenite/Chalcopyrite
d) Dolamite
e) Copper and Nickel alloy

II. Water Analysis:

a) Determination of dissolved Oxygen
b) Determination of BOD of Waste water
c) Determination of COD of Waste water

d) Hardness of Water

e) Chloride, sulphates, carbonates and bicarbonates.

CHE AC 305A	Chemotherapy and Drug Analysis	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Chemotherapy and Drug Analysis

Course Objectives:

- Gain knowledge on chemotherapy and analysis of drugs.
- Analysis of drugs chemically and biologically.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about the classification and synthesis of drugs.
CO2	To familiarize with the qualitative and quantitative analysis of drugs.
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	-	2	3	2	1	1	1	-
CO2	3	2	2	3	2	2	3	2	2	1	-	2
CO3												
CO4												

CHE : AC : 305 (A) : (SKILL ORIENTED COURSE : THEORY) : CHEMOTHEROPY AND DRUG ANALYSIS

UNIT-I: Chemotherapy

Definition, History, and Evolution of Chemotherapy; Discovery, Classification, Nomenclature, Mode of action and synthesis of the following classes of compounds with special references to specific drugs mentioned under each class

i) Sulfa drugs- Sulfanilamide and Sulfamethoxazole.

ii) Antibacterials

a) Lactum group of antibiotics – Penicillin, Ampicillin and Amoxycillin.

b) Cephalosporin-C and Ciprofloxacin.

iii) Anticancer drugs – 5-Flurouracil, Methotrexate.

iv) Antifungals – Griseofulvin

v) Antimalarials – Chloroquin

UNIT-II: Chemical and Biochemical analysis of Drugs

Qualitative and Quantitative Analysis of drugs: Uses of IR, UV, GLC and HPLC methods.

Drug Assay by Biochemical Analysis – ELISA (Cortisol, alcohol, opiates).

Radio Immuno Assay (RIA) – Enalapril, Insulin; Kidney, Lungs and Liver function tests; Use of isotopes in the Bioanalysis of drugs and in drug design programmes.

Book Suggested

1. Medicinal Chemistry and Pharmaceutical Chemistry – Harikishan Singh and Kapur
2. Medicinal Chemistry and Biochemistry – R.L.Nath
3. Introduction to Medicinal Chemistry – Patrick
4. The Organic Chemistry of Drug Synthesis Vols. 1-6 - Ledneicer Top drugs top synthetic routes – John Saunders
5. Medicinal Chemistry – Ashutoshkar
6. Synthetic Organic Chemistry and Drugs – Gurideep R Chetwal
7. Biochemistry – Harper, Conn & Stumpf, Lehninger
8. Biochemistry – Western Jodd
9. Biochemistry – Cann & Stumpf
10. Bergers Medicinal Chemistry Vols. 1-5 – Manfred E. Wolf
11. Introduction to drug design – Siverman
12. Biochemical approach to Medicinal Chemistry – Thomas Nogrady
13. Prinicples of Medicinal chemistry – William Foye
14. Text book of organic medicinal and pharmaceutical chemistry – Delgrado and William A
15. Industrial Microbiology – Casida

CHE AC 305B	Instrumental Methods of Analysis	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Instrumental Methods of Analysis Practical

Course Objectives:

- Gain knowledge on synthesis of inorganic complexes.
- Estimation of metal ions by complex metric and colorimetric method.

Course Outcomes: At the end of the course, the student will be able

CO1	To Understand the complexity, theory and working principle of colourimetry.
CO2	To gain knowledge on analysis of organic components
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	1	2	3	2	1	-	1	-
CO2	3	2	2	3	2	2	3	2	-	1	1	2
CO3												
CO4												

CHE : AC 305 (B) : PRACTICALS (SKILL ORIENTED COURSE) : Instrumental methods of analysis

1. Colorimetric Determinations:

a) Determination of manganese

b) Determination of nickel

c) Determination of iron by 1,10 Pheren-thiroline

d) Determination of chromium

e) Determination of Phosphate

f) Determination of Pesticides

g) Determination of Nitrite.

CHE AC 306 A	Spectral Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Spectral Techniques

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands.
- Study on the applications of flame atomic absorption spectroscopy.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy.

Course Outcomes: At the end of the course, the student will able

CO1	To know the basic principles of spectroscopy.
CO2	To familiarize with the analysis of various functional groups by using different spectroscopic techniques.
CO3	To Understand the applications of AAS.
CO4	To gain knowledge about Mass spectral fragmentation of organic compounds and common functional groups.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	-	2	3	2	1	2	1	1
CO2	3	2	2	3	2	2	3	2	-	1	-	2
CO3	3	2	2	2	2		2	-	1	-	1	-
CO4	3	2	2	3	-	2	-	2	-	1	-	2

CHE : AC : 306(A): (OPEN ELECTIVE) SPECTRAL TECHNIQUES

UNIT – I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY 15 Hrs

Various electronic transitions (185-800nm.), Beer-Lambert Law, effect of solvent on electronic transitions , ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, Fieser-Woodward rules for conjugated dienes and carbonyl compounds

UNIT – II : INFRARED SPECTROSCOPY 15 Hrs

Instrumentation and sample handling, characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols, amines, ketones, aldehydes, esters, amides, acids and anhydrides. Effect of hydrogen bonding.

UNIT – III:ATOMIC ABSORPTION SPECTROSCOPY: FLAME AAS: 15 Hrs

Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT –IV: MASS SPECTROMETRY 15 Hrs

Principle, instrumentation, different methods of ionization, EI, CI, FD and FAB, Mass spectra-molecular ion, base peak, meta-stable peak, nitrogen rule and Mc Lafferty rearrangement. Mass spectral fragmentation of organic compounds and common functional groups. Normal and branched alkanes, alkenes, cycloalkanes, benzene and its derivatives, alcohols and phenols, ethers, aldehydes and ketones, carboxylic acids and their derivatives , amines and nitro compounds. Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Books Suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS .2.
2. Spectroscopy of organic compounds, RM Silversteen and others 5th Ed, John Wiley 1991
3. Spectroscopy of organic compounds, PS Kalsi, Wiley, 1993
4. NMR in chemistry – A Multi nuclear introduction, William Kemp, Mc Millan 1986
5. Spectroscopic methods in Organic Chemistry, DH Williams & I Flemmi TMH . 2005

CHE AC 306 B	Chromatographic Techniques	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chromatographic Techniques

Course Objectives:

- Familiarize with Classification of Chromatographic methods.
- Understand Demonstration experiment in TLC.
- Study on the applications of High-Performance Liquid Chromatography (HPLC).
- Understand the working principle of gas chromatography.

Course Outcomes: At the end of the course, the student will able to

CO1	To know the stationary and mobile phases in chromatographic techniques.
CO2	To familiarize applications of different chromatographic methods.
CO3	To Understand the principle of chromatographic techniques.
CO4	To gain knowledge on the normal phase and reverse phase.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	2	1	-	-
CO2	3	3	2	2	2	1	1	-	2	1	-	-
CO3	3	3	2	2	2	1	1	-	2	1	-	-
CO4	3	3	2	2	2	1	1	-	2	1	-	-

CHE AC 306 B : Chromatographic Techniques

Unit –I: Introduction - Classification of Chromatographic methods – Column chromatography-Adsorption phenomenon: Nature of adsorbents-Solvent systems-Differential migration-Separation of mixture of o-/p-nitro anilines (A demonstration experiment).

Unit –II: Thin-Layer Chromatography (TLC)-Coating materials and preparation of TLC plates-Solvents for development-Detection of compounds in TLC- R_f values in TLC-Applications of TLC in chemistry-Preparative TLC – Demonstration experiment in TLC.

Unit –III: High-Performance Liquid Chromatography (HPLC) - Application of HPLC- HPLC instrument-Stationary phases in HPLC-Normal and reversed phase HPLC: A comparison- Normal phase HPLC: Principle-Retention times in Normal and reversed phase HPLC- Reversed phase HPLC: Principle.

Unit –IV: Gas-Liquid Chromatography- Instruments for Gas-Liquid Chromatography- Gas-

Chromatographic Columns and the Stationary Phase- Application of Gas-Liquid Chromatography- Gas-Solid Chromatography.

Reference Books:

1. Analytical chemistry: G L David Krupadanam, D. Vijaya prsad, K. Varaprasad Rao, KLN Reddy, C. Sudhakar.
2. . Analytical chemistry: Skoog West Holler.
3. Modern Analytical Chemistry : David Harvey DePauw University.
4. J.G. Dick. Analytical Chemistry, Mc Grraw Hill, New Delhi, (1973).

(Mandatory Core)

CHE-AC- 401	Quality Control and General Principles	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Quality Control and General Principles

Course Objectives:

- Study on quality assurance and management
- Obtain practice on the applications of different organic reagents in analysis of inorganic compounds.
- Understand standard reduction potential, mechanism of complex formation reactions. Enzyme characteristics and applications
- Study on Equilibrium constants of oxidation and reduction reactions and the complexometric titration with EDTA.

Course Outcomes : At the end of the course, the student will be able

CO1	To diagnose problems in the quality improvement process and Explain each total quality implementation phase
CO2	To know about theoretical basis for the use of organic reagents in inorganic analysis.
CO3	To understand different types of kinetic methods and their evaluation and to determine the kinetics of enzyme
CO4	To understand the oxidation reactions with Ce (IV) sulphate solutions and applications of complexometric titrations.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	-	-	2	2	-
CO2	3	2	2	3	-	2	-	-	-	2	-	2
CO3	3	3	3	3	-	2	-	-	-	1	1	1
CO4	3	3	3	3	-		-	-	-	-	-	1

CHE AC 401: CORE THEORY: QUALITY CONTROL AND GENERAL PRINCIPLES

UNIT-I: QUALITY CONTROL IN ANALYTICAL CHEMISTRY 15 Hrs

Definition of analytical terms: Accuracy, precision, limit of detection, sensitivity, selectivity and specificity, ruggedness, principles of Ruggedness test, validating the Method as a Standard Method.

Quality assurance and management systems: Elements of quality assurance, Quality and quantity management system ISO 9000 and ISO 14000 series.

Good laboratory practices (GLP): Elements of Good Laboratory Practice, Laboratory accreditation,

GLP status in India.

UNIT-II: ORGANIC REAGENTS IN INORGANIC ANALYSIS 15 Hrs

Theoretical basis for the use of organic reagents in inorganic analysis**:** Application of the following reagents in inorganic analysis: dimethylglyoxime, salicylaldehyde, cupferron, d-benzoin, 1,10 phenanthroline, 8-hydroxy quinoline, nitron, tannin, pyridine, 8-hydroxyquinoldine, dithizone, Acetylacetone, theonyl, trifluoroacetone, 8-hydroxy quinoline, tri-M-octylphosphine oxide.

UNIT – III: KINETIC METHODS OF TRACE ANALYASIS 15 Hrs

Rate laws, Analytical use of reaction rates, First and second order reactions, relative rate of reactions. Determination of reaction rates. Analytical utility of first and pseudo first order reactions. Types of kinetic methods, differential, integral, logarithmic, extrapolation method. Evaluation of kinetic methods – Scale of Operation, Catalyzed reactions, measurement method for catalyzed reaction. Micro determination of Inorganic species like Iodine and Hg in complex materials. Determination of organic species. Kinetics of enzyme, catalyzed reactions. Michael's constant factors affecting the rate of enzyme, Catalyzed reactions, Enzyme characteristics and applications of Kinetic methods of trace analysis.

UNIT-IV:REDOX AND COMPLEXOMETRIC TITRATIONS: 15Hrs

Redox Titrations: Standard reduction potential, equilibrium constants of oxidation-reduction reactions, change of electrode potential during the titration of reductant with an oxidant. Formal potential primary standard substance. Standard solutions. Preparation and storage. Oxidations with cerium (IV) sulphate solutions. Theory and use of (i) acid-base, (ii) Oxidation-reduction (iii) Metal ion indicators.; **Complexometric titrations:** Introduction, complexones, stability constants of EDTA complexes, conditional stability constants, titration curves, types of EDTA titration's, titration of mixtures.

Books Suggested

1. Vogel's Text book of Quantitative Chemical Analysis, Basselt, Denmy, Jaffery and Merdhan, ELBS, Orientlong- Manan, 5th Ed.1990.
2. Analytical Chemistry, Gary D. Christian, John Laliley and Senes, New York, 6th Ed., 2007.
3. Fundamentals of ANALYTICAL CHEMISTRY, Skoog, West, Holler; 7th Editin 2001
4. Fundamentals of Analytical Chemistry, D.A. Skoog & D.M. West, Holf-Saunderrs, 5th Ed., 1991.
5. Principles and Methods Chemical Analysis: H.F. Walton, Prentice Hall, New Delhi.
6. Chemical Analysis, H.A. Laitinan, Mc.Graw Hill Book Company.
7. Technical methods of analysis – Griffin, Mc Graw Hill Book Co.

8. K.V.S.G Murali Krishna, An Introduction ISO 9000, ISO 1400 Series,
9. Environmental Management Quality Assurance and Good Laboratory Practices, Prof. Y. Anjaneyulu, In Now Publication, New York.
10. Quality Assurance in Analytical Chemistry – G.Kateman and F.W Pijpers, John Wiley and Sons, New York

(Mandatory Core)

CHE-AC 402	: Instrumental Methods of Analysis	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Instrumental Methods of Analysis

Course Objectives:

- Gain sound knowledge in spectroscopic methods of ICP-AES, ICP-MS, x-ray fluorescence, spectroscopic techniques and their applications.
- Chromatographic techniques like High-Performance Liquid Chromatography, Capillary Electrophoresis and Supercritical Fluid Chromatography (SFC).
- Familiarise with instrumentation, resolution and ionization sources of GCMS and LCMS.

Course Outcomes: At the end of the course, the student will be able to

CO1	To understand the working principles, instrumentation and applications of ICP-AES and ICP-MS, energy dispersive X-ray fluorescence (EDXRF), Wavelength dispersive X-ray fluorescence (WDXRF).
CO2	To understand the basic principles, procedure and components of the High-Performance Liquid Chromatography (HPLC), Gel Permeation Chromatography (GPC): Capillary Electrophoresis (CE), Supercritical Fluid Chromatography (SFC).
CO3	To get knowledge on instrumentation and applications of GCMS in drug analysis and environmental samples analysis.
CO4	To improve the knowledge about coulometric techniques and their analysis of cations (As (III), Fe (II)) and anions (I^- and S^{2-}) by using I_2 liberations and Ce^{4+} liberation in solutions

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	-	-	1	-	1
CO2	3	3	3	3	3	2	-	-	-	1	1	1
CO3	3	3	3	3	3	2	-	2	-	1	1	3
CO4	3	3	2	2	-	2	-	-	-	1	1	3

CHE-402: CORE THEORY: INSTRUMENTAL METHODS OF ANALYSIS

UNIT –I SPECTROSCOPIC METHODS **15 Hrs**

Emission Spectroscopy:

(i) ICP-AES: Principles, instrumentation, AES detectors, applications in the analysis of trace and toxic metals in water, geological and industrial samples.

(ii) ICP-MS: Principles, instrumentation, quadrupole mass spectrometers, applications

Fluorescence Spectroscopy:

i) Molecular Fluorescence Spectroscopy: Principle, Theory of fluorescence, phosphorescence, relation between intensity of fluorescence and concentration, Correlation of fluorescence with molecular structure, Fluorescence quenching, Instrumentation and applications.

ii) X-ray Fluorescence Spectroscopy: Principle, energy dispersive X-ray fluorescence (EDXRF), Wavelength dispersive X-ray fluorescence (WDXRF), applications.

UNIT – II: CHROMATOGRAPHIC METHODS 15 Hrs

High Performance Liquid Chromatography (HPLC): Principles, Stationary phases, Instrumentation, Solvent delivery system, sample introduction, gradient elution, columns and detectors.Partition Chromatography, adsorption chromatography, Gel permeation chromatography.

Capillary Electrophoresis: Principle, Electroosmotic flow, Instrumentation, Applications to separation of small ions, separation of Molecular Species, DNA sequencing

Supercritical-fluid chromatography: Supercritical-fluids, Instrumentation and Applications

UNIT –III: HYPHENATED TECHNIQUES 15 Hrs

Mass Spectroscopy: Principle, basic instrumentation, resolution, Ionization sources- Electron impact and Chemical ionization, Mass Analyzers- Quadrupole Mass analyzer and Time- of- Flight Analyzer.

Gas Chromatography- Mass spectrometry: Introduction, GC – MS interface, processing of GC – MS data – ion chromatogram. Quantitative measurement – sample preparation, Selected ion monitoring – Application of GC-MS for Trace constituents. Drugs analysis, Environmental analysis and others.

Liquid chromatography- Mass spectrometry – Introduction – Instrumentation – liquid chromatography – Mass spectrometer Interface – Instrumental details – Processing LC-MS data – ion chromatograms, Sample preparation – selected ion monitoring. Application of LC-MS for Drug analysis, Environmental samples and others.

UNIT- IV: ELECTRO ANALYTICAL METHODS 15 Hrs

Anodic stripping voltametry: principle, instrumentation, Hanging mercury drop electrode, application in the analysis of Pb and Cd in environmental samples, principle of cathode stripping voltametry.

Coulometric analysis: principles of coulometric analysis with constant current, coulometric analysis with controlled potential, applications of coulometric methods for the analysis of cations-As (III), Fe (II) and I- and S_2- by using I_2 liberations and Ce^{4+} liberation in solutions

Ion Selective Electrodes: types of ion selective electrodes, basic properties, potentials and construction, calibration of ion selective electrodes, ion selective electrodes with fixed membrane sites, silver, lead, cadmium, sulfide, fluoride, cyanide and glass electrodes, applications in the analysis of air and water pollutants, principles of liquid membrane, gas sensing and enzyme based electrode

Books Suggested

1. Analytical Chemistry, Gary D. Christian, John Laliley and Senes, New York, 6th Ed., 2007.
2. Analytical Chemistry Principles and Techniques, I.G. Harge, Prentice Hall.
3. Principles of Instrumental analysis, D.A. Skoog and J.L. Loacy, W.B. Saunders.
4. Handbook of Instrumental Techniques for Analytical Chemistry, F. Serlie, Prentice Hall.
5. Vogels Text book of Quantitative Chemical Analysis, Basett, Denny Jebbary, 5th Ed. ELBs 1990.
6. Instrumental Methods of Chemical Analysis, Willard Merrit, Dean, Stella Jr 6th Edition.
7. Separation methods, M.N Sastri, Himalaya Publishing Company, Mumbai

(Mandatory Core)

CHE-AC-403A	Applied and Environmental Aspects	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Environmental Aspects

Course Objectives:

- Gain sound knowledge on preparation of sampling, decomposition, separation and pre-concentration
- Experience with fertilizer analysis, pesticide analysis minerals and ores.
- Know about analysis of fuels, alloys and explosives
- Expertise with water quality monitoring

Course Outcomes: At the end of the course, the student will be able to

CO1	Have an idea about preparation of sampling, decomposition, separation and preconcentration of metal ions etc.
CO2	Gain experience on agrochemicals and fertilizers and their analysis.
CO3	Have an idea on the analysis of fuels, alloys and explosives
CO4	Experience with environmental pollution monitoring techniques.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	-	-	1	-	1
CO2	3	3	3	3	3	2	-	-	-	1	1	1
CO3	3	3	3	3	3	2	-	2	-	1	1	3
CO4	3	3	2	2	-	2	-	-	-	1	1	3

CHE : AC 403(A): (GENERIC ELECTIVE) APPLIED AND ENVIRONMENTAL ASPECTS

UNIT-I: SAMPLING AND SEPARATION METHODS 15 Hrs

Preparing the sample for analysis: Sampling, The effect of sampling uncertainties, Gross sample, determination of the size of the gross sample. Analytical sample. Preparation of laboratory sample from gross sample, Moisture in the sample, Karl-Fisher reagent for the determination of moisture content in samples.

Decomposition and dissolving the sample: Decomposition of sample by fluxes, wet digestion, dry ashing, combustion with oxygen, microwave decomposition.

Separation and pre-concentration: Extractive separation of metal ions as chelates (dithizone, oxine,

APDC, NaDDTC), Solid-phase extraction

UNIT-II: ANALYSIS OF AGRO CHEMICALS and MINERALS 15 Hrs

Soil analysis: Soil moisture, pH, total nitrogen, Phosphorus, silica, boron and metals (Cd, Cu, Fe, Mn, and zinc) in soil.

Fertilizer analysis: Analysis of Ammonical fertilizers, Phosphate fertilizers, Nitrate fertilizers

Pesticide Analysis: Analysis of organo chlorine pesticides by gas chromatography, Determination of DDT residue in vegetable and food grains. Analysis of organo phosphorous pesticides (Malathion, parathion) by spectrophotometric and chromatographic methods.

Analysis of Minerals and Ores: Limestone, Ilmenite, Chalcopylites and Beryl. Analysis of Cement, Ceramics and glass.

UNIT-III: ANALYSIS OF COMPLEX MATERIALS 15 Hrs

Analysis of Fuels: Coal, proximate and ultimate analysis, heating valves and grading of coal.

Liquid Fuels: Flash point, aniline point, octane number and carbon residue.

Analysis of Gaseous Fuels: Producer gas, Water gas, Calorific values

Analysis of alloys: German Silver, Brass, bronze, Solder, Steels containing elements such as Mo, Co, V, Cr, Si and Ni.

Aanalysis of Explosives: Introduction, Classification, Deflagrating or low explosives, Characteristics of explosives, Nitrocellulose, PETN or PENTHRIT, Di-nitrobenzene (DNB), Trinitrobenzene (TNB), Trinitrotoluene (TNT),

UNIT – IV: ENVIRONMENTAL POLLUTION MONITORING: 15 Hrs

Water Quality monitoring: Methods of **w**ater sample collection, Determination of Dissolved oxygen (D.O), Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand(COD)

Analytical methods for the determination of the following ions in water:

Anions: F^-, PO_4^{3-}, NO_3^-, NO_2^- Cations: Cr^{6+}, As^{5+}, Pb^{2+}, Hg^{2+}, Cd^{2+}

Air Quality Monitoring: Air sampling methods, Chemical analysis of the following Air pollutants**.** i) Gaseous pollutants: Carbon monoxide (CO). sulphur dioxide (SO_2), nitrogen dioxide (NO_2), Aliphatic hydrocarbons and polycyclic aromatic hydrocarbons (PAH). (ii) Particulate matter

Books Suggested

1. Analytical Chemistry, Gary D. Christian, John Laliley and Senes, New York, 6th Ed., 2007.
2. Fundamentals of ANALYTICAL CHEMISTRY, Skoog, West, Holler; 7th Editin 2001.
3. Analytical Chemistry Principles and Techniques, I.G. Harge, Prentice Hall.

4. Principles of Instrumental analysis, D.A. Skoog and J.L. Loacy, W.B. Saunders.
5. Fundamentals of Air Pollution by A.C. Strem and others, Academic Press, 1975.
6. Standard methods for the examination of water and waste water published by American public health association, 15th Ed.1981.
7. Methods of Soil Analysis, C.A. Black, Part I and II.
8. Handbook of Analytical Control of Iron and Steel Production, Harrison John Weily 1979
9. Standard methods of Chemical Analysis, Welcher.
10. Technical Methods of Analysis, Griffin, Mc Graw Hill.
11. Environmental Chemistry, Anil Kumar De, Wiley Eastern Ltd.

(Compulsory Foundation)

CHE-AC-403B	Bioinorganic, Bioorganic, Biophysical Chemistry	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Bioinorganic, Bioorganic, Biophysical Chemistry

Course Objectives:

- Highlighten metal complexes as oxygen carriers and electron transfer in biology
- Metal ion transport and storage in biological systems and importance of trace metals in biology
- Learn physiological functions of carbohydrates, lipids, enzymes classification, stereospecificity
- The basic concepts of biophysical chemistry in biochemical reactions, exergonic and endergonic reactions.

Course Outcomes: At the end of the course, the student will be able to

CO1	Gain knowledge on metallo proteins in electron transfer processes.
CO2	Know the applications of trace metal ions and metal ions as chelating agents in medicine.
CO3	Achieve and develop highly stereoselective synthesis of organic compounds and drugs by adopting environmentally.
CO4	Understand thermodynamics of biopolymer reactions and to correlate free energy and biopolymer parameters.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	-	-	1	-	1
CO2	3	3	3	3	3	2	-	-	-	1	1	1
CO3	3	3	3	3	3	2	-	2	-	1	1	3
CO4	3	3	2	2	-	2	-		-	1	1	3

CHE AC-403(B): (GENERIC ELECTIVE): BIOINORGANIC, BIOORGANIC, BIOPHYSICAL CHEMISTRY

UNIT-I: **BIO-INORGANIC CHEMISTRY- I** **15 Hrs**

Metal complexes as oxygen carriers –Heme proteins –Hemoglobin and myoglobin –Non heme proteins –hemerythrin and hemocyanin – model synthetic complexes of iron, cobalt and copper.Co-enzymes Vitamin B_{12},carboxy peptidase and superoxidedismutase.

Electron Transfer in Biology: Structure and functions of metalloproteins in electron transfer processes –catalase –peroxidose –cytochromes and iron –sulphur proteins –synthetic models.

UNIT – II: BIOINORGANIC CHEMISTRY- II: Metal ion transport and storage in biological systems**,** Metal ions in Biology, Molecular mechanism of ion transport across membranes: ionophores, photosynthesis.

Hydrolytic metalloenzymes: Carbonic anyhdrase, carboxy peptidase, calcium in control processes, calcium and muscle contraction, calcium and secretion, calcium in blood clotting mechanisms. Therapeutic uses of enzymes.

Importance of trace metals in biology: Metal ions as chelating agents in medicine, trace metal ions and metal and non-metal deficiency. Biological nitrogen fixation,in-vivo and in-vitro nitrogen fixation.

UNIT-III: BIOORGANIC CHEMISTRY

Carbohydrates: Structure and biological functions of mucopolysaccharides, glycoproteins, and glycolipids- Role of sugars in biological recognition- Blood group substances

Lipids: Essential fatty acids-structure and function of triglycerols, Glycerophospholipids, cholesterol, bile acids prostaglandins- composition and functioning of lipoproteins

Enzymes: Nomenclature and classification, properties, factors affecting enzyme catalysis, enzyme inhibition- reversible and irreversible inhibition. Uses of enzymes in food drink industry and clinical laboratories.

UNIT-IV: BIOPHYSICAL CHEMISTRY:

Standard free energy change in biochemical reactions, exergonic and endergonic reactions, hydrolysis of ATP, thermodynamics of biopolymer solutions, chain configuration of bio polymers, and calculation of average dimensions. Membrane equilibrium, ion transport through cell membrane.dialosis and its function. Structure and functions of proteins, enzymes, DNA and RNA in living systems, forces involved in bio polymer interactions, electrostatic forces, hydrophobic forces, molecular expansion, and dispersion forces.

Books Suggested

1. M.N. Hughes, The Inorganic chemistry of Biological Processes, John wiley and Sons, New York 2nd Edition, 1981.
2. A Text book of Biochemistry, A.V.S.S. Rama Rao
3. Physical chemistry by Atkenes
4. Physical chemistry by Albertz.
5. Bio physical chemistry by Van Holde
6. Bio Physics by Narayanam

7. Organic Chemistry, Vol. 2, I. L. Finar, ELBS.
8. Chemistry of Natural Products, P.S. Kalsi, Kalyani Publishers.
9. Chemistry of Organic Natural Products, O. P. Agarwal, Vols., 1 & 2, Geol Pubs.
10. Natural products Chemistry K.B.G. Torssell, John Wiley, 1983.
11. Burger's Medicinal Chemistry, M.E. Wolff, John Wiley
12. Medicinal Chemistry, A. Kar, New Age International

CHE AC 404	Core practical I: Analytical Chemistry- Practical	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Analytical Chemistry- Practical.

Course Objectives:

- To learn about the separation methods and flame photometric analysis of pesticide residues
- Determination of transition metal ions by polarography
- Principle, instrumentation, determination of metal ions By AAS.
- Interpretation of NMR chemical shifts and hydrogen bonding.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand the common laboratory techniques including separation techniques
CO2	Polarography, atomic absorption spectroscopy in both emission and absorption mode.
CO3	Gain knowledge on implementation of gas chromatography and HPLC for separation of mixtures.
CO4	Familiarize with interpretation of data to structures by NMR.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	-	-	1	-	1
CO2	3	3	3	3	3	2	-	-	-	1	1	1
CO3	3	3	3	3	3	2	-	2	-	1	1	3
CO4	3	3	2	2	-	2	-	-	-	1	1	3

CHE AC 404: CORE PRACTICALS: <u>PRACTICAL – I-</u>

Instrumental methods of analysis- II

1. Flame Photometry**:** Determination of Na and K, Ca and Li in Water and Soil.
2. TLC/Paper chromatographic separation.
3. Determination of Pesticide residues by gas chromatographic method
4. Polarography: a) Determination of E ½ of Zn and Cd; b) Determination of amounts of Zn and Cd
5. Atomic Absorption Spectroscopy: Determination of transition metal ions (Cd, Cr, Cu, Pb, Zn etc.,) by AAS.
6. Separation of Metal ion by Solvent Extraction /Ion exchange.

II <u>DEMONSTRATION EXPERIMENTS</u>

1. IR – Interpretation of IR spectrum of alcohols, ketones, aldehydes and other standard materials

2. AAS: Demonstration of AAS – Determination of Zn, Cd, Pb, Mn, Fe and Ni in effluents using AAS.
3. Spectrofluorimetry – estimation of quinine and fluoroscene
4. Ion selective electrodes – estimation of F^-, S^{2-} and CN^- in effluents using ion selective electrode meter.
5. Polarography and Anode stripping voltametry
   a). Polarography and Anode stripping voltametry – behavior of Cd, Zn, Pb in a mixture.
   b). Determination of Pb and Cd in samples using Anode stripping voltametr
6. Gas chromatography- Determination of pesticides
7. HPLC- Determination of pesticides
8. NMR
   (a). Demonstration of NMR spectrometer and study of hydrogen bonding in a given alcohol or phenol.
   (b). Interpretation of NMR chemical shifts of ethyl benzene, ethyl alcohol
9. TGA, DTA, DSC – Demonstration of TG, DTA and DSC and study of decomposition of calcium oxalate, calcium carbonate, copper sulfate, oxalic acid.
10. pH metry
    (a). Determination of alkalinity in a colored effluent using pH metric end point.
    (b). Determination of purity of commercial HCl, H_2SO_4, H_3PO_4 and CH_3COOH using pH metric end point.

CHE AC 405A	Project Work	L-5,T-1,P-0	4Credits

Pre-requisite: Project Work

Course Objectives:

- Identification of problem
- Ability to carry out independent chemistry research with competency in research design, data gathering
- Interpretation and communication of research results through scientific publications and presentations.
- Preparation of dissertation

Course Outcomes: At the end of the course, the student will be able to

CO1	Perform experiments, collection and evaluation of data.
CO2	Interpretation of results while adhering to scientific principles of responsible and ethical behaviour.
CO3	Analysing and compiling the data and results in a chronological order in the form of dissertation.
CO4	Preparation of dissertation.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3	-	3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-		-	2	-	3

CHE AC 405 A : <u>PROJECT WORK</u>

CHE AC 406A	Drug Chemistry	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Drug Chemistry

Course Objectives:

- To learn about the natural products as leads for new drugs
- Determination of cardiovascular drugs
- To study Autacoids
- Interpretation of Antipyretics

Course Outcomes: At the end of the course, the student will be able to

CO1	Know about natural products.
CO2	Know Interpretation of cardiovascular drugs.
CO3	Know the Analyzing about prostaglandins.
CO4	Know the Definition, Classification, Nomenclature, Structure and Synthesis of anti-inflammatory drugs.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3	-	3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-		-	2	-	3

CHE : AC : 406 (A): (OPEN ELECTIVE) : DRUG CHEMISTRY

UNIT – I: NATURAL PRODUCTS AS LEADS FOR NEW DRUGS

Occurrence, Structure and therapeutic uses of Drugs acting on Central Nervous System

Morphine alkaloids (morphine, codeine, thebaine, heroin, pethidine)

Cannabinoids (9-cannabinol, Tetrahydrocannabinol)

Neuromuscular Blocking Agents (Curare, Decamethonium)

Vinca Alkaloids (Vincristin and Vinblastin), Taxol and Taxotere, podophyllotoxin, Etoposide, Teniposide.

UNIT – II: CARDIOVASCULAR DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis.

Cardiac glycosides (ex: Digoxin, Digitoxin);

Antihypertensive drugs (ex: Methyl dopa, Clonidene hydrochloride);

Antiarrhythmic agents (ex: Quinidine sulfate);

Antisympathetic drugs (ex: Propranolol hydrochloride, Verapamil hydrochloride);

Vasopressor drugs (ex: Prenylamine, Buphenine).

UNIT – III: AUTACOIDS

Definition, Occurrence, Isolation, Nomenclature, Classification, Synthesis, Biosynthesis and Stereochemical structures of Prostaglandins. Structural elucidation of PGE_1, PGE_2; Synthesis and biosynthesis of PGE_2, $PGF_{2\alpha}$. Structure and Biosynthesis of Thromboxane A2 and Prostacyclin (synthesis not expected).

UNIT – IV: ANTI-INFLAMMATORY DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis of Paracetamol, Aspirin (Antipyretic), Salol, Cinchophen, Antipyrene, Phenylbutazone, Indomethacin, Tolmetin, Ibuprofen, Diclofenac and Naproxen.

Books suggested:

1. Medicinal Chemistry by Ashitosh Kar
2 Medicinal Chemistry by D. Sriram, P. Yogeeswari
3 Medicinal Chemistry by David A. Williams, Thomas L. Lemke
4 Medicinal Chemistry by V**.** Alagarsamy
5 Biochemistry by U. Satyanarayana
6 Natural Products Chemistry and Applications by Sujata V. Bhat, B.A. Nagasampagi, S. Meenakshi
7 Medicinal Chemistry by V.K. Ahluwalia, Madhu Chopra
8 Medicinal Chemistry by Balkishen Razdar
9 Advanced Practical Medicinal Chemistry by Ashutosh Kar
10 Chemistry of Organic Natural Products by O. P. Agarwal, Vols., 1 & 2, Geol Pubs.
11 Chemistry of Natural Products by S. V. Bhat, B.A. Nagasampagi, M. Sivakumar
12 Natural Products Chemistry by K.B.G. Torssell, John Wiley, 1983.

CHE AC 406 B	Electroanalytical Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Electroanalytical Techniques

Course Objectives:

- To learn about the classification of electroanalytical methods
- Determination of types of currents
- Principle, instrumentation, reversible and irreversible cyclic voltammograms..
- Interpretation of Ion selective electrodes

Course Outcomes: At the end of the course, the student will able to

CO1	Know how to interpret potentiometry and conductometry
CO2	Know the Interpretation of results while adhering to DC Polarography.
CO3	Know the Analysing and compiling the data and results in polarography .
CO4	Familiarize Types of ion sensitive electrodes.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3	-	3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE : AC : 406(B): (OPEN ELECTIVE) : ELECTRO ANALYTICAL TECHNIQUES

Unit I: Types and Classification of Electro analytical Methods.

i) Potentiometry- Types of electrodes, Hydrogen gas, Calomel, Quin hydrone and glasselectrodes. Determination of pH. Potentiometric titrations.

ii) Conductometry – Definition of terms – conductivity, specific conductivity, cell constant. Mobility of ions, Conductometric titrations.

Unit II: D.C Polarography :. Dropping mercury electrode- Instrumentation-polarogram. Types ofCurrents : Residual, Migration, Limiting. Two and Three electrode assemblies. Ilkovic equation(derivation not necessary) and its consequences. Types of limiting Currents: Adsorption,Diffusion, Kinetic. Applications of polarography in qualitative and quantitative analysis. Analysis of mixtures. Application to inorganic and organic compounds. Determination of stability constants of complexes.

Unit III: (i) A.C. polarography (ii) Square-wave polarography (iii) Pulse polarography (iv) Differential pulse polarography(V) Cyclic Voltammetry: Principle, instrumentation, reversible and irreversible cyclic voltammograms.

Unit IV: Ion selective electrodes: Ion-sensitive electrodes –types of ion sensitive electrodes –metal based cation and anion sensitive electrodes, solid membrane electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A. Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denny. Vogel's Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (Mc Graw Hill).

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

SVU COLLEGE OF SCIENCES

DEPARTMENT OF CHEMISTRY

2. ENVIRONMENTAL CHEMISTRY (Specialization)



Syllabus for M.Sc. CHEMISTRY

Choice Based Credit System (CBCS)

Amended as per NEP-2020

(Academic Year 2023-2024)

About the Department

The Department of Chemistry is one of the first six departments started during the year 1954 when the university was founded. The Department offers M.Sc. course in Chemistry with specializations in Analytical, Environmental, Inorganic, Organic and Physical Chemistry besides Self Supporting Courses in Organic and Analytical Chemistry. Choice Based Credit System is followed and the courses are categorized as per the guidelines of the statutory authorities. Ability enhancement and skill development courses are part of the curriculum. Almost 15% of the students are qualifying in National Entrance Test conducted by UGC-CSIR. Also the Department offers quality research and training experience leading to Ph.D., Degrees for the students in the areas of synthesis of pharmacologically potential molecules analogous to drugs, application of green methodologies for the synthesis of complex molecules, development of new hybrid sorbents for monitoring toxic metals in environmental samples, fabrication of novel electrochemical sensors and biosensors towards the detection of organic molecules and pollutants. Over the last sixty five years the department has trained about 650 students for their Doctoral degrees. Most of the research scholars are doing Post-Doctoral research in abroad and in India. The faculty published more than 3000 research papers in reputed National and International journals. The Department organizes National and International conferences / seminars/ workshops on regular basis. The Department has well equipped laboratories for research and teaching besides a DST funded computer lab and a Department library. All the faculty members are having individual research laboratories with internet facility.

At present the Department is flourished with 10 faculty members and most of the faculty members have Post Doctoral research and training experience abroad. Some of the faculty worked as Visiting Professors and Visiting Fellows in prestigious universities abroad. Majority of faculty members have undertaken major research projects funded by agencies like UGC, CSIR, DST, BRNS, DBT and MOES and have successfully completed the tasks with a budget outlay of Rs. 250.00 lakhs. Most of the faculty members have developed collaboration with Indian Institute of Sciences, Bangalore, Indian Institute of Chemical Technology, Hyderabad, AVRA Laboratories, EPR Laboratories, Hyderabad, Amara Raja Batteries, Tirupati, RRL, Trivandrum and Birla Institute of Technology & Science, Pilani – Hyderabad campus and have approved patents. Some of the faculty and Alumni are the recipients of JSPS Fellowship, UGC Raman Fellowship, Common wealth Academic Fellowship, State Best Teacher Award etc., Recognizing the excellence in teaching and research in the Department, the University Grants Commission and Department of Science Technology have provided funding under DRS and FIST programmes. The Alumni of the department served in coveted positions as Vice-chancellors, Registrars, CEO of pharma industries etc. The former students of the Department have established leading International pharmaceutical industries in India and abroad. Some of them are actively engaged in the manufacture of COVID 19 vaccine. The ultimate goal of the Department is to achieve excellence in fundamental research as well as the development of innovative technologies for the future.

Vision

- Impart quality education & training in the field of chemistry to enable successful careers for the post graduate students in the field of research, education & industry applications of chemical sciences.

Mission

The Department of Chemistry strives:

- To get an ideal balance between knowledge creation and knowledge dissemination in the chemical sciences with a focus to train and mentor students to become responsible scientists and scientifically literate professionals to attain National and International impact.
- To contribute to the improvement of scientific and technological literacy, and the development of critical-thinking and problem-solving skills of all students in order to compete for the world of work and responsible citizenship

Program Specific Outcomes: At the end of the program, the student will be able to:

PSO1	**Scientific Problem solving skills**: Deep knowledge of the topic which can develop the problem solving skills using chemical principles.
PSO2	**Analytical skills**: Develop analytical skills such as synthesizing, separating, characterizing chemical compounds and chemical reactions with the help of sophisticated instruments
PSO3	**Research skills**: Develop research skills through dissertation/project work in different fields of chemistry such as organic, inorganic, analytical, physical and environmental.
PSO4	**Learning skills on life processes**: Acquire advanced level of knowledge in natural products as well as biological systems from the chemistry point of view.

Program Objectives

PO1	To divulge an advance level of theoretical and practical knowledge in the major fields of Chemistry- Analytical, Environmental, Inorganic, Organic and Physical.
PO2	To engage in research projects for acquiring wide spectrum of subject knowledge and research experience in respective fields.
PO3	To enlighten on skill enhancement in the core chemistry with practical expertise hands this will make students employable in academia and industries
PO4	To mould as responsible citizens to serve the nation

Program Outcomes: On completion of M.Sc. Chemistry programme, graduates will be able to –

PO1	Have a firm foundation in the fundamentals and application of current chemical and scientific theories in different areas of chemistry *viz*., Analytical, Environmental, Inorganic, Organic and Physical.
PO2	Understands the background of organic reaction mechanisms, complex chemical structures, and instrumental methods of chemical analysis, molecular rearrangements and separation techniques.
PO3	Familiarize with the importance of various elements present in the periodic table, coordination chemistry and structure of molecules, properties of compounds, structural determination of complexes using theories and instruments.
PO4	Understand about the physical aspects of atomic structure, dual behavior, reaction pathways with respect to time, various energy transformations, molecular assembly in nano-level, significance of electrochemistry, molecular segregation using their symmetry.
PO5	Create awareness and sense of responsibilities towards environment and apply knowledge to solve the issues related to Environmental pollution.
PO6	Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in the subject concerned. Ability to identify unethical behavior such as fabrication, falsification or misrepresentation of data and adoptive objective, unbiased and truthful actions in all aspects.
PO7	Be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
PO8	Clearly communicate the results of scientific work in oral, written and electronic formats.
PO9	Explore new areas of research in both chemistry and allied fields of science and technology.
PO10	Design, analyze and carry out scientific experiments and interpret data to provide solutions to different industrial problems.
PO11	Independently carry out research to solve practical problems and present a substantial technical report.

PO12	Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning throughout life, through self- paced and self-directed learning aimed at personal development, and adapting to change academic demands of work place through knowledge/ skill development/ reskilling.

Program Educational Objectives:

At the end of the program, the student wills be able to:

PEO1	To demonstrate broad knowledge of descriptive chemistry.
PEO2	To impart basic analytical and technical skills to work effectively in various fields of chemistry.
PEO3	To motivate critical thinking and analysis skills to solve complex problems viz., analysis of data, synthetic logistics, spectroscopy, structure and modeling, team based problem solving etc.
PEO4	To demonstrate an ability to conduct experiments in the above sub disciplines with mastery of appropriate techniques and proficiency using core chemical instrumentation and modeling method
PEO5	To develop laboratory competence in relating chemical structure to spectroscopic phenomena.
PEO6	To demonstrate the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment and modern instrumentation.

SRIVENKATESWARAUNIVERSITY::TIRUPATI

DEPARTMENTOF CHEMISTRY

ENVIRONMENTAL CHEMISTRY

TWO YEAR M.Sc. COURSE IN CHEMISTRY

(2021-2022)SCHEME

Semester -I

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-101	Core-Theory	Inorganic Chemistry- I	6	4	20	80	100
2	CHE-102	Core-Theory	Organic Chemistry I	6	4	20	80	100
3	CHE-103	* Compulsory Foundation	a)Physical Chemistry- I b)Chemistry of Nano materials	6	4	20	80	100
4	CHE-104	* Elective Foundation	a)General Chemistry- I b)Green Chemistry	6	4	20	80	100
5	CHE-105	Practicals (Core & Comp.)	a)Inorganic Practical-I b) Physical Chemistry-I	3 3	2 2	- -	- -	50 50
6	CHE-106	Practicals (Core & Elective)	a) OrganicChemistry- I b)General Chemistry-I	3 3	2 2	- -	- -	50 50
7	CHE-107	Audit Course	Human Values and Professional Ethics – I	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

SEMESTER-II

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-201	Core-Theory	Inorganic Chemistry- II	6	4	20	80	100
2	CHE-202	Core-Theory	Organic Chemistry -II	6	4	20	80	100
3	CHE-203	* Compulsory Foundation	(a)Physical Chemistry- II (b) Advanced Thermodynamics and Biophysical chemistry	6	4	20	80	100
4	CHE-204	* Elective Foundation	a)General Chemistry- II b)Chemistry of contemporary society	6	4	20	80	100
5	CHE-205	Practicals (Core & Comp.)	a)Inorganic Practical-II b) Physical Chemistry-II	3 3	2 2	- -	- -	50 50
6	CHE-206	Practicals (Core & Elective)	a)OrganicChemistry- II b)General Chemistry-II	3 3	2 2	- -	- -	50 50
7	CHE-207	Audit Course	Human Values and Professional Ethics – II	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

M.Sc. (ENVIRONMENTAL CHEMISTRY)

SEMESTER-III

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-EC-301	Core-Theory	Inorganic Spectroscopy & Thermal Methods of Analysis	6	4	20	80	100
2	CHE-EC -302	Core-Theory	Organic Spectroscopy	6	4	20	80	100
3	CHE-EC-303	*Generic Elective	(a) Organic Chemistry III (b) Physical Chemistry III	6	4	20	80	100
4	CHE-EC-304	Core& Gen. Practicals	Water & Soil Analysis	6	4	-	-	100
5	CHE –EC-305 A	Skill Oriented Course (theory)	Chemotherapy and drug analysis	3	2	10	40	50
	CHE –EC-305 B	Skill Oriented Course (Practicals)	Instrumental methods of analysis	3	2	-	-	50
6	CHE- 306	Open Elective **(For other departments)**	(a) Spectral Techniques (b) Chromatographic Techniques	6	4	20	80	100
		Total		**36**	**24**			**600**

***Among the Generic Elective a student shall choose any one.**

SEMESTER-IV

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-EC-401	Core-Theory	Energy Environment and Soils	6	4	20	80	100
2	CHE-EC-402	Core-Theory	Water Pollution monitoring and Environment Laws	6	4	20	80	100
3	CHE-EC-403	Generic Elective* **(Related to subject)**	(a) Air Pollution, Control Methods-Noise and Thermal pollution (b) Bioinorganic, Bioorganic & Biophysical Chemistry	6	4	20	80	100
4	CHE-EC-404	Core& Gen. Practical	Instrumental Methods of analysis – II	6	4	-	-	100
5	CHE-EC-405	Core-Practicals/ Project work	Project work	6	4	-	-	100
6	CHE-406	Open Elective **(For other departments)**	(a)Drug Chemistry or (b) Electroanalytical Techniques	6	4	20	80	100
		Total		**36**	**24**			**600**

***Among the Generic Elective a student shall choose any one.**

(Mandatory Core)

CHE-101	INORGANIC CHEISTRY I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Comprehend the key features of coordination compounds, Crystal Field Theory, different properties and bonding by spectroscopic techniques
- Study the polymorphic forms of non-transition elements and their synthesis and properties
- Understand the basics of reaction mechanism and the mechanistic concepts of Dissociative (Id) and Associative interchange Mechanism (Ia), Taube's classification, Trans effect and Electron Transfer Reactions
- Familiarize with the methods of synthesis of metal carbonyls and metal nitrosyls, Synergistic effect, EAN and 18-electron rule

Course Outcomes: At the end of the course, the student will be able

CO1	To understand the key features of coordination compounds, Crystal Field Theory, magnetic properties and bonding in transition metal complexes.
CO2	To learn about the polymorphic forms of Carbon, Sulphur and Phosphorus, synthesis and properties of sulphur-nitrogen compounds, boranes, carbides, silicates and to know Wades rules.
CO3	To explain the reactivity of complexes in terms of Valence bond and Crystal Field theories, Taube's classification, Trans effect and Electron Transfer Reactions.
CO4	To gain knowledge on synthesis and structures of different metal carbonyls, synergistic effect and 18 electron rule.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	1	-	1	-	2	-	1
CO2	3	1	-	3	-	2	2	2	2	1	-	2
CO3	3	2	-	3	2	-	-	1	-	1	2	1
CO4	3	1	1	3	-	2	2	2	1	-	1	1

CHE 101: INORGANIC CHEISTRY I

UNIT-I: CO-ORDINATION COMPOUNDS 15 Hrs

Introduction to Crystal field Theory, CFSE and its calculation, Paring energy, Splitting of 'd' orbitals in Trigonal bi pyramidal, square planar, square pyramid and pentagonal bipyramidal geometries, Jahn –Teller effect, Application of CFT, OSSE, site Selection in Spinels, Short comings of CFT, Evidence for covalency –

Nephelauxetic effect. MOT of co-ordinate bonds –M.O. Diagrams for octahedral, tetrahedral and square planar complexes. Experimental evidences for π- bonding – Crystallography, Infrared spectroscopy and Photoelectron spectroscopy.

UNIT-II: CHEMISTRY OF NON-TRANSITION ELEMENTS 15 Hrs

General characteristics of the non- transition elements special features of individual elements ; Synthesis' properties and structure of their Halides and Oxides, Polymorphism of Carbon, Phosphorus and Sulphur, Synthesis, properties and structure of boranes, Carboranes, borazines, Silicates, Carbides, Sulphur-nitrogen compounds. Electron counting in boranes, Wades rules (Poly hedral skeletal electron pair theory), Isopopoly and hetero poly acids.

UNIT-III: REACTION MECHANISMS IN COMPLEXES 15 Hrs

Reactivity of metal complexes. Inert and Labile complexes. Concept of Labile and Inert complexes in terms of Valence bond and Crystal Field theories. Taube's classification of complexes as labile and inert complexes. Dissociative (D) and Dissociative interchange Mechanism (Id) & Associative (A) and Associative interchange Mechanism (Ia). Substitution reactions in octahedral complexes- Acid Hydrolysis -factors affecting Acid Hydrolysis - Base Hydrolysis-conjugate Base Mechanisms - Anation Reactions -Substitution Reactions in Square Planar complexes- Trans effect – Mechanisms of Trans effect: polarization and π-bonding theories.Electron Transfer Reaction-Inner Sphere and outer Sphere Mechanisms- Marcus theory.

UNIT-IV: METAL πCOMPLEXES-I 15 Hrs

Nature of π bonding, Classification of π ligands, π donor ligands and π -acceptor ligands.

Metal Carbonyls: Synthesis of metal carbonyls, Structures of metal carbonyls of the types M(CO)n (M= Cr, Fe, Ni; n=4-6), $M_2(CO)n$ (M=Co, Fe, Mn; n=8-10), $M_3(CO)_{12}$ (M=Fe, Ru and Os), $M_4(CO)_{12}$ (M=Co, Rh, Ir). IR Spectraof metal carbonyls (i) Detection of bridging and terminal CO ligand, (ii) Synergistic effect, EAN and 18-electron rule. Electron counting methods (i) Oxidation state method and (ii) Neutral Atom method.

Metal Nitrosyls: Synthesis of metal Nitrosyls, bonding, Electron donation by nitric oxide, Models for NO bonding (i) Covalent model and (ii) Ionic models, Structures of metal nitrosyls (1) $[Fe_4S_3(NO)]$ (2)$[Fe_2(NO)_2I_2]$ (3) $[(\phi_3P)_2Ir(CO)Cl(NO)]^+$ (4) $[(\phi_3P)_2Ru(NO)_2Cl]$, Detection of bridging NO ligand, Applications of metal nitrosyls.

Books Suggested

1. F.A.Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999.John wiley & sons. Inc., New York.
2. James E. Huheey, Inorganic chemistry- Principles of structure and reactivity, VI Edition 1993. Harper Collins College Publishers, New York.

3. J.D. Lee: Concise Inorganic Chemistry (Blackwell)
4. Gary Wolfsburg: Inorganic Chemistry (5th Ed. (Viva Books)
5. W.L. Jolly: Modern Inorganic Chemistry (McGraw-Hill)
6. B.N Figgis: Introduction to Ligand Fields (John-Willey)
7. S.F.A. Kettle: Coordination compounds.
8. Coordination Chemistry. Bassalo & Jahnson.

(Mandatory Core)

CHE-102	Organic Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Organic Chemistry

Course Objectives:

- Classify molecules based on stereo chemical aspects study on optical and geometrical isomerism by the application of Cahn-Ingold-Prelog rules.
- Familiarize with different types of substitution reactions, able to predict products, including stereochemistry in aliphatic and aromatic nucleophilic substitution reactions, effect of neighboring group participation
- Understand thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects in reactive intermediates
- Study about occurrence, isolation, structure establishment and synthesis of natural products-terpenoids.

Course Outcomes: At the end of the course, the student will be able

CO1	To detect stereochemical structures of the molecules, stereoselective and stereocontrolled reactions.
CO2	To ascertain the stereochemistry of the products with the effect of neighbouring group participation and to familiarize the various types of aromatic substitution reactions, their mechanism and the effect of substituents.
CO3	To know the concept of isotope effects, potential energy diagrams and transition states in different intermediates
CO4	To familiarize with stereospecific synthesis of naturally occurring terpenoids and degradation products of terpenoids

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	2	-	1	1	-	1	-	-
CO2	3	2	1	3	-	1	2		-	2	1	1
CO3	3	1	2	3	-	1	1	2	1	-	1	-
CO4	3	2	2	3	2	1	1	1	-	1	1	1

CHE102: Organic Chemistry I

UNIT-I: **Stereochemistry**

Sereoisomerism-Stereoisomers Classification – Configuration and conformation.

Molecular Three dimensional representations: Wedge, Fischer, Newman and Saw-horse formulae, their description and interconversions.

Molecular Symmetry & Chirality: Symmetry operations and symmetry elements (Cn & Sn). Criteria for Chirality. Dissymmetrization.

Optical isomerism: Molecular Symmetry and Chirality-Cahn-Ingold-Prelog rules R, S-nomenclature, stereoisomerism resulting from more than one chiral center, meso and pseudoasymmetric compounds - **Axial Chirality** - Stereochemistry of allenes spiranes - biphenyl derivatives and atropisomerism - **Planar chirality** - Ansa compounds and trans - Cycloalkenes - **Helicity**. Helically chiral compounds

Geometrical isomerism - E, Z - nomenclature - Physical and Chemical methods of determining the configuration of geometrical isomers-Stereoisomerism in 3, 4 and 5-membered cyclic compounds.

UNIT-II: Substitution Reactions

i) Aliphatic Nucleophilic substitutions: The S_N2, S_N1, mixed S_N1 and S_N2, SET mechanisms. Reactivity- effects of substrates, attacking nucleophiles, leaving groups and reaction medium.Common carbocation rearrangements – primary, secondary and tertiary. The neighbouring group participation (NGP) -anchimeric assistance, NGP by σ and π- bonds, phenonium ions, norbornyl and norbornenyl systems, Classical and nonclassical carbocations, NGP by halogens and heteroatoms (O,N,S)

The S_N^i and S_N2' mechanisms. Nucleophilic substitution at an allylic, and vinylic carbons.

ii. Aromatic Nucleophilic Substitution: The S_NAr, S_N1, benzyne and $S_{RN}1$mechanisms. Reactivity - effect of substrate, structure, leaving group and attacking nucleophile. The von Richter, Sommelet - Hauser and Smiles rearrangements.

UNIT-III: Reactive intermediates

Types of reactions, types of bond cleavage mechanisms, generation, structure, stability and reactivity of carbocations, carbanions, free radicals, carbenes, nitrenes and arynes. Thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects**.**

UNIT-IV: Terpenoids

Classification of terpenoids, occurrence, isolation, general methods of structure determination. Isoprene and special isoprene rule. Structure determination and synthesis of the following representative molecules: Farnesol, Zingeberine, Cadinene and Abietic acid.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
6. Stereochemistry, P.S. Kalsi, Wiley Eastern.
7. Text book of Organic Chemistry, M.C. Murry
8. Organic Chemistry, Vol I, I.L. Finar, ELBS Eds.

(Mandatory Core)

CHE-103	Physical Chemistry I	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Acquire knowledge in Quantum Chemistry, postulates of Quantum Mechanics., Applications of Schrodinger wave equation and Born-Oppenheimer approximation
- Study on Chemical Dynamics and theories in unimolecular, chain and fast reactions and determination of reaction rates.
- Familiarize with concepts of Thermodynamics and statistical thermodynamics, Gibbs- Duhem equation and Sackur-Tetrade equation
- Know about Thermodynamic and Kinetic concept of Electrochemistry and conductance, conductivity of electrolytes

Course Outcomes At the end of the course, the student will be able to

CO1	To know the concepts such as Operator algebra, Eigen values and Eigen functions, Degeneracy, Schrodinger wave equation and the postulates of Quantum Mechanics.
CO2	To learn about theories of reaction rates, Lindemann, Lindemann-Hinshel wood, and RRKM theories.
CO3	To know about Thermodynamic concepts and entropy change in reversible process and irreversible process, Gibbs- Duhem equation, calculation of thermodynamic properties.
CO4	To study the Thermodynamic and Kinetic Derivation of Nernst Equation and the derivation of Debye-Huckle Equation and its Verification

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	3	2	1	--	1	2	---	1	1
CO2	3	1	2	3	1		1		1	1	-	1
CO3	3	-	1	3	2	1	-	1		-	2	-
CO4	3	1	2	3	-	1	1	-	2	1	-	1

CHE-103: Physical Chemistry I

UNIT-I: Quantum Chemistry-I

(A)**Introduction to Exact Quantum Mechanical Results**

Operator algebra, Eigen values and Eigen functions, Operators for momentum and energy, Degeneracy, Linear combination of Eigen functions of an operator, well behaved wave functions, Normalized and

orthogonal functions, The schrodinger wave equation and the postulates of Quantum Mechanics, (B) **Applications of Schrodinger wave equation:** Particle in one dimensional and three dimensional box, harmonic oscillator, rigid rotor, hydrogen atom and its applications. Hydrogen like wave function, hydrogen like orbitals and their representation, polar plots, contour plots and boundary diagram. (C)**Approximate Methods:** The variation Theorem, Linear variation principle, perturbation Theory (first Order and non-degenerate), Application of variation Method and perturbation theory to the helium atom, The Born-Oppenheimer approximation.

UNIT-II: Chemical Dynamics

(A)**Theories of reaction rates:** Collision theory, steric factor. Theory of Absolute Reaction Rates-Reaction coordinate, activated complex and the transition state. Thermodynamic formiulation of reacton rates.

(B) **Unimolecular reactions:** Lindemann, Lindemann-Hinshel wood, and RRKM theories. Termolecular reactions. Complex reactions-Rate expressions for opposing, parallel and consecutive reaction (all first order type) (C) **Chain reactions:** Dynamic chain, hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane, photochemical reactions- H_2-Br_2, H_2-Cl_2 reactions, Autocatalysis, H_2-O_2 reaction explosion limits. (D) **Fast Reactions:** Flow system – Temperature and pressure Jump Methods – Relaxation Techniques.

UNIT – III : Thermodynamics

(A) **Brief review of Thermodynamic concepts:** Enthalpy, entropy, free energy. Concept of Entropy – Entropy as a state function –Entropy change in reversible process and irreversible process – Temperature – Entropy diagrams – Entropy change and phase change – Entropy of mixing – Entropy and disorder. (B) **Statistical thermodynamics:** Partial molar properties: their significance and determination of partial molar properties, fugacity and its determination. Concept of distribution, thermodynamic probability and most probable Distribution, Ensemble averaging, postulates of ensemble averaging, canonical, grand canonical and micro- canonical ensembles, partition functions, translational, rotational, vibrational and electronic partition functions, Gibbs- Duhem equation, calculation of thermodynamic properties in terms of partition functions, Entropy of monatomic gases (Sackur-Tetrade equation)

UNIT-IV : Electrochemistry I

(A) **Thermodynamic and Kinetic concept of Electrochemistry**

Thermodynamic and Kinetic Derivation of Nernst Equation, Chemical and Concentration Cells with and

without Transference, Liquid Junction Potential, Derivation of the Expression for Liquid Junction Potentials-its determination and elimination, Applications of EMF Measurements: (i)Solubility product, (ii)pH Determination, (iii) Potentiometric Titrations.; (B)**Conductivity:** Theory of Electrolytic Conductance, Derivation of Debye-Huckle Equation and its Verification, Debye- Falkenhagen Effect, and Wein Effect, kohlrausch law. Calculation of Solubility of Sparingly soluble Salt from Conductance Measurements.

Conductometric Titrations : Titration of Strong Acid Vs Strong Base (HCl vs NaoH) ; Titration of Weak Acid Vs Strong Base (AcoH vs NaoH); Titration of mixture of Strong and Weak Acids vs Strong Base ; Precipitation Titrations.

Books Suggested

1. physical chemistry, P. W. Atkins (ELBS)
2. Quantum Chemistry, Ira N. Levine (Prentice Hall)
3. Atomic Structure and Chemical bond, Manas Chandra.
4. Chemical Kinetics, K.J. Laidler (Mc Graw Hill)
5. Kinetics and Mechanism of Chemical Transformations, J. Rajaraman and J. Kuriacose (Mcmilan)
6. Thermodynamics for chemists, S. Glasstone
7. Chemical thermodynamics, I.M. Klotz
8. Statistical Thermodynamics, M. Dole
9. Modern Electrochemistry, Vol. I & II, J.O. M. Bockris and A.K.N. Reddy (plen
10. An Introduction to Electrochemistry (3rd ed.), S. Glasstone (Affiliated East-West).

(Compulsory Foundation)

CHE-104 (A)	General Chemistry I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on precision and accuracy, Limit of detection, Limit of determination, Sensitivity and selectivity, statistical evaluation of data
- Familiarize with principles and concepts of flame emission spectroscopy and atomic absorption spectroscopy and their applications.
- To know about ecosystem, nutrient cycle and dessert ecosystem and forest ecosystem and aquatic ecosystem.
- Gain knowledge on air pollution, water pollution, soil pollution, marine pollution, noise pollution and solid waste management.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about mean and median values, standard deviation and coefficient of variation.
CO2	To acquire knowledge on principle and instrumentation of AAS and difference between flame AAS and furnace AAS.
CO3	To know about the principle and concept of ecosystem and their functioning
CO4	To have an idea on environmental pollution and environmental impact assessment.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	-	-	2	1	1
CO2	3	2	-	3	1	-	2	1	-	1	1	-
CO3	3	3	2	3	2	1		1	2	1	1	2
CO4	3	2	1	2	3	1	1	1	-	2	1	1

CHE104-A: General Chemistry I

UNIT-I: TREATMENT OF ANALYTICAL DATA 15 Hrs

Precision and accuracy –mean and median values –Standard deviation – coefficient of variation, Types of errors: Determinate and indeterminate errors, confidence limits, significant figures, computations, minimization of errors, statistical evaluation of data –T-test ,F- test , and X^2 –test. Correlation coefficient and coefficient of determination; Limit of detection (LOQ); Limit of determination(LOD) Sensitivity and selectivity of an analytical method.

UNIT-II: FLAME EMISSION AND ATOMIC ABSORPTION SPECTROSCOPY 15 Hrs

(a) **Flame Emission Spectroscopy**: Principles, chemical reactions in flames, Interferences, evaluation methods, flame photometer and experimental technique, procedure for determinations, limitations and disadvantages. Applications

(b)**Atomic Absorption Spectroscopy: Flame AAS:** Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT-III: ECOSYSTEMS 15 Hrs

Concept of an ecosystem (Abiotic and biotic environment), structure and function of an ecosystem Producers, Consumers and decomposers. Energy flow in the ecosystem, (Nutrient cycle in the ecosystem) Ecological succession Food Chain, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystems, Forest ecosystem, Grassl and ecosystem, Desert ecosystems aquatic ecosystems [ponds, streams, lakes, rivers, ocean estuaries].

UNIT-IV: ENVIRONMENTAL POLLUTION 15 Hrs

Definition a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear pollution Solid waste management : Causes, effects and control measures of urban and industrial wastes. Environmental impact assessment.

Books Suggested

1. H.W. Willard, LL. Merritt and J.A. Dean: Instrumental Methods of Analysis
2. Vogel's Text book of Quantitative Inorganic Analysis.
3. Analytical Chemistry
4. Instrumental Methods of Analysis H. Kaur

CHE 104B	General Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To familiarize with the significance of green chemistry and assessment of the impact.
- To gain knowledge on biocatalyst in oxidation, reduction and hydrolytic reactions
- To have an idea on solvent free reactions and modern reaction techniques.
- To familiarize with the use of ionic liquids as green solvents.

Course Outcomes: At the end of the course, the student will be able

CO1	To get knowledge on green reaction conditions and their impact on environment.
CO2	To know about use of different biocatalysts as environmentally friendly reagents.
CO3	To acquire knowledge on the use of modern techniques like ultrasound, microwave etc.
CO4	To have an idea on the use of ionic liquids in different reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	2	1	1	-	1	-	1	1
CO2	3	1	1	3	1	-	1	1	-	1	-	1
CO3	3	3	2	3	2	1		2	-	1	1	1
CO4	3	2	1	2	3	1	1	1	1	-	1	1

CHE 104B: General Chemistry I

UNIT-I

Fundamentals and significance of Green Chemistry: Discussion of the current state of chemistry and the environment and the definition of green chemistry. Assessment of the impact of chemistry in the environment and definition of risk hazard. An introduction to the tools of green chemistry and its fundamental principles.

Principles of Green Chemistry: Prevention of waste / by-products, Hazardous products- Designing of safer chemicals- Selection of appropriate solvents and starting materials- Use of protecting groups and catalysis- Designing of biodegradable products.

UNIT-II

Catalysis for Green Chemistry: Use of biocatalysts- Biochemical Oxidation, Biochemical Reduction, Enzyme Catalyzed Hydrolytic Process, Modified biocatalysis- transition metal catalysis- Reformatsky reaction, Wurtz reaction, Pinacol coupling, Simmons-Smith reaction,

Mukaiyama reaction, Heak reaction, Ullmann's coupling.

UNIT-III

Solvent Free Reactions: Solvent free techniques- Reactions on solid mineral supports, Phase Transfer Catalysis- C-alkylation, N-alkylation, S-alkylation, Darzen's reaction, Wittig reaction. Ultrasound assisted green synthesis- Oxidation, Reduction, Hydroboration, Bouveault reaction, Strecker reaction, Microwave assisted green synthesis- Biginelli reaction, Aza-Michael reaction, Suzuki reaction, Stille reaction, Sonogashira reaction.

UNIT-IV

Ionic liquids: Definition- Types of Ionic Liquids-Synthesis of Ionic Liquids- Selection of ionic liquids- physical properties- Application in organic synthesis- alkylation, allylation, oxidation, reduction, polymerization, hydrogenation, hydroformylation, alkoxycarbonylation, carbon-carbon bond forming reactions, alkene metathesis.

Books suggested:

1. New Trends in Green Chemistry by V.K. Ahluwalia, M. Kidwai.
2. Green Chemistry: Environment Friendly Alternatives by Rashmi Sanghi, M M Srivastava
3. Green Solvents for Organic Synthesis by V.K. Ahluwalia, Rajender S. Varma
4. Green Analytical Chemistry by Mihkel Koel and Mihkel Kaljurand

CHE 105 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Basic laboratory techniques of titration and analysis.
- Quantitative estimation of inorganic compounds through volumetric techniques.
- Calibration of volumetric apparatus and statistical analysis of the data.
- Determination of critical solution temperature of phenol-water system.

Course Outcomes: At the end of the course, the student will be able

CO1	To demonstrate mastery of basic semi-micro qualitative analysis of simple salts and interprets analytical data and will make scientific claims that are supported by the observations.
CO2	To familiarize with techniques of titration and calculation of errors.
CO3	To study the determination of critical solution temperature, eutectic composition, distribution coefficient, adsorption of different systems.
CO4	To calibrate the statistical data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	1	2	1	2	-
CO2	3	2	2	2	-	2	1	1	-	2	2	1
CO3	3	2	1	2	2	1	-	2	1	1	2	1
CO4	3	2	2	1	2	1	-	2	2	1	1	1

CHE 105 A & B: Core practical I: Inorganic & Physical Chemistry

CHE 105 A : Core practical I: Inorganic Chemistry

Semi Micro Qualitative Analysis

Qualitative Analysis of a mixture containing four cations including two less common cations (viz., W, Mo, Se, Te, V, Ce, Th, Zr, Li and U).

CHE 105 B : Core practical I: Physical Chemistry

1. Determination of critical solution temperature, eutectic composition and temperature of binary system.
2. Calibration of volumetric apparatus and statistical analysis of the data.
3. Determination of critical solution temperature of phenol-water system and study the effect of electrolyte on CST.
4. Determination of Eutectic composition and temperature of binary system
5. Determination of distribution coefficient of benzoic acid between water and benzene.
6. Study the adsorption of acetic acid on charcoal and analysis of the data on the basis of Langmuir and Freundlich adsorption isotherms.
7. Determination of rate constant of acid hydrolysis of an ester and investigate the effect of catalyst concentration, reactant concentration and temperature.

CHE 106A & B	Core practical I: Organic & General Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.

Course Objectives:

- Identification of single organic component by systematic qualitative analysis
- Preparation of derivatives and purification process
- Single step preparations
- Calibration of spectral analysis to this structures

Identification of single organic component by systematic qualitative analysis.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the systematic procedures of analysis of organic components.
CO2	To know the conformational tests for various functional groups.
CO3	To understand the mechanisms and familiarize with methodologies to prepare biologically important molecules.
CO4	Purification of compounds by different process

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	1	2	-	1	-	1	1	-
CO2	3	2	2	3	-	2	-	1	1	-	1	2
CO3	2	2	2	1	2	1	2	1	-	1	-	2
CO4	1	2	2	1	1	1	1	-	1	1	1	2

CHE : 106 A : PRACTICAL – I : ORGANIC CHEMISTRY

Identification of single components by Qualitative Analysis method

1. Aromatic acids
2. Aromatic amines
3. Aromatic phenols
4. Aromatic estors
5. Aromatic hydrocarbons
6. Carbohydrates
7. Aromatic carobohydrates compounds

CHE : 106 B : PRACTICAL – I : GENERAL CHEMISTRY

Single step preparations

1. Preparation of aspirin
2. Preparation of p-nitroacetanilide
3. Preparation of p-bromoacetanilide

CHE 107	Human Values and Professional Ethics-I	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of graduate level Human Values and professional ethics

Course Objectives:

- Analyze values in various ethical professions
- Understand moral concepts, character and conduct multiple
- Concept of ethical values with respect to individual and society
- ethical interests at stake in areal-world situation or practice and assess own ethical values with respect to social context and problems

Course Outcomes: At the end of the course, the student will be able to

CO1	To know about the needs and importance of professional ethics.
CO2	To analyze nature of Values, basic Moral Concepts character and Conduct.
CO3	To gain knowledge on individual and society ethical values, ahimsa, satya and brahmacharya.
CO4	To understand values of Bhagavd Gita, various religions, religious tolerence, Gandhian ethics.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	2	-	1	2	3	1	1	2
CO2	3	2	2	3	1	1	1	2	3	-	-	2
CO3	3	1	2	3	2	-	1	-	-	1	1	3
CO4	3	1	1	3	-	1	2	2	2	2	-	3

CHE 107: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS – I)

Chapter I: Definition and Nature of Ethics – Is relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics – Goals – Ethical Values in Various Professions.

Chapter II: Nature of Values – Good and Bad, Ends and Means, Actual and Potential Values, Objective and Subjective Values, Analysis of Basic Moral Concepts – Right, Ought, Duty, Obligation, Justice, Responsibility and Freedom, Good Behavior and Respect for Elders, Character and Conduct.

Chapter III: Individual and Society: Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non Possesion) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues) - Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation), Crime and

Theories of Punishment – (a) Reformative, Retributive and Deterrent, (b) Views on Manu and Yajnavalkya

Chapter IV: Bhagavd Gita – (a) Niskama Karma, (b) Buddhism – The Four Nobel Truths – Arya astanga marga, (c) Jainism - Mahavratas and Anuvratas. Values Embedded in Various Religions, Religious Tolerence, Gandhian Ethics.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
4. Harold H. Titus: Ethics for Today
5. Maitra, S.K: Hindu Ethics
6. William Lilly: Introduction to Ethics
7. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
8. Sasruta Samhita: Tr. Kaviraj Kunjanlal, Kunjanlal Brishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
9. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
10. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
11. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
12. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Mandatory Core)

CHE - 201	Inorganic Chemistry II	L-5, T-1, P-0	4 Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Understand magnetic properties of transition metal complexes and various reactions on ligands with respect to synthesis.
- Gain knowledge on electronic spectra of complex molecules of octahedral and tetrahedral geometry
- Understand magnetic properties viz., diamagnetism and paramagnetism and other related properties of complex molecules
- Familiarize with different catalytic reactions of complex molecules and factors effecting the reactions.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize with the general methods of complex preparations and properties, nature of bonding and structural features of metal complexes.
CO2	To know about Russel-Saunders coupling, splitting of energy levels in octahedral field and differentiate between Orgel diagrams and Tanabe-Sugano diagrams.
CO3	To understand about the laws of Hunds, Curie and Weiss, magnetism and magnetic susceptibility determination by Gouy's and Farady methods.
CO4	To gain knowledge on Induced reactions, Free radical reactions, Thermal decomposition reactions, Chain reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	2	1	-	1
CO2	3	2	-	3	1	2	1	-	1	2	1	1
CO3	3	-	2	3	-	2	1	1	-	1		1
CO4	3	1	1	3	-	2	-	1	1	1	1	-

CHE 201: INORGANIC CHEISTRY II

UNIT – I: TRANSITION METAL II – COMPLEXES II **15 Hrs**

Transition metal π – complexes with unsaturated organic molecules – alkenes, alkynes, diene, dienyl and Cyclopentadienyl complexes and arene complexes-general methods of preparation, properties, nature of bonding and structural features – Important reactions relating to Nucleophilic and Electrophilic attack on

ligands and to organic synthesis.

UNIT – II: ELECTRONIC SPECTRA OF COMPLEXES 15 Hrs

Russel-Saunders coupling – Spectroscopic term symbols- Derivation of term symbols of p^2 and d^2 configuration, Hole Formulation, Energy ordering of terms (Hund's Rules), Splitting of energy levels and spectroscopic states in Octahedral field, Selection rules – Break – down of selection rules, Orgel diagrams, Definition and utility–Orgel Diagrams for d^1 to d^9 configurations in Octahedral and tetrahedral fields. Interpretation of electronic spectra of high spin octahedral and tetra hedral complexes of Ti(III), V(III), Cr(III), Mn(III), Mn(II), Fe(II), Fe(III), Co(III), Co(II), Ni(II) and Cu(II) complexes, Calculation of Dq and B^1 parameters for Cr(III) and Ni(II) complexes. Tanabe – Sugano diagrams, Differences between Orgel diagrams and Tanabe – Sugano diagrams, Tanabe – Sugano diagrams of d^2 to d^6 and d^8 configurations. Charge transfer spectra- LMCT and MLCT.

UNIT – III: MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES 15 Hrs

Diamagnetism and paramagnetism-orbital and spin contributions, spin-orbit coupling, Hunds third rule and Energies of J levels – Curie law and Curie – Weiss law- Ferromagnetism and antiferromagnetism – Temperature independent magnetism Magnetic susceptibility and its determination by Gouy's and Faraday methods.Calculation of magnetic moment from magnetic susceptibility, spin-only formula, Orbital contribution to magnetic moment (Oh and Td Complexes) –Paramagnetism and crystalline fields – Ti (III), V (III), VO^{2+}, Cr (III), Mn (II), Fe (III), Co(II), Ni (II) and Cu (II). Magnetic Exchange in copper acetate and other dimmers – spin cross over in complexes.

UNIT –IV: CATALYSIS 15 Hrs

Homogeneous catalysis, Metal ion catalyzed reactions – Redox potentials and processes – Mechanism of redox processes involving ligands – Factors affecting redox potentials - other types of metal catalyzed reactions – Reactions involving Ag (I) , Cu (II) and Os (VIII) – Reactions of Oxyanions – Factors affecting rate (General discussion only) – Induced reactions – Free radical reactions – Thermal decomposition of peroxy disulphate – Fe(III) $–S_2O_8$ reactions – chain reactions – H-Br reactions, H_2O_2 $–S_2O_8$reactions.

Books Suggested

1. Inorganic Chemistry principles of Structure and Reactivity 6th Edition. James E. Huheey.
2. Organometallic Chemistry: R.C. Mehrotra and Singh.
3. R. S. Drago: Structural methods in Inorganic Chemistry.
4. H. H. Willard, L. L. Merritt, Jr., J. A. Dean and F. A. Settle, Jr.: Instrumental Methods of Analysis (CBS Publishers).
5. R. L. Carlin: Magnetic Chemistry. R. L. Datta and A. Syamal: Elements of Magnetic Chemistry.

(Mandatory Core)

CHE-202	Organic Chemistry II	L-3, T-1, P-2	4 Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives:

- Able to recognize, classify, explain, and apply fundamental organic reactions such as E2, E1, E1CB.
- Familiar with molecular rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom.
- Provide Hantzsch-Widmann nomenclature for the three and four membered heterocycles. Be able to predict synthetic routes and chemical reactions of these heterocycles.
- Be familiar with occurrence, isolation, structural elucidation and synthesis of natural products-alkaloids

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the mechanisms of E_1, E_2 and E_{1CB} reactions, steroselectivity and synpyrolytic eliminations and use of isotopes, chemical trapping and crossover experiments.
CO2	To learn the rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom and familiarize with the limitations and applications of reactions.
CO3	To learn the synthesis of three and four membered heterocycles, mechanism of ring opening reactions and the effect of electron donating and withdrawing substituents in selectivity of ring opening reactions.
CO4	To understand the structural elucidation and synthesis of alkaloids using specific reagents.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	1	1	1	-
CO2	3	2	2	3	2	2		1	1	-	1	1
CO3	3	2	2	3	2	2	1	1	-	1	-	1
CO4	3	2	2	3	-	2	-	1	-	1	1	1

CHE- 202 : ORGANIC CHEMISTRY II

UNIT-I: Reaction mechanism-I **15 Hrs**

Electrophilic addition to carbon carbon double bond: Stereoselective addition to carbon carbon double

bond; anti addition- Bromination and epoxidation followed by ring opening. Syn addition of OsO_4 and $KMnO_4$.

Elimination reactions Elimination reactions E_2, E_1, E_{1CB} mechanisms. Orientation and stereoselectivity in E_2 eliminations. Pyrolytic syn elimination and α-elimination, elimination Vs substitution. Facors influencing the elimination reactions

Determination of reaction mechanism: Determination of reaction mechanism: Energy profiles of addition and elimination reactions, transition states, product isolation and structure of intermediates, use of isotopes, chemical trapping, crossover experiments. Use of IR and NMR in the investigation of reaction mechanism.

UNIT-II: Molecular Rearrangements: **15 Hrs**

Rearrangements to electron deficient Carbon atom:

Pinacol-Pinacolone, Wagner-Meerwein, Dienone-Phenol and Demjonove Rearrngements

Rearrangements to electron deficient Nitrogen atom:

Hofmann, Curtius, Schimidt and Beckmann Rearrangements.

Rearrangements to electron deficient Oxygen atom: Baeyer-Villiger and Dakins Rearrangements

Rearrangements to electron rich Carbon atom: Favorski and Neber Rearrangements

Aromatic and Sigmatropic Rearrangements: Fries and Claisen Rearrangements

UNIT III: Three and four membered heterocycles: 15 Hrs

Systematic nomenclature (Hantzsch-Widmann system) and Replacement nomenclature for monocyclic heterocycles (Three and four membered rings). Synthesis and chemical reactions of aziridines, oxiranes, thiiranes, azetidines, oxetanes, and thietanes.

UNIT-IV: Alkaloids 15 Hrs

Occurrence, isolation, general methods of structure elucidation and physiological action, degradation, classification based on nitrogen heterocyclic ring, structure elucidation and synthesis of the following: Atropine, Papaverine and Quinine.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.

5. Modern Organic Reactions, H.O. House, Benjamin.
6. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
7. Stereochemistry, P.S. Kalsi, Wiley Eastern.
8. Text book of Organic Chemistry, M.C. Murry
9. Text book of Organic Chemistry, Fessendon and Fessendon.
10. Text book of Organic Chemistry, T.W. Solomon,
11. Organic Chemistry, Vol II, I.L. Finar, ELBS Eds.
12. Heterocyclic chemistry T.L Gilchrist, Longman Scientific Technical
13. An Introduction to the Heterocyclic compounds, R M Acheson, John Wiley.

(Mandatory Core)

CHE -203	Physical chemistry II	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Learn Angular momentum and Molecular Orbital Theory and application of Huckel theory to organic molecules.
- Know about concepts in Surface Chemistry, concept of electric double layer model and Micelles.
- Get knowledge on symmetry and group theory their use in spectroscopy, Mulliken character tables.
- Understand Irreversible Electrode phenomenon controlled potential electrolysis and polarography.

Course Outcomes At the end of the course, the student will be able

CO1	To know about Pauli Exclusion principle and Slater determinant, atomic orbitals, Simple molecular orbitals and Huckel theory of conjugated systems.
CO2	To learn Gibbs adsorption isotherm, BET equation and correlate limitations, critical micellar concentration (CMC) and factors affecting the CMC of surfactants.
CO3	To identify Relation between order of a finite group and its sub-group, conjugacy, Symmetry point group (MLS, MHS and MSS) and orthogonality theorem.
CO4	To acquire knowledge on DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, to derive equation for Tafel plots, half-wave potentials for reversible system.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	2	-	1	1	1	2	-
CO2	3	2	2	3	2	2	-	1	1	1	-	1
CO3	3	2	2	3	-		1	-	-	1	1	-
CO4	3	2	-	2	1	1	-	1	1	1	1	-

CHE-AC-203 Physical Chemistry III

UNIT-I: Quantum Chemistry-II **15 Hrs**

(A) Angular momentum: Angular momentum, Rotations and angular momentum, Eigen functions and Eigen values of angular momentum, Ladder operator, addition of angular momenta, spin, antisymmetry and pauli Exclusion principle. Slater determinant. ;

(B) Molecular Orbital TheoryAtomic Orbitals, Simple Molecular Orbitals, Hybrid Atomic Orbitals, Shapes and energies of Molecular Orbital, Systems of Organic Molecules (Ex: Methane, Ethylene,

Acetylene). Huckel theory of conjugated systems, Π-bond order and charge density calculations, application of Huckel theory to ethylene, butadiene and benzene.

UNIT-II: Surface Chemistry **15 Hrs**

Surface tension, capillary action, pressure difference across curved surface, (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, BET adsorption isotherm, derivation of BET equation , limitations of BET equation, estimation of surface area from BET equation, Surface films on liquids. Concept of electric double layer model- Helmholtz perrin, Gouy- Chapman and stern models (no derivation)

Micells: Surface active agents, classification of surface active agents micellisation, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants, thermodynamics of micellisation, emulsions, reverse micelles.

UNIT-III: SYMMETRY AND GROUP THEORY **15 Hrs**

Definition of a group, rules that are set for a group, sub-group, order of a group, Relation between order of a finite group and its sub-group, conjugacy relation and class of a group, symmetry elements and symmetry operation. Symmetry point group (MLS, MHS and MSS), Schoenflies symbols - Representation of groups by matrices (representation for C_n, C_{nv}, D_{nh} etc. groups to be worked out explicitly), character of a representation, group multiplication tables, reducible - irreducible representations The great orthogonality theorem (without proof) - character tables (H_2O,NH_3) and their use in spectroscopy, Mulliken character tables.

UNIT-IV: ELECTROCHEMISTRY- II **15 Hrs**

Irreversible Electrode phenomenon: Reversibility and irreversibility, Dissolution and deposition potentials, Decomposition voltage, overvoltage, diffusion overvoltage, charge transfer overvoltage, concentration overvoltage-hydrogen and oxygen overvoltages, Tafel plots, Exchange current density and Transfer coefficient, Butler-Volmer equation for one electron transfer processes.

Polarography: Theory, classification , principle , Instrumentation of Polarography, DME, HMDE diffusion current, Ilkovic equation, DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, Millicoulometry, Equation for half-wave potentials, for reversible system when oxidant alone, reductant alone and both are present.

Books Suggested

1. P.W. Atkins: Physical Chemistry (ELBS).
2. Ira N. Levine: Quantum Chemistry (Prentice Hall).
3. R. Mcweeny: Coulson's Valence (ELBS).

4. J.O.M. Bockris and A.K.N. Reddy, Modern Electrochemistry, vol.I & II (Plenum).
5. S. Glasstone; An Introduction to Electrochemistry (3rd ed.)(Affiliated East-West).
6. V. Moroi: Micelles, theoretical and applied aspects (Plenum).
7. Maron and prutton: principles of physical Chemistry.
8. Silbey, Alberty, Bawendi. Physical Chemistry.Jhon-Wiley & Sons. 4th edition-2006.
9. D.N. Bajpai: Advanced physical Chemistry: S. Chand & Company, 1998.

(COMPULSORY FOUNDATION)

CHE-204 A	General Chemistry II	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on the principles of different electro analytical methods
- Familiarize with chromatographic techniques.
- To study on biodiversity and conservation of biodiversity
- To know about natural resources and non-renewable resources

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge on ion selective electrodes, solid membrane electrodes and glass electrodes and principles of amperometric titrations.
CO2	To learn general principles and classifications of chromatographic separations and applications of TLC, GLC and HPLC.
CO3	To know about biodiversity, ecosystem diversity and conservation of biodiversity.
CO4	To acquire knowledge on natural resources related to food, water, mineral, energy and land.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2		1	-	1	1	2
CO2	3	-	2	3	-	2	1	-	2	1	1	1
CO3	3	3	2	2	1	2	-	1	-	-	1	2
CO4	3	3	2	2	2	2	1	1	-	1	1	1

CHE 204-A: General Chemistry II

UNIT-I: ELECTRO ANALYTICAL METHODS

Theory of potentiometry, calculation electrode potential at the equivalence. Finding of equivalence volume, derivative and linear titration plots. Ion-sensitive electrodes –types of ion sensitive electrodes – metal based cation and anion sensitive electrodes, solid membrane electrodes, glass electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes, Amperometric titrations - Anodic stripping voltammetry, chronoamperometry, chronopotentiometry, Cyclic Voltammetry, Differential Pulse Polarography, linear sweep voltammetry, square wave voltammetry.

UNIT-II: CHROMATOGRAPHY

General principles and classifications of chromatographic separations

Thin layer chromatography: Classification, principle, experimental technique, sample application, development of plate, retardation factor.

Gas liquid chromatography: Gas liquid chromatography - instrumentation (columns and detectors), retention time and retention volume. Chromatographic behaviour of solutes, column efficiency and resolution, column processes and band broadening, time of analysis and resolution, Van-Deemter equation.

High performance liquid chromatography: Theory and instrumentation-column performance, gradient elution, delivery system, sample introduction, separation columns, detectors and applications of HPLC.

Unit – III : Biodiversity

Conservation introduction definition genetic species and ecosystem diversity, hot spots of biodiversity, threats to biodiversity habitat loss poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India, conservation of biodiversity in – situ an ex-situ conservation of biodiversity.

Unit – IV Natural resources and non-renewable resources

An overview of natural resources and associated problems with references to a) Forest resources b) Water resources c) Mineral resources d) Food resources e) Energy resources f) Land resources.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A.Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery J. Bassett, J. Mendham and R.C. Denny. Vogel"s Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (McGraw Hill).
5. D. Midgley and K. Torrance : potentiometric Water Analysis (John Wiley).
6. Silbey, Alberty, Bawendi. Physical chemistry. Jhon-Wiley & sons. 4th edition-2006.

CHE 204B	Chemistry in Contemporary Society	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To know about quality control and impurities in Pharmaceuticals.
- To have an idea on body fluids, blood, enzymes and forensic.
- To gain knowledge on composition of milk, oil, fats etc.
- To familiarize with different types of fuels, soils and its ingredients.

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge in pharmaceutical chemicals
CO2	To familiarize with blood fluids, blood, enzymes and forensic
CO3	To know about fermentation, detection of purity, beverages
CO4	To acquire knowledge on gaseous fuels, soil ingredients and analysis of trace elements

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	2	2	-	1	1
CO2	3	1	2	3	1	2	1	-	2	2	1	-
CO3	3	2	2	3	1	2	2	1	-	2	1	1
CO4	3	2	3	2	1	2	1	2	-	1	1	1

CHE 204B: Chemistry in Contemporary Society

UNIT – I : PHARMACEUTICALS 15 Hrs

Pharmaceuticals : Importance of quality control, drugs and pharmaceuticals, sources of impurities in pharmaceutical chemicals, analytical quality control in finished / final products, common methods of assay.

Common drugs and their uses: Analgesics – aspirin, paracetamol; Antheimentics – mebendazole ; Antiallergies – chlorpenneramine malleate; Antibiotics-pencillin, chloromecytin; Anti-inflammatory agents-oxyphenbutazone; **Antimalarials** – primaquine phosphate; Antituberculosists – INH; Narcotics – nicotine, morphine; Expectorants – Benadryl; Sedatives – diazepam; Vitamins – B**1**, B**2**, B**6**, niacin and folic acid.

UNIT – II : FORENSIC AND BIOMEDICALS **15 Hrs**

Body fluids: Composition and detection of abnormal level of certain constituents leading to diagnosis, sample collection and preservation of physiological fluids, analytical methods for the constituents of physiological fluids (blood, urine).

Blood: Estimation of glucose, cholesterol, urea, haemoglobin and bilirubin.

Urine: Urea, uric acid, creatinine, calcium phosphate, sodium, potassium and chloride.

Enzymes: Biological significance, assay of enzymes (pepsin, tyrasinase), vitamins (thiamine ascorbic acid, vitamin A) and harmones (progesterone, oxytocin, insulin), chemical, instrumental and biological assays to be discussed wherever necessary.

Forensic : General discussion of poisons with special reference to mode of action of cyanide organophosphates and snake venom, poisonous materials such as lead, mercury and arsenic in biological materials.

UNIT – III : FOOD AND BEVERAGES **15 Hrs**

Milk and milk products : Composition, alcohol test, fermentation, dye reduction-methylene blue and resazurin tests, analysis of fat content, minerals in milk and butter, estimation of added water in milk.

Oils and fats: General composition of edible oils, detection of purity, tests for common edible oils and groundnut oil, cottonseed oil and mustard oil, tests for adulterants like argemone oil and mineral oils,

Beverages: Soft drinks, alcoholic drinks, tea, coffee and fruit juice, analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, food preservatives like benzoates, propionates, sorbates, bisulphites, artificial sweetners, like saccharin, dulcin and sodium cyclamate, flavours – vanillin, esters (fruit flavours) and monosodium glutamate, artificial food colourants-coal tar dyes and non-permitted colours and metallic salts, control of food quality – codex alimentarices, Indian standards.

UNIT – IV : FUEL AND SOIL **15 Hrs**

Fuels : Definition, classification and characteristics of fuels, sampling, determination of calorific value. Liquid fuels-determination of flash point, fire point, aniline point. Knocking of petrol and diesel – octane and cetere numbers carbon residue. **Gaseous fuels** : Coal gas, waste gas, producer gas, gober gas and blast furnace gas, calorific value determination by Junker's gas calorimeter, relatice merits of solid, liquid and gaseous fules. **Soil** : Ingradiants of soil-organic matter, nitrogen, sulphur, sodium, potassium and calcium, analysis of trace elements, copper, molybdenum, zinc and boron.

Reference Books :

1. Pharmaceutical Analysis, T. Higuchi and E.B. Hanseen, John Wiley and Sons, New York.

2. Quantitative Analysis of drugs, P.D. Sethi, 3rd edition, CBS Publishers, New Delhi, 1997.
3. Practical Clinical biochemistry methods and interpretations, R. Chawala, J.P. Brothers Medical Publishers (P) Ltd., 1995.
4. Laboratory manual in biochemistry, J. Jayaraman. New Age International Publishers, New Delhi, 1981.

CHE 205 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Separation and determination of the two component mixtures
- Preparation of metal complexes
- Familiarize with conductometric, potentiometric and redox methods of analysis
- colorometric and pHmetric methods of analysis

Course Outcomes: At the end of the course, the student will be able

CO1	To separate and determine the two component mixtures
CO2	To acquire knowledge in the preparation of metal complexes
CO3	To study the determination of cell constant and verification of Onsagar equation, strength of strong acid by Titration of a strong acid with a strong base and vice versa
CO4	To get knowledge on the applications of conductometry, potentiometry, coulometry and pHmetry.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	3	1	-	2		1	1	-
CO2	3	2	2	3	2	2	1	-	1	-	1	2
CO3	3	2	2	3	3	1	1	2	-	1	1	-
CO4	3	2	2	3	2	-	1	-	1	1	-	2

CHE 205 A & B: Core practical I: Inorganic & Physical Chemistry

CHE 205 A : Core practical I: Inorganic Chemistry

I . Quantitative Analysis:

Separation and determination of two component mixtures:

(i) Separation of Al(III) and Determination of Fe (III)

(ii) Separation of Cu(II) and Determination of Zn (II)

(iii) Separation of Ca(II) and Determination of Mg (II)

(iv) Separation of Cu(II) and Determination of Ni (II)

(v) Determination of Ferrocyanide and Ferricyanide

CHE 205 B: Core practical I: Physical Chemistry

1. Conductometry:
   (a) Determination of cell constant
   (b) Verification of Onsagar equation
   (c) Determination of dissociation constant of a weak acid
   (d) Titration of a strong acid with a strong base
   (e) Titration of a weak acid with a strong base
2. Potentiometry:
   (a) Titration of a strong acid with a strong base
   (b) Titration of a weak acid with a strong base
   (c) Redox titration
3. Coulometry: Estimation of Manganese
4. pHmetry: Strong acid, Strong base titrations.

CHE 206A & B	**Core practical I: Organic & General Chemistry**	**L-5,T-1,P-0**	**4 Credits**
Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.			
Course Objectives: • Familiarize with two component mixture separation and identification. • Preparation of derivatives. • Purification by components by different methods. • Calibration of products by spectral methods.			

Course Outcomes: At the end of the course, the student will be able	
CO1	To familiarize with binary mixture separation
CO2	To gain hands-on-experience in purification of the components, preparation of derivatives.
CO3	To get knowledge about the chemical behavior of different components and mechanisms
CO4	Purification and calibration of data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	1	-	3	3	1
CO2	3	2	2	3	-	1	-	2	1	3	3	-
CO3	3	2	2	3	1	1	2	1	-	2	-	2
CO4	3	2	2	3	1	2		1	1	2	1	2

CHE 206 A & B: Core practical I: Organic & General Chemistry

CHE-206 A : PRACTICAL – I : ORGANIC CHEMISTRY

Separation and Identification of two component organic mixture by systematic qualitative analysis.

1.Acid + Neutral 2. Base + Neutral 3. Phenol + Neutral 4. Ether insoluable component + acid / phenol / base.

CHE-206 B : PRACTICAL – I : GENERAL CHEMISTRY

Preparation of Metal Complexes:

(i) Tetra(ammine) copper (II) sulphate.

(ii) Mercury tetra(thiocyanato) cobaltate(II).

(iii) Hexa(ammine) Nickel (II) chloride.

(iv) Tris(acetylacetonato) Manganese (III) chloride.

(v) Tris (ethylenediammine) Nickel (II) thiosulpha

CHE 207	Human Values and professional ethics-II	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of Human Values and professional ethics

Course Objectives:

- Gain knowledge on value education, family values and adjustability
- Develop ethics towards medical, health care professionals and ethical issues in genetic engineering
- Understand the importance of social ethics towards organ trade, human traffic king human rights violation and social disparities.
- Know about environmental ethics, ecological crises, pollution and protection of environment

Course Outcomes: At the end of the course, the student will be able to

CO1	To understand the concepts of human values, responsibilities of family values and status of women in family and society.
CO2	To acquire knowledge on different medical ethics the views of charaka and sushruta on moral responsibilities of medical practitioners.
CO3	To gain knowledge on social ethics and understand the characteristics of ethical problems in management.
CO4	To familiarize environmental ethics, ethical theory and ecological crisis.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	1	2	2	2	3	1	1	1
CO2	3	1	2	3	1	2	2	3	3	1	1	1
CO3	3	2	1	3	-	2	1	2	2	3	-	1
CO4	3	1	1	3	1	2	1	1	2	3	1	1

CHE 207: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS-II)

Chapter I: Value Education – Definition – Relevance to present day – Concept of human values - Self introspection – Self-esteem. Family values-Components, Structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Chapter II: Medical ethics – Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical

obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problem of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Chapter III: Social ethics – Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media – Impact of Newspapers, Television, Movies and Internet, Business ethics – Ethical standards of business – Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, Ethical abuses and work ethics.

Chapter IV: Environmental ethics – Ethical theory, man and nature - Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and pollution, Justice and environmental health.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. Management Ethics – Integrity at work by Joseph A. Petrick and John F. Quinn, Response Books, New Delhi.
4. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
10. Sasruta Samhita: Tr. KavirajKunjanlal, KunjanlalBrishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
11. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Eduction – Telugu Academy, Hyderabad.
14. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Mandatory Core)

CHE-EC- 301	Inorganic Spectroscopy and Thermal Methods of Analysis	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Basic Inorganic Spectroscopy and Thermal Methods of Analysis

Course Objectives:

- Gain knowledge on thermal methods of analysis and principles and applications to inorganic materials
- Familiarize with basics of Mossbauer and NQR spectroscopy.
- Learn the properties like g-factor, nuclear spin, hyperfine coupling constants
- Study the ESR instrumentation, various applications and photoelectron spectroscopy.

Course Outcomes : At the end of the course, the student will be able

CO1	To know about TG and DTA and applications of different scanning calorimetry.
CO2	To gain knowledge on Doppler shift and chemical shift, basic principles and applications of NQR spectroscopy.
CO3	To learn zero field splitting and Kramer's degeneracy, relaxation processes, instrumentation and applications of ESR.
CO4	To know about photoelectric effect and Koopmans theorem and impart the applications of X-ray and UV photoelectron spectroscopy.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	2	1	-	2	1
CO2	3	2	2	3	2	2	1	-	1	2	2	2
CO3	3	2	2	3	2	2	-	1	-	2	1	2
CO4	3	2	2	3	2	-	1	1	1	-	2	1

CHE-EC- 301: Inorganic Spectroscopy and Thermal Methods of Analysis

UNIT –I: THERMAL METHODS OF ANALYSIS 15 Hrs

Thermo gravimetry –Principle, Factors affecting the results, instrumentation. Application with special reference to $CuSO_45H_2O$, CaC_2O_4 $2H_2O$. Different thermal analysis – principle, instrumentation, difference between TG and DTA, applications with special reference to the clays and minerals.Different scanning calorimetry –principle, and applications to inorganic materials like chlorates and perchlorates, ammonium nitrate.

UNIT –II: MOSSBAUER SPECTROSCOPY and NQR 15 Hrs

Mossbauer spectroscopy: Basic principles, Recoil energy, Doppler shift, Chemical shift, Quadrapole effects, Magnetic effects. Instrumentation, spectral parameters and spectrum display.

Aapplication of the technique to the studies of (1) bonding and structures of Fe^{2+} and Fe^{3+} compounds, (2) Sn^{2+} and Sn^{4+} compounds.

NQR spectroscopy: Basic principles of NQR spectroscopy, quadrupole nuclei, quadrupole moments, electric field gradient, coupling constant and applications.

UNIT –III: ELECTRON SPIN RESONANCE SPECTROSCOPY 15 Hrs

Basic Principles, Hyper fine splitting, Factors affecting the 'g' value. Isotropic and anisotropic hyperfine coupling constants, Hamiltonian and spin densities. Zero field splitting and Kramer's degeneracy, Relaxation process and line widths. Instrumentation and Applications.The EPR spectrum of bis(salicylidimine)-copper(II) complex, study of inorganic free radicals, biological applications of Electron Spin Resonance (Study of free radicals and Iron-sulfur proteins)

UNIT –IV: PHOTO ELECTRON SPECTROSCOPY 15 Hrs

Photoelectric effect, Koopmans's theorem, ionization energy.

X-ray photoelectron spectroscopy (ESCA): Principle, Binding energies, Chemical shift, Applications of XPES to Qualitative analysis , to surface studies and structural analysis. Ultraviolet photoelectron spectroscopy- Principle, application of UPES in studying the molecular orbitals of O_2 and N_2 molecules. Block diagram of photoelectron spectrophotometer. Sources of radiation, detectors. Auger spectra – Principle, Applications of Auger spectra to surface studies and use of Auger spectra as a finger print tool.

Books Suggested

1. F.A. Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999. John wiley & sons. Inc., New York.
2. J.E. Huheey, E.A. Keiter and R.L. Keiter: Inorganic Chemsitry, Principles of Structure and Reactivity (4th Ed.) (Addison-Wesley)
3. Gary Wulfsberg: Inorganic Chemistry (5th Ed. (Viva Books)
4. J.D. Lee: Concise Inorganic Chemistry (Blackwell)
5. W.L. Jolly: Modern Inorganic Chemsitry (McGraw-Hill)
6. R.L. Carlin: Magneto-chemsitry (Springer-Verlag)
7. R.L. Dutta and A. Syamal: Elements of Magnetochemsitry (Affiliate East-West).
8. K. Hussain Reddy – Text book of Bioinorganic chemistry

(Mandatory Core)

CHE-EC 302	Organic Spectroscopy and Applications	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Organic Spectroscopy and Applications

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands
- Study on the applications of NMR spectroscopy in ascertaining the stereochemical structures of the molecules.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy

Course Outcomes: At the end of the course, the student will be able to

CO1	To get experience to calculate λ max values for dienes, enones, polyenes, aromatic and heteroaromatic compounds.
CO2	To familiarize with the absorption bands of the molecules with specific functional groups
CO3	To interpret the data to different types of protons and carbons present in a molecule so as to ascertain the structure of the molecule based on the data provided
CO4	To acquire knowledge about specific fragmentation rules of different molecules which are unique.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	-	2	2	2	2	1
CO2	3	2	2	3	2	2	1	1	-	2	2	-
CO3	3	2	2	3	2	2	-	2	1	2	2	2
CO4	3	2	2	3	2	2	2	-	2	2	2	1

CHE-EC 302: CORE THEORY: ORGANIC SPECTROSCOPY AND APPLICATIONS

UNIT-I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY: 15Hrs

Various electronic transitions (185-800 nm), effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fisher-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds. Steric effect in biphenyls.

UNIT – II: INFRARED SPECTROSCOPY 15Hrs

Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ether, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and fermi resonance, FT-IR

UNIT –III: NMR SPECTROSCOPY: 15Hrs

^{1}H NMR spectroscopy: Magnetic properties of nuclei, Principles of NMR. Instrumentation, CW and pulsed FT instrumentation, equivalent and nonequivalent protons, enantiotopic and diastereotopic protons, Chemical shifts, factors affecting the chemical shifts, electronegativity and anisotropy, shielding and deshielding effects, Signal integration, Spin-spin coupling: vicinal, germinal and long range, Coupling constants and factors affecting coupling constants.

Applications of ^{1}H NMR spectroscopy: Reaction mechanisms (cyclic bromonium ion, electrophilic and nucleophilic substitutions, carbocations and carbanions), E, Z isomers, conformation of cyclohexane and decalins, keto-enol tautomerism, hydrogen bonding, proton exchange processes (alcohols, amines and carboxylic acids), C-N rotation. Stereochemistry, hindered rotation, Karplus curve variation of coupling constant with dihedral angle. Simplification of complex spectra, nuclear magnetic double resonance, contact shift reagents, nuclear Overhauser effect (NOE).

^{13}C NMR spectroscopy: General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimensional NMR spectroscopy-COSY.

UNIT-IV: MASS SPECTROMETRY 15Hrs

Introduction, ion production, type of ionization, EI, CI, FD, and FAB-factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular-ion peak, metastable peak, Mc. Lafferty rearrangement. Nitrogen rule, isotope labeling. High resolution mass spectrometry, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Books suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS
2. Spectroscopy of organic compounds, RM Silversteen and others, 5th Ed,John Wiley
3. Spectroscopy of organic compounds, P.S. Kalsi, Wiley, 1993.
4. NMR in chemistry-A multi nuclear introduction, William Kemp, Mc Millan, 1986.
5. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmi

(Mandatory Core)

CHE-EC-303A	Organic Chemistry III	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives: Course Objectives:

- Familiarize with the applications of different reagents in organic synthesis, Mechanisms and stereochemistry.
- Study the methods of preparation and applications of organometallic reagents.
- Understand topocity, prochirality, auxillary and reagent-controlled methods in asymmetric synthesis.
- Applications of different oxidizing and reducing agents in organic synthesis with region and stereo controlled products.

Course Outcomes: At the end of the course, the student will be able to

CO1	To familiarize with the specific functions of the reagents particularly diazomethane, N-bromosuccinimide, Ziegler Natta catalyst, 1,3-dithianes and Merrifield resin in the synthesis of a variety of complex molecules.
CO2	To gain knowledge in the synthesis of different organometallic reagents and also stereo and regio specificity and selectivity of reactions with organometallic reagents
CO3	To understand diastereoselectivity, stereoselectivity and substrate controlled auxillary controlled reactions
CO4	To acquire knowledge about the reagents which causes oxidation in various compounds and also the reagents that causes selective and complete reductions to synthesize various compounds.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	3	2	2	3	2	1	-	1	1
CO2	3	2	2	3	2	2	3	2	2	1	1	2
CO3	3	1	1	3	-	2	-	2	1	-	2	-
CO4	3	2	2	3	1	-	1	2	1	1	-	2

CHE-EC-303A Core-Theory Organic Chemistry III

UNIT I: REAGENTS IN ORGANIC SYNTHESIS 15 Hrs

Use of the following reagents in organic synthesis: Anhydrous $AlCl_3$, Boran trifluoride, N-Bromosuccinimide, Diazomethane, Dicyclohexylcarbodiimide, Lead tetraacetate, Zieglar-Natta

catalysts, DDQ, Dithianes, Merrifield resin.

UNIT-II: ORGANOMETALLIC REAGENTS 15 Hrs

Synthesis and applications of Grignard reagents, Organolithium, Zinc, Copper, Mercury, Palladium and Rhodium compounds in Organic Synthesis, Homogeneous catalytic hydrogenation and hydroformylation reactions

UNIT III: ASYMMETRIC SYNTHESIS 15 Hrs

Topocity - Prochirality- Substrate selectivity - Diastereoselectivity and enantioselectivity-Substrate controlled methods-use of chiral substrates - examples

Auxiliary controlled methods-Use of chiral auxiliaries-Chiral enolates-alkylation of chiral imines – Stereoselective Diels-Alder reaction

Reagent controlled methods-Use of chiral reagents-Asymmetric oxidation-Sharpless epoxidation-Asymmetric reduction-Use of lithium aluminium hydride and borate reagents.

UNIT IV: METHODS OF ORGANIC SYNTHESIS 15 Hrs

i). ***Oxidations:*** **(a)** Alcohols to carbonyls-Chromium (iv) oxidants-Dimethylsulfoxide oxidation, periodate xidation, Oppenauer oxidation, oxidation with manganese dioxide, oxidation with silver carbonate **(b)** Alkenes to epoxides-peroxide induced epoxidations. **(c)** Alkenes to diols-oxidation with potassium permanaganate, osmium tetraoxide, Prevost reaction **(d)** Ketones to esters-Bayer-Villiger oxidation **(e)** Oxidative bond cleavage-cleavage of alkenes by transition metals. **(f)** Oxidation of alkyl or alkenyl fragments-selenium dioxide and chromium trioxide oxidations.

ii). ***Reductions*** **:** Reduction with lithium aluminium hydride, sodium borohydride, alkoxides, bis-methoxy ethoxy aluminium hydride, Boran aluminium hydride and derivatives-catalytic,hydrogenation-dissolving metal reductions, Non-Metallic reducing agents including enzymatic and microbial reductions.

Suggested Books

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry, C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Name reactions and reagents in organic synthesis, B.P. Muway and M.G Ellord, John Wiley.
6. Principles of Organic Synthesis, R.O.C Norman and J.M Coxon, Blackie Academic & Professional.
7. Reaction Mechanism in Organic Chemistry, P.S. Kalsi, New Age International.
8. Principles of organometallic chemistry, P. Powell, ELBS.

9. Organo transition metal chemistry-Applications to organic synthesis, S.G. Davis, Pergmon.
10. Stereochemistry to Organic Compounds, D. Nasipuri, New Age International.
11. Stereochemistry, P.S. Kalsi, Wiley Eastern.

CHE-EC-303B	Physical Chemistry III	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Physical Chemistry

Course Objectives:

- Learn applications of Group Theory, symmetry criteria and symmetry restrictions
- Applications of X-ray Diffraction and Electron Diffraction on solid state chemistry
- Familiarize with the applications of Microwave spectroscopy, infrared spectroscopy and Raman spectroscopy
- Get knowledge on concept of Thermodynamics of polymer dissolution and Flory-Huggins theory of polymer solutions

Course Outcomes: At the end of the course, the student will be able to

CO1	To know the determination of Character Co-ordinate of C_2V point group based on 3N Coordinates and to learn the Mutual exclusion Principle.
CO2	To learn the Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals.
CO3	To study the rigid rotator model, stark effect, vibration-rotation spectroscopy, PQR branches, selection rules and Vibrational- rotational Raman spectroscopy.
CO4	To study the concepts on heat of dissolution, regular solution theory, Hildebrand solubility parameter, concept of Flory-Huggins theory of polymer solutions

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	2	-	2	-	2	2
CO2	3	2	2	3	2	2	1	2	-	2	1	-
CO3	3	2	2	3	2	2	2	-	1	1	1	2
CO4	3	2	2	3	-	2	1	1	1	2	-	2

CHE-AC-303B CORE-THEORY PHYSICAL CHEMISTRY III

UNIT-I Applications of Group Theory 15 Hrs

Construction of reducible and irreducible representations, Determination of Character Co-ordinate of C_2V point group based on 3N Co-ordinates. Standard reduction formula, Determination of normal modes of vibrations of SO_2, NH_3, $POCl_3$, $PtCl_4^{2-}$, H_2O_2 molecules. Mutual exclusion Principle, Direct Product, Accidental Degeneracy and Fermi resonance Group Theory and Spectroscopy: IR Spectral activity of NH_3 molecule, selection rules, symmetry Criteria for optical activity, symmetry restrictions on dipole moments, symmetry and stereo isomerism. Prediction of IR and Raman Spectral activity of H_2O and CO_2.

UNIT-II: X-ray Diffraction: 15 Hrs

(A) Solid State Chemistry Dislocation of Solids, Schottky and Frenkeldefects, insulaters, a,d semiconductors, Band theory of solids,solid state reactions.

(B) Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals. Index reflections, identification of unit cells from systematic absences in diffraction pattern- structure of simple lattices and X-ray intensities- structure factor and its relation to intensity and electron density- Description of procedure for X-ray structure analysis (NaCl and KCl)

(C) Electron Diffraction: Scattering intensity Vs scattering angle, Wierlequation, and its importance. Measurement techniques, Elucidation of structures of simple gas phase molecules, Low energy electron diffraction (LEED) for the study of surfaces.

UNIT-III: SPECTROSCOPHY 15 Hrs

Microwave spectroscopy: classification of molecules, rigid rotator model, effect of isotopic substitution on the transition frequencies, intensities- stark effect.

Infrared spectroscopy: Linear harmonic oscillator, zero point energy, anharmonity, Mores potential energy diagram, fundamental and overtone transitions, hot bands and combinations bands. Vibration-rotation spectroscopy, PQR branches, selection rules, factors affecting the band positions and intensities for IR region. **Raman spectroscopy:** Classical and quantum theories of Raman effect, pure rotational, pure vibrational Raman spectroscopy, selection rules, mutual exclusion principle, resonance Raman spectroscopy and coherent antistokes Raman spectroscopy. Vibrational- rotational Raman spectroscopy.

UNIT-IV: POLYMER SOLUTIONS 15 Hrs

Thermodynamics of polymer dissolution, effect of molecular weight on solubility, solubility of crystalline and amorphous polymer, heat of dissolution, regular solution theory, Hildebrand solubility parameter, Flory-Huggins theory of polymer solutions, conformational entropy, osmotic pressure and viscosity of polymer solutions. Molecular weight determination by light scattering, ultra-centrifugation and sedimentation equilibrium method. Liquid Crystals- synthesis and applications

Books Suggested

1. F.A. Cotton : Introduction to Group theory for chemists.
2. Geroge Davidson Elsevier : Introductory Group Theory for Chemists.
3. Gurdeep Raj , Ajay Bhagi&Vinod Jain : Group Theory and Symmetry in Chemistry
4. Instrumental methods of analysis – M.H. Willard, Meritt Jr. and J.A. Dean
5. Principles of instrumental analysis – Skoog and West
6. F. W. Billmeyer, Jr.: Text Book of Polymer Science. Wiley Interscience.

7. V. R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar.: polymer Science. New Age international Publishers.

CHE EC 304	Core practical I: Environmental Chemistry - Practical	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Environmental Chemistry- Practical.

Course Objectives:

- Familiarize with the water analysis techniques to anlyse acidity and alkalinity
- Gain knowledge on BOD and COD.
- Understand the basics of soil analysis
- Determination of heavy metals in soil.

Course Outcomes: At the end of the course, the student will be able

CO1	To know the basic idea on techniques of water analysis and acidity alkalinity
CO2	To get experience with the calculations of BOD and COD
CO3	To Understand the basics of soil analysis *viz*. pH, Conducivity
CO4	To have an experience on the determination of heavy metals in soil

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	-	2	3	2	-	1	1	1
CO2	3	2	2	3	2	2	3	2	2	1	1	2
CO3	3	-	1	3	1	2		2	2	-	2	-
CO4	3	2	2	3	1	-	2	2	2	1	-	2

CHE : EC-304: PRACTICALS (Core & Gen.) :: WATER & SOIL ANALYSIS

Water Analysis

a. Alkalinity
b. Acidity
c. Temporary, Permanent and total hardness
d. Sulphate
e. Phosphorus
f. Nitrites
g. Cholorides
h. D.O, BOD and COD
i. Insecticides

Soil Analysis

Determination Of:

a) pH

b) Conductivity

c) Ca

d) Mg

e) Heavy metals like Cr, Pb, Cd, Zn.

CHE EC 305A	**Chemotherapy and Drug Analysis**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Understanding of Chemotherapy and Drug Analysis

Course Objectives:

- Gain knowledge on chemotherapy and analysis of drugs.
- Analysis of drugs chemically and biologically.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about the classification and synthesis of drugs.
CO2	To familiarize with the qualitative and quantitative analysis of drugs.
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	2	3	2	1	1	1	1
CO2	3	2	2	3	2	2	3	2	1	1	-	2
CO3												
CO4												

CHE EC 305A: (SKILL ORIENTED COURSE : THEORY) : CHEMOTHEROPY AND DRUG ANALYSIS

UNIT-I: Chemotherapy

Definition, History, and Evolution of Chemotherapy; Discovery, Classification, Nomenclature, Mode

of action and synthesis of the following classes of compounds with special references to specific drugs mentioned under each class

i) Sulfa drugs- Sulfanilamide and Sulfamethoxazole.

ii) Antibacterials

a) Lactum group of antibiotics – Penicillin, Ampicillin and Amoxycillin.

b) Cephalosporin-C and Ciprofloxacin.

iii) Anticancer drugs – 5-Flurouracil, Methotrexate.

iv) Antifungals – Griseofulvin

v) Antimalarials – Chloroquin

UNIT-II: Chemical and Biochemical analysis of Drugs

Qualitative and Quantitative Analysis of drugs: Uses of IR, UV, GLC and HPLC methods.

Drug Assay by Biochemical Analysis – ELISA (Cortisol, alcohol, opiates).

Radio Immuno Assay (RIA) – Enalapril, Insulin; Kidney, Lungs and Liver function tests; Use of isotopes in the Bioanalysis of drugs and in drug design programmes.

Book Suggested

1. Medicinal Chemistry and Pharmaceutical Chemistry – Harikishan Singh and Kapur
2. Medicinal Chemistry and Biochemistry – R.L.Nath
3. Introduction to Medicinal Chemistry – Patrick
4. The Organic Chemistry of Drug Synthesis Vols. 1-6 - Ledneicer Top drugs top synthetic routes – John Saunders
5. Medicinal Chemistry – Ashutoshkar
6. Synthetic Organic Chemistry and Drugs – Gurideep R Chetwal
7. Biochemistry – Harper, Conn & Stumpf, Lehninger
8. Biochemistry – Western Jodd
9. Biochemistry – Cann & Stumpf
10. Bergers Medicinal Chemistry Vols. 1-5 – Manfred E. Wolf
11. Introduction to drug design – Siverman
12. Biochemical approach to Medicinal Chemistry – Thomas Nogrady
13. Prinicples of Medicinal chemistry – William Foye
14. Text book of organic medicinal and pharmaceutical chemistry – Delgrado and William A
15. Industrial Microbiology – Casida

CHE EC 305B	Instrumental Methods of Analysis	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Instrumental Methods of Analysis Practical

Course Objectives:

- Familiarize with analysis of mixtures of acids and halides by potentiometry
- Study about the determination of different cations by Flame photometry

Course Outcomes: At the end of the course, the student will be able

CO1	To know about the potentometric analysis of mixtures of acids and halides
CO2	To familiarize with the Flame photometric analysis of Na, K, and Li
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	3	-	2	3	2	1	1	1	-
CO2	3	2	1	3	2	2	3	2	1	-	1	2
CO3												
CO4												

CHE : AC 305 (B) : PRACTICALS (SKILL ORIENTED COURSE) : INSTRUMENTAL METHODS OF ANALYSIS

1. Colorimetric Determinations:

a. Determination of manganese

b. Determination of nickel

c. Determination of iron by 1,10 Pheren-thiroline

d. Determination of chromium

e. Determination of Phosphate

f. Determination of Pesticides

g. Determination of Nitrite.

CHE EC 306 A	Spectral Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Spectral Techniques

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands.
- Study on the applications of flame atomic absorption spectroscopy.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy.

Course Outcomes: At the end of the course, the student will able

CO1	To know the basic principles of spectroscopy.
CO2	To familiarize with the analysis of various functional groups by using different spectroscopic techniques.
CO3	To Understand the applications of AAS.
CO4	To gain knowledge about Mass spectral fragmentation of organic compounds and common functional groups.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	-	2	3	2	1	-	1	1
CO2	3	2	2	3	2	2	3	2	2	1	-	2
CO3	3	2	1	2	2	--	2	1	-	1	1	-
CO4	3	2	2	3	-	2	1	-	2	1	-	2

CHE : AC : 306(A): (OPEN ELECTIVE) SPECTRAL TECHNIQUES

UNIT – I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY 15 Hrs

Various electronic transitions (185-800nm.), Beer-Lambert Law, effect of solvent on electronic transitions , ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, Fieser-Woodward rules for conjugated dienes and carbonyl compounds

UNIT – II : INFRARED SPECTROSCOPY 15 Hrs

Instrumentation and sample handling, characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols, amines, ketones, aldehydes, esters, amides, acids and anhydrides. Effect of hydrogen bonding.

UNIT – III:ATOMIC ABSORPTION SPECTROSCOPY: FLAME AAS: 15 Hrs

Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT –IV: MASS SPECTROMETRY 15 Hrs

Principle, instrumentation, different methods of ionization, EI, CI, FD and FAB, Mass spectra-molecular ion, base peak, meta-stable peak, nitrogen rule and Mc Lafferty rearrangement. Mass spectral fragmentation of organic compounds and common functional groups. Normal and branched alkanes, alkenes, cycloalkanes, benzene and its derivatives, alcohols and phenols, ethers, aldehydes and ketones, carboxylic acids and their derivatives , amines and nitro compounds. Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Books Suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS .2.
2. Spectroscopy of organic compounds, RM Silversteen and others 5th Ed, John Wiley 1991
3. Spectroscopy of organic compounds, PS Kalsi, Wiley, 1993
4. NMR in chemistry – A Multi nuclear introduction, William Kemp, Mc Millan 1986
5. Spectroscopic methods in Organic Chemistry, DH Williams & I Flemmi TMH . 2005

CHE EC 306 B	Chromatographic Techniques	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chromatographic Techniques

Course Objectives:

- Familiarize with Classification of Chromatographic methods.
- Understand Demonstration experiment in TLC.
- Study on the applications of High-Performance Liquid Chromatography (HPLC).
- Understand the working principle of gas chromatography.

Course Outcomes: At the end of the course, the student will able to

CO1	To know the stationary and mobile phases in chromatographic techniques.
CO2	To familiarize applications of different chromatographic methods.
CO3	To Understand the principle of chromatographic techniques.
CO4	To gain knowledge on the normal phase and reverse phase.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	2	-	3	2	2	1	-	1	-
CO2	3	2	2	2	2	2	3	2		1	1	2
CO3	3	2	1	2	2		2	-	2	-	1	-
CO4	3	2	2	1	2	1	1	1	1	1	-	2

CHE EC 306 B : Chromatographic Techniques

Unit –I: Introduction - Classification of Chromatographic methods – Column chromatography-Adsorption phenomenon: Nature of adsorbents-Solvent systems-Differential migration-Separation of mixture of o-/p-nitro anilines (A demonstration experiment).

Unit –II: Thin-Layer Chromatography (TLC)-Coating materials and preparation of TLC plates-Solvents for development-Detection of compounds in TLC- R_f values in TLC-Applications of TLC in chemistry-Preparative TLC – Demonstration experiment in TLC.

Unit –III: High-Performance Liquid Chromatography (HPLC) - Application of HPLC- HPLC instrument-Stationary phases in HPLC-Normal and reversed phase HPLC: A comparison- Normal phase HPLC: Principle-Retention times in Normal and reversed phase HPLC- Reversed phase HPLC: Principle.

Unit –IV: Gas-Liquid Chromatography- Instruments for Gas-Liquid Chromatography- Gas-Chromatographic Columns and the Stationary Phase- Application of Gas-Liquid Chromatography- Gas-

Solid Chromatography.

Reference Books:

1. Analytical chemistry: G L David Krupadanam, D. Vijaya prsad, K. Varaprasad Rao, KLN Reddy, C. Sudhakar.
2. . Analytical chemistry: Skoog West Holler.
3. Modern Analytical Chemistry : David Harvey DePauw University.
4. J.G. Dick. Analytical Chemistry, Mc Grraw Hill, New Delhi, (1973).

(Mandatory Core)

CHE-EC- 401	Energy, Environment and Soil	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Energy, Environment and Soil

Course Objectives:

- Familiarize with fossil fuels, solar energy, geothermal energy
- Hydropower and photo-electrochemistry, hydrological cycle, water pollutants, eutrophication and greenhouse effect.
- Detection of composition of soil, biodegradation, goals of green chemistry, biocatalysis
- Soil pollution, solid waste management and disposable methods.

Course Outcomes : At the end of the course, the student will be able to

CO1	Know about nuclear fission and fusion, uses of solar energy in space heating and water heating, hydropower and water heating, hydropower and production of ethanol from indirect solar energy.
CO2	Learn physical and chemical properties of water and water complexation in natural and waste water and to understand about global warming, ozone depletion, green house effect and acid rains.
CO3	Acquire knowledge on composition of inorganic and organic contaminants in soil, soil corrosion and industrial applications of green chemistry.
CO4	Get knowledge on various methods of solid waste collection and its disposal.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	-	2	2	2	-	3
CO2	3	3	3	3	3	-	-	2	2	-	-	3
CO3	3	3	3	3	2	2	-		2	2	-	3
CO4	3	3	3	3	3	2	-	2	2	-		3

CHE EC-401: CORE THEORY: ENERGY, ENVIRONMENT AND SOILS

UNIT-I: Sources of Energy **15 Hrs**

Fossil fuels- Nuclear fission and fusion- Solar energy-use of solar energy in space heating and water heating- production of electricity using solar energy- solar trough collectors- power tower- solar pond- solar energy for driving vehicles- power from indirect solar energy – Hydropower- wind power- Biomass energy- production of ethanol from biomass- production of methane from biomass- photosynthesis- photo electro chemistry- Geothermal energy.

UNIT-II: Water Resources and Air **15 Hrs**

Hydrological cycle- physical and chemical properties of water-complexation in natural and waste water,-Anomalous properties-water pollutants-Types-Sources- Heavy metals- metalloids- organic – Inorganic –Biological and Radio active-Types of reactions in various water bodies including marine environment- Eutrophication- Ground water- Potable water standards.Treatment for portable water.

Air: Chemical reactions in the atmosphere – Aerosols types- Production and distribution – Aerosols and Radiation – structure and composition of atmosphere- temperature inversion – Global warning- Ozone depletion – Green house effect, "CFC"s- Acid rain.

UNIT-III: Soil and Green Chemistry **15 Hrs**

Soil: Composition of soil- lithosphere- inorganic and organic contaminants in the soil- Biodegradation-Nondegrdable waste and its effect on the environment- Bioremediation –of surface soils- Fate and transport of contaminants on soil system– Bioindicators- Soil parameters- soil destruction- Erosion- Soil conservation – Nitrogen pathways and NPK in soil .

Green Chemistry: Goals of Green chemistry- Significance and basic components of Green chemistry research - industrial applications of Green chemistry-products from natural materials- Green fuels and E-Green propellants- Zeolites- Biocatalysts.

UNIT IV: Soil pollution: **15 Hrs**

Introduction – soil pollution by industrial wastes. soil pollution by urban wastes, Radioactive pollutants and Agricultural waste- chemical and metallic pollutants-Biological agents – mining - Detrimental effects of soil pollutants – Effects of industrial pollutants- Effects of sewage and domestic wastes-Effects of heavy metals- Effects of radioactive pollutants- Effects of modern agro- technology – Diseases caused by soil pollution – solid waste management – sources and classification -public Health Aspects – methods of collection- Disposal methods – potential methods of disposal.

Books Suggested:

1. Daniel D. Chiras (1994), Environmental Science, 4th Ed.
2. Environmental Chemistry by W. Moore and J.Moore
3. Environmental chemistry by J.O.M. Bockariss
4. Environm,ental by BK SHArma
5. Environmental chemistry by SS Dara
6. Environmental chemistry by Mahajan
7. Environmental chemistry by a.K.De

(Mandatory Core)

CHE-EC 402	Water Pollution Monitoring and Environment Laws	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Water pollution monitoring and environment laws.

Course Objectives:

- Basic concepts of different water pollutants
- Different principles of water treatment.
- Biotechnology and its applications in environmental protection
- Environmental management and environmental laws

Course Outcomes: At the end of the course, the student will be able to

CO1	Acquire knowledge on disease causing agents in water.
CO2	Learn about the removal of suspended and dissolved solids present in waste water.
CO3	Understand different uses of micro-organisms in environmental protection.
CO4	Know different world life acts such as forest conversion act, water control pollution act and air prevention and control act.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	2	-	-	-	3
CO2	3	3	3	2	2	-	-	2	2	-	-	3
CO3	3	3	3	3	2	2	-	2	2	-	-	3
CO4	3	3	3	3	-	2	-	2	3	-	2	3

CHE EC-402: CORE THEORY: WATER POLLUTION MONITORING AND ENVIRONMENT LAWS

UNIT-I: Water pollution **15 Hrs**

Basic aspects of water-general principles of water (physical and chemical)-criteria of water quality.Types of water pollutants: sewage and domestic wastes-industrial wastes-agriculture discharges- toxic metals-oxygen demanding wastes-disease causing agents-oils- detergents and phosphates. Sampling**:** Basics of Sampling, sampling procedure, statistics, sampling and physical state, crushing and grinding, hazards waste of sampling, pre-concentration methods

UNIT-II: Waste water treatment: 15 Hrs

Basic process of water treatment- primary treatment pretreatment – sedimentation – Flotation-secondary (Biological) Treatment – Active sludge process – Trickling filters – sludge Treatment and disposal – Advanced waste water Treatment – Removal of suspended solids – Removal of dissolved solids – Nitrogen removal – phosphorous removal – Advanced Biological systems – chemical oxidation .

UNIT III: Biotechnology and its application in Environmental protection 15 Hrs

Introduction- Bio-informatics- Bio-Technology and pollution control,-Bioremediation- Biological de-odourisation- Biological purification of contaminated air-microorganisms and energy of mankind-use of microorganisms role in petroleum augmentation and recovery.

UNIT IV: Environmental Management and Important Environmental Laws: 15 Hrs

Environmental Management: Introduction-objectives-components-environmental impact assessment (EIA)-historical background-elements of EIA process-participants in EIA processes-contents of EIS-design of EIA.

Important Environmental Laws: the world life act-the forest conservation act-the water and control pollution act-air prevention& control act—the environment act-environmental quality management standard-ISO 14000 series.

Books Suggested

1. Environmental Chemistry by W. Moore and J.Moore
2. Environmental chemistry by J.O.M. Bokriss
3. Environmental by BK Sharma
4. Environmental chemistry by SS Dara
5. Environmental chemistry by Mahajan
6. Environmental chemistry by a.K.De
7. Lodge (1994) Methods of air sampling and analysis.Publications, Jaipur
8. Kudesia, V.P. (1985) Water Pollution, Pragati Prakashan
9. Elements of biotechnology by PK Gupta and Rastogi

(Mandatory Core)

CHE-EC-403A	Air Pollution, Control Methods-Noise and Thermal Pollution	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of Air Pollution, Control Methods-Noise and Thermal Pollution

Course Objectives:

- Study on properties of air pollutants, air pollution sampling measurements and analysis.
- Familiarize with different control methods and adsorption of solids and liquids, gas analysis.
- Know about pollution caused by vehicle emissions and different industries.
- Get an idea on noise and thermal pollutions and their effect on human health.

Course Outcomes: At the end of the course, the student will be able to

CO1	Acquire knowledge on air pollutants, air pollution sampling measurements and analysis caused due to sulphur dioxide, carbon monoxide, nitrogen dioxide, oxidants, ozone, hydro carbons and particulate matter.
CO2	Learn about different control methods and adsorption of solids and liquids, gas analysis eluents viz., nitrogen oxides, carbon monoxide and hydrocarbons.
CO3	Understand pollution caused by vehicle emission, different industries, cement plants, steel mills and petroleum refineries.
CO4	Know about noise and thermal power project pollutions and their effect on human health.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	2	-	-	-	3
CO2	3	3	3	2	2	-	-	2	2	-	-	3
CO3	3	3	3	3	2	2	-	2	2	-	-	3
CO4	3	3	3	3	-	2	-	2	3	-	2	3

CHE : EC-403 (A): (GENERIC ELECTIVE): AIR POLLUTION, CONTROL METHODS-NOISE AND THERMAL POLLUTION

UNIT-I: Air Pollution **15 Hrs**

Classification and properties of air pollutants-emission sources-major emissions from global sources-importance of anthropogenic sources-behavior and fate of air pollutants photochemical smog and its effects on health-vegetation-material damage in India.

Air pollution sampling and measurement-ambient air sampling-collection of gaseous air pollutants-collection of particulate pollutants-stack sampling-analysis of air pollutants-sulphur dioxide-carbon monoxide-nitrogen dioxide-oxidants-ozone-hydro carbons and particulate matter

UNIT- II: Control methods **15 Hrs**

Sources-correction methods-particulate emission control-gravitational settling chambers-cyclone separators-fabric filters-electrostatic precipitator-wet scrubbers-control of gaseous emissions by adsorption of solids and liquids-control methods of sulphur dioxide emission, flue gasesanalysis-control method, nitrogen oxides, carbon monoxide and hydrocarbon-mobile sources.

UNIT-III: Vehicular Air Pollution: **15 Hrs**

Genesis of vehicular emissions standard- natural pollution-gasification of vehicles-point sources of air pollution – mechanism of air pollution from automobiles -automobile pollution- Indian scenario population and pollution loads of vehicles-automobile air pollution control-exhaust gas controlling treatment devices-thermal reactor-catalytic converter from automobiles-fuel tank carbonator. Air pollution from Portland cement plants-steel mills and petroleum refineries.

UNIT-IV: Noise and Thermal Polution **15 Hrs**

Noise pollution: sources-measurement of noise and indices-effect of meteorological parameters on noise propagation-noise exposure levels and standards –measurement of noise-impact of noise on human health

Thermal pollution: Introduction-definition-sources-harmful effects-toxic compounds in traces-prevention and control of thermal pollution –thermal power projects in India.

Books Suggested:

1. Environmental Chemistry by W. Moore and J.Moore
2. Environmental chemistry by J.O.M. Bockeriss
4. Environmental chemistry by Sharmar and Kaur, Krishna Publishers
6. Environmental chemistry by a.K.De
8. Henry C perkins (1974) Air Pollution, McGraw-Hill
9. Kudesia, V.P. (1985) Water Pollution, Pragati Prakashan.
10. Environmental Engineering by CS Rao
11. Environmental by BK Sharma
12. Environmental chemistry by SS Dara

(Compulsory Foundation)

CHE-EC-403B	Bioinorganic, Bioorganic, Biophysical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Bioinorganic, Bioorganic, Biophysical Chemistry

Course Objectives:

- Highlighten metal complexes as oxygen carriers and electron transfer in biology.
- Metal ion transport and storage in biological systems and importance of trace metals in biology.
- Learn physiological functions of carbohydrates, lipids, enzymes classification, stereospecificity.
- The basic concepts of biophysical chemistry in biochemical reactions, exergonic and endergonic reactions.

Course Outcomes: At the end of the course, the student will be able to

CO1	Gain knowledge on metallo proteins in electron transfer processes.
CO2	Know the applications of trace metal ions and metal ions as chelating agents in medicine.
CO3	Achieve and develop highly stereoselective synthesis of organic compounds and drugs by adopting environmentally.
CO4	Understand thermodynamics of biopolymer reactions and to correlate free energy and biopolymer parameters.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	3	2	-	2	-	3
CO2	3	3	3	3	3	2	3	-	-	-	3	3
CO3	3	3	3	3	3	3	-	2	-	2	-	3
CO4	3	3	3	3	3	3	2	2	-	3	3	3

CHE EC-403(B): (GENERIC ELECTIVE): BIOINORGANIC, BIOORGANIC, BIOPHYSICAL CHEMISTRY

UNIT-I: **BIO-INORGANIC CHEMISTRY- I** **15 Hrs**

Metal complexes as oxygen carriers –Heme proteins –Hemoglobin and myoglobin –Non heme proteins –hemerythrin and hemocyanin – model synthetic complexes of iron, cobalt and copper.Co-enzymes Vitamin B_{12},carboxy peptidase and superoxidedismutase.

Electron Transfer in Biology: Structure and functions of metalloproteins in electron transfer processes –catalase –peroxidose –cytochromes and iron –sulphur proteins –synthetic models.

UNIT – II: BIOINORGANIC CHEMISTRY- II: Metal ion transport and storage in biological systems**,** Metal ions in Biology, Molecular mechanism of ion transport across membranes: ionophores, photosynthesis.

Hydrolytic metalloenzymes: Carbonic anyhdrase, carboxy peptidase, calcium in control processes, calcium and muscle contraction, calcium and secretion, calcium in blood clotting mechanisms. Therapeutic uses of enzymes.

Importance of trace metals in biology: Metal ions as chelating agents in medicine, trace metal ions and metal and non-metal deficiency. Biological nitrogen fixation,in-vivo and in-vitro nitrogen fixation.

UNIT-III: BIOORGANIC CHEMISTRY

Carbohydrates: Structure and biological functions of mucopolysaccharides, glycoproteins, and glycolipids- Role of sugars in biological recognition-Blood group substances

Lipids: Essential fatty acids-structure and function of triglycerols, Glycerophospholipids, cholesterol, bile acids prostaglandins- composition and functioning of lipoproteins

Enzymes: Nomenclature and classification, properties, factors affecting enzyme catalysis, enzyme inhibition- reversible and irreversible inhibition. Uses of enzymes in food drink industry and clinical laboratories.

UNIT-IV: BIOPHYSICAL CHEMISTRY:

Standard free energy change in biochemical reactions, exergonic and endergonic reactions, hydrolysis of ATP, thermodynamics of biopolymer solutions, chain configuration of bio polymers, and calculation of average dimensions. Membrane equilibrium, ion transport through cell membrane. dialosis and its function. Structure and functions of proteins, enzymes, DNA and RNA in living systems, forces involved in bio polymer interactions, electrostatic forces, hydrophobic forces, molecular expansion, and dispersion forces.

Books Suggested

1. M.N. Hughes, The Inorganic chemistry of Biological Processes, John wiley and Sons, New York 2nd Edition, 1981.
2. A Text book of Biochemistry, A.V.S.S. Rama Rao
3. Physical chemistry by Atkenes
4. Physical chemistry by Albertz.
5. Bio physical chemistry by Van Holde

6. Bio Physics by Narayanam
7. Organic Chemistry, Vol. 2, I. L. Finar, ELBS.
8. Chemistry of Natural Products, P.S. Kalsi, Kalyani Publishers.
9. Chemistry of Organic Natural Products, O. P. Agarwal, Vols., 1 & 2, Geol Pubs.
10. Natural products Chemistry K.B.G. Torssell, John Wiley, 1983.
11. Burger's Medicinal Chemistry, M.E. Wolff, John Wiley
12. Medicinal Chemistry, A. Kar, New Age International

CHE EC 404	Practical I	L-5,T-1,P-0	4 Credits

Pre-requisite: Environmental Chemistry Practical I

Course Objectives:

- Conductometric methods of analysis.
- Colorimetric methods of analysis
- Interpretation of data from IR, HPLC, GC, AAS
- Determination of purity and alkanility by pH metry

Course Outcomes: At the end of the course, the student will be able

CO1	To know the basic principles of conductometry and analysis of acids and halides.
CO2	Colorometric estimation of iron and manganese.
CO3	To have an idea about working principles of IR, AAS, Spectrofluorimetry, Gas chromatography and HPLC.
CO4	Tofamiliarize with interpretation of data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	-	2	-	2		2
CO2	3	3	3	3	2	3	-	-	-	2	-	3
CO3	3	3	3	3	3	2	-	2	-	2	-	3
CO4	3	3	2	2	3	2	-	2	-	2	-	3

CHE EC-404: PRACTICAL-I- INSREUMENTAL METHODS OF ANALYSIS-II

1) Conductometry:

a) Mixture of Acids

b) Mixture of Halides

2) Colorimetry:

a) Estimation of Iron

b) Manganese

c) Phosphate

d) Titration of copper Vs EDTA

DEMONSTRATION EXPERIMENTS

1 IR – Interpretation of IR spectrum of alcohols, ketones, aldehydes and other standard materials

2 AAS: Demonstration of AAS – Determination of Zn, Cd, Pb, Mn, Fe and Ni in effluents using AAS.

3 Spectrofluorimetry – estimation of quinine and fluoroscene

4 Ion selective electrodes – estimation of F^-, S^{2-} and CN^- in effluents using ion selective electrode meter.

5 Polarography and Anode stripping voltametry

(A)Polarography and Anode stripping voltametry – behavior of Cd, Zn, Pb in a mixture.

(B)Determination of Pb and Cd in samples using Anode stripping voltametr

6 Gas chromatography- Determination of pesticides

7 HPLC- Determination of pesticides

8 pH metry

(A)Determination of alkalinity in a colored effluent using pH metric end point.

(B)Determination of purity of commercial HCl, H_2SO_4, H_3PO_4 and CH_3COOH using pH metric end point.

CHE EC 405 A	Practical II:Project Work	L-5,T-1,P-0	4 Credits

Pre-requisite: Project Work

Course Objectives:

- Identification of problem by literature survey
- Carry out the problem independently
- Interpretation of data
- Communication of research results through presentations and preparation of dissertation

Course Outcomes: At the end of the course, the student will be able

CO1	To identify research problem, propose the hypothesis and to collect literature.
CO2	To perform research designs & experiments
CO3	To tabulate research results
CO4	To conclude research outcomes in the form of dissertation.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	3	-	2	-	2	3
CO2	3	3	3	3	2	3	-	-	2	-	-	3
CO3	3	3	3	3	3	2	3	-	2	-	3	3
CO4	3	3	3	3	2	3	3	2	3		2	3

CHE EC- 405 A : PROJECT WORK

CHE EC 406A	Drug Chemistry	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Drug Chemistry

Course Objectives:

- To learn about the natural products as leads for new drugs
- Determination of cardiovascular drugs
- To study Autacoids
- Interpretation of Antipyretics

Course Outcomes: At the end of the course, the student will be able to

CO1	Know about natural products.
CO2	Know Interpretation of cardiovascular drugs.
CO3	Know the Analyzing about prostaglandins.
CO4	Know the Definition, Classification, Nomenclature, Structure and Synthesis of anti-inflammatory drugs.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3		3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE : EC : 406 (A): (OPEN ELECTIVE) : DRUG CHEMISTRY

UNIT – I: NATURAL PRODUCTS AS LEADS FOR NEW DRUGS

Occurrence, Structure and therapeutic uses of Drugs acting on Central Nervous System

Morphine alkaloids (morphine, codeine, thebaine, heroin, pethidine)

Cannabinoids (9-cannabinol, Tetrahydrocannabinol)

Neuromuscular Blocking Agents (Curare, Decamethonium)

Vinca Alkaloids (Vincristin and Vinblastin), Taxol and Taxotere, podophyllotoxin, Etoposide, Teniposide.

UNIT – II: CARDIOVASCULAR DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis.

Cardiac glycosides (ex: Digoxin, Digitoxin);
Antihypertensive drugs (ex: Methyl dopa, Clonidene hydrochloride);
Antiarrhythmic agents (ex: Quinidine sulfate);
Antisympathetic drugs (ex: Propranolol hydrochloride, Verapamil hydrochloride);
Vasopressor drugs (ex: Prenylamine, Buphenine).

UNIT – III: AUTACOIDS

Definition, Occurrence, Isolation, Nomenclature, Classification, Synthesis, Biosynthesis and Stereochemical structures of Prostaglandins. Structural elucidation of PGE_1, PGE_2; Synthesis and biosynthesis of PGE_2, $PGF_{2\alpha}$.

Structure and Biosynthesis of Thromboxane A2 and Prostacyclin (synthesis not expected).

UNIT – IV: ANTI-INFLAMMATORY DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis of Paracetamol, Aspirin (Antipyretic), Salol, Cinchophen, Antipyrene, Phenylbutazone, Indomethacin, Tolmetin, Ibuprofen, Diclofenac and Naproxen.

Books suggested:

1. Medicinal Chemistry by Ashitosh Kar
2. Medicinal Chemistry by D. Sriram, P. Yogeeswari
3. Medicinal Chemistry by David A. Williams, Thomas L. Lemke
4. Medicinal Chemistry by V**.** Alagarsamy
5. Biochemistry by U. Satyanarayana
6. Natural Products Chemistry and Applications by Sujata V. Bhat, B.A. Nagasampagi,
   S. Meenakshi
7. Medicinal Chemistry by V.K. Ahluwalia, Madhu Chopra
8. Medicinal Chemistry by Balkishen Razdar
9. Advanced Practical Medicinal Chemistry by Ashutosh Kar
10. Chemistry of Organic Natural Products by O. P. Agarwal, Vols., 1 & 2, Geol Pubs.

11. Chemistry of Natural Products by S. V. Bhat, B.A. Nagasampagi, M. Sivakumar
12. Natural Products Chemistry by K.B.G. Torssell, John Wiley, 1983.

CHE EC 406	Electroanalytical Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Electroanalytical Techniques

Course Objectives:

- To learn about the classification of electroanalytical methods
- Determination of types of currents
- Principle, instrumentation, reversible and irreversible cyclic voltammograms..
- Interpretation of Ion selective electrodes

Course Outcomes: At the end of the course, the student will able to

CO1	Ability to interpret potentiometry and conductometry
CO2	Interpretation of results while adhering to DC Polarography.
CO3	Analysing and compiling the data and results in polarography.
CO4	Familiarize Types of ion sensitive electrodes.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3	-	3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE : EC : 406(B): (OPEN ELECTIVE) : ELECTRO ANALYTICAL TECHNIQUES

Unit I: Types and Classification of Electro analytical Methods.

i) Potentiometry- Types of electrodes, Hydrogen gas, Calomel, Quin hydrone and glasselectrodes. Determination of pH. Potentiometric titrations.

ii) Conductometry – Definition of terms – conductivity, specific conductivity, cell constant. Mobility of ions, Conductometric titrations.

Unit II: D.C Polarography: Dropping mercury electrode- Instrumentation-polarogram. Types of Currents : Residual, Migration, Limiting. Two and Three electrode assemblies. Ilkovic equation (derivation not necessary) and its consequences. Types of limiting Currents: Adsorption, Diffusion, Kinetic. Applications of polarography in qualitative and quantitative analysis. Analysis of mixtures. Application to inorganic and organic compounds. Determination of stability constants of complexes.

Unit III: (i) A.C. polarography (ii) Square-wave polarography (iii) Pulse polarography (iv) Differential pulse polarography(V) Cyclic Voltammetry: Principle, instrumentation, reversible and irreversible cyclic voltammograms.

Unit IV: Ion selective electrodes: Ion-sensitive electrodes –types of ion sensitive electrodes –metal based cation and anion sensitive electrodes, solid membrane electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A. Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denny. Vogel's Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (Mc Graw Hill).

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

SVU COLLEGE OF SCIENCES

DEPARTMENT OF CHEMISTRY
3. INORGANIC CHEMISTRY (Specialization)



Syllabus for M.Sc. CHEMISTRY

Choice Based Credit System (CBCS)

Amended as per NEP-2020

(Academic Year 2023-2024)

About the Department

The Department of Chemistry is one of the first six departments started during the year 1954 when the university was founded. The Department offers M.Sc. course in Chemistry with specializations in Analytical, Environmental, Inorganic, Organic and Physical Chemistry besides Self Supporting Courses in Organic and Analytical Chemistry. Choice Based Credit System is followed and the courses are categorized as per the guidelines of the statutory authorities. Ability enhancement and skill development courses are part of the curriculum. Almost 15% of the students are qualifying in National Entrance Test conducted by UGC-CSIR. Also the Department offers quality research and training experience leading to Ph.D., Degrees for the students in the areas of synthesis of pharmacologically potential molecules analogous to drugs, application of green methodologies for the synthesis of complex molecules, development of new hybrid sorbents for monitoring toxic metals in environmental samples, fabrication of novel electrochemical sensors and biosensors towards the detection of organic molecules and pollutants. Over the last sixty five years the department has trained about 650 students for their Doctoral degrees. Most of the research scholars are doing Post-Doctoral research in abroad and in India. The faculty published more than 3000 research papers in reputed National and International journals. The Department organizes National and International conferences / seminars/ workshops on regular basis. The Department has well equipped laboratories for research and teaching besides a DST funded computer lab and a Department library. All the faculty members are having individual research laboratories with internet facility.

At present the Department is flourished with 10 faculty members and most of the faculty members have Post Doctoral research and training experience abroad. Some of the faculty worked as Visiting Professors and Visiting Fellows in prestigious universities abroad. Majority of faculty members have undertaken major research projects funded by agencies like UGC, CSIR, DST, BRNS, DBT and MOES and have successfully completed the tasks with a budget outlay of Rs. 250.00 lakhs. Most of the faculty members have developed collaboration with Indian Institute of Sciences, Bangalore, Indian Institute of Chemical Technology, Hyderabad, AVRA Laboratories, EPR Laboratories, Hyderabad, Amara Raja Batteries, Tirupati, RRL, Trivandrum and Birla Institute of Technology & Science, Pilani – Hyderabad campus and have approved patents. Some of the faculty and Alumni are the recipients of JSPS Fellowship, UGC Raman Fellowship, Common wealth Academic Fellowship, State Best Teacher Award etc., Recognizing the excellence in teaching and research in the Department, the University Grants Commission and Department of Science Technology have provided funding under DRS and FIST programmes. The Alumni of the department served in coveted positions as Vice-chancellors, Registrars, CEO of pharma industries etc. The former students of the Department have established leading International pharmaceutical industries in India and abroad. Some of them are actively engaged in the manufacture of COVID 19 vaccine. The ultimate goal of the Department is to achieve excellence in fundamental research as well as the development of innovative technologies for the future.

Vision

- Impart quality education & training in the field of chemistry to enable successful careers for the post graduate students in the field of research, education & industry applications of chemical sciences.

Mission

The Department of Chemistry strives:

- To get an ideal balance between knowledge creation and knowledge dissemination in the chemical sciences with a focus to train and mentor students to become responsible scientists and scientifically literate professionals to attain National and International impact.
- To contribute to the improvement of scientific and technological literacy, and the development of critical-thinking and problem-solving skills of all students in order to compete for the world of work and responsible citizenship

Program Specific Outcomes: At the end of the program, the student will be able to:

PSO1	**Scientific Problem solving skills**: Deep knowledge of the topic which can develop the problem solving skills using chemical principles.
PSO2	**Analytical skills**: Develop analytical skills such as synthesizing, separating, characterizing chemical compounds and chemical reactions with the help of sophisticated instruments
PSO3	**Research skills**: Develop research skills through dissertation/project work in different fields of chemistry such as organic, inorganic, analytical, physical and environmental.
PSO4	**Learning skills on life processes**: Acquire advanced level of knowledge in natural products as well as biological systems from the chemistry point of view.

Program Objectives

PO1	To divulge an advance level of theoretical and practical knowledge in the major fields of Chemistry- Analytical, Environmental, Inorganic, Organic and Physical.
PO2	To engage in research projects for acquiring wide spectrum of subject knowledge and research experience in respective fields.
PO3	To enlighten on skill enhancement in the core chemistry with practical expertise hands this will make students employable in academia and industries
PO4	To mould as responsible citizens to serve the nation

Program Outcomes: On completion of M.Sc. Chemistry programme, graduates will be able to –

PO1	Have a firm foundation in the fundamentals and application of current chemical and scientific theories in different areas of chemistry *viz*., Analytical, Environmental, Inorganic, Organic and Physical.
PO2	Understands the background of organic reaction mechanisms, complex chemical structures, and instrumental methods of chemical analysis, molecular rearrangements and separation techniques.
PO3	Familiarize with the importance of various elements present in the periodic table, coordination chemistry and structure of molecules, properties of compounds, structural determination of complexes using theories and instruments.
PO4	Understand about the physical aspects of atomic structure, dual behavior, reaction pathways with respect to time, various energy transformations, molecular assembly in nano-level, significance of electrochemistry, molecular segregation using their symmetry.
PO5	Create awareness and sense of responsibilities towards environment and apply knowledge to solve the issues related to Environmental pollution.
PO6	Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in the subject concerned. Ability to identify unethical behavior such as fabrication, falsification or misrepresentation of data and adoptive objective, unbiased and truthful actions in all aspects.
PO7	Be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
PO8	Clearly communicate the results of scientific work in oral, written and electronic formats.
PO9	Explore new areas of research in both chemistry and allied fields of science and technology.
PO10	Design, analyze and carry out scientific experiments and interpret data to provide solutions to different industrial problems.
PO11	Independently carry out research to solve practical problems and present a substantial technical report.
PO12	Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning throughout life, through self- paced and self-directed learning aimed at personal development, and adapting to change academic

	demands of work place through knowledge/ skill development/ reskilling.

Program Educational Objectives:

At the end of the program, the student wills be able to:

PEO1	To demonstrate broad knowledge of descriptive chemistry.
PEO2	To impart basic analytical and technical skills to work effectively in various fields of chemistry.
PEO3	To motivate critical thinking and analysis skills to solve complex problems viz., analysis of data, synthetic logistics, spectroscopy, structure and modeling, team based problem solving etc.
PEO4	To demonstrate an ability to conduct experiments in the above sub disciplines with mastery of appropriate techniques and proficiency using core chemical instrumentation and modeling method
PEO5	To develop laboratory competence in relating chemical structure to spectroscopic phenomena.
PEO6	To demonstrate the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment and modern instrumentation.

SRIVENKATESWARAUNIVERSITY::TIRUPATI

DEPARTMENTOF CHEMISTRY

INORGANIC CHEMISTRY

TWO YEAR M.Sc. COURSE IN CHEMISTRY

(2021-2022) SCHEME

Semester -I

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-101	Core-Theory	Inorganic Chemistry- I	6	4	20	80	100
2	CHE-102	Core-Theory	Organic Chemistry I	6	4	20	80	100
3	CHE-103	* Compulsory Foundation	a)Physical Chemistry- I b)Chemistry of Nano materials	6	4	20	80	100
4	CHE-104	* Elective Foundation	a)General Chemistry- I b)Green Chemistry	6	4	20	80	100
5	CHE-105	Practicals (Core & Comp.)	a)Inorganic Practical-I b) Physical Chemistry-I	3 3	2 2	- -	- -	50 50
6	CHE-106	Practicals (Core & Elective)	a) OrganicChemistry- I b)General Chemistry-I	3 3	2 2	- -	- -	50 50
7	CHE-107	Audit Course	Human Values and Professional Ethics – I	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

SEMESTER-II

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-201	Core-Theory	Inorganic Chemistry- II	6	4	20	80	100
2	CHE-202	Core-Theory	Organic Chemistry -II	6	4	20	80	100
3	CHE-203	* Compulsory Foundation	(a)Physical Chemistry- II (b) Advanced Thermodynamics and Biophysical chemistry	6	4	20	80	100
4	CHE-204	* Elective Foundation	a)General Chemistry- II b)Chemistry of contemporary society	6	4	20	80	100
5	CHE-205	Practicals (Core & Comp.)	a)Inorganic Practical-II b) Physical Chemistry-II	3 3	2 2	- -	- -	50 50
6	CHE-206	Practicals (Core & Elective)	a)OrganicChemistry- II b)General Chemistry-II	3 3	2 2	- -	- -	50 50
7	CHE-207	Audit Course	Human Values and Professional Ethics – II	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

M.Sc. (INORGANIC CHEMISTRY)

SEMESTER-III

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-IC-301	Core-Theory	Inorganic Spectroscopy & Thermal Methods of Analysis	6	4	20	80	100
2	CHE-IC -302	Core-Theory	Organic Spectroscopy	6	4	20	80	100
3	CHE-IC-303	*Generic Elective	(a) Organic Chemistry III (b) Physical Chemistry III	6	4	20	80	100
4	CHE-IC-304	Core& Gen. Practical	Preparation of Inorganic complexes and characterization	6	4	-	-	100
5	CHE –IC-305 A	Skill Oriented Course (theory)	Chemotherapy and drug analysis	3	2	10	40	50
	CHE –IC-305 B	Skill Oriented Course (Practicals)	Instrumental methods of analysis	3	2	-	-	50
6	CHE- 306	Open Elective **(For other Departments)**	(a) Spectral Techniques (b) Chromatographic Techniques	6	4	20	80	100
		Total		**36**	**24**			**600**

***Among the Generic Elective a student shall choose any one.**

SEMESTER-IV

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-IC-401	Core-Theory	Co-ordination compounds, Organometallic chemistry of non-transition elements	6	4	20	80	100
2	CHE-IC-402	Core-Theory	Instrumental Methods of Analysis	6	4	20	80	100
3	CHE-IC-403	Generic Elective* **(Related to subject)**	(a) Instrumental Methods of analysis (b) Bioinorganic, Bioorganic & Biophysical Chemistry	6	4	20	80	100
4	CHE-IC-404	Core& Gen. Practical	Instrumental methods of Analysis -II	6	4	-	-	100
5	CHE-IC-405	Core-Practicals/ Project work	Project work	6	4	-	-	100
6	CHE-406	Open Elective **(For other departments)**	(a)Drug Chemistry or (b) Electroanalytical Techniques	6	4	20	80	100
		Total		**36**	**28**			**600**

***Among the Generic Elective a student shall choose any one.**

(Mandatory Core)

CHE-101	INORGANIC CHEISTRY I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Comprehend the key features of coordination compounds, Crystal Field Theory, different properties and bonding by spectroscopic techniques
- Study the polymorphic forms of non-transition elements and their synthesis and properties
- Understand the basics of reaction mechanism and the mechanistic concepts of Dissociative (Id) and Associative interchange Mechanism (Ia), Taube's classification, Trans effect and Electron Transfer Reactions
- Familiarize with the methods of synthesis of metal carbonyls and metal nitrosyls, Synergistic effect, EAN and 18-electron rule

Course Outcomes: At the end of the course, the student will be able

CO1	To understand the key features of coordination compounds, Crystal Field Theory, magnetic properties and bonding in transition metal complexes.
CO2	To learn about the polymorphic forms of Carbon, Sulphur and Phosphorus, synthesis and properties of sulphur-nitrogen compounds, boranes, carbides, silicates and to know Wades rules.
CO3	To explain the reactivity of complexes in terms of Valence bond and Crystal Field theories, Taube's classification, Trans effect and Electron Transfer Reactions.
CO4	To gain knowledge on synthesis and structures of different metal carbonyls, synergistic effect and 18 electron rule.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	1	-	1	-	2	-	1
CO2	3	1	-	3	-	2	2	2	2	1	-	2
CO3	3	2	-	3	2	-	-	1	-	1	2	1
CO4	3	1	1	3	-	2	2	2	1	-	1	1

CHE 101: INORGANIC CHEISTRY I

UNIT-I: CO-ORDINATION COMPOUNDS 15 Hrs

Introduction to Crystal field Theory, CFSE and its calculation, Paring energy, Splitting of 'd' orbitals in

Trigonal bi pyramidal, square planar, square pyramid and pentagonal bipyramidal geometries, Jahn –Teller effect, Application of CFT, OSSE, site Selection in Spinels, Short comings of CFT, Evidence for covalency – Nephelauxetic effect. MOT of co-ordinate bonds –M.O. Diagrams for octahedral, tetrahedral and square planar complexes. Experimental evidences for π- bonding – Crystallography, Infrared spectroscopy and Photoelectron spectroscopy.

UNIT-II: CHEMISTRY OF NON-TRANSITION ELEMENTS 15 Hrs

General characteristics of the non- transition elements special features of individual elements ; Synthesis' properties and structure of their Halides and Oxides, Polymorphism of Carbon, Phosphorus and Sulphur, Synthesis, properties and structure of boranes, Carboranes, borazines, Silicates, Carbides, Sulphur-nitrogen compounds. Electron counting in boranes, Wades rules (Poly hedral skeletal electron pair theory), Isopopoly and hetero poly acids.

UNIT-III: REACTION MECHANISMS IN COMPLEXES 15 Hrs

Reactivity of metal complexes. Inert and Labile complexes. Concept of Labile and Inert complexes in terms of Valence bond and Crystal Field theories. Taube's classification of complexes as labile and inert complexes. Dissociative (D) and Dissociative interchange Mechanism (Id) & Associative (A) and Associative interchange Mechanism (Ia). Substitution reactions in octahedral complexes- Acid Hydrolysis -factors affecting Acid Hydrolysis - Base Hydrolysis-conjugate Base Mechanisms - Anation Reactions -Substitution Reactions in Square Planar complexes- Trans effect – Mechanisms of Trans effect: polarization and π-bonding theories.Electron Transfer Reaction-Inner Sphere and outer Sphere Mechanisms- Marcus theory.

UNIT-IV: METAL πCOMPLEXES-I 15 Hrs

Nature of π bonding, Classification of π ligands, π donor ligands and π -acceptor ligands.

Metal Carbonyls: Synthesis of metal carbonyls, Structures of metal carbonyls of the types M(CO)n (M= Cr, Fe, Ni; n=4-6), $M_2(CO)n$ (M=Co, Fe, Mn; n=8-10), $M_3(CO)_{12}$ (M=Fe, Ru and Os), $M_4(CO)_{12}$ (M=Co, Rh, Ir). IR Spectraof metal carbonyls (i) Detection of bridging and terminal CO ligand, (ii) Synergistic effect, EAN and 18-electron rule. Electron counting methods (i) Oxidation state method and (ii) Neutral Atom method.

Metal Nitrosyls: Synthesis of metal Nitrosyls, bonding, Electron donation by nitric oxide, Models for NO bonding (i) Covalent model and (ii) Ionic models, Structures of metal nitrosyls (1) $[Fe_4S_3(NO)]$ (2)$[Fe_2(NO)_2I_2]$ (3) $[(\phi_3P)_2Ir(CO)Cl(NO)]^+$ (4) $[(\phi_3P)_2Ru(NO)_2Cl]$, Detection of bridging NO ligand, Applications of metal nitrosyls.

Books Suggested

1. F.A.Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999.John wiley & sons. Inc., New York.
2. James E. Huheey, Inorganic chemistry- Principles of structure and reactivity, VI Edition 1993. Harper Collins College Publishers, New York.
3. J.D. Lee: Concise Inorganic Chemistry (Blackwell)
4. Gary Wolfsburg: Inorganic Chemistry (5th Ed. (Viva Books)
5. W.L. Jolly: Modern Inorganic Chemistry (McGraw-Hill)
6. B.N Figgis: Introduction to Ligand Fields (John-Willey)
7. S.F.A. Kettle: Coordination compounds.
8. Coordination Chemistry. Bassalo & Jahnson.

(Mandatory Core)

CHE-102	Organic Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Organic Chemistry

Course Objectives:

- Classify molecules based on stereo chemical aspects study on optical and geometrical isomerism by the application of Cahn-Ingold-Prelog rules.
- Familiarize with different types of substitution reactions, able to predict products, including stereochemistry in aliphatic and aromatic nucleophilic substitution reactions, effect of neighboring group participation
- Understand thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects in reactive intermediates
- Study about occurrence, isolation, structure establishment and synthesis of natural products-terpenoids.

Course Outcomes: At the end of the course, the student will be able

CO1	To detect stereochemical structures of the molecules, stereoselective and stereocontrolled reactions.
CO2	To ascertain the stereochemistry of the products with the effect of neighbouring group participation and to familiarize the various types of aromatic substitution reactions, their mechanism and the effect of substituents.
CO3	To know the concept of isotope effects, potential energy diagrams and transition states in different intermediates
CO4	To familiarize with stereospecific synthesis of naturally occurring terpenoids and degradation products of terpenoids

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	2	-	1	1	-	1	-	-
CO2	3	2	1	3	-	1	2		-	2	1	1
CO3	3	1	2	3	-	1	1	2	1	-	1	-
CO4	3	2	2	3	2	1	1	1	-	1	1	1

CHE102: Organic Chemistry I

UNIT-I: **Stereochemistry**

Sereoisomerism-Stereoisomers Classification – Configuration and conformation.

Molecular Three dimensional representations: Wedge, Fischer, Newman and Saw-horse formulae, their description and interconversions.

Molecular Symmetry & Chirality: Symmetry operations and symmetry elements (Cn & Sn). Criteria for Chirality. Dissymmetrization.

Optical isomerism: Molecular Symmetry and Chirality-Cahn-Ingold-Prelog rules R, S-nomenclature, stereoisomerism resulting from more than one chiral center, meso and pseudoasymmetric compounds - **Axial Chirality** - Stereochemistry of allenes spiranes - biphenyl derivatives and atropisomerism - **Planar chirality** - Ansa compounds and trans - Cycloalkenes - **Helicity**. Helically chiral compounds

Geometrical isomerism - E, Z - nomenclature - Physical and Chemical methods of determining the configuration of geometrical isomers-Stereoisomerism in 3, 4 and 5-membered cyclic compounds.

UNIT-II: Substitution Reactions

i) Aliphatic Nucleophilic substitutions: The S_N2, S_N1, mixed S_N1 and S_N2, SET mechanisms. Reactivity- effects of substrates, attacking nucleophiles, leaving groups and reaction medium.Common carbocation rearrangements – primary, secondary and tertiary. The neighbouring group participation (NGP) -anchimeric assistance, NGP by σ and π- bonds, phenonium ions, norbornyl and norbornenyl systems, Classical and nonclassical carbocations, NGP by halogens and heteroatoms (O,N,S)

The S_N^i and S_N2' mechanisms. Nucleophilic substitution at an allylic, and vinylic carbons.

ii. Aromatic Nucleophilic Substitution: The S_NAr, S_N1, benzyne and $S_{RN}1$mechanisms. Reactivity - effect of substrate, structure, leaving group and attacking nucleophile. The von Richter, Sommelet - Hauser and Smiles rearrangements.

UNIT-III: Reactive intermediates

Types of reactions, types of bond cleavage mechanisms, generation, structure, stability and reactivity of carbocations, carbanions, free radicals, carbenes, nitrenes and arynes. Thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects**.**

UNIT-IV: Terpenoids

Classification of terpenoids, occurrence, isolation, general methods of structure determination. Isoprene and special isoprene rule. Structure determination and synthesis of the following representative molecules: Farnesol, Zingeberine, Cadinene and Abietic acid.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
6. Stereochemistry, P.S. Kalsi, Wiley Eastern.
7. Text book of Organic Chemistry, M.C. Murry
8. Organic Chemistry, Vol I, I.L. Finar, ELBS Eds.

(Mandatory Core)

CHE-103	Physical Chemistry I	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Acquire knowledge in Quantum Chemistry, postulates of Quantum Mechanics., Applications of Schrodinger wave equation and Born-Oppenheimer approximation
- Study on Chemical Dynamics and theories in unimolecular, chain and fast reactions and determination of reaction rates.
- Familiarize with concepts of Thermodynamics and statistical thermodynamics, Gibbs- Duhem equation and Sackur-Tetrade equation
- Know about Thermodynamic and Kinetic concept of Electrochemistry and conductance, conductivity of electrolytes

Course Outcomes At the end of the course, the student will be able to

CO1	To know the concepts such as Operator algebra, Eigen values and Eigen functions, Degeneracy, Schrodinger wave equation and the postulates of Quantum Mechanics.
CO2	To learn about theories of reaction rates, Lindemann, Lindemann-Hinshel wood, and RRKM theories.
CO3	To know about Thermodynamic concepts and entropy change in reversible process and irreversible process, Gibbs- Duhem equation, calculation of thermodynamic properties.
CO4	To study the Thermodynamic and Kinetic Derivation of Nernst Equation and the derivation of Debye-Huckle Equation and its Verification

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	3	2	1	--	1	2	---	1	1
CO2	3	1	2	3	1		1		1	1	-	1
CO3	3	-	1	3	2	1	-	1		-	2	-
CO4	3	1	2	3	-	1	1	-	2	1	-	1

CHE-103: Physical Chemistry I

UNIT-I: Quantum Chemistry-I

(A)**Introduction to Exact Quantum Mechanical Results**

Operator algebra, Eigen values and Eigen functions, Operators for momentum and energy, Degeneracy, Linear combination of Eigen functions of an operator, well behaved wave functions, Normalized and

orthogonal functions, The schrodinger wave equation and the postulates of Quantum Mechanics, (B) **Applications of Schrodinger wave equation:** Particle in one dimensional and three dimensional box, harmonic oscillator, rigid rotor, hydrogen atom and its applications. Hydrogen like wave function, hydrogen like orbitals and their representation, polar plots, contour plots and boundary diagram. (C)**Approximate Methods:** The variation Theorem, Linear variation principle, perturbation Theory (first Order and non-degenerate), Application of variation Method and perturbation theory to the helium atom, The Born-Oppenheimer approximation.

UNIT-II: Chemical Dynamics

(A)**Theories of reaction rates:** Collision theory, steric factor. Theory of Absolute Reaction Rates-Reaction coordinate, activated complex and the transition state. Thermodynamic formiulation of reacton rates.

(B) **Unimolecular reactions:** Lindemann, Lindemann-Hinshel wood, and RRKM theories. Termolecular reactions. Complex reactions-Rate expressions for opposing, parallel and consecutive reaction (all first order type) (C) **Chain reactions:** Dynamic chain, hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane, photochemical reactions- H_2-Br_2, H_2-Cl_2 reactions, Autocatalysis, H_2-O_2 reaction explosion limits. (D) **Fast Reactions:** Flow system – Temperature and pressure Jump Methods – Relaxation Techniques.

UNIT – III : Thermodynamics

(A) **Brief review of Thermodynamic concepts:** Enthalpy, entropy, free energy. Concept of Entropy – Entropy as a state function –Entropy change in reversible process and irreversible process – Temperature – Entropy diagrams – Entropy change and phase change – Entropy of mixing – Entropy and disorder. (B) **Statistical thermodynamics:** Partial molar properties: their significance and determination of partial molar properties, fugacity and its determination. Concept of distribution, thermodynamic probability and most probable Distribution, Ensemble averaging, postulates of ensemble averaging, canonical, grand canonical and micro- canonical ensembles, partition functions, translational, rotational, vibrational and electronic partition functions, Gibbs- Duhem equation, calculation of thermodynamic properties in terms of partition functions, Entropy of monatomic gases (Sackur-Tetrade equation)

UNIT-IV : Electrochemistry I

(A) **Thermodynamic and Kinetic concept of Electrochemistry**

Thermodynamic and Kinetic Derivation of Nernst Equation, Chemical and Concentration Cells with and

without Transference, Liquid Junction Potential, Derivation of the Expression for Liquid Junction Potentials-its determination and elimination, Applications of EMF Measurements: (i)Solubility product, (ii)pH Determination, (iii) Potentiometric Titrations.; (B)**Conductivity:** Theory of Electrolytic Conductance, Derivation of Debye-Huckle Equation and its Verification, Debye- Falkenhagen Effect, and Wein Effect, kohlrausch law. Calculation of Solubility of Sparingly soluble Salt from Conductance Measurements.

Conductometric Titrations : Titration of Strong Acid Vs Strong Base (HCl vs NaoH) ; Titration of Weak Acid Vs Strong Base (AcoH vs NaoH); Titration of mixture of Strong and Weak Acids vs Strong Base ; Precipitation Titrations.

Books Suggested

1. physical chemistry, P. W. Atkins (ELBS)
2. Quantum Chemistry, Ira N. Levine (Prentice Hall)
3. Atomic Structure and Chemical bond, Manas Chandra.
4. Chemical Kinetics, K.J. Laidler (Mc Graw Hill)
5. Kinetics and Mechanism of Chemical Transformations, J. Rajaraman and J. Kuriacose (Mcmilan)
6. Thermodynamics for chemists, S. Glasstone
7. Chemical thermodynamics, I.M. Klotz
8. Statistical Thermodynamics, M. Dole
9. Modern Electrochemistry, Vol. I & II, J.O. M. Bockris and A.K.N. Reddy (plen
10. An Introduction to Electrochemistry (3rd ed.), S. Glasstone (Affiliated East-West).

(Compulsory Foundation)

CHE-104 (A)	General Chemistry I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on precision and accuracy, Limit of detection, Limit of determination, Sensitivity and selectivity, statistical evaluation of data
- Familiarize with principles and concepts of flame emission spectroscopy and atomic absorption spectroscopy and their applications.
- To know about ecosystem, nutrient cycle and dessert ecosystem and forest ecosystem and aquatic ecosystem.
- Gain knowledge on air pollution, water pollution, soil pollution, marine pollution, noise pollution and solid waste management.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about mean and median values, standard deviation and coefficient of variation.
CO2	To acquire knowledge on principle and instrumentation of AAS and difference between flame AAS and furnace AAS.
CO3	To know about the principle and concept of ecosystem and their functioning
CO4	To have an idea on environmental pollution and environmental impact assessment.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	-	-	2	1	1
CO2	3	2	-	3	1	-	2	1	-	1	1	-
CO3	3	3	2	3	2	1		1	2	1	1	2
CO4	3	2	1	2	3	1	1	1	-	2	1	1

CHE104-A: General Chemistry I

UNIT-I: TREATMENT OF ANALYTICAL DATA 15 Hrs

Precision and accuracy –mean and median values –Standard deviation – coefficient of variation, Types of errors: Determinate and indeterminate errors, confidence limits, significant figures, computations, minimization of errors, statistical evaluation of data –T-test ,F- test , and X^2 –test. Correlation coefficient and coefficient of determination; Limit of detection (LOQ); Limit of determination(LOD) Sensitivity and selectivity of an analytical method.

UNIT-II: FLAME EMISSION AND ATOMIC ABSORPTION SPECTROSCOPY 15 Hrs

(a) **Flame Emission Spectroscopy**: Principles, chemical reactions in flames, Interferences, evaluation methods, flame photometer and experimental technique, procedure for determinations, limitations and disadvantages. Applications

(b)**Atomic Absorption Spectroscopy: Flame AAS:** Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT-III: ECOSYSTEMS 15 Hrs

Concept of an ecosystem (Abiotic and biotic environment), structure and function of an ecosystem Producers, Consumers and decomposers. Energy flow in the ecosystem, (Nutrient cycle in the ecosystem) Ecological succession Food Chain, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystems, Forest ecosystem, Grassl and ecosystem, Desert ecosystems aquatic ecosystems [ponds, streams, lakes, rivers, ocean estuaries].

UNIT-IV: ENVIRONMENTAL POLLUTION 15 Hrs

Definition a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear pollution Solid waste management : Causes, effects and control measures of urban and industrial wastes. Environmental impact assessment.

Books Suggested

1. H.W. Willard, LL. Merritt and J.A. Dean: Instrumental Methods of Analysis
2. Vogel's Text book of Quantitative Inorganic Analysis.
3. Analytical Chemistry
4. Instrumental Methods of Analysis H. Kaur

CHE 104B	General Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To familiarize with the significance of green chemistry and assessment of the impact.
- To gain knowledge on biocatalyst in oxidation, reduction and hydrolytic reactions
- To have an idea on solvent free reactions and modern reaction techniques.
- To familiarize with the use of ionic liquids as green solvents.

Course Outcomes: At the end of the course, the student will be able

CO1	To get knowledge on green reaction conditions and their impact on environment.
CO2	To know about use of different biocatalysts as environmentally friendly reagents.
CO3	To acquire knowledge on the use of modern techniques like ultrasound, microwave etc.
CO4	To have an idea on the use of ionic liquids in different reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	2	1	1	-	1	-	1	1
CO2	3	1	1	3	1	-	1	1	-	1	-	1
CO3	3	3	2	3	2	1		2	-	1	1	1
CO4	3	2	1	2	3	1	1	1	1	-	1	1

CHE 104B: General Chemistry I

UNIT-I

Fundamentals and significance of Green Chemistry: Discussion of the current state of chemistry and the environment and the definition of green chemistry. Assessment of the impact of chemistry in the environment and definition of risk hazard. An introduction to the tools of green chemistry and its fundamental principles.

Principles of Green Chemistry: Prevention of waste / by-products, Hazardous products- Designing of safer chemicals- Selection of appropriate solvents and starting materials- Use of protecting groups and catalysis- Designing of biodegradable products.

UNIT-II

Catalysis for Green Chemistry: Use of biocatalysts- Biochemical Oxidation, Biochemical Reduction, Enzyme Catalyzed Hydrolytic Process, Modified biocatalysis- transition metal catalysis- Reformatsky reaction, Wurtz reaction, Pinacol coupling, Simmons-Smith reaction,

Mukaiyama reaction, Heak reaction, Ullmann's coupling.

UNIT-III

Solvent Free Reactions: Solvent free techniques- Reactions on solid mineral supports, Phase Transfer Catalysis- C-alkylation, N-alkylation, S-alkylation, Darzen's reaction, Wittig reaction. Ultrasound assisted green synthesis- Oxidation, Reduction, Hydroboration, Bouveault reaction, Strecker reaction, Microwave assisted green synthesis- Biginelli reaction, Aza-Michael reaction, Suzuki reaction, Stille reaction, Sonogashira reaction.

UNIT-IV

Ionic liquids: Definition- Types of Ionic Liquids-Synthesis of Ionic Liquids- Selection of ionic liquids- physical properties- Application in organic synthesis- alkylation, allylation, oxidation, reduction, polymerization, hydrogenation, hydroformylation, alkoxycarbonylation, carbon-carbon bond forming reactions, alkene metathesis.

Books suggested:

1. New Trends in Green Chemistry by V.K. Ahluwalia, M. Kidwai.
2. Green Chemistry: Environment Friendly Alternatives by Rashmi Sanghi, M M Srivastava
3. Green Solvents for Organic Synthesis by V.K. Ahluwalia, Rajender S. Varma
4. Green Analytical Chemistry by Mihkel Koel and Mihkel Kaljurand

CHE 105 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Basic laboratory techniques of titration and analysis.
- Quantitative estimation of inorganic compounds through volumetric techniques.
- Calibration of volumetric apparatus and statistical analysis of the data.
- Determination of critical solution temperature of phenol-water system.

Course Outcomes: At the end of the course, the student will be able

CO1	To demonstrate mastery of basic semi-micro qualitative analysis of simple salts and interprets analytical data and will make scientific claims that are supported by the observations.
CO2	To familiarize with techniques of titration and calculation of errors.
CO3	To study the determination of critical solution temperature, eutectic composition, distribution coefficient, adsorption of different systems.
CO4	To calibrate the statistical data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	1	2	1	2	-
CO2	3	2	2	2	-	2	1	1	-	2	2	1
CO3	3	2	1	2	2	1	-	2	1	1	2	1
CO4	3	2	2	1	2	1	-	2	2	1	1	1

CHE 105 A & B: Core practical I: Inorganic & Physical Chemistry

CHE 105 A : Core practical I: Inorganic Chemistry

Semi Micro Qualitative Analysis

Qualitative Analysis of a mixture containing four cations including two less common cations (viz., W, Mo, Se, Te, V, Ce, Th, Zr, Li and U).

CHE 105 B : Core practical I: Physical Chemistry

1. Determination of critical solution temperature, eutectic composition and temperature of binary

system.

2. Calibration of volumetric apparatus and statistical analysis of the data.
3. Determination of critical solution temperature of phenol-water system and study the effect of electrolyte on CST.
4. Determination of Eutectic composition and temperature of binary system
5. Determination of distribution coefficient of benzoic acid between water and benzene.
6. Study the adsorption of acetic acid on charcoal and analysis of the data on the basis of Langmuir and Freundlich adsorption isotherms.
7. Determination of rate constant of acid hydrolysis of an ester and investigate the effect of catalyst concentration, reactant concentration and temperature.

CHE 106A & B	Core practical I: Organic & General Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.

Course Objectives:

- Identification of single organic component by systematic qualitative analysis
- Preparation of derivatives and purification process
- Single step preparations
- Calibration of spectral analysis to this structures

Identification of single organic component by systematic qualitative analysis.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the systematic procedures of analysis of organic components.
CO2	To know the conformational tests for various functional groups.
CO3	To understand the mechanisms and familiarize with methodologies to prepare biologically important molecules.
CO4	Purification of compounds by different process

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	1	2	-	1	-	1	1	-
CO2	3	2	2	3	-	2	-	1	1	-	1	2
CO3	2	2	2	1	2	1	2	1	-	1	-	2
CO4	1	2	2	1	1	1	1	-	1	1	1	2

CHE : 106 A : PRACTICAL – I : ORGANIC CHEMISTRY

Identification of single components by Qualitative Analysis method

1. Aromatic acids
2. Aromatic amines
3. Aromatic phenols
4. Aromatic estors
5. Aromatic hydrocarbons
6. Carbohydrates
7. Aromatic carobohydrates compounds

CHE : 106 B : PRACTICAL – I : GENERAL CHEMISTRY

Single step preparations

1. Preparation of aspirin
2. Preparation of p-nitroacetanilide
3. Preparation of p-bromoacetanilide

CHE 107	Human Values and Professional Ethics-I	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of graduate level Human Values and professional ethics

Course Objectives:

- Analyze values in various ethical professions
- Understand moral concepts, character and conduct multiple
- Concept of ethical values with respect to individual and society
- ethical interests at stake in areal-world situation or practice and assess own ethical values with respect to social context and problems

Course Outcomes: At the end of the course, the student will be able to

CO1	To know about the needs and importance of professional ethics.
CO2	To analyze nature of Values, basic Moral Concepts character and Conduct.
CO3	To gain knowledge on individual and society ethical values, ahimsa, satya and brahmacharya.
CO4	To understand values of Bhagavd Gita, various religions, religious tolerence, Gandhian ethics.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	2	-	1	2	3	1	1	2
CO2	3	2	2	3	1	1	1	2	3	-	-	2
CO3	3	1	2	3	2	-	1	-	-	1	1	3
CO4	3	1	1	3	-	1	2	2	2	2	-	3

CHE 107: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS – I)

Chapter I: Definition and Nature of Ethics – Is relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics – Goals – Ethical Values in Various Professions.

Chapter II: Nature of Values – Good and Bad, Ends and Means, Actual and Potential Values, Objective and Subjective Values, Analysis of Basic Moral Concepts – Right, Ought, Duty, Obligation, Justice, Responsibility and Freedom, Good Behavior and Respect for Elders, Character and Conduct.

Chapter III: Individual and Society: Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non Possesion) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues) - Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation), Crime and

Theories of Punishment – (a) Reformative, Retributive and Deterrent, (b) Views on Manu and Yajnavalkya

Chapter IV: Bhagavd Gita – (a) Niskama Karma, (b) Buddhism – The Four Nobel Truths – Arya astanga marga, (c) Jainism - Mahavratas and Anuvratas. Values Embedded in Various Religions, Religious Tolerence, Gandhian Ethics.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
4. Harold H. Titus: Ethics for Today
5. Maitra, S.K: Hindu Ethics
6. William Lilly: Introduction to Ethics
7. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
8. Sasruta Samhita: Tr. Kaviraj Kunjanlal, Kunjanlal Brishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
9. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
10. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
11. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
12. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Mandatory Core)

CHE - 201	Inorganic Chemistry II	L-5, T-1, P-0	4 Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Understand magnetic properties of transition metal complexes and various reactions on ligands with respect to synthesis.
- Gain knowledge on electronic spectra of complex molecules of octahedral and tetrahedral geometry
- Understand magnetic properties viz., diamagnetism and paramagnetism and other related properties of complex molecules
- Familiarize with different catalytic reactions of complex molecules and factors effecting the reactions.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize with the general methods of complex preparations and properties, nature of bonding and structural features of metal complexes.
CO2	To know about Russel-Saunders coupling, splitting of energy levels in octahedral field and differentiate between Orgel diagrams and Tanabe-Sugano diagrams.
CO3	To understand about the laws of Hunds, Curie and Weiss, magnetism and magnetic susceptibility determination by Gouy's and Farady methods.
CO4	To gain knowledge on Induced reactions, Free radical reactions, Thermal decomposition reactions, Chain reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	2	1	-	1
CO2	3	2	-	3	1	2	1	-	1	2	1	1
CO3	3	-	2	3	-	2	1	1	-	1		1
CO4	3	1	1	3	-	2	-	1	1	1	1	-

CHE 201: INORGANIC CHEISTRY II

UNIT – I: TRANSITION METAL II – COMPLEXES II **15 Hrs**

Transition metal π – complexes with unsaturated organic molecules – alkenes, alkynes, diene, dienyl and Cyclopentadienyl complexes and arene complexes-general methods of preparation, properties, nature of bonding and structural features – Important reactions relating to Nucleophilic and Electrophilic attack on

ligands and to organic synthesis.

UNIT – II: ELECTRONIC SPECTRA OF COMPLEXES 15 Hrs

Russel-Saunders coupling – Spectroscopic term symbols- Derivation of term symbols of p^2 and d^2 configuration, Hole Formulation, Energy ordering of terms (Hund's Rules), Splitting of energy levels and spectroscopic states in Octahedral field, Selection rules – Break – down of selection rules, Orgel diagrams, Definition and utility–Orgel Diagrams for d^1 to d^9 configurations in Octahedral and tetrahedral fields. Interpretation of electronic spectra of high spin octahedral and tetra hedral complexes of Ti(III), V(III), Cr(III), Mn(III), Mn(II), Fe(II), Fe(III), Co(III), Co(II), Ni(II) and Cu(II) complexes, Calculation of Dq and B^1 parameters for Cr(III) and Ni(II) complexes. Tanabe – Sugano diagrams, Differences between Orgel diagrams and Tanabe – Sugano diagrams, Tanabe – Sugano diagrams of d^2 to d^6 and d^8 configurations. Charge transfer spectra- LMCT and MLCT.

UNIT – III: MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES 15 Hrs

Diamagnetism and paramagnetism-orbital and spin contributions, spin-orbit coupling, Hunds third rule and Energies of J levels – Curie law and Curie – Weiss law- Ferromagnetism and antiferromagnetism – Temperature independent magnetism Magnetic susceptibility and its determination by Gouy's and Faraday methods.Calculation of magnetic moment from magnetic susceptibility, spin-only formula, Orbital contribution to magnetic moment (Oh and Td Complexes) –Paramagnetism and crystalline fields – Ti (III), V (III), VO^{2+}, Cr (III), Mn (II), Fe (III), Co(II), Ni (II) and Cu (II). Magnetic Exchange in copper acetate and other dimmers – spin cross over in complexes.

UNIT –IV: CATALYSIS 15 Hrs

Homogeneous catalysis, Metal ion catalyzed reactions – Redox potentials and processes – Mechanism of redox processes involving ligands – Factors affecting redox potentials - other types of metal catalyzed reactions – Reactions involving Ag (I) , Cu (II) and Os (VIII) – Reactions of Oxyanions – Factors affecting rate (General discussion only) – Induced reactions – Free radical reactions – Thermal decomposition of peroxy disulphate – Fe(III) $–S_2O_8$ reactions – chain reactions – H-Br reactions, H_2O_2 $–S_2O_8$reactions.

Books Suggested

1. Inorganic Chemistry principles of Structure and Reactivity 6th Edition. James E. Huheey.
2. Organometallic Chemistry: R.C. Mehrotra and Singh.
3. R. S. Drago: Structural methods in Inorganic Chemistry.
4. H. H. Willard, L. L. Merritt, Jr., J. A. Dean and F. A. Settle, Jr.: Instrumental Methods of Analysis (CBS Publishers).
5. R. L. Carlin: Magnetic Chemistry. R. L. Datta and A. Syamal: Elements of Magnetic Chemistry.

(Mandatory Core)

CHE-202	Organic Chemistry II	L-3, T-1, P-2	4 Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives:

- Able to recognize, classify, explain, and apply fundamental organic reactions such as E2, E1, E1CB.
- Familiar with molecular rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom.
- Provide Hantzsch-Widmann nomenclature for the three and four membered heterocycles. Be able to predict synthetic routes and chemical reactions of these heterocycles.
- Be familiar with occurrence, isolation, structural elucidation and synthesis of natural products-alkaloids

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the mechanisms of E_1, E_2 and E_{1CB} reactions, steroselectivity and synpyrolytic eliminations and use of isotopes, chemical trapping and crossover experiments.
CO2	To learn the rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom and familiarize with the limitations and applications of reactions.
CO3	To learn the synthesis of three and four membered heterocycles, mechanism of ring opening reactions and the effect of electron donating and withdrawing substituents in selectivity of ring opening reactions.
CO4	To understand the structural elucidation and synthesis of alkaloids using specific reagents.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	1	1	1	-
CO2	3	2	2	3	2	2		1	1	-	1	1
CO3	3	2	2	3	2	2	1	1	-	1	-	1
CO4	3	2	2	3	-	2	-	1	-	1	1	1

CHE- 202 : ORGANIC CHEMISTRY II

UNIT-I: Reaction mechanism-I **15 Hrs**

Electrophilic addition to carbon carbon double bond: Stereoselective addition to carbon carbon double

bond; anti addition- Bromination and epoxidation followed by ring opening. Syn addition of OsO_4 and $KMnO_4$.

Elimination reactions Elimination reactions E_2, E_1, E_{1CB} mechanisms. Orientation and stereoselectivity in E_2 eliminations. Pyrolytic syn elimination and α-elimination, elimination Vs substitution. Facors influencing the elimination reactions

Determination of reaction mechanism: Determination of reaction mechanism: Energy profiles of addition and elimination reactions, transition states, product isolation and structure of intermediates, use of isotopes, chemical trapping, crossover experiments. Use of IR and NMR in the investigation of reaction mechanism.

UNIT-II: Molecular Rearrangements: **15 Hrs**

Rearrangements to electron deficient Carbon atom:

Pinacol-Pinacolone, Wagner-Meerwein, Dienone-Phenol and Demjonove Rearrngements

Rearrangements to electron deficient Nitrogen atom:

Hofmann, Curtius, Schimidt and Beckmann Rearrangements.

Rearrangements to electron deficient Oxygen atom: Baeyer-Villiger and Dakins Rearrangements

Rearrangements to electron rich Carbon atom: Favorski and Neber Rearrangements

Aromatic and Sigmatropic Rearrangements: Fries and Claisen Rearrangements

UNIT III: Three and four membered heterocycles: 15 Hrs

Systematic nomenclature (Hantzsch-Widmann system) and Replacement nomenclature for monocyclic heterocycles (Three and four membered rings). Synthesis and chemical reactions of aziridines, oxiranes, thiiranes, azetidines, oxetanes, and thietanes.

UNIT-IV: Alkaloids 15 Hrs

Occurrence, isolation, general methods of structure elucidation and physiological action, degradation, classification based on nitrogen heterocyclic ring, structure elucidation and synthesis of the following: Atropine, Papaverine and Quinine.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.

5. Modern Organic Reactions, H.O. House, Benjamin.
6. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
7. Stereochemistry, P.S. Kalsi, Wiley Eastern.
8. Text book of Organic Chemistry, M.C. Murry
9. Text book of Organic Chemistry, Fessendon and Fessendon.
10. Text book of Organic Chemistry, T.W. Solomon,
11. Organic Chemistry, Vol II, I.L. Finar, ELBS Eds.
12. Heterocyclic chemistry T.L Gilchrist, Longman Scientific Technical
13. An Introduction to the Heterocyclic compounds, R M Acheson, John Wiley.

(Mandatory Core)

CHE -203	Physical chemistry II	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Learn Angular momentum and Molecular Orbital Theory and application of Huckel theory to organic molecules.
- Know about concepts in Surface Chemistry, concept of electric double layer model and Micelles.
- Get knowledge on symmetry and group theory their use in spectroscopy, Mulliken character tables.
- Understand Irreversible Electrode phenomenon controlled potential electrolysis and polarography.

Course Outcomes At the end of the course, the student will be able

CO1	To know about Pauli Exclusion principle and Slater determinant, atomic orbitals, Simple molecular orbitals and Huckel theory of conjugated systems.
CO2	To learn Gibbs adsorption isotherm, BET equation and correlate limitations, critical micellar concentration (CMC) and factors affecting the CMC of surfactants.
CO3	To identify Relation between order of a finite group and its sub-group, conjugacy, Symmetry point group (MLS, MHS and MSS) and orthogonality theorem.
CO4	To acquire knowledge on DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, to derive equation for Tafel plots, half-wave potentials for reversible system.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	2	-	1	1	1	2	-
CO2	3	2	2	3	2	2	-	1	1	1	-	1
CO3	3	2	2	3	-		1	-	-	1	1	-
CO4	3	2	-	2	1	1	-	1	1	1	1	-

CHE-AC-203 Physical Chemistry III

UNIT-I: Quantum Chemistry-II **15 Hrs**

(A) Angular momentum: Angular momentum, Rotations and angular momentum, Eigen functions and Eigen values of angular momentum, Ladder operator, addition of angular momenta, spin, antisymmetry and pauli Exclusion principle. Slater determinant. ;

(B) Molecular Orbital TheoryAtomic Orbitals, Simple Molecular Orbitals, Hybrid Atomic Orbitals, Shapes and energies of Molecular Orbital, Systems of Organic Molecules (Ex: Methane, Ethylene,

Acetylene). Huckel theory of conjugated systems, Π-bond order and charge density calculations, application of Huckel theory to ethylene, butadiene and benzene.

UNIT-II: Surface Chemistry **15 Hrs**

Surface tension, capillary action, pressure difference across curved surface, (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, BET adsorption isotherm, derivation of BET equation , limitations of BET equation, estimation of surface area from BET equation, Surface films on liquids. Concept of electric double layer model- Helmholtz perrin, Gouy- Chapman and stern models (no derivation)

Micells: Surface active agents, classification of surface active agents micellisation, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants, thermodynamics of micellisation, emulsions, reverse micelles.

UNIT-III: SYMMETRY AND GROUP THEORY **15 Hrs**

Definition of a group, rules that are set for a group, sub-group, order of a group, Relation between order of a finite group and its sub-group, conjugacy relation and class of a group, symmetry elements and symmetry operation. Symmetry point group (MLS, MHS and MSS), Schoenflies symbols - Representation of groups by matrices (representation for C_n, C_{nv}, D_{nh} etc. groups to be worked out explicitly), character of a representation, group multiplication tables, reducible - irreducible representations The great orthogonality theorem (without proof) - character tables (H_2O,NH_3) and their use in spectroscopy, Mulliken character tables.

UNIT-IV: ELECTROCHEMISTRY- II **15 Hrs**

Irreversible Electrode phenomenon: Reversibility and irreversibility, Dissolution and deposition potentials, Decomposition voltage, overvoltage, diffusion overvoltage, charge transfer overvoltage, concentration overvoltage-hydrogen and oxygen overvoltages, Tafel plots, Exchange current density and Transfer coefficient, Butler-Volmer equation for one electron transfer processes.

Polarography: Theory, classification , principle , Instrumentation of Polarography, DME, HMDE diffusion current, Ilkovic equation, DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, Millicoulometry, Equation for half-wave potentials, for reversible system when oxidant alone, reductant alone and both are present.

Books Suggested

1. P.W. Atkins: Physical Chemistry (ELBS).
2. Ira N. Levine: Quantum Chemistry (Prentice Hall).
3. R. Mcweeny: Coulson's Valence (ELBS).

4. J.O.M. Bockris and A.K.N. Reddy, Modern Electrochemistry, vol.I & II (Plenum).
5. S. Glasstone; An Introduction to Electrochemistry (3rd ed.)(Affiliated East-West).
6. V. Moroi: Micelles, theoretical and applied aspects (Plenum).
7. Maron and prutton: principles of physical Chemistry.
8. Silbey, Alberty, Bawendi. Physical Chemistry.Jhon-Wiley & Sons. 4th edition-2006.
9. D.N. Bajpai: Advanced physical Chemistry: S. Chand & Company, 1998.

(COMPULSORY FOUNDATION)

CHE-204 A	General Chemistry II	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on the principles of different electro analytical methods
- Familiarize with chromatographic techniques.
- To study on biodiversity and conservation of biodiversity
- To know about natural resources and non-renewable resources

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge on ion selective electrodes, solid membrane electrodes and glass electrodes and principles of amperometric titrations.
CO2	To learn general principles and classifications of chromatographic separations and applications of TLC, GLC and HPLC.
CO3	To know about biodiversity, ecosystem diversity and conservation of biodiversity.
CO4	To acquire knowledge on natural resources related to food, water, mineral, energy and land.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2		1	-	1	1	2
CO2	3	-	2	3	-	2	1	-	2	1	1	1
CO3	3	3	2	2	1	2	-	1	-	-	1	2
CO4	3	3	2	2	2	2	1	1	-	1	1	1

CHE 204-A: General Chemistry II

UNIT-I: ELECTRO ANALYTICAL METHODS

Theory of potentiometry, calculation electrode potential at the equivalence. Finding of equivalence volume, derivative and linear titration plots. Ion-sensitive electrodes –types of ion sensitive electrodes – metal based cation and anion sensitive electrodes, solid membrane electrodes, glass electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes, Amperometric titrations - Anodic stripping voltammetry, chronoamperometry, chronopotentiometry, Cyclic Voltammetry, Differential Pulse Polarography, linear sweep voltammetry, square wave voltammetry.

UNIT-II: CHROMATOGRAPHY

General principles and classifications of chromatographic separations

Thin layer chromatography: Classification, principle, experimental technique, sample application, development of plate, retardation factor.

Gas liquid chromatography: Gas liquid chromatography - instrumentation (columns and detectors), retention time and retention volume. Chromatographic behaviour of solutes, column efficiency and resolution, column processes and band broadening, time of analysis and resolution, Van-Deemter equation.

High performance liquid chromatography: Theory and instrumentation-column performance, gradient elution, delivery system, sample introduction, separation columns, detectors and applications of HPLC.

Unit – III : Biodiversity

Conservation introduction definition genetic species and ecosystem diversity, hot spots of biodiversity, threats to biodiversity habitat loss poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India, conservation of biodiversity in – situ an ex-situ conservation of biodiversity.

Unit – IV Natural resources and non-renewable resources

An overview of natural resources and associated problems with references to a) Forest resources b) Water resources c) Mineral resources d) Food resources e) Energy resources f) Land resources.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A.Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery J. Bassett, J. Mendham and R.C. Denny. Vogel"s Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (McGraw Hill).
5. D. Midgley and K. Torrance : potentiometric Water Analysis (John Wiley).
6. Silbey, Alberty, Bawendi. Physical chemistry. Jhon-Wiley & sons. 4th edition-2006.

CHE 204B	Chemistry in Contemporary Society	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To know about quality control and impurities in Pharmaceuticals.
- To have an idea on body fluids, blood, enzymes and forensic.
- To gain knowledge on composition of milk, oil, fats etc.
- To familiarize with different types of fuels, soils and its ingredients.

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge in pharmaceutical chemicals
CO2	To familiarize with blood fluids, blood, enzymes and forensic
CO3	To know about fermentation, detection of purity, beverages
CO4	To acquire knowledge on gaseous fuels, soil ingredients and analysis of trace elements

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	2	2	-	1	1
CO2	3	1	2	3	1	2	1	-	2	2	1	-
CO3	3	2	2	3	1	2	2	1	-	2	1	1
CO4	3	2	3	2	1	2	1	2	-	1	1	1

CHE 204B: Chemistry in Contemporary Society

UNIT – I : PHARMACEUTICALS 15 Hrs

Pharmaceuticals : Importance of quality control, drugs and pharmaceuticals, sources of impurities in pharmaceutical chemicals, analytical quality control in finished / final products, common methods of assay.

Common drugs and their uses: Analgesics – aspirin, paracetamol; Antheimentics – mebendazole ; Antiallergies – chlorpenneramine malleate; Antibiotics-pencillin, chloromecytin; Anti-inflammatory agents-oxyphenbutazone; **Antimalarials** – primaquine phosphate; Antituberculosists – INH; Narcotics – nicotine, morphine; Expectorants – Benadryl; Sedatives – diazepam; Vitamins – B**1**, B**2**, B**6**, niacin and folic acid.

UNIT – II : FORENSIC AND BIOMEDICALS **15 Hrs**

Body fluids: Composition and detection of abnormal level of certain constituents leading to diagnosis, sample collection and preservation of physiological fluids, analytical methods for the constituents of physiological fluids (blood, urine).

Blood: Estimation of glucose, cholesterol, urea, haemoglobin and bilirubin.

Urine: Urea, uric acid, creatinine, calcium phosphate, sodium, potassium and chloride.

Enzymes: Biological significance, assay of enzymes (pepsin, tyrasinase), vitamins (thiamine ascorbic acid, vitamin A) and harmones (progesterone, oxytocin, insulin), chemical, instrumental and biological assays to be discussed wherever necessary.

Forensic : General discussion of poisons with special reference to mode of action of cyanide organophosphates and snake venom, poisonous materials such as lead, mercury and arsenic in biological materials.

UNIT – III : FOOD AND BEVERAGES **15 Hrs**

Milk and milk products : Composition, alcohol test, fermentation, dye reduction-methylene blue and resazurin tests, analysis of fat content, minerals in milk and butter, estimation of added water in milk.

Oils and fats: General composition of edible oils, detection of purity, tests for common edible oils and groundnut oil, cottonseed oil and mustard oil, tests for adulterants like argemone oil and mineral oils,

Beverages: Soft drinks, alcoholic drinks, tea, coffee and fruit juice, analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, food preservatives like benzoates, propionates, sorbates, bisulphites, artificial sweetners, like saccharin, dulcin and sodium cyclamate, flavours – vanillin, esters (fruit flavours) and monosodium glutamate, artificial food colourants-coal tar dyes and non-permitted colours and metallic salts, control of food quality – codex alimentarices, Indian standards.

UNIT – IV : FUEL AND SOIL **15 Hrs**

Fuels : Definition, classification and characteristics of fuels, sampling, determination of calorific value. Liquid fuels-determination of flash point, fire point, aniline point. Knocking of petrol and diesel – octane and cetere numbers carbon residue. **Gaseous fuels** : Coal gas, waste gas, producer gas, gober gas and blast furnace gas, calorific value determination by Junker's gas calorimeter, relatice merits of solid, liquid and gaseous fules. **Soil** : Ingradiants of soil-organic matter, nitrogen, sulphur, sodium, potassium and calcium, analysis of trace elements, copper, molybdenum, zinc and boron.

Reference Books :

1. Pharmaceutical Analysis, T. Higuchi and E.B. Hanseen, John Wiley and Sons, New York.

2. Quantitative Analysis of drugs, P.D. Sethi, 3rd edition, CBS Publishers, New Delhi, 1997.
3. Practical Clinical biochemistry methods and interpretations, R. Chawala, J.P. Brothers Medical Publishers (P) Ltd., 1995.
4. Laboratory manual in biochemistry, J. Jayaraman. New Age International Publishers, New Delhi, 1981.

CHE 205 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Separation and determination of the two component mixtures
- Preparation of metal complexes
- Familiarize with conductometric, potentiometric and redox methods of analysis
- colorometric and pHmetric methods of analysis

Course Outcomes: At the end of the course, the student will be able

CO1	To separate and determine the two component mixtures
CO2	To acquire knowledge in the preparation of metal complexes
CO3	To study the determination of cell constant and verification of Onsagar equation, strength of strong acid by Titration of a strong acid with a strong base and vice versa
CO4	To get knowledge on the applications of conductometry, potentiometry, coulometry and pHmetry.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	3	1	-	2		1	1	-
CO2	3	2	2	3	2	2	1	-	1	-	1	2
CO3	3	2	2	3	3	1	1	2	-	1	1	-
CO4	3	2	2	3	2	-	1	-	1	1	-	2

CHE 205 A & B: Core practical I: Inorganic & Physical Chemistry

CHE 205 A : Core practical I: Inorganic Chemistry

I . Quantitative Analysis:

Separation and determination of two component mixtures:

(i) Separation of Al(III) and Determination of Fe (III)

(ii) Separation of Cu(II) and Determination of Zn (II)

(iii) Separation of Ca(II) and Determination of Mg (II)

(iv) Separation of Cu(II) and Determination of Ni (II)

(v) Determination of Ferrocyanide and Ferricyanide

CHE 205 B: Core practical I: Physical Chemistry

1. Conductometry:
   (a) Determination of cell constant
   (b) Verification of Onsagar equation
   (c) Determination of dissociation constant of a weak acid
   (d) Titration of a strong acid with a strong base
   (e) Titration of a weak acid with a strong base
2. Potentiometry:
   (a) Titration of a strong acid with a strong base
   (b) Titration of a weak acid with a strong base
   (c) Redox titration
3. Coulometry: Estimation of Manganese
4. pHmetry: Strong acid, Strong base titrations.

CHE 206A & B	Core practical I: Organic & General Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.

Course Objectives:

- Familiarize with two component mixture separation and identification.
- Preparation of derivatives.
- Purification by components by different methods.
- Calibration of products by spectral methods.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize with binary mixture separation
CO2	To gain hands-on-experience in purification of the components, preparation of derivatives.
CO3	To get knowledge about the chemical behavior of different components and mechanisms
CO4	Purification and calibration of data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	1	-	3	3	1
CO2	3	2	2	3	-	1	-	2	1	3	3	-
CO3	3	2	2	3	1	1	2	1	-	2	-	2
CO4	3	2	2	3	1	2		1	1	2	1	2

CHE 206 A & B: Core practical I: Organic & General Chemistry

CHE-206 A : PRACTICAL – I : ORGANIC CHEMISTRY

Separation and Identification of two component organic mixture by systematic qualitative analysis.

1.Acid + Neutral 2. Base + Neutral 3. Phenol + Neutral 4. Ether insoluable component + acid / phenol / base.

CHE-206 B : PRACTICAL – I : GENERAL CHEMISTRY

Preparation of Metal Complexes:

(i) Tetra(ammine) copper (II) sulphate.

(ii) Mercury tetra(thiocyanato) cobaltate(II).

(iii) Hexa(ammine) Nickel (II) chloride.

(iv) Tris(acetylacetonato) Manganese (III) chloride.

(v) Tris (ethylenediammine) Nickel (II) thiosulpha

CHE 207	Human Values and professional ethics-II	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of Human Values and professional ethics

Course Objectives:

- Gain knowledge on value education, family values and adjustability
- Develop ethics towards medical, health care professionals and ethical issues in genetic engineering
- Understand the importance of social ethics towards organ trade, human traffic king human rights violation and social disparities.
- Know about environmental ethics, ecological crises, pollution and protection of environment

Course Outcomes: At the end of the course, the student will be able to

CO1	To understand the concepts of human values, responsibilities of family values and status of women in family and society.
CO2	To acquire knowledge on different medical ethics the views of charaka and sushruta on moral responsibilities of medical practitioners.
CO3	To gain knowledge on social ethics and understand the characteristics of ethical problems in management.
CO4	To familiarize environmental ethics, ethical theory and ecological crisis.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	1	2	2	2	3	1	1	1
CO2	3	1	2	3	1	2	2	3	3	1	1	1
CO3	3	2	1	3	-	2	1	2	2	3	-	1
CO4	3	1	1	3	1	2	1	1	2	3	1	1

CHE 207: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS-II)

Chapter I: Value Education – Definition – Relevance to present day – Concept of human values - Self introspection – Self-esteem. Family values-Components, Structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Chapter II: Medical ethics – Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical

obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problem of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Chapter III: Social ethics – Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media – Impact of Newspapers, Television, Movies and Internet, Business ethics – Ethical standards of business – Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, Ethical abuses and work ethics.

Chapter IV: Environmental ethics – Ethical theory, man and nature - Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and pollution, Justice and environmental health.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. Management Ethics – Integrity at work by Joseph A. Petrick and John F. Quinn, Response Books, New Delhi.
4. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
10. Sasruta Samhita: Tr. KavirajKunjanlal, KunjanlalBrishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
11. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Eduction – Telugu Academy, Hyderabad.
14. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Mandatory Core)

CHE-IC-301	Inorganic Spectroscopy and Thermal Methods of Analysis	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Basic Inorganic Spectroscopy and Thermal Methods of Analysis

Course Objectives:

- Gain knowledge on thermal methods of analysis and principles and applications to inorganic materials
- Familiarize with basics of Mossbauer and NQR spectroscopy.
- Learn the properties like g-factor, nuclear spin, hyperfine coupling constants
- Study the ESR instrumentation, various applications and photoelectron spectroscopy.

Course Outcomes : At the end of the course, the student will be able

CO1	To know about TG and DTA and applications of different scanning calorimetry.
CO2	To gain knowledge on Doppler shift and chemical shift, basic principles and applications of NQR spectroscopy.
CO3	To learn zero field splitting and Kramer's degeneracy, relaxation processes, instrumentation and applications of ESR.
CO4	To know about photoelectric effect and Koopmans theorem and impart the applications of X-ray and UV photoelectron spectroscopy.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	2	1	1	2	1
CO2	3	2	2	3	2	2	2	-	2	2	2	2
CO3	3	2	2	3	2	2	1	2	-	2	1	-
CO4	3	2	2	3	2	1	1	-	1	-	2	1

CHE-IC- 301: INORGANIC SPECTROSCOPY AND THERMAL METHODS OF ANALYSIS

UNIT –I: THERMAL METHODS OF ANALYSIS 15 Hrs

Thermo gravimetry –Principle, Factors affecting the results, instrumentation. Application with special reference to $CuSO_45H_2O$, $CaC_2O_4\,2H_2O$. Different thermal analysis – principle, instrumentation, difference between TG and DTA, applications with special reference to the clays and minerals.Different scanning calorimetry –principle, and applications to inorganic materials like chlorates and perchlorates, ammonium nitrate.

UNIT –II: MOSSBAUER SPECTROSCOPY and NQR **15 Hrs**

Mossbauer spectroscopy: Basic principles, Recoil energy, Doppler shift, Chemical shift, Quadrapole effects, Magnetic effects. Instrumentation, spectral parameters and spectrum display.

Aapplication of the technique to the studies of (1) bonding and structures of Fe^{2+} and Fe^{3+} compounds, (2) Sn^{2+} and Sn^{4+} compounds.

NQR spectroscopy: Basic principles of NQR spectroscopy, quadrupole nuclei, quadrupole moments, electric field gradient, coupling constant and applications.

UNIT –III: ELECTRON SPIN RESONANCE SPECTROSCOPY **15 Hrs**

Basic Principles, Hyper fine splitting, Factors affecting the 'g' value. Isotropic and anisotropic hyperfine coupling constants, Hamiltonian and spin densities. Zero field splitting and Kramer's degeneracy, Relaxation process and line widths. Instrumentation and Applications.The EPR spectrum of bis(salicylidimine)-copper(II) complex, study of inorganic free radicals, biological applications of Electron Spin Resonance (Study of free radicals and Iron-sulfur proteins)

UNIT –IV: PHOTO ELECTRON SPECTROSCOPY **15 Hrs**

Photoelectric effect, Koopmans's theorem, ionization energy.

X-ray photoelectron spectroscopy (ESCA): Principle, Binding energies, Chemical shift, Applications of XPES to Qualitative analysis , to surface studies and structural analysis. Ultraviolet photoelectron spectroscopy- Principle, application of UPES in studying the molecular orbitals of O_2 and N_2 molecules. Block diagram of photoelectron spectrophotometer. Sources of radiation, detectors. Auger spectra – Principle, Applications of Auger spectra to surface studies and use of Auger spectra as a finger print tool.

Books Suggested

1. F.A. Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999. John wiley & sons. Inc., New York.
2. J.E. Huheey, E.A. Keiter and R.L. Keiter: Inorganic Chemsitry, Principles of Structure and Reactivity (4th Ed.) (Addison-Wesley)
3. Gary Wulfsberg: Inorganic Chemistry (5th Ed. (Viva Books)
4. J.D. Lee: Concise Inorganic Chemistry (Blackwell)
5. W.L. Jolly: Modern Inorganic Chemsitry (McGraw-Hill)
6. R.L. Carlin: Magneto-chemsitry (Springer-Verlag)
7. R.L. Dutta and A. Syamal: Elements of Magnetochemsitry (Affiliate East-West).
8. K. Hussain Reddy – Text book of Bioinorganic chemistry

(Mandatory Core)

CHE-IC 302	Organic Spectroscopy and Applications	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Organic Spectroscopy and Applications

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands
- Study on the applications of NMR spectroscopy in ascertaining the stereochemical structures of the molecules.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy

Course Outcomes: At the end of the course, the student will be able to

CO1	To get experience to calculate λ max values for dienes, enones, polyenes, aromatic and heteroaromatic compounds.
CO2	To familiarize with the absorption bands of the molecules with specific functional groups
CO3	To interpret the data to different types of protons and carbons present in a molecule so as to ascertain the structure of the molecule based on the data provided
CO4	To acquire knowledge about specific fragmentation rules of different molecules which are unique.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	-	1	-	2	2	1
CO2	3	2	2	3	2	2	2	1	1	2	2	-
CO3	3	2	2	3	2	2	-	2	-	2	2	2
CO4	3	2	2	3	2	2	1	1	-	2	2	-

CHE-IC 302: CORE THEORY: ORGANIC SPECTROSCOPY AND APPLICATIONS

UNIT-I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY: 15Hrs

Various electronic transitions (185-800 nm), effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fisher-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds. Steric effect in biphenyls.

UNIT – II: INFRARED SPECTROSCOPY 15Hrs

Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ether, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and fermi resonance, FT-IR

UNIT –III: NMR SPECTROSCOPY: 15Hrs

^{1}H NMR spectroscopy: Magnetic properties of nuclei, Principles of NMR. Instrumentation, CW and pulsed FT instrumentation, equivalent and nonequivalent protons, enantiotopic and diastereotopic protons, Chemical shifts, factors affecting the chemical shifts, electronegativity and anisotropy, shielding and deshielding effects, Signal integration, Spin-spin coupling: vicinal, germinal and long range, Coupling constants and factors affecting coupling constants.

Applications of ^{1}H NMR spectroscopy: Reaction mechanisms (cyclic bromonium ion, electrophilic and nucleophilic substitutions, carbocations and carbanions), E, Z isomers, conformation of cyclohexane and decalins, keto-enol tautomerism, hydrogen bonding, proton exchange processes (alcohols, amines and carboxylic acids), C-N rotation. Stereochemistry, hindered rotation, Karplus curve variation of coupling constant with dihedral angle. Simplification of complex spectra, nuclear magnetic double resonance, contact shift reagents, nuclear Overhauser effect (NOE).

^{13}C NMR spectroscopy: General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimensional NMR spectroscopy-COSY.

UNIT-IV: MASS SPECTROMETRY 15Hrs

Introduction, ion production, type of ionization, EI, CI, FD, and FAB-factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular-ion peak, metastable peak, Mc. Lafferty rearrangement. Nitrogen rule, isotope labeling. High resolution mass spectrometry, Examples of mass spectral fragmentation of organic

compounds with respect to their structure determination.

Books suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS
2. Spectroscopy of organic compounds, RM Silversteen and others, 5th Ed,John Wiley
3. Spectroscopy of organic compounds, P.S. Kalsi, Wiley, 1993.
4. NMR in chemistry-A multi nuclear introduction, William Kemp, Mc Millan, 1986.
5. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmi

(Mandatory Core)

CHE-IC-303A	Organic Chemistry III	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives: Course Objectives:

- Familiarize with the applications of different reagents in organic synthesis, Mechanisms and stereochemistry.
- Study the methods of preparation and applications of organometallic reagents.
- Understand topocity, prochirality, auxillary and reagent-controlled methods in asymmetric synthesis.
- Applications of different oxidizing and reducing agents in organic synthesis with region and stereo controlled products.

Course Outcomes: At the end of the course, the student will be able to

CO1	To familiarize with the specific functions of the reagents particularly diazomethane, N-bromosuccinimide, Ziegler Natta catalyst, 1,3-dithianes and Merrifield resin in the synthesis of a variety of complex molecules.
CO2	To gain knowledge in the synthesis of different organometallic reagents and also stereo and regio specificity and selectivity of reactions with organometallic reagents
CO3	To understand diastereoselectivity, stereoselectivity and substrate controlled auxillary controlled reactions
CO4	To acquire knowledge about the reagents which causes oxidation in various compounds and also the reagents that causes selective and complete reductions to synthesize various compounds.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	-	2	1	2	2	1
CO2	3	2	2	3	2	2	-	2	2	-	2	1
CO3	3	2	2	3	2	2	1	-	1	1	-	2
CO4	3	2	2	3	2	2	-	2	1	2	2	-

CHE-IC-303A Core-Theory Organic Chemistry III

UNIT I: REAGENTS IN ORGANIC SYNTHESIS 15 Hrs

Use of the following reagents in organic synthesis: Anhydrous $AlCl_3$, Boran trifluoride,

N-Bromosuccinimide, Diazomethane, Dicyclohexylcarbodiimide, Lead tetraacetate, Zieglar-Natta catalysts, DDQ, Dithianes, Merrifield resin.

UNIT-II: ORGANOMETALLIC REAGENTS **15 Hrs**

Synthesis and applications of Grignard reagents, Organolithium, Zinc, Copper, Mercury, Palladium and Rhodium compounds in Organic Synthesis, Homogeneous catalytic hydrogenation and hydroformylation reactions

UNIT III: ASYMMETRIC SYNTHESIS **15 Hrs**

Topocity - Prochirality- Substrate selectivity - Diastereoselectivity and enantioselectivity-Substrate controlled methods-use of chiral substrates - examples

Auxiliary controlled methods-Use of chiral auxiliaries-Chiral enolates-alkylation of chiral imines – Stereoselective Diels-Alder reaction

Reagent controlled methods-Use of chiral reagents-Asymmetric oxidation-Sharpless epoxidation-Asymmetric reduction-Use of lithium aluminium hydride and borate reagents.

UNIT IV: METHODS OF ORGANIC SYNTHESIS **15 Hrs**

i). ***Oxidations:*** **(a)** Alcohols to carbonyls-Chromium (iv) oxidants-Dimethylsulfoxide oxidation, periodate xidation, Oppenauer oxidation, oxidation with manganese dioxide, oxidation with silver carbonate **(b)** Alkenes to epoxides-peroxide induced epoxidations. **(c)** Alkenes to diols-oxidation with potassium permanaganate, osmium tetraoxide, Prevost reaction **(d)** Ketones to esters-Bayer-Villiger oxidation **(e)** Oxidative bond cleavage-cleavage of alkenes by transition metals. **(f)** Oxidation of alkyl or alkenyl fragments-selenium dioxide and chromium trioxide oxidations.

ii). ***Reductions*** **:** Reduction with lithium aluminium hydride, sodium borohydride, alkoxides, bis-methoxy ethoxy aluminium hydride, Boran aluminium hydride and derivatives-catalytic,hydrogenation-dissolving metal reductions, Non-Metallic reducing agents including enzymatic and microbial reductions.

Suggested Books

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry, C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Name reactions and reagents in organic synthesis, B.P. Muway and M.G Ellord, John Wiley.
6. Principles of Organic Synthesis, R.O.C Norman and J.M Coxon, Blackie Academic & Professional.
7. Reaction Mechanism in Organic Chemistry, P.S. Kalsi, New Age International.

8. Principles of organometallic chemistry, P. Powell, ELBS.
9. Organo transition metal chemistry-Applications to organic synthesis, S.G. Davis, Pergmon.
10. Stereochemistry to Organic Compounds, D. Nasipuri, New Age International.
11. Stereochemistry, P.S. Kalsi, Wiley Eastern.

CHE-IC-303B	Physical Chemistry III	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Physical Chemistry

Course Objectives:

- Learn applications of Group Theory, symmetry criteria and symmetry restrictions.
- Applications of X-ray Diffraction and Electron Diffraction on solid state chemistry.
- Familiarize with the applications of Microwave spectroscopy, infrared spectroscopy and Raman spectroscopy.
- Get knowledge on concept of Thermodynamics of polymer dissolution and Flory-Huggins theory of polymer solutions.

Course Outcomes: At the end of the course, the student will be able to

CO1	To know the determination of Character Co-ordinate of C_2V point group based on 3N Coordinates and to learn the Mutual exclusion Principle.
CO2	To learn the Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals.
CO3	To study the rigid rotator model, stark effect, vibration-rotation spectroscopy, PQR branches, selection rules and Vibrational- rotational Raman spectroscopy.
CO4	To study the concepts on heat of dissolution, regular solution theory, Hildebrand solubility parameter, concept of Flory-Huggins theory of polymer solutions

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	2	1	-	1	2	1
CO2	3	2	2	3	2	2	-	2	-	2	1	-
CO3	3	2	2	3	2	2	2		1	--	1	2
CO4	3	2	2	3	-	2	1	1	-	2	-	2

CHE-AC-303B CORE-THEORY PHYSICAL CHEMISTRY III

UNIT-I Applications of Group Theory 15 Hrs

Construction of reducible and irreducible representations, Determination of Character Co-ordinate of C_2V point group based on 3N Coordinates. Standard reduction formula, Determination of normal modes of vibrations of SO_2, NH_3, $POCl_3$, $PtCl_4^{2-}$, H_2O_2 molecules. Mutual exclusion Principle, Direct Product, Accidental Degeneracy and Fermi resonance Group Theory and Spectroscopy: IR Spectral activity of NH_3 molecule, selection rules, symmetry Criteria for optical activity, symmetry restrictions on dipole moments, symmetry and stereo isomerism. Prediction of IR and Raman Spectral activity of H_2O and CO_2.

UNIT-II: X-ray Diffraction: 15 Hrs

(A) Solid State Chemistry Dislocation of Solids, Schottky and Frenkeldefects, insulaters, a,d semiconductors, Band theory of solids,solid state reactions.

(B) Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals. Index reflections, identification of unit cells from systematic absences in diffraction pattern- structure of simple lattices and X-ray intensities- structure factor and its relation to intensity and electron density- Description of procedure for X-ray structure analysis (NaCl and KCl)

(C) Electron Diffraction: Scattering intensity Vs scattering angle, Wierlequation, and its importance. Measurement techniques, Elucidation of structures of simple gas phase molecules, Low energy electron diffraction (LEED) for the study of surfaces.

UNIT-III: SPECTROSCOPHY 15 Hrs

Microwave spectroscopy: classification of molecules, rigid rotator model, effect of isotopic substitution on the transition frequencies, intensities- stark effect.

Infrared spectroscopy: Linear harmonic oscillator, zero point energy, anharmonity, Mores potential energy diagram, fundamental and overtone transitions, hot bands and combinations bands. Vibration-rotation spectroscopy, PQR branches, selection rules, factors affecting the band positions and intensities for IR region. **Raman spectroscopy:** Classical and quantum theories of Raman effect, pure rotational, pure vibrational Raman spectroscopy, selection rules, mutual exclusion principle, resonance Raman spectroscopy and coherent antistokes Raman spectroscopy. Vibrational- rotational Raman spectroscopy.

UNIT-IV: POLYMER SOLUTIONS 15 Hrs

Thermodynamics of polymer dissolution, effect of molecular weight on solubility, solubility of crystalline and amorphous polymer, heat of dissolution, regular solution theory, Hildebrand solubility parameter, Flory-Huggins theory of polymer solutions, conformational entropy, osmotic pressure and viscosity of polymer solutions. Molecular weight determination by light scattering, ultra-centrifugation and sedimentation equilibrium method. Liquid Crystals- synthesis and applications

Books Suggested

1. F.A. Cotton : Introduction to Group theory for chemists.
2. Geroge Davidson Elsevier : Introductory Group Theory for Chemists.
3. Gurdeep Raj , Ajay Bhagi&Vinod Jain : Group Theory and Symmetry in Chemistry
4. Instrumental methods of analysis – M.H. Willard, Meritt Jr. and J.A. Dean
5. Principles of instrumental analysis – Skoog and West
6. F. W. Billmeyer, Jr.: Text Book of Polymer Science. Wiley Interscience.

7. V. R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar.: polymer Science. New Age international Publishers.

CHE IC 304	Core practical I: Inorganic Chemistry - Practical	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Inorganic Chemistry - Practical.

Course Objectives:

- Gain knowledge on synthesis of inorganic complexes – sulphates and chlorides
- Experience with the characterization techniques
- Preparation of cobaltates and ferrates
- Able to characterize the complexes

Course Outcomes: At the end of the course, the student will be able

CO1	To know the synthesis of inorganic complexes Tris thiourea Zinc (II) Sulphate, Tris thiourea Copper(I) Sulphate,Hexamine nickel (II) Chloride, Chloropentamanine cobalt (III) Chloride
CO2	To gain knowledge on characterization techniques
CO3	To get experience on the preparation of Mercury tetrakristhiocyanato cobaltate (II) Sodium trioxalato ferrate (III)
CO4	To familiarize with the characterization of complexes.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	2	-	2	3	2	1	2	1	-
CO2	3	2	2	3	2	2	3	2	1	1	-	2
CO3	3	1	-	2	1	2	1	2	-	1	1	-
CO4	3	2	2	3		1	-	2	1	1	-	2

CHE : IC -304: PRACTICALS (Core & Gen.)

Preparation of Inorganic complexes and characterization:

a) Tris thiourea Zinc (II) Sulphate

b) Tris thiourea Copper(I) Sulphate

c) Hexamine nickel (II) Chloride

d) Chloropentamanine cobalt (III) Chloride

e) Cis potassium diaquodioxalato chromate (III)

f) Tris (acetylacetonato) manganese (III)

g) Mercury tetrakristhiocyanato cobaltate (II)

h) Sodium trioxalato ferrate (III)

i) Tetrammine Copper (II) Sulphate

j) Potassium hexathiocyanato chromate (III) tetrahydrate

CHE IC 305A	Chemotherapy and Drug Analysis	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Chemotherapy and Drug Analysis

Course Objectives:

- Gain knowledge on chemotherapy and analysis of drugs.
- Analysis of drugs chemically and biologically.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about the classification and synthesis of drugs.
CO2	To familiarize with the qualitative and quantitative analysis of drugs.
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	3	-	2	3	2	1	1	1	1
CO2	3	2	2	3	2	2	3	2	-	1	-	2
CO3												
CO4												

CHE IC 305A: (SKILL ORIENTED COURSE : THEORY) : CHEMOTHEROPY AND DRUG ANALYSIS

UNIT-I: Chemotherapy

Definition, History, and Evolution of Chemotherapy; Discovery, Classification, Nomenclature, Mode of action and synthesis of the following classes of compounds with special references to specific drugs mentioned under each class

a) Sulfa drugs- Sulfanilamide and Sulfamethoxazole.

b) Antibacterials

c) Lactum group of antibiotics – Penicillin, Ampicillin and Amoxycillin.

d) Cephalosporin-C and Ciprofloxacin.

e) Anticancer drugs – 5-Flurouracil, Methotrexate.

f) Antifungals – Griseofulvin

g) Antimalarials – Chloroquin

UNIT-II: Chemical and Biochemical analysis of Drugs

Qualitative and Quantitative Analysis of drugs: Uses of IR, UV, GLC and HPLC methods.

Drug Assay by Biochemical Analysis – ELISA (Cortisol, alcohol, opiates).

Radio Immuno Assay (RIA) – Enalapril, Insulin; Kidney, Lungs and Liver function tests; Use of isotopes in the Bioanalysis of drugs and in drug design programmes.

Book Suggested

1. Medicinal Chemistry and Pharmaceutical Chemistry – Harikishan Singh and Kapur
2. Medicinal Chemistry and Biochemistry – R.L.Nath
3. Introduction to Medicinal Chemistry – Patrick
4. The Organic Chemistry of Drug Synthesis Vols. 1-6 - Ledneicer Top drugs top synthetic routes – John Saunders
5. Medicinal Chemistry – Ashutoshkar
6. Synthetic Organic Chemistry and Drugs – Gurideep R Chetwal
7. Biochemistry – Harper, Conn & Stumpf, Lehninger
8. Biochemistry – Western Jodd
9. Biochemistry – Cann & Stumpf
10. Bergers Medicinal Chemistry Vols. 1-5 – Manfred E. Wolf
11. Introduction to drug design – Siverman
12. Biochemical approach to Medicinal Chemistry – Thomas Nogrady
13. Prinicples of Medicinal chemistry – William Foye
14. Text book of organic medicinal and pharmaceutical chemistry – Delgrado and William A
15. Industrial Microbiology – Casida

CHE IC 305B	Instrumental Methods of Analysis	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Instrumental Methods of Analysis Practical

Course Objectives:

- Gain knowledge on instrumental methods of analysis
- Estimation of metal ions by complex metric and colorimetric method.

Course Outcomes: At the end of the course, the student will be able

CO1	To Understand the complexity, theory and working principle of colourimetry.
CO2	To gain knowledge on analysis of organic components.
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	3	1	2	3	2	1	-	1	-
CO2	3	2	2	3	2	2	3	2	-	1	-	2
CO3												
CO4												

CHE : IC 305 (B) : PRACTICALS (SKILL ORIENTED COURSE) : Instrumental methods of analysis

1. Colorimetric Determinations:

a. Determination of manganese
b. Determination of nickel
c. Determination of iron by 1,10 Pheren-thiroline
d. Determination of chromium
e. Determination of Phosphate
f. Determination of Pesticides
g. Determination of Nitrite.

CHE IC 306 A	Spectral Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Spectral Techniques

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands.
- Study on the applications of flame atomic absorption spectroscopy.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy.

Course Outcomes: At the end of the course, the student will able

CO1	To know the basic principles of spectroscopy.
CO2	To familiarize with the analysis of various functional groups by using different spectroscopic techniques.
CO3	To Understand the applications of AAS.
CO4	To gain knowledge about Mass spectral fragmentation of organic compounds and common functional groups.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	-	2	3	2	-	-	1	-
CO2	3	1	2	2	2	2	2	2	1	1	-	2
CO3	3	2	1	2	2	1	2	-	2	-	1	1
CO4	3	1	2	3	1	2	-	-	1	1	-	2

CHE : IC : 306(A): (OPEN ELECTIVE) SPECTRAL TECHNIQUES

UNIT – I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY 15 Hrs

Various electronic transitions (185-800nm.), Beer-Lambert Law, effect of solvent on electronic transitions , ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, Fieser-Woodward rules for conjugated dienes and carbonyl compounds

UNIT – II : INFRARED SPECTROSCOPY 15 Hrs

Instrumentation and sample handling, characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols, amines, ketones, aldehydes, esters, amides, acids and anhydrides. Effect of hydrogen bonding.

UNIT – III:ATOMIC ABSORPTION SPECTROSCOPY: FLAME AAS: 15 Hrs

Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT –IV: MASS SPECTROMETRY 15 Hrs

Principle, instrumentation, different methods of ionization, EI, CI, FD and FAB, Mass spectra-molecular ion, base peak, meta-stable peak, nitrogen rule and Mc Lafferty rearrangement. Mass spectral fragmentation of organic compounds and common functional groups. Normal and branched alkanes, alkenes, cycloalkanes, benzene and its derivatives, alcohols and phenols, ethers, aldehydes and ketones, carboxylic acids and their derivatives , amines and nitro compounds. Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Books Suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS .2.
2. Spectroscopy of organic compounds, RM Silversteen and others 5th Ed, John Wiley 1991
3. Spectroscopy of organic compounds, PS Kalsi, Wiley, 1993
4. NMR in chemistry – A Multi nuclear introduction, William Kemp, Mc Millan 1986
5. Spectroscopic methods in Organic Chemistry, DH Williams & I Flemmi TMH . 2005

CHE IC 306 B	Chromatographic Techniques	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chromatographic Techniques

Course Objectives:

- Familiarize with Classification of Chromatographic methods.
- Understand Demonstration experiment in TLC.
- Study on the applications of High-Performance Liquid Chromatography (HPLC).
- Understand the working principle of gas chromatography.

Course Outcomes: At the end of the course, the student will able to

CO1	To know the stationary and mobile phases in chromatographic techniques.
CO2	To familiarize applications of different chromatographic methods.
CO3	To Understand the principle of chromatographic techniques.
CO4	To gain knowledge on the normal phase and reverse phase.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	2	-	2	2	2	1	-	1	-
CO2	2	2	2	1	2	2	3	2	-	1	-	2
CO3	3	2	2	2	2	-	2	1	1		1	-
CO4	1	2	2	3	-	2		1	-	1	-	2

CHE IC 306 : Chromatographic Techniques

Unit –I: Introduction - Classification of Chromatographic methods – Column chromatography-Adsorption phenomenon: Nature of adsorbents-Solvent systems-Differential migration-Separation of mixture of o-/p-nitro anilines (A demonstration experiment).

Unit –II: Thin-Layer Chromatography (TLC)-Coating materials and preparation of TLC plates-Solvents for development-Detection of compounds in TLC- R_f values in TLC-Applications of TLC in chemistry-Preparative TLC – Demonstration experiment in TLC.

Unit –III: High-Performance Liquid Chromatography (HPLC) - Application of HPLC- HPLC instrument-Stationary phases in HPLC-Normal and reversed phase HPLC: A comparison- Normal phase HPLC: Principle-Retention times in Normal and reversed phase HPLC- Reversed phase HPLC: Principle.

Unit –IV: Gas-Liquid Chromatography- Instruments for Gas-Liquid Chromatography- Gas-Chromatographic Columns and the Stationary Phase- Application of Gas-Liquid Chromatography- Gas-Solid Chromatography.

Reference Books:

1. Analytical chemistry: G L David Krupadanam, D. Vijaya prsad, K. Varaprasad Rao, KLN Reddy, C. Sudhakar.
2. . Analytical chemistry: Skoog West Holler.
3. Modern Analytical Chemistry : David Harvey DePauw University.
4. J.G. Dick. Analytical Chemistry, Mc Grraw Hill, New Delhi, (1973).

(Mandatory Core)

CHE-IC- 401	Co-ordination Compounds, Organometallic Chemistry & Chemistry of Non-transition Elements	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Co-ordination Compounds, Organometallic Chemistry & chemistry of non-transition elements

Course Objectives:

- Study the organometallic chemistry of different complexes and coordinated ligands.
- Understand the mechanistic aspects of several well-known industrial catalytic processes like olefin hydrogenation, olefin oxygenation, Olefin hydroformylation and Fischer –Tropsch synthesis with an aim to gain a good knowledge on synthetic applications of Organo–Lithium, Magnesium and Aluminium compounds.
- Acquire knowledge of metal cluster compounds, various types of reactions of metal cluster compounds, isoelectronic and isolobal relationship and electron counting scheme for HNCC'S.
- Study on synthesis, properties and structures of nontransition elements

Course Outcomes : At the end of the course, the student will be able

CO1	To Gain an extensive knowledge about dinitrogen complexes of Ru(II), Os(II),Co(I), Mo(0)and dioxygen complexes of Ir(I) and Rh(I) and on cycloheptatriene and tropylium complexes of oxidative, reductive elimination reactions
CO2	To understand mechanism, stereochemical aspects and regeneration of catalyst in olefin hydrogenation (Wilkinson's catalyst), olefin oxygenation (Wacker process or Smidt reaction), Olefin hydroformylation and Fischer –Tropsch process.
CO3	To study the examples of metal complexes having metal-metal single or multiple bonds and analyse the spectroscopic evidences for the presence of metal-metal bond.
CO4	To understand the synthesis and structures of boranes, carboranes, borazines, silicates carbides, peroxo compounds and inter halogens, pseudo halides.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	-	-	2	-	1
CO2	3	2	2	2	-	2	-	-	-	-	1	1
CO3	3	3	3	3	2	2	-	-	-	1	-	1
CO4	3	3	3	3	-		-	-	-	1	1	1

CHE IC 401: CORE THEORY: Co-ordination Compounds, Organometallic Chemistry and Chemistry of Non-transition Elements

UNIT –I: ORGANOMETALLIC CHEMISTRY OF TRANSITION ELEMENTS:

1.Dinitrogen complexes of Ru(II) , Os (II),Co(I) and Mo(0)

2. Dioxygen complexes of Ir (I) and Rh (I)

3. Cycloheptatriene and Tropylium complexes –Oxidative addition and Reductive Elimination.

Insertion and Elimination reaction –Nucleophilic and Electrophilic attack of coordinated ligands.

UNIT –II: APPLICATIONS OF ORGANOMETALLIC COMPOUNDS 15 Hrs

Catalytic applications –Fischer –Tropsch synthesis, Olefin hydrogenation (Wilkinson catalyst).Olefin oxygenation (Wacker process or Smidt reaction) Olefin hydroformylation (Ziegler-NattaCatalysis).

Synthetic applications of Organo–Lithium, –Magnesium and Aluminium compounds.Biological applications of organometallic compounds in medicine, agriculture and horticulture.

UNIT –III: METAL-TO METAL BONDS AND METAL ATOM CLUSTERS 15 Hrs

Introduction, metal carbonyl clusters –low –nuclearity (M and M) clusters, isoelectronic and isolobal relationships, High nuclearity, carbonyl clusters (HNCC'S), Hetero stomes in metal atom clusters, electron counting scheme for HNCC'S, HNCC'S of the Fe, Ru and Os group HNCC'S of the Cu, Rh and Ir group, HNCC'S of the Ni, Pd, and Pt group. Compounds with M-M multiple bonds, Major structural types, quadruple bonds, relation of clusters to multiple bonds and one dimensional solids.

UNIT –IV: CHEMISTRY OF NON-TRANSITION ELEMENTS 15 Hrs

General characteristics of the non-transition elements, special features of individual elements: Synthesis, properties and structure of their Halides and oxides, polymorphism of carbon, Phosphorus and Sulphur. Synthesis, properties and structure of boranes, carboranes. borazines, silicates, carbides, Sulphur-nitrogen compounds, peroxo compounds of boron, carbon and sulphur, oxyacids of nitrogen, phosphorus, sulphur and halogens, inter halogens pseudo halides.

Books Suggested

1. F.A. Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999. John wiley & sons. Inc., New York.
2. James E. Huheey, Inorganic chemistry- Principles of structure and reactivity, IV Edition 1993. Harper Collins College Publishers, New York.
3. J.D. Lee, Concise Inorganic chemistry, V Edition 1996, ELBS, Chapman and Hall, London.

4. Concise Inorganic chemistry by J.D. Lee V Edition ELBS, Chapman and Hall, London.
5. Organometallic Chemistry by R.C. Mehrotra and Singh.

(Mandatory Core)

CHE-IC 402	Instrumental Methods of Analysis	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Organic Spectroscopy and Applications

Course Objectives:

- Gain sound knowledge in spectroscopic methods of ICP-AES, ICP-MS, x-ray fluorescence, spectroscopic techniques and their applications
- Chromatographic techniques like High-Performance Liquid Chromatography, Capillary Electrophoresis and Supercritical Fluid Chromatography (SFC).
- Familiarise with instrumentation, resolution and ionization sources of GCMS and LCMS.

Course Outcomes: At the end of the course, the student will be able to

CO1	To understand the working principles, instrumentation and applications of ICP-AES and ICP-MS, energy dispersive X-ray fluorescence (EDXRF), Wavelength dispersive X-ray fluorescence (WDXRF).
CO2	To understand the basic principles, procedure and components of the High-Performance Liquid Chromatography (HPLC), Gel Permeation Chromatography (GPC): Capillary Electrophoresis (CE), Supercritical Fluid Chromatography (SFC).
CO3	To get knowledge on instrumentation and applications of GCMS in drug analysis and environmental samples analysis.
CO4	To improve the knowledge about coulometric techniques and their analysis of cations (As (III), Fe (II)) and anions (I- and S2-)by using I2 liberations and Ce4+ liberation in solutions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	-	-	1	-	1
CO2	3	3	3	3	3	2	-	-	-	1	1	1
CO3	3	3	3	3	3	2	-	2	-	1	1	3
CO4	3	3	2	2	-	2	-	-	-	1	1	3

CHE-IC 402: CORE THEORY: INSTRUMENTAL METHODS OF ANALYSIS

UNIT –I SPECTROSCOPIC METHODS 15 Hrs

Emission Spectroscopy:

(i) ICP-AES: Principles, instrumentation, AES detectors, applications in the analysis of trace and toxic metals in water, geological and industrial samples.

(ii) ICP-MS: Principles, instrumentation, quadrupole mass spectrometers, applications

Fluorescence Spectroscopy:

i) Molecular Fluorescence Spectroscopy: Principle, Theory of fluorescence, phosphorescence, relation between intensity of fluorescence and concentration, Correlation of fluorescence with molecular structure, Fluorescence quenching, Instrumentation and applications.

ii) X-ray Fluorescence Spectroscopy: Principle, energy dispersive X-ray fluorescence (EDXRF), Wavelength dispersive X-ray fluorescence (WDXRF), applications.

UNIT – II: CHROMATOGRAPHIC METHODS 15 Hrs

High Performance Liquid Chromatography (HPLC): Principles, Stationary phases, Instrumentation, Solvent delivery system, sample introduction, gradient elution, columns and detectors.Partition Chromatography, adsorption chromatography, Gel permeation chromatography.

Capillary Electrophoresis: Principle, Electroosmotic flow, Instrumentation, Applications to separation of small ions, separation of Molecular Species, DNA sequencing

Supercritical-fluid chromatography: Supercritical-fluids, Instrumentation and Applications

UNIT –III: HYPHENATED TECHNIQUES 15 Hrs

Mass Spectroscopy: Principle, basic instrumentation, resolution, Ionization sources- Electron impact and Chemical ionization, Mass Analyzers- Quadrupole Mass analyzer and Time- of- Flight Analyzer.

Gas Chromatography- Mass spectrometry: Introduction, GC – MS interface, processing of GC – MS data – ion chromatogram. Quantitative measurement – sample preparation, Selected ion monitoring – Application of GC-MS for Trace constituents. Drugs analysis, Environmental analysis and others.

Liquid chromatography- Mass spectrometry – Introduction – Instrumentation – liquid chromatography – Mass spectrometer Interface – Instrumental details – Processing LC-MS data – ion chromatograms, Sample preparation – selected ion monitoring. Application of LC-MS for Drug analysis, Environmental samples and others.

UNIT- IV: ELECTRO ANALYTICAL METHODS 15 Hrs

Anodic stripping voltammetry: principle, instrumentation, Hanging mercury drop electrode, application in the analysis of Pb and Cd in environmental samples, principle of cathode stripping voltammetry.

Coulometric analysis: principles of coulometric analysis with constant current, coulometric analysis with controlled potential, applications of coulometric methods for the analysis of cations-As (III), Fe (II) and I- and S_2- by using I_2 liberations and Ce^{4+} liberation in solutions

Ion Selective Electrodes: types of ion selective electrodes, basic properties, potentials and construction, calibration of ion selective electrodes, ion selective electrodes with fixed membrane sites, silver, lead,

cadmium, sulfide, fluoride, cyanide and glass electrodes, applications in the analysis of air and water pollutants, principles of liquid membrane, gas sensing and enzyme based electrode

Books Suggested

1. Analytical Chemistry, Gary D. Christian, John Laliley and Senes, New York, 6th Ed., 2007.
2. Analytical Chemistry Principles and Techniques, I.G. Harge, Prentice Hall.
3. Principles of Instrumental analysis, D.A. Skoog and J.L. Loacy, W.B. Saunders.
4. Handbook of Instrumental Techniques for Analytical Chemistry, F. Serlie, Prentice Hall.
5. Vogels Text book of Quantitative Chemical Analysis, Basett, Denny Jebbary, 5th Ed. ELBs 1990.
6. Instrumental Methods of Chemical Analysis, Willard Merrit, Dean, Stella Jr 6th Edition.
7. Separation methods, M.N Sastri, Himalaya Publishing Company, Mumbai.

(Mandatory Core)

CHE-IC-403A	Instrumental Methods of Analysis	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Instrumental methods of analysis

Course Objectives:

- Gain sound knowledge in spectroscopic methods of ICP-AES, ICP-MS, x-ray fluorescence, spectroscopic techniques and their applications
- Chromatographic techniques like High-Performance Liquid Chromatography, Capillary Electrophoresis, and Supercritical Fluid Chromatography (SFC).
- Familiarise with instrumentation , resolution and ionization sources of GCMS and LCMS
- Basic principles of electro analytical techniques and their applications.

Course Outcomes: At the end of the course, the student will be able to

CO1	To understand the working principles, instrumentation and applications of ICP-AES and ICP-MS, energy dispersive X-fluorescence (EDXRF), Wavelength dispersive X-ray fluorescence (WDXRF).
CO2	To understand the basic principles, procedure and components of the High-Performance Liquid Chromatography (HPLC), Gel Permeation Chromatography (GPC): Capillary Electrophoresis (CE), Supercritical Fluid Chromatography (SFC).
CO3	To get knowledge on instrumentation and applications of GCMS in drug analysis and environmental samples analysis.
CO4	To improve the knowledge about coulometric techniques and their analysis of cations (As (III), Fe (II)) and anions (I^- and S^{2-})by using I^2 liberations and Ce^{4+} liberation in solutions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	-	-	1		1
CO2	3	3	3	3	3	2	-	-	-	1	1	1
CO3	3	3	3	3	3	2	-	2	-	1	1	3
CO4	3	3	2	2	-	2	-	-	-	1	1	3

CHE-IC 403A: CORE THEORY: INSTRUMENTAL METHODS OF ANALYSIS

UNIT –I SPECTROSCOPIC METHODS 15 Hrs

Emission Spectroscopy:

(i) ICP-AES: Principles, instrumentation, AES detectors, applications in the analysis of trace and toxic metals in water, geological and industrial samples.

(ii) ICP-MS: Principles, instrumentation, quadrupole mass spectrometers, applications

Fluorescence Spectroscopy:

i) Molecular Fluorescence Spectroscopy: Principle, Theory of fluorescence, phosphorescence, relation between intensity of fluorescence and concentration, Correlation of fluorescence with molecular structure, Fluorescence quenching, Instrumentation and applications.

ii) X-ray Fluorescence Spectroscopy: Principle, energy dispersive X-ray fluorescence (EDXRF), Wavelength dispersive X-ray fluorescence (WDXRF), applications.

UNIT – II: CHROMATOGRAPHIC METHODS 15 Hrs

High Performance Liquid Chromatography (HPLC): Principles, Stationary phases, Instrumentation, Solvent delivery system, sample introduction, gradient elution, columns and detectors.Partition Chromatography, adsorption chromatography, Gel permeation chromatography.

Capillary Electrophoresis: Principle, Electroosmotic flow, Instrumentation, Applications to separation of small ions, separation of Molecular Species, DNA sequencing

Supercritical-fluid chromatography: Supercritical-fluids, Instrumentation and Applications

UNIT –III: HYPHENATED TECHNIQUES 15 Hrs

Mass Spectroscopy: Principle, basic instrumentation, resolution, Ionization sources- Electron impact and Chemical ionization, Mass Analyzers- Quadrupole Mass analyzer and Time- of- Flight Analyzer.

Gas Chromatography- Mass spectrometry: Introduction, GC – MS interface, processing of GC – MS data – ion chromatogram. Quantitative measurement – sample preparation, Selected ion monitoring – Application of GC-MS for Trace constituents. Drugs analysis, Environmental analysis and others.

Liquid chromatography- Mass spectrometry – Introduction – Instrumentation – liquid chromatography – Mass spectrometer Interface – Instrumental details – Processing LC-MS data – ion chromatograms, Sample preparation – selected ion monitoring. Application of LC-MS for Drug analysis, Environmental samples and others.

UNIT- IV: ELECTRO ANALYTICAL METHODS 15 Hrs

Anodic stripping voltammetry: principle, instrumentation, Hanging mercury drop electrode, application in the analysis of Pb and Cd in environmental samples, principle of cathode stripping voltammetry.

Coulometric analysis: principles of coulometric analysis with constant current, coulometric analysis with controlled potential, applications of coulometric methods for the analysis of cations-As (III), Fe (II) and I- and S_2- by using I_2 liberations and Ce^{4+} liberation in solutions

Ion Selective Electrodes: types of ion selective electrodes, basic properties, potentials and construction, calibration of ion selective electrodes, ion selective electrodes with fixed membrane sites, silver, lead,

cadmium, sulfide, fluoride, cyanide and glass electrodes, applications in the analysis of air and water pollutants, principles of liquid membrane, gas sensing and enzyme based electrode

Books Suggested

1) Analytical Chemistry, Gary D. Christian, John Laliley and Senes, New York, 6th Ed., 2007.
2) Analytical Chemistry Principles and Techniques, I.G. Harge, Prentice Hall.
3) Principles of Instrumental analysis, D.A. Skoog and J.L. Loacy, W.B. Saunders.
4) Handbook of Instrumental Techniques for Analytical Chemistry, F. Serlie, Prentice Hall.
5) Vogels Text book of Quantitative Chemical Analysis, Basett, Denny Jebbary, 5th Ed. ELBs 1990.
6) Instrumental Methods of Chemical Analysis, Willard Merrit, Dean, Stella Jr 6th Edition.
7) Separation methods, M.N Sastri, Himalaya Publishing Company, Mumbai.

(Compulsory Foundation)

CHE-IC-403B	Bioinorganic, Bioorganic & Biophysical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Bioinorganic, Bioorganic, Biophysical Chemistry

Course Objectives:

- Highlighten metal complexes as oxygen carriers and electron transfer in biology.
- Metal ion transport and storage in biological systems and importance of trace metals in biology.
- Learn physiological functions of carbohydrates, lipids, enzymes classification, stereospecificity.
- The basic concepts of biophysical chemistry in biochemical reactions, exergonic and endergonic reactions.

Course Outcomes: At the end of the course, the student will be able to

CO1	Gain knowledge on metallo proteins in electron transfer processes.
CO2	Know the applications of trace metal ions and metal ions as chelating agents in medicine.
CO3	Achieve and develop highly stereoselective synthesis of organic compounds and drugs by adopting environmentally.
CO4	Understand thermodynamics of biopolymer reactions and to correlate free energy and biopolymer parameters.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	-	2	-	2	-	1	1	1
CO2	3	3	3	3	-	2	-	2	-	-	1	3
CO3	3	3	3	2	2		-	3	-	1	1	3
CO4	3	2	2	3	2	2	-		-	2	-	1

CHE AC-403(B): (GENERIC ELECTIVE): BIOINORGANIC, BIOORGANIC, BIOPHYSICAL CHEMISTRY

UNIT-I: **BIO-INORGANIC CHEMISTRY- I** **15 Hrs**

Metal complexes as oxygen carriers –Heme proteins –Hemoglobin and myoglobin –Non heme proteins –hemerythrin and hemocyanin – model synthetic complexes of iron, cobalt and copper.Co-enzymes Vitamin B_{12},carboxy peptidase and superoxidedismutase.

Electron Transfer in Biology: Structure and functions of metalloproteins in electron transfer processes –catalase –peroxidose –cytochromes and iron –sulphur proteins –synthetic models.

UNIT – II: BIOINORGANIC CHEMISTRY- II: Metal ion transport and storage in biological systems**,** Metal ions in Biology, Molecular mechanism of ion transport across membranes: ionophores, photosynthesis.

Hydrolytic metalloenzymes: Carbonic anyhdrase, carboxy peptidase, calcium in control processes, calcium and muscle contraction, calcium and secretion, calcium in blood clotting mechanisms. Therapeutic uses of enzymes.

Importance of trace metals in biology: Metal ions as chelating agents in medicine, trace metal ions and metal and non-metal deficiency. Biological nitrogen fixation,in-vivo and in-vitro nitrogen fixation.

UNIT-III: BIOORGANIC CHEMISTRY

Carbohydrates: Structure and biological functions of mucopolysaccharides, glycoproteins, and glycolipids- Role of sugars in biological recognition-Blood group substances

Lipids: Essential fatty acids-structure and function of triglycerols, Glycerophospholipids, cholesterol, bile acids prostaglandins- composition and functioning of lipoproteins

Enzymes: Nomenclature and classification, properties, factors affecting enzyme catalysis, enzyme inhibition- reversible and irreversible inhibition. Uses of enzymes in food drink industry and clinical laboratories.

UNIT-IV: BIOPHYSICAL CHEMISTRY:

Standard free energy change in biochemical reactions, exergonic and endergonic reactions, hydrolysis of ATP, thermodynamics of biopolymer solutions, chain configuration of bio polymers, and calculation of average dimensions. Membrane equilibrium, ion transport through cell membrane. dialosis and its function. Structure and functions of proteins, enzymes, DNA and RNA in living systems, forces involved in bio polymer interactions, electrostatic forces, hydrophobic forces, molecular expansion, and dispersion forces.

Books Suggested

1. M.N. Hughes, The Inorganic chemistry of Biological Processes, John wiley and Sons, New York 2nd Edition, 1981.
2. A Text book of Biochemistry, A.V.S.S. Rama Rao
3. Physical chemistry by Atkenes
4. Physical chemistry by Albertz.
5. Bio physical chemistry by Van Holde

6. Bio Physics by Narayanam
7. Organic Chemistry, Vol. 2, I. L. Finar, ELBS.
8. Chemistry of Natural Products, P.S. Kalsi, Kalyani Publishers.
9. Chemistry of Organic Natural Products, O. P. Agarwal, Vols., 1 & 2, Geol Pubs.
10. Natural products Chemistry K.B.G. Torssell, John Wiley, 1983.
11. Burger's Medicinal Chemistry, M.E. Wolff, John Wiley
12. Medicinal Chemistry, A. Kar, New Age International

CHE IC 404	Core practical I: Inorganic Chemistry - Practical	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Inorganic Chemistry - Practical.

Course Objectives:

- To learn about the separation methods and flame photometric analysis of pesticide residues.
- Determination of transition metal ions by polarography.
- Principle, instrumentation, determination of metal ions By AAS.
- Interpretation of NMR chemical shifts and hydrogen bonding.

Course Outcomes: At the end of the course, the student will be able

CO1	To understand the common laboratory techniques including separation techniques.
CO2	Polarography, atomic absorption spectroscopy in both emission and absorption mode.
CO3	To gain knowledge on implementation of gas chromatography and HPLC for separation of mixtures.
CO4	To Familiarize with interpretation of data to structures by NMR.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3	-	3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE IC 403: CORE PRACTICALS: <u>PRACTICAL – I-</u>

Instrumental methods of analysis- II

1) Flame Photometry**:** Determination of Na and K, Ca and Li in Water and Soil.
2) TLC/Paper chromatographic separation.
3) Determination of Pesticide residues by gas chromatographic method
4) Polarography:a) Determination of E ½ of Zn and Cd; b) Determination of amounts of Zn and Cd
5) Atomic Absorption Spectroscopy: Determination of transition metal ions (Cd, Cr, Cu, Pb, Zn etc.) by AAS.
6) Separation of Metal ion by Solvent Extraction /Ion exchange.

II <u>DEMONSTRATION EXPERIMENTS</u>

1. IR – Interpretation of IR spectrum of alcohols, ketones, aldehydes and other standard materials
2. AAS: Demonstration of AAS – Determination of Zn, Cd, Pb, Mn, Fe and Ni in effluents using AAS.
3. Spectrofluorimetry – estimation of quinine and fluoroscene
4. Ion selective electrodes – estimation of F^-, S^{2-} and CN^- in effluents using ion selective electrode meter.
5. Polarography and Anode stripping voltametry
6. Polarography and Anode stripping voltametry – behavior of Cd, Zn, Pb in a mixture.
7. Determination of Pb and Cd in samples using Anode stripping voltametr
8. Gas chromatography- Determination of pesticides
9. HPLC- Determination of pesticides
10. NMR
11. (a)Demonstration of NMR spectrometer and study of hydrogen bonding in a given alcohol or phenol.

    (b)Interpretation of NMR chemical shifts of ethyl benzene, ethyl alcohol.
12. TGA, DTA, DSC – Demonstration of TG, DTA and DSC and study of decomposition of calcium oxalate, calcium carbonate, copper sulfate, oxalic acid.
13. pH metry

a. (a)Determination of alkalinity in a colored effluent using pH metric end point.
b. (b)Determination of purity of commercial HCl, H_2SO_4, H_3PO_4 and CH_3COOH using pH metric end point

CHE IC 405	Project Work	L-5,T-1,P-0	4 Credits

Pre-requisite: Inorganic Chemistry Project Work

Course Objectives:

- Identification of problem
- Ability to carry out independent chemistry research with competency in research design, data gathering
- Interpretation and communication of research results through scientific publications and presentations.
- Preparation of dissertation

Course Outcomes: At the end of the course, the student will be able

CO1	Ability to perform experiments, collection and evaluation of data
CO2	Interpretation of results while adhering to scientific principles of responsible and ethical behaviour.
CO3	Analysing and compiling the data and results in a chronological order in the form of dissertation.
CO4	Preparation of dissertation.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	-	2	-	2	-	1	1	1
CO2	3	3	3	3	-	2	-	2	-	-	1	3
CO3	3	3	3	2	2	-	-	3	-	1	1	3
CO4	3	2	2	3	2	2	-	-	-	2	-	1

CHE IC 404 / 405 : PRACTIAL II/ PROJECT WORK

CHE IC 406A	Drug Chemistry	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Drug Chemistry

Course Objectives:

- To learn about the natural products as leads for new drugs
- Determination of cardiovascular drugs
- To study Autacoids
- Interpretation of Antipyretics

Course Outcomes: At the end of the course, the student will be able to

CO1	Know about natural products.
CO2	Know Interpretation of cardiovascular drugs.
CO3	Know the Analyzing about prostaglandins.
CO4	Know the Definition, Classification, Nomenclature, Structure and Synthesis of anti-inflammatory drugs.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3		3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE : AC : 406 (A): (OPEN ELECTIVE) : DRUG CHEMISTRY

UNIT – I: NATURAL PRODUCTS AS LEADS FOR NEW DRUGS

Occurrence, Structure and therapeutic uses of Drugs acting on Central Nervous System

Morphine alkaloids (morphine, codeine, thebaine, heroin, pethidine)

Cannabinoids (9-cannabinol, Tetrahydrocannabinol)

Neuromuscular Blocking Agents (Curare, Decamethonium)

Vinca Alkaloids (Vincristin and Vinblastin), Taxol and Taxotere, podophyllotoxin, Etoposide, Teniposide.

UNIT – II: CARDIOVASCULAR DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis.

Cardiac glycosides (ex: Digoxin, Digitoxin);

Antihypertensive drugs (ex: Methyl dopa, Clonidene hydrochloride);
Antiarrhythmic agents (ex: Quinidine sulfate);
Antisympathetic drugs (ex: Propranolol hydrochloride, Verapamil hydrochloride);
Vasopressor drugs (ex: Prenylamine, Buphenine).

UNIT – III: AUTACOIDS

Definition, Occurrence, Isolation, Nomenclature, Classification, Synthesis, Biosynthesis and Stereochemical structures of Prostaglandins. Structural elucidation of PGE_1, PGE_2; Synthesis and biosynthesis of PGE_2, $PGF_{2\alpha}$.

Structure and Biosynthesis of Thromboxane A2 and Prostacyclin (synthesis not expected).

UNIT – IV: ANTI-INFLAMMATORY DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis of Paracetamol, Aspirin (Antipyretic), Salol, Cinchophen, Antipyrene, Phenylbutazone, Indomethacin, Tolmetin, Ibuprofen, Diclofenac and Naproxen.

Books suggested:

1. Medicinal Chemistry by Ashitosh Kar
2. Medicinal Chemistry by D. Sriram, P. Yogeeswari
3. Medicinal Chemistry by David A. Williams, Thomas L. Lemke
4. Medicinal Chemistry by V**.** Alagarsamy
5. Biochemistry by U. Satyanarayana
6. Natural Products Chemistry and Applications by Sujata V. Bhat, B.A. Nagasampagi, S. Meenakshi
7. Medicinal Chemistry by V.K. Ahluwalia, Madhu Chopra
8. Medicinal Chemistry by Balkishen Razdar
9. Advanced Practical Medicinal Chemistry by Ashutosh Kar
10. Chemistry of Organic Natural Products by O. P. Agarwal, Vols., 1 & 2, Geol Pubs.
11. Chemistry of Natural Products by S. V. Bhat, B.A. Nagasampagi, M. Sivakumar
12. Natural Products Chemistry by K.B.G. Torssell, John Wiley, 1983.

CHE IC 406 B	Electroanalytical Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Electroanalytical Techniques

Course Objectives:

- To learn about the classification of electroanalytical methods
- Determination of types of currents
- Principle, instrumentation, reversible and irreversible cyclic voltammograms..
- Interpretation of Ion selective electrodes

Course Outcomes: At the end of the course, the student will able to

CO1	Ability to interpret potentiometry and conductometry
CO2	Interpretation of results while adhering to DC Polarography.
CO3	Analysing and compiling the data and results in polarography.
CO4	Familiarize Types of ion sensitive electrodes.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3	-	3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE : IC : 406(B): (OPEN ELECTIVE) : ELECTRO ANALYTICAL TECHNIQUES

Unit I: Types and Classification of Electro analytical Methods.

i) Potentiometry- Types of electrodes, Hydrogen gas, Calomel, Quin hydrone and glasselectrodes. Determination of pH. Potentiometric titrations.

ii) Conductometry – Definition of terms – conductivity, specific conductivity, cell constant. Mobility of ions, Conductometric titrations.

Unit II: D.C Polarography :. Dropping mercury electrode- Instrumentation-polarogram. Types ofCurrents : Residual, Migration, Limiting. Two and Three electrode assemblies. Ilkovic equation(derivation not necessary) and its consequences. Types of limiting Currents: Adsorption,Diffusion, Kinetic. Applications of polarography in qualitative and quantitative analysis. Analysis of

mixtures. Application to inorganic and organic compounds. Determination of stability constants of complexes.

Unit III: (i) A.C. polarography (ii) Square-wave polarography (iii) Pulse polarography (iv) Differential pulse polarography(V) Cyclic Voltammetry: Principle, instrumentation, reversible and irreversible cyclic voltammograms.

Unit IV: Ion selective electrodes: Ion-sensitive electrodes –types of ion sensitive electrodes –metal based cation and anion sensitive electrodes, solid membrane electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A. Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denny. Vogel's Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (Mc Graw Hill).

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

SVU COLLEGE OF SCIENCES

DEPARTMENT OF CHEMISTRY
4. ORGANIC CHEMISTRY (Specialization)



Syllabus for M.Sc. CHEMISTRY

Choice Based Credit System (CBCS)

Amended as per NEP-2020

(Academic Year 2023-2024)

About the Department

The Department of Chemistry is one of the first six departments started during the year 1954 when the university was founded. The Department offers M.Sc. course in Chemistry with specializations in Analytical, Environmental, Inorganic, Organic and Physical Chemistry besides Self Supporting Courses in Organic and Analytical Chemistry. Choice Based Credit System is followed and the courses are categorized as per the guidelines of the statutory authorities. Ability enhancement and skill development courses are part of the curriculum. Almost 15% of the students are qualifying in National Entrance Test conducted by UGC-CSIR. Also the Department offers quality research and training experience leading to Ph.D., Degrees for the students in the areas of synthesis of pharmacologically potential molecules analogous to drugs, application of green methodologies for the synthesis of complex molecules, development of new hybrid sorbents for monitoring toxic metals in environmental samples, fabrication of novel electrochemical sensors and biosensors towards the detection of organic molecules and pollutants. Over the last sixty five years the department has trained about 650 students for their Doctoral degrees. Most of the research scholars are doing Post-Doctoral research in abroad and in India. The faculty published more than 3000 research papers in reputed National and International journals. The Department organizes National and International conferences / seminars/ workshops on regular basis. The Department has well equipped laboratories for research and teaching besides a DST funded computer lab and a Department library. All the faculty members are having individual research laboratories with internet facility.

At present the Department is flourished with 10 faculty members and most of the faculty members have Post Doctoral research and training experience abroad. Some of the faculty worked as Visiting Professors and Visiting Fellows in prestigious universities abroad. Majority of faculty members have undertaken major research projects funded by agencies like UGC, CSIR, DST, BRNS, DBT and MOES and have successfully completed the tasks with a budget outlay of Rs. 250.00 lakhs. Most of the faculty members have developed collaboration with Indian Institute of Sciences, Bangalore, Indian Institute of Chemical Technology, Hyderabad, AVRA Laboratories, EPR Laboratories, Hyderabad, Amara Raja Batteries, Tirupati, RRL, Trivandrum and Birla Institute of Technology & Science, Pilani – Hyderabad campus and have approved patents. Some of the faculty and Alumni are the recipients of JSPS Fellowship, UGC Raman Fellowship, Common wealth Academic Fellowship, State Best Teacher Award etc., Recognizing the excellence in teaching and research in the Department, the University Grants Commission and Department of Science Technology have provided funding under DRS and FIST programmes. The Alumni of the department served in coveted positions as Vice-chancellors, Registrars, CEO of pharma industries etc. The former students of the Department have established leading International pharmaceutical industries in India and abroad. Some of them are actively engaged in the manufacture of COVID 19 vaccine. The ultimate goal of the Department is to achieve excellence in fundamental research as well as the development of innovative technologies for the future.

Vision

- Impart quality education & training in the field of chemistry to enable successful careers for the post graduate students in the field of research, education & industry applications of chemical sciences.

Mission

The Department of Chemistry strives:

- To get an ideal balance between knowledge creation and knowledge dissemination in the chemical sciences with a focus to train and mentor students to become responsible scientists and scientifically literate professionals to attain National and International impact.
- To contribute to the improvement of scientific and technological literacy, and the development of critical-thinking and problem-solving skills of all students in order to compete for the world of work and responsible citizenship

Program Specific Outcomes: At the end of the program, the student will be able to:

PSO1	**Scientific Problem solving skills**: Deep knowledge of the topic which can develop the problem solving skills using chemical principles.
PSO2	**Analytical skills**: Develop analytical skills such as synthesizing, separating, characterizing chemical compounds and chemical reactions with the help of sophisticated instruments
PSO3	**Research skills**: Develop research skills through dissertation/project work in different fields of chemistry such as organic, inorganic, analytical, physical and environmental.
PSO4	**Learning skills on life processes**: Acquire advanced level of knowledge in natural products as well as biological systems from the chemistry point of view.

Program Objectives

PO1	To divulge an advance level of theoretical and practical knowledge in the major fields of Chemistry- Analytical, Environmental, Inorganic, Organic and Physical.
PO2	To engage in research projects for acquiring wide spectrum of subject knowledge and research experience in respective fields.
PO3	To enlighten on skill enhancement in the core chemistry with practical expertise hands this will make students employable in academia and industries
PO4	To mould as responsible citizens to serve the nation

Program Outcomes: On completion of M.Sc. Chemistry programme, graduates will be able to –

PO1	Have a firm foundation in the fundamentals and application of current chemical and scientific theories in different areas of chemistry *viz*., Analytical, Environmental, Inorganic, Organic and Physical.
PO2	Understands the background of organic reaction mechanisms, complex chemical structures, and instrumental methods of chemical analysis, molecular rearrangements and separation techniques.
PO3	Familiarize with the importance of various elements present in the periodic table, coordination chemistry and structure of molecules, properties of compounds, structural determination of complexes using theories and instruments.
PO4	Understand about the physical aspects of atomic structure, dual behavior, reaction pathways with respect to time, various energy transformations, molecular assembly in nano-level, significance of electrochemistry, molecular segregation using their symmetry.
PO5	Create awareness and sense of responsibilities towards environment and apply knowledge to solve the issues related to Environmental pollution.
PO6	Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in the subject concerned. Ability to identify unethical behavior such as fabrication, falsification or misrepresentation of data and adoptive objective, unbiased and truthful actions in all aspects.
PO7	Be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
PO8	Clearly communicate the results of scientific work in oral, written and electronic formats.
PO9	Explore new areas of research in both chemistry and allied fields of science and technology.
PO10	Design, analyze and carry out scientific experiments and interpret data to provide solutions to different industrial problems.
PO11	Independently carry out research to solve practical problems and present a substantial technical report.
PO12	Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning throughout life, through self- paced and self-directed learning aimed at personal development, and adapting to change academic

	demands of work place through knowledge/ skill development/ reskilling.

Program Educational Objectives:

At the end of the program, the student wills be able to:

PEO1	To demonstrate broad knowledge of descriptive chemistry.
PEO2	To impart basic analytical and technical skills to work effectively in various fields of chemistry.
PEO3	To motivate critical thinking and analysis skills to solve complex problems viz., analysis of data, synthetic logistics, spectroscopy, structure and modeling, team based problem solving etc.
PEO4	To demonstrate an ability to conduct experiments in the above sub disciplines with mastery of appropriate techniques and proficiency using core chemical instrumentation and modeling method
PEO5	To develop laboratory competence in relating chemical structure to spectroscopic phenomena.
PEO6	To demonstrate the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment and modern instrumentation.

SRIVENKATESWARAUNIVERSITY::TIRUPATI

DEPARTMENTOF CHEMISTRY

ORGANIC CHEMISTRY

TWO YEAR M.Sc. COURSE IN CHEMISTRY

(2021-2022)SCHEME

Semester -I

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-101	Core-Theory	Inorganic Chemistry- I	6	4	20	80	100
2	CHE-102	Core-Theory	Organic Chemistry I	6	4	20	80	100
3	CHE-103	* Compulsory Foundation	a)Physical Chemistry- I b)Chemistry of Nano materials	6	4	20	80	100
4	CHE-104	* Elective Foundation	a)General Chemistry- I b)Green Chemistry	6	4	20	80	100
5	CHE-105	Practicals (Core & Comp.)	a)Inorganic Practical-I b) Physical Chemistry-I	3 3	2 2	- -	- -	50 50
6	CHE-106	Practicals (Core & Elective)	a) OrganicChemistry- I b)General Chemistry-I	3 3	2 2	- -	- -	50 50
7	CHE-107	Audit Course	Human Values and Professional Ethics – I	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

SEMESTER-II

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-201	Core-Theory	Inorganic Chemistry- II	6	4	20	80	100
2	CHE-202	Core-Theory	Organic Chemistry -II	6	4	20	80	100
3	CHE-203	* Compulsory Foundation	(a)Physical Chemistry- II (b) Advanced Thermodynamics and Biophysical chemistry	6	4	20	80	100
4	CHE-204	* Elective Foundation	a)General Chemistry- II b)Chemistry of contemporary society	6	4	20	80	100
5	CHE-205	Practicals (Core & Comp.)	a)Inorganic Practical-II b) Physical Chemistry-II	3 3	2 2	- -	- -	50 50
6	CHE-206	Practicals (Core & Elective)	a)OrganicChemistry- II b)General Chemistry-II	3 3	2 2	- -	- -	50 50
7	CHE-207	Audit Course	Human Values and Professional Ethics – II	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

M.Sc. (ORGANIC CHEMISTRY)

SEMESTER-III

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-OC-301	Core-Theory	Organic Chemistry-III	6	4	20	80	100
2	CHE-OC - 302	Core-Theory	Organic Spectroscopy	6	4	20	80	100
3	CHE-OC-303	*Generic Elective	(a) Inorganic Spectroscopy & Thermal Methods of analysis (b) Physical Chemistry III	6	4	20	80	100
4	CHE-OC-304	Core& Gen. Practical	Organic Estimations	6	4	-	-	100
5	CHE –OC-305 A	Skill Oriented Course (theory)	Chemotherapy and drug analysis	3	2	10	40	50
	CHE –OC-305 B	Skill Oriented Course (Practicals)	Multistep preparations	3	2	-	-	50
6	CHE- 306	Open Elective **(For other departments)**	(a) Spectral Techniques (b) Chromatographic Techniques	6	4	20	80	100
		Total		**36**	**24**			**600**

***Among the Generic Elective a student shall choose any one.**

SEMESTER-IV

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-OC-401	Core-Theory	Organic Synthesis - I	6	4	20	80	100
2	CHE-OC-402	Core-Theory	Organic Synthesis - II	6	4	20	80	100
3	CHE-OC-403	Generic Elective* **(Related to subject)**	(a) Heterocycles and natural Products (b) Bioinorganic, Bioorganic & Biophysical Chemistry	6	4	20	80	100
4	CHE-OC-404	Core& Gen. Practical	Spectral Identification	6	4	-	-	100
5	CHE-OC-405	Core-Practicals/ Project work	Project work	6	4	-	-	100
6	CHE-406	Open Elective **(For other departments)**	(a)Drug Chemistry or (b) Electroanalytical Techniques	6	4	20	80	100
		Total		**36**	**24**			**600**

***Among the Generic Elective a student shall choose any one.**

(Mandatory Core)

CHE-101	INORGANIC CHEISTRY I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Comprehend the key features of coordination compounds, Crystal Field Theory, different properties and bonding by spectroscopic techniques
- Study the polymorphic forms of non-transition elements and their synthesis and properties
- Understand the basics of reaction mechanism and the mechanistic concepts of Dissociative (Id) and Associative interchange Mechanism (Ia), Taube's classification, Trans effect and Electron Transfer Reactions
- Familiarize with the methods of synthesis of metal carbonyls and metal nitrosyls, Synergistic effect, EAN and 18-electron rule

Course Outcomes: At the end of the course, the student will be able

CO1	To understand the key features of coordination compounds, Crystal Field Theory, magnetic properties and bonding in transition metal complexes.
CO2	To learn about the polymorphic forms of Carbon, Sulphur and Phosphorus, synthesis and properties of sulphur-nitrogen compounds, boranes, carbides, silicates and to know Wades rules.
CO3	To explain the reactivity of complexes in terms of Valence bond and Crystal Field theories, Taube's classification, Trans effect and Electron Transfer Reactions.
CO4	To gain knowledge on synthesis and structures of different metal carbonyls, synergistic effect and 18 electron rule.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	1	-	1	-	2	-	1
CO2	3	1	-	3	-	2	2	2	2	1	-	2
CO3	3	2	-	3	2	-	-	1	-	1	2	1
CO4	3	1	1	3	-	2	2	2	1	-	1	1

CHE 101: INORGANIC CHEISTRY I

UNIT-I: CO-ORDINATION COMPOUNDS 15 Hrs

Introduction to Crystal field Theory, CFSE and its calculation, Paring energy, Splitting of 'd' orbitals in Trigonal bi pyramidal, square planar, square pyramid and pentagonal bipyramidal geometries, Jahn –Teller effect, Application of CFT, OSSE, site Selection in Spinels, Short comings of CFT, Evidence for covalency –

Nephelauxetic effect. MOT of co-ordinate bonds –M.O. Diagrams for octahedral, tetrahedral and square planar complexes. Experimental evidences for π- bonding – Crystallography, Infrared spectroscopy and Photoelectron spectroscopy.

UNIT-II: CHEMISTRY OF NON-TRANSITION ELEMENTS 15 Hrs

General characteristics of the non- transition elements special features of individual elements ; Synthesis' properties and structure of their Halides and Oxides, Polymorphism of Carbon, Phosphorus and Sulphur, Synthesis, properties and structure of boranes, Carboranes, borazines, Silicates, Carbides, Sulphur-nitrogen compounds. Electron counting in boranes, Wades rules (Poly hedral skeletal electron pair theory), Isopopoly and hetero poly acids.

UNIT-III: REACTION MECHANISMS IN COMPLEXES 15 Hrs

Reactivity of metal complexes. Inert and Labile complexes. Concept of Labile and Inert complexes in terms of Valence bond and Crystal Field theories. Taube's classification of complexes as labile and inert complexes. Dissociative (D) and Dissociative interchange Mechanism (Id) & Associative (A) and Associative interchange Mechanism (Ia). Substitution reactions in octahedral complexes- Acid Hydrolysis -factors affecting Acid Hydrolysis - Base Hydrolysis-conjugate Base Mechanisms - Anation Reactions -Substitution Reactions in Square Planar complexes- Trans effect – Mechanisms of Trans effect: polarization and π-bonding theories.Electron Transfer Reaction-Inner Sphere and outer Sphere Mechanisms- Marcus theory.

UNIT-IV: METAL πCOMPLEXES-I 15 Hrs

Nature of π bonding, Classification of π ligands, π donor ligands and π -acceptor ligands.

Metal Carbonyls: Synthesis of metal carbonyls, Structures of metal carbonyls of the types M(CO)n (M= Cr, Fe, Ni; n=4-6), $M_2(CO)n$ (M=Co, Fe, Mn; n=8-10), $M_3(CO)_{12}$ (M=Fe, Ru and Os), $M_4(CO)_{12}$ (M=Co, Rh, Ir). IR Spectraof metal carbonyls (i) Detection of bridging and terminal CO ligand, (ii) Synergistic effect, EAN and 18-electron rule. Electron counting methods (i) Oxidation state method and (ii) Neutral Atom method.

Metal Nitrosyls: Synthesis of metal Nitrosyls, bonding, Electron donation by nitric oxide, Models for NO bonding (i) Covalent model and (ii) Ionic models, Structures of metal nitrosyls (1) $[Fe_4S_3(NO)]$ (2)$[Fe_2(NO)_2I_2]$ (3) $[(\phi_3P)_2Ir(CO)Cl(NO)]^+$ (4) $[(\phi_3P)_2Ru(NO)_2Cl]$, Detection of bridging NO ligand, Applications of metal nitrosyls.

Books Suggested

1. F.A.Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999.John wiley & sons. Inc., New York.
2. James E. Huheey, Inorganic chemistry- Principles of structure and reactivity, VI Edition 1993. Harper Collins College Publishers, New York.

3. J.D. Lee: Concise Inorganic Chemistry (Blackwell)
4. Gary Wolfsburg: Inorganic Chemistry (5th Ed. (Viva Books)
5. W.L. Jolly: Modern Inorganic Chemistry (McGraw-Hill)
6. B.N Figgis: Introduction to Ligand Fields (John-Willey)
7. S.F.A. Kettle: Coordination compounds.
8. Coordination Chemistry. Bassalo & Jahnson.

(Mandatory Core)

CHE-102	Organic Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Organic Chemistry

Course Objectives:

- Classify molecules based on stereo chemical aspects study on optical and geometrical isomerism by the application of Cahn-Ingold-Prelog rules.
- Familiarize with different types of substitution reactions, able to predict products, including stereochemistry in aliphatic and aromatic nucleophilic substitution reactions, effect of neighboring group participation
- Understand thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects in reactive intermediates
- Study about occurrence, isolation, structure establishment and synthesis of natural products-terpenoids.

Course Outcomes: At the end of the course, the student will be able

CO1	To detect stereochemical structures of the molecules, stereoselective and stereocontrolled reactions.
CO2	To ascertain the stereochemistry of the products with the effect of neighbouring group participation and to familiarize the various types of aromatic substitution reactions, their mechanism and the effect of substituents.
CO3	To know the concept of isotope effects, potential energy diagrams and transition states in different intermediates
CO4	To familiarize with stereospecific synthesis of naturally occurring terpenoids and degradation products of terpenoids

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	2	-	1	1	-	1	-	-
CO2	3	2	1	3	-	1	2		-	2	1	1
CO3	3	1	2	3	-	1	1	2	1	-	1	-
CO4	3	2	2	3	2	1	1	1	-	1	1	1

CHE102: Organic Chemistry I

UNIT-I: **Stereochemistry**

Sereoisomerism-Stereoisomers Classification – Configuration and conformation.

Molecular Three dimensional representations: Wedge, Fischer, Newman and Saw-horse formulae, their description and interconversions.

Molecular Symmetry & Chirality: Symmetry operations and symmetry elements (Cn & Sn). Criteria for Chirality. Dissymmetrization.

Optical isomerism: Molecular Symmetry and Chirality-Cahn-Ingold-Prelog rules R, S-nomenclature, stereoisomerism resulting from more than one chiral center, meso and pseudoasymmetric compounds - **Axial Chirality** - Stereochemistry of allenes spiranes - biphenyl derivatives and atropisomerism - **Planar chirality** - Ansa compounds and trans - Cycloalkenes - **Helicity**. Helically chiral compounds

Geometrical isomerism - E, Z - nomenclature - Physical and Chemical methods of determining the configuration of geometrical isomers-Stereoisomerism in 3, 4 and 5-membered cyclic compounds.

UNIT-II: Substitution Reactions

i) Aliphatic Nucleophilic substitutions: The S_N2, S_N1, mixed S_N1 and S_N2, SET mechanisms. Reactivity- effects of substrates, attacking nucleophiles, leaving groups and reaction medium.Common carbocation rearrangements – primary, secondary and tertiary. The neighbouring group participation (NGP) -anchimeric assistance, NGP by σ and π- bonds, phenonium ions, norbornyl and norbornenyl systems, Classical and nonclassical carbocations, NGP by halogens and heteroatoms (O,N,S)

The S_N^i and S_N2' mechanisms. Nucleophilic substitution at an allylic, and vinylic carbons.

ii. Aromatic Nucleophilic Substitution: The S_NAr, S_N1, benzyne and $S_{RN}1$mechanisms. Reactivity - effect of substrate, structure, leaving group and attacking nucleophile. The von Richter, Sommelet - Hauser and Smiles rearrangements.

UNIT-III: Reactive intermediates

Types of reactions, types of bond cleavage mechanisms, generation, structure, stability and reactivity of carbocations, carbanions, free radicals, carbenes, nitrenes and arynes. Thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects**.**

UNIT-IV: Terpenoids

Classification of terpenoids, occurrence, isolation, general methods of structure determination. Isoprene and special isoprene rule. Structure determination and synthesis of the following representative molecules: Farnesol, Zingeberine, Cadinene and Abietic acid.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
6. Stereochemistry, P.S. Kalsi, Wiley Eastern.
7. Text book of Organic Chemistry, M.C. Murry
8. Organic Chemistry, Vol I, I.L. Finar, ELBS Eds.

(Mandatory Core)

CHE-103	Physical Chemistry I	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Acquire knowledge in Quantum Chemistry, postulates of Quantum Mechanics., Applications of Schrodinger wave equation and Born-Oppenheimer approximation
- Study on Chemical Dynamics and theories in unimolecular, chain and fast reactions and determination of reaction rates.
- Familiarize with concepts of Thermodynamics and statistical thermodynamics, Gibbs- Duhem equation and Sackur-Tetrade equation
- Know about Thermodynamic and Kinetic concept of Electrochemistry and conductance, conductivity of electrolytes

Course Outcomes At the end of the course, the student will be able to

CO1	To know the concepts such as Operator algebra, Eigen values and Eigen functions, Degeneracy, Schrodinger wave equation and the postulates of Quantum Mechanics.
CO2	To learn about theories of reaction rates, Lindemann, Lindemann-Hinshel wood, and RRKM theories.
CO3	To know about Thermodynamic concepts and entropy change in reversible process and irreversible process, Gibbs- Duhem equation, calculation of thermodynamic properties.
CO4	To study the Thermodynamic and Kinetic Derivation of Nernst Equation and the derivation of Debye-Huckle Equation and its Verification

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	3	2	1	--	1	2	---	1	1
CO2	3	1	2	3	1		1		1	1	-	1
CO3	3	-	1	3	2	1	-	1		-	2	-
CO4	3	1	2	3	-	1	1	-	2	1	-	1

CHE-103: Physical Chemistry I

UNIT-I: Quantum Chemistry-I

(A)**Introduction to Exact Quantum Mechanical Results**

Operator algebra, Eigen values and Eigen functions, Operators for momentum and energy, Degeneracy, Linear combination of Eigen functions of an operator, well behaved wave functions, Normalized and

orthogonal functions, The schrodinger wave equation and the postulates of Quantum Mechanics, (B) **Applications of Schrodinger wave equation:** Particle in one dimensional and three dimensional box, harmonic oscillator, rigid rotor, hydrogen atom and its applications. Hydrogen like wave function, hydrogen like orbitals and their representation, polar plots, contour plots and boundary diagram. (C)**Approximate Methods:** The variation Theorem, Linear variation principle, perturbation Theory (first Order and non-degenerate), Application of variation Method and perturbation theory to the helium atom, The Born-Oppenheimer approximation.

UNIT-II: Chemical Dynamics

(A)**Theories of reaction rates:** Collision theory, steric factor. Theory of Absolute Reaction Rates-Reaction coordinate, activated complex and the transition state. Thermodynamic formiulation of reacton rates.

(B) **Unimolecular reactions:** Lindemann, Lindemann-Hinshel wood, and RRKM theories. Termolecular reactions. Complex reactions-Rate expressions for opposing, parallel and consecutive reaction (all first order type) (C) **Chain reactions:** Dynamic chain, hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane, photochemical reactions- H_2-Br_2, H_2-Cl_2 reactions, Autocatalysis, H_2-O_2 reaction explosion limits. (D) **Fast Reactions:** Flow system – Temperature and pressure Jump Methods – Relaxation Techniques.

UNIT – III : Thermodynamics

(A) **Brief review of Thermodynamic concepts:** Enthalpy, entropy, free energy. Concept of Entropy – Entropy as a state function –Entropy change in reversible process and irreversible process – Temperature – Entropy diagrams – Entropy change and phase change – Entropy of mixing – Entropy and disorder. (B) **Statistical thermodynamics:** Partial molar properties: their significance and determination of partial molar properties, fugacity and its determination. Concept of distribution, thermodynamic probability and most probable Distribution, Ensemble averaging, postulates of ensemble averaging, canonical, grand canonical and micro- canonical ensembles, partition functions, translational, rotational, vibrational and electronic partition functions, Gibbs- Duhem equation, calculation of thermodynamic properties in terms of partition functions, Entropy of monatomic gases (Sackur-Tetrade equation)

UNIT-IV : Electrochemistry I

(A) **Thermodynamic and Kinetic concept of Electrochemistry**

Thermodynamic and Kinetic Derivation of Nernst Equation, Chemical and Concentration Cells with and

without Transference, Liquid Junction Potential, Derivation of the Expression for Liquid Junction Potentials-its determination and elimination, Applications of EMF Measurements: (i)Solubility product, (ii)pH Determination, (iii) Potentiometric Titrations.; (B)**Conductivity:** Theory of Electrolytic Conductance, Derivation of Debye-Huckle Equation and its Verification, Debye- Falkenhagen Effect, and Wein Effect, kohlrausch law. Calculation of Solubility of Sparingly soluble Salt from Conductance Measurements.

Conductometric Titrations : Titration of Strong Acid Vs Strong Base (HCl vs NaoH) ; Titration of Weak Acid Vs Strong Base (AcoH vs NaoH); Titration of mixture of Strong and Weak Acids vs Strong Base ; Precipitation Titrations.

Books Suggested

1. physical chemistry, P. W. Atkins (ELBS)
2. Quantum Chemistry, Ira N. Levine (Prentice Hall)
3. Atomic Structure and Chemical bond, Manas Chandra.
4. Chemical Kinetics, K.J. Laidler (Mc Graw Hill)
5. Kinetics and Mechanism of Chemical Transformations, J. Rajaraman and J. Kuriacose (Mcmilan)
6. Thermodynamics for chemists, S. Glasstone
7. Chemical thermodynamics, I.M. Klotz
8. Statistical Thermodynamics, M. Dole
9. Modern Electrochemistry, Vol. I & II, J.O. M. Bockris and A.K.N. Reddy (plen
10. An Introduction to Electrochemistry (3rd ed.), S. Glasstone (Affiliated East-West).

(Compulsory Foundation)

CHE-104 (A)	General Chemistry I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on precision and accuracy, Limit of detection, Limit of determination, Sensitivity and selectivity, statistical evaluation of data
- Familiarize with principles and concepts of flame emission spectroscopy and atomic absorption spectroscopy and their applications.
- To know about ecosystem, nutrient cycle and dessert ecosystem and forest ecosystem and aquatic ecosystem.
- Gain knowledge on air pollution, water pollution, soil pollution, marine pollution, noise pollution and solid waste management.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about mean and median values, standard deviation and coefficient of variation.
CO2	To acquire knowledge on principle and instrumentation of AAS and difference between flame AAS and furnace AAS.
CO3	To know about the principle and concept of ecosystem and their functioning
CO4	To have an idea on environmental pollution and environmental impact assessment.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	-	-	2	1	1
CO2	3	2	-	3	1	-	2	1	-	1	1	-
CO3	3	3	2	3	2	1		1	2	1	1	2
CO4	3	2	1	2	3	1	1	1	-	2	1	1

CHE104-A: General Chemistry I

UNIT-I: TREATMENT OF ANALYTICAL DATA 15 Hrs

Precision and accuracy –mean and median values –Standard deviation – coefficient of variation, Types of errors: Determinate and indeterminate errors, confidence limits, significant figures, computations, minimization of errors, statistical evaluation of data –T-test ,F- test , and X^2 –test. Correlation

coefficient and coefficient of determination; Limit of detection (LOQ); Limit of determination(LOD) Sensitivity and selectivity of an analytical method.

UNIT-II: FLAME EMISSION AND ATOMIC ABSORPTION SPECTROSCOPY 15 Hrs

(a) **Flame Emission Spectroscopy**: Principles, chemical reactions in flames, Interferences, evaluation methods, flame photometer and experimental technique, procedure for determinations, limitations and disadvantages. Applications

(b)**Atomic Absorption Spectroscopy: Flame AAS:** Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT-III: ECOSYSTEMS 15 Hrs

Concept of an ecosystem (Abiotic and biotic environment), structure and function of an ecosystem Producers, Consumers and decomposers. Energy flow in the ecosystem, (Nutrient cycle in the ecosystem) Ecological succession Food Chain, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystems, Forest ecosystem, Grassl and ecosystem, Desert ecosystems aquatic ecosystems [ponds, streams, lakes, rivers, ocean estuaries].

UNIT-IV: ENVIRONMENTAL POLLUTION 15 Hrs

Definition a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear pollution Solid waste management : Causes, effects and control measures of urban and industrial wastes. Environmental impact assessment.

Books Suggested

1. H.W. Willard, LL. Merritt and J.A. Dean: Instrumental Methods of Analysis
2. Vogel's Text book of Quantitative Inorganic Analysis.
3. Analytical Chemistry
4. Instrumental Methods of Analysis H. Kaur

CHE 104B	General Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To familiarize with the significance of green chemistry and assessment of the impact.
- To gain knowledge on biocatalyst in oxidation, reduction and hydrolytic reactions
- To have an idea on solvent free reactions and modern reaction techniques.
- To familiarize with the use of ionic liquids as green solvents.

Course Outcomes: At the end of the course, the student will be able

CO1	To get knowledge on green reaction conditions and their impact on environment.
CO2	To know about use of different biocatalysts as environmentally friendly reagents.
CO3	To acquire knowledge on the use of modern techniques like ultrasound, microwave etc.
CO4	To have an idea on the use of ionic liquids in different reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	2	1	1	-	1	-	1	1
CO2	3	1	1	3	1	-	1	1	-	1	-	1
CO3	3	3	2	3	2	1		2	-	1	1	1
CO4	3	2	1	2	3	1	1	1	1	-	1	1

CHE 104B: General Chemistry I

UNIT-I

Fundamentals and significance of Green Chemistry: Discussion of the current state of chemistry and the environment and the definition of green chemistry. Assessment of the impact of chemistry in the environment and definition of risk hazard. An introduction to the tools of green chemistry and its fundamental principles.

Principles of Green Chemistry: Prevention of waste / by-products, Hazardous products- Designing of safer chemicals- Selection of appropriate solvents and starting materials- Use of protecting groups and catalysis- Designing of biodegradable products.

UNIT-II

Catalysis for Green Chemistry: Use of biocatalysts- Biochemical Oxidation, Biochemical Reduction, Enzyme Catalyzed Hydrolytic Process, Modified biocatalysis- transition metal catalysis- Reformatsky reaction, Wurtz reaction, Pinacol coupling, Simmons-Smith reaction,

Mukaiyama reaction, Heak reaction, Ullmann's coupling.

UNIT-III

Solvent Free Reactions: Solvent free techniques- Reactions on solid mineral supports, Phase Transfer Catalysis- C-alkylation, N-alkylation, S-alkylation, Darzen's reaction, Wittig reaction. Ultrasound assisted green synthesis- Oxidation, Reduction, Hydroboration, Bouveault reaction, Strecker reaction, Microwave assisted green synthesis- Biginelli reaction, Aza-Michael reaction, Suzuki reaction, Stille reaction, Sonogashira reaction.

UNIT-IV

Ionic liquids: Definition- Types of Ionic Liquids-Synthesis of Ionic Liquids- Selection of ionic liquids- physical properties- Application in organic synthesis- alkylation, allylation, oxidation, reduction, polymerization, hydrogenation, hydroformylation, alkoxycarbonylation, carbon-carbon bond forming reactions, alkene metathesis.

Books suggested:

1. New Trends in Green Chemistry by V.K. Ahluwalia, M. Kidwai.
2. Green Chemistry: Environment Friendly Alternatives by Rashmi Sanghi, M M Srivastava
3. Green Solvents for Organic Synthesis by V.K. Ahluwalia, Rajender S. Varma
4. Green Analytical Chemistry by Mihkel Koel and Mihkel Kaljurand

CHE 105 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Basic laboratory techniques of titration and analysis.
- Quantitative estimation of inorganic compounds through volumetric techniques.
- Calibration of volumetric apparatus and statistical analysis of the data.
- Determination of critical solution temperature of phenol-water system.

Course Outcomes: At the end of the course, the student will be able

CO1	To demonstrate mastery of basic semi-micro qualitative analysis of simple salts and interprets analytical data and will make scientific claims that are supported by the observations.
CO2	To familiarize with techniques of titration and calculation of errors.
CO3	To study the determination of critical solution temperature, eutectic composition, distribution coefficient, adsorption of different systems.
CO4	To calibrate the statistical data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	1	2	1	2	-
CO2	3	2	2	2	-	2	1	1	-	2	2	1
CO3	3	2	1	2	2	1	-	2	1	1	2	1
CO4	3	2	2	1	2	1	-	2	2	1	1	1

CHE 105 A & B: Core practical I: Inorganic & Physical Chemistry

CHE 105 A : Core practical I: Inorganic Chemistry

Semi Micro Qualitative Analysis

Qualitative Analysis of a mixture containing four cations including two less common cations (viz., W, Mo, Se, Te, V, Ce, Th, Zr, Li and U).

CHE 105 B : Core practical I: Physical Chemistry

1. Determination of critical solution temperature, eutectic composition and temperature of binary system.

2. Calibration of volumetric apparatus and statistical analysis of the data.
3. Determination of critical solution temperature of phenol-water system and study the effect of electrolyte on CST.
4. Determination of Eutectic composition and temperature of binary system
5. Determination of distribution coefficient of benzoic acid between water and benzene.
6. Study the adsorption of acetic acid on charcoal and analysis of the data on the basis of Langmuir and Freundlich adsorption isotherms.
7. Determination of rate constant of acid hydrolysis of an ester and investigate the effect of catalyst concentration, reactant concentration and temperature.

CHE 106A & B	Core practical I: Organic & General Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.

Course Objectives:

- Identification of single organic component by systematic qualitative analysis
- Preparation of derivatives and purification process
- Single step preparations
- Calibration of spectral analysis to this structures

Identification of single organic component by systematic qualitative analysis.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the systematic procedures of analysis of organic components.
CO2	To know the conformational tests for various functional groups.
CO3	To understand the mechanisms and familiarize with methodologies to prepare biologically important molecules.
CO4	Purification of compounds by different process

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	1	2	-	1	-	1	1	-
CO2	3	2	2	3	-	2	-	1	1	-	1	2
CO3	2	2	2	1	2	1	2	1	-	1	-	2
CO4	1	2	2	1	1	1	1	-	1	1	1	2

CHE : 106 A : PRACTICAL – I : ORGANIC CHEMISTRY

Identification of single components by Qualitative Analysis method

1. Aromatic acids
2. Aromatic amines
3. Aromatic phenols
4. Aromatic estors
5. Aromatic hydrocarbons
6. Carbohydrates
7. Aromatic carobohydrates compounds

CHE : 106 B : PRACTICAL – I : GENERAL CHEMISTRY

Single step preparations

1. Preparation of aspirin
2. Preparation of p-nitroacetanilide
3. Preparation of p-bromoacetanilide

CHE 107	Human Values and Professional Ethics-I	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of graduate level Human Values and professional ethics

Course Objectives:

- Analyze values in various ethical professions
- Understand moral concepts, character and conduct multiple
- Concept of ethical values with respect to individual and society
- ethical interests at stake in areal-world situation or practice and assess own ethical values with respect to social context and problems

Course Outcomes: At the end of the course, the student will be able to

CO1	To know about the needs and importance of professional ethics.
CO2	To analyze nature of Values, basic Moral Concepts character and Conduct.
CO3	To gain knowledge on individual and society ethical values, ahimsa, satya and brahmacharya.
CO4	To understand values of Bhagavd Gita, various religions, religious tolerence, Gandhian ethics.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	2	-	1	2	3	1	1	2
CO2	3	2	2	3	1	1	1	2	3	-	-	2
CO3	3	1	2	3	2	-	1	-	-	1	1	3
CO4	3	1	1	3	-	1	2	2	2	2	-	3

CHE 107: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS – I)

Chapter I: Definition and Nature of Ethics – Is relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics – Goals – Ethical Values in Various Professions.

Chapter II: Nature of Values – Good and Bad, Ends and Means, Actual and Potential Values, Objective and Subjective Values, Analysis of Basic Moral Concepts – Right, Ought, Duty, Obligation, Justice, Responsibility and Freedom, Good Behavior and Respect for Elders, Character and Conduct.

Chapter III: Individual and Society: Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non Possesion) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues) - Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation), Crime and

Theories of Punishment – (a) Reformative, Retributive and Deterrent, (b) Views on Manu and Yajnavalkya

Chapter IV: Bhagavd Gita – (a) Niskama Karma, (b) Buddhism – The Four Nobel Truths – Arya astanga marga, (c) Jainism - Mahavratas and Anuvratas. Values Embedded in Various Religions, Religious Tolerence, Gandhian Ethics.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
4. Harold H. Titus: Ethics for Today
5. Maitra, S.K: Hindu Ethics
6. William Lilly: Introduction to Ethics
7. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
8. Sasruta Samhita: Tr. Kaviraj Kunjanlal, Kunjanlal Brishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
9. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
10. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
11. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
12. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Mandatory Core)

CHE - 201	Inorganic Chemistry II	L-5, T-1, P-0	4 Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Understand magnetic properties of transition metal complexes and various reactions on ligands with respect to synthesis.
- Gain knowledge on electronic spectra of complex molecules of octahedral and tetrahedral geometry
- Understand magnetic properties viz., diamagnetism and paramagnetism and other related properties of complex molecules
- Familiarize with different catalytic reactions of complex molecules and factors effecting the reactions.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize with the general methods of complex preparations and properties, nature of bonding and structural features of metal complexes.
CO2	To know about Russel-Saunders coupling, splitting of energy levels in octahedral field and differentiate between Orgel diagrams and Tanabe-Sugano diagrams.
CO3	To understand about the laws of Hunds, Curie and Weiss, magnetism and magnetic susceptibility determination by Gouy's and Farady methods.
CO4	To gain knowledge on Induced reactions, Free radical reactions, Thermal decomposition reactions, Chain reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	2	1	-	1
CO2	3	2	-	3	1	2	1	-	1	2	1	1
CO3	3	-	2	3	-	2	1	1	-	1		1
CO4	3	1	1	3	-	2	-	1	1	1	1	-

CHE 201: INORGANIC CHEISTRY II

UNIT – I: TRANSITION METAL II – COMPLEXES II 15 Hrs

Transition metal π – complexes with unsaturated organic molecules – alkenes, alkynes, diene, dienyl and Cyclopentadienyl complexes and arene complexes-general methods of preparation, properties, nature of bonding and structural features – Important reactions relating to Nucleophilic and Electrophilic attack on

ligands and to organic synthesis.

UNIT – II: ELECTRONIC SPECTRA OF COMPLEXES 15 Hrs

Russel-Saunders coupling – Spectroscopic term symbols- Derivation of term symbols of p^2 and d^2 configuration, Hole Formulation, Energy ordering of terms (Hund's Rules), Splitting of energy levels and spectroscopic states in Octahedral field, Selection rules – Break – down of selection rules, Orgel diagrams, Definition and utility–Orgel Diagrams for d^1 to d^9 configurations in Octahedral and tetrahedral fields. Interpretation of electronic spectra of high spin octahedral and tetra hedral complexes of Ti(III), V(III), Cr(III), Mn(III), Mn(II), Fe(II), Fe(III), Co(III), Co(II), Ni(II) and Cu(II) complexes, Calculation of Dq and B^1 parameters for Cr(III) and Ni(II) complexes. Tanabe – Sugano diagrams, Differences between Orgel diagrams and Tanabe – Sugano diagrams, Tanabe – Sugano diagrams of d^2 to d^6 and d^8 configurations. Charge transfer spectra- LMCT and MLCT.

UNIT – III: MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES 15 Hrs

Diamagnetism and paramagnetism-orbital and spin contributions, spin-orbit coupling, Hunds third rule and Energies of J levels – Curie law and Curie – Weiss law- Ferromagnetism and antiferromagnetism – Temperature independent magnetism Magnetic susceptibility and its determination by Gouy's and Faraday methods.Calculation of magnetic moment from magnetic susceptibility, spin-only formula, Orbital contribution to magnetic moment (Oh and Td Complexes) –Paramagnetism and crystalline fields – Ti (III), V (III), VO^{2+}, Cr (III), Mn (II), Fe (III), Co(II), Ni (II) and Cu (II). Magnetic Exchange in copper acetate and other dimmers – spin cross over in complexes.

UNIT –IV: CATALYSIS 15 Hrs

Homogeneous catalysis, Metal ion catalyzed reactions – Redox potentials and processes – Mechanism of redox processes involving ligands – Factors affecting redox potentials - other types of metal catalyzed reactions – Reactions involving Ag (I) , Cu (II) and Os (VIII) – Reactions of Oxyanions – Factors affecting rate (General discussion only) – Induced reactions – Free radical reactions – Thermal decomposition of peroxy disulphate – Fe(III) $–S_2O_8$ reactions – chain reactions – H-Br reactions, H_2O_2 $–S_2O_8$reactions.

Books Suggested

1. Inorganic Chemistry principles of Structure and Reactivity 6th Edition. James E. Huheey.
2. Organometallic Chemistry: R.C. Mehrotra and Singh.
3. R. S. Drago: Structural methods in Inorganic Chemistry.
4. H. H. Willard, L. L. Merritt, Jr., J. A. Dean and F. A. Settle, Jr.: Instrumental Methods of Analysis (CBS Publishers).
5. R. L. Carlin: Magnetic Chemistry. R. L. Datta and A. Syamal: Elements of Magnetic Chemistry.

(Mandatory Core)

CHE-202	Organic Chemistry II	L-3, T-1, P-2	4 Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives:

- Able to recognize, classify, explain, and apply fundamental organic reactions such as E2, E1, E1CB.
- Familiar with molecular rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom.
- Provide Hantzsch-Widmann nomenclature for the three and four membered heterocycles. Be able to predict synthetic routes and chemical reactions of these heterocycles.
- Be familiar with occurrence, isolation, structural elucidation and synthesis of natural products-alkaloids

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the mechanisms of E_1, E_2 and E_{1CB} reactions, steroselectivity and synpyrolytic eliminations and use of isotopes, chemical trapping and crossover experiments.
CO2	To learn the rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom and familiarize with the limitations and applications of reactions.
CO3	To learn the synthesis of three and four membered heterocycles, mechanism of ring opening reactions and the effect of electron donating and withdrawing substituents in selectivity of ring opening reactions.
CO4	To understand the structural elucidation and synthesis of alkaloids using specific reagents.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	1	1	1	-
CO2	3	2	2	3	2	2		1	1	-	1	1
CO3	3	2	2	3	2	2	1	1	-	1	-	1
CO4	3	2	2	3	-	2	-	1	-	1	1	1

CHE- 202 : ORGANIC CHEMISTRY II

UNIT-I: Reaction mechanism-I **15 Hrs**

Electrophilic addition to carbon carbon double bond: Stereoselective addition to carbon carbon double

bond; anti addition- Bromination and epoxidation followed by ring opening. Syn addition of OsO_4 and $KMnO_4$.

Elimination reactions Elimination reactions E_2, E_1, E_{1CB} mechanisms. Orientation and stereoselectivity in E_2 eliminations. Pyrolytic syn elimination and α-elimination, elimination Vs substitution. Facors influencing the elimination reactions

Determination of reaction mechanism: Determination of reaction mechanism: Energy profiles of addition and elimination reactions, transition states, product isolation and structure of intermediates, use of isotopes, chemical trapping, crossover experiments. Use of IR and NMR in the investigation of reaction mechanism.

UNIT-II: Molecular Rearrangements: **15 Hrs**

Rearrangements to electron deficient Carbon atom:

Pinacol-Pinacolone, Wagner-Meerwein, Dienone-Phenol and Demjonove Rearrngements

Rearrangements to electron deficient Nitrogen atom:

Hofmann, Curtius, Schimidt and Beckmann Rearrangements.

Rearrangements to electron deficient Oxygen atom: Baeyer-Villiger and Dakins Rearrangements

Rearrangements to electron rich Carbon atom: Favorski and Neber Rearrangements

Aromatic and Sigmatropic Rearrangements: Fries and Claisen Rearrangements

UNIT III: Three and four membered heterocycles: 15 Hrs

Systematic nomenclature (Hantzsch-Widmann system) and Replacement nomenclature for monocyclic heterocycles (Three and four membered rings). Synthesis and chemical reactions of aziridines, oxiranes, thiiranes, azetidines, oxetanes, and thietanes.

UNIT-IV: Alkaloids 15 Hrs

Occurrence, isolation, general methods of structure elucidation and physiological action, degradation, classification based on nitrogen heterocyclic ring, structure elucidation and synthesis of the following: Atropine, Papaverine and Quinine.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.

5. Modern Organic Reactions, H.O. House, Benjamin.
6. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
7. Stereochemistry, P.S. Kalsi, Wiley Eastern.
8. Text book of Organic Chemistry, M.C. Murry
9. Text book of Organic Chemistry, Fessendon and Fessendon.
10. Text book of Organic Chemistry, T.W. Solomon,
11. Organic Chemistry, Vol II, I.L. Finar, ELBS Eds.
12. Heterocyclic chemistry T.L Gilchrist, Longman Scientific Technical
13. An Introduction to the Heterocyclic compounds, R M Acheson, John Wiley.

(Mandatory Core)

CHE -203	Physical chemistry II	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Learn Angular momentum and Molecular Orbital Theory and application of Huckel theory to organic molecules.
- Know about concepts in Surface Chemistry, concept of electric double layer model and Micelles.
- Get knowledge on symmetry and group theory their use in spectroscopy, Mulliken character tables.
- Understand Irreversible Electrode phenomenon controlled potential electrolysis and polarography.

Course Outcomes At the end of the course, the student will be able

CO1	To know about Pauli Exclusion principle and Slater determinant, atomic orbitals, Simple molecular orbitals and Huckel theory of conjugated systems.
CO2	To learn Gibbs adsorption isotherm, BET equation and correlate limitations, critical micellar concentration (CMC) and factors affecting the CMC of surfactants.
CO3	To identify Relation between order of a finite group and its sub-group, conjugacy, Symmetry point group (MLS, MHS and MSS) and orthogonality theorem.
CO4	To acquire knowledge on DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, to derive equation for Tafel plots, half-wave potentials for reversible system.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	2	-	1	1	1	2	-
CO2	3	2	2	3	2	2	-	1	1	1	-	1
CO3	3	2	2	3	-		1	-	-	1	1	-
CO4	3	2	-	2	1	1	-	1	1	1	1	-

CHE-AC-203 Physical Chemistry III

UNIT-I: Quantum Chemistry-II **15 Hrs**

(A) Angular momentum: Angular momentum, Rotations and angular momentum, Eigen functions and Eigen values of angular momentum, Ladder operator, addition of angular momenta, spin, antisymmetry and pauli Exclusion principle. Slater determinant. ;

(B) Molecular Orbital TheoryAtomic Orbitals, Simple Molecular Orbitals, Hybrid Atomic Orbitals, Shapes and energies of Molecular Orbital, Systems of Organic Molecules (Ex: Methane, Ethylene,

Acetylene). Huckel theory of conjugated systems, Π-bond order and charge density calculations, application of Huckel theory to ethylene, butadiene and benzene.

UNIT-II: Surface Chemistry **15 Hrs**

Surface tension, capillary action, pressure difference across curved surface, (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, BET adsorption isotherm, derivation of BET equation , limitations of BET equation, estimation of surface area from BET equation, Surface films on liquids. Concept of electric double layer model- Helmholtz perrin, Gouy- Chapman and stern models (no derivation)

Micells: Surface active agents, classification of surface active agents micellisation, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants, thermodynamics of micellisation, emulsions, reverse micelles.

UNIT-III: SYMMETRY AND GROUP THEORY **15 Hrs**

Definition of a group, rules that are set for a group, sub-group, order of a group, Relation between order of a finite group and its sub-group, conjugacy relation and class of a group, symmetry elements and symmetry operation. Symmetry point group (MLS, MHS and MSS), Schoenflies symbols - Representation of groups by matrices (representation for C_n, C_{nv}, D_{nh} etc. groups to be worked out explicitly), character of a representation, group multiplication tables, reducible - irreducible representations The great orthogonality theorem (without proof) - character tables (H_2O,NH_3) and their use in spectroscopy, Mulliken character tables.

UNIT-IV: ELECTROCHEMISTRY- II **15 Hrs**

Irreversible Electrode phenomenon: Reversibility and irreversibility, Dissolution and deposition potentials, Decomposition voltage, overvoltage, diffusion overvoltage, charge transfer overvoltage, concentration overvoltage-hydrogen and oxygen overvoltages, Tafel plots, Exchange current density and Transfer coefficient, Butler-Volmer equation for one electron transfer processes.

Polarography: Theory, classification , principle , Instrumentation of Polarography, DME, HMDE diffusion current, Ilkovic equation, DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, Millicoulometry, Equation for half-wave potentials, for reversible system when oxidant alone, reductant alone and both are present.

Books Suggested

1. P.W. Atkins: Physical Chemistry (ELBS).
2. Ira N. Levine: Quantum Chemistry (Prentice Hall).
3. R. Mcweeny: Coulson's Valence (ELBS).

4. J.O.M. Bockris and A.K.N. Reddy, Modern Electrochemistry, vol.I & II (Plenum).
5. S. Glasstone; An Introduction to Electrochemistry (3rd ed.)(Affiliated East-West).
6. V. Moroi: Micelles, theoretical and applied aspects (Plenum).
7. Maron and prutton: principles of physical Chemistry.
8. Silbey, Alberty, Bawendi. Physical Chemistry.Jhon-Wiley & Sons. 4th edition-2006.
9. D.N. Bajpai: Advanced physical Chemistry: S. Chand & Company, 1998.

(COMPULSORY FOUNDATION)

CHE-204 A	General Chemistry II	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on the principles of different electro analytical methods
- Familiarize with chromatographic techniques.
- To study on biodiversity and conservation of biodiversity
- To know about natural resources and non-renewable resources

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge on ion selective electrodes, solid membrane electrodes and glass electrodes and principles of amperometric titrations.
CO2	To learn general principles and classifications of chromatographic separations and applications of TLC, GLC and HPLC.
CO3	To know about biodiversity, ecosystem diversity and conservation of biodiversity.
CO4	To acquire knowledge on natural resources related to food, water, mineral, energy and land.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2		1	-	1	1	2
CO2	3	-	2	3	-	2	1	-	2	1	1	1
CO3	3	3	2	2	1	2	-	1	-	-	1	2
CO4	3	3	2	2	2	2	1	1	-	1	1	1

CHE 204-A: General Chemistry II

UNIT-I: ELECTRO ANALYTICAL METHODS

Theory of potentiometry, calculation electrode potential at the equivalence. Finding of equivalence volume, derivative and linear titration plots. Ion-sensitive electrodes –types of ion sensitive electrodes – metal based cation and anion sensitive electrodes, solid membrane electrodes, glass electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes, Amperometric titrations - Anodic stripping voltammetry, chronoamperometry, chronopotentiometry, Cyclic Voltammetry, Differential Pulse Polarography, linear sweep voltammetry, square wave voltammetry.

UNIT-II: CHROMATOGRAPHY

General principles and classifications of chromatographic separations

Thin layer chromatography: Classification, principle, experimental technique, sample application, development of plate, retardation factor.

Gas liquid chromatography: Gas liquid chromatography - instrumentation (columns and detectors), retention time and retention volume. Chromatographic behaviour of solutes, column efficiency and resolution, column processes and band broadening, time of analysis and resolution, Van-Deemter equation.

High performance liquid chromatography: Theory and instrumentation-column performance, gradient elution, delivery system, sample introduction, separation columns, detectors and applications of HPLC.

Unit – III : Biodiversity

Conservation introduction definition genetic species and ecosystem diversity, hot spots of biodiversity, threats to biodiversity habitat loss poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India, conservation of biodiversity in – situ an ex-situ conservation of biodiversity.

Unit – IV Natural resources and non-renewable resources

An overview of natural resources and associated problems with references to a) Forest resources b) Water resources c) Mineral resources d) Food resources e) Energy resources f) Land resources.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A.Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery J. Bassett, J. Mendham and R.C. Denny. Vogel"s Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (McGraw Hill).
5. D. Midgley and K. Torrance : potentiometric Water Analysis (John Wiley).
6. Silbey, Alberty, Bawendi. Physical chemistry. Jhon-Wiley & sons. 4th edition-2006.

CHE 204B	Chemistry in Contemporary Society	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To know about quality control and impurities in Pharmaceuticals.
- To have an idea on body fluids, blood, enzymes and forensic.
- To gain knowledge on composition of milk, oil, fats etc.
- To familiarize with different types of fuels, soils and its ingredients.

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge in pharmaceutical chemicals
CO2	To familiarize with blood fluids, blood, enzymes and forensic
CO3	To know about fermentation, detection of purity, beverages
CO4	To acquire knowledge on gaseous fuels, soil ingredients and analysis of trace elements

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	2	2	-	1	1
CO2	3	1	2	3	1	2	1	-	2	2	1	-
CO3	3	2	2	3	1	2	2	1	-	2	1	1
CO4	3	2	3	2	1	2	1	2	-	1	1	1

CHE 204B: Chemistry in Contemporary Society

UNIT – I : PHARMACEUTICALS 15 Hrs

Pharmaceuticals : Importance of quality control, drugs and pharmaceuticals, sources of impurities in pharmaceutical chemicals, analytical quality control in finished / final products, common methods of assay.

Common drugs and their uses: Analgesics – aspirin, paracetamol; Antheimentics – mebendazole ; Antiallergies – chlorpenneramine malleate; Antibiotics-pencillin, chloromecytin; Anti-inflammatory agents-oxyphenbutazone; **Antimalarials** – primaquine phosphate; Antituberculosists – INH; Narcotics – nicotine, morphine; Expectorants – Benadryl; Sedatives – diazepam; Vitamins – B**1**, B**2**, B**6**, niacin and folic acid.

UNIT – II : FORENSIC AND BIOMEDICALS **15 Hrs**

Body fluids: Composition and detection of abnormal level of certain constituents leading to diagnosis, sample collection and preservation of physiological fluids, analytical methods for the constituents of physiological fluids (blood, urine).

Blood: Estimation of glucose, cholesterol, urea, haemoglobin and bilirubin.

Urine: Urea, uric acid, creatinine, calcium phosphate, sodium, potassium and chloride.

Enzymes: Biological significance, assay of enzymes (pepsin, tyrasinase), vitamins (thiamine ascorbic acid, vitamin A) and harmones (progesterone, oxytocin, insulin), chemical, instrumental and biological assays to be discussed wherever necessary.

Forensic : General discussion of poisons with special reference to mode of action of cyanide organophosphates and snake venom, poisonous materials such as lead, mercury and arsenic in biological materials.

UNIT – III : FOOD AND BEVERAGES **15 Hrs**

Milk and milk products : Composition, alcohol test, fermentation, dye reduction-methylene blue and resazurin tests, analysis of fat content, minerals in milk and butter, estimation of added water in milk.

Oils and fats: General composition of edible oils, detection of purity, tests for common edible oils and groundnut oil, cottonseed oil and mustard oil, tests for adulterants like argemone oil and mineral oils,

Beverages: Soft drinks, alcoholic drinks, tea, coffee and fruit juice, analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, food preservatives like benzoates, propionates, sorbates, bisulphites, artificial sweetners, like saccharin, dulcin and sodium cyclamate, flavours – vanillin, esters (fruit flavours) and monosodium glutamate, artificial food colourants-coal tar dyes and non-permitted colours and metallic salts, control of food quality – codex alimentarices, Indian standards.

UNIT – IV : FUEL AND SOIL **15 Hrs**

Fuels : Definition, classification and characteristics of fuels, sampling, determination of calorific value. Liquid fuels-determination of flash point, fire point, aniline point. Knocking of petrol and diesel – octane and cetere numbers carbon residue. **Gaseous fuels** : Coal gas, waste gas, producer gas, gober gas and blast furnace gas, calorific value determination by Junker's gas calorimeter, relatice merits of solid, liquid and gaseous fules. **Soil** : Ingradiants of soil-organic matter, nitrogen, sulphur, sodium, potassium and calcium, analysis of trace elements, copper, molybdenum, zinc and boron.

Reference Books :

1. Pharmaceutical Analysis, T. Higuchi and E.B. Hanseen, John Wiley and Sons, New York.

2. Quantitative Analysis of drugs, P.D. Sethi, 3rd edition, CBS Publishers, New Delhi, 1997.
3. Practical Clinical biochemistry methods and interpretations, R. Chawala, J.P. Brothers Medical Publishers (P) Ltd., 1995.
4. Laboratory manual in biochemistry, J. Jayaraman. New Age International Publishers, New Delhi, 1981.

CHE 205 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Separation and determination of the two component mixtures
- Preparation of metal complexes
- Familiarize with conductometric, potentiometric and redox methods of analysis
- colorometric and pHmetric methods of analysis

Course Outcomes: At the end of the course, the student will be able

CO1	To separate and determine the two component mixtures
CO2	To acquire knowledge in the preparation of metal complexes
CO3	To study the determination of cell constant and verification of Onsagar equation, strength of strong acid by Titration of a strong acid with a strong base and vice versa
CO4	To get knowledge on the applications of conductometry, potentiometry, coulometry and pHmetry.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	3	1	-	2		1	1	-
CO2	3	2	2	3	2	2	1	-	1	-	1	2
CO3	3	2	2	3	3	1	1	2	-	1	1	-
CO4	3	2	2	3	2	-	1	-	1	1	-	2

CHE 205 A & B: Core practical I: Inorganic & Physical Chemistry

CHE 205 A : Core practical I: Inorganic Chemistry

I . Quantitative Analysis:

Separation and determination of two component mixtures:

(i) Separation of Al(III) and Determination of Fe (III)

(ii) Separation of Cu(II) and Determination of Zn (II)

(iii) Separation of Ca(II) and Determination of Mg (II)

(iv) Separation of Cu(II) and Determination of Ni (II)

(v) Determination of Ferrocyanide and Ferricyanide

CHE 205 B: Core practical I: Physical Chemistry

1. Conductometry:
   (a) Determination of cell constant
   (b) Verification of Onsagar equation
   (c) Determination of dissociation constant of a weak acid
   (d) Titration of a strong acid with a strong base
   (e) Titration of a weak acid with a strong base
2. Potentiometry:
   (a) Titration of a strong acid with a strong base
   (b) Titration of a weak acid with a strong base
   (c) Redox titration
3. Coulometry: Estimation of Manganese
4. pHmetry: Strong acid, Strong base titrations.

CHE 206A & B	Core practical I: Organic & General Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.

Course Objectives:

- Familiarize with two component mixture separation and identification.
- Preparation of derivatives.
- Purification by components by different methods.
- Calibration of products by spectral methods.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize with binary mixture separation
CO2	To gain hands-on-experience in purification of the components, preparation of derivatives.
CO3	To get knowledge about the chemical behavior of different components and mechanisms
CO4	Purification and calibration of data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	1	-	3	3	1
CO2	3	2	2	3	-	1	-	2	1	3	3	-
CO3	3	2	2	3	1	1	2	1	-	2	-	2
CO4	3	2	2	3	1	2		1	1	2	1	2

CHE 206 A & B: Core practical I: Organic & General Chemistry

CHE-206 A : PRACTICAL – I : ORGANIC CHEMISTRY

Separation and Identification of two component organic mixture by systematic qualitative analysis.

1.Acid + Neutral 2. Base + Neutral 3. Phenol + Neutral 4. Ether insoluable component + acid / phenol / base.

CHE-206 B : PRACTICAL – I : GENERAL CHEMISTRY

Preparation of Metal Complexes:

(i) Tetra(ammine) copper (II) sulphate.

(ii) Mercury tetra(thiocyanato) cobaltate(II).

(iii) Hexa(ammine) Nickel (II) chloride.

(iv) Tris(acetylacetonato) Manganese (III) chloride.

(v) Tris (ethylenediammine) Nickel (II) thiosulpha

CHE 207	Human Values and professional ethics-II	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of Human Values and professional ethics

Course Objectives:

- Gain knowledge on value education, family values and adjustability
- Develop ethics towards medical, health care professionals and ethical issues in genetic engineering
- Understand the importance of social ethics towards organ trade, human traffic king human rights violation and social disparities.
- Know about environmental ethics, ecological crises, pollution and protection of environment

Course Outcomes: At the end of the course, the student will be able to

CO1	To understand the concepts of human values, responsibilities of family values and status of women in family and society.
CO2	To acquire knowledge on different medical ethics the views of charaka and sushruta on moral responsibilities of medical practitioners.
CO3	To gain knowledge on social ethics and understand the characteristics of ethical problems in management.
CO4	To familiarize environmental ethics, ethical theory and ecological crisis.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	1	2	2	2	3	1	1	1
CO2	3	1	2	3	1	2	2	3	3	1	1	1
CO3	3	2	1	3	-	2	1	2	2	3	-	1
CO4	3	1	1	3	1	2	1	1	2	3	1	1

CHE 207: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS-II)

Chapter I: Value Education – Definition – Relevance to present day – Concept of human values - Self introspection – Self-esteem. Family values-Components, Structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Chapter II: Medical ethics – Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical

obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problem of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Chapter III: Social ethics – Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media – Impact of Newspapers, Television, Movies and Internet, Business ethics – Ethical standards of business – Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, Ethical abuses and work ethics.

Chapter IV: Environmental ethics – Ethical theory, man and nature - Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and pollution, Justice and environmental health.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. Management Ethics – Integrity at work by Joseph A. Petrick and John F. Quinn, Response Books, New Delhi.
4. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
10. Sasruta Samhita: Tr. KavirajKunjanlal, KunjanlalBrishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
11. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

13. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Eduction – Telugu Academy, Hyderabad.
14. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Core Theory)

CHE-OC-301	Organic Chemistry III	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives: Course Objectives:

- Familiarize with the applications of different reagents in organic synthesis, Mechanisms and stereochemistry.
- Study the methods of preparation and applications of organometallic reagents.
- Understand topocity, prochirality, auxillary and reagent-controlled methods in asymmetric synthesis.
- Applications of different oxidizing and reducing agents in organic synthesis with region and stereo controlled products.

Course Outcomes: At the end of the course, the student will be able to

CO1	To familiarize with the specific functions of the reagents particularly diazomethane, N-bromosuccinimide, Ziegler Natta catalyst, 1,3-dithianes and Merrifield resin in the synthesis of a variety of complex molecules.
CO2	To gain knowledge in the synthesis of different organometallic reagents and also stereo and regio specificity and selectivity of reactions with organometallic reagents
CO3	To understand diastereoselectivity, stereoselectivity and substrate controlled auxillary controlled reactions
CO4	To acquire knowledge about the reagents which causes oxidation in various compounds and also the reagents that causes selective and complete reductions to synthesize various compounds.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	1	2	2	2	2	1
CO2	3	2	2	2	2	2	1	2	1	1	2	-
CO3	3	2	2	3	2	2	-	1	-	1	-	2
CO4	3	2	2	3	2	2	1	2	1	2	2	1

CHE-OC-301 Core-Theory Organic Chemistry III

UNIT I: REAGENTS IN ORGANIC SYNTHESIS 15 Hrs

Use of the following reagents in organic synthesis: Anhydrous $AlCl_3$, Boran trifluoride,

N-Bromosuccinimide, Diazomethane, Dicyclohexylcarbodiimide, Lead tetraacetate, Zieglar-Natta catalysts, DDQ, Dithianes, Merrifield resin.

UNIT-II: ORGANOMETALLIC REAGENTS **15 Hrs**

Synthesis and applications of Grignard reagents, Organolithium, Zinc, Copper, Mercury, Palladium and Rhodium compounds in Organic Synthesis, Homogeneous catalytic hydrogenation and hydroformylation reactions

UNIT III: ASYMMETRIC SYNTHESIS **15 Hrs**

Topocity - Prochirality- Substrate selectivity - Diastereoselectivity and enantioselectivity-Substrate controlled methods-use of chiral substrates - examples

Auxiliary controlled methods-Use of chiral auxiliaries-Chiral enolates-alkylation of chiral imines – Stereoselective Diels-Alder reaction

Reagent controlled methods-Use of chiral reagents-Asymmetric oxidation-Sharpless epoxidation-Asymmetric reduction-Use of lithium aluminium hydride and borate reagents.

UNIT IV: METHODS OF ORGANIC SYNTHESIS **15 Hrs**

i). ***Oxidations:*** **(a)** Alcohols to carbonyls-Chromium (iv) oxidants-Dimethylsulfoxide oxidation, periodate xidation, Oppenauer oxidation, oxidation with manganese dioxide, oxidation with silver carbonate **(b)** Alkenes to epoxides-peroxide induced epoxidations. **(c)** Alkenes to diols-oxidation with potassium permanaganate, osmium tetraoxide, Prevost reaction **(d)** Ketones to esters-Bayer-Villiger oxidation **(e)** Oxidative bond cleavage-cleavage of alkenes by transition metals. **(f)** Oxidation of alkyl or alkenyl fragments-selenium dioxide and chromium trioxide oxidations.

ii). ***Reductions*** **:** Reduction with lithium aluminium hydride, sodium borohydride, alkoxides, bis-methoxy ethoxy aluminium hydride, Boran aluminium hydride and derivatives-catalytic,hydrogenation-dissolving metal reductions, Non-Metallic reducing agents including enzymatic and microbial reductions.

Suggested Books

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry, C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Name reactions and reagents in organic synthesis, B.P. Muway and M.G Ellord, John Wiley.
6. Principles of Organic Synthesis, R.O.C Norman and J.M Coxon, Blackie Academic & Professional.

7. Reaction Mechanism in Organic Chemistry, P.S. Kalsi, New Age International.
8. Principles of organometallic chemistry, P. Powell, ELBS.
9. Organo transition metal chemistry-Applications to organic synthesis, S.G. Davis, Pergmon.
10. Stereochemistry to Organic Compounds, D. Nasipuri, New Age International.
11. Stereochemistry, P.S. Kalsi, Wiley Eastern.

(Core Theory)

CHE-OC 302	**Organic Spectroscopy and Applications**	**L-5,T-1,P-0**	**4 Credits**

Pre-requisite: Understanding of Organic Spectroscopy and Applications

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands
- Study on the applications of NMR spectroscopy in ascertaining the stereochemical structures of the molecules.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy

Course Outcomes: At the end of the course, the student will be able to

CO1	To get experience to calculate λ max values for dienes, enones, polyenes, aromatic and heteroaromatic compounds.
CO2	To familiarize with the absorption bands of the molecules with specific functional groups
CO3	To interpret the data to different types of protons and carbons present in a molecule so as to ascertain the structure of the molecule based on the data provided
CO4	To acquire knowledge about specific fragmentation rules of different molecules which are unique.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	-	1	-	2	2	1
CO2	3	2	2	3	2	2	1	-	1	2	2	1
CO3	3	2	2	3	2	2	-	1	-	2	2	2
CO4	3	2	2	3	2	2	1	2	1	2	2	-

CHE 302: CORE THEORY: ORGANIC SPECTROSCOPY AND APPLICATIONS

UNIT-I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY: 15Hrs

Various electronic transitions (185-800 nm), effect of solvent on electronic transitions, ultraviolet bands

for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fisher-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds. Steric effect in biphenyls.

UNIT – II: INFRARED SPECTROSCOPY 15Hrs

Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ether, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and fermi resonance, FT-IR

UNIT –III: NMR SPECTROSCOPY: 15Hrs

^{1}H NMR spectroscopy: Magnetic properties of nuclei, Principles of NMR. Instrumentation, CW and pulsed FT instrumentation, equivalent and nonequivalent protons, enantiotopic and diastereotopic protons, Chemical shifts, factors affecting the chemical shifts, electronegativity and anisotropy, shielding and deshielding effects, Signal integration, Spin-spin coupling: vicinal, germinal and long range, Coupling constants and factors affecting coupling constants.

Applications of ^{1}H NMR spectroscopy: Reaction mechanisms (cyclic bromonium ion, electrophilic and nucleophilic substitutions, carbocations and carbanions), E, Z isomers, conformation of cyclohexane and decalins, keto-enol tautomerism, hydrogen bonding, proton exchange processes (alcohols, amines and carboxylic acids), C-N rotation. Stereochemistry, hindered rotation, Karplus curve variation of coupling constant with dihedral angle. Simplification of complex spectra, nuclear magnetic double resonance, contact shift reagents, nuclear Overhauser effect (NOE).

^{13}C NMR spectroscopy: General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimensional NMR spectroscopy-COSY.

UNIT-IV: MASS SPECTROMETRY 15Hrs

Introduction, ion production, type of ionization, EI, CI, FD, and FAB-factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular-ion peak, metastable peak, Mc. Lafferty rearrangement. Nitrogen rule, isotope labeling. High resolution mass spectrometry, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Books suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS
2. Spectroscopy of organic compounds, RM Silversteen and others, 5th Ed,John Wiley
3. Spectroscopy of organic compounds, P.S. Kalsi, Wiley, 1993.
4. NMR in chemistry-A multi nuclear introduction, William Kemp, Mc Millan, 1986.
5. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmi

(Mandatory Core)

CHE-OC-303A	Inorganic Spectroscopy and Thermal Methods of Analysis	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Basic Inorganic Spectroscopy and Thermal Methods of Analysis

Course Objectives:

- Gain knowledge on thermal methods of analysis and principles and applications to inorganic materials.
- Familiarize with basics of Mossbauer and NQR spectroscopy.
- Learn the properties like g-factor, nuclear spin, hyperfine coupling constants
- Study the ESR instrumentation, various applications and photoelectron spectroscopy.

Course Outcomes : At the end of the course, the student will be able

CO1	To know the basic principles of instrumental methods of analysis.
CO2	To gain knowledge on chemistry of alloys.
CO3	To Understand the complexity, theory and working principle of colourimetry
CO4	To familiarize with laws of colorimetric titrations.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	-	2	3	2	-	1	1	-
CO2	3	2	2	3	2	2	3	2	2	1	-	2
CO3	3	1	-	3	-	2	-	2	1	-	1	-
CO4	3	2	2	3	2	-	1	2	-	1	-	2

CHE-OC- 303A: Inorganic Spectroscopy and Thermal Methods of Analysis

UNIT –I: THERMAL METHODS OF ANALYSIS 15 Hrs

Thermo gravimetry –Principle, Factors affecting the results, instrumentation. Application with special reference to $CuSO_45H_2O$, $CaC_2O_4\ 2H_2O$. Different thermal analysis – principle, instrumentation, difference between TG and DTA, applications with special reference to the clays and minerals.Different scanning calorimetry –principle, and applications to inorganic materials like chlorates and perchlorates, ammonium nitrate.

UNIT –II: MOSSBAUER SPECTROSCOPY and NQR 15 Hrs

Mossbauer spectroscopy: Basic principles, Recoil energy, Doppler shift, Chemical shift, Quadrapole effects, Magnetic effects. Instrumentation, spectral parameters and spectrum display.

Aapplication of the technique to the studies of (1) bonding and structures of Fe^{2+} and Fe^{3+} compounds,

(2) Sn^{2+} and Sn^{4+} compounds.

NQR spectroscopy: Basic principles of NQR spectroscopy, quadrupole nuclei, quadrupole moments, electric field gradient, coupling constant and applications.

UNIT –III: ELECTRON SPIN RESONANCE SPECTROSCOPY 15 Hrs

Basic Principles, Hyper fine splitting, Factors affecting the 'g' value. Isotropic and anisotropic hyperfine coupling constants, Hamiltonian and spin densities. Zero field splitting and Kramer's degeneracy, Relaxation process and line widths. Instrumentation and Applications.The EPR spectrum of bis(salicylidimine)-copper(II) complex, study of inorganic free radicals, biological applications of Electron Spin Resonance (Study of free radicals and Iron-sulfur proteins)

UNIT –IV: PHOTO ELECTRON SPECTROSCOPY 15 Hrs

Photoelectric effect, Koopmans's theorem, ionization energy.

X-ray photoelectron spectroscopy (ESCA): Principle, Binding energies, Chemical shift, Applications of XPES to Qualitative analysis, to surface studies and structural analysis. Ultraviolet photoelectron spectroscopy- Principle, application of UPES in studying the molecular orbitals of O_2 and N_2 molecules. Block diagram of photoelectron spectrophotometer. Sources of radiation, detectors. Auger spectra – Principle, Applications of Auger spectra to surface studies and use of Auger spectra as a finger print tool.

Books Suggested

1. F.A. Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999. John wiley & sons. Inc., New York.
2. J.E. Huheey, E.A. Keiter and R.L. Keiter: Inorganic Chemsitry, Principles of Structure and Reactivity (4th Ed.) (Addison-Wesley)
3. Gary Wulfsberg: Inorganic Chemistry (5th Ed. (Viva Books)
4. J.D. Lee: Concise Inorganic Chemistry (Blackwell)
5. W.L. Jolly: Modern Inorganic Chemsitry (McGraw-Hill)
6. R.L. Carlin: Magneto-chemsitry (Springer-Verlag)
7. R.L. Dutta and A. Syamal: Elements of Magnetochemsitry (Affiliate East-West).
8. K. Hussain Reddy – Text book of Bioinorganic chemistry

CHE-OC- 303B	Physical Chemistry III	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Physical Chemistry

Course Objectives:

- Learn applications of Group Theory, symmetry criteria and symmetry restrictions.
- Applications of X-ray Diffraction and Electron Diffraction on solid state chemistry.
- Familiarize with the applications of Microwave spectroscopy, infrared spectroscopy and Raman spectroscopy.
- Get knowledge on concept of Thermodynamics of polymer dissolution and Flory-Huggins theory of polymer solutions.

Course Outcomes: At the end of the course, the student will be able to

CO1	To know the determination of Character Co-ordinate of C_2V point group based on 3N Coordinates and to learn the Mutual exclusion Principle.
CO2	To learn the Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals.
CO3	To study the rigid rotator model, stark effect, vibration-rotation spectroscopy, PQR branches, selection rules and Vibrational- rotational Raman spectroscopy.
CO4	To study the concepts on heat of dissolution, regular solution theory, Hildebrand solubility parameter, concept of Flory-Huggins theory of polymer solutions

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	2	1	2	-
CO2	3	2	2	3	2	2	1	2	-	2	1	1
CO3	3	2	2	3	2	2	1	1	2	-	1	2
CO4	3	2	2	3	-	2	1	-	1	2	1	2

CHE-AC-303B CORE-THEORY PHYSICAL CHEMISTRY III

UNIT-I Applications of Group Theory **15 Hrs**

Construction of reducible and irreducible representations, Determination of Character Co-ordinate of C_2V point group based on 3N Coordinates. Standard reduction formula, Determination of normal modes of vibrations of SO_2, NH_3, $POCl_3$, $PtCl_4^{2-}$, H_2O_2 molecules. Mutual exclusion Principle, Direct Product, Accidental Degeneracy and Fermi resonance Group Theory and Spectroscopy: IR Spectral activity of NH_3 molecule, selection rules, symmetry Criteria for optical activity, symmetry restrictions on dipole moments, symmetry and stereo isomerism. Prediction of IR and Raman Spectral activity of H_2O and CO_2.

UNIT-II: X-ray Diffraction: **15 Hrs**

(A) Solid State Chemistry Dislocation of Solids, Schottky and Frenkeldefects, insulaters, a,d semiconductors, Band theory of solids,solid state reactions.

(B) Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals. Index reflections, identification of unit cells from systematic absences in diffraction pattern- structure of simple lattices and X-ray intensities- structure factor and its relation to intensity and electron density- Description of procedure for X-ray structure analysis (NaCl and KCl)

(C) Electron Diffraction: Scattering intensity Vs scattering angle, Wierlequation, and its importance. Measurement techniques, Elucidation of structures of simple gas phase molecules, Low energy electron diffraction (LEED) for the study of surfaces.

UNIT-III: SPECTROSCOPHY 15 Hrs

Microwave spectroscopy: classification of molecules, rigid rotator model, effect of isotopic substitution on the transition frequencies, intensities- stark effect.

Infrared spectroscopy: Linear harmonic oscillator, zero point energy, anharmonity, Mores potential energy diagram, fundamental and overtone transitions, hot bands and combinations bands. Vibration-rotation spectroscopy, PQR branches, selection rules, factors affecting the band positions and intensities for IR region. **Raman spectroscopy:** Classical and quantum theories of Raman effect, pure rotational, pure vibrational Raman spectroscopy, selection rules, mutual exclusion principle, resonance Raman spectroscopy and coherent antistokes Raman spectroscopy. Vibrational- rotational Raman spectroscopy.

UNIT-IV: POLYMER SOLUTIONS 15 Hrs

Thermodynamics of polymer dissolution, effect of molecular weight on solubility, solubility of crystalline and amorphous polymer, heat of dissolution, regular solution theory, Hildebrand solubility parameter, Flory-Huggins theory of polymer solutions, conformational entropy, osmotic pressure and viscosity of polymer solutions. Molecular weight determination by light scattering, ultra-centrifugation and sedimentation equilibrium method. Liquid Crystals- synthesis and applications

Books Suggested

1. F.A. Cotton : Introduction to Group theory for chemists.
2. Geroge Davidson Elsevier : Introductory Group Theory for Chemists.
3. Gurdeep Raj , Ajay Bhagi&Vinod Jain : Group Theory and Symmetry in Chemistry
4. Instrumental methods of analysis – M.H. Willard, Meritt Jr. and J.A. Dean
5. Principles of instrumental analysis – Skoog and West

6. F. W. Billmeyer, Jr.: Text Book of Polymer Science. Wiley Interscience.
7. V. R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar.: polymer Science. New Age international Publishers.

CHE OC 304	Core practical I: Organic Estimations - Practical	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Organic Chemistry - Practical.

Course Objectives:

- Estimation of phenol
- Estimation of glucose
- Estimation and percentage purity of aspirin
- Estimation and percentage purity of paracetamol

Course Outcomes: At the end of the course, the student will be able

CO1	To gain knowledge about the estimation/percent purity of different organic molecules.
CO2	To get hands-on-experience with the synthesis and determination of concentrations and purity.
CO3	To acquire knowledge in handling of toxic chemicals in estimation process.
CO4	To gain experience in the calculating the percentage purity.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	1	2	1	-	2	-
CO2	3	2	2	3	2	2	2	2	-	2	2	2
CO3	3	2	2	3	2	1	-	2	2	1	-	2
CO4	3	2	2	3	2	-	1	2	1	2	-	2

CHE : OC : 304 : Practicals (Core & Gen.) Organic Estimations

1) Estimation of phenol
2) Estimation of glucose
3) Estimation of percentage purity of aspirin
4) Estimation of percentage purity of paracetamol.

CHE OC 305A	Chemotherapy and Drug Analysis	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Chemotherapy and Drug Analysis

Course Objectives:

- Gain knowledge on chemotherapy and analysis of drugs.
- Analysis of drugs chemically and biologically.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about the classification and synthesis of drugs.
CO2	To familiarize with the qualitative and quantitative analysis of drugs.
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	2	-	2	3	2	2	-	1	1
CO2	3	2	2	3	2	2	2	2	-	1	-	2
CO3												
CO4												

CHE OC 305A: (SKILL ORIENTED COURSE : THEORY) : CHEMOTHEROPY AND DRUG ANALYSIS

UNIT-I: Chemotherapy

Definition, History, and Evolution of Chemotherapy; Discovery, Classification, Nomenclature, Mode of action and synthesis of the following classes of compounds with special references to specific drugs mentioned under each class

a) Sulfa drugs- Sulfanilamide and Sulfamethoxazole.
b) Antibacterials
c) Lactum group of antibiotics – Penicillin, Ampicillin and Amoxycillin.
d) Cephalosporin-C and Ciprofloxacin.
e) Anticancer drugs – 5-Flurouracil, Methotrexate.
f) Antifungals – Griseofulvin
g) Antimalarials – Chloroquin

UNIT-II: Chemical and Biochemical analysis of Drugs

Qualitative and Quantitative Analysis of drugs: Uses of IR, UV, GLC and HPLC methods.

Drug Assay by Biochemical Analysis – ELISA (Cortisol, alcohol, opiates).

Radio Immuno Assay (RIA) – Enalapril, Insulin; Kidney, Lungs and Liver function tests; Use of isotopes in the Bioanalysis of drugs and in drug design programmes.

Book Suggested

1. Medicinal Chemistry and Pharmaceutical Chemistry – Harikishan Singh and Kapur
2. Medicinal Chemistry and Biochemistry – R.L.Nath
3. Introduction to Medicinal Chemistry – Patrick
4. The Organic Chemistry of Drug Synthesis Vols. 1-6 - Ledneicer Top drugs top synthetic routes – John Saunders
5. Medicinal Chemistry – Ashutoshkar
6. Synthetic Organic Chemistry and Drugs – Gurideep R Chetwal
7. Biochemistry – Harper, Conn & Stumpf, Lehninger
8. Biochemistry – Western Jodd
9. Biochemistry – Cann & Stumpf
10. Bergers Medicinal Chemistry Vols. 1-5 – Manfred E. Wolf
11. Introduction to drug design – Siverman
12. Biochemical approach to Medicinal Chemistry – Thomas Nogrady
13. Prinicples of Medicinal chemistry – William Foye
14. Text book of organic medicinal and pharmaceutical chemistry – Delgrado and William A
15. Industrial Microbiology – Casida

CHE OC 305B	Multistep perparations	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding the theory behind multistep preparations Practical

Course Objectives:

- Multistep preparations of biologically important organic molecules.
- Familiarize to identify the synthesized compounds by spectral methods.

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge in handling of toxic chemicals in multistep preparation of biologically important molecules in good percentage of yield.
CO2	To gain experience in the proposal of synthetic routes to functionalized derivatives.
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	-	2	3	2	1	-	1	1
CO2	3	2	2	3	2	2	3	2	-	1	-	2
CO3												
CO4												

CHE : OC: 305 (B) : Practicals (Skill Oriented Course) : Multistep preparations

1) Preparation of benzilic acid
2) Preparation of benzanilide
3) Preparation of o-chlorobenzoic acid
4) Preparation of symmetric tribromobenzene

CHE OC 306	Spectral Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Spectral Techniques

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands.
- Study on the applications of flame atomic absorption spectroscopy.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy.

Course Outcomes: At the end of the course, the student will able

CO1	To know the basic principles of spectroscopy.
CO2	To familiarize with the analysis of various functional groups by using different spectroscopic techniques.
CO3	To Understand the applications of AAS.
CO4	To gain knowledge about Mass spectral fragmentation of organic compounds and common functional groups.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	-	2	3	2	-	-	1	-
CO2	3	1	2	2	2	2	2	2	1	1	-	2
CO3	3	2	1	2	2	1	2	-	2	-	1	1
CO4	3	1	2	3	1	2	-	-	1	1	-	2

CHE : OC : 306(A): (OPEN ELECTIVE) SPECTRAL TECHNIQUES

UNIT – I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY 15 Hrs

Various electronic transitions (185-800nm.), Beer-Lambert Law, effect of solvent on electronic transitions , ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, Fieser-Woodward rules for conjugated dienes and carbonyl compounds

UNIT – II : INFRARED SPECTROSCOPY 15 Hrs

Instrumentation and sample handling, characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols, amines, ketones, aldehydes, esters, amides, acids and anhydrides. Effect of hydrogen bonding.

UNIT – III:ATOMIC ABSORPTION SPECTROSCOPY: FLAME AAS: 15 Hrs

Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT –IV: MASS SPECTROMETRY 15 Hrs

Principle, instrumentation, different methods of ionization, EI, CI, FD and FAB, Mass spectra-molecular ion, base peak, meta-stable peak, nitrogen rule and Mc Lafferty rearrangement. Mass spectral fragmentation of organic compounds and common functional groups. Normal and branched alkanes, alkenes, cycloalkanes, benzene and its derivatives, alcohols and phenols, ethers, aldehydes and ketones, carboxylic acids and their derivatives , amines and nitro compounds. Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Books Suggested:

1. Organic spectroscopy, W.Kemp 5th Ed, ELBS .2.
2. Spectroscopy of organic compounds, RM Silversteen and others 5th Ed, John Wiley 1991
3. Spectroscopy of organic compounds, PS Kalsi, Wiley, 1993
4. NMR in chemistry – A Multi nuclear introduction, William Kemp, Mc Millan 1986
5. Spectroscopic methods in Organic Chemistry, DH Williams & I Flemmi TMH . 2005

CHE OC 306	Chromatographic Techniques	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chromatographic Techniques

Course Objectives:

- Familiarize with Classification of Chromatographic methods.
- Understand Demonstration experiment in TLC.
- Study on the applications of High-Performance Liquid Chromatography (HPLC).
- Understand the working principle of gas chromatography.

Course Outcomes: At the end of the course, the student will able to

CO1	To know the stationary and mobile phases in chromatographic techniques.
CO2	To familiarize applications of different chromatographic methods.
CO3	To Understand the principle of chromatographic techniques.
CO4	To gain knowledge on the normal phase and reverse phase.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3		2	3	2	-	-	1	-
CO2	3	2	2	3	2	2	3	2	-	1	-	2
CO3	3	2	-	2	2		2	-	-	-	1	-
CO4	3	2	2	3	-	2		-	-	1	-	2

CHE OC 306 : Chromatographic Techniques

Unit –I: Introduction - Classification of Chromatographic methods – Column chromatography-Adsorption phenomenon: Nature of adsorbents-Solvent systems-Differential migration-Separation of mixture of o-/p-nitro anilines (A demonstration experiment).

Unit –II: Thin-Layer Chromatography (TLC)-Coating materials and preparation of TLC plates-Solvents for development-Detection of compounds in TLC- R_f values in TLC-Applications of TLC in chemistry-Preparative TLC – Demonstration experiment in TLC.

Unit –III: High-Performance Liquid Chromatography (HPLC) - Application of HPLC- HPLC instrument-Stationary phases in HPLC-Normal and reversed phase HPLC: A comparison- Normal phase HPLC: Principle-Retention times in Normal and reversed phase HPLC- Reversed phase HPLC: Principle.

Unit –IV: Gas-Liquid Chromatography- Instruments for Gas-Liquid Chromatography- Gas-Chromatographic Columns and the Stationary Phase- Application of Gas-Liquid Chromatography- Gas-

Solid Chromatography.

Reference Books:

1. Analytical chemistry: G L David Krupadanam, D. Vijaya prsad, K. Varaprasad Rao, KLN Reddy, C. Sudhakar.
2. . Analytical chemistry: Skoog West Holler.
3. Modern Analytical Chemistry : David Harvey DePauw University.
4. J.G. Dick. Analytical Chemistry, Mc Grraw Hill, New Delhi, (1973).

(Mandatory Core)

CHE-OC- 401	Organic synthesis I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Organic synthesis

Course Objectives:

- Acquire knowledge in the applications of Boron, Phosphorus, Sulfur and Silicon reagents in organic synthesis and their special behavior.
- Study photochemical reactions of olefins, carbonyl compounds, aromatic compounds, rearrangements and stereochemistry of the products.
- Understand the concept of pericyclic reactions, determination of allowed and forbidden transitions and prediction of stereochemistry of the products.
- Study different polymer reactions, Stereospecific polymers, Thermoplastics, Fibers, Elastomers and Ion exchange resins.

Course Outcomes : At the end of the course, the student will be able to

CO1	Familiarize with the unique reactivity of Boron, Phosphorus, Sulfur and Silicon reagents
CO2	Learn about photolytic reactions of carbonyl compounds, conjugated carbonyl derivatives, olefins, conjugated dienes CO_3:To gain knowledge in the determination of allowed or forbidden of chemical reactions *viz*., cycloaddition and
CO3	Learn the methods of preparation, properties, and industrial applications of various addition and condensation
CO4	Familiarize with the unique reactivity of Boron, Phosphorus, Sulfur and Silicon reagents

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	3	-	2	-	2	-	1
CO2	3	3	3	3	3	2	-	1	-	2	-	3
CO3	3	3	3	3	3	2	-	1	-	-	1	3
CO4	3	3	3	2	-	2	-	-	2	2	1	2

CHE OC-401: CORE THEORY: ORGANIC SYNTHESIS-I

UNIT-I: Chemistry of Organo Boran, Phophorus, Sulfur and Silicon reagents 15Hrs

Electronic structure and bonding in Boron, Phosphorus, Sulphur and Silicon compounds-Their reactivity and applications in Organic Synthesis.

Boron Reagents-Hydroboration-Organoboranes in the formation of C-C bonds, alcohols, amines, halogen and carbonyl compounds-Free radical reactions of organoboranes.

Phosphorus Reagents- Formation of carbon-carbon double bonds-Functional group transformations –

deoxygenation reactions-reactivity as electrophiles- conversitoon of alcohols to alkyl halides, Witting reaction and nucleophiles - Corey-Winters reaction, Michaelis-Arbusov reaction-Perkow reaction and Mitsnobu reaction.

Sulphur Reagents- Sulphur ylides, stabilized and non-stabilized – Preparation and reactivity Pummerer reaction – sulphonyl carbanions-Julia reaction

Silicon reagents-Peterson's olefination, influence of trialkyl silyl reagents in electrophilic reactions, aryl silanes, alkenyl silanes, alkynyl silanes, allyl silanes.

UNIT-II: PHOTOCHEMISTRY 15Hr

Photochemical energy, photochemical excitations, Franck-Condon principle, electronic transitions, Jablonski diagram, singlet and triplet states, energy transfer in photochemical reactions - photosensitization reactions and quantum yield.

Photochemistry of carbonyl compounds - Norrish Type-I and Norrish Type-II reactions, Photo Reduction and Paterno-Buchi reaction. Photochemistry of α,β-unsaturated ketones, enones, dienones and p-benzoquinones.

Photochemistry of unsaturated systems (olefins), cis-trans isomerization and dimerization reactions, Photochemistry of conjugated dienes - 1,3-butadiene, aromatic compounds, Photoaddition (1,2- & 1,4-additions) and Photosubstitution reactions of benzene derivatives. Photo-Fries rearrangement and Barton reaction.

UNIT III: PERICYCLIC REACTIONS 15 Hrs

Molecular orbital symmetry, Frontier orbitals of ethylene, 1,3 butadiene, 1,3,5-hexatriene and allyl and pentadienyl system. Classification of pericyclic reactions. Woodward-Hoffmann correlation diagrams. FMO and PMO (Mobius Huckel) approach. Electrocyclic reactions-Conrotatory and disrotatory. 4n, 4n+2 and allyl systems. Cycloadditions-antarafacial and suprafacial additions, 4n and 4n+2 systems, 2+2 addition of ketene, 1,3 dipolar cycloadditions and cheleotropic reactions.

Sigmatropic rearrangements - Suprafacial and antarafacial shifts of H, Sigmatropic shifts involving carbon moieties, 3,3 and 5,5 Sigmatropic rearrangements. Claisen, Cope and Oxy-Cope rearrangements. Ene reaction

UNIT IV: SYNTHETHETIC POLYMERS 15 Hrs

Polymer Reactions-Addition and condensation polymerization processes- Bulk, Solution, Suspension

and Emulsion polymerization.

Stereospecific Polymers-Preparation and significance- classification of polymers based on physical properties-Thermoplastics-Thermosetting plastics-Fibers and elastomers- General applications.

Preparation of Polymers-Preparation of Polymers based on different types of monomers Industrial applications-olefin polymers-Diene polymers-nylons-Glyptal resins-Urea-formaldehyde, phenol-formaldehyde and melamine resins- Epoxy resins - Ion exchange resins.

Book References:

1. Modern Synthetic Reactions, H.O. House, W.A Benjamin.
2. Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge University Press.
3. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
4. Principles of Organic Synthesis, R.O.C. Norman and J.M Coxon, Blackie
5. Advanced Organic Chemistry Part A & B, F.A Carey and R. J Sunderg, Plenum Press.
6. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
7. Reaction Mechanism in Organic Chemistry, P.S. Kalsi, New Age International.
8. Modern Synthetic Reactions, H.O. House, W.A. Benjamin.
9. Chemistry of Organic Natural Products, O.P. Agrawal, Vols., 1 & 2, Goel Pubs.
10. Natural Products Chemistry K.B.G. Torssell, John Wiley, 1983.
11. Principles of biochemistry, A.L. Lehninger worth publishers
12. A Text book of Biochemistry, A.V.S.S. Rama Rao

(Mandatory Core)

CHE-OC 402	Organic Synthesis II	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Organic Synthesis

Course Objectives:

- Use disconnection approach and retrosynthetic analysis and control of stereochemistry to design efficient multi-step syntheses involving different types of disconnection approaches
- Applications to synthesis complex naturally occurring compounds
- Familiarize with synthesis and pharmacological properties of antimalarials and antibiotics
- Understand structure and synthesis of proteins and nucleic acids

Course Outcomes: At the end of the course, the student will be able to

CO1	Familiarize with functionalization and interconversion of functional groups and the concept of organic synthesis by retrosynthetic approach.
CO2	Gain knowledge in the formulation of synthetic routes for naturally occurring drugs.
CO3	Understand quinoline, acridine and guanidine group of alkaloids as antimalarials and to familiarize with the role of functioning of broad spectrum antibiotics.
CO4	Acquire knowledge about the classification, properties, structure & conformation and biological functions of peptides/proteins.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	-	1	-	-	1	-	3
CO2	3	3	3	3	2	1	-	-	-	1	-	2
CO3	3	3	3	3	2	-	-	2	-	1	1	3
CO4	3	3	3	3	2	2	-	2	-	-	2	3

CHE OC-402: CORE THEORY: ORGANIC SYNTHESIS-II

UNIT-I: DESIGNING OF ORGANIC SYNTHESIS 15 Hrs

Disconnection Approach-Classification of organic reactions. Functionalisation and interconversion of functional groups, formation of carbon-carbon single and double bonds, general strategy, disconnection and synthon approach, retrosynthetic analysis, key intermediates and starting materials in designing a synthesis, linear and convergent synthesis, reconnections. The importance of the order of events in organic synthesis, one group C-X and two group C-X disconnections, chemoselectivity, reversal of polarity, cyclisation reactions, amine synthesis.

Protecting Groups-Principles of protection of alcohol, amine, carbonyl and carboxyl groups.

One Group C-C Disconnections-Alcohols and carbonyl compounds, regioselectivity. Alkene synthesis, use of acetylenic compounds in organic synthesis.

Two Group C-C Disconnections-Diels-Alder reaction, 1,3-difunctionalised compounds, unsaturated carbonyl compounds, control in carbonyl condensations, 1,5-difunctionalised compounds, Michael addition and Robinson annulation.

UNIT II: MULTI STEP SYNTHESIS **15 hrs**

Multi step synthesis of some complex naturally occurring compounds involving through retrosynthetic analysis and control of stereochemistry, Longifolene, Taxol, Juvabione, Fediricamycine A.

UNIT III: ANTIMALARIALS AND ANTIBOTICS **15 hrs**

Antimalarials: Synthesis and activity of Quinoline group – Quinine, Plasmoquine and Chloroquine – Acridine group – Quinacrine – Guanidine group – Paludrine.

Antibiotics: Synthesis and activity of Penicillin, Chloramphenicol and Streptomycin – Broad spectrum antibiotics – Tetracyclines, Novobiocin.

Chemotherapy: Structure – activity relationships.

UNIT-IV: BIOMOLECULES **15 Hrs**

Peptides and Proteins-Methods of peptide synthesis, sequence determination, structure of oxytocin, proteins-classification, structure, conformation and properties. Nucleic acids- Nucleosides, Nucleotides, DNA and RNA, structure and conformations, replication, translation of genetic material, genetic code, gene expression, gene mutation, protein synthesis.

Book References:

1) Modern Synthetic Reactions, H.O. House, W.A Benjamin.
2) Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge University Press.
3) Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
4) Principles of Organic Synthesis, R.O.C. Norman and J.M Coxon, Blackie
5) Advanced Organic Chemistry Part A & B, F.A Carey and R. J Sunderg, Plenum Press.
6) Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
7) Reaction Mechanism in Organic Chemistry, P.S. Kalsi, New Age International.
8) Modern Synthetic Reactions, H.O. House, W.A. Benjamin.
9) Chemistry of Organic Natural Products, O.P. Agrawal, Vols., 1 & 2, Goel Pubs.
10) Natural Products Chemistry K.B.G. Torssell, John Wiley, 1983.
11) Principles of biochemistry, A.L. Lehninger worth publishers
12) A Text book of Biochemistry, A.V.S.S. Rama Rao

(Mandatory Core)

CHE-OC-403A	Heterocycles and Natural Products	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of Heterocycles and Natural Products

Course Objectives:

- Familiarize with Hantzsch- Widmann nomenclature of Fused heterocycles. Synthesis and reactivity of five membered heterocycles with two hetero atoms
- Understand synthesis and reactivity of benzofused five membered and six membered heterocycles
- Gain knowledge on structural elucidation, synthesis and biosynthesis of steroids and hormones
- Familiarize with on structural elucidation, synthesis and biosynthesis of flavonoids and isoflavonoids

Course Outcomes: At the end of the course, the student will be able to

CO1	Familiarize with the synthetic routes of five membered heterocycles with two heteroatoms and to justify the site of
CO2	Acquire knowledge on the synthetic methodologies of benzofused and six membered heterocycles and the effect of
CO3	Familiarize with the structural elucidation and synthesis of naturally occurring steroids and hormones
CO4	Know about isolation, structural determination and synthesis of flavonoids and isoflavonoids.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	-	2	-	2	-	3
CO2	3	3	3	3	2	2	-	2	-	2	1	3
CO3	3	3	3	3	2	-	-	2	-	-	1	3
CO4	3	3	3	3	2	-	-	2	-	-	1	3

CHE : OC-403(A) : (GENERIC ELECTIVE): HETEROCYCLES AND NATURAL PRODUCTS

UNIT-I: NOMENCLATURE AND FIVE MEMBERED HETEROCYCLES 15 HRS

Systematic nomenclature (Hantzsch-Widman nomenclature) for fused and bridged heterocycles, Five membered heterocycles with two heteroatoms: Synthesis and reactions of pyrazole, imidazole, isoxazole, oxazole, isothiazole and thiazole

UNIT-II: BENZOFUSED FIVE MEMBERED AND SIX MEMBERED HETEROCYCLES

15 HRS

Benzofused five membered heterocycles: Synthesis and reactions of Benzopyrazoles, Benzimidazoles and Benzoxazoles

Six Membered heterocycles with two or more heteroatoms: Synthesis and reactions of diazines (pyridazine, pyrimidine & pyrazine) and triazines (1,2,3-, 1,2,4- 1,3,5- triazines)

UNIT-III: STEROIDS AND HORMONES 15 HRS

Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry. Isolation, structure determination and synthesis of Cholesterol (total synthesis not expected), Bile acids, Androsterone, Testosterone, Estrone, Progesterone. Biosynthesis of steroids.

UNIT-IV: FLAVONOIDS AND ISOFLAVONOIDS 15 Hrs

Occurrence, nomenclature and general methods of structure determination. Isolation and synthesis of Apigenin, Luteolin, Kaempferol, Quercetin, Butein, Daidzein, Biosynthesis of flavonoids and isoflavonoids: Acetate Pathway and Shikimic acid Pathway. Biological importance of flavonoids and isoflavonoids.

Reference Books:

1. Heterocyclic chemistry Vol. 1-3, R.R. Gupta, M.Kumar and V. Gupta, Springer Verlag.
2. The Chemistry of Heterocycles, T. Eicher and S. Hauptmann, Thieme.
3. Heterocyclic Chemistry, J.A. Joule, K. Mills and G.F. Smith, Chapman and Hall.
4. Heterocyclic Chemistry, T.L. Gilchrist, Longman Scientific Technical.
5. Contemporary Heterocyclic Chemistry, G.R. Newkome and W.W. Paudler, Wiley-Inter Science.
6. An Introduction to the Heterocyclic Compounds, R.M. Acheson, Jonn Wiley.
7. Comprehensive Heterocyclic Chemistry, A.R. Katritzky and C.W. Rees, eds. Pergamon Press.
8. Organic Chemistry, Vol. 2, I. L. Finar, ELBS.
9. Introduction to Flavonoids TA Geissman.

(Compulsory Foundation)

CHE-OC-403B	Bioinorganic, Bioorganic, Biophysical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Bioinorganic, Bioorganic, Biophysical Chemistry

Course Objectives:

- Highlighten metal complexes as oxygen carriers and electron transfer in biology.
- Metal ion transport and storage in biological systems and importance of trace metals in biology.
- Learn physiological functions of carbohydrates, lipids, enzymes classification, stereospecificity.
- The basic concepts of biophysical chemistry in biochemical reactions, exergonic and endergonic reactions.

Course Outcomes: At the end of the course, the student will be able to

CO1	Gain knowledge on metallo proteins in electron transfer processes.
CO2	Know the applications of trace metal ions and metal ions as chelating agents in medicine.
CO3	Achieve and develop highly stereoselective synthesis of organic compounds and drugs by adopting environmentally.
CO4	Understand thermodynamics of biopolymer reactions and to correlate free energy and biopolymer parameters.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	3	2	-	2	-	3
CO2	3	3	3	3	3	2	3	-	-	-	3	3
CO3	3	3	3	3	3	3	-	2	-	2	-	3
CO4	3	3	3	3	3	3	2	2	-	3	3	3

CHE AC-403(B): (GENERIC ELECTIVE): BIOINORGANIC, BIOORGANIC, BIOPHYSICAL CHEMISTRY

UNIT-I: **BIO-INORGANIC CHEMISTRY- I** **15 Hrs**

Metal complexes as oxygen carriers –Heme proteins –Hemoglobin and myoglobin –Non heme proteins –hemerythrin and hemocyanin – model synthetic complexes of iron, cobalt and copper.Co-enzymes Vitamin B_{12},carboxy peptidase and superoxidedismutase.

Electron Transfer in Biology: Structure and functions of metalloproteins in electron transfer processes –catalase –peroxidose –cytochromes and iron –sulphur proteins –synthetic models.

UNIT – II: BIOINORGANIC CHEMISTRY- II: Metal ion transport and storage in biological systems**,** Metal ions in Biology, Molecular mechanism of ion transport across membranes: ionophores, photosynthesis.

Hydrolytic metalloenzymes: Carbonic anyhdrase, carboxy peptidase, calcium in control processes, calcium and muscle contraction, calcium and secretion, calcium in blood clotting mechanisms. Therapeutic uses of enzymes.

Importance of trace metals in biology: Metal ions as chelating agents in medicine, trace metal ions and metal and non-metal deficiency. Biological nitrogen fixation,in-vivo and in-vitro nitrogen fixation.

UNIT-III: BIOORGANIC CHEMISTRY

Carbohydrates: Structure and biological functions of mucopolysaccharides, glycoproteins, and glycolipids- Role of sugars in biological recognition-Blood group substances

Lipids: Essential fatty acids-structure and function of triglycerols, Glycerophospholipids, cholesterol, bile acids prostaglandins- composition and functioning of lipoproteins

Enzymes: Nomenclature and classification, properties, factors affecting enzyme catalysis, enzyme inhibition- reversible and irreversible inhibition. Uses of enzymes in food drink industry and clinical laboratories.

UNIT-IV: BIOPHYSICAL CHEMISTRY:

Standard free energy change in biochemical reactions, exergonic and endergonic reactions, hydrolysis of ATP, thermodynamics of biopolymer solutions, chain configuration of bio polymers, and calculation of average dimensions. Membrane equilibrium, ion transport through cell membrane. dialosis and its function. Structure and functions of proteins, enzymes, DNA and RNA in living systems, forces involved in bio polymer interactions, electrostatic forces, hydrophobic forces, molecular expansion, and dispersion forces.

Books Suggested

1. M.N. Hughes, The Inorganic chemistry of Biological Processes, John wiley and Sons, New York 2nd Edition, 1981.
2. A Text book of Biochemistry, A.V.S.S. Rama Rao
3. Physical chemistry by Atkenes
4. Physical chemistry by Albertz.
5. Bio physical chemistry by Van Holde

6. Bio Physics by Narayanam
7. Organic Chemistry, Vol. 2, I. L. Finar, ELBS.
8. Chemistry of Natural Products, P.S. Kalsi, Kalyani Publishers.
9. Chemistry of Organic Natural Products, O. P. Agarwal, Vols., 1 & 2, Geol Pubs.
10. Natural products Chemistry K.B.G. Torssell, John Wiley, 1983.
11. Burger's Medicinal Chemistry, M.E. Wolff, John Wiley
12. Medicinal Chemistry, A. Kar, New Age International

CHE OC 404	Core practical I: Spectral Identification of Organic Compounds	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Spectral identification of organic compounds

Course Objectives:

- Spectral identification of organic compounds by UV by calculating λ max values
- Identification of absorption bands by IR and ascertain to the functional groups
- Unambiguous assignment of structures by interpreting NMR values
- Predict the characteristic cleavage processes by Mass.

Course Outcomes: At the end of the course, the student will be able to

CO1	Calculate λ max values.
CO2	Ascertain functional groups.
CO3	Interpret the spectral data to the structure and stereochemistry of the molecules.
CO4	Analyse the fragmentation patern of the molecules.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3	-	3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE OC 403: PRACTICAL-I

Spectral identification of organic compounds by UV, IR, NMR (^{1}H & ^{13}C) & Mass spectroscopy.

DEMONSTRATION EXPERIMENTS

1 IR – Interpretation of IR spectrum of alcohols, ketones, aldehydes and other standard materials

2 AAS: Demonstration of AAS – Determination of Zn, Cd, Pb, Mn, Fe and Ni in effluents using AAS.

3 Spectrofluorimetry – estimation of quinine and fluoroscene

4 Ion selective electrodes – estimation of F^-, S^{2-} and CN^- in effluents using ion selective electrode meter.

5 Polarography and Anode stripping voltametry

(a) Polarography and Anode stripping voltametry – behavior of Cd, Zn, Pb in a mixture.

(b) Determination of Pb and Cd in samples using Anode stripping voltametr

6 Gas chromatography- Determination of pesticides

7 HPLC- Determination of pesticides

8 NMR

a). Demonstration of NMR spectrometer and study of hydrogen bonding in a given alcohol or phenol.

b). Interpretation of NMR chemical shifts of ethyl benzene, ethyl alcohol

9 TGA, DTA, DSC – Demonstration of TG, DTA and DSC and study of decomposition of calcium oxalate, calcium carbonate, copper sulfate, oxalic acid.

10 pH metry

a) Determination of alkalinity in a colored effluent using pH metric end point.

b) Determination of purity of commercial HCl, H_2SO_4, H_3PO_4 and CH_3COOH using pH metric end point

CHE OC 405	Practical II: Project Work	L-5,T-1,P-0	4 Credits

Pre-requisite: Organic Chemistry Project Work

Course Objectives:

- Identification of problem by literature survey
- Ability to carry out independently with competency in research design and synthesis
- Interpretation of spectral data to the structures of the molecules
- Communication of research results through presentations and preparation of dissertation

Course Outcomes: At the end of the course, the student will be able to

CO1	Identify the problem, to collect the literature and understanding parameters to design the problem.
CO2	Perform experiments to synthesize the molecules with desired stereochemistry adopting modern techniques.
CO3	Collect and interpretation of the data to the structures.
CO4	Presentation of the data in the form of dissertation.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	-	2	2	2	-	2	2	3
CO2	3	3	3	3	3	2	2	2	-	2	2	3
CO3	3	3	3	3	3	3	3	2	-	2	-	3
CO4	3	3	3	3	3	2	3	2	-	-	2	3

CHE OC 404: PRACTIAL II/ PROJECT WORK

CHE OC 406A	Drug Chemistry	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Drug Chemistry

Course Objectives:

- To learn about the natural products as leads for new drugs
- Determination of cardiovascular drugs
- To study Autacoids
- Interpretation of Antipyretics

Course Outcomes: At the end of the course, the student will be able to

CO1	Know about natural products.
CO2	Know Interpretation of cardiovascular drugs.
CO3	Know the Analyzing about prostaglandins.
CO4	Know the Definition, Classification, Nomenclature, Structure and Synthesis of anti-inflammatory drugs.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3		3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE : OC : 406 (A): (OPEN ELECTIVE) : DRUG CHEMISTRY

UNIT – I: NATURAL PRODUCTS AS LEADS FOR NEW DRUGS

Occurrence, Structure and therapeutic uses of Drugs acting on Central Nervous System

Morphine alkaloids (morphine, codeine, thebaine, heroin, pethidine)

Cannabinoids (9-cannabinol, Tetrahydrocannabinol)

Neuromuscular Blocking Agents (Curare, Decamethonium)

Vinca Alkaloids (Vincristin and Vinblastin), Taxol and Taxotere, podophyllotoxin, Etoposide, Teniposide.

UNIT – II: CARDIOVASCULAR DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis.

Cardiac glycosides (ex: Digoxin, Digitoxin);

Antihypertensive drugs (ex: Methyl dopa, Clonidene hydrochloride);
Antiarrhythmic agents (ex: Quinidine sulfate);
Antisympathetic drugs (ex: Propranolol hydrochloride, Verapamil hydrochloride);
Vasopressor drugs (ex: Prenylamine, Buphenine).

UNIT – III: AUTACOIDS

Definition, Occurrence, Isolation, Nomenclature, Classification, Synthesis, Biosynthesis and Stereochemical structures of Prostaglandins. Structural elucidation of PGE_1, PGE_2; Synthesis and biosynthesis of PGE_2, $PGF_{2\alpha}$.

Structure and Biosynthesis of Thromboxane A2 and Prostacyclin (synthesis not expected).

UNIT – IV: ANTI-INFLAMMATORY DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis of Paracetamol, Aspirin (Antipyretic), Salol, Cinchophen, Antipyrene, Phenylbutazone, Indomethacin, Tolmetin, Ibuprofen, Diclofenac and Naproxen.

Books suggested:

1. Medicinal Chemistry by Ashitosh Kar
2. Medicinal Chemistry by D. Sriram, P. Yogeeswari
3. Medicinal Chemistry by David A. Williams, Thomas L. Lemke
4. Medicinal Chemistry by V**.** Alagarsamy
5. Biochemistry by U. Satyanarayana
6. Natural Products Chemistry and Applications by Sujata V. Bhat, B.A. Nagasampagi,
   S. Meenakshi
7. Medicinal Chemistry by V.K. Ahluwalia, Madhu Chopra
8. Medicinal Chemistry by Balkishen Razdar
9. Advanced Practical Medicinal Chemistry by Ashutosh Kar
10. Chemistry of Organic Natural Products by O. P. Agarwal, Vols., 1 & 2, Geol Pubs.
11. Chemistry of Natural Products by S. V. Bhat, B.A. Nagasampagi, M. Sivakumar
12. Natural Products Chemistry by K.B.G. Torssell, John Wiley, 1983.

CHE OC 406 B	Electroanalytical Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Electroanalytical Techniques

Course Objectives:

- To learn about the classification of electroanalytical methods
- Determination of types of currents
- Principle, instrumentation, reversible and irreversible cyclic voltammograms..
- Interpretation of Ion selective electrodes

Course Outcomes: At the end of the course, the student will able to

CO1	Ability to interpret potentiometry and conductometry
CO2	Interpretation of results while adhering to DC Polarography.
CO3	Analysing and compiling the data and results in polarography.
CO4	Familiarize Types of ion sensitive electrodes.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3	-	3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE : OC : 406(B): (OPEN ELECTIVE) : ELECTRO ANALYTICAL TECHNIQUES

Unit I: Types and Classification of Electro analytical Methods.

i) Potentiometry- Types of electrodes, Hydrogen gas, Calomel, Quin hydrone and glasselectrodes. Determination of pH. Potentiometric titrations.

ii) Conductometry – Definition of terms – conductivity, specific conductivity, cell constant. Mobility of ions, Conductometric titrations.

Unit II: D.C Polarography: Dropping mercury electrode- Instrumentation-polarogram. Types of Currents : Residual, Migration, Limiting. Two and Three electrode assemblies. Ilkovic equation (derivation not necessary) and its consequences. Types of limiting Currents: Adsorption, Diffusion, Kinetic. Applications of polarography in qualitative and quantitative analysis. Analysis of

mixtures. Application to inorganic and organic compounds. Determination of stability constants of complexes.

Unit III: (i) A.C. polarography (ii) Square-wave polarography (iii) Pulse polarography (iv) Differential pulse polarography(V) Cyclic Voltammetry: Principle, instrumentation, reversible and irreversible cyclic voltammograms.

Unit IV: Ion selective electrodes: Ion-sensitive electrodes –types of ion sensitive electrodes –metal based cation and anion sensitive electrodes, solid membrane electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A. Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denny. Vogel's Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (Mc Graw Hill).

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

SVU COLLEGE OF SCIENCES

DEPARTMENT OF CHEMISTRY
5. PHYSICAL CHEMISTRY (Specialization)



Syllabus for M.Sc. CHEMISTRY

Choice Based Credit System (CBCS)

Amended as per NEP-2020

(Academic Year 2023-2024)

About the Department

The Department of Chemistry is one of the first six departments started during the year 1954 when the university was founded. The Department offers M.Sc. course in Chemistry with specializations in Analytical, Environmental, Inorganic, Organic and Physical Chemistry besides Self Supporting Courses in Organic and Analytical Chemistry. Choice Based Credit System is followed and the courses are categorized as per the guidelines of the statutory authorities. Ability enhancement and skill development courses are part of the curriculum. Almost 15% of the students are qualifying in National Entrance Test conducted by UGC-CSIR. Also the Department offers quality research and training experience leading to Ph.D., Degrees for the students in the areas of synthesis of pharmacologically potential molecules analogous to drugs, application of green methodologies for the synthesis of complex molecules, development of new hybrid sorbents for monitoring toxic metals in environmental samples, fabrication of novel electrochemical sensors and biosensors towards the detection of organic molecules and pollutants. Over the last sixty five years the department has trained about 650 students for their Doctoral degrees. Most of the research scholars are doing Post-Doctoral research in abroad and in India. The faculty published more than 3000 research papers in reputed National and International journals. The Department organizes National and International conferences / seminars/ workshops on regular basis. The Department has well equipped laboratories for research and teaching besides a DST funded computer lab and a Department library. All the faculty members are having individual research laboratories with internet facility.

At present the Department is flourished with 10 faculty members and most of the faculty members have Post Doctoral research and training experience abroad. Some of the faculty worked as Visiting Professors and Visiting Fellows in prestigious universities abroad. Majority of faculty members have undertaken major research projects funded by agencies like UGC, CSIR, DST, BRNS, DBT and MOES and have successfully completed the tasks with a budget outlay of Rs. 250.00 lakhs. Most of the faculty members have developed collaboration with Indian Institute of Sciences, Bangalore, Indian Institute of Chemical Technology, Hyderabad, AVRA Laboratories, EPR Laboratories, Hyderabad, Amara Raja Batteries, Tirupati, RRL, Trivandrum and Birla Institute of Technology & Science, Pilani – Hyderabad campus and have approved patents. Some of the faculty and Alumni are the recipients of JSPS Fellowship, UGC Raman Fellowship, Common wealth Academic Fellowship, State Best Teacher Award etc., Recognizing the excellence in teaching and research in the Department, the University Grants Commission and Department of Science Technology have provided funding under DRS and FIST programmes. The Alumni of the department served in coveted positions as Vice-chancellors, Registrars, CEO of pharma industries etc. The former students of the Department have established leading International pharmaceutical industries in India and abroad. Some of them are actively engaged in the manufacture of COVID 19 vaccine. The ultimate goal of the Department is to achieve excellence in fundamental research as well as the development of innovative technologies for the future.

Vision

- Impart quality education & training in the field of chemistry to enable successful careers for the post graduate students in the field of research, education & industry applications of chemical sciences.

Mission

The Department of Chemistry strives:

- To get an ideal balance between knowledge creation and knowledge dissemination in the chemical sciences with a focus to train and mentor students to become responsible scientists and scientifically literate professionals to attain National and International impact.
- To contribute to the improvement of scientific and technological literacy, and the development of critical-thinking and problem-solving skills of all students in order to compete for the world of work and responsible citizenship

Program Specific Outcomes: At the end of the program, the student will be able to:

PSO1	**Scientific Problem solving skills**: Deep knowledge of the topic which can develop the problem solving skills using chemical principles.
PSO2	**Analytical skills**: Develop analytical skills such as synthesizing, separating, characterizing chemical compounds and chemical reactions with the help of sophisticated instruments
PSO3	**Research skills**: Develop research skills through dissertation/project work in different fields of chemistry such as organic, inorganic, analytical, physical and environmental.
PSO4	**Learning skills on life processes**: Acquire advanced level of knowledge in natural products as well as biological systems from the chemistry point of view.

Program Objectives

PO1	To divulge an advance level of theoretical and practical knowledge in the major fields of Chemistry- Analytical, Environmental, Inorganic, Organic and Physical.
PO2	To engage in research projects for acquiring wide spectrum of subject knowledge and research experience in respective fields.
PO3	To enlighten on skill enhancement in the core chemistry with practical expertise hands this will make students employable in academia and industries
PO4	To mould as responsible citizens to serve the nation

Program Outcomes: On completion of M.Sc. Chemistry programme, graduates will be able to –

PO1	Have a firm foundation in the fundamentals and application of current chemical and scientific theories in different areas of chemistry *viz*., Analytical, Environmental, Inorganic, Organic and Physical.
PO2	Understands the background of organic reaction mechanisms, complex chemical structures, and instrumental methods of chemical analysis, molecular rearrangements and separation techniques.
PO3	Familiarize with the importance of various elements present in the periodic table, coordination chemistry and structure of molecules, properties of compounds, structural determination of complexes using theories and instruments.
PO4	Understand about the physical aspects of atomic structure, dual behavior, reaction pathways with respect to time, various energy transformations, molecular assembly in nano-level, significance of electrochemistry, molecular segregation using their symmetry.
PO5	Create awareness and sense of responsibilities towards environment and apply knowledge to solve the issues related to Environmental pollution.
PO6	Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in the subject concerned. Ability to identify unethical behavior such as fabrication, falsification or misrepresentation of data and adoptive objective, unbiased and truthful actions in all aspects.
PO7	Be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
PO8	Clearly communicate the results of scientific work in oral, written and electronic formats.
PO9	Explore new areas of research in both chemistry and allied fields of science and technology.
PO10	Design, analyze and carry out scientific experiments and interpret data to provide solutions to different industrial problems.
PO11	Independently carry out research to solve practical problems and present a substantial technical report.
PO12	Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning throughout life, through self- paced and self-directed learning aimed at personal development, and adapting to change academic demands of work place through knowledge/ skill development/ reskilling.

Program Educational Objectives:

At the end of the program, the student wills be able to:

PEO1	To demonstrate broad knowledge of descriptive chemistry.
PEO2	To impart basic analytical and technical skills to work effectively in various fields of chemistry.
PEO3	To motivate critical thinking and analysis skills to solve complex problems viz., analysis of data, synthetic logistics, spectroscopy, structure and modeling, team based problem solving etc.
PEO4	To demonstrate an ability to conduct experiments in the above sub disciplines with mastery of appropriate techniques and proficiency using core chemical instrumentation and modeling method
PEO5	To develop laboratory competence in relating chemical structure to spectroscopic phenomena.
PEO6	To demonstrate the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment and modern instrumentation.

SRIVENKATESWARAUNIVERSITY::TIRUPATI

DEPARTMENTOF CHEMISTRY

PHYSICAL CHEMISTRY

TWO YEAR M.Sc. COURSE IN CHEMISTRY

(2021-2022)SCHEME

Semester -I

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-101	Core-Theory	Inorganic Chemistry- I	6	4	20	80	100
2	CHE-102	Core-Theory	Organic Chemistry I	6	4	20	80	100
3	CHE-103	* Compulsory Foundation	a)Physical Chemistry- I b)Chemistry of Nano materials	6	4	20	80	100
4	CHE-104	* Elective Foundation	a)General Chemistry- I b)Green Chemistry	6	4	20	80	100
5	CHE-105	Practicals (Core & Comp.)	a)Inorganic Practical-I b) Physical Chemistry-I	3 3	2 2	- -	- -	50 50
6	CHE-106	Practicals (Core & Elective)	a) OrganicChemistry- I b)General Chemistry-I	3 3	2 2	- -	- -	50 50
7	CHE-107	Audit Course	Human Values and Professional Ethics – I	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

SEMESTER-II

Sl. No.	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-201	Core-Theory	Inorganic Chemistry- II	6	4	20	80	100
2	CHE-202	Core-Theory	Organic Chemistry -II	6	4	20	80	100
3	CHE-203	* Compulsory Foundation	(a)Physical Chemistry- II (b) Advanced Thermodynamics and Biophysical chemistry	6	4	20	80	100
4	CHE-204	* Elective Foundation	a)General Chemistry- II b)Chemistry of contemporary society	6	4	20	80	100
5	CHE-205	Practicals (Core & Comp.)	a)Inorganic Practical-II b) Physical Chemistry-II	3 3	2 2	- -	- -	50 50
6	CHE-206	Practicals (Core & Elective)	a)OrganicChemistry- II b)General Chemistry-II	3 3	2 2	- -	- -	50 50
7	CHE-207	Audit Course	Human Values and Professional Ethics – II	0	0	100	-	
		Total		**36**	**24**			**600**

***Among the Compulsory and Elective Foundation a student shall choose anyone.**

M.Sc. (PHYSICAL CHEMISTRY)

SEMESTER-III

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-PC-301	Core-Theory	Physical Chemistry-III	6	4	20	80	100
2	CHE-PC -302	Core-Theory	Organic Spectroscopy	6	4	20	80	100
3	CHE-PC-303	*Generic Elective	(a) Organic Chemistry III (b) Inorganic Spectroscopy & Thermal Methods of analysis	6	4	20	80	100
4	CHE-PC-304	Core& Gen. Practical	Chemical kinetics	6	4	-	-	100
5	CHE –PC-305 A	Skill Oriented Course (theory)	Chemotherapy and drug analysis	3	2	10	40	50
	CHE –PC-305 B	Skill Oriented Course (Practicals)	Conductometry Colorimetry	3	2	-	-	50
6	CHE- 306	Open Elective **(For other departments)**	(a) Spectral Techniques (b) Chromatographic Techniques	6	4	20	80	100
		Total		**36**	**24**			**600**

***Among the Generic Elective a student shall choose any one.**

SEMESTER-IV

Sl. No	Course Code	Components of Study	Title of the Course	Credit Hrs/ Week	No. of Credits	IA Marks	SEM End Exam Marks	Total
1	CHE-PC-401	Core-Theory	Electro Chemistry	6	4	20	80	100
2	CHE-PC-402	Core-Theory	Thermodynamic, Polymers and Solid state chemistry	6	4	20	80	100
3	CHE-PC-403	Generic Elective* **(Related to subject)**	(a) Chemical Kinetics (b) Bioinorganic, Bioorganic & Biophysical Chemistry	6	4	20	80	100
4	CHE-PC-404	Core& Gen. Practical	Instrumental Methods of Analysis	6	4	-	-	100
5	CHE-PC-405	Core-Practicals/ Project work	Project work	6	4	-	-	100
6	CHE-406	Open Elective **(For other departments)**	(a)Drug Chemistry or (b) Electroanalytical Techniques	6	4	20	80	100
		Total		**36**	**24**			**600**

***Among the Generic Elective a student shall choose any one.**

(Mandatory Core)

CHE-101	INORGANIC CHEISTRY I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Comprehend the key features of coordination compounds, Crystal Field Theory, different properties and bonding by spectroscopic techniques
- Study the polymorphic forms of non-transition elements and their synthesis and properties
- Understand the basics of reaction mechanism and the mechanistic concepts of Dissociative (Id) and Associative interchange Mechanism (Ia), Taube's classification, Trans effect and Electron Transfer Reactions
- Familiarize with the methods of synthesis of metal carbonyls and metal nitrosyls, Synergistic effect, EAN and 18-electron rule

Course Outcomes: At the end of the course, the student will be able

CO1	To understand the key features of coordination compounds, Crystal Field Theory, magnetic properties and bonding in transition metal complexes.
CO2	To learn about the polymorphic forms of Carbon, Sulphur and Phosphorus, synthesis and properties of sulphur-nitrogen compounds, boranes, carbides, silicates and to know Wades rules.
CO3	To explain the reactivity of complexes in terms of Valence bond and Crystal Field theories, Taube's classification, Trans effect and Electron Transfer Reactions.
CO4	To gain knowledge on synthesis and structures of different metal carbonyls, synergistic effect and 18 electron rule.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	1	-	1	-	2	-	1
CO2	3	1	-	3	-	2	2	2	2	1	-	2
CO3	3	2	-	3	2	-	-	1	-	1	2	1
CO4	3	1	1	3	-	2	2	2	1	-	1	1

CHE 101: INORGANIC CHEISTRY I

UNIT-I: CO-ORDINATION COMPOUNDS 15 Hrs

Introduction to Crystal field Theory, CFSE and its calculation, Paring energy, Splitting of 'd' orbitals in Trigonal bi pyramidal, square planar, square pyramid and pentagonal bipyramidal geometries, Jahn –Teller effect, Application of CFT, OSSE, site Selection in Spinels, Short comings of CFT, Evidence for covalency – Nephelauxetic effect. MOT of co-ordinate bonds –M.O. Diagrams for octahedral, tetrahedral and square

planar complexes. Experimental evidences for π- bonding – Crystallography, Infrared spectroscopy and Photoelectron spectroscopy.

UNIT-II: CHEMISTRY OF NON-TRANSITION ELEMENTS 15 Hrs

General characteristics of the non- transition elements special features of individual elements ; Synthesis' properties and structure of their Halides and Oxides, Polymorphism of Carbon, Phosphorus and Sulphur, Synthesis, properties and structure of boranes, Carboranes, borazines, Silicates, Carbides, Sulphur-nitrogen compounds. Electron counting in boranes, Wades rules (Poly hedral skeletal electron pair theory), Isopopoly and hetero poly acids.

UNIT-III: REACTION MECHANISMS IN COMPLEXES 15 Hrs

Reactivity of metal complexes. Inert and Labile complexes. Concept of Labile and Inert complexes in terms of Valence bond and Crystal Field theories. Taube's classification of complexes as labile and inert complexes. Dissociative (D) and Dissociative interchange Mechanism (Id) & Associative (A) and Associative interchange Mechanism (Ia). Substitution reactions in octahedral complexes- Acid Hydrolysis -factors affecting Acid Hydrolysis - Base Hydrolysis-conjugate Base Mechanisms - Anation Reactions -Substitution Reactions in Square Planar complexes- Trans effect – Mechanisms of Trans effect: polarization and π-bonding theories.Electron Transfer Reaction-Inner Sphere and outer Sphere Mechanisms- Marcus theory.

UNIT-IV: METAL πCOMPLEXES-I 15 Hrs

Nature of π bonding, Classification of π ligands, π donor ligands and π -acceptor ligands.

Metal Carbonyls: Synthesis of metal carbonyls, Structures of metal carbonyls of the types M(CO)n (M= Cr, Fe, Ni; n=4-6), $M_2(CO)n$ (M=Co, Fe, Mn; n=8-10), $M_3(CO)_{12}$ (M=Fe, Ru and Os), $M_4(CO)_{12}$ (M=Co, Rh, Ir). IR Spectraof metal carbonyls (i) Detection of bridging and terminal CO ligand, (ii) Synergistic effect, EAN and 18-electron rule. Electron counting methods (i) Oxidation state method and (ii) Neutral Atom method.

Metal Nitrosyls: Synthesis of metal Nitrosyls, bonding, Electron donation by nitric oxide, Models for NO bonding (i) Covalent model and (ii) Ionic models, Structures of metal nitrosyls (1) $[Fe_4S_3(NO)]$ (2)$[Fe_2(NO)_2I_2]$ (3) $[(\phi_3P)_2Ir(CO)Cl(NO)]^+$ (4) $[(\phi_3P)_2Ru(NO)_2Cl]$, Detection of bridging NO ligand, Applications of metal nitrosyls.

Books Suggested

1. F.A.Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999.John wiley & sons. Inc., New York.
2. James E. Huheey, Inorganic chemistry- Principles of structure and reactivity, VI Edition 1993. Harper Collins College Publishers, New York.
3. J.D. Lee: Concise Inorganic Chemistry (Blackwell)

4. Gary Wolfsburg: Inorganic Chemistry (5th Ed. (Viva Books)
5. W.L. Jolly: Modern Inorganic Chemistry (McGraw-Hill)
6. B.N Figgis: Introduction to Ligand Fields (John-Willey)
7. S.F.A. Kettle: Coordination compounds.
8. Coordination Chemistry. Bassalo & Jahnson.

(Mandatory Core)

CHE-102	Organic Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Organic Chemistry

Course Objectives:

- Classify molecules based on stereo chemical aspects study on optical and geometrical isomerism by the application of Cahn-Ingold-Prelog rules.
- Familiarize with different types of substitution reactions, able to predict products, including stereochemistry in aliphatic and aromatic nucleophilic substitution reactions, effect of neighboring group participation
- Understand thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects in reactive intermediates
- Study about occurrence, isolation, structure establishment and synthesis of natural products-terpenoids.

Course Outcomes: At the end of the course, the student will be able

CO1	To detect stereochemical structures of the molecules, stereoselective and stereocontrolled reactions.
CO2	To ascertain the stereochemistry of the products with the effect of neighbouring group participation and to familiarize the various types of aromatic substitution reactions, their mechanism and the effect of substituents.
CO3	To know the concept of isotope effects, potential energy diagrams and transition states in different intermediates
CO4	To familiarize with stereospecific synthesis of naturally occurring terpenoids and degradation products of terpenoids

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	2	-	1	1	-	1	-	-
CO2	3	2	1	3	-	1	2		-	2	1	1
CO3	3	1	2	3	-	1	1	2	1	-	1	-
CO4	3	2	2	3	2	1	1	1	-	1	1	1

CHE102: Organic Chemistry I

UNIT-I: **Stereochemistry**

Sereoisomerism-Stereoisomers Classification – Configuration and conformation.

Molecular Three dimensional representations: Wedge, Fischer, Newman and Saw-horse formulae, their description and interconversions.

Molecular Symmetry & Chirality: Symmetry operations and symmetry elements (Cn & Sn). Criteria for Chirality. Dissymmetrization.

Optical isomerism: Molecular Symmetry and Chirality-Cahn-Ingold-Prelog rules R, S-nomenclature, stereoisomerism resulting from more than one chiral center, meso and pseudoasymmetric compounds - **Axial Chirality** - Stereochemistry of allenes spiranes - biphenyl derivatives and atropisomerism - **Planar chirality** - Ansa compounds and trans - Cycloalkenes - **Helicity**. Helically chiral compounds

Geometrical isomerism - E, Z - nomenclature - Physical and Chemical methods of determining the configuration of geometrical isomers-Stereoisomerism in 3, 4 and 5-membered cyclic compounds.

UNIT-II: Substitution Reactions

i) Aliphatic Nucleophilic substitutions: The S_N2, S_N1, mixed S_N1 and S_N2, SET mechanisms. Reactivity- effects of substrates, attacking nucleophiles, leaving groups and reaction medium.Common carbocation rearrangements – primary, secondary and tertiary. The neighbouring group participation (NGP) -anchimeric assistance, NGP by σ and π- bonds, phenonium ions, norbornyl and norbornenyl systems, Classical and nonclassical carbocations, NGP by halogens and heteroatoms (O,N,S)

The S_N^i and S_N2' mechanisms. Nucleophilic substitution at an allylic, and vinylic carbons.

ii. Aromatic Nucleophilic Substitution: The S_NAr, S_N1, benzyne and $S_{RN}1$mechanisms. Reactivity - effect of substrate, structure, leaving group and attacking nucleophile. The von Richter, Sommelet - Hauser and Smiles rearrangements.

UNIT-III: Reactive intermediates

Types of reactions, types of bond cleavage mechanisms, generation, structure, stability and reactivity of carbocations, carbanions, free radicals, carbenes, nitrenes and arynes. Thermodynamic and kinetic requirements, kinetic and thermodynamic control, potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects**.**

UNIT-IV: Terpenoids

Classification of terpenoids, occurrence, isolation, general methods of structure determination. Isoprene and special isoprene rule. Structure determination and synthesis of the following representative molecules: Farnesol, Zingeberine, Cadinene and Abietic acid.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.

2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
6. Stereochemistry, P.S. Kalsi, Wiley Eastern.
7. Text book of Organic Chemistry, M.C. Murry
8. Organic Chemistry, Vol I, I.L. Finar, ELBS Eds.

(Mandatory Core)

CHE-103	Physical Chemistry I	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Acquire knowledge in Quantum Chemistry, postulates of Quantum Mechanics., Applications of Schrodinger wave equation and Born-Oppenheimer approximation
- Study on Chemical Dynamics and theories in unimolecular, chain and fast reactions and determination of reaction rates.
- Familiarize with concepts of Thermodynamics and statistical thermodynamics, Gibbs- Duhem equation and Sackur-Tetrade equation
- Know about Thermodynamic and Kinetic concept of Electrochemistry and conductance, conductivity of electrolytes

Course Outcomes At the end of the course, the student will be able to

CO1	To know the concepts such as Operator algebra, Eigen values and Eigen functions, Degeneracy, Schrodinger wave equation and the postulates of Quantum Mechanics.
CO2	To learn about theories of reaction rates, Lindemann, Lindemann-Hinshel wood, and RRKM theories.
CO3	To know about Thermodynamic concepts and entropy change in reversible process and irreversible process, Gibbs- Duhem equation, calculation of thermodynamic properties.
CO4	To study the Thermodynamic and Kinetic Derivation of Nernst Equation and the derivation of Debye-Huckle Equation and its Verification

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	3	2	1	--	1	2	---	1	1
CO2	3	1	2	3	1		1		1	1	-	1
CO3	3	-	1	3	2	1	-	1		-	2	-
CO4	3	1	2	3	-	1	1	-	2	1	-	1

CHE-103: Physical Chemistry I

UNIT-I: Quantum Chemistry-I

(A)**Introduction to Exact Quantum Mechanical Results**

Operator algebra, Eigen values and Eigen functions, Operators for momentum and energy, Degeneracy, Linear combination of Eigen functions of an operator, well behaved wave functions, Normalized and

orthogonal functions, The schrodinger wave equation and the postulates of Quantum Mechanics, (B) **Applications of Schrodinger wave equation:** Particle in one dimensional and three dimensional box, harmonic oscillator, rigid rotor, hydrogen atom and its applications. Hydrogen like wave function, hydrogen like orbitals and their representation, polar plots, contour plots and boundary diagram. (C)**Approximate Methods:** The variation Theorem, Linear variation principle, perturbation Theory (first Order and non-degenerate), Application of variation Method and perturbation theory to the helium atom, The Born-Oppenheimer approximation.

UNIT-II: Chemical Dynamics

(A)**Theories of reaction rates:** Collision theory, steric factor. Theory of Absolute Reaction Rates-Reaction coordinate, activated complex and the transition state. Thermodynamic formiulation of reacton rates.

(B) **Unimolecular reactions:** Lindemann, Lindemann-Hinshel wood, and RRKM theories. Termolecular reactions. Complex reactions-Rate expressions for opposing, parallel and consecutive reaction (all first order type) (C) **Chain reactions:** Dynamic chain, hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane, photochemical reactions- H_2-Br_2, H_2-Cl_2 reactions, Autocatalysis, H_2-O_2 reaction explosion limits. (D) **Fast Reactions:** Flow system – Temperature and pressure Jump Methods – Relaxation Techniques.

UNIT – III : Thermodynamics

(A) **Brief review of Thermodynamic concepts:** Enthalpy, entropy, free energy. Concept of Entropy – Entropy as a state function –Entropy change in reversible process and irreversible process – Temperature – Entropy diagrams – Entropy change and phase change – Entropy of mixing – Entropy and disorder. (B) **Statistical thermodynamics:** Partial molar properties: their significance and determination of partial molar properties, fugacity and its determination. Concept of distribution, thermodynamic probability and most probable Distribution, Ensemble averaging, postulates of ensemble averaging, canonical, grand canonical and micro- canonical ensembles, partition functions, translational, rotational, vibrational and electronic partition functions, Gibbs- Duhem equation, calculation of thermodynamic properties in terms of partition functions, Entropy of monatomic gases (Sackur-Tetrade equation)

UNIT-IV : Electrochemistry I

(A) **Thermodynamic and Kinetic concept of Electrochemistry**

Thermodynamic and Kinetic Derivation of Nernst Equation, Chemical and Concentration Cells with and without Transference, Liquid Junction Potential, Derivation of the Expression for Liquid Junction

Potentials-its determination and elimination, Applications of EMF Measurements: (i)Solubility product, (ii)pH Determination, (iii) Potentiometric Titrations.; (B)**Conductivity:** Theory of Electrolytic Conductance, Derivation of Debye-Huckle Equation and its Verification, Debye- Falkenhagen Effect, and Wein Effect, kohlrausch law. Calculation of Solubility of Sparingly soluble Salt from Conductance Measurements.

Conductometric Titrations : Titration of Strong Acid Vs Strong Base (HCl vs NaoH) ; Titration of Weak Acid Vs Strong Base (AcoH vs NaoH); Titration of mixture of Strong and Weak Acids vs Strong Base ; Precipitation Titrations.

Books Suggested

1. physical chemistry, P. W. Atkins (ELBS)
2. Quantum Chemistry, Ira N. Levine (Prentice Hall)
3. Atomic Structure and Chemical bond, Manas Chandra.
4. Chemical Kinetics, K.J. Laidler (Mc Graw Hill)
5. Kinetics and Mechanism of Chemical Transformations, J. Rajaraman and J. Kuriacose (Mcmilan)
6. Thermodynamics for chemists, S. Glasstone
7. Chemical thermodynamics, I.M. Klotz
8. Statistical Thermodynamics, M. Dole
9. Modern Electrochemistry, Vol. I & II, J.O. M. Bockris and A.K.N. Reddy (plen
10. An Introduction to Electrochemistry (3rd ed.), S. Glasstone (Affiliated East-West).

(Compulsory Foundation)

CHE-104 (A)	General Chemistry I	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on precision and accuracy, Limit of detection, Limit of determination, Sensitivity and selectivity, statistical evaluation of data
- Familiarize with principles and concepts of flame emission spectroscopy and atomic absorption spectroscopy and their applications.
- To know about ecosystem, nutrient cycle and dessert ecosystem and forest ecosystem and aquatic ecosystem.
- Gain knowledge on air pollution, water pollution, soil pollution, marine pollution, noise pollution and solid waste management.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about mean and median values, standard deviation and coefficient of variation.
CO2	To acquire knowledge on principle and instrumentation of AAS and difference between flame AAS and furnace AAS.
CO3	To know about the principle and concept of ecosystem and their functioning
CO4	To have an idea on environmental pollution and environmental impact assessment.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	-	-	2	1	1
CO2	3	2	-	3	1	-	2	1	-	1	1	-
CO3	3	3	2	3	2	1		1	2	1	1	2
CO4	3	2	1	2	3	1	1	1	-	2	1	1

CHE104-A: General Chemistry I

UNIT-I: TREATMENT OF ANALYTICAL DATA 15 Hrs

Precision and accuracy –mean and median values –Standard deviation – coefficient of variation, Types of errors: Determinate and indeterminate errors, confidence limits, significant figures, computations, minimization of errors, statistical evaluation of data –T-test ,F- test , and X^2 –test. Correlation coefficient and coefficient of determination; Limit of detection (LOQ); Limit of determination(LOD)

Sensitivity and selectivity of an analytical method.

UNIT-II: FLAME EMISSION AND ATOMIC ABSORPTION SPECTROSCOPY 15 Hrs

(a) **Flame Emission Spectroscopy**: Principles, chemical reactions in flames, Interferences, evaluation methods, flame photometer and experimental technique, procedure for determinations, limitations and disadvantages. Applications

(b)**Atomic Absorption Spectroscopy: Flame AAS:** Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT-III: ECOSYSTEMS 15 Hrs

Concept of an ecosystem (Abiotic and biotic environment), structure and function of an ecosystem Producers, Consumers and decomposers. Energy flow in the ecosystem, (Nutrient cycle in the ecosystem) Ecological succession Food Chain, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystems, Forest ecosystem, Grassl and ecosystem, Desert ecosystems aquatic ecosystems [ponds, streams, lakes, rivers, ocean estuaries].

UNIT-IV: ENVIRONMENTAL POLLUTION 15 Hrs

Definition a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear pollution Solid waste management : Causes, effects and control measures of urban and industrial wastes. Environmental impact assessment.

Books Suggested

1. H.W. Willard, LL. Merritt and J.A. Dean: Instrumental Methods of Analysis
2. Vogel's Text book of Quantitative Inorganic Analysis.
3. Analytical Chemistry
4. Instrumental Methods of Analysis H. Kaur

CHE 104B	General Chemistry I	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To familiarize with the significance of green chemistry and assessment of the impact.
- To gain knowledge on biocatalyst in oxidation, reduction and hydrolytic reactions
- To have an idea on solvent free reactions and modern reaction techniques.
- To familiarize with the use of ionic liquids as green solvents.

Course Outcomes: At the end of the course, the student will be able

CO1	To get knowledge on green reaction conditions and their impact on environment.
CO2	To know about use of different biocatalysts as environmentally friendly reagents.
CO3	To acquire knowledge on the use of modern techniques like ultrasound, microwave etc.
CO4	To have an idea on the use of ionic liquids in different reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	2	1	1	-	1	-	1	1
CO2	3	1	1	3	1	-	1	1	-	1	-	1
CO3	3	3	2	3	2	1		2	-	1	1	1
CO4	3	2	1	2	3	1	1	1	1	-	1	1

CHE 104B: General Chemistry I

UNIT-I

Fundamentals and significance of Green Chemistry: Discussion of the current state of chemistry and the environment and the definition of green chemistry. Assessment of the impact of chemistry in the environment and definition of risk hazard. An introduction to the tools of green chemistry and its fundamental principles.

Principles of Green Chemistry: Prevention of waste / by-products, Hazardous products- Designing of safer chemicals- Selection of appropriate solvents and starting materials- Use of protecting groups and catalysis- Designing of biodegradable products.

UNIT-II

Catalysis for Green Chemistry: Use of biocatalysts- Biochemical Oxidation, Biochemical Reduction, Enzyme Catalyzed Hydrolytic Process, Modified biocatalysis- transition metal catalysis- Reformatsky reaction, Wurtz reaction, Pinacol coupling, Simmons-Smith reaction, Mukaiyama reaction, Heak reaction, Ullmann's coupling.

UNIT-III

Solvent Free Reactions: Solvent free techniques- Reactions on solid mineral supports, Phase Transfer Catalysis- C-alkylation, N-alkylation, S-alkylation, Darzen's reaction, Wittig reaction. Ultrasound assisted green synthesis- Oxidation, Reduction, Hydroboration, Bouveault reaction, Strecker reaction, Microwave assisted green synthesis- Biginelli reaction, Aza-Michael reaction, Suzuki reaction, Stille reaction, Sonogashira reaction.

UNIT-IV

Ionic liquids: Definition- Types of Ionic Liquids-Synthesis of Ionic Liquids- Selection of ionic liquids- physical properties- Application in organic synthesis- alkylation, allylation, oxidation, reduction, polymerization, hydrogenation, hydroformylation, alkoxycarbonylation, carbon-carbon bond forming reactions, alkene metathesis.

Books suggested:

1. New Trends in Green Chemistry by V.K. Ahluwalia, M. Kidwai.
2. Green Chemistry: Environment Friendly Alternatives by Rashmi Sanghi, M M Srivastava
3. Green Solvents for Organic Synthesis by V.K. Ahluwalia, Rajender S. Varma
4. Green Analytical Chemistry by Mihkel Koel and Mihkel Kaljurand

CHE 105 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Basic laboratory techniques of titration and analysis.
- Quantitative estimation of inorganic compounds through volumetric techniques.
- Calibration of volumetric apparatus and statistical analysis of the data.
- Determination of critical solution temperature of phenol-water system.

Course Outcomes: At the end of the course, the student will be able

CO1	To demonstrate mastery of basic semi-micro qualitative analysis of simple salts and interprets analytical data and will make scientific claims that are supported by the observations.
CO2	To familiarize with techniques of titration and calculation of errors.
CO3	To study the determination of critical solution temperature, eutectic composition, distribution coefficient, adsorption of different systems.
CO4	To calibrate the statistical data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	1	2	1	2	-
CO2	3	2	2	2	-	2	1	1	-	2	2	1
CO3	3	2	1	2	2	1	-	2	1	1	2	1
CO4	3	2	2	1	2	1	-	2	2	1	1	1

CHE 105 A & B: Core practical I: Inorganic & Physical Chemistry

CHE 105 A : Core practical I: Inorganic Chemistry

Semi Micro Qualitative Analysis

Qualitative Analysis of a mixture containing four cations including two less common cations (viz., W, Mo, Se, Te, V, Ce, Th, Zr, Li and U).

CHE 105 B : Core practical I: Physical Chemistry

1. Determination of critical solution temperature, eutectic composition and temperature of binary system.
2. Calibration of volumetric apparatus and statistical analysis of the data.

3. Determination of critical solution temperature of phenol-water system and study the effect of electrolyte on CST.
4. Determination of Eutectic composition and temperature of binary system
5. Determination of distribution coefficient of benzoic acid between water and benzene.
6. Study the adsorption of acetic acid on charcoal and analysis of the data on the basis of Langmuir and Freundlich adsorption isotherms.
7. Determination of rate constant of acid hydrolysis of an ester and investigate the effect of catalyst concentration, reactant concentration and temperature.

CHE 106A & B	Core practical I: Organic & General Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.

Course Objectives:

- Identification of single organic component by systematic qualitative analysis
- Preparation of derivatives and purification process
- Single step preparations
- Calibration of spectral analysis to this structures

Identification of single organic component by systematic qualitative analysis.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the systematic procedures of analysis of organic components.
CO2	To know the conformational tests for various functional groups.
CO3	To understand the mechanisms and familiarize with methodologies to prepare biologically important molecules.
CO4	Purification of compounds by different process

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	1	2	-	1	-	1	1	-
CO2	3	2	2	3	-	2	-	1	1	-	1	2
CO3	2	2	2	1	2	1	2	1	-	1	-	2
CO4	1	2	2	1	1	1	1	-	1	1	1	2

CHE : 106 A : PRACTICAL – I : ORGANIC CHEMISTRY

Identification of single components by Qualitative Analysis method

1. Aromatic acids
2. Aromatic amines
3. Aromatic phenols
4. Aromatic estors
5. Aromatic hydrocarbons
6. Carbohydrates
7. Aromatic carobohydrates compounds

CHE : 106 B : PRACTICAL – I : GENERAL CHEMISTRY

Single step preparations

1. Preparation of aspirin
2. Preparation of p-nitroacetanilide
3. Preparation of p-bromoacetanilide

CHE 107	Human Values and Professional Ethics-I	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of graduate level Human Values and professional ethics

Course Objectives:

- Analyze values in various ethical professions
- Understand moral concepts, character and conduct multiple
- Concept of ethical values with respect to individual and society
- ethical interests at stake in areal-world situation or practice and assess own ethical values with respect to social context and problems

Course Outcomes: At the end of the course, the student will be able to

CO1	To know about the needs and importance of professional ethics.
CO2	To analyze nature of Values, basic Moral Concepts character and Conduct.
CO3	To gain knowledge on individual and society ethical values, ahimsa, satya and brahmacharya.
CO4	To understand values of Bhagavd Gita, various religions, religious tolerence, Gandhian ethics.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	3	2	-	1	2	3	1	1	2
CO2	3	2	2	3	1	1	1	2	3	-	-	2
CO3	3	1	2	3	2	-	1	-	-	1	1	3
CO4	3	1	1	3	-	1	2	2	2	2	-	3

CHE 107: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS – I)

Chapter I: Definition and Nature of Ethics – Is relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics – Goals – Ethical Values in Various Professions.

Chapter II: Nature of Values – Good and Bad, Ends and Means, Actual and Potential Values, Objective and Subjective Values, Analysis of Basic Moral Concepts – Right, Ought, Duty, Obligation, Justice, Responsibility and Freedom, Good Behavior and Respect for Elders, Character and Conduct.

Chapter III: Individual and Society: Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non Possesion) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues) - Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation), Crime and

Theories of Punishment – (a) Reformative, Retributive and Deterrent, (b) Views on Manu and Yajnavalkya

Chapter IV: Bhagavd Gita – (a) Niskama Karma, (b) Buddhism – The Four Nobel Truths – Arya astanga marga, (c) Jainism - Mahavratas and Anuvratas. Values Embedded in Various Religions, Religious Tolerence, Gandhian Ethics.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
4. Harold H. Titus: Ethics for Today
5. Maitra, S.K: Hindu Ethics
6. William Lilly: Introduction to Ethics
7. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
8. Sasruta Samhita: Tr. Kaviraj Kunjanlal, Kunjanlal Brishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
9. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
10. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
11. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
12. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Mandatory Core)

CHE - 201	Inorganic Chemistry II	L-5, T-1, P-0	4 Credits

Pre-requisite: Understanding of graduate level chemistry

Course Objectives:

- Understand magnetic properties of transition metal complexes and various reactions on ligands with respect to synthesis.
- Gain knowledge on electronic spectra of complex molecules of octahedral and tetrahedral geometry
- Understand magnetic properties viz., diamagnetism and paramagnetism and other related properties of complex molecules
- Familiarize with different catalytic reactions of complex molecules and factors effecting the reactions.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize with the general methods of complex preparations and properties, nature of bonding and structural features of metal complexes.
CO2	To know about Russel-Saunders coupling, splitting of energy levels in octahedral field and differentiate between Orgel diagrams and Tanabe-Sugano diagrams.
CO3	To understand about the laws of Hunds, Curie and Weiss, magnetism and magnetic susceptibility determination by Gouy's and Farady methods.
CO4	To gain knowledge on Induced reactions, Free radical reactions, Thermal decomposition reactions, Chain reactions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	2	1	-	1
CO2	3	2	-	3	1	2	1	-	1	2	1	1
CO3	3	-	2	3	-	2	1	1	-	1		1
CO4	3	1	1	3	-	2	-	1	1	1	1	-

CHE 201: INORGANIC CHEISTRY II

UNIT – I: TRANSITION METAL II – COMPLEXES II 15 Hrs

Transition metal π – complexes with unsaturated organic molecules – alkenes, alkynes, diene, dienyl and Cyclopentadienyl complexes and arene complexes-general methods of preparation, properties, nature of bonding and structural features – Important reactions relating to Nucleophilic and Electrophilic attack on ligands and to organic synthesis.

UNIT – II: ELECTRONIC SPECTRA OF COMPLEXES 15 Hrs

Russel-Saunders coupling – Spectroscopic term symbols- Derivation of term symbols of p^2 and d^2 configuration, Hole Formulation, Energy ordering of terms (Hund's Rules), Splitting of energy levels and spectroscopic states in Octahedral field, Selection rules – Break – down of selection rules, Orgel diagrams, Definition and utility–Orgel Diagrams for d^1 to d^9 configurations in Octahedral and tetrahedral fields. Interpretation of electronic spectra of high spin octahedral and tetra hedral complexes of Ti(III), V(III), Cr(III), Mn(III), Mn(II), Fe(II), Fe(III), Co(III), Co(II), Ni(II) and Cu(II) complexes, Calculation of Dq and B^1 parameters for Cr(III) and Ni(II) complexes. Tanabe – Sugano diagrams, Differences between Orgel diagrams and Tanabe – Sugano diagrams, Tanabe – Sugano diagrams of d^2 to d^6 and d^8 configurations. Charge transfer spectra- LMCT and MLCT.

UNIT – III: MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES 15 Hrs

Diamagnetism and paramagnetism-orbital and spin contributions, spin-orbit coupling, Hunds third rule and Energies of J levels – Curie law and Curie – Weiss law- Ferromagnetism and antiferromagnetism – Temperature independent magnetism Magnetic susceptibility and its determination by Gouy's and Faraday methods.Calculation of magnetic moment from magnetic susceptibility, spin-only formula, Orbital contribution to magnetic moment (Oh and Td Complexes) –Paramagnetism and crystalline fields – Ti (III), V (III), VO^{2+}, Cr (III), Mn (II), Fe (III), Co(II), Ni (II) and Cu (II). Magnetic Exchange in copper acetate and other dimmers – spin cross over in complexes.

UNIT –IV: CATALYSIS 15 Hrs

Homogeneous catalysis, Metal ion catalyzed reactions – Redox potentials and processes – Mechanism of redox processes involving ligands – Factors affecting redox potentials - other types of metal catalyzed reactions – Reactions involving Ag (I) , Cu (II) and Os (VIII) – Reactions of Oxyanions – Factors affecting rate (General discussion only) – Induced reactions – Free radical reactions – Thermal decomposition of peroxy disulphate – Fe(III) –S_2O_8 reactions – chain reactions – H-Br reactions, H_2O_2 –S_2O_8reactions.

Books Suggested

1. Inorganic Chemistry principles of Structure and Reactivity 6th Edition. James E. Huheey.
2. Organometallic Chemistry: R.C. Mehrotra and Singh.
3. R. S. Drago: Structural methods in Inorganic Chemistry.
4. H. H. Willard, L. L. Merritt, Jr., J. A. Dean and F. A. Settle, Jr.: Instrumental Methods of Analysis (CBS Publishers).
5. R. L. Carlin: Magnetic Chemistry. R. L. Datta and A. Syamal: Elements of Magnetic Chemistry.

(Mandatory Core)

CHE-202	Organic Chemistry II	L-3, T-1, P-2	4 Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives:

- Able to recognize, classify, explain, and apply fundamental organic reactions such as E2, E1, E1CB.
- Familiar with molecular rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom.
- Provide Hantzsch-Widmann nomenclature for the three and four membered heterocycles. Be able to predict synthetic routes and chemical reactions of these heterocycles.
- Be familiar with occurrence, isolation, structural elucidation and synthesis of natural products-alkaloids

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize the mechanisms of E_1, E_2 and E_{1CB} reactions, steroselectivity and synpyrolytic eliminations and use of isotopes, chemical trapping and crossover experiments.
CO2	To learn the rearrangements involving electron deficient carbon, nitrogen and oxygen atoms and electron rich carbon atom and familiarize with the limitations and applications of reactions.
CO3	To learn the synthesis of three and four membered heterocycles, mechanism of ring opening reactions and the effect of electron donating and withdrawing substituents in selectivity of ring opening reactions.
CO4	To understand the structural elucidation and synthesis of alkaloids using specific reagents.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	1	-	1	1	1	-
CO2	3	2	2	3	2	2		1	1	-	1	1
CO3	3	2	2	3	2	2	1	1	-	1	-	1
CO4	3	2	2	3	-	2	-	1	-	1	1	1

CHE- 202 : ORGANIC CHEMISTRY II

UNIT-I: Reaction mechanism-I **15 Hrs**

Electrophilic addition to carbon carbon double bond: Stereoselective addition to carbon carbon double bond; anti addition- Bromination and epoxidation followed by ring opening. Syn addition of OsO_4 and

$KMnO_4$.

Elimination reactions Elimination reactions E_2, E_1, E_{1CB} mechanisms. Orientation and stereoselectivity in E_2 eliminations. Pyrolytic syn elimination and α-elimination, elimination Vs substitution. Facors influencing the elimination reactions

Determination of reaction mechanism: Determination of reaction mechanism: Energy profiles of addition and elimination reactions, transition states, product isolation and structure of intermediates, use of isotopes, chemical trapping, crossover experiments. Use of IR and NMR in the investigation of reaction mechanism.

UNIT-II: Molecular Rearrangements: **15 Hrs**

Rearrangements to electron deficient Carbon atom:

Pinacol-Pinacolone, Wagner-Meerwein, Dienone-Phenol and Demjonove Rearrngements

Rearrangements to electron deficient Nitrogen atom:

Hofmann, Curtius, Schimidt and Beckmann Rearrangements.

Rearrangements to electron deficient Oxygen atom: Baeyer-Villiger and Dakins Rearrangements

Rearrangements to electron rich Carbon atom: Favorski and Neber Rearrangements

Aromatic and Sigmatropic Rearrangements: Fries and Claisen Rearrangements

UNIT III: Three and four membered heterocycles: 15 Hrs

Systematic nomenclature (Hantzsch-Widmann system) and Replacement nomenclature for monocyclic heterocycles (Three and four membered rings). Synthesis and chemical reactions of aziridines, oxiranes, thiiranes, azetidines, oxetanes, and thietanes.

UNIT-IV: Alkaloids 15 Hrs

Occurrence, isolation, general methods of structure elucidation and physiological action, degradation, classification based on nitrogen heterocyclic ring, structure elucidation and synthesis of the following: Atropine, Papaverine and Quinine.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Modern Organic Reactions, H.O. House, Benjamin.

6. Principles of Organic Synthesis, R.O.C Norman and J. M. Coxon, Blackie Academic.
7. Stereochemistry, P.S. Kalsi, Wiley Eastern.
8. Text book of Organic Chemistry, M.C. Murry
9. Text book of Organic Chemistry, Fessendon and Fessendon.
10. Text book of Organic Chemistry, T.W. Solomon,
11. Organic Chemistry, Vol II, I.L. Finar, ELBS Eds.
12. Heterocyclic chemistry T.L Gilchrist, Longman Scientific Technical
13. An Introduction to the Heterocyclic compounds, R M Acheson, John Wiley.

(Mandatory Core)

CHE -203	Physical chemistry II	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Physical Chemistry

Course Objectives:

- Learn Angular momentum and Molecular Orbital Theory and application of Huckel theory to organic molecules.
- Know about concepts in Surface Chemistry, concept of electric double layer model and Micelles.
- Get knowledge on symmetry and group theory their use in spectroscopy, Mulliken character tables.
- Understand Irreversible Electrode phenomenon controlled potential electrolysis and polarography.

Course Outcomes At the end of the course, the student will be able

CO1	To know about Pauli Exclusion principle and Slater determinant, atomic orbitals, Simple molecular orbitals and Huckel theory of conjugated systems.
CO2	To learn Gibbs adsorption isotherm, BET equation and correlate limitations, critical micellar concentration (CMC) and factors affecting the CMC of surfactants.
CO3	To identify Relation between order of a finite group and its sub-group, conjugacy, Symmetry point group (MLS, MHS and MSS) and orthogonality theorem.
CO4	To acquire knowledge on DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, to derive equation for Tafel plots, half-wave potentials for reversible system.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	2	-	1	1	1	2	-
CO2	3	2	2	3	2	2	-	1	1	1	-	1
CO3	3	2	2	3	-		1	-	-	1	1	-
CO4	3	2	-	2	1	1	-	1	1	1	1	-

CHE-AC-203 Physical Chemistry III

UNIT-I: Quantum Chemistry-II **15 Hrs**

(A) Angular momentum: Angular momentum, Rotations and angular momentum, Eigen functions and Eigen values of angular momentum, Ladder operator, addition of angular momenta, spin, antisymmetry and pauli Exclusion principle. Slater determinant. ;

(B) Molecular Orbital TheoryAtomic Orbitals, Simple Molecular Orbitals, Hybrid Atomic Orbitals, Shapes and energies of Molecular Orbital, Systems of Organic Molecules (Ex: Methane, Ethylene,

Acetylene). Huckel theory of conjugated systems, Π-bond order and charge density calculations, application of Huckel theory to ethylene, butadiene and benzene.

UNIT-II: Surface Chemistry **15 Hrs**

Surface tension, capillary action, pressure difference across curved surface, (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, BET adsorption isotherm, derivation of BET equation , limitations of BET equation, estimation of surface area from BET equation, Surface films on liquids. Concept of electric double layer model- Helmholtz perrin, Gouy- Chapman and stern models (no derivation)

Micells: Surface active agents, classification of surface active agents micellisation, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants, thermodynamics of micellisation, emulsions, reverse micelles.

UNIT-III: SYMMETRY AND GROUP THEORY **15 Hrs**

Definition of a group, rules that are set for a group, sub-group, order of a group, Relation between order of a finite group and its sub-group, conjugacy relation and class of a group, symmetry elements and symmetry operation. Symmetry point group (MLS, MHS and MSS), Schoenflies symbols - Representation of groups by matrices (representation for C_n, C_{nv}, D_{nh} etc. groups to be worked out explicitly), character of a representation, group multiplication tables, reducible - irreducible representations The great orthogonality theorem (without proof) - character tables (H_2O,NH_3) and their use in spectroscopy, Mulliken character tables.

UNIT-IV: ELECTROCHEMISTRY- II **15 Hrs**

Irreversible Electrode phenomenon: Reversibility and irreversibility, Dissolution and deposition potentials, Decomposition voltage, overvoltage, diffusion overvoltage, charge transfer overvoltage, concentration overvoltage-hydrogen and oxygen overvoltages, Tafel plots, Exchange current density and Transfer coefficient, Butler-Volmer equation for one electron transfer processes.

Polarography: Theory, classification , principle , Instrumentation of Polarography, DME, HMDE diffusion current, Ilkovic equation, DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, Millicoulometry, Equation for half-wave potentials, for reversible system when oxidant alone, reductant alone and both are present.

Books Suggested

1. P.W. Atkins: Physical Chemistry (ELBS).
2. Ira N. Levine: Quantum Chemistry (Prentice Hall).
3. R. Mcweeny: Coulson's Valence (ELBS).
4. J.O.M. Bockris and A.K.N. Reddy, Modern Electrochemistry, vol.I & II (Plenum).

5. S. Glasstone; An Introduction to Electrochemistry (3rd ed.)(Affiliated East-West).
6. V. Moroi: Micelles, theoretical and applied aspects (Plenum).
7. Maron and prutton: principles of physical Chemistry.
8. Silbey, Alberty, Bawendi. Physical Chemistry.Jhon-Wiley & Sons. 4th edition-2006.
9. D.N. Bajpai: Advanced physical Chemistry: S. Chand & Company, 1998.

(COMPULSORY FOUNDATION)

CHE-204 A	General Chemistry II	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- Gain knowledge on the principles of different electro analytical methods
- Familiarize with chromatographic techniques.
- To study on biodiversity and conservation of biodiversity
- To know about natural resources and non-renewable resources

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge on ion selective electrodes, solid membrane electrodes and glass electrodes and principles of amperometric titrations.
CO2	To learn general principles and classifications of chromatographic separations and applications of TLC, GLC and HPLC.
CO3	To know about biodiversity, ecosystem diversity and conservation of biodiversity.
CO4	To acquire knowledge on natural resources related to food, water, mineral, energy and land.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2		1	-	1	1	2
CO2	3	-	2	3	-	2	1	-	2	1	1	1
CO3	3	3	2	2	1	2	-	1	-	-	1	2
CO4	3	3	2	2	2	2	1	1	-	1	1	1

CHE 204-A: General Chemistry II

UNIT-I: ELECTRO ANALYTICAL METHODS

Theory of potentiometry, calculation electrode potential at the equivalence. Finding of equivalence volume, derivative and linear titration plots. Ion-sensitive electrodes –types of ion sensitive electrodes – metal based cation and anion sensitive electrodes, solid membrane electrodes, glass electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes, Amperometric titrations - Anodic stripping voltammetry, chronoamperometry, chronopotentiometry, Cyclic Voltammetry, Differential Pulse Polarography, linear sweep voltammetry, square wave voltammetry.

UNIT-II: CHROMATOGRAPHY

General principles and classifications of chromatographic separations

Thin layer chromatography: Classification, principle, experimental technique, sample application, development of plate, retardation factor.

Gas liquid chromatography: Gas liquid chromatography - instrumentation (columns and detectors), retention time and retention volume. Chromatographic behaviour of solutes, column efficiency and resolution, column processes and band broadening, time of analysis and resolution, Van-Deemter equation.

High performance liquid chromatography: Theory and instrumentation-column performance, gradient elution, delivery system, sample introduction, separation columns, detectors and applications of HPLC.

Unit – III : Biodiversity

Conservation introduction definition genetic species and ecosystem diversity, hot spots of biodiversity, threats to biodiversity habitat loss poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India, conservation of biodiversity in – situ an ex-situ conservation of biodiversity.

Unit – IV Natural resources and non-renewable resources

An overview of natural resources and associated problems with references to a) Forest resources b) Water resources c) Mineral resources d) Food resources e) Energy resources f) Land resources.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A.Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery J. Bassett, J. Mendham and R.C. Denny. Vogel"s Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (McGraw Hill).
5. D. Midgley and K. Torrance : potentiometric Water Analysis (John Wiley).
6. Silbey, Alberty, Bawendi. Physical chemistry. Jhon-Wiley & sons. 4th edition-2006.

CHE 204B	Chemistry in Contemporary Society	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Chemistry

Course Objectives:

- To know about quality control and impurities in Pharmaceuticals.
- To have an idea on body fluids, blood, enzymes and forensic.
- To gain knowledge on composition of milk, oil, fats etc.
- To familiarize with different types of fuels, soils and its ingredients.

Course Outcomes: At the end of the course, the student will be able

CO1	To acquire knowledge in pharmaceutical chemicals
CO2	To familiarize with blood fluids, blood, enzymes and forensic
CO3	To know about fermentation, detection of purity, beverages
CO4	To acquire knowledge on gaseous fuels, soil ingredients and analysis of trace elements

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	2	-	2	2	-	1	1
CO2	3	1	2	3	1	2	1	-	2	2	1	-
CO3	3	2	2	3	1	2	2	1	-	2	1	1
CO4	3	2	3	2	1	2	1	2	-	1	1	1

CHE 204B: Chemistry in Contemporary Society

UNIT – I : PHARMACEUTICALS 15 Hrs

Pharmaceuticals : Importance of quality control, drugs and pharmaceuticals, sources of impurities in pharmaceutical chemicals, analytical quality control in finished / final products, common methods of assay.

Common drugs and their uses: Analgesics – aspirin, paracetamol; Antheimentics – mebendazole ; Antiallergies – chlorpenneramine malleate; Antibiotics-pencillin, chloromecytin; Anti-inflammatory agents-oxyphenbutazone; **Antimalarials** – primaquine phosphate; Antituberculosists – INH; Narcotics – nicotine, morphine; Expectorants – Benadryl; Sedatives – diazepam; Vitamins – B**1**, B**2**, B**6**, niacin and folic acid.

UNIT – II : FORENSIC AND BIOMEDICALS **15 Hrs**

Body fluids: Composition and detection of abnormal level of certain constituents leading to diagnosis, sample collection and preservation of physiological fluids, analytical methods for the constituents of physiological fluids (blood, urine).

Blood: Estimation of glucose, cholesterol, urea, haemoglobin and bilirubin.

Urine: Urea, uric acid, creatinine, calcium phosphate, sodium, potassium and chloride.

Enzymes: Biological significance, assay of enzymes (pepsin, tyrasinase), vitamins (thiamine ascorbic acid, vitamin A) and harmones (progesterone, oxytocin, insulin), chemical, instrumental and biological assays to be discussed wherever necessary.

Forensic : General discussion of poisons with special reference to mode of action of cyanide organophosphates and snake venom, poisonous materials such as lead, mercury and arsenic in biological materials.

UNIT – III : FOOD AND BEVERAGES **15 Hrs**

Milk and milk products : Composition, alcohol test, fermentation, dye reduction-methylene blue and resazurin tests, analysis of fat content, minerals in milk and butter, estimation of added water in milk.

Oils and fats: General composition of edible oils, detection of purity, tests for common edible oils and groundnut oil, cottonseed oil and mustard oil, tests for adulterants like argemone oil and mineral oils,

Beverages: Soft drinks, alcoholic drinks, tea, coffee and fruit juice, analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, food preservatives like benzoates, propionates, sorbates, bisulphites, artificial sweetners, like saccharin, dulcin and sodium cyclamate, flavours – vanillin, esters (fruit flavours) and monosodium glutamate, artificial food colourants-coal tar dyes and non-permitted colours and metallic salts, control of food quality – codex alimentarices, Indian standards.

UNIT – IV : FUEL AND SOIL **15 Hrs**

Fuels : Definition, classification and characteristics of fuels, sampling, determination of calorific value. Liquid fuels-determination of flash point, fire point, aniline point. Knocking of petrol and diesel – octane and cetere numbers carbon residue. **Gaseous fuels** : Coal gas, waste gas, producer gas, gober gas and blast furnace gas, calorific value determination by Junker's gas calorimeter, relatice merits of solid, liquid and gaseous fules. **Soil** : Ingradiants of soil-organic matter, nitrogen, sulphur, sodium, potassium and calcium, analysis of trace elements, copper, molybdenum, zinc and boron.

Reference Books :

1. Pharmaceutical Analysis, T. Higuchi and E.B. Hanseen, John Wiley and Sons, New York.

2. Quantitative Analysis of drugs, P.D. Sethi, 3rd edition, CBS Publishers, New Delhi, 1997.
3. Practical Clinical biochemistry methods and interpretations, R. Chawala, J.P. Brothers Medical Publishers (P) Ltd., 1995.
4. Laboratory manual in biochemistry, J. Jayaraman. New Age International Publishers, New Delhi, 1981.

CHE 205 A & B	Core practical I: Inorganic & Physical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Inorganic & Physical Chemistry practical.

Course Objectives:

- Separation and determination of the two component mixtures
- Preparation of metal complexes
- Familiarize with conductometric, potentiometric and redox methods of analysis
- colorometric and pHmetric methods of analysis

Course Outcomes: At the end of the course, the student will be able

CO1	To separate and determine the two component mixtures
CO2	To acquire knowledge in the preparation of metal complexes
CO3	To study the determination of cell constant and verification of Onsagar equation, strength of strong acid by Titration of a strong acid with a strong base and vice versa
CO4	To get knowledge on the applications of conductometry, potentiometry, coulometry and pHmetry.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	3	1	-	2		1	1	-
CO2	3	2	2	3	2	2	1	-	1	-	1	2
CO3	3	2	2	3	3	1	1	2	-	1	1	-
CO4	3	2	2	3	2	-	1	-	1	1	-	2

CHE 205 A & B: Core practical I: Inorganic & Physical Chemistry

I . Quantitative Analysis:

Separation and determination of two component mixtures:

(i) Separation of Al(III) and Determination of Fe (III)

(ii) Separation of Cu(II) and Determination of Zn (II)

(iii) Separation of Ca(II) and Determination of Mg (II)

(iv) Separation of Cu(II) and Determination of Ni (II)

(v) Determination of Ferrocyanide and Ferricyanide

II. Physical Chemistry

1. Conductometry:
   (a) Determination of cell constant
   (b) Verification of Onsagar equation
   (c) Determination of dissociation constant of a weak acid
   (d) Titration of a strong acid with a strong base
   (e) Titration of a weak acid with a strong base
2. Potentiometry:
   (a) Titration of a strong acid with a strong base
   (b) Titration of a weak acid with a strong base
   (c) Redox titration
3. Coulometry: Estimation of Manganese
4. pHmetry: Strong acid, Strong base titrations.

CHE 206A & B	Core practical I: Organic & General Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Organic & General Chemistry practical.

Course Objectives:

- Familiarize with two component mixture separation and identification.
- Preparation of derivatives.
- Purification by components by different methods.
- Calibration of products by spectral methods.

Course Outcomes: At the end of the course, the student will be able

CO1	To familiarize with binary mixture separation
CO2	To gain hands-on-experience in purification of the components, preparation of derivatives.
CO3	To get knowledge about the chemical behavior of different components and mechanisms
CO4	Purification and calibration of data

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	1	1	-	3	3	1
CO2	3	2	2	3	-	1	-	2	1	3	3	-
CO3	3	2	2	3	1	1	2	1	-	2	-	2
CO4	3	2	2	3	1	2		1	1	2	1	2

CHE 206 A & B: Core practical I: Organic & General Chemistry

CHE-206 A : PRACTICAL – I : ORGANIC CHEMISTRY

Separation and Identification of two component organic mixture by systematic qualitative analysis.

1.Acid + Neutral 2. Base + Neutral 3. Phenol + Neutral 4. Ether insoluable component + acid / phenol / base.

CHE-206 B : PRACTICAL – I : GENERAL CHEMISTRY

Preparation of Metal Complexes:

(i) Tetra(ammine) copper (II) sulphate.

(ii) Mercury tetra(thiocyanato) cobaltate(II).

(iii) Hexa(ammine) Nickel (II) chloride.

(iv) Tris(acetylacetonato) Manganese (III) chloride.

(v) Tris (ethylenediammine) Nickel (II) thiosulpha

CHE 207	Human Values and professional ethics-II	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of Human Values and professional ethics

Course Objectives:

- Gain knowledge on value education, family values and adjustability
- Develop ethics towards medical, health care professionals and ethical issues in genetic engineering
- Understand the importance of social ethics towards organ trade, human traffic king human rights violation and social disparities.
- Know about environmental ethics, ecological crises, pollution and protection of environment

Course Outcomes: At the end of the course, the student will be able to

CO1	To understand the concepts of human values, responsibilities of family values and status of women in family and society.
CO2	To acquire knowledge on different medical ethics the views of charaka and sushruta on moral responsibilities of medical practitioners.
CO3	To gain knowledge on social ethics and understand the characteristics of ethical problems in management.
CO4	To familiarize environmental ethics, ethical theory and ecological crisis.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	1	2	2	2	3	1	1	1
CO2	3	1	2	3	1	2	2	3	3	1	1	1
CO3	3	2	1	3	-	2	1	2	2	3	-	1
CO4	3	1	1	3	1	2	1	1	2	3	1	1

CHE 207: ELECTIVE FOUNDATION (HUMAN VALUES AND PROFESSIONAL ETHICS-II)

Chapter I: Value Education – Definition – Relevance to present day – Concept of human values - Self introspection – Self-esteem. Family values-Components, Structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Chapter II: Medical ethics – Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in

health care, human cloning, problem of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Chapter III: Social ethics – Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media – Impact of Newspapers, Television, Movies and Internet, Business ethics – Ethical standards of business – Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, Ethical abuses and work ethics.

Chapter IV: Environmental ethics – Ethical theory, man and nature - Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and pollution, Justice and environmental health.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. Management Ethics – Integrity at work by Joseph A. Petrick and John F. Quinn, Response Books, New Delhi.
4. "Ethics in Management" by S.A. Shelekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
10. Sasruta Samhita: Tr. KavirajKunjanlal, KunjanlalBrishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
11. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Eduction – Telugu Academy, Hyderabad.
14. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

(Mandatory Core)

CHE-PC-301	Physical Chemistry III	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Physical Chemistry

Course Objectives:

- Learn applications of Group Theory, symmetry criteria and symmetry restrictions.
- Applications of X-ray Diffraction and Electron Diffraction on solid state chemistry.
- Familiarize with the applications of Microwave spectroscopy, infrared spectroscopy and Raman spectroscopy.
- Get knowledge on concept of Thermodynamics of polymer dissolution and Flory-Huggins theory of polymer solutions.

Course Outcomes: At the end of the course, the student will be able to

CO1	To know the determination of Character Co-ordinate of C_2V point group based on 3N Coordinates and to learn the Mutual exclusion Principle.
CO2	To learn the Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals.
CO3	To study the rigid rotator model, stark effect, vibration-rotation spectroscopy, PQR branches, selection rules and Vibrational- rotational Raman spectroscopy.
CO4	To study the concepts on heat of dissolution, regular solution theory, Hildebrand solubility parameter, concept of Flory-Huggins theory of polymer solutions

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	-	-	-	2	
CO2	3	2	2	3	2	2	-	-	-	2	-	-
CO3	3	2	2	3	2	2	-	-	-		-	2
CO4	3	2	2	3	-	2	-	-	-	2	-	2

CHE-PC-301 CORE-THEORY PHYSICAL CHEMISTRY III

UNIT-I Applications of Group Theory 15 Hrs

Construction of reducible and irreducible representations, Determination of Character Co-ordinate of C_2V point group based on 3N Coordinates. Standard reduction formula, Determination of normal modes of vibrations of SO_2, NH_3, $POCl_3$, $PtCl_4^{2-}$ ·H_2O_2 molecules. Mutual exclusion Principle, Direct Product, Accidental Degeneracy and Fermi resonance Group Theory and Spectroscopy: IR Spectral activity of NH_3 molecule, selection rules, symmetry Criteria for optical activity, symmetry restrictions on dipole moments, symmetry and stereo isomerism. Prediction of IR and Raman Spectral activity of H_2O and CO_2.

UNIT-II: X-ray Diffraction: 15 Hrs

(A) Solid State Chemistry Dislocation of Solids, Schottky and Frenkeldefects, insulaters, a,d semiconductors, Band theory of solids,solid state reactions.

(B) Bragg conditions-Miller Indices- Laue method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals. Index reflections, identification of unit cells from systematic absences in diffraction pattern- structure of simple lattices and X-ray intensities- structure factor and its relation to intensity and electron density- Description of procedure for X-ray structure analysis (NaCl and KCl).

(C) Electron Diffraction: Scattering intensity Vs scattering angle, Wierlequation, and its importance. Measurement techniques, Elucidation of structures of simple gas phase molecules, Low energy electron diffraction (LEED) for the study of surfaces.

UNIT-III: SPECTROSCOPHY 15 Hrs

Microwave spectroscopy: classification of molecules, rigid rotator model, effect of isotopic substitution on the transition frequencies, intensities- stark effect.

Infrared spectroscopy: Linear harmonic oscillator, zero point energy, anharmonity, Mores potential energy diagram, fundamental and overtone transitions, hot bands and combinations bands. Vibration-rotation spectroscopy, PQR branches, selection rules, factors affecting the band positions and intensities for IR region. **Raman spectroscopy:** Classical and quantum theories of Raman effect, pure rotational, pure vibrational Raman spectroscopy, selection rules, mutual exclusion principle, resonance Raman spectroscopy and coherent antistokes Raman spectroscopy. Vibrational- rotational Raman spectroscopy.

UNIT-IV: POLYMER SOLUTIONS 15 Hrs

Thermodynamics of polymer dissolution, effect of molecular weight on solubility, solubility of crystalline and amorphous polymer, heat of dissolution, regular solution theory, Hildebrand solubility parameter, Flory-Huggins theory of polymer solutions, conformational entropy, osmotic pressure and viscosity of polymer solutions. Molecular weight determination by light scattering, ultra-centrifugation and sedimentation equilibrium method. Liquid Crystals- synthesis and applications

Books Suggested

1. F.A. Cotton : Introduction to Group theory for chemists.
2. Geroge Davidson Elsevier : Introductory Group Theory for Chemists.
3. Gurdeep Raj , Ajay Bhagi&Vinod Jain : Group Theory and Symmetry in Chemistry
4. Instrumental methods of analysis – M.H. Willard, Meritt Jr. and J.A. Dean
5. Principles of instrumental analysis – Skoog and West

6. F. W. Billmeyer, Jr.: Text Book of Polymer Science. Wiley Interscience.
7. V. R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar.: polymer Science. New Age international Publishers.

(Mandatory Core)

CHE-PC 302	**Organic Spectroscopy and Applications**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Understanding of Organic Spectroscopy and Applications

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands
- Study on the applications of NMR spectroscopy in ascertaining the stereochemical structures of the molecules.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy

Course Outcomes: At the end of the course, the student will be able to

CO1	To get experience to calculate λ max values for dienes, enones, polyenes, aromatic and heteroaromatic compounds.
CO2	To familiarize with the absorption bands of the molecules with specific functional groups
CO3	To interpret the data to different types of protons and carbons present in a molecule so as to ascertain the structure of the molecule based on the data provided
CO4	To acquire knowledge about specific fragmentation rules of different molecules which are unique.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	-	-	-	2	2	-
CO2	3	2	2	3	2	2	-	-	-	2	2	-
CO3	3	2	2	3	2	2	-	-	-	2	2	2
CO4	3	2	2	3	2	2	-	-	-	2	2	-

CHE-PC 302: CORE THEORY: ORGANIC SPECTROSCOPY AND APPLICATIONS

UNIT-I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY: 15Hrs

Various electronic transitions (185-800 nm), effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fisher-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds. Steric effect in biphenyls.

UNIT – II: INFRARED SPECTROSCOPY 15Hrs

Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ether, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and fermi resonance, FT-IR

UNIT –III: NMR SPECTROSCOPY: 15Hrs

^{1}H NMR spectroscopy: Magnetic properties of nuclei, Principles of NMR. Instrumentation, CW and pulsed FT instrumentation, equivalent and nonequivalent protons, enantiotopic and diastereotopic protons, Chemical shifts, factors affecting the chemical shifts, electronegativity and anisotropy, shielding and deshielding effects, Signal integration, Spin-spin coupling: vicinal, germinal and long range, Coupling constants and factors affecting coupling constants.

Applications of ^{1}H NMR spectroscopy: Reaction mechanisms (cyclic bromonium ion, electrophilic and nucleophilic substitutions, carbocations and carbanions), E, Z isomers, conformation of cyclohexane and decalins, keto-enol tautomerism, hydrogen bonding, proton exchange processes (alcohols, amines and carboxylic acids), C-N rotation. Stereochemistry, hindered rotation, Karplus curve variation of coupling constant with dihedral angle. Simplification of complex spectra, nuclear magnetic double resonance, contact shift reagents, nuclear Overhauser effect (NOE).

^{13}C NMR spectroscopy: General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimensional NMR spectroscopy-COSY.

UNIT-IV: MASS SPECTROMETRY 15Hrs

Introduction, ion production, type of ionization, EI, CI, FD, and FAB-factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular-ion peak, metastable peak, Mc. Lafferty rearrangement. Nitrogen rule, isotope labeling. High resolution mass spectrometry, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Books suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS

2. Spectroscopy of organic compounds, RM Silversteen and others, 5th Ed, John Wiley
3. Spectroscopy of organic compounds, P.S. Kalsi, Wiley, 1993.
4. NMR in chemistry-A multi nuclear introduction, William Kemp, Mc Millan, 1986.
5. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmi

(Mandatory Core)

CHE-PC-303A	Organic Chemistry III	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of Organic Chemistry

Course Objectives: Course Objectives:

- Familiarize with the applications of different reagents in organic synthesis, Mechanisms and stereochemistry.
- Study the methods of preparation and applications of organometallic reagents.
- Understand topocity, prochirality, auxillary and reagent-controlled methods in asymmetric synthesis.
- Applications of different oxidizing and reducing agents in organic synthesis with region and stereo controlled products.

Course Outcomes: At the end of the course, the student will be able to

CO1	To familiarize with the specific functions of the reagents particularly diazomethane, N-bromosuccinimide, Ziegler Natta catalyst, 1,3-dithianes and Merrifield resin in the synthesis of a variety of complex molecules.
CO2	To gain knowledge in the synthesis of different organometallic reagents and also stereo and regio specificity and selectivity of reactions with organometallic reagents
CO3	To understand diastereoselectivity, stereoselectivity and substrate controlled auxillary controlled reactions
CO4	To acquire knowledge about the reagents which causes oxidation in various compounds and also the reagents that causes selective and complete reductions to synthesize various compounds.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	-	2	-	2	2	-
CO2	3	2	2	3	2	2	-	2	-	-	2	-
CO3	3	2	2	3	2	2	-		-	-	-	-
CO4	3	2	2	3	2	2	-	2	-	2	2	-

CHE-PC-303A Core-Theory Organic Chemistry III

UNIT I: REAGENTS IN ORGANIC SYNTHESIS 15 Hrs

Use of the following reagents in organic synthesis: Anhydrous $AlCl_3$, Boran trifluoride, N-Bromosuccinimide, Diazomethane, Dicyclohexylcarbodiimide, Lead tetraacetate, Zieglar-Natta catalysts, DDQ, Dithianes, Merrifield resin.

UNIT-II: ORGANOMETALLIC REAGENTS **15 Hrs**

Synthesis and applications of Grignard reagents, Organolithium, Zinc, Copper, Mercury, Palladium and Rhodium compounds in Organic Synthesis, Homogeneous catalytic hydrogenation and hydroformylation reactions

UNIT III: ASYMMETRIC SYNTHESIS **15 Hrs**

Topocity - Prochirality- Substrate selectivity - Diastereoselectivity and enantioselectivity-Substrate controlled methods-use of chiral substrates - examples

Auxiliary controlled methods-Use of chiral auxiliaries-Chiral enolates-alkylation of chiral imines – Stereoselective Diels-Alder reaction

Reagent controlled methods-Use of chiral reagents-Asymmetric oxidation-Sharpless epoxidation-Asymmetric reduction-Use of lithium aluminium hydride and borate reagents.

UNIT IV: METHODS OF ORGANIC SYNTHESIS **15 Hrs**

i). ***Oxidations:*** **(a)** Alcohols to carbonyls-Chromium (iv) oxidants-Dimethylsulfoxide oxidation, periodate xidation, Oppenauer oxidation, oxidation with manganese dioxide, oxidation with silver carbonate **(b)** Alkenes to epoxides-peroxide induced epoxidations. **(c)** Alkenes to diols-oxidation with potassium permanaganate, osmium tetraoxide, Prevost reaction **(d)** Ketones to esters-Bayer-Villiger oxidation **(e)** Oxidative bond cleavage-cleavage of alkenes by transition metals. **(f)** Oxidation of alkyl or alkenyl fragments-selenium dioxide and chromium trioxide oxidations.

ii). ***Reductions*** **:** Reduction with lithium aluminium hydride, sodium borohydride, alkoxides, bis-methoxy ethoxy aluminium hydride, Boran aluminium hydride and derivatives-catalytic,hydrogenation-dissolving metal reductions, Non-Metallic reducing agents including enzymatic and microbial reductions.

Suggested Books

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Plenum.
3. Structure and Mechanism in Organic Chemistry, C.K. Inglod, Cornell University Press.
4. Organic Chemistry, R.T Morrison and R.N. Boyd, Prentice - Hall.
5. Name reactions and reagents in organic synthesis, B.P. Muway and M.G Ellord, John Wiley.
6. Principles of Organic Synthesis, R.O.C Norman and J.M Coxon, Blackie Academic & Professional.

7. Reaction Mechanism in Organic Chemistry, P.S. Kalsi, New Age International.
8. Principles of organometallic chemistry, P. Powell, ELBS.
9. Organo transition metal chemistry-Applications to organic synthesis, S.G. Davis, Pergmon.
10. Stereochemistry to Organic Compounds, D. Nasipuri, New Age International.
11. Stereochemistry, P.S. Kalsi, Wiley Eastern.

CHE-PC- 304	Inorganic Spectroscopy and Thermal Methods of Analysis	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Basic Inorganic Spectroscopy and Thermal Methods of Analysis

Course Objectives:

- Gain knowledge on thermal methods of analysis and principles and applications to inorganic materials
- Familiarize with basics of Mossbauer and NQR spectroscopy.
- Learn the properties like g-factor, nuclear spin, hyperfine coupling constants
- Study the ESR instrumentation, various applications and photoelectron spectroscopy.

Course Outcomes : At the end of the course, the student will be able

CO1	To know about TG and DTA and applications of different scanning calorimetry.
CO2	To gain knowledge on Doppler shift and chemical shift, basic principles and applications of NQR spectroscopy.
CO3	To learn zero field splitting and Kramer's degeneracy, relaxation processes, instrumentation and applications of ESR.
CO4	To know about photoelectric effect and Koopmans theorem and impart the applications of X-ray and UV photoelectron.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	2	-	-	-	-	2	-
CO2	3	2	2	3	2	2	-	-	-	2	2	-
CO3	3	2	2	3	2	2	-	-	-	2	-	-
CO4	3	2	2	3	2		-	-	-	-	2	-

CHE-PC- 304: Inorganic Spectroscopy and Thermal Methods of Analysis

UNIT –I: THERMAL METHODS OF ANALYSIS 15 Hrs

Thermo gravimetry –Principle, Factors affecting the results, instrumentation. Application with special reference to $CuSO_4 5H_2O$, $CaC_2O_4\ 2H_2O$. Different thermal analysis – principle, instrumentation, difference between TG and DTA, applications with special reference to the clays and minerals.Different scanning calorimetry –principle, and applications to inorganic materials like chlorates and perchlorates, ammonium nitrate.

UNIT –II: MOSSBAUER SPECTROSCOPY and NQR **15 Hrs**

Mossbauer spectroscopy: Basic principles, Recoil energy, Doppler shift, Chemical shift, Quadrapole effects, Magnetic effects. Instrumentation, spectral parameters and spectrum display.

Aapplication of the technique to the studies of (1) bonding and structures of Fe^{2+} and Fe^{3+} compounds, (2) Sn^{2+} and Sn^{4+} compounds.

NQR spectroscopy: Basic principles of NQR spectroscopy, quadrupole nuclei, quadrupole moments, electric field gradient, coupling constant and applications.

UNIT –III: ELECTRON SPIN RESONANCE SPECTROSCOPY **15 Hrs**

Basic Principles, Hyper fine splitting, Factors affecting the 'g' value. Isotropic and anisotropic hyperfine coupling constants, Hamiltonian and spin densities. Zero field splitting and Kramer's degeneracy, Relaxation process and line widths. Instrumentation and Applications.The EPR spectrum of bis(salicylidimine)-copper(II) complex, study of inorganic free radicals, biological applications of Electron Spin Resonance (Study of free radicals and Iron-sulfur proteins)

UNIT –IV: PHOTO ELECTRON SPECTROSCOPY **15 Hrs**

Photoelectric effect, Koopmans's theorem, ionization energy.

X-ray photoelectron spectroscopy (ESCA): Principle, Binding energies, Chemical shift, Applications of XPES to Qualitative analysis , to surface studies and structural analysis. Ultraviolet photoelectron spectroscopy- Principle, application of UPES in studying the molecular orbitals of O_2 and N_2 molecules. Block diagram of photoelectron spectrophotometer. Sources of radiation, detectors. Auger spectra – Principle, Applications of Auger spectra to surface studies and use of Auger spectra as a finger print tool.

Books Suggested

1. F.A. Cotton and G. Wilkinson, Advanced In-organic chemistry VI Edition, 1999. John wiley & sons. Inc., New York.
2. J.E. Huheey, E.A. Keiter and R.L. Keiter: Inorganic Chemsitry, Principles of Structure and Reactivity (4th Ed.) (Addison-Wesley)
3. Gary Wulfsberg: Inorganic Chemistry (5th Ed. (Viva Books)
4. J.D. Lee: Concise Inorganic Chemistry (Blackwell)
5. W.L. Jolly: Modern Inorganic Chemsitry (McGraw-Hill)
6. R.L. Carlin: Magneto-chemsitry (Springer-Verlag)
7. R.L. Dutta and A. Syamal: Elements of Magnetochemsitry (Affiliate East-West).
8. K. Hussain Reddy – Text book of Bioinorganic chemistry

CHE PC 304	Core practical I: Inorganic spectroscopy and thermal methods of analysis	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Inorganic Chemistry - Practical.

Course Objectives:

- Study on chemical kinetics of different reactions
- Flame photometry to determine different cations
- Familiarize with conductometric titrations of mixtures
- Colorometric estimation of different molecules.

Course Outcomes: At the end of the course, the student will be able

CO1	To study chemical kinetics of homogeneous solutions
CO2	To gain knowledge on the determination of different cations by flame photometry
CO3	To understand the principle and working aspects of conductometric titrations
CO4	To acquire knowledge on the implementation of colorometric estimations.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3	-	2	3	2	-	-	1	-
CO2	3	2	2	3	2	2	3	2	-	1		2
CO3	3	-	-	3	-	2	-	2	-	-	-	-
CO4	3	2	2	3	-	-	-	2	-	1	-	2

CHE : PC-304: Practicals (Core & Gen.)

1. Chemical Kinetics:

a) Study of the kinetics of halogenations of acetone.

b) Determination of activation energy of reaction between iodide and Persulphate

c) Determination rate constant of oxidation of iodide ion by persulphate ion and study the effect of neutral salt (KCl).

2. Flame Photometry:

a) Determination of Na

b) Determination of K

c) Determination of Cu

CHE PC 305A	Chemotherapy and Drug Analysis	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Chemotherapy and Drug Analysis

Course Objectives:

- Gain knowledge on chemotherapy and analysis of drugs.
- Analysis of drugs chemically and biologically.

Course Outcomes: At the end of the course, the student will be able

CO1	To know about the classification and synthesis of drugs.
CO2	To familiarize with the qualitative and quantitative analysis of drugs.
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			3		2	3	2			1	
CO2	3	2	2	3	2	2	3	2		1		2
CO3												
CO4												

CHE PC 305A: (SKILL ORIENTED COURSE : THEORY) : CHEMOTHEROPY AND DRUG ANALYSIS

UNIT-I: Chemotherapy

Definition, History, and Evolution of Chemotherapy; Discovery, Classification, Nomenclature, Mode of action and synthesis of the following classes of compounds with special references to specific drugs mentioned under each class

a. Sulfa drugs- Sulfanilamide and Sulfamethoxazole.
b. Antibacterials
c. Lactum group of antibiotics – Penicillin, Ampicillin and Amoxycillin.
d. Cephalosporin-C and Ciprofloxacin.
e. Anticancer drugs – 5-Flurouracil, Methotrexate.
f. Antifungals – Griseofulvin
g. Antimalarials – Chloroquin

UNIT-II: Chemical and Biochemical analysis of Drugs

Qualitative and Quantitative Analysis of drugs: Uses of IR, UV, GLC and HPLC methods.

Drug Assay by Biochemical Analysis – ELISA (Cortisol, alcohol, opiates).

Radio Immuno Assay (RIA) – Enalapril, Insulin; Kidney, Lungs and Liver function tests; Use of isotopes in the Bioanalysis of drugs and in drug design programmes.

Book Suggested

1. Medicinal Chemistry and Pharmaceutical Chemistry – Harikishan Singh and Kapur
2. Medicinal Chemistry and Biochemistry – R.L.Nath
3. Introduction to Medicinal Chemistry – Patrick
4. The Organic Chemistry of Drug Synthesis Vols. 1-6 - Ledneicer Top drugs top synthetic routes – John Saunders
5. Medicinal Chemistry – Ashutoshkar
6. Synthetic Organic Chemistry and Drugs – Gurideep R Chetwal
7. Biochemistry – Harper, Conn & Stumpf, Lehninger
8. Biochemistry – Western Jodd
9. Biochemistry – Cann & Stumpf
10. Bergers Medicinal Chemistry Vols. 1-5 – Manfred E. Wolf
11. Introduction to drug design – Siverman
12. Biochemical approach to Medicinal Chemistry – Thomas Nogrady
13. Prinicples of Medicinal chemistry – William Foye
14. Text book of organic medicinal and pharmaceutical chemistry – Delgrado and William A
15. Industrial Microbiology – Casida

CHE PC 305B	Instrumental Methods of Analysis	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Instrumental Methods of Analysis Practical

Course Objectives:

- Familiarize with conductometric titrations of mixtures
- Colorometric estimation of different molecules

Course Outcomes: At the end of the course, the student will be able

CO1	To understand the principle and working aspects of conductometric titrations
CO2	To acquire knowledge on the implementation of colorometric estimations.
CO3	
CO4	

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	-	-	-	-	2	-	2
CO2	3	2	2	3	3	2	-	-	-	2	2	2
CO3												
CO4												

CHE : PC-305 (B) : Practicals (Skill Oriented Course)

1. Conductometry:

a) Titration of mixture of halides

b) Titration of mixture of HCl+HOAC

c) Saponification of an ester

2. Colorimetry:

a) Estimation of Manganese

b) Estimation of Iron

c) Estimation of Phosphate

d) Titration of copper Vs EDTA

CHE PC 306	Spectral Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Spectral Techniques

Course Objectives:

- Familiarize with the instrumentation of UV and visible spectroscopy, applications of identifying the structures of the molecules.
- Understand IR spectrometry and applications to ascertain the fundamental groups by observing absorption bands.
- Study on the applications of flame atomic absorption spectroscopy.
- Understand the working principle and fragmentation rules of different molecules in Mass spectroscopy.

Course Outcomes: At the end of the course, the student will able

CO1	To know the basic principles of spectroscopy.
CO2	To familiarize with the analysis of various functional groups by using different spectroscopic techniques.
CO3	To Understand the applications of AAS.
CO4	To gain knowledge about Mass spectral fragmentation of organic compounds and common functional groups.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3	-	2	3	2	-	-	1	-
CO2	3	2	2	3	2	2	3	2	-	1	-	2
CO3	3	2	-	2	2	-	2	-	-	-	1	-
CO4	3	2	2	3	-	2	-	-	-	1	-	2

CHE : PC : 306(A): (OPEN ELECTIVE) SPECTRAL TECHNIQUES

UNIT – I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY 15 Hrs

Various electronic transitions (185-800nm.), Beer-Lambert Law, effect of solvent on electronic transitions , ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, Fieser-Woodward rules for conjugated dienes and carbonyl compounds

UNIT – II : INFRARED SPECTROSCOPY 15 Hrs

Instrumentation and sample handling, characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols, amines, ketones, aldehydes, esters, amides, acids and anhydrides. Effect of hydrogen bonding.

UNIT – III:ATOMIC ABSORPTION SPECTROSCOPY: FLAME AAS: 15 Hrs

Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

GF AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

UNIT –IV: MASS SPECTROMETRY 15 Hrs

Principle, instrumentation, different methods of ionization, EI, CI, FD and FAB, Mass spectra-molecular ion, base peak, meta-stable peak, nitrogen rule and Mc Lafferty rearrangement. Mass spectral fragmentation of organic compounds and common functional groups. Normal and branched alkanes, alkenes, cycloalkanes, benzene and its derivatives, alcohols and phenols, ethers, aldehydes and ketones, carboxylic acids and their derivatives , amines and nitro compounds. Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Books Suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS .2.
2. Spectroscopy of organic compounds, RM Silversteen and others 5th Ed, John Wiley 1991
3. Spectroscopy of organic compounds, PS Kalsi, Wiley, 1993
4. NMR in chemistry – A Multi nuclear introduction, William Kemp, Mc Millan 1986
5. Spectroscopic methods in Organic Chemistry, DH Williams & I Flemmi TMH . 2005

CHE PC 306	Chromatographic Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of graduate level Chromatographic Techniques

Course Objectives:

- Familiarize with Classification of Chromatographic methods.
- Understand Demonstration experiment in TLC.
- Study on the applications of High-Performance Liquid Chromatography (HPLC).
- Understand the working principle of gas chromatography.

Course Outcomes: At the end of the course, the student will able to

CO1	To know the stationary and mobile phases in chromatographic techniques.
CO2	To familiarize applications of different chromatographic methods.
CO3	To Understand the principle of chromatographic techniques.
CO4	To gain knowledge on the normal phase and reverse phase.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	3	-	2	3	2	-	-	1	-
CO2	3	2	2	3	2	2	3	2	-	1	-	2
CO3	3	2	-	2	2	-	2	-	-	-	1	-
CO4	3	2	2	3	-	2	-	-	-	1	-	2

CHE PC 306 : Chromatographic Techniques

Unit –I: Introduction - Classification of Chromatographic methods – Column chromatography-Adsorption phenomenon: Nature of adsorbents-Solvent systems-Differential migration-Separation of mixture of o-/p-nitro anilines (A demonstration experiment).

Unit –II: Thin-Layer Chromatography (TLC)-Coating materials and preparation of TLC plates-Solvents for development-Detection of compounds in TLC- R_f values in TLC-Applications of TLC in chemistry-Preparative TLC – Demonstration experiment in TLC.

Unit –III: High-Performance Liquid Chromatography (HPLC) - Application of HPLC- HPLC instrument-Stationary phases in HPLC-Normal and reversed phase HPLC: A comparison- Normal phase HPLC: Principle-Retention times in Normal and reversed phase HPLC- Reversed phase HPLC: Principle.

Unit –IV: Gas-Liquid Chromatography- Instruments for Gas-Liquid Chromatography- Gas-Chromatographic Columns and the Stationary Phase- Application of Gas-Liquid Chromatography- Gas-

Solid Chromatography.

Reference Books:

1. Analytical chemistry: G L David Krupadanam, D. Vijaya prsad, K. Varaprasad Rao, KLN Reddy, C. Sudhakar.
2. Analytical chemistry: Skoog West Holler.
3. Modern Analytical Chemistry : David Harvey DePauw University.
4. J.G. Dick. Analytical Chemistry, Mc Grraw Hill, New Delhi, (1973).

(Mandatory Core)

CHE-PC- 401	Electrochemistry	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Electrochemistry

Course Objectives:

- Study industrial electrochemistry, corrosion and methods of prevention
- Learn about electrochemical batteries and cells and their performance
- Study on electro kinetics and electro capillary phenomena and electrokinetic effect
- Familiarize polarography techniques and chemical passivity

Course Outcomes : At the end of the course, the student will be able to

CO1	Know the techniques of deposition of metals, throwing power simultaneous discharge of cations and methods of corrosion protection
CO2	Learn about electrochemical Batteries, fuel cells and nickel-cadmium batteries.
CO3	Understand electrical double layer systems, sedimentation potential, null points of metals and zeta potential.
CO4	Calculate electrochemical parameters; familiarize mixed ligand systems and reversible systems.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	-	2	-	-	1	2
CO2	3	3	3	3	2	-	-	2	-	2	-	3
CO3	3	3	3	3	3	-	-	2	-	-	-	2
CO4	3	3	3	3	-	2	-	-	-	-	-	3

CHE PC-401: CORE THEORY: **ELECTROCHEMISTRY**

UNIT-I: Industrial Electrochemistry 15 Hrs

Deposition of metals, Factors influencing physical nature of electrodeposited metals – current density, concentration of electrolyte, temperature, colloidal matter, electrolyte and basis metal. Throwing power, simultaneous discharge of cations. Separation of metals by electrolysis. Electrochemical passivity. Passivity and current density. Chemical passivity. Theories of passivity. Mechanical passivity. The corrosion of metals. Hydrogen evolution type of corrosion, corrosion in presence of depolarizer. Differential oxygenation corrosion. Methods of corrosion protection.

UNIT- II: Electrochemical Devices: 15 Hr

Batteries- their performance – characteristics – considerations in the selection and applications, Chemistry of primary batteries – Zinc – Carbon, Mercuric oxide, silver oxide and lithium cells – Solid electrolyte cells.

Chemistry of secondary batteries – Lead acid , Nickel cadmium batteries, Water activated batteries, Fuel cells – Their thermodynamics- performance

UNIT-III: Electrokinetic's and Electro capillary phenomena: 15 Hrs

Electrical double layer, Helmholtz – Perrin, Gouy – Chapman and Stern theories of electrical double layer. Lipmann equation.

Electrokinetic effect: Electro osmosis, Electrophoresis, streaming potential , sedimentation potential and their relation to zeta potential. Determination of zeta potential from electrophoresis measurements. Tiselius apparatus. Electro capillary curves, Null points of metals and their experimental determination.

UNIT-IV: **Advances in Polarography**: **15 Hrs**

(A) Polarography of Metal Complexes

Reversible, Diffusion-controlled systems, Determination of Formulae and Stability, Constants of Complexed Metal Ions, Determination of Stability Constants and Coordination Numbers of metal complexes, Calculation of Individual Complex, Stability Constants, Mixed Ligand Systems- the Method of Schaap and Mcmasters

(B) Polarography of organic compounds

Structural Effects, Nature of Electroactive group, Steric Effects, substituent Effects.

Books suggested:

1. S. Glasstone. An introduction to Electrochemistry. Affiliated East-West Press Pvt. Ltd.
2. P.T.K. Kissinger, W.R. Heinemann. Laboratory Techniques in Electro analytical Chemistry, Marsal Debber, Inc.
3. Willard, Merit. Instrumental methods of analysis, Welowarth Publiching Co.,
4. L. Antropov. Theoretical Electrochemistry. Mir Publications.
5. Silbey, Alberty, Bawendi. Physical chemistry. Jhon-Wiley & sons. 4th edition-2006.
6. V.S. Bagotsky. Fundamental of Electrochemistry. Jhon Wiley & Sons. 2nd editions-2006.
7. Introduction to polarography and allied Technique by Dr.K. Zutshi

(Mandatory Core)

CHE-PC 402	Thermodynamics, Polymers and Solid-state Chemistry	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of Thermodynamics, Polymers and Solid-state Chemistry

Course Objectives:

- To learn thermodynamic Properties of fluids, phase equilibria and flash calculations.
- Thermodynamic properties of liquids, activity and activity coefficients.
- Polymer structures, morphology and properties.
- To get knowledge on concept of solid state chemistry and super conductance.

Course Outcomes: At the end of the course, the student will be able to

CO1	Derive Gibbs Duhem equation and to calculate fugacity and chemical potential.
CO2	Calculate excess free energy and entropy, to draw Hildebrand curves and to correlate excess functions and activity coefficients
CO3	Learn morphology, Tm and Tg points and to calculate transition temperatures and to identify cross linking in polymers.
CO4	Identify magnetic properties of solids, magnetic materials, superconductors and BCS theory

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	-	-	1	-	3
CO2	3	3	3	2	2	-	-	-	-	-	1	3
CO3	3	3	2	2	2	-	-	-	-	2	-	2
CO4	3	3	3	2	2	-	-	-	-	2	-	1

CHE PC-402: CORE THEORY: **THERMODYNAMICS, POLYMERS AND SOLID STATE CHEMISTRY**

UNIT-I: Thermodynamic properties of fluids: 15 Hrs

Thermodynamic relationship residual properties – systems of variable composition- ideal and non-ideal behaviour – fugacity-fugacity coefficient in solutions- Phase equilibrium of low to moderate pressures- dew point-bubble point and flash calculations**.**

UNIT – II: Thermodynamic properties of 'Liquid Mixtures 15 Hrs

Activity and activity coefficients-excess free energy-excess enthalpy-excess volume-excess

entropy-relation between excess functions and activity coefficients –Application of Gibbs-Deuhem equation-regular solutions –van Laar theory and Scachard-Hildebrand theory.

UNIT-III: Polymers- structure and properties 15 Hrs

Morphology and order in crystalline polymers, configuration of Polymer chains, crystal structures and polymers, Stain induced morphology, morphology of chrystalline polymers, crystallisation and melting- polymer structure and physical properties, crystalline melting point, T_m-melting point of homogeneous series, effect of chain flexibility and other steric factors- entropy and heat of fusion, the glass transition temperature, Tg , relationship between Tm and Tg effects of molecular weight, diluents, chemical structure, chain topology, branching and cross linking.

UNIT-IV: Solid State Chemistry 15 Hrs

Magnetic properties of solids- Classification of magnetic materials, Magnetic Susceptibility, Langevin diamagnetism, Weiss theory of para magnetism. Electronic properties of metals, insulators and semiconductors: Electronic Structure of solids, Band theory, band Structure of metals, insulators and semiconductors. Electrons, holes and Excitons. The temperature dependence of conductivity of extrinsic semiconductors. Photo conductivity and photovoltaic effect –P-n-Junctions. Super conductivity: Occurence of superconductivity. Destruction of Superconductivity by magnetic fields-Meisner effect. Types of superconductors. Theories of super conductivity BCS theory.

Books suggested:

1. J.M. Pransnitz. Molecular Thermodynamics of Fluid Phase Equilibrium. Prentice. Hall
2. Kuriocose and Rajram. Thermodynamics
3. Smith and Van Ners. Chemical Thermodynamics.
4. R.C. Srivastava, Subi. K. Saha. Thermodynamics-A care course. Prentice-Hall of India Pvt, Ltd,. 3rd edition-2007.
5. Silbey, Alberty, Bawendi. Physical chemistry. Jhon-Wiley & sons. 4th edition-2006.
6. F. W. Billmeyer, Jr.: Text Book of Polymer Science. Wiley Interscience.
7. V. R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar.: polymer Science. New Age international Publishers.
8. Solid State chemistry by M.G. Arora.
9. Solid State Chemistry by Wiley.

(Mandatory Core)

CHE-PC-403A	Chemical Kinetics	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Chemical kinetics

Course Objectives:

- Differentiate homogeneous and heterogeneous catalysis enzyme catalysis and applications
- Learn photo chemistry, chemical excitations and rate of photochemical reactions
- To familiarize electrochemical relaxation methods, photochemical and isotope effects
- Radical photochemical reactions, theory and applications

Course Outcomes: At the end of the course, the student will be able to

CO1	Draw skrabal pH diagram and to separate unimolecular and bimolecular reactions
CO2	Study laws of photochemistry, to derive stern-volmer equation
CO3	Identify chromo potentiometry points and to investigate kinetic currents and isotopic effects
CO4	Learn photochemical thresholds, chemiluminescence

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	-	-	1	2	1
CO2	3	3	3	3		2	-	-	-	1	-	2
CO3	3	3	3	3	2	2	-	-	-	-	-	2
CO4	3	3	3	3	2	-	-	-	-	-	2	2

CHE PC-403A : (GENERIC ELECTIVE): CHEMICAL KINETICS

UNIT – I: Catalysis 15 Hrs

Homogeneous catalysis: Steady state and equilibrium treatments of acid-base catalysis. Skrabal P^H diagrams, Protolytic and Prototropic mechanism. Acidity functions, Zucker, Hammett, Bunnett and Yates hypothesis in the elucidation of the mechanism. Enzyme catalysis – influence of concentration, P^H and temperature. **Heterogeneous Catalysis:** Mechanism of interface reactions, application of transition state theories to unimolecular and bimolecular surface reactions

UNIT – II: Photochemistry: 15 Hrs

Interaction of electromagnetic radiation with matter, laws of photochemistry, Quantum yield, types of excitations, Fate of excited molecule, transfer of excitation energy, kinetics of unimolecular and bimolecular photophysical process, Stern-Volmer equation, Kinetics of photochemical reaction rate constants and life times of reactive energy states, determination of rate constants of reactions, effect of light intensity on the rate of photochemical reactions.

UNIT-III: Electrochemical relaxation methods, Photochemical methods, Isoptopic effect 15 Hrs

Electrochemical relaxation methods: Introduction , advantages of Electrochemical transient (or) relaxation techniques, application of these methods, various types of perturbation of a system, pulse polarography, chronopotentiametry, investigation of kinetic currents by chronopoptentiometry.

Photochemical methods: Introduction , phenomena of ISC, fluorescence and phosphorescence, experimental arrangement of fluorescence measurements. Example of quenching reactions.

Isotopic Effects: Equilibrium isotope effects, equilibria in solution, primary kinetic isotopic effects semiclassical treatments, Quantum-mechanical Tunneling,Reactions of the Type $H+H_2$,Transfer of H^+,H and H^- reactions of Huonium,Isotope effect with Havier atoms.

Unit-IV: Photo Chemical and Radiation Chemical Reactions 15 Hrs

Photochemical reactions photochemical primary process, reactions of electronically excited states of species, photo chemical thresholds, laws of photochemical equivalence, rotating-sector technique, multi photon excitation, photosensitization, radiation chemical primary process, chemiluminiscence**.**

Books suggested:

1. K.K. Rohatgi Mukerjee. Fundamentals of Photochemistry.
2. C. Kalidas. Principles of fast reactions techniques and Applications.
3. V. Yegnaramam, C.A. Basha And G. Prabhakar Rao : Applications of Electrochemistry.
4. Keith J.Laidler: Chemical Kinetics.
5. J. Dalton: A New System of Chemical Philosophy.
6. Chemical Kinetics:Keith J.Laider.

(Compulsory Foundation)

CHE-PC-403B	Bioinorganic, Bioorganic, Biophysical Chemistry	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Bioinorganic, Bioorganic, Biophysical Chemistry

Course Objectives:

- Highlighten metal complexes as oxygen carriers and electron transfer in biology.
- Metal ion transport and storage in biological systems and importance of trace metals in biology.
- Learn physiological functions of carbohydrates, lipids, enzymes classification, stereospecificity.
- The basic concepts of biophysical chemistry in biochemical reactions, exergonic and endergonic reactions.

Course Outcomes: At the end of the course, the student will be able to

CO1	Gain knowledge on metallo proteins in electron transfer processes.
CO2	Know the applications of trace metal ions and metal ions as chelating agents in medicine.
CO3	Achieve and develop highly stereoselective synthesis of organic compounds and drugs by adopting environmentally.
CO4	Understand thermodynamics of biopolymer reactions and to correlate free energy and biopolymer parameters.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	-	2	-	2	-	1	1	1
CO2	3	3	3	3	-	2	-	2	-	-	1	3
CO3	3	3	3	2	2		-	3	-	1	1	3
CO4	3	2	2	3	2	2	-		-	2	-	1

CHE PC-403(B): (GENERIC ELECTIVE): BIOINORGANIC, BIOORGANIC, BIOPHYSICAL CHEMISTRY

UNIT-I: **BIO-INORGANIC CHEMISTRY- I** **15 Hrs**

Metal complexes as oxygen carriers –Heme proteins –Hemoglobin and myoglobin –Non heme proteins –hemerythrin and hemocyanin – model synthetic complexes of iron, cobalt and copper.Co-enzymes Vitamin B_{12},carboxy peptidase and superoxidedismutase.

Electron Transfer in Biology: Structure and functions of metalloproteins in electron transfer processes –catalase –peroxidose –cytochromes and iron –sulphur proteins –synthetic models.

UNIT – II: BIOINORGANIC CHEMISTRY- II: Metal ion transport and storage in biological systems**,** Metal ions in Biology, Molecular mechanism of ion transport across membranes: ionophores, photosynthesis.

Hydrolytic metalloenzymes: Carbonic anyhdrase, carboxy peptidase, calcium in control processes, calcium and muscle contraction, calcium and secretion, calcium in blood clotting mechanisms. Therapeutic uses of enzymes.

Importance of trace metals in biology: Metal ions as chelating agents in medicine, trace metal ions and metal and non-metal deficiency. Biological nitrogen fixation,in-vivo and in-vitro nitrogen fixation.

UNIT-III: BIOORGANIC CHEMISTRY

Carbohydrates: Structure and biological functions of mucopolysaccharides, glycoproteins, and glycolipids- Role of sugars in biological recognition-Blood group substances

Lipids: Essential fatty acids-structure and function of triglycerols, Glycerophospholipids, cholesterol, bile acids prostaglandins- composition and functioning of lipoproteins

Enzymes: Nomenclature and classification, properties, factors affecting enzyme catalysis, enzyme inhibition- reversible and irreversible inhibition. Uses of enzymes in food drink industry and clinical laboratories.

UNIT-IV: BIOPHYSICAL CHEMISTRY:

Standard free energy change in biochemical reactions, exergonic and endergonic reactions, hydrolysis of ATP, thermodynamics of biopolymer solutions, chain configuration of bio polymers, and calculation of average dimensions. Membrane equilibrium, ion transport through cell membrane. dialosis and its function. Structure and functions of proteins, enzymes, DNA and RNA in living systems, forces involved in bio polymer interactions, electrostatic forces, hydrophobic forces, molecular expansion, and dispersion forces.

Books Suggested

1. M.N. Hughes, The Inorganic chemistry of Biological Processes, John wiley and Sons, New York 2nd Edition, 1981.
2. A Text book of Biochemistry, A.V.S.S. Rama Rao
3. Physical chemistry by Atkenes
4. Physical chemistry by Albertz.
5. Bio physical chemistry by Van Holde
6. Bio Physics by Narayanam

7. Organic Chemistry, Vol. 2, I. L. Finar, ELBS.
8. Chemistry of Natural Products, P.S. Kalsi, Kalyani Publishers.
9. Chemistry of Organic Natural Products, O. P. Agarwal, Vols., 1 & 2, Geol Pubs.
10. Natural products Chemistry K.B.G. Torssell, John Wiley, 1983.
11. Burger's Medicinal Chemistry, M.E. Wolff, John Wiley
12. Medicinal Chemistry, A. Kar, New Age International

CHE PC 404	Core practical I: Inorganic Chemistry - Practical	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Inorganic Chemistry - Practical.

Course Objectives:

- Learn potentiometric titrations of mixture of acids
- Determination of electrode potential by polarography
- Gain knowledge on interpretation of data from IR, AAS, HPLC and GC
- Determination of alkanility and purity by pH metry

Course Outcomes: At the end of the course, the student will be able

CO1	To perform titration of mixture of halides and to draw potentiometry curves
CO2	To learn ampherometric titrations and mixtures by polarography
CO3	To Correlation of data obtained from IR, AAS, HPLC and GC
CO4	To Determination of alkanility and purity by pH metry

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	3	-	-	2	-	2	-	3
CO2	3	3	3	2	3	2	-	-	-	2	3	3
CO3	3	2	3	3	2	3	-	2	-		2	3
CO4	3	3	3	2	3	3	-	2	-	2	-	3

CHE PC 403: CORE PRACTICALS: <u>PRACTICAL – I-</u>

1. Potentiometry: a) Titration of mixture of acids
   b) Titration of mixture of halides
   c) Titration of ferrous ammonium sulphate with potassium dichromate
   d) Redox titrations
   e) Solubility of Sparingly soluble salt.
   f) Formula and instability constant of a complex
   g) Dissociation constant of acetic acid

2. Polarography: a) Determination of E1/2 of Zn and Cd
   b) Determination of Zn and Cd in mixture
   c) Amperometric titration.

II DEMONSTRATION EXPERIMENTS

1. IR – Interpretation of IR spectrum of alcohols, ketones, aldehydes and other standard materials
2. AAS: Demonstration of AAS – Determination of Zn, Cd, Pb, Mn, Fe and Ni in effluents using AAS.
3. Spectrofluorimetry – estimation of quinine and fluoroscene
4. Ion selective electrodes – estimation of F^-, S^{2-} and CN^- in effluents using ion selective electrode meter.
5. Polarography and Anode stripping voltametry
6. Polarography and Anode stripping voltametry – behavior of Cd, Zn, Pb in a mixture.
7. Determination of Pb and Cd in samples using Anode stripping voltametr
8. Gas chromatography- Determination of pesticides
9. HPLC- Determination of pesticides
10. NMR
11. (a)Demonstration of NMR spectrometer and study of hydrogen bonding in a given alcohol or phenol.
12. (b)Interpretation of NMR chemical shifts of ethyl benzene, ethyl alcohol.
13. TGA, DTA, DSC – Demonstration of TG, DTA and DSC and study of decomposition of calcium oxalate, calcium carbonate, copper sulfate, oxalic acid.
14. pH metry
    a. Determination of alkalinity in a colored effluent using pH metric end point.
    b. Determination of purity of commercial HCl, H_2SO_4, H_3PO_4 and CH_3COOH using pH metric end point

CHE PC 405	Project Work	L-5,T-1,P-0	4 Credits

Pre-requisite: Physical Chemistry Project Work

Course Objectives:

- Identification of problem by literature survey
- Carry out the problem independently
- Interpretation of data
- Communication of research results through presentations and preparation of dissertation

Course Outcomes: At the end of the course, the student will be able

CO1	To identify research problems and to collect research literature
CO2	To propose hypothesis of a research problem
CO3	To perform research experiments
CO4	To analyse the data and conclude the research outcomes

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	-	-	-	3
CO2	3	3	3	3	3	2	3	2	-	-	2	3
CO3	3	3	3	2	2	3	2	3	-	2	-	3
CO4	3	3	3	3	3	3	2	2	-	2	-	3

CHE PC 405: PRACTIAL II/ PROJECT WORK

CHE PC 406A	Drug Chemistry	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of Drug Chemistry

Course Objectives:

- To learn about the natural products as leads for new drugs
- Determination of cardiovascular drugs
- To study Autacoids
- Interpretation of Antipyretics

Course Outcomes: At the end of the course, the student will be able to

CO1	Know about natural products.
CO2	Know Interpretation of cardiovascular drugs.
CO3	Know the Analyzing about prostaglandins.
CO4	Know the Definition, Classification, Nomenclature, Structure and Synthesis of anti-inflammatory drugs.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3		3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE : PC : 406 (A): (OPEN ELECTIVE) : DRUG CHEMISTRY

UNIT – I: NATURAL PRODUCTS AS LEADS FOR NEW DRUGS

Occurrence, Structure and therapeutic uses of Drugs acting on Central Nervous System

Morphine alkaloids (morphine, codeine, thebaine, heroin, pethidine)

Cannabinoids (9-cannabinol, Tetrahydrocannabinol)

Neuromuscular Blocking Agents (Curare, Decamethonium)

Vinca Alkaloids (Vincristin and Vinblastin), Taxol and Taxotere, podophyllotoxin, Etoposide, Teniposide.

UNIT – II: CARDIOVASCULAR DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis.

Cardiac glycosides (ex: Digoxin, Digitoxin);

Antihypertensive drugs (ex: Methyl dopa, Clonidene hydrochloride);

Antiarrhythmic agents (ex: Quinidine sulfate);

Antisympathetic drugs (ex: Propranolol hydrochloride, Verapamil hydrochloride);

Vasopressor drugs (ex: Prenylamine, Buphenine).

UNIT – III: AUTACOIDS

Definition, Occurrence, Isolation, Nomenclature, Classification, Synthesis, Biosynthesis and Stereochemical structures of Prostaglandins. Structural elucidation of PGE_1, PGE_2; Synthesis and biosynthesis of PGE_2, $PGF_{2\alpha}$.

Structure and Biosynthesis of Thromboxane A2 and Prostacyclin (synthesis not expected).

UNIT – IV: ANTI-INFLAMMATORY DRUGS

Definition, Classification, Nomenclature, Structure and Synthesis of Paracetamol, Aspirin (Antipyretic), Salol, Cinchophen, Antipyrene, Phenylbutazone, Indomethacin, Tolmetin, Ibuprofen, Diclofenac and Naproxen.

Books suggested:

1. Medicinal Chemistry by Ashitosh Kar
2. Medicinal Chemistry by D. Sriram, P. Yogeeswari
3. Medicinal Chemistry by David A. Williams, Thomas L. Lemke
4. Medicinal Chemistry by V**.** Alagarsamy
5. Biochemistry by U. Satyanarayana
6. Natural Products Chemistry and Applications by Sujata V. Bhat, B.A. Nagasampagi, S. Meenakshi
7. Medicinal Chemistry by V.K. Ahluwalia, Madhu Chopra
8. Medicinal Chemistry by Balkishen Razdar
9. Advanced Practical Medicinal Chemistry by Ashutosh Kar
10. Chemistry of Organic Natural Products by O. P. Agarwal, Vols., 1 & 2, Geol Pubs.
11. Chemistry of Natural Products by S. V. Bhat, B.A. Nagasampagi, M. Sivakumar
12. Natural Products Chemistry by K.B.G. Torssell, John Wiley, 1983.

CHE PC 406 B	Electroanalytical Techniques	L-5,T-1,P-0	4 Credits

Pre-requisite: Understanding of Electroanalytical Techniques

Course Objectives:

- To learn about the classification of electroanalytical methods
- Determination of types of currents
- Principle, instrumentation, reversible and irreversible cyclic voltammograms..
- Interpretation of Ion selective electrodes

Course Outcomes: At the end of the course, the student will able to

CO1	Ability to interpret potentiometry and conductometry
CO2	Interpretation of results while adhering to DC Polarography.
CO3	Analysing and compiling the data and results in polarography.
CO4	Familiarize Types of ion sensitive electrodes.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	2	-	-	2	3
CO2	3	3	3	3	-	2	-	2	-	2	-	3
CO3	3	3	-	3	-	3	-	2	-	3	-	3
CO4	3	-	3	-	3	2	-	-	-	2	-	3

CHE : PC : 406(B): (OPEN ELECTIVE) : ELECTRO ANALYTICAL TECHNIQUES

Unit I: Types and Classification of Electro analytical Methods.

i) Potentiometry- Types of electrodes, Hydrogen gas, Calomel, Quin hydrone and glasselectrodes. Determination of pH. Potentiometric titrations.

ii) Conductometry – Definition of terms – conductivity, specific conductivity, cell constant. Mobility of ions, Conductometric titrations.

Unit II: D.C Polarography :. Dropping mercury electrode- Instrumentation-polarogram. Types ofCurrents : Residual, Migration, Limiting. Two and Three electrode assemblies. Ilkovic equation(derivation not necessary) and its consequences. Types of limiting Currents: Adsorption, Diffusion, Kinetic. Applications of polarography in qualitative and quantitative analysis. Analysis of mixtures. Application to inorganic and organic compounds. Determination of stability constants of complexes.

Unit III: (i) A.C. polarography (ii) Square-wave polarography (iii) Pulse polarography (iv) Differential pulse polarography(V) Cyclic Voltammetry: Principle, instrumentation, reversible and irreversible cyclic voltammograms.

Unit IV: Ion selective electrodes: Ion-sensitive electrodes –types of ion sensitive electrodes –metal based cation and anion sensitive electrodes, solid membrane electrodes. Liquid ion-exchange electrodes, gas sensing membrane electrodes.

Books Suggested

1. H.W. Willard, LL. Merrit and J.A. Dean: Instrumental Methods of Analysis. Affiliated East-West).
2. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denny. Vogel's Text Book of Quantitative Chemical Analysis (ELBS).
3. D.A. Skoog and D.M. West: Principles of Instrumental Analysis (Holt, Rinehart and Wilson).
4. J.G. Dick : Analytical Chemistry (Mc Graw Hill).

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OFENVIRONMENTALSCIENCES



Course

M.Sc. ENVIRONMENTAL SCIENCES

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per

NEP - 2020

DEPARTMENT OF ENVIRONMENTAL SCIENCES

About the Department

The Centre for Environmental Sciences with sophisticated analytical instruments was established in Sri Venkateswara University in the year 1989 as a centralized instrumentation facility for analyses of chemical, physical and physico-chemical aspects of the environment undertaken by different departments of the University.

The Department of Environmental Sciences was established in 1997 with a goal to build environmental knowledge base and to promote quality education and research. Various activities have been taken up to redress the local environmental problems, to create environmental awareness and to promote environmental education with special emphasis on rural development.

Vision

- To be the Nation's premier in research and development in Environmental Sciences.
- The Department will be multidisciplinary in its approach and responsive to current environmental issues Air pollution, water pollution and global warming.
- Environmental Sciences is to contribute quality instruction and scientific expertise in the geosciences, both now and for the future, to meeting global challenges in supplies of natural resources.
- To reduce environmental pollution, developing agriculture without soil contamination, preserving aesthetic values, mitigation of natural hazards, protection of the environment and public awareness of science.

Mission

- Relevant and innovative information and communication to aid in sustainable development, management and decision making involving increasingly stressed land and water supplies.

- Technical expertise for addressing critical zone and environmental issues(including contaminant remediation, sustainable food production, soil and water quality) in rural and urban centers and the rapidly changing interfaces between them.

Course Description: Ecology and Environment, Environmental Chemistry, Environmental Toxicology and Public Health, Human Values and Professional Ethics, Energy and Environment, Environmental Pollution, Instrumental Techniques and Applications, Waste Treatment and Management, Environmental Impact Assessment, Audit And Economics, Statistics, Computer Applications and Modeling, Natural Resources Conservation, Water Resources and Watershed Management, Remote Sensing and GIS, Environmental Laws, Policies and Legislation Forest Resources and Management

Programme Specific Outcomes (PSOs)

- By knowing pollution levels in the environment best possible fresh environment can be created in different methods like afforestation, natural parks and sanctuaries etc., for human concern.
- Imparting practical knowledge about estimation of pH, Total Dissolved Solids, Hardness and Dissolved Oxygen, Chlorides and Sulphates in water samples.
- Pollution free environment for human life will be achieved.
- Applications of basic scientific principle in the evaluation of pollution by instruments.
- Environmental potentiality will be achieved. This is indirect benefits to the society.
- Discuss the solid waste collection systems, route optimization techniques and processing of solid wastes.

Programme Objectives:

- To impart the knowledge on ecology, ecosystems imbalance, impact and restoration.
- To develop population growth, regulations and dynamics in different communities.
- To inculcate ethics and lifelong learning in ecosystem imbalance, impact, control practice considering society, health and environment.

- To improve sustainable management of inorganic fertilizers, animal manures and green manures in order optimize plant productivity and to reduce nutrient losses.
- To create an awareness on Engineering Ethics and Human Values.
- To instill moral and social values and loyalty.
- To emphasize on design considerations of various unit operations and processes of water treatment facilities.
- To learn aeration, sedimentation, coagulation and flocculation processes.
- To characterize the waste and apply the knowledge of laws for municipal solid waste management, for handling of biomedical wastes and for handling of plastic wastes.
- To design composting systems, maintain and operate the aerobic and anaerobic composting process for effective organic waste recycling.
- To introduce and provide theoretical and practical education on environmental impact assessment.
- To focus on the rationale and methodology of integrated environmental impact assessment (EIA), including consideration of the relevant bio-physical, social, cultural, economic and human health aspects of development proposals, programs and policies.
- Evaluation of land use for various agricultural practices.
- To recognize how soil type and topography affects recommended agricultural, commercial and residential use and water quality at varying locations.
- To identify core environmental issues and legal and institutional responses
- To analyze the role of judiciary in environmental protection.
- To impart knowledge in sustainable forest management.

Programme Outcomes:

- Describe programmes environmental protection by implementing eco-friendly for human existence.
- By knowing pollution levels in the environment best possible fresh environment can be created in different methods like afforestation, natural parks and sanctuaries etc., for human concern.
- Imparting practical knowledge about estimation of pH, Total Dissolved Solids, Hardness and Dissolved Oxygen, Chlorides and Sulphates in water samples.
- Inform, educate, and empower people about the potential hazards of toxic substances to environmental and human health.
- They explain basic competence regarding environmental impacts arising from different energy carriers and technical solutions.
- Pollution free environment for human life will be achieved.
- Applications of basic scientific principle in the evaluation of pollution by instruments.
- Environmental potentiality will be achieved. This is indirect benefits to the society.
- Discuss the solid waste collection systems, route optimization techniques and processing of solid wastes.
- Critically examine assumptions inherent in impact assessment, examine a range of environmental impact assessments and identify and explore impact assessment fields and approaches.
- Understand requirement of oxygen for growth of organisms to break down organic matter in wastewaters.
- Rest and recreation to the public and income generation for the Government.
- Explain the conservation of the environment by adopting bio treatment for waste degradation.
- Critically examining the gap in the resource availability, use and conservation.
- Describe the management of water resources through construction of watersheds for future generations.
- Evaluating the application of RS-GIS techniques to the matrices of environment and resource management.

Program Educational Objective (PEOs):

- To impart students with strong knowledge base through syllabi courses and sessional that makes them suitable for industries, academics, research and consultancies.
- To develop students analytical, computational and research skills through assignments, weekly presentations and modeling software.
- To train the students on developing practical, efficient and cost effective solutions on problems and challenges on environmental sciences.
- To inculcate among students sensitivity towards social and corporate responsibilities

SVU COLLEGE OF SCIENCES

CHOICE BASED CREDIT SYSTEM (CBCS) (AS PER NEW UGC REGULATIONS)

The course of Study and Scheme of Examinations(With Effect from 2021-22)

M.SC. ENVIRONMENTAL SCIENCES

SEMESTER - I

S. No	Course Code	Components of Study	Title of the Paper	Contact hours	No. of Credits	I A Marks	End SEM Exam Marks	Total
1	ENV 101	Core-Theory	Ecology and Environment	6	4	20	80	100
2	ENV 102	Core-Theory	Environmental Chemistry	6	4	20	80	100
3	ENV 103	Core-Practical I	Practical – I	6	4	-	-	100
4	ENV 104	Core-Practical II	Practical – II	6	4	-	-	100
5	ENV 105	Compulsory Foundation **(Related to Subject)**	Environmental Toxicology and Public Health	6	4	20	80	100
6	ENV 106	Elective Foundation	Biodiversity and Conservation and Management	6	4	20	80	100
		Total		**36**	**24**	**80**	**520**	**600**

SEMESTER-II

S.No	Course Code	Components of Study	Title of the Paper	Contact hours	No. of Credits	I A Marks	End SEM Exam Marks	Total
1	ENV 201	Core-Theory	Energy and Environment	6	4	20	80	100
2	ENV 202	Core-Theory	Environmental Pollution	6	4	20	80	100
3	ENV 203	Core-Practical I	Practical – I	6	4	-	-	100
4	ENV 204	Core-Practical II	Practical – II	6	4	-	-	100
5	ENV 205	Compulsory Foundation **(Related to Subject)**	Instrumental Techniques and Applications	6	4	20	80	100
6	ENV 206	Elective Foundation	Environmental Laws, Policies and Legislation	6	4	20	80	100
		Total		**36**	**24**	**80**	**520**	**600**

SEMESTER-III

S.No	Course Code	Components of Study	Title of the Paper	Contact hours	No. of Credits	I A Marks	End SEM Exam Marks	Total
1	ENV 301	Core- Theory	Waste Treatment and Management	6	4	20	80	100
2	ENV 302	Core- Theory	Environmental Impact Assessment, Audit And Economics	6	4	20	80	100
3	ENV 303	Core- Practical I	Practical – I	6	4	-	-	100
4	ENV 304	Core- Theory **Skill Development**	Basics of Statistical Methods and Computer Programmes	6	4	20	20	100
5	ENV 305	Generic Elective* **(Related to Subject)**	(a) Ecotourism and Eco- Restoration (b) Occupational Health and Industrial Safety (c) Statistics, Computer Applications and Modeling	6	4	20	80	100
6	ENV 306	Open Elective* (**For other Department**)	(a) Natural Resources Conservation (b) Environmental Education	6	4	20	80	100
		Total		**36**	**24**	**80**	**520**	**600**

*** A Student is allowed to take i) one generic elective and one open elective or ii) two generic electives, to secure the minimum number of credits.**

SEMESTER-IV

S.No	Course Code	Components of Study	Title of the Paper	Contact hours	No. of Credits	I A Marks	End SEM Exam Marks	Total
1	ENV 401	Core-Theory	Water Resources and Watershed Management	6	4	20	80	100
2	ENV 402	Core-Theory	Remote Sensing and GIS	6	4	20	80	100
3	ENV 403	Core-Practical I	Practical – I	6	4	-	-	100
4	ENV 404	Core-Practical II/ Project Work	Project Work + Comprehensive Viva-Voce	6	4	-	-	100
5	ENV 405	Generic Elective* **(Related to Subject)**	(a) Disaster Mitigation and Management (b) Environmental Safety (c) Environmental Management and Sustainable Development	6	4	20	80	100
6	ENV 406	Open Elective* (**For other Department**)	(a) Forest Resources and Management (b) Global Environmental Issues	6	4	20	80	100
		Total		**36**	**24**	**80**	**520**	**600**

*** A Student is allowed to take i) one generic elective and one open elective ii) two generic electives, to secure the minimum number of credits.**

SEMESTER - I

ENV 101::ECOLOGY AND ENVIRONMENT

Course Objectives

- To impart the knowledge on ecology and structure and functions of ecosystems.
- To inculcate ethics and learning in ecosystem imbalance, health and environment.
- To analyze soil profile and its importance of ecological balance.
- To estimate the nutrients in the different soil samples.

UNIT-I

Ecology and Environment: Scope – Ecological Principles- Structure and Functions of Ecology- Ecological Factors-Environmental Science as interdisciplinary Subject – Earth, Man and Environment Relationship – Importance of biological cycles in the environment

UNIT-II

Population and Community Ecology: Population density- Population fluctuations- Population dynamics – Impact on Environment – Human population – Effect on Environment – Growth and factors affecting change in size of human population – Family Planning Methods, birth control, socio-economic methods of controlling population growth- Seed Germination and Reproductive capacity

Different communities and their occupation in different ranges in the environment and their relationship for the maintenance of eco-balance in the environment

UNIT – III

Ecosystem – Definition – Components – Structure – Types – Functions – Interrelationship of different ecosystems – Food chain – Food web – Productivity – Ecological energetics – Energy flow in the ecosystem-Ecological efficiency-Ecological Concepts of the Species-Habitat and Niche, ecological succession.

UNIT – IV

Soil Nutrients – Soil profile – Soil texture – Soil classification– Soil organic matter –Soil microbes– Biogeochemical cycles (C, N, P, K) – Ecological aspects and their importance for maintenance of eco-balance – Food production and future human existence in the environment – Eco-friendly programmes.

References:

1. Odum E.P., **Fundamentals of Ecology,** WB Saunders Co., London (1971).
2. Sharma P.D., **Ecology and Environment,** Rastogi Publications, Meerut (1994).
3. Oliver S Owen, **Natural Resources Conservation – An Ecological Approach**, acmillan Publishing Co. Inc., New York (1980).
4. Daniel D Chiras, **Environmental Science,** the Benjamin/Cummings Publishing Co. Inc (1994).
5. Singh H.R., **Introduction to Animal and Environmental Biology,** Vishal Publications (1989).
6. Robert H Giler, **Wildlife Management,** W.H. Freeman and Company, San Francisco (1978).
7. Raymond F Dasmann, **Environmental Conservation**, John Wiley & Sons (1984).
8. N.S. Subrahmanyam, A.V.S.S Sambamurty, **Ecology,** Narosa Publishing House, New Delhi.

Course Outcomes

- Provide solutions to environmental problems using appropriate tools and techniques.
- Develop both a quantitative and qualitative understanding of interactions between organisms and their consequences.
- Gain the knowledge of functions of organisms and ecosystem.
- Describe programmes environmental protection by implementing eco-friendly for human existence**.**

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3	2		3		2	3					3
CO2	3	3				3	3					3
CO3	3			3		3	3				3	3
CO4	2					3		3				3

ENV 102::ENVIRONMENTAL CHEMISTRY

Course Objectives

- To understand emissions and distribution of the air pollutants and particles in the atmosphere.
- To identify chemical properties and reactions of the compounds in the air.
- To understand the primary and secondary pollutants and its effects.
- To inculcate non polluted environment using green chemistry**.**

UNIT – I

Atmospheric Chemistry: Chemical reactions in the atmosphere – Aerosol types, production and distribution – Aerosols and radiation – Atmospheric turbidity and related environmental problems - Inversions – Global climate and photochemical reactions – Global warming – Greenhouse effect – Ozone depletion – Acid rain – Corrosion mechanism – Prevention – Particles in Atmosphere – Composition sources – Types and effects.

UNIT – II

Toxicological Chemistry: Introduction to toxicology and toxicological Chemistry – Toxicants – Dose-Response Relationships – Reactions of acids and bases on surfaces - Toxic chemicals in the environment – Biochemical aspects of As, Cd, Pb, Hg, CO, O_3, PAN, Pesticides, MIC and carcinogens in air.

Biotransformation of Xenobiotics: Principles – Receptor sites – absorption and storage of xenobiotics – types of biotransformations – Microsomal oxidations – Mixed function oxygenizes – conjugation – biotransformation of organochlorine and organophosphorous pesticides – Antidotal procedures in Toxicology.

UNIT – III

Soil Chemistry: Micro and Macronutrients – Inorganic and Organic contaminants in the soil – Biodegradation – Nondegradable waste and its effect on the environment –Bioremediation of surface soils – Fate and Transports of contaminants in the Vadose zone – Bioindicators – Soil parameters – Soil destruction – Erosion – Soil conservation.

UNIT – IV

Water Chemistry: Water pollutants – Types – Sources – Heavy metals – Metalloids – Organic, Inorganic, Biological and Radioactive – Types of reactions in various water bodies including marine environment – Eutrophication – Ground water – Potable water.

Green Chemistry: Introduction – Inception and Evolution – Importance of solvents – Types of catalysts and their role – Biological alternatives – Applications.

References::

1. Sharma, B.K. Kaur H., **Environmental Chemistry**, Goel Publishing House (1995).
2. Tyagi O.D. and Mehra M, **Text Book of Environmental Chemistry,**Anmol Publications (1990).
3. Johnson D.O., Netterville J.T., Wood J.C. and James M, **Chemistry and the Environment**,W.B.Saunders Company Philadelphia (1972).
4. Bailey R.A., Clerke H.M., Ferris J.P., Krause S and Strong R.L., **Chemistry of the Environment,** Academic Press., New York (1978).
5. Stanley E Manahan, **Environmental Chemistry,** Lewis Publishers (2001).
6. Thomas G Spiro and William M Stigliani, **Chemistry of the Environment,**Prentice Hall of India (2004).
7. RashmiSanghi and Srivastava M.M., **Green Chemistry,** Narosa (2006).

Course outcomes

- Demonstrate knowledge of chemical and biochemical principles of fundamental environmental processes in air, water and soil.
- Apply basic chemical concepts to analyze chemical processes involved in different environmental problems.
- By knowing pollution levels in the environment best possible fresh environment can be created in different methods like afforestation, natural parks and sanctuaries etc., for human concern.
- Acquire the knowledge to implementation of biological alternatives for protection of the environment**.**

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3	2		3	3	2	3		2			3
CO2	3	3				3	3					3
CO3	3			3		3	3				3	3
CO4	2					3		3				3

ENV103:: PRACTICAL – I

Course objectives

- To estimate population of flora and fauna in the ecosystem.
- To examine nutrients levels in various samples of wastewater.
- To estimate the protein, carbohydrates and nucleic acid in the different species.
- To examine the natural condition for species survival.

1. Estimation of effective population size.
2. Estimation of Species Diversity.
3. Estimation of a primary production in a water body.
4. Estimation of dust accumulated on plant parts and its effects on morphology and anatomy of plants.
5. Estimation of protein content of biological samples.
6. Determination of total carbohydrates in biological system.
7. Estimation of trace heavy metals in soil, plant and animal material.
8. Estimation of sulphates, phosphates, nitrates and chlorides in water sample.

Course outcomes

- Imparting practical knowledge about estimation of pH, Total Dissolved Solids, Hardness and Dissolved Oxygen, Chlorides and Sulphates in water samples.
- Imparting practical knowledge about estimation of pH, Total Dissolved Solids, Hardness and Dissolved Oxygen, Chlorides and Sulphates in water samples.
- Understand the environmental changes due to pollution levels.
- Examine the various ecosystems and its biodiversity.

ENV104:: PRACTICAL – II

Course objectives

1. To examine the contamination of the environment with chemical load by spectroscopic technology.
2. To analyze the concentration of the metals in the environment.
3. To inculcate the knowledge in scientific instrumentation.
4. To understand applications of organic matter in soils.

5. Determination of chromium and zinc by Spectrophotometry.
6. Multi element analysis by AAS.
7. Analysis of mercury by mercury analyzer.
8. Application of Fluorimetry.
9. Estimation of Na, K, Ca, Mg by Flame Photometry.
10. Determination of soil type and texture, pH, Hydraulic conductivity, Soil moisture, Nitrogen, Potassium, Phosphorous and Organic matter.
11. Determination of Fe^{+2}/Cr^{+6} in soil sample.

Course outcomes

- Understanding of various alkalinities present in the water sample by volumetric titration linked with theory.
- By knowing water pollution potable water can be drawn out and wastewater can be treated.
- By knowing various experiments of minerals fertility of the soil can be known which is advantage to farmers for agriculture.
- Describe the advantages of organic forming.

ENV 105 :: ENVIRONMENTAL TOXICOLOGY AND PUBLIC HEALTH

Course objectives

- To introduce the applications of environmental toxicology in the context of public health.
- To focus on the fate of chemicals in our environment and routes of exposure.
- To understand the epidemic diseases and control methods.
- To impart the knowledge in understanding of biotechnology for degradation of waste products in the environment.

UNIT - I

Environmental Degradation: Man and Environment – Man made Degradation – Deforestation – Urbanization – Industrialization – Mining – Dam building and other activities.

UNIT – II

Environmental Toxicology: Introduction of Toxicology – History and Types of Toxicology – Toxicity (LD^{50} and LC^{50}) – Hazards – Risk Benefits – Risk ratio to tolerance limits – Acceptable daily intake – Threshold Value – Pesticide Toxicology – Detoxification – Resistance and Metabolism – Pesticide – Pesticide Classification – Pest Surveillance – Pest resistance - Residue and Effect – Heavy Metal Toxicology – Toxicology of some Hydrocarbons – Industrial Toxicology and Risk Assessment.

UNIT – III

Environmental Epidemiology: Role of Epidemiological Study in evaluation of Environmental Hazards – Occupational Environmental and Health Hazards – Community Environment and Health Hazards – Microbial, Algal, Invertebrate and Alternative Toxicity Tests – Epidemiological Episodes.

UNIT - IV

Health and environmental impacts of Nanaotechnology :

Engineered Nanomaterials of Relevance to Human Health – Engineered Nanomaterials in the Body – Routes of Entry – Toxicological Health Effects Caused by Nanopartircles – Relevant Parameters in Nanoparticle Toxicology – Integrated Concept of Risk Assessment of Nanoparticles – Plant and Microbes as Nanofactories.

Public Health: Public Health Programmes – Objectives and Scope – Urban and rural Health – Sanitation – Malarial Control Measures – HIV/AIDS – Domestic and Residential Waste Disposal Studies.

References:

1. Sharma.P.D.,**Environmental Biology and Toxicology,** Rastogy (1994).
2. MeeraAsthana and Asthana.D.K.,**Environmental Pollution And Toxicology,**Alka Printers (1994).
3. Guithinier Perry, **Introduction to Environmental Toxicology,** Elsevier Publications (1980).
4. Oehme W.F., **Toxicity of Heavy Metals in Environment,** Marcel Dakkar Inc., New York (1989).
5. Lave L.B. and Upton A.C., **Toxic Chemicals, Health and the Environment,** John Hopkins University Press, Baltimore and London (1987).
6. Beyar W.N., Heing H.G. and Norwood A.W.R., **Environmental Contaminants in Wild Life,** CRC Lewis Publishers, New York (1996).
7. Dikshit T.S.S., **Toxicology of Pesticide in Animals,** CRS Press Inc., Boca Raton, Florida, USA (1991).
8. SubbiahBalji**Nanobiotechnology,** MJP Publishers, Chennai(2010). (P.No.181 – 207).
9. Dr.U.Kumar, **NanoTechonology: Fundamental approach**, AgroBios, Jodhpur. (P.No.216 - 225)

Course outcomes

- Understand the role of toxicants in environment and methods used to quantify toxicity.
- Inform, educate, and empower people about the potential hazards of toxic substances
  to environmental and human health.
- By knowing the adverse health problems on human beings, safety, preventing measures can be implemented endemic and pandemic diseased can be controlled.
- Understand the toxicity of pesticide, detoxification metals on public health.

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3	2			3	2	2					3
CO2	3	3				3	3					3
CO3	3			3			3					3
CO4	2				2	3		3		2		3

ENV 106 :: BIODIVERSITY CONSERVATION AND MANAGEMENT

Course objectives

- To assess biodiversity loss and the importance of biodiversity conservation.
- To emphasis regional diversity hotspots and important conservation areas.
- To develop biotechnological methods in pollution abatement and develop eco-friendly bio-products for environmental health.
- To acquire knowledge in environmental management through biological system.

UNIT – I

Biodiversity: Definition and concept – Distribution of climatic regions of world and vegetation types – Patterns of species diversity – Species importance – Species area relationships – Theories of species diversity – Equilibrium theory – Biodiversity of tropical and temperate regions – Hot Spots of the world – Case Studies on Forests, Deserts, Coral Reef and Island Species.

UNIT – II

Measures of Biodiversity: Alfa, Beta and Gamma diversities – Indices of diversity and evenness – The Simpson Index Diversity of fully censured communities – Estimating the diversity of large community – Evenness and Equitability – Hierarchical diversity.

UNIT – III

Conservation and Management of Biodiversity: Types of conservation – In-situ and Ex-situ conservation – Concept of germ plasma preservation and gene banks – Community Biodiversity – Registers and their importance – National Biodiversity Strategy and Action Plan Programme – Protected Area Management Plan – Biodiversity Bill 2002 – Patent Act Agenda 21 – National Policies and Acts [Wild Life (Protection) Act,1972] related to biodiversity.

UNIT – IV

Environment and Biotechnology: Microbes in relation to environment – Biosensors – Environmental applications of biosensors – Biotechnological methods in pollution abatement – Biodegradation – Genetically Engineered Microbes (GEMs) in biotreatment of wastes – Eco-friendly bio-products for environmental health – Environmental biotechnology in the 21st century.

References:

1. Mac Arthur R.H., **Geographical Ecology: Patterns in the Distribution of Species,** Harper & Row Publications, New York (1972).
2. Pielou E.C., **Ecological Diversity,** John Wiley & Sons, New York (1975**).**
3. Stracey P.D., **Wild Life in India – Its Conservation and Control,** Ministry of Food And Agriculture, Govt. of India, New Delhi (1963).
4. Saharia V.B., **Wild Life in India,**Nataraj Publishers, Dehradun (1982).
5. Seshadri B, **Indian Wild Life Resources,** Sterling Publishers, New Delhi (1982**)**.
6. Chatterji, A.K., **Introduction to Environmental Biotechnology,** Prentice Hall, New Delhi (2005).

Course outcomes

- Systematically understand biodiversity and its vital role in ecosystem function.
- Understand the value of biodiversity and current threats to biodiversity.
- Describe Environment of nature.
- Explain the conservation of the environment by adopting bio treatment for waste degradation.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3	2		2		2	3				2	2
CO2	3	2		2	2	2	3				2	3
CO3	3			2		3	2				2	3
CO4	3	2		2		3	3				2	3

SEMESTER – II

ENV 201::ENERGY AND ENVIRONMENT

Course outcomes

- To understand energy concepts for conventional and renewable energy technologies and their application.
- To provide energy production methods and consequent environmental impacts.
- To understand sources of various green energy and applications.
- To inculcate the bio-energy practices for maintain environmental quality.

UNIT – I

Basic Concepts of Energy: Energy – Definition – Forms of energy – Potential, Kinetic, Mechanical, Thermal, Electrical, Chemical and Nuclear Energy – Uses of energy – Energy Sources – Conventional and Non-conventional energy sources.

Conventional Energy Sources: Firewood – Coal – Origin and development of coal – Coal reserves in India and World – Clean coal combustion – Petroleum and Natural Gas – Composition and Classification of Petroleum – Reserves of Petroleum and Natural Gas in India and the World – Hydroelectric Power – Thermal Power – Synthetic Fuels – Consumption and management of conventional energy sources.

UNIT - II

Alternate energy Sources: Need for alternate energy sources – Renewable energy sources.

Solar Energy: Importance – Collection of Thermal Energy – Flat Plate Collector – Solar Air Collector – Solar Concentrators – Thermal Energy Storage – Non-convective Solar Pond – Photovoltaic Systems.

UNIT – III

Wind Energy: Wind Energy Conversion System – Operational Characteristics – Applications of Wind Energy.

Geothermal Energy: Basics of Geological Process – Geothermal Resources – Utilization.

Ocean Tidal and Wave Energy: Introduction – Energy Conversion Systems.

Bioenergy: Biomass, Biofuels and Biogas – Origin of Biomass – Biomass Sources – Biofuel Production Process – Gasification – Biogas.

Nuclear Energy: Need and importance – Sources of nuclear energy – Nuclear fission reactions – Fission Power – Fusion Power.

UNIT – IV

Environmental Effects associated with Energy Sources and Energy Planning: Energy Consumption in India and different parts of the World – Environmental Impact of large scale exploitation of solar, wind, hydro and ocean energy – Energy Planning and Legislation – Future Energy Options – Indo-US Nuclear Agreement.

References::

1. Tiwari G.N. and Ghosal M.K., **Renewable Energy Resources,** Narosa (2005).
2. Rai G.D., **Non-conventional Energy Sources,** Khanna Publishers (2001).
3. Desai A.V., **Bio energy,** Wiley Eastern Limited, International Development Research Center, Ottawa, Canada.
4. Trivedi R.P. and Gurudeep Raj, **Encyclopedia of Environmental Sciences – Environmental Energy Resources.**
5. Sukhatme S.P., **Solar Energy,** Tata McGraw Hill, New Delhi (1996).

Course outcomes

- Explain the key challenges and technologies in energy use, utilization of energy resources, energy conversion and environmental consequences.
- They explain basic competence regarding environmental impacts arising from different energy carriers and technical solutions.
- Enrichment of ecosystem will be achieved.
- Explain energy planning for future generations**.**

CO-PO mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	2		2	2	3	2	2		1		2	3
CO2	2		2	2	2	2	3		1		2	2
CO3	2	2	2	3	2	3	3		2			3
CO4	2		2	2	2	3	2		2	2	2	2

ENV 202:: ENVIRONMENTAL POLLUTION

Course objectives

To understand route way of pollutants and their impacts on the environment.

- To impart the knowledge on diseases caused by pollution.
- To understand classification of pollution, predictions and consequences of society.
- To understand safe disposal of radioactive wastes**.**

UNIT – I

Atmospheric Pollution: Sampling and analysis of SO_2, NO_X, NO_2, CO_2, fluoride, hydrocarbons and particulates – Cryogenic sampling – Impinges – Scrubbers – Adsorption – Absorption for analysis of SO_2, NO_2, CO_2, fluoride and hydrocarbons – Automobile emissions – Types and their control methods – Auto cyclic engines – Gaseous pollutant monitoring – Particulate – Ringleman Scale – Dosimetry – High volume samples – Analysis and control of particulate matter.

Indoor Air Pollution: Sources – Classification – Respirable particulates – Radon and biological contaminants – Analysis and design.

UNIT – II

Water Pollution: Sampling, analysis and prevention – Determination of pH, DO, BOD, COD, Solids, colour, turbidity, various forms nitrogen, phosphates, fluorides, sulphates, hardness, heavy metals, oil and grease, phenols, pesticides and radio nuclides.

UNIT – III

Soil Pollution: Sampling, analysis and prevention – Determination of pH – Cation exchange capacity of macro and micronutrients in soil systems.

Marine Pollution: Marine – Material addition – Natural and Anthropogenic activity – Oil pollution and effects on marine organisms – Control methods.

UNIT – IV

Noise Pollution: Sources – Noise indices – Classification of Noise loads – Effect of noise on biota and human health – Control and prevention methods.

Radioactive Pollution: Sources of Pollution – Effect of radiation on environment –Safe disposal of radioactive waste – Radiation protection and control measures – Biological dosimetry.

Thermal Pollution: Sources – Various chemical and biological reactions of water – Prevention and Control of thermal pollution.

References:

1. Henry C Perkins, **Air Pollution,** McGraw-Hill (1974).
2. Chhatwal G.R, Mehra M.O., Katyal T, Satake K Mohan Katyal and Nagahiro T, **Environmental Noise Pollution and its Control**, Anmol Publications (1989).
3. Trivedy R.K. and Goel P.K., **An Introduction to Air Pollution**, Techno Science Publications, Jaipur (1995*).*
4. Kudesia V.P., Water**Pollution,**PragatiPrakashan Publications (1985).
5. Sharma P.D., **Environmental Biology,** Rastogi and Co (1995).
6. Harrison, R.M., **Pollution – Causes, Effects and Control,** Royal Society of Chemistry (1990).
7. Handbook of Nanofabrication. Edited by Gary W iederrcht.Elsevier, 2010.
8. Introduction to Nanoscience by Gabor L. Hornyak, Joydeep Dutta, Harry F. Tibbals, Anil K. Rao. CRC Press, 2008.

Course outcomes

- Analyze sources of pollution, exposure pathways, fate and evaluate consequences of human exposure to pollution and its impacts to environmental quality.
- Distinguish the effect of pollutants on human health, economy and wild environments.
- Pollution free environment for human life will be achieved.
- Explain the contamination of water bodies due to discharge of untreated wastewater into the drain.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3	2	1	2	3	2	2					2
CO2	2	2	2	2	2	2	3	1			2	2
CO3	2	2		2	2	2	3					3
CO4	2	2	2	2	2	2	2		2	2	2	2

ENV 203:: PRACTICAL – I

Course objectives

- To analyze wastewater and pond water samples.
- To estimate the concentration of various metals is environment.
- To analysis of toxicants in environmental samples.
- To understand bioaccumulation of pesticides.

1. Determination of pH, Dissolved solids and suspended solids, Dissolved Oxygen, COD, BOD, Alkalinity/Acidity and hardness.
2. Production of biogas in laboratory.
3. Photovoltaic applications of solar cell.
4. Determination of the amount of pesticide/insecticide in water/vegetable samples.
5. Estimation of biochemical toxicity by AAS.
6. Estimation of the amount of NO_2 in photochemical smog samples.

Course outcomes

- **Describe the amount of pesticide/insecticide in water/vegetable samples.**
- **To find concentration levels of toxicant by use of instrumental techniques**
- **To estimate physicochemical assessments in different water samples.**
- **Explain the formation of photochemicals.**

ENV 204:: PRACTICAL – II

Course objectives

- To understand the difference of LC50 and LD50.
- To evaluate the samples like water, soil and biological.
- To examine the growth rate of fauna in different habitats.
- To assess micro and macro nutrients in the soil samples.

1. Estimation of the amount of LC_{50} of Pb in organisms.
2. Vegetation analysis: Frequency, Abundance and Density, Cover and Basal area, Important Value Index.
3. Vegetation sampling: Transects, Plot less methods.
4. Community coefficients.
5. Diversity measures: Shannon Wiener, Simpson and Brillion's Index.
6. Diversity measures of Birds fauna in different habitat conditions.

Course outcomes

- Identify the concentration of biochemical by using instrumental methods.
- Applications of scientific methods for analysis of pollution.
- Applications of basic scientific principle in the evaluation of pollution by instruments.

ENV 205: INSTRUMENTAL TECHNIQUES AND APPLICATIONS

Course objectives

- To impart the knowledge in instrumental techniques.
- To understand in the operation and care of instruments used in the chemical laboratories.
- To inculcate chromatographics in plant pigments.
- To understand value of nanotechnology.

UNIT – I

Spectroscopic Techniques: Basic principles – Beer-Lambert's Law – Salient features – Instrumentation and applications of UV-VIS Spectrophotometry – Colorimetry – Flame Photometry – Fluorimetry – Types of spectrophotometers – Use of spectroscopic techniques for trace metal analysis in environmental samples.

UNIT – II

Atomic Absorption and Emission Spectroscopy: Fundamentals of Atomic Emission and Atomic Absorption – Flame Atomic and Emission Spectroscopy – Atomic Absorption Spectrophotometer (AAS) – Principle and Instrumentation – Graphite Furnace – Flow Injection Technique – Inductively Coupled Plasma Emission Spectroscopy (ICPES) – Comparison of AAS and ICPES – Application of the AAS and ICPES for the determination of trace metals.

UNIT – III

Chromatographic Techniques: Basic principles – Paper Chromatography – Thin Layer Chromatography – Ion Exchange Chromatography – Higher Performance Liquid Chromatography – Gas Chromatography – Instrumentation and applications.

UNIT – IV

Radiochemical Techniques: Radioactivity – Carbon dating – Radioactive labeling – Tracer applications: Isotope Dilution, Neutron Activation Analysis – Radiometric Titration.

Nanomaterials for Environmental Protection: Nano technology processes – Nano Engineering materials for Pollution Prevention, Energy efficient resources and materials, Nano technology products- Nanomaterials, Nano devices and nanosystems.

References::

1. Willard, Merritt, Dean and Settle, **Instrumental Methods of Analysis,** CBS Publishers, New Delhi (1986).
2. Gurudeep R Chatwal and Sham K Anand, **Instrumental Methods of Chemical Analysis,** Himalaya (2005).
3. Vogel, **Text Book of Quantitative Inorganic Analysis,** Longmann Scientific and Technical, UK (1991).
4. Sharma B.K., **Instrumental Methods of Chemical Analysis,** Goel (2001).
5. **Standard Methods for the Examination of Water and Waste Water,** APHA, Washington (1998).
6. Murugesan and Rajakumari, **Environmental Science and Biotechnology – Theory and Practice,** MJP Publishers, New Delhi (2005)
7. Mao Hong fan, Chin pao Huang, Alan E Bland, Z Honglin Wang, RachidSliman, Ian Wright, **Environanotechnology**, Elsevier,(2010)
8. Jo Anne Shatkin, **Nanotechnology: Health and Environmental risk** , CRC press,(2008)

Course outcomes

- Integrate a fundamental understanding of the underlining physics principles as they relate to specific instrumentation used for atomic, molecular, and mass spectrometry, magnetic resonance spectrometry and chromatography.
- Environmental potentiality will be achieved. This is indirect benefits to the society.
- Understand the analysis and level of concentration of different metals through instrumental techniques.
- Explain Nanotechnology and Nano Engineering and Nano Science.

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3	2		1	2	2	1					1
CO2	3	2		2	2	2	1					1
CO3	2	2		2	1		3					3
CO4	2	2		2		2	2					2

ENV 206::ENVIRONMENTAL LAWS, POLICIES AND LEGISLATION

Course objectives

- To prevent, minimize, remedy and punish actions that threaten or damage the environment.
- To preserve and protect the nature's gifts from pollution by implementation of environmental laws and policies.
- To understand environmental public policy strategies in pollution control.
- To understand environmental laws and acts for protect and conservation of environment.

UNIT – I

Environmental Protection: Need – Issues - Problems and Awareness – International and National Efforts for Environmental Protection – Agenda 21- Environmental Ethics and Global Imperatives – Current Environmental Issues in India – Constitutional Amendments – Article 48 A & 52 A.

UNIT – II

Environmental Legislation: Scope and importance – Key concept of environmental management and approaches – Environmental legislation and punitive control – Objectives of legislation and frame work in the country – Planning and enforcement – Environmental Organizations – Information exchange and surveillance – EIA Notification in 1994 – ISO 14000 – EMS Standards.

UNIT – III

Environmental Policy in India: Need for policies- Public Policy – Economic policies – Relationship between economic development and environment – Implementing Environmental Public Policy Strategies in pollution control – Constitutional provisions in India regarding environment – Public Awareness and Participation in Environmental Management – National Land Use Policy 1988 – Industrial Policy 1991.

UNIT– IV

Environmental Laws and Acts: Environmental Laws – Need – Indian Prospective – National Committee on Environmental Planning (NCEP) – Role of Indian Judiciary in the protection of Environment : Forest Conservation Act, 1980, Indian Forest Act (Revised) 1982, Wild Life Protection Act, 1972 amended 1991, Air (Prevention and Control of pollution) Act 1981 amended 1987, The Water (Prevention and control of pollution) Act 1988, Motor Vehicle Act 1988, Hazardous Waste Management Act 1989, Biomedical Waste

Act 1999, Plastic Act 2000 – Municipal solid waste Act 1999, Public Liability Insurance Act 1992 - Biodiversity and WTO (1988) – Convention on biological diversity (1992) – Ecological, Economic, Aesthetic and other importance of Biological diversity.

References::

1. Trivedi R.K., **Handbook of Environmental Laws, Guidelines, Compliances and Standards, Vol I and II,** B.S. Publications.
2. Newson M.M., **Managing the Human Impact on the Natural Environment: Patterns and Processes,** International Book Distributor, Dehradun (1993).
3. Keith Thomas, **Man and Natural World – A History of Modern Sensibility,** Pantheon, New York (1983).
4. Jadav H and Bhosale V.M., Environmental **Protection and Laws, Himalaya** Publications (1995).
5. Shyam Divan and Armin Rosencranz, **Environmental Law and Policy in India, Oxford** Uni. Press (2001).

Course outcomes

- Understanding judicial response to environmental issues in India.
- Acquiring the ability to evaluate the role of law and policy in conservation and management of natural resources and prevention of pollution.
- It enhances the societies support for environment's protection programmes.
- Develop the environmental quality through implementation of environmental laws and acts.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3	2		2	3	2	3				2	3
CO2	3	2		2	3	3	3				3	3
CO3	3	2		2	3	2	3				2	3
CO4	3	2		2	3	2	3				2	3

SEMESTER – III

ENV 301:: WASTE TREATMENT AND MANAGEMENT

Course objectives

- To understand purification practices for wastewater.
- To emphasize on design considerations of various unit operations and processes of water treatment facilities.
- To characterize the waste and apply the knowledge of laws for handling of various wastes and management.
- To understand the reduction of environmental pollution by recycling the waste products.

UNIT – I

Water Treatment: Different sources of water – Methods of water purification – Flocculation, Sedimentation, Sedimentation with coagulation – Jar Test – mixing basins – Clarifiers – Filtration – Types of filtration – Disinfections of water – Industrial Waste water Treatment – Tannery, Distillery, Sugar mill, Paper mill and Pulp Industry – study of effluent treatment plants.- Miscellaneous methods, Desalination, Membrane techniques – Reclamation and reuse of industrial and domestic waste water – Rain water harvesting.

UNIT – II

Sewage Treatment and Disposal: Self purifications of streams – BOD and its importance – Treatment methods – Primary, Secondary and tertiary levels – Disinfections of treated sewage effluent – Septic tank design and effluent disposal methods – Disposal on land, Sewage sickness – Disposal by dilution – Design of biological treatment units – Sludge characteristics, unit operation in sludge disposal, conventional and high rate digester – Disposal of sludge – Gas utilization.

UNIT – III

Solid Waste Management: Sources and generation of solid waste – characterization, chemical composition and classification – Dumping of garbage – Commercial, Industrial Agriculture, Mining and Power Plant discharges – Disposal Methods – Composting, incineration and others – Biomedical waste management.

Hazardous Waste Management: Cyanides, Dioxins, detergents, plastics, nylon, PCB's and others – Waste minimization methods – Monitoring and management strategies – Chemical and disaster management and risk analysis – Degradation of pesticides, detergents, plastics and polymers.

Radio Active Waste: Sources – Radiation standards by ICRP – Other standards (AERB) – Low level and High level radioactive waste management –

UNIT – IV

Recycling of Wastes: Waste types – Sources – Waste generated per capita – Composition of wastes – Recycling of waste for Industrial, Agricultural and domestic purposes – Recycling of metal Products – Reuse, Recovery – Reduction of paper, plastics etc., - Recycling of food manufacturing, beverages, apparel, leather, paper, pulp, chemical and other industries – Fly ash utilization.

References:

1. Jerry A Nathanson, **Basic Environmental Technology,** Prentice Hall of India Pvt. Ltd. (2003).
2. Rao M.N. and Datta A.K., **Waste Water Treatment,** Oxford & IBH Publishing Company Pvt. Ltd. (1987).
3. Hammer M.J., **Water and Waste Water Technology,** John Willey (1986).
4. Garg S.K., **Sewage Disposal and Air Pollution Engineering,**Khanna Publications (1990).
5. Goel P.K., (ed), **Advances in Industrial Waste Water Treatment,**Techno Science Publications, Jaipur (1999).
6. Gilbert M Masters, **Introduction to Environmental Engineering and Science,** Prentice Hall of India Pvt. Ltd (1998).

Course Outcomes

- Describe the components of solid waste management and the laws governing it.
- Discuss the solid waste collection systems, route optimization techniques and processing of solid wastes.
- Biodegradation of waste through natural and artificial methods will be achieved.
- Evaluating solid waste management practices in urban and rural environment.
- Explain minimize and reduce waste generation through applications of 3 R's policy.

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3	2	3	2	2	2	3				2	3
CO2	3	2	2	2	2	2	3				2	3
CO3	3	3	2	2	2	3	3				2	3
CO4	3	2	2	2	3	3	3				2	3

ENV 302 : ENVIRONMENTAL IMPACT ASSESSMENT, AUDIT AND ECONOMICS

Course objectives

- To introduce and provide theoretical and practical education on environmental impact assessment.
- To assess the economic burden of environmental cause.
- To focus on the rationale and methodology of integrated environmental impact assessment (EIA) including consideration of the relevant bio-physical, social, cultural, economic and human health aspects of development proposals, programs and policies.
- To understand financial impact of environmental policy.

UNIT – I

Environmental Impact Assessment: Definition – Purpose of EIA – Regulatory frame work in India – Base line data generation – Requiring and planning of field survey – Review of information required on development/industrial project – procedure for reviewing EI analysis and statement – EIA guidelines 1994 – Notification of Govt., of India – Identification of environmental risks due to developmental project activities – Preparation of on-site and off-site disaster management plans.

UNIT – II

Assessment Methodologies: Physical Environment Assessment – Flora Assessment – Plant Survey – Animal population size – Aquatic Assessment – Necessity of public participation in environmental decision making – Prediction and assessment of visual impacts of socio-economic environment.

Ecoplaning: Definition And concept – Land use policy for India – Urban and rural planning for India – Land use pattern – Cost benefit Analysis – Limits to Growth theory.

UNIT – III

Environmental Audit: Objectives – Scope – Coverage – Policy development – Defining boundaries – Goals – Policy compliance – Organization and staffing of Audit team – Resources – Approach to Audit ; (a) Pre-visit Activity (b) on-site activities – Understanding Management Systems – Assessing strengths and weaknesses – Audit evidence gathering and evaluation (c) Post Audit Activities – Audit principles – Benefits to Industry

UNIT – IV

Environmental Economics: Concepts of Economics and Scope of Environmental Economics – Economics of Pollution Control – Cost-Benefit Analysis and Evaluating Alternatives – Environmental Accounting – General Framework of Environmental Accounts.

References:

1. Canter L.W., **Environmental Impact Assessment,** McGraw Hill Book Co, New York (1996).
2. Bregman J.L., **Environmental Impact Statements,** Lewis Publishers, London (1999).
3. Singleton R, Castle P and Sort D, **Environmental Assessment,** Thomas Telford Puiblishing, London (1999).
4. Eccleston C.H., **Environmental Impact Assessment – A comprehensive guide to project and strategic planning,** John Wiley and Sons (2000).
5. Murthi S, **Economic Growth and Environment,** RSBA Publishers (1998).

Course outcomes

- Explain the concepts about the Environmental Impact Assessment (EIA) and describe the environment laws, aims and the necessity of EIA.
- Critically examine assumptions inherent in impact assessment, examine a range of environmental impact assessments and identify and explore impact assessment fields and approaches.
- Understand the sustainable development and controlling environmental pollution.
- Describe the environmental economics for sustainable development.

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3	2		2	2	2	3				2	3
CO2	3	3	2	2	2	2	3				2	3
CO3	3	3		2		3	2				2	3
CO4	3	2		2	3	3	3				2	3

ENV 303 :: PRACTICAL – I

Course objectives

- To prepare EIA for project management and environmental statement for industries.
- To estimate the presence of sedimentary particles by scientific methods.
- To analyze environmental impact for will being of the society**.**

1. Preparation of Activity-processes Flow Diagrams.
2. Case Study analysis for EIA of a major industry.
3. Case Study analysis for EIA of a Reservoir/Land Conversion/Mining activity.
4. Preparation of Environmental Statement.
5. Estimation of BOD content in industrial waste water.
6. Estimation of degradable products from pesticides.
7. Estimation of sedimentary particles by Jar Test.
8. Calculation of mean, meridian and mode

Course outcomes

- Understand the degradation of natural resources by constructions of various projects.
- Understand requirement of oxygen for growth of organisms to break down organic matter in wastewaters.
- Describe the low cost wastewater treatment practices in water demand areas.

ENV 304 :: BASICS OF STATISTICAL METHODS AND COMPUTER PROGRAMMES

Course Objectives

- To provide an understanding on statistical concepts include measurements of location and dispersion, probability, probability distributions, sampling, estimation, hypothesis testing and multiple regression.
- To define quantity of data, organize and summarize the data.
- To provide computing ability to design for solution with appropriate requirements.
- To provide skill in computing knowledge.

UNIT-I

Sampling Distributions: Chi-Square Distribution, t-distribution, F- distribution-Statistical Inference and Hypothesis Testing- One sample tests, two sample tests, several sample tests. Applications: Case-Control Studies, Test of Association.

UNIT-II

Correlation and Regression: Karl Pearson‟s Coefficient of Correlation, Spearman‟s rank correlation coefficient, Linear Regression

UNIT-III

Object oriented programming in C++: Concepts of data abstraction, encapsulation, Introduction to objects, classes and instances, static members, inheritance, polymorphism, Overloading and information hiding – function overloading, operator overloading in C++, Memory management - constructors, overloading of constructors, copy constructors, destructors, constructors and information hiding, concepts of file handling in C++.

UNIT-IV

Object oriented Mechanism in JAVA: Class definition in JAVA, constructors, inheritance, polymorphism in JAVA, Access specifications in JAVA, Interfaces and packages in JAVA, Error and exception handling in JAVA, Building JAVA Applets and Applications in JAVA Multi threads in JAVA - introduction to threads, the thread class, the runnable interface, thread states, thread priorities, thread groups and synchronization. Graphics in JAVA.

Course outcomes

- Understand and critically discuss the issues surrounding sampling and significance.
- Describe critical mathematical problems in an easy way to solve through computer knowledge.
- Explain evaluate a computing solution that meets requirements.
- Understand computer programmesto solve statistical problems**.**

References:

1. S. C. Gupta and V. K. Kapoor: Fundamentals of Mathematical Statistics.
2. Rohatgi, V. K. (1984). An introduction to probability theory and mathematical Statistics. New ge International Publication.
3. B. L. Agarwal: Basic Statistics.
4. Kiran Pandya, SmrutiBulsari and Sanjay Sinha : SPSS in Simple Steps
5. 1.Object Oriented Programming in C++, Robert Lafore, Galgotia
6. Object Oriented programs, BalaGuruswamy, TMH
7. Programming in JAVA, Dietel&Dietel, AWL
8. Introduction to JAVA programs, Y.Danial Liang, PHI
9. Complete Reference JAVA, 3ed, Peter Naughton&H.Schimalt – TMH

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3				2							3
CO2	3		2	2	2	2					2	3
CO3	3			3		3					2	3
CO4	3			3		3					2	2

ENV 305 (a) ::ECOTOURISM AND ECORESTORATION

Course objectives

- To impart the knowledge in understanding the concepts of eco-tourism.
- To describe about the Eco-tourism and wildlife tourism in protected areas, planning and economics.
- To understand major sources of environmental degradation and its consequences on biodiversity.
- To understand soil fertility by adopting eco-restoration.

UNIT - I

Concepts of Tourism: Classification – Religious Tourism – Cultural Tourism – Heritage Tourism – Monumental Tourism – Adventure Tourism – Sustainable Tourism – Consumptive and Non-consumptive Tourism – Origin of Ecotourism – Principles of Ecotourism – Types of Ecotourism – Concepts of Ecotourism – Objectives of Ecotourism – Benefits of Ecotourism.

UNIT – II

Study of Ecosystems: Places of interest of Ecotourism – Infrastructural facilities for Ecotourism – Maintenance of Ecological Centers – Important Biosphere Reserves – Ecotourism and Conservation – Study of different Ecosystems – Rain Forest Ecotourism – Mountain Ecotourism – Polar, Islands and Coasts Ecotourism.

UNIT - III

Impact of Ecotourism: Economic Impacts – Types and Degree of Impacts from Ecotourism activities – Socio-cultural Impacts – Ecotourism related organization – Trends affecting Ecotourism – Ecotourism Research – Disasters and Ecotourism.

UNIT – IV

Environmental Degradation: Major forms of Environmental Degradation – Causes and Consequences of Environmental Degradation.

Eco Restoration: Redressing of Ecological Poverty – Population Control – Attitudinal Changes – Rational Use of Resources – Restoring Soil Fertility, Soil Health – Optimum Use of Bio Resources – Eco Solutions.

References

1. Weaver D.B., **The Encyclopedia of Ecotourism,** CABI Publishing, UK (2001).
2. Sinha P.C., **Encyclopedia of Ecotourism, Vol I, II and III,** Anmol Publications Pvt. Ltd., New Delhi (2003)

Course outcomes

- Describe the challenging in eco-tourism and wildlife tourism.
- Understand values of wildlife and minimizing impact on natural ecosystem due to tourism.
- Rest and recreation to the public and income generation for the Government.
- Eco solutions will be achieved**.**

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3		2	2	2	3	3					2
CO2	3					3	3					2
CO3	3					2						2
CO4	3	2										2

ENV 305 (b) ::OCCUPATIONAL HEALTH AND INDUSTRIAL SAFETY

Course Objectives

To provide knowledge in understand hazardous material in industrial area.

- To understand general health education and surveillance.
- To identify unrecognized hazardous materials in and around factory.
- To create awareness on handling of hazards material.

UNIT I: Occupational Health

Hazards and Safety–Physical, Chemical and Biological hazards. Occupational Diseases and Occupationally induced illness - Prevention and Control. Health problems in different types of industries. Measures for Workers. Health Education Medical First- Aid and Management of Medical Emergencies. Epidemiological approaches. Ergonomics.

UNIT II: Industrial Safety Management Techniques

Industrial Safety Standards. Dispersion of Radioactive material and release of Toxic and inflammable materials. Work Study – Method of Study and Measurement. Measurement of Skills. Safety - Cost of Expenses. Principles and Functions in Safety Management.

UNIT III: Hazards Exposure evaluation

Sampling techniques, Personal monitoring, Biological monitoring; Threshold Limit Values (TLV), STEL; List of Industries involving Hazardous process Occupational Hazards under the First Schedule of the Factories Act,1948; Permissible Limits of certain Chemical substances in work environment under the Second Schedule of the Factories Act,1948.

UNIT IV: Hazards Control

Causes of Accident – Theory of accidents, Accident Reporting system, Safety Audit, Accident prevention, Safety Committee, Case studies on Bhopal, Chernobyl and similar disasters - Control of Hazards Substitutions, Isolation, Personal Protective Equipment (PPE).

Course outcomes

- Ability to acquire the knowledge, skills and judgment to function as an entry-level practitioner in occupational health and safety.
- Understand collect, manage and interpret information and data to identify trends and issues in the workplace.

- Explain effective communication skills and methods to clearly and briefly convey regulatory and technical information and data to designated audiences.
- Develop controlling measures of hazards.

References

1. A B C of Industrial Safety, Walsh, W and Russell, L, (1984), Pitma Publishing United Kingdom.
2. Della D.E., and Giustina, 199Ò, DzSafety and Environmental Managementdz, Van NostrandReinhold International Thomson Publishing Inc.
3. Environmental and Industrial Safety, Hommadi, A. H. (1989), I.B.B Publication, New Delhi.
4. Environmental Strategies–Hand Book, Kolluru R. V, (1994) McGraw Hill Inc., New York.
5. Goetsch D.L.,1990, Occupational Safety and Health for Technologists, Engineers andManagersdz, Prentice Hall.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3	2	2	2	2	3	3				2	2
CO2	3	2	2		2	3	2					2
CO3	3					2						2
CO4	3	2	2	2		2	2					2

ENV 305 (c):: STATISTICS, COMPUTER APPLICATIONS AND MODELING

Course objectives

- To assess the strengths of the conclusions and evaluating their uncertainty in the data.
- To understand importance of computer applications in business, education and research.
- To develop appropriate mathematical models to predict environmental changes.
- To understand mathematical tools used in modeling.

UNIT – I

Statistics: Introduction – Measures of central tendencies – Arithmetic Mean – Dispersion – Variance – Standard Deviation – Coefficient of Variation – Simple Correlation – Linear Regression with two variables.

Tests of significance**:** Statistical Hypothesis – Null Hypothesis – Level of Significance – Large sample Tests for means – Sampling Distribution – Standard Error – Small sample tests based on t-distribution.

UNIT – II

Fundamentals of Computers: Introduction to computers – History of evolution - Organization and working of computer – Classification of computers.

Computer Hardware: CPU, Mother Board, Disk Drives, Memory, I/O Devices, Printers and plotters – Network peripherals – Modem.

Computer Software: System Software – Compiler and Interpreter – Application Software – Operating Systems – Fundamentals of DOS, UNIX and Windows operating systems – Computer languages.

UNIT – III

Fundamentals of MS-WORD, MS-EXCEL and MS-POWER POINT.

Computer Network and Internet: Advances of networking – Computer for communication – Internet – Search machines – Sending and receiving E-mail – Downloading files.

UNIT – IV

Ecological Predictions and Mathematical Modeling: Modeling – Nature of Mathematical Models – Basic Mathematical Tools used in Modeling – Elements used in Modeling – Limitations of models – Models for ecological predictions – Lotka-Volterra Model – Leslie's Matrix Model – Air Quality Model.

References:

1. Peter Norton, **Introduction to Computers,** Tata McGraw Hill (1998).
2. Alexis Leon and Mathews Leon, **Fundamentals of Information Technology,** Leon Tech World, Chennai (2001).
3. Gupta S.P., Introduction **to Statistical Methods,** Chand Co.,(1985).
4. Gupta S.C. and Kapoor V.K., **Fundamentals of Applied Statistics,** Chand Co.,
5. Rajaraman V, **Fundamentals of Computers,** Prentice Hall of India (2000).
6. Jorgensen S.E., **Applications of Ecological Modeling in Environmental Management,** Elsevier, London (1996).
7. Henry C Perkins, **Air Pollution**, McGrew Hill (1974).

Course outcomes

- Analyze data using standard statistical techniques.
- Utilize the Internet Web resources and evaluate on-line e-business system.
- Environmental analysis, forecasting of the environment can be achieved.
- Evaluate test significant for ecological predictions.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3			2		2						3
CO2	3		2	2	2	2				2	2	3
CO3	3		2	2	2	2				2	2	3
CO4	3			2		2					2	2

ENV 306 (a):: NATURAL RESOURCES CONSERVATION

Course objectives

- To introduce the importance of natural resources and its management.
- To integrate technical field knowledge with analytical skills to solve important natural resource management problems.
- To understand different practices of agriculture and its impact on environment and food stock.
- To understand use and exploitation of mineral and food resources daily life.

UNIT – I

Natural Resources: Definition – Importance – Classification – Human physiological socio-economic and cultural development – Human Population Explosion – Natural Resource Degradation – Concept of conservation – Value system – Equitable resource use for sustainable life system.

UNIT – II

Forest Resources: Forest cover in India and the World – Importance – Desertification – Forest Wealth – Afforestation – VanasamrakshnaSamithi in A.P. – Agroforestry – Social Forestry – Joint Forest Management Strategy for Forest Conservation.

Wild Life: Resources – Importance – Benefits – Wild life Extinction – Causes for Extinction – List of Endanger species in India and in the World – Ecological approach in wild life management – Eco Tourism – Wild Life projects in India – Sanctuaries and National Parks In India – Man and Bio sphere Programme – Aesthetic type of Conservation by TTD.

UNIT – III

Land and Soil Resources: Soil, Complexity of soil nature, regional deposits, Land use and capability classification systems, Land use Planning models and their limitations. Impacts of natural and man-made activities on land characteristics and land use planning– Soil Erosion – Loss of Soil Nutrients – Restoration of Soil Fertility – Soil Conservation Methods and Strategies in India.

Wet Land Conservation and Management – Ecological Importance of wet lands in India – Conservation Strategy and ecological Importance.

Water Resources: Rivers and Lakes In India – Water Conservation and ground water level increase - -Watershed Programme.

UNIT – IV

Mineral Resources: Use and exploitation – Environmental effects of extracting and using mineral resources – Restoration of mining lands – Expansion of supplies by substitution and conservation.

Food Resources: World Food Problems – Changes caused by agriculture – overgrazing effects of modern agriculture – Fertilizer-Pesticide problems – Water Logging – Salinity – Sustainable agriculture, life stock breeding and farming.

References:

1. Haue R and Freed V.H., **Environmental Dynamics of Pesticides**, Menum Press, London (1975).
2. Singh B, **Social Forestry for Rural Development,** Anmol Publishers, New Delhi (1992).
3. Shafi. R., **Forest Ecosystem of the World,** (1992)
4. Trivedi R.K., **Environment and Natural Resources Conservation,** (1994).
5. Murthy J.V.S., **Watershed Management in India,** (1994).
6. Raymond F Dasmann, **Environmental Conservation,** John Wiley (1984).
7. Nalini K.S., **Environmental Resources and Management,** Anmol Publishers, New Delhi (1993).
8. Land use in Mining Area of India, RekhaGhosh,Envis, ISM Dhanbad, ISSN 0972-4656
9. Environmental Land use planning and Management, John Randolph, Island Press.

Course outcomes

- Application of theories and methods with interdisciplinary approach towards natural resource management.
- Critically examining the gap in the resource availability, use and conservation.
- Environment conservation and employment generation.
- Describe sustainable agriculture management.

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3			2		2	3				2	3
CO2	3			2	2	3	3				2	3
CO3	3			2	2	2	3				2	3
CO4	3			2	2	3	3				2	3

ENV 306 (b):: GLOBAL ENVIRONMENTAL ISSUES

Course objectives

- To promote an investigation of the scientific principles behind global environmental issues.
- To develop a world which is eco-friendly and pro for sustainable development.
- To develop new dimensions to environment – human relationships.
- To develop non polluting energy resources.

UNIT - I

Global Climate Changes: Global Warming – Effect of global warming on hydrological cycle – Carbon Budget – Control Measures – Greenhouse Effect – Sources and Sinks of greenhouse gases.

UNIT - II

Atmospheric Pollution in Global Climate: Importance of stratosphere – Ozone depletion – Effect of ozone depletion on environment – Ways of protecting ozone layer – Acid Rain – Impact of acid rain on environment – Major Air Pollution Episodes.

UNIT - III

Radiation and Environment: Sources of radiation – Radioactive pollutants – Radioactive isotopes and their application – Effect of radiation on plants and animals at genetic level – Disposal of radioactive wastes – Nuclear Episodes – Radiation protection and control measures.

UNIT - IV

Future Challenges: Population stabilization - Integrated land use planning – Healthy cropland and grassland - woodland and re vegetation – Conservation of biological diversity – Control of pollution – Development of nonpolluting renewable energy systems – Recycling of waste and residues – Ecologically compatible human settlements and slum improvements – Environmental awareness and education – Updating environmental laws and new dimension to human towards environment.

References:

1. Manahan S.E., **Environmental Chemistry,** Lewis Publishers, New York (2000).

2. Daley M.J., **Nuclear Power: Promise or Peril,** Lerner Publishing Minneapolic (1997).
3. Cheremisinoff N.P., Handbook **of Industrial Toxicology and Hazardous Materials,** Marcel Dekker, New York (1999).
4. Botkin, D.B. **Changing the Global Environment,** Academic Press, San Diago (1989).

Course outcomes

- Predicting the consequences of human actions on quality of human life and global economy.
- Developing critical thinking for shaping strategies for environmental protection and its conservation.
- Updating the global environmental laws binding on the Governments.
- Establish awareness on environment to meet future challenges.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3	2	2	2	2	2	3				2	2
CO2	3	2	2	2	2	2	3					2
CO3	3	2	2	2		2	3			2	2	2
CO4	3				2	2	3				2	3

SEMESTER-IV

ENV- 401:: WATER RESOURCES AND WATERSHED MANAGEMENT

Course objectives

- To develop an understanding of the occurrence and availability of freshwater, its uses, and problems related to water resources management.
- To learn more about managing our water resources and solve societal and environmental woes.
- To understand traditional water conservation methods and equitable use of water for sustainable development.
- To develop more rainwater conservation practices for future generations.

UNIT - I

Introduction: Hydrological Cycle – Formation and its Importance – Rain fall – Surface water – Ground water – Soil water and plant relationship.

Water Table – Water Budget – Global Water Balance and Distribution – Importance of Streams, Rivers, Lakes and Ponds.

UNIT – II

Water and Society: Water Usage – Overdrawing of Water and its consequences – Water shortage – Water Table and Depletion – Surface Water - Causes for diminishing surface water – Land subsidence – Salt water intrusion – Hydraulic gradient – Darcy's Law – Cone of depressions – Capture-zone curves – Control of ground water plumes – Factors for drought formation – Consequence of drought – Problem of irrigation water – Conflicts over water.

UNIT - III

Water Quality and Waste Water Treatment: Population explosion – Causes and Consequences –Water Quality Standards – Need for safe drinking water – Safe Drinking Water Act – Water Quality in Lakes and Reservoirs – Ground Water – Water born diseases – Water distribution and sanitary sewer systems – Sources of water pollution – Waste Water Treatment – Environmental Legislation for water conservation – Water Act 1974 – Future needs and alternate sources of water – Additional Remediation Technology.

UNIT – IV

Water Harvesting and Management: Water Resources – Indian and A.P. Scenario – Traditional Water Management System – Methods for ground water infiltration – Recharge pits for individual house plot – Watershed Management – Catchment Area Developments –

Command Area Development – Cropping Pattern – Cloud Seeding – Big Dams – Benefits and Problems – Equitable use of water resources for sustainable growth and development.

References:

1. Gilbert M Masters, **Introduction to Environmental Engineering and Science,** Prentice Hall of India Pvt. Ltd. (1998).
2. Kumar A, **Ecology and Conservation of Lakes, Reservoirs and Rivers,** ABD Publishers, Jaipur (2004).
3. Goel P.K., **Water Pollution: Causes, Effects and Control,** New Age International Pvt. Ltd. (1996).
4. Eckenfelder, **Industrial Water Pollution and Control,** Wesley Publications (1997).
5. Sharma V.K., **Water Resources – Planning and Management,** Himalaya Publishing House (1985).

Course outcomes

- Understand water's importance as a precious resource.
- Provide a basic understanding of the impact of water and water-related issues in a global, economic, environmental and societal context.
- Describe the management of water resources through construction of watersheds for future generations.
- Understand value and role of the water resources for sustainable growth and development.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3					3	3					2
CO2	3			2		3	3					2
CO3	3	2	2	2	2	2	3				2	3
CO4	3		2	2	2	2	3		2		2	3

ENV - 402:: REMOTE SENSING AND GIS

Course objectives

- To provide background knowledge and understanding of principles of RS and RS systems.
- To enhance capacity to interpret images and extract information on the earth surface from multi-resolution imagery at multi-scale level.
- To analyze satellite data in understanding forest, water resources, agricultural and soil coverage.
- To find the degradation level of environmental parameters through remote sensing applications.

UNIT – I

Basic Concepts and Fundamentals: Remote Sensing – Basic concepts – Physics of Remote Sensing – Energy interaction with atmosphere – Energy interaction with earth surface features – Aerial photographs –Interpretation principles and techniques.

Earth Resources Satellites – IRS – Land sat satellites – SPOT, TRS Programmes – Meteorological and ocean monitoring satellites.

UNIT – II

Sensors and Scanners: Sensors – Optical – Thermal – Microwave – Sensor Characteristics – Scanners – Digital – Geocoded – Multispectral and thermal Imagers.

Microwave Remote Sensing: Basic principles – SAR, SLAR Operations – Characteristics of RADAR signals – Earth surface characteristics influencing RADAR returns – Interpretation of microwave data.

Digital Image Processing: Basic principles – Techniques – Image enhancement – Edge enhancement – Image classification – Data merging and GIS Integration – Biophysical modeling.

UNIT – III

Satellite Data Applications: Resource management – Forest, Water, Ground Water, Soil, Agricultural, Land use, Wasteland – Quantitative Estimation – Yield Estimation – Coastal Zone Changes.

GIS Applications: Fundamentals of GIS – Applications for Infrastructure, Ground Water, Land use planning, Watershed management – Rainfall, Runoff etc. – GPS types and applications.

UNIT – IV

Environmental Applications of RS and GIS: Impact Assessment – Pollution Monitoring – Land Degradation – Desertification – Industry – Mining – Ground Water – Damage Assessment – Coastal and Marine applications – Satellite System – IKONAS – QUICKBIRD – CARTOSAT – ENVISAT – TRMM – EOS Missions – Integral Earth Observation Studies – Global Change.

References:

1. Berry S Siegal and Allen R Gillspie, **Remote Sensing in Geology,** Tata McGraw Hill Publishing Co. (1987).
2. Lillesand and Kiefer, **Remote Sensing and Image Interpretation,** John Wiley (1987).
3. Chouhan and Joshi K.N., **Applied Remote Sensing and Photo Interpretation** (1991).
4. Rajan M.S., **Remote Sensing and GIS for Natural Resources.**
5. Elangovan, **GIS Fundamentals, Applications and Implications,** NIPA, New Delhi (2006).
6. Elachi C, **Introduction to Physics and Techniques of Remote Sensing,** John Wiley, New York (1978).

Course outcomes

- Laying foundations for understanding Remote Sensing and Geographic Information System as a powerful tool for geospatial analysis.
- Evaluating the application of RS-GIS techniques to the matrices of environment and resource management.
- Future predictions of the environment will be known about weather.
- Explain the damages occurred in the environment **by GIS.**

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3		2	2	2	3	3				2	2
CO2	3		2	2	2	3	3				2	2
CO3	3		2	2	2	2	3				2	3
CO4	3		2	2	2	2	3				2	3

ENV - 403: PRACTICAL-I

Course objectives

- To estimate the various metals by using instrumental techniques.
- To understand the coverage of watershed development from aerial photos.
- To recognize geomorphological characters from aerial survey.

1. Determination of amount of Zn, Cu and Cr in surface water.
2. Estimation of amount of E-coli in drinking water.
3. Estimation of the amount of NO_2^-, NO_3^- in ground water samples.
4. Interpretation of drainage characteristics from aerial photographs.
5. Geo morphological Characters Appreciation from aerial photos.
6. Watershed development from aerial photos.

Course outcomes

- Analyze the multi elements in various wastewater samples.
- Understand the quality of ground water.
- Describe extend of drainage area with its hazardous characters.

ENV- 404: PROJECT WORK AND COMPREHENSIVE VIVA-VOCE

Course objectives

- To understand the concepts of project management for better execution of projects.
- To identify the different funding agencies for environmental protection.
- To develop valuable social networking which increases public participation in environmental management.

Course outcomes

- Understanding project characteristics at its various stages of implementation.
- Estimating the cost of physical and human resources and making plans to obtain the necessary resources.
- Developing young researchers with appropriate exposure and necessary training.

ENV 405 (a):: DISASTER MITIGATION AND MANAGEMENT

Course objectives

- To obtain, analyze and communicate information on risks and relief needs.
- To assess review and control the risk.
- To develop methods of risks analysis and evaluation of accidents in industrial development.
- To inculcate economic evaluation of risks after the disaster.

UNIT-I

Natural disasters: Cyclone – Tornadoes – Avalanches – Flood – Drought – Volcano – Earthquake – Fire – Landslide – Forecasting and Warning System – Disaster Education – Safety Measures – Impact on environment.

UNIT-II

Disaster Management: Pre-disaster Planning – Toning of disaster prone areas – Prioritization – Regulations – Protection measures during disaster – Post-disaster Relief Camp Organization – Survey and Assessment – Disaster Management Cycle - Vulnerability Analysis – Warning System – Legal Aspects – Case Studies for disaster management.

UNIT-III

Disaster preparedness and training: Community preparedness in natural disasters – Role of NGOs, Executives and Army for disaster reduction and mitigation in local conditions.

UNIT-IV

Risk Analysis and Assessment: Basic concepts – Purpose of risk analysis – Tools for risk assessment – Toxicology – Epidemiology **-** Exposure Modeling – Significance of risk and management – Evaluation of accidents in industrial processes – Assessment of risk to ecosystem and human health from GMOs – Psychology of risk – Economic evaluation of risks – Experiences of World Bank – Risk Communication – Frame work for sustainable development.

References:

1. Cuttler S, **Environmental Risk and Hazards,** Prentice Hall of India, New Delhi (1994).
2. Shailendra K Singh, Subhash C Kundu and Shobu Singh, **Disaster Management,** Mittal Publications, New Delhi (1998).
3. Ricci P.F. and Rowe M.D. (ed), **Health and Environmental Risk Assessment,** Pergman Paper, New York (1985).
4. Peter Calow, **Environmental Impact Assessment,** McGraw Hill Inc., New Delhi (1998).

Course outcomes

- Understand the mitigation approaches, their choices and alternatives.
- Develop foundations for hazard, risk and vulnerability assessment.
- Explain the knowledge on disaster preparedness to meet risks in natural disasters.
- Know about the economic evaluation of risks and frame work for sustainable development.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3	2	2			2	3					2
CO2	3	2	2	2		2	3				2	3
CO3	3			2		3	2				2	3
CO4	3	2		2		3	3				2	3

ENV 405 (b)::ENVIRONMENTAL SAFETY

Course Objectives

- To understand control the pollutants released into the environment by human activities.
- To identify the various factors that can lead to leaks, spills and releases and their potential dangers to worker safety and environmental protection.
- To inculcate the equitable use of natural resources into a sustainable way for human existence.
- To gain knowledge in understanding of Government and NGO role for protection of environment.

UNIT-I

Scope and Importance; need for public awareness about our environment; Economic and social security; Environment impact of transportation and Mining. Environmental impact assessment (EIA) — purpose, procedure and benefits of EIA; Biodiversity and its conservation; Sustainable development. Global warming and greenhouse effect, urbanization, acid rain, ozone layer depletion, nuclear accident and holocaust.

UNIT– II

Case studies, population explosion, family welfare programmers-HIV/AIDS, women and child welfare, Environmental pollution — causes, Effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution and nuclear hazards, Solid waste management-urban and industrial waste-causes, effects and control measures.

UNIT-III

Renewable and non-renewable natural resources — Forest resource, Water resource, Mineral wealth / resource, Food resource, Energy resources, Growing energy needs, renewable and non-renewable energy sources, Use of alternate energy sources, Land resource and land degradation, Role of an individual in conservation of natural resources, equitable use of resources for sustainable life styles.

UNIT-IV

Role of Government in environment protection, legal aspects of environment protection, NGO initialization, National Committee on environmental Planning (NCP), Environmental Appraisal Committee (EAC), central and state boards for prevention and control of pollution, goals of environment impact policy, case studies, Disaster management floods, earth quake, cyclone, landslides, role of individual in prevention of pollution.

References:

1. Benny Joseph (2005) Environmental Studies — Tata McGraw Hill - Publishers.
2. Rao CS (2006) - Environmental Pollution Control — New Age International Pvt. Ltd Publishers.
3. ManjunathD..L (2007) - Environmental Studies - Pearson Education Publishers.
4. Yaji R.K (2006) - Text Book of Environmental Studies - United Publishers.
5. Centre for Environmental Education (1990) - Essential learning's in Environmental education.
6. Venugopal Rao P (2006) - Principles of Environmental Science and Engineering — Prentice Hall.

Course outcomes

- Understanding judicial response to environmental issues in India.
- Acquiring the ability to evaluate the role of law and policy in conservation and management of natural resources and prevention of pollution.
- It enhances the societies support for environment's protection programmes.
- Develop the environmental quality through implementation of environmental laws and acts.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3	2				2	3					2
CO2	3	2	2	2		2	3					3
CO3	3			2		3	2				2	3
CO4	3	2				2	3				2	3

ENV 405 (C): ENVIRONMENTAL MANAGEMENT AND SUSTAINABLE DEVELOPMENT

Course objectives

- To develop skill in management of environment in a global level.
- To understand the environmental knowledge into action in order to achieve particular outcomes in the way landscapes, societies and/or natural ecosystems are used and managed.
- To provide skills and an improved understanding of how firms and organisations work with sustainability issues.
- To understand sustainable environmental management by implementing policy principles.

UNIT-I: Environmental Management

Implementation of Environmental Management System-EMS definitionEnvironment Policy and components of EMS-Identification of environmental aspects and impacts

UNIT II: Management tools

Implications of Environmental Management tools for Environmental Management-Environmental legislations, institutions and policies with special reference to India-Policy responses to environmental degradation.

UNIT-II: Management requirements

Legal and other requirements-Training and awareness requirements- Application of Environmental Standards- ISO standards and history of their development.

UNIT IV: Sustainable Development

Concept of sustainable development- key principles - poverty and sustainable development Environmental management - innovation strategies for sustainable development - Governance for sustainable development.

References:

1. Cunningham W and Cunningham M.A., **Principles of Environmental Science,** McGraw Hill, London (2003).
2. Joseph K and Nagendran R, **Essentials of Environmental Studies,** Pearson Education, Delhi (2004).
3. Agarwal K.M., Sikdar P.K. and Deb S.C., **A Text Book of Environment,** Mac Millan India Ltd, Kolkatta (2002).
4. Tyler Miller Jr. G, **Living in the Environment – Principles, Connections and Solutions,** Wadsworth Publishing Co., New York (1996).
5. Wright R.T. and Nebel B.J., **Environmental Science – Towards Sustainable Future,** Prentice Hall, New Delhi (2002).

Course outcomes

- Explain the environmental management practices.
- Ability to analyze environmental management in relation to the major principles of sustainable development.
- The ability to work effectively to create environmental management analysis outputs of professional quality, both independently and within team environments.
- Develop innovation strategies for sustainable development at local and national level.

CO-PO Mapping

CO outcomes	**PO_1 Knowledge**	**PO_2 Analysis**	**PO_3 Design**	**PO_4 Development**	**PO_5 Modern Tools**	**PO_6 Society**	**PO_7 Environment**	**PO_8 Ethics**	**PO_9 Team Work**	**PO_{10} Communi-cation**	**PO_{11} Programme Management**	**PO_{12} Lifelong Learning**
CO1	3					3	3					2
CO2	3					3	3					2
CO3	3					2	3					2
CO4	3					2	3				2	3

ENV 406 (a)::FOREST RESOURCES AND MANAGEMENT

Course objectives

- To provide desired physical, chemical, and biological soil processes and functions on the Forests to maintain and/or improve soil productivity.
- To create basic strategies for forest management like plantation forestry, natural forest management, and agroforestry.

UNIT-I

Introduction – Forest Ecology – Basic concept and approaches to ecology – community ecology – characters used in community structure – Habitat ecology – Fresh water, marine, estuarine terrestrial ecology – desert ecology.

UNIT-II

Phytogeography: Major plant communities of the world – phytogeographical regions of the world - Soil climate – Flora and vegetation of India – Floristic regions of India – Endemism.

UNIT-III

Environmental Organizations and Agencies: National and International environmental organizations – Ministry of Environment and Forest (government) – International Agency Frame Work on environmental conservation.

UNIT-IV

Emerging concepts in conservation of forest and action plan – Conserving forest genetic resource from theory and practice – Action Plans and research need to conservation – Threats and mitigation measures.

References:

1. Odum E.P., **Fundamentals of Ecology,** WB Saunders Co., London (1971).
2. Ramakrishnan P.S., **Mountain Biodiversity, Land Use Dynamics, Traditional Ecological Knowledge,** Oxford and IBH Publications Pvt. Ltd., New Delhi (2000).
3. Krishnamurthy K.V., **An Advanced Text Book on Biodiversity,** Oxford and IBH Publications Pvt. Ltd., New Delhi (2004).
4. Ramesh B.R. and Pascal J.P., **Atlas of Endemics of the Western Ghats,** French Institute, Pondichery (1997).

Course outcomes

- Demonstrate knowledge of forest vegetation modeling and the ability to forecast its development over time using models of forest growth.
- Integrate knowledge of basic biology, physical sciences, forest and wildlife ecology, and social sciences into the stewardship of forest resources.
- Through forest management national economy will be improved.

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3	2	2	2		2	3				2	2
CO2	3	2				2	3					2
CO3	3					2	3			2	2	2
CO4	3				2	2	3				2	3

ENV- 406 (b): ENVIRONMENTAL EDUCATION AND SUSTAINABILITY

Course objectives

- To indentify the interconnected and interdisciplinary nature of environmental studies.
- To expand the knowledge of liberal arts for understanding the relationship between humans and their environment.
- To analyze environmental priorities and develop appropriate strategies for programme implementation.
- To understand environmental education and awareness for sustainable development.

UNIT – I

Knowledge of Environment: About the environment – Humanity-Environment relationship – Population growth – Problems – Rational use of resources – Objectives of environmental education – Guiding principles – UNESCO 1977 recommendations – Environmental programmes – Environmental education in India – Classification of environmental education programmes.

UNIT – II

Environmental Education: Environmental education at primary, secondary and tertiary level – Non-formal environmental education – Environmental education for professional level groups.

Environmental Organizations and Agencies: International Bodies, MAB, Government and Non-government (Voluntary) Organizations – Environmental administrative control – Central and State Pollution Control Boards – Department of Environment and Forests – Special Technologies.

UNIT – III

Sustainable Development: Definition, Scope and Importance – Causes of unsustainablity – Ecological footprints – Guidelines for sustainable development and reduction of poverty – Earth's ethics for sustainable living – Ethical guidelines – UN Conference on human environment – Environment and Development and Earth Summit.

UNIT – IV

Future Challenges to Society: Environmental priorities in India and strategies for action – Population stabilization – Integrated land use planning – Healthy cropland and grassland – Woodland and revegetation – Conservation of biological diversity – Control of pollution –

Development of non-polluting renewable energy systems – Recycling of waste and residues – Ecologically compatible human settlements and slum improvements – Environmental education and awareness – Updating environmental laws – Rain water harvesting and new dimensions to national security.

References:

1. Cunningham W and Cunningham M.A., **Principles of Environmental Science,** McGraw Hill, London (2003).
2. Joseph K and Nagendran R, **Essentials of Environmental Studies,** Pearson Education, Delhi (2004).
3. Agarwal K.M., Sikdar P.K. and Deb S.C., **A Text Book of Environment,** Mac Millan India Ltd, Kolkatta (2002).
4. Tyler Miller Jr. G, **Living in the Environment – Principles, Connections and Solutions,** Wadsworth Publishing Co., New York (1996).
5. Wright R.T. and Nebel B.J., **Environmental Science – Towards Sustainable Future,** Prentice Hall, New Delhi (2002).

Course outcomes

- Demonstrating an integrative approach to environmental issues with a focus on sustainability.
- Communicating complex environmental information to both technical and non-technical audiences.
- Enriches the students with knowledge of environmental problems and appropriate solutions to overcome them.
- Describe the eco-friendly techniques to meet future challenges**.**

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3			2		2	3				2	3
CO2	3			2		3	3				2	3
CO3	3			2		2	3				2	3
CO4	3			2		2	3				2	3

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF FISHERY SCIENCE AND AQUACULTURE



Course

M.Sc. AQUACULTURE

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per

NEP-2020

About the Department

The Department of Fishery Science and Aquaculture was established in the year 1997 as an offshoot of Department of Zoology with Prof. D. C. Reddy as the Founder Professor, Head and Chairman (BOS) of the Department. Initially the department offered one year PG diploma Course in Aquaculture, but, subsequently the department started offering two year M.Sc., course in Aquaculture from the Academic Year 1998. Although Prof. Reddy with his untiring efforts and help from the Colleagues of other sister departments could run the M. Sc. course in Aquaculture successfully. Prof. Reddy has developed good research facilities to carry research in the Department to offer M.Phil. and Ph.D programmes in Full-Time and Part-time. The department has excellent facilities for carrying out research in the fields of Aquaculture Biochemistry, Aquaculture Nutrition, Nanotechnology, Immun-Biology of Fish and Prawns, Probiotics in Aquaculture and Bioenergetics of fish. The University has recruited two more staff members in the year 2007. The placement record of the department is stupendous with all the students getting jobs in Aqua hatcheries/ Aqua farms/ Aqua feed companies/ Aqua laboratories throughout Andhra Pradesh and in Tamil Nadu. The NAAC Peer Team during its visit to S.V. University, Tirupati, made a special mention of the achievements in steering forward the Department of Fishery Science and Aquaculture on par with other major science departments in terms of quality of research. After the superannuation of Prof. Reddy Dr. P. Naga Jyothi shoulders the responsibility of the department and has been leading the department with her sincere efforts towards 100% placements each year. Dr. P. Naga Jyothi with her dedicated mind aims to make the department ONE OF THE BESTDEPARTMENT in the campus. The University can proudly say that the Department of Fishery Science and Aquaculture is the only department in S. V. University Campus which has been providing 100% placements to the outgoing M. Sc., Aquaculture students. Department of Fishery Science and Aquauclture having MOU with one of the best Multi National Company, (CPF India Pvt Limited) Chennai.

Vision

- Provide 100% Job security to our students
- To make the department a well-established and reputed center for Aquaculture related studies
- To promote knowledge base and make students self-reliant and useful to the society.
- Faculty involved in decision making – collective leadership. “Wisdom lies in the right perspective”.

Mission

- "To train students in Principles and Practices of Aquaculture relevant to regional and National food production programs and Provide Employment to all the outgoing students".

Choice Based Credit System (CBCS):

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed.

Students of this course would be expected to :

- Be able to play leading role in industry, research and the public services;
- Understand and appreciate major public concerns and issues associated with Aquaculture.
- Have an understanding and grasp of international research environment where the frontiers of knowledge in Aquaculture are under research;
- Be able to adapt and respond positively and flexibly to changing circumstances;
- Develop the professional skills and personal attributes to deal with complex issues, both systematically and creatively;
- Have the capacity for individual work and teamwork;
- Be lifelong learners with intellectual and practical skills.

Department Objectives:

The Department is having the following objectives:

- To expose students to updated curricula and to recent advances in the subject and enable the students to face NET, SET and other competitive examinations successfully.
- To create awareness among students about the latest streams of Aquaculture including advanced subjects like Biotechnology, Probiotics, Ornamental fish culture, Fish processing technology and Lab technology.
- To improve the quality of laboratory and field work for which Aquaculture study tours and excursions have been made compulsory so that the students can become familiar with field status of Aquaculture and surrounding study.
- To prepare students to attract and develop interest in Aquafarming, Hatcheries, Marketing, processing plants, Fisheries science and Toxicology so that the students can select Aquaculture as their career.
- The BOS in Aquaculture expects that this new framework of curriculum caters the need of enabling students of subject to accept new challenges of dynamically changing modern era.

Program Specific Outcomes

- Identify and select sources of credible information in fish Nutrition and management
- Apply and incorporate the principles of Aquaculture farming, nutrition, diseases, marketing, hatcheries and aquaculture by products and real world situations and problems

Programme Objectives

The primary objective of the program is to impart quality education in the subject of Fishery Science and Aquaculture as a basic science and its applied branches to the students

- To meet the academic to provide knowledge for sustainable aquaculture.
- To expose learners to frontier and thrust areas of Aquaculture
- To train learners for better performance in various competitive examination and in research careers.
- To enable the learners to acquire and develop self- study habits
- To facilitate Higher education & research in Aquaculture

- To provide the students an on field exposure to help them in understanding the aquaculture practices
- To provide the learners an experience in research for Aquaculture production,
- To conduct field studies and different projects of local and global interests.
- To provide effective utilization of aquatic and land resource
- Enhancing skills of rural youth commercial fish farming and increasing their entrepreneurship opportunities.
- Providing means of livelihood through commercial and industrial aquaculture.

Programme Outcomes:

S.No	Program Outcomes
PO1	Apply knowledge in Aquatic Ecology and ecosystem to understand the physical and chemical characteristics of water constituents their physico chemical and functional properties. To assess organic matter and recognize various biogeochemical cycles. Determine the dynamics of aquatic ecosystem and productivity.
PO2	Identify and understand different types of fishes and fin fish anatomy related to classification of commercially important crustaceans and mollusks up to sub class level and their salient features and distribution. Apply knowledge on shell fish anatomy and examine identification and morphology of cultivable organisms.
PO3	Design supplementary feeds applying the principles of food and feeding habits and nutrition to meet the challenges of nutritional problems. Describe fertilization and liming in aquaculture ponds, dynamics of dissolved oxygen, aeration and miscellaneous treatments to increase the production. Determination and estimation of total proteins, carbohydrates and lipids in aquatic feeds.
PO4	Know nature of ethics, values, ahimsa, crime and theories of punishment and explain Bhagavad-Gita as student, researcher and aqua technician. Know Professional and social ethics as researcher, marketing, farming, community mentor, aqua business operator and hatcheries.
PO5	Apply appropriate methods of Aquaculture systems, selection, survey and location of suitable site, Aquaculture engineering, hydrology of ponds, selection of species, restocking management and stocking. Techniques of

	post stocking management and growth. Apply soil and water characteristics and physiology of finfish and shell fish.
PO6	Discuss digestion, respiration, excretion and osmoregulation, circulatory system, neuroendocrine system and reproduction. Describe bioluminescence, mating and parental care. Describe the culture of Indian major carps, exotic carps, air breathing fishes. Locate Hatchery management, Fresh water prawn and pearl culture. Predict Aquarium fishes and management.
PO7	Communicate effectively viral and bacterial diseases in finfish and shellfish. Nutrition and environmental stress diseases information in person and with community. Microbiology and fish pathology. Acquire skills in writing research report, documentation, case studies, seminar presentations, group discussions and marketing strategies.
PO8	Describe fish immunology and immunotechnology. Social and environmental dimensions within nutrition and the life sciences. Able to demonstrate the cell biology , genetics and immunology.
PO9	Know basic structure of cell and its organelles, chromosomes, principles of physico chemical basis of heredity, genetic rationale in fish breeding, natural hybridization and cytogenetics of fishes.
PO10	Apply knowledge on chemical composition of fish and shellfish, common bacteria present in fish, handling of fish. Prepare pharmacology chromosomal engineering and hormonal manipulation of genetics, recombinant DNA and Polymerase chain reaction and gene amplification.
PO11	Develop and design fish feeds, supplementary feeds, biomolecules enzymes metabolism and bioenergetics. Identify computer application and scope of biostatics and statistical analysis in an aquaculture.
PO12	Learn new concepts of fish breeding and hatchery management, limnology, Bioinformatics in aquaculture, General Principles and practices of Aquaculture, Ornamental fish Culture, fish processing technology, marine pollution.

Program Educational Objectives:

- Exposure of students to aqua industries and modern types to acquire this knowledge and skill.
- To update the syllabus essential for appearing in NET, SET, GATE, ASRB and other competitive exams of UPSC and APPSC.
- To make aware the students to know Aquaculture practices.
- To develop trained and knowledgeable human resource for educational and research institutions and industries; to use this human resource for self-reliant India.
- To develop self-employable ability and to apply knowledge for several Aqua-based industries like farming, feed mills, processing units, it will also provide employment to other dependents.

The M.Sc. degree in Aquaculture being offered by this University provides its students with a course of study that integrates a range of learning and teaching techniques relevant to their educational development and career ambitions. This Masters programme covers the latest developments in Aquaculture and its specializations, viz., Applied Genetics, Fish Biochemistry, Aquatic Biotechnology Fishery Science and Diseases. It provides theoretical knowledge as well as training in the practical and intellectual skills to enable students to better understand and then solve some of the problems in this subject. Graduates in this programme will be induced into critical thinking, and would be able to solve complex problems in Aquaculture. The students would also be inculcated with personal and problem-solving skills that will enhance their employability prospects. Enhanced competence of students has been the key concern in designing and developing this syllabus. Careful thought has gone into selection of topics and setting their scope. Major areas of Aquaculture like Genetics, Physiology, Biochemistry, Ecology, Immunology, Cytology, Aquaculture Biotechnology and Taxonomy have been included in the syllabus only after multiple rounds of thorough discussions and intensive study. Special attention has been paid to subjects like Bioinformatics, Molecular Biology and Genetics to incorporate the latest developments in these fields.

UGC in recent had made initiatives to reorient and restructure the policies of higher education. For creating a boost to the economic growth and social development. It has recognized the need and importance of the skills in the students by bringing down the demand – supply mismatch with ready manpower as skills and knowledge. In addition to conventional disciplines, there is a need to introduce some career oriented courses where qualified students may learn certain skills and knowledge which will provide them more openings in service, industry and self-employment sectors.

Findings for the past and future trends, drivers and challenges, regional aqua feed demand break up of finfish and shellfish is show that there is a need on the major ingredients used in commercial finfish feed, to understand and evaluate the kind of ingredients that will be in demand with the increase in aquaculture production. There are also central and state governments initiatives for promoting aquaculture production and industry. restraints of the commercial aqua feed market as well as technological advancements in aquaculture industry. In view of the facts the department of Fishery Science and Aquaculture would like to establish skill development courses in Sri Venkatewara University Campus. M.Sc., Aquaculture course was started on 1997 academic year. This sector provides good employment and research opportunities for students, because aquaculture is one of the growth engine of Andhra Pradesh.

Semester - I

S. No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	**AQC 101:**	Mandatory	Concepts of Aquatic Ecology	6	4	20	80	100
2		**AQC 102 :**	Mandatory	Systematics And External Anatomy of Cultivable Organisms	6	4	20	80	100
3	Compulsory Foundation	**AQC 103 A:**	Optional -1	Fish Nutrition and Water Quality Management	6	4	20	80	100
		AQC: **103 B** :		Environmental Monitoring and Bio deterioration					
4	Elective Foundation	**AQC-104A:**	Optional -1	Coastal Aquaculture	6	4	20	80	100
		AQC 104 B:		Ornamental Fish Culture					
5	Practical - I	**AQC 105:**	Paper 1 & 3	Identification and Morphology of Cultivable Organisms	6	4		100	100
6	Practical - II	**AQC106 :**	Paper 2 & 4	Fish Nutrition	6	4		100	100
				Total	36	24	80	520	600
7	Audit Course-I	AQC: 107: Human values Professional Ethics - I			0	0	100	0	0

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one Paper**
- **Elective Foundation - Choose one Paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under self study**

Semester - II

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	**AQC 201:**	Mandatory	Principles of Aquaculture	6	4	20	80	100
2		**AQC 202 :**	Mandatory	Physiology of Cultivable Organisms	6	4	20	80	100
3	Compulsory Foundation	**AQC 203A**	Optional -1	Fresh Water Aquaculture	6	4	20	80	100
		AQC 203B:		Capture fisheries					
4	Elective Foundation	**AQC 204 A:**	Optional -1	Fishery Economics, Extension and Environmental Management	6	4	20	80	100
		AQC 204: B		Limnology					
5	Practical - I	**AQC205:**	Paper 1 & 3	Soil and Water Characteristics	6	4		100	100
6	Practical - II	**AQC206:**	Paper 2 & 4	Physiology of Fin Fish and Shell Fish	6	4		100	100
	Total				36	24	80	520	600
7	Audit Course-II			AQC: 207: Human values Professional Ethics - II	0	0	100	0	0

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one Paper**
- **Elective Foundation - Choose one Paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under self study**

Semester - III

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	**AQC 301 :**	Mandatory	Microbiology and Fish Pathology	6	4	20	80	100
2		**AQC 302:**	Mandatory	Fish Immunology	6	4	20	80	100
3	Generic Elective	**AQC: 303A:**	Optional -1	Cell Biology and Genetics	6	4	20	80	100
		AQC 303 B:		Bioinformatics In Aquaculture					
4	Practical - I	**AQC 304:**	Core & Generic Electives	Microbiology and Fish Diseases	6	4		100	100
5	Skill Oriented Course	**AQC 305:**	Mandatory (Theory + Practical)	Fish Nutrition Technology	6 (3+3)	4	10	90 (40 + 50)	100
6	Open Elective	**a)AQC 306A:**	Optional - 1	Fish Processing Technology	6	4	20	80	100
		b) AQC306 B:		Pollution and Toxicology					
	Total				36	24	90	510	600

***All CORE Papers are Mandatory**

- **Generic Elective - Choose Two**
- **Core papers and Generic Electives opted Paper held Practical-I**

- **Skill Oriented Course is Mandatory. Relevant to Society along with practical (10 Marks Internal, 40 Final Theory & 50 for Practical's)**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of Open Electives depending on the interest of the student through self study.**

Semester - IV

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	**AQC 401 :**	Mandatory	Aquaculture Biotechnology	6	4	20	80	100
2		**AQC402 :**	Mandatory	Essentials Of Biochemistry	6	4	20	80	100
3	Generic Elective	**AQC403 A :**	Optional -1	Computer Applications, Information Technology And Biostatistics In Aquaculture	6	4	20	80	100
		AQC403 B:		Aquaculture Engineering					
4	Practical - II	**AQC 404:**	Core & Generic Electives	Biotechnology And Biochemical Estimations	6	4		100	100
5	Project Work	**AQC405 :**	Mandatory (Theory + Practical)	Project Work	--	4	--	100	100
6	Open Elective	**AQC 406(A):**	Optional - 1	General Principles and Practices of Aquaculture	6	4	20	80	100
		AQC 406 (B):		Fish Breeding and Hatchery Management					

	Total	30	24	80	520	600

***All CORE Papers are Mandatory**

- **Generic Elective - Choose Two**
- **Core papers and Generic Elective opted Paper held Practical-II**
- **Project Work – Collaboration with various Firms/Companies/Societies.**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**

I – SEMESTER

DEPARTMENT OF FISHERY SCIENCE AND AQUACULTURE

M. Sc. AQUACULTURE

CHOICE BASED CREDIT SYSTEM (CBCS)

(With effect from academic year 2021-22 onwards for students admitted into First Semester)

SEMESTER – I

CORE – THEORY- AQC 101: CONCEPTS OF AQUATIC ECOLOGY

Course objectives

To enable the students to

1. Understand the concepts of Aquatic Ecology
2. Acquire knowledge on the Characteristics of water and dynamics of Aquatic ecosystem
3. Understand the Aquatic vegetation
4. Acquire knowledge on Energy transfer in the ecosystem

CORE – THEORY

AQC 101 : CONCEPTS OF AQUATIC ECOLOGY

UNIT – I

1.INTRODUCTION: Definition of ecology, organism and environment; features of organism - environment relations; living and non - living environments; the ecosystem or habitat.

2.AQUATIC ECOSYSTEMS : Freshwater ecosystems - Lotic and Lentic ecosystems; Marine ecosystems - oceans and seas, zonation of the seas - rocky, sandy and muddy shores; classification of marine habitat - pelagic, benthic, neritic, oceanic, littoral and abyssal.

UNIT – II

3.PHYSICAL CHARACTERISTICS OF WATER : Light - penetration of sunlight into aquatic media, effect of light on productivity, photoperiodicity in animals; Temperature - annual temperature cycles, thermal stratification of water bodies, thermal optimum, maximum and minimum, water movements, periodic and a periodic current systems; Turbidity - causes, variations and effects.

4.CHEMICAL CHARACTERISTICS OF WATER: Atmosphere and atmospheric gases dissolved in water; Oxygen - oxygen and life, hypoxia, anoxia and hyperoxia, adaptations of animals to varying oxygen tensions; Carbon dioxide - sources of Co_2, its ecological effects; pH or hydrogen ion concentration - its significance. total hardness and total alkalinity

UNIT – III

5.BIOGEOCHEMICAL CYCLES: Nitrogen cycle; phosphorus cycle; sulfur cycle; carbon cycle; trace elements - manganese and copper.

6.ORGANIC MATTER : Aquatic vegetation – zones of aquatic vegetation; Plankton - classification of plankton, factors affecting plankton distribution, plankton counting and sampling; phytoplankton - zooplankton relationship, plankton productivity; Benthos - phytobenthos and zoo benthos.

UNIT – IV

7.PRODUCTIVITY: Concept of productivity – standing crop, rate of production and rate of removal; primary and secondary productivity; classification of water bodies on the basis of productivity.

8.DYNAMICS OF AQUATIC ECOSYSTEM : Principal steps and components – niches, trophic levels and relations; producers, consumers, decomposers and transformers; food chain and food web; pyramid of biomasses; pyramid of numbers; energy transfer in the ecosystem.

Suggested reading :

- Santhanam, R. 1993. A Manual of Fresh Water Ecology: An Aspect of Fishery Environment. Daya Publishing House, New Delhi.
- Pillai, N. K. 1993. Marine Biology and Ecology. Daya Publishing House, New Delhi.
- Reid, G. K. and R. D. Wood. 1976. Ecology of Inland Waters and Estuaries D. Van Nostrand Company.
- Kormondy, E. J. 1996. Concepts of Ecology. Prentice Hall of India Pvt. Ltd. New Delhi.
- Cole, G. L. 1954. Text Book of Limnology. The C. V. Mosloy Co.,
- Odum, E. P. 1996. Fundamentals of Ecology. 3rd Edn. Natraj Publishers, Dehradun.
- Santhanam, R. and A. Srinivasan. 1994. A Manual of Marine Zooplankton. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- Pillai, N. K. 1986. Introduction to Planktonology. Himalaya Publishing House, Mumbai.
- Balakrishnan Nair, N and D. M. Thampy. 1980. A Text Book of Marine Ecology. Mc Millan Co. of India Ltd.
- Battish, S. K. 1992. Freshwater Zooplankton of India. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

Course out comes

Upon completion of the course, students will be able to

CO1.Understand the Aquatic environment and Aquatic ecosystem.

CO2.Understand the Physical and Chemical Characteristics of water.

CO3.Acquire knowledge on Importance of Biogeochemical cycles

CO4. Describe the Nature of Dynamics of Aquatic Ecosystem

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	1	2	1	1	1	1	1	1	1	1	1
CO2	3	1	1	1	2	1	1	1	1	1	1	2
CO3	3	1	2	1	2	1	1	1	1	1	1	1
CO4	3	1	2	1	2	1	1	1	1	1	1	1

H-High-3, M- Medium-2, L- Low-1

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AQC 102: SYSTEMATICS AND EXTERNAL ANATOMY OF CULTIVABLE ORGANISMS

Course objective

To enable the students to

- Understand the Systematic and External Anatomy of Cultivable Organisms
- Discuss the basic structure of fishes
- Understand the classification of commercially important crustaceans and molluscs
- Acquire knowledge on morphology shell fish

CORE – THEORY

AQC 102 : SYSTEMATICS AND EXTERNAL ANATOMY OF CULTIVABLE ORGANISMS

UNIT – I

1. FIN FISH SYSTEMATICS: Classification of fishes up to subclass level; major groups of fresh water fish and their salient features and distribution.

UNIT – II

2. FIN FISH ANATOMY : Basic structure of the skin in fishes; epidermal derivatives – microridges and integumentary glands; dermal derivatives – cosmoid scales, ganoid scales, placoid scales, elasmoid, cycloid and ctenoid scales; fish age and scales; integumentary pigments; mouth and jaws; gill slits; fins – median fins and paired fins, origin of paired fins; coloration – morphology of chromatophores, pigments, physical and chemical colours, mixed colours, colour change, adaptive significance.

UNIT – III

3.SHELL FISH SYSTEMATICS: Classification of commercially important crustaceans and molluscs up to sub class level and their salient features and distribution.

UNIT – IV

4.SHELL FISH ANATOMY: External morphology of shell fish: prawn, shrimp, crab and molluscs – exoskeleton and appendages.

Suggested reading :

- Lagler, K. F., J. E. Bardach and R. R. Miller. 1977. Ichthyology. John Wiley.
- Moyl, P. B. 1995. Fishes : An Introduction to Ichthyology. 3/Ed. Narendra Publishing House, New Delhi.
- Talwar, P. K. and V. G. Jhingran. 1991. Inland Fishes of India and Adjacent Countries. Vol. I & II. Oxford and IBM Publishing Co., New Delhi.
- Kurian, C. V. and V. O. Sebastian. 1976. Prawns and Prawn Fisheries of India. Hindustan Publishing Co., 1976.
- Bond E. Carl. 1979. Biology of Fishes. Saunders.
- Datta Munshi and Srivastava. 1995. Natural History of Fishes and Systematics of Fresh Water Fishes of India. Daya Publishing House, New Delhi.
- Parihar, R. P. 1994. A Text Book of Fish Biology and Indian Fisheries. Central Publishing House, Allahabad.
- Lankaster, E. R. 1996. A classification of animals from the point of view of Economic Zoology. Daya Publishing House, New Delhi.
- Srivastava, C. B. L. 1999. Fish Biology. Narendra Publishing House, New Delhi.
- Khann a, S. S. 1997. An Introduction to Fishes. Central Book Depot, Allahabad.

Course out comes

CO1.Understand the Classification of Fishes and Distribution.

CO2.Understand the Finfish Anatomy.

CO3.Importance of Commercially important crustaceans and molluscs

CO4.Apply the concepts of Nature of External Morphology of shell fish

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	3	1	1	2	1	1	1	1	1	1	1
CO2	1	3	1	1	2	2	1	1	1	1	1	1
CO3	2	3	2	1	1	2	1	1	1	1	1	1
CO4	2	3	2	1	2	1	1	1	1	1	2	1

H-High-3, M- Medium-2, L- Low-1

AQC 103A: COMPULSORY FOUNDATION- THEORY -FISH NUTIRITION AND WATER QUALITY MANAGEMENT

Course objective

To enable the students to:

- Comprehensive knowledge on nutritional requirements in aquaculture
- Know the principles and working application of supplementary feed
- Understand the properties of fertilizers and liming
- A quire knowledge on aeration in fish pond

AQC 103A : FISH NUTIRITION AND WATER QUALITY MANAGEMENT

UNIT – I

- **NUTRITION:** Importance of nutrition; nutritional requirements; nutritive needs of finfish with special reference to carps and cat fishes and shrimp and prawn; major nutrients – carbohydrates, proteins and lipids and their importance. Natural food and live feed culture: methods of collection of live feed organisms; identification, isolation and maintenance of phytoplankton and zooplankton; mass culture of spirulina and azolla, culture of rotifers (Brachionus and Moina) and artemia.
- **FOOD AND FEEDING HABITS :** Types of food – basic food, secondary food, incidental food, obligatory food; feeding habits – detritivores, scavengers, herbivores, omnivores, carnivores, surface feeders, column feeders, bottom feeders; monophagic, stenophagic and euryphagic fishes; seasonal changes in food availability and food preferences; food and feeding in relation to age; food selectivity and feeding intensity; feeding strategies; food and feeding habits of prawns, shrimps, crabs and bivalves; morphological adaptations for feeding in fishes.

UNIT – II

- **SUPPLEMENTARY FEEDS :** Supplementary feed and feed formulations; different types of feeds (dry feed, wet feed, floating feed, sinking feed and flakes); feed composition; nutrient source; feed ingredients (conventional and non-conventional, their nutritive value); water stability of feeds; use of attractants in feeds; binders; processing of feeds (importance of anabolic agents, antioxidants and mould inhibitors; anti nutritional factors); storage and quality control; determination of energy content in feeds.

- **FEEDING :** Introduction; feeding and fish production; fate of nutrients in feed; water quality and feeding rates – temporal changes; relationship to maximum feeding rate; effects of weather on maximum feeding rate; effluents from fish ponds; off-flavor.

UNIT – III

- **FERTILIZATION:** Properties of chemical fertilizers: Primary nutrients; secondary nutrients; sources of fertilizers; mixed fertilizers; solubility of fertilizers. Effects of fertilization on plants and invertebrates: Phytoplankton; zooplankton; benthos; macrophytes; water transparency as an index to fertilization; fish yield in fertilized ponds. Organic fertilizers: Sources; influence on pond ecology and fish production.
- **LIMING :** Properties of liming materials – compounds, neutralizing value, fineness; effects of liming on pond ecosystem – chemistry, production of plankton and invertebrates; fish production; liming rates for ponds; application of liming materials for ponds – selection of liming material and time of application; methods of application; residual effects of liming.

UNIT – IV

- **DYNAMICS OF DISSOLVED OXYGEN :** Introduction; diffusion; photosynthesis; respiration; diet changes in dissolved oxygen concentrations; predicting decline in dissolved oxygen concentrations; oxygen budgets of fish ponds; algal die-offs; overturns; identification of oxygen problems.
- **AERATION :** Introduction; principles of aeration; emergency aeration; supplemental or continuous aeration; destratification; practical considerations.
- **MISCELLANEOUS TREATMENTS :** Introduction; potassium permanganate; hydrogen peroxide; calcium hydroxide; reduction of pH; control of turbidity; salinity; hardness and chloride; water exchange; chlorine removal; rotenone; formalin and malachite green; methods of applying chemicals.

Suggested reading :

- Halver, J. E. 1972. Fish Nutrition. Academic Press, New York.
- Sena, S. De Silva and Trever A. Anderson. Fish Nutrition in Aquaculture. Chapman & Hall London. 1998, p. 319.

- Lovell, J. 1989. Nutrition and Feeding of Fish. Von Nostrand.
- MPEDA, 1990. Hand Book on Aquafarming – Live feed.
- MPEDA, 1990. Hand Book on Aquafarming – Aquaculture feed.
- MPEDA 1990. Aquaculture Engineering and Water Quality Management. Cochin, India.
- Pillay, T. V. R. Aquaculture: Principles and Practices. Fishing News Books.
- Jhingran, V. G. 1985. Fish and Fisheries of India. Hindustan Publishing Corporation, New Delhi.
- Boyd, C. E. 1982. Water Quality Management for Pond Fish Culture.Elsevier Science Publishers.
- Chakroff, M. 1993. Freshwater Fish Pond Culture and Management. Daya Publishing House, New Delhi.
- Pillay, T. V. R. and W. A. Dill. 1979. Advances in Aquaculture. Fishing News Books Ltd.

Course out comes

After the completion of the course, the students will be able to:

CO1.Aquire knowledge on the Importance of Nutrition

CO2.Understand the Food and Feeding Habits.

CO3.Importance of Supplementary feeds and Fertilization

CO4.Knowledge on Dynamics of Dissolved oxygen

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	1	3	1	1	2	1	1	1	1	3	2
CO2	2	2	3	1	1	3	1	1	1	1	3	3
CO3	1	1	3	1	1	2	1	1	1	1	3	1
CO4	3	1	3	1	3	3	1	1	1	1	1	2

H-High-3, M- Medium-2, L- Low-1

AQC103 B: COMPULSORY FOUNDATION-THEORY- ENVIRONMENTAL MONITORING AND BIODETERIORATION

Course objective

To enable the students to

- Understand limitations for monitoring critical pollutants
- Know the role of biotechnology in environmental pollution
- Aquire knowledge on Control of bio deterioration of wood and synthetic substances in the sea
- Understand prospects of sustainable development and current environment al problems in india and their management.

AQC 103 B: ENVIRONMENTAL MONITORING AND BIODETERIORATION

UNIT-I

- Global environmental monitoring methods: Status and objectives, limitations for monitoring critical pollutants.
- Role of biotechnology in environmental pollution control: Indicator organisms, Test organisms, Monitoring organisms, Enzymes.

UNIT-II

- Coastal developmental activities-environmental issues.
- Micro and Macro fouling, corrosion of metals and alloys in the sea, effects of bio-fouling and bio deterioration on marine structures.

UNIT-III

- Protection methods against corrosion and fouling; Application of biotechnology in
- controlling the bio deterioration of wood and synthetic substances in the sea.
- Red tides: Cause character and effects on the organisms of Marine environment.

UNIT-IV

- Current Environmental Issues: Current environmental problems in India and their management. Urban waste and health: recycle of water and use; role of garden, park and reservoirs in environmental protection.
- Sustainable development: an international perspective; Retrospect and prospects of sustainable environmental development

Text Books/References:

- S.E. Nielsen: Tropical Pollution, 1982.
- A.M.Chakravarthy: Biodegradation and detoxification of Environmental pollutants,CRC Press, 1928.
- o.Kinne: Marine Ecology, Vol.V. Ocean Management 3&4 John Wiley & Sons.1984.
- Johnston R. (Ed.): Marine Pollution, Academic Press, 1976.
- Patin S.A.: Pollution and Biological resources of the Oceans Butterworth & Co.Ltd., 1982.
- Ruive M. (Ed.): Marine Pollution and Fishing News Sea Life 1972.
- Venugopalan, V.K.: Pollution and Toxicology, CAS in Marine Biology, 1991.
- Rita Colwell (Ed): Biotechnology in Marine Sciences, Academic Press, 1981.
- Prakash P.: Textbook of Marine Pollution.
- Gupta, P.K.: Introduction to Biotechnology.

COURSE OUT COMES

After completion of this course, students

CO1Understand the Global Environmental monitoring methods

CO2 Aquire knowledge on Coastal development activities

CO3 Creating awareness on Protection methods against corrosion and fouling

CO4 Knowledge on Current Environmental issues

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	1	2	1	1	2	1	1	1	1	1	1
CO2	1	1	1	1	1	1	1	1	1	1	1	1
CO3	2	1	1	2	2	1	1	1	1	2	1	1
CO4	3	1	1	3	1	1	2	1	1	1	1	2

H-High-3, M- Medium-2, L- Low-1

AQC- 104A: ELECTIVE FOUNDATION – THEORY- COASTAL AQUACULTURE

Course Objectives

To enable the students to:

Course objective

- Understand seed collections from natural resources
- Aquire knowledge on Crab culture and Lobster culture
- Understand the methods of Double cropping
- Comprehension knowledge on Oysters, pearl oysters and mussels

AQC- 104A: COASTAL AQUACULTURE

UNIT – I

1.SHRIMP HATCHERY MANAGEMENT: Seed collection from natural resources, identification of post larval stages, brood stock management, breeding by eyestalk ablation, hatchery management, larval rearing of *Penaeus monodon*. Shrimp Culture Management: Culture of *P.vannamei* and *P.mondon*

2.CRAB CULTURE: Culture of *Scylla serrata, Scylla oceanica, Scylla tranquibarica*.

3.LOBSTER FISHERY: Distribution – biology of spiny lobster – abundance of spiny lobster - culture of spiny lobster – processing and preservation of lobsters.

UNIT – II

4.CRAY FISH CULTURE: Culture of *Procambarus clarkii* – pond culture methods – double cropping.

5.MOLLUSCAN CULTURE: Oysters, pearl oysters and mussels.

UNIT – III

6.SEAWEED CULTURE: Seaweed morphology, biology, reproduction, importance of seaweeds; culture of seaweeds.

7.MARINE AND BRACKISHWATER FISH CULTURE: Culture of *Lates calcarifer, Etroplus suratensis* and *Mugil cephalus*.

UNIT – IV

8. POST HARVEST TECHNOLOGY: Harvesting methods - drainable ponds, undrainable ponds, cage and raceway farms, handling and transport; principles and importance of fish

preservation; preservation methods - traditional and advanced methods of fish preservation – sun drying, salt curing, pickling, smoking, chilling, freezing and canning.

9. PRESERVATION AND PROCESSING : Processing and preservation of fish products and byproducts – minced meat, FPC, fish meal, fish oils, fish hydrolsate, fish sauce, fish glue; sanitation in processing plants and quality control of fresh and processed fish and fishery products; IQF shrimp Freezing.

Suggested reading :

- MPEDA, **Hand Book on Aquafarming,** Shrimps, lobsters, mudcrabs (1996).
- Nandi, N. C. and S. K. Pramanik. 1994. **Crabs and crab Fisheries of Sundarban**. Hindustan Publishing Corporation.
- Pillay, T. V. R. 1988. **Aquaculture, Principles and Practices**. Fishing News Books.
- Piska, R. S. 1999. **Fisheries and Aquaculture.** Lahari Publications, Hyderabad.
- Pandian, T. J. 2001. **Sustainable Indian Fisheries.** National Academy of Agricultural Sciences.
- Sahoo, D. and S. Z. Qasim. 2002. **Sustainable Aquaculture.** APH Publishing Corporation, New Delhi – 110 002.
- MPEDA – Hand Book on Aqua farming – **Fish Processing, Quality Control & Marketing**. 1995. Kochi, India.
- Pillay, T. V. R. 1993. **Aquaculture: Principles and Practices**. Fishing News Books.

Course out comes

- Understand the Shrimp hatchery management
- A quire knowledge on Crab culture, cray fish culture and Molluscan culture
- Creating awareness on Seaweed culture
- Knowledge on Post harvest technology

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	1	1	1	1	1	2	2	2	3	2	2
CO2	2	3	2	1	2	2	2	1	2	2	1	1
CO3	2	1	1	1	3	1	1	1	1	1	2	1
CO4	2	3	1	1	3	2	1	1	1	1	1	1

H-High-3, M- Medium-2, L- Low-1

AQC- 104B: ELECTIVE FOUNDATION – THEORY: ORNAMENTAL FISH CULTURE

Course objective

To enable the students to

- Understand classification of ornamental fishes
- Acquire knowledge on construction and setting up fresh water aquarium and it maintenance
- Know diseases of aquarium fishes
- Understand economic s of ornamental fish culture

AQC 104 (B) : ORNAMENTAL FISH CULTURE

UNIT – I

1. Classification and characteristic features of common species of freshwater ornamental fishes.

2. Classification and characteristic features of common species of brackish water and marine ornamental fishes.

UNIT – II

3. Construction and setting up freshwater aquarium and its maintenance; aquarium plants.

4. Mass production of ornamental fishes – food and feeding habits, water quality maintenance, breeding and rearing.

UNIT – III

5. Bacterial and viral diseases of aquarium fishes – causes, symptoms and control.

6. Fungal, parasitic and nutritional deficiency diseases – causes, symptoms and control.

UNIT – IV

7. Setting up of an export oriented ornamental fish unit.

8. Economics of ornamental fish culture.

Suggested readings :

- V. K. Dey, 1986. Ornamental Fishes. MPEDA.
- R. Santhanam. 1987. A Manual of Freshwater Aquaculture, Oxford X IBH.
- V. Satyanarayana. 1996. Fish culture, Narendra Publishing House.
- P. K. Talwar and A. G. Jhingran 1991. Indian Fishes, Oxford & IBH
- J. Shammi and S. Bhatnagar. 2002. Applied Fisheries, Agrobios (India)

Course out comes

After completion of this course, students

CO1.Understand the Common species of fresh water ornamental fishes

CO2. Acquire knowledge on Mass production of ornamental fishes

CO3.Creating awareness on Diseases of aquarium fishes

CO4.Knowledge on Economics of ornamental fish culture

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	2	2	1	2	3	3	1	3	2	2	3
CO2	2	1	2	3	2	3	3	2	1	2	2	3
CO3	1	1	2	1	2	3	3	2	3	2	2	3
CO4	2	1	2	2	2	1	1	1	1	1	3	3

H-High-3, M- Medium-2, L- Low-1

PRACTICALS

I – Semester

Course objective

- Understand Commercially important fin fish and shell fish
- A quire knowledge on Identification of eggs and larval forms of cultivable finfish and shellfish
- Understand the Biometric analysis Comprehension knowledge on crafts and gear, aquatic insets, aquatic weeds.

AQC105: IDENTIFICATION AND MORPHOLOGY OF CULTIVABLE ORGANISMS

- Identification of commercially important finfish – marine fishes, freshwater fishes, exotic carps, ornamental fishes, predatory fishes and weed fishes.
- Identification of commercially important shellfish – crabs, prawns and shrimps.
- Identification of eggs and larval forms of cultivable finfish and shellfish.

- Identification of fins and scales of fish; mounting of scales.
- Collection and identification of fish food organisms.
- Biometric analysis.
- Length-weight relationship.
- Dissections: (1) Digestive system (2) Reproductive system in finfish and shellfish.
- Identification of different crafts and gear.
- Identification of aquatic insects.

  Identification of aquatic weeds.

Course out comes

- Understand the commercially important cultivable organisms
- A quire knowledge on commercially important finfish and shellfishes
- Creating awareness on anatomy of finfish and shellfish
- Knowledge on Morphology of aquatic insects and weeds

Course objective

- Understand the biomolecules in aquatic animals
- A quire knowledge on Identification of physiology
- Understand the feed management
- Comprehension knowledge on feed composition.

AQC 106: FISH NUTRITION

- Estimation of total proteins, carbohydrates and lipids in fish feeds.
- Estimation of ash content.
- Estimation of inorganic ions through flame photometer.
- Estimation of fiber content in fish feeds.
- Determination of amino acid profiles through paper chromatography.
- Effect of different feeds on digestibility, FCR and FCE.
- Determination of energy contents using bomb colorimeter.
- Proximate composition of fish digestive tract.

Course out comes

- Understand the estimation of biomolecules

- A quire knowledge on techniques for estimations
- Creating awareness on intestine and gut capacity of aquatic organisms
- Knowledge on feed composition

Audit Course 106: HUMAN VALUES AND PROFESSIONAL ETHICS – I

Course objective

- Define the term ethics, Good and Bad values, Crime and Punishment
- Understand the importance good character, conduct and values embedded in various religious
- Apply knowledge on professional ethichs and correlate the concepts in addressing the ethical issues outside the class rooms
- Demonstrate knowledge of ethical values in non-class room activity internships and work and resolved the moral issues.

Audit Course 106: HUMAN VALUES AND PROFESSIONAL ETHICS – I

- Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.
- Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.
- Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).
- Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths - Arya astanga marga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.
- Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study:

- John S Mackenjie: A manual of ethics.
- "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
- "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
- "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
- Harold H. Titus: Ethics for Today
- Maitra, S.K: Hindu Ethics
- William Lilly : Introduction to Ethics
- Sinha: A Manual of Ethics
- Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
- Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
- Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
- Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
- Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
- An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo

Publications.

- Text book for Intermediate logic, Ethics and Human Values , board of Intermediate
- Education& Telugu Academic Hyderabad
- I.C Sharma Ethical Philosophy of India. Nagin&co Julundhar.

Course out comes

After studying the course students will able to.

CO1. Define the term ethics, good and bad values, crime and punishment and religious.

CO2.Understand the importance of good character, conduct and values embedded in various religions

CO3. Apply knowledge of Professional ethics and correlate the concepts in addressing the ethical issues outside the class room.

CO4. Demonstrate the ability to face difficult situations in non class room activities, internships and field work and resolve them confidently.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO	PO11	PO12

POS / COS										10		
CO1	1	1	1	3	1	1	1	1	1	1	1	1
CO2	1	1	1	3	1	1	1	1	1	1	1	1
CO3	1	1	1	3	1	1	1	1	1	1	1	1
CO4	1	1	1	3	1	1	1	1	1	1	1	1

H-High-3, M- Medium-2, L- Low-1

CORE – THEORY AQC 201: PRINCIPLES OF AQUACULTURE

Course objective

To enable the students to

Describe the Principles of Aquaculture

- Identify the Design Construction of pond
- Indicate the Biological characterstics of aquaculture species
- Acquire knowledge on measurement of growth and water and soil quality parameter.

Semester – II

AQC 201 : PRINCIPLES OF AQUACULTURE

UNIT – I

1. **AQUACULTURE SYSTEMS AND METHODS:** Scope and definition; origins and growth of aquaculture; biological and technological basis; Traditional, extensive, semi - intensive and intensive culture; monoculture, polyculture, composite culture, mixed culture, monosex culture; cage culture, pen culture, raft culture, race way culture, culture in circulatory systems; warm water and cold water aquaculture; sewage – fed fish culture, integrated fish farming.

2. **SELECTION OF SITES:** Survey and location of suitable site – topography; soil characteristics; acid sulphate soils; water source; hydrometerological data.

UNIT – II

3. **AQUACULTURE ENGINEERING :** Design and construction of pond, layout and design of aquaculture farm, construction, water intake system, drainage system; aeration and aerators; recent advances in aquaculture engineering; tips for better aquaculture practices; design and construction of hatcheries.
4. **HYDROLOGY OF PONDS :** Types of ponds; sources of water – precipitation, direct run off, stream inflow, ground water inflow, regulated inflow; losses of water– evaporation, seepage, outflow, consumptive use, water budgets of embankment ponds; water budget of an excavated pond; water exchange.

UNIT – III

5. **SELECTION OF SPECIES:** Biological characteristics of aquaculture species; economic and market considerations; seed resources, collection and transportation.
6. **PRE STOCKING MANAGEMENT:** Sun drying, ploughing / tilling, desilting, liming and fertilization, eradication of weed fishes.
7. **STOCKING:** Acclimatization of seed and release; species combinations; stocking density; ratio.

UNIT – IV

8. POST STOCKING MANAGEMENT : Water and soil quality parameters required for optimum production, control of aquatic weeds and aquatic insects, algal blooms; specific food consumption, food conversion ratio (FCR), protein efficiency ratio, true net protein utilization, apparent net protein utilization, biological value of protein.

9. GROWTH : Measurement of growth; length - weight relationship; methods of determination of age in fishes and shellfish based on length data and growth checks; ponderal index; growth hormones.

Suggested reading :

- Mathew Landau. 1995. **Introduction to Aquaculture**. Daya Publishing House, New Delhi.
- Pillay, T. V. R. 1993. **Aquaculture: Principles and Practices**. Fishing News Books. Black Well Scientific Publications.
- MPEDA, 1991. **Hand Book on Shrimp Farming**, Kochi, India.
- Jhingran, V. G. 1982. **Fish and Fisheries of India**. Hindustan Publishing Corporation, New Delhi.
- Chakrabarti, N. M. 1998. **Biology, Culture and Production of Indian Major Carps**. Narendra Publishing House, New Delhi.
- Coche, A. G. and J. F. Muir. 1996. **Pond Construction and Fresh Water Fish Culture – Pond Farm Structures and Layouts – Simple Methods for Aquaculture**. FAO. Daya Publishing House, New Delhi.
- Upadhyay, A. S. 1995. **A Hand Book on Design, Construction and Equipments in Coastal Aquaculture (Shrimp Farming)**. Daya Publishing House, New Delhi.
- Wheaton, F. W. 1985. **Aquaculture Engineering**. MPEDA, Cochin.
- MPEDA 1990. **Aquaculture Engineering and Water Quality Management**. Cochin, India.

Course out comeS

After completion of this course, students will be able to:

CO1.Understand the Aquaculture systems and methods

CO2.Aquire knowledge on Aquaculture Engineering

CO3.Creating awareness on selection of species and Hydrology of ponds

CO4.Knowledge on Pre stocking Management and Post stocking management and growth.

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	2	2	2	1	3	2	1	1	1	2	2	2
CO2	2	2	2	1	2	1	2	1	1	1	2	2
CO3	2	2	2	1	2	2	2	1	2	1	2	2
CO4	3	3	3	1	3	2	2	2	2	2	2	2

H-High-3, M- Medium-2, L- Low-1

CORE – THEORY AQC 202: PHYSIOLOGY OF CULTIVABLE ORGANISMS

Course objective

To enable the students to

- Recognize the Physiology of cultivable Organisms.
- Understand the digestion and respiration.
- Creating awareness on neuroendocrine system and reproduction.
- Knowledge on Bioluminescence, mating and parental care.

AQC 202 : PHYSIOLOGY OF CULTIVABLE ORGANISMS

UNIT – I

1. **DIGESTION:** Digestive systems, digestive enzymes, absorption and assimilation.
2. **RESPIRATION :** Respiratory organs, mechanisms of ventilation, respiratory pigments, gaseous exchange mechanism, response of the respiratory system to external changes; accessory respiratory organs.

UNIT – II

3. **EXCRETION AND OSMOREGULATION:** Mechanism of excretion – kidney structure and functions of freshwater and marine teleosts. Osmoregulation in freshwater fishes and marine fishes and salt balance.
4. **CIRCULATORY SYSTEM:** Arteries and veins; mechanical properties and regulation of cardiac activity; general properties of the cardiovascular system; effects of drugs.

UNIT – III

5. **NEUROENDOCRINE SYSTEM:** Neuroendocrine system in finfish; neuroendocrine regulation of moulting and reproduction in crustaceans.
6. **REPRODUCTION:** Reproductive cycles, sexual maturity, spawning and fecundity, gonado somatic index, fertilization, hormones and reproductive behaviour in fishes.

UNIT – IV

7. **BIOLUMINISCENCE:** Light organs – biochemistry, regulation of light emission, significance and employment of luminescence.
8. **MATING AND PARENTAL CARE :**The abyssal and pelagic eggs; attachment devices; spawning sites; nest building and other means of parental care; ovoviviparity and viviparity; types of larvae; metamorphosis; larval life and feeding habits of larvae in finfish and shellfish.

Suggested reading :

- Hoar W.S. and D. J. Randal. 1976. Fish Physiology. Vol. I to IX Academic Press, New York.
- Khanna, S. S. 1996. An Introduction to fishes. Central book depot, Allahabad.
- Lynwood S. Smith. 1999. Introduction to Fish Physiology. Narendra Publishing House, Delhi.
- Harper, A. L. 1989. Physiological Chemistry.
- Lagler, K. F., J. E. Bardach and R. R. Miller.1972. Ichthyology. John Wiley.

Course out comes

After completion of this course, students will be able to:

CO1 To Understand the metabolism of fishes and prawns

CO2 Acquire knowledge on Neuroendocrine system

CO3 Creating awareness on bioluminescence

CO4 Knowledge on fertilization and parental care

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	2	2	3	1	2	3	3	2	2	2	2	2
CO2	2	2	2	1	2	3	2	1	3	2	2	1
CO3	3	2	3	1	2	3	2	2	3	2	2	2
CO4	2	2	2	1	2	3	2	3	3	3	3	3

H-High-3, M- Medium-2, L- Low-1

COMPULSORY FOUNDATIONAQC 203A: FRESHWATER AQUACULTURE

Course objective

To enable the students to

- Understand the culture of Indian Major carps
- Acquire knowledge on hatchery management
- Creating awareness on Fresh water pearl culture
- Knowledge on important Aquarium fishes and management

AQC 203A : FRESHWATER AQUACULTURE

UNIT – I

1. **CULTURE OF INDIAN MAJOR CARPS** – Catla, Rohu, Mrigal
2. **CULTURE OF EXOTIC CARPS** – Grass carp, common carp, silver carp, tilapia
3. **CULTURE OF AIR BREATHING FISHES** – Murrels and cat fishes

UNIT – II

HATCHERY MANAGEMENT:

4. **FISH:** Induced breeding; hypophysation of Indian Major carps; types of hatcheries - Hapa, Jar hatchery, circular hatchery (Chinese hatchery), Modern Indian hatchery system.
5. **FRESHWATER PRAWN:** Identification of post larval stages; brood stock management, breeding and Hatchery management, larval rearing.

UNIT – III

6. **FRESHWATER PRAWN CULTURE:** Seed collection from natural sources; culture of M.*rosenbergii* / *M.malcolmsonii*
7. **FRESHWATER PEARL CULTURE:** Definition and scope, origin of pearls, pearl producing molluscs; freshwater pearl culture in the World and in India; types of pearls; mantle cavity insertion, mantle tissue insertion, gonadal insertion; water quality management.

UNIT – IV

1. **AQUARIUM FISHES AND MANAGEMENT :** Identification of commercially important ornamental fishes, setting and design of freshwater aquarium; taxonomy of species; live bearing fishes; egg laying fishes; biology of ornamental fishes; physiochemical properties of water used in aquaria; aquatic plants and other structures for beauty and utility; common aquarium fish diseases and their control; preparation of supplementary feeds and mass production of ornamental fishes.

Suggested reading:

- Pillay, T. V. R. 1998. **Aquaculture Principles and Practices**. The Fishing News Books.

- Rath, R. K. 2000. **Freshwater Aquaculture.** Scientific Publishers (India) Jodhpur.
- Piska, R. S. 1999. **Fisheries and Aquaculture**. Lahari Publications. Hyderabad.
- Pandian, T. J. 2001. **Sustainable Indian Fisheries.** National Academy of Agricultural Sciences

Course out comes

After completion of this course, students will be able to:

CO1 Understand the Culture of Indian Major carps

CO2 Acquire knowledge on Aquaculture Hatchery Management

CO3 Creating awareness on Fresh water prawn culture

CO4 Knowledge on Aquarium fishes and Management

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	2	3	3	1	2	3	2	2	2	2	2	2
CO2	3	3	3	1	3	3	3	2	2	2	3	2
CO3	3	3	3	1	3	2	2	2	1	1	1	2
CO4	3	2	3	1	3	3	2	2	1	2	2	2

H-High-3, M- Medium-2, L- Low-1

Compulsory foundation aqc 203b: capture fisheries

Course objective

- Understand crafts, gears, nets from natural resources
- Acquire knowledge on commercial reservoirs
- Understand the methods of fisheries in India.
- Comprehension knowledge on clupepods, prawns and mullets.

COMPULSORY FOUNDATION AQC 203B: CAPTURE FISHERIES

UNIT – I

1. **CRAFTS** - Introduction to fishing crafts; types of fishing crafts: indigenous crafts – coracle, sangadam, shoe dhonl, catamaran, tuticorin boats, dugout canoe, outrigger canoes, masula boats; / built up boats – Kakinada nava, Machilipatnam nava, dinghy and nauka. Materials used for construction of fishing crafts- timber,metals forsheating,metallicfitting, protection of the boat.
2. **GEAR** – types of fishing gear – disabling type, traps and barriers, filtering type, entangling type, self-fishing type, wounding gear.

   NETS – types of nets; common fishing gears for inland waters – traps, angling, cast net, stake net, hand seings, gill net. Gears for spawn collection – Midnapore type of net, murshidabad type of net, lalgola type, jaunpur type. Gamcha, - midnapore type, murshidabad type – materials used for fishing gear; preservation of fishing gears.

UNIT – II

3. **RIVERINE FISHERIES OF INDIA :** Ecology of riverine environment; different river systems and their fisheries; regulations of populations and exploitation; improvement of fish stocks; status of spawn prospecting; fisheries of major and minor carps and cat fishes.
4. **LACUSTRINE FISHERIES:** Lakes and reservoirs; development of reservoir fisheries; commercial exploitation of reservoirs; recent advances in reservoir management.

UNIT – III

5. **MARINE FISHERIES:** Marine fishery resources of India; historical background and

recent trends; problems of inshore fisheries; fishery resources of the continental shelf; exploitation and management of under exploited and unexploited resources of EEZ.

6. **PELAGIC FISHERIES:** Pelagic fishery resources of India; fisheries of oil sardine, lesser sardines, anchovies, mackerel, ribbon fishes and cephalopods.
7. **DEMERSAL FISHERIES:** Fisheries of elasmobranchs; Bombay duck, silver bellies, threadfins and other perches; flat fishes, shrimps, crabs, oysters and clams.

UNIT – IV

8. **ESTUARINE FISHERIES:** Definition; origin and classification;

types of estuaries in India and their fishery resources fisheries o brackish water lakes and backwaters; problems confronting brackish water capture fishers.

9. fisheries of clupepoids,prawns and mullets;fisheries of brackish water lakes and backwaters;problems confronting brackishwater capture fisheries.

Suggested reading:

- Jhingran, V. G. 1985. **Fish and Fisheries of India**. Hindustan Publishing Corporation, New Delhi.
- Kurian, C. V. and O. V. Sebastian, 1982. **Prawns and Prawn Fisheries of India**. Hindustan Publishing Corporation, New Delhi.
- Srivastava, U. K. and Dharma Reddy. 1983. **Cold Water Fisheries of India**. Concept Publishing Co., New Delhi.
- Bal, D. V. and K. V. Rao. 1990. **Marine Fisheries**. Narendra Publishing House, New Delhi.
- **Proceedings of the Symposium of Living Resources of the Seas around India**. CMFRI. 1973. Spl. Publ. CMFRI. Cochin.
- FAO, **Year Book of Fishery Statistics** (Yearly).
- Talwar, P. K. and R. K. Kacker. 1984. **Commercial Sea Fishes of India**. ZSI, Kolkata.
- Khanna, S. S. 1997. **An Introduction to Fishes**. Central Book Depot, Allahabad.
- Sinha, V. R. P. 1993.**A Compendium of Aquaculture Technologies**. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
- Piska, R. S. 1999. **Fisheries and Aquaculture.** Lahari Publications, Hyderabad.
- Pandian, T. J. 2001. **Sustainable Indian Fisheries.** National Academy of Agricultural Sciences.

Course out comes

After completion of this course, students will be able to:

CO1 Understand the types of fishing crafts, gears and nets.

CO2 Acquire knowledge on Aquaculture fisheries

CO3 Creating awareness on marine, pelagic and demersal fisheries.

CO4 Knowledge on estuarine fisheries and Management

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	1	2	1	2	2	3	2	1	1	2	2
CO2	3	3	3	1	3	2	1	1	1	2	2	1
CO3	3	2	2	1	2	2	1	1	1	3	2	2
CO4	2	2	2	1	3	1	2	1	1	1	1	2

H-High-3, M- Medium-2, L- Low-1

ELECTIVE FOUNDATION AQC 204A: FISHERY ECONOMICS, EXTENSION AND ENVIRONMENTAL MANAGEMENT

Course objective

To enable the students to

- Understand the concepts of Fishery Economics
- Describe the role and responsibilities of marketing
- Knowledge on Finance of Aquaculture
- Knowledge on utility on remote sensing techniques for the identification of
- suitable grounds for aquaculture

AQC 204 A : FISHERY ECONOMICS, EXTENSION AND ENVIRONMENTAL MANAGEMENT

UNIT – I

1. **AQUACULTURE ECONOMICS :** Production economics – definition of economics and application of economic principles to aquaculture; the input-output relationship; maximum level of input; least-cost combination of inputs; maximum level of output; combination of products; economics of size; partial budget analysis.

2. **MARKET ECONOMICS:** Basic concepts in demand and price analysis; supply and demand for fish; elasticity of demand (price elasticity of demand, income elasticity of demand, cross elasticity of demand).

UNIT – II

3. **ECONOMICS AND FINANCING OF AQUACULTURE :** Economic viability; assets and liabilities; cost-return analysis; production costs-variable and fixed costs; operating income; evaluation of farm performance; sensitivity analysis; minimum farm size; gross revenue.
4. Economic feasibility of investment analysis; methods of feasibility analysis – the payback method, net present value method, average rate of return, discounting method; benefit – cost ratio; internal rate of return; cash flow analysis; socio-economic analysis; risk and insurance.
5. Economics of carp, prawn and shrimp breeding farms and production farms.
6. Role of banks, central organizations and other funding agencies in the growth and development of aquaculture.

UNIT – III

7. **FARM MANAGEMENT:** Concepts of economic principles of farm management; application of farm management principles in aquaculture.
8. **MARKETING :** Economics of fish markets; marketing and resource management; co-operatives and their importance in fish production and marketing; export oriented growth policies; fisheries projects and fish resources; institutional and management issues; planning and financing schemes for fisheries; legal and environmental issues.
9. **FISHERIES EXTENSION:** Extension education-objectives and principles; role of extension in community development; rural development strategies – programmes for weaker sections of the community; fisheries as a tool in rural development; extension strategies and methodologies; employment generation.

UNIT – IV

10. **REMOTE SENSING:** Utility of remote sensing techniques for the identification of suitable grounds for aquaculture and for obtaining data on geographical information system (GIS); role of remote sensing in the assessment of aquatic pollution.
11. **ASSESSMENT OF ENVIRONMENTAL HAZARDS AND IMPACTS OF AQUACULTURE :** Concept of clean environment; impact of fish farming on the aquatic ecosystem; impact of fish farming on socio-economic and socio cultural environment; effects of aquatic pollution on fish farming; environmental impact assessment studies (EIA); ecofriendly technologies in aquaculture.

Suggested reading :

- Korakandy, R., 1996. **Economics of Fisheries Management – A Critique in the Third World Perspective**. Daya Publishing House, New Delhi.
- Allen et. al (Eds). 1984. **Bio-Economics of Aquaculture**. Elsevier.
- Hepher, B. and Pruginin, Y. 1981. **Commercial Fish Farming**.
- Pillay, T. V. R., 1993. **Aquaculture : Principles and Practices**. Fishing News Books.
- Kothar, P., 1988. **Marketing Management**. Prentice Hall, Inc.
- Adivi Reddy, A. 1976. **Extension Education**. Sree Lakshmi Press, Bapatla, India.
- Joshi, M. V., 1996. **Economics of Fisheries**. Daya Publishing House, New Delhi.
- Girirappa, S., 1995. **The Role of Fisheries in Rural Development**. Daya Publishing House, New Delhi.
- Guidelines for the **Promotion of Environmental Management of Coastal Aquaculture Development**, FAO Fisheries Technical Paper 328. 1992. Rome.

- Pillay, T. V. R. 1996. **Aquaculture and the Environment**. Daya Publishing House, New Delhi.
- FAO, 1995. **Geographical Information Systems and Remote Sensing in Inland Fisheries and Aquaculture**. Daya Publishing House, New Delhi.

Course out comes

CO1 Understand the Marketing and Aquaculture Economics

CO2 Acquire knowledge on Financing of Aquaculture

CO3Creating awareness on Farm Management and Marketing

CO4 Knowledge on Remote sensing

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	2	2	1	3	3	1	1	1	1	1	1	1
CO2	2	1	1	3	3	2	3	1	1	1	1	1
CO3	1	1	1	3	2	3	1	1	1	1	2	1
CO4	1	1	1	1	1	1	1	1	1	1	1	1

H-High-3, M- Medium-2, L- Low-1

Elective foundation aqc 204 (b) : limnology

Course objective

To enable the students to

- Acquire knowledge on dynamics of lentic and lotic environments
- Understand classification of planktons
- Know aquatic plants
- Understand artificial enrichment

ELECTIVE FOUNDATION AQC 204 (B) : LIMNOLOGY

UNIT-I

Introduction to limnology: inland water types, their identities and distribution; ponds and lakes; streams and rivers; dynamics of lentic and lotic environments.

Lakes - their origin and diversity. Famous lakes of the world and India; nature of lake environment; morphometry, physical and chemical conditions and related phenomena;

UNIT-II

Biological relations: influence of physical and chemical conditions on living organisms in inland waters. Plankton: planktonic organisms; classification of plankton;Distribution of plankton: geographic, vertical, horizontal and seasonal distribution of phytoplankton and zooplankton: seasonal changes of body form in planktonic organisms; food of planktonic organisms. Primary productivity;

UNIT-III

Aquatic plants: character, classification, zonation, seasonal relations, quantity produced chemical composition distribution in different waters, limnological role. Nekton: composition, distribution, movements. Benthos: classification; periphyton; zonation; distribution; movements and migration; seasonal changes in benthos, profundal bottom fauna.

UNIT-IV

Biological productivity: circulation of food material; classification of lakes based on productivity; laws of minimum; biotic potential and environmental resistance; quantitative relationships in a standing crop; trophic dynamics; successional phenomena; indices of productivity of lakes; artificial enrichment.Lotic environments: running waters in general; physical conditions; classification of lotic environments, biological conditions; productivity of lotic environments. influence of currents; plant growth; plankton; nekton; benthos; temporary and head waters streams; ecological succession.

Suggested reading :

- Santhanam, R. 1993. **A Manual of Fresh Water Ecology : An Aspect of Fishery Environment.** Daya Publishing House, New Delhi.
- Pillai, N. K. 1993. **Marine Biology and Ecology.** Daya Publishing House, New Delhi.
- Reid, G. K. and R. D. Wood. 1976. **Ecology of Inland Waters and Estuaries** D. Van Nostrand Company.
- Kormondy, E. J. 1996. **Concepts of Ecology.** Prentice Hall of India Pvt. Ltd. New Delhi.
- Cole, G. L. 1954. **Text Book of Limnology**. The C. V. Mosloy Co.,
- Odum, E. P. 1996. **Fundamentals of Ecology**. 3rd Edn. Natraj Publishers, Dehradun.

- Santhanam, R. and A. Srinivasan. 1994. **A Manual of Marine Zooplankton.** Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- Pillai, N. K. 1986. **Introduction to Planktonology**. Himalaya Publishing House, Mumbai.
- Balakrishnan Nair, N and D. M. Thampy. 1980. **A Text Book of Marine Ecology.** Mc Millan Co. of India Ltd.

Course out comes

After completion of this course, students

CO1. Understand the Limnology

CO2. Acquire knowledge on Biological relations

CO3. Creating awareness on Aquatic plants

CO4. Knowledge on Biological Productivity

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	1	2	3	3	2	2	1	1	1	2	3
CO2	3	2	3	3	3	2	1	1	1	1	2	3
CO3	3	1	3	2	3	1	3	1	1	1	3	3
CO4	3	2	3	2	3	3	3	1	1	1	3	3

PRACTICALS

AQC 205: SOIL AND WATER CHARACTERISTICS

- Determination of temperature, pH and transparency.
- Estimation of dissolved oxygen and primary productivity.
- Estimation of carbon dioxide.
- Estimation of total ammonia – nitrogen and nitrate – nitrogen.
- Estimation of phosphates.
- Estimation of iron.
- Estimation of chlorine
- Determination of hardness.
- Estimation of organic matter and biological oxygen demand (BOD)
- Determination of salinity.
- Plankton analysis.

Course out comes

After completion of this course, students

CO1. Understand water quality parameters

CO2. Acquire knowledge on soil quality parameters

CO3. Creating awareness on Plankton analysis

CO4. Knowledge on Excretion

COURSE OBJECTIVE

To enable the students to

- Recognize the Physiology of cultivable Organisms.
- Understand the excretion and respiration
- Creating awareness on Determination of fish age.
- Knowledge on gonado somatic index and fecundity in fish

AQC 206: PHYSIOLOGY OF FINFISH AND SHELLFISH

- Effect of size, sex and salinity on oxygen consumption.
- Effect of eyestalk ablation on oxygen consumption in crab.
- Estimation of excretory ammonia.
- Collection and preservation of pituitary gland in fish

- Induced breeding in fish through hypophysation.
- Estimation of haemolymph chlorides with reference to salinity in crab.
- Effect of thyroxine on fish growth.
- Determination of fish age.
- Estimation of gonado somatic index and fecundity in fish

Course out comes

After completion of this course, students will be able to:

1.CO1 To Understand the metabolism of fishes and prawns
2.CO2 Acquire knowledge on Neuroendocrine system
3.CO3 Creating awareness on hormones
4.CO4 Knowledge on fertilization and fecundity

Audit Course 207: HUMAN VALUES AND PROFESSIONAL ETHICS – II

Course objective

- Define the term ethics, Good and Bad values, Crime and Punishment
- Understand the importance good character, conduct and values embedded in various religious
- Apply knowledge on professional ethichs and correlate the concepts in addressing the ethical issues outside the class rooms
- Demonstrate knowledge of ethical values in non-class room activity internships and work and resolved the moral issues.

Audit Course 106: HUMAN VALUES AND PROFESSIONAL ETHICS – I

- Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.
- Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.
- Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)-Dharma

(Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).

- Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths - Arya astanga marga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.
- Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study:

- John S Mackenjie: A manual of ethics.
- "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
- "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
- "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
- Harold H. Titus: Ethics for Today
- Maitra, S.K: Hindu Ethics
- William Lilly : Introduction to Ethics
- Sinha: A Manual of Ethics
- Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
- Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
- Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
- Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
- Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
- An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo
- **Publications.**
- Text book for Intermediate logic, Ethics and Human Values , board of Intermediate
- Education& Telugu Academic Hyderabad
- I.C Sharma Ethical Philosophy of India. Nagin&co Julundhar.

Course out comes

After studying the course students will able to.

CO1. Define the term ethics, good and bad values, crime and punishment and religious.

CO2.Understand the importance of good character, conduct and values embedded in various religions

CO3. Apply knowledge of Professional ethics and correlate the concepts in addressing the ethical issues outside the class room.

CO4. Demonstrate the ability to face difficult situations in non class room activities, internships and field work and resolve them confidently.

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	1	1	3	1	1	1	1	1	1	1	1
CO2	1	1	1	3	1	1	1	1	1	1	1	1
CO3	1	1	1	3	1	1	1	1	1	1	1	1
CO4	1	1	1	3	1	1	1	1	1	1	1	1

H-High-3, M- Medium-2, L- Low-1

CORE – THEORY- AQC 301: MICROBIOLOGY AND FISH PATHOLOGY

Course objective

To enable the students to

- Understand the Principles and scope of Microbiology
- Classify Microbiology and Fish Pathology
- Summarize Food Microbiology, Organize Fish farming and public health techniques
- Examine Diseases and Nutritional Deficiency diseases in Aquaculture

Semester – III

CORE THEORY AQC 301 : MICROBIOLOGY AND FISH PATHOLOGY

UNIT – I

1. **INTRODUCTION TO MICROBIOLOGY:** Scope and definition; major groups of microorganisms and their characteristics; classification and identification of microorganisms; fine structure, morphology and culture characteristics of bacteria and viruses.

UNIT – II

2. **SOIL AND AQUATIC MICROBIOLOGY:** Study of role of microorganisms in soil and water; soil and water probiotics and their importance.
3. **FOOD MICROBIOLOGY:** Role of microorganism's in preservation and spoilage of fishery products and food stuffs.

UNIT – III

4.VIRAL AND BACTERIAL DISEASES IN FINFISH AND SHELLFISH: Causes, symptoms, diagnosis, prophylactic and therapeutic measures.

5. PROTOZOAN AND FUNGAL DISEASES: Causes, Symptoms, diagnosis and preventive measures.

UNIT – IV

6.CRUSTACEAN AND HELMINTH PARASITES IN FISH:

Diseases caused by isopods and learnea; diseases caused by dactylogyrus and monocoelium; trematode larvae, nematodes and fish leeches – clinical picture, symptoms and prophylaxis. **Tumours in fish** – Epitheliomas and fibroepitheliomas, epithelioma

papulosum; papillomas; adenomas; carcinomas; hepatoma and melanosarcomas.

7.**NUTRITIONAL DEFICIENCY DISEASES:** Metabolic disturbances; vitamin deficiency; gastritis and enteritis; aflatoxins in feed.

1. **ENVIRONMENTAL STRESS DISEASES:** Lack of oxygen; gas bubble disease; pH; acidosis and alkalosis; intoxications; hydrocyanic acid, free chlorine, metals, phenol and temperature, disturbances.
2. Fish farming and public health; techniques of curative baths and mass injections.

Suggested reading :

- David Freifelder. 1987. **Microbial Genetics,** Narosa Publishing House.
- Michael J. Pelczar, JR. E C. S. Chan & Noel R. Krieg : **Microbiology,** Tata McGraw Hill Edition. 5th Edition.
- Dubey, R. C. & D. K. Maheswari (2000). **Text Book of Microbiology,** S. Chand & Company Ltd. New Delhi.
- Sharma, P. D. (1988). **Microbiology**, Rastogi Publications, Meerut, India.
- Biswas, K. P. 1995. **Prevention and Control of Fish and Prawn Diseases**. Daya Publishing House, New Delhi.
- Luky. 1994. **Methods for the Diagnosis of Fish Disease**. Daya Publishing House, New Delhi.
- Kabatza, Z. 1985. **Parasites and Diseases of Fish Cultured in the Tropics**. Taylor and Frances, London.
- Van Duijn, C. 1973. **Diseases of Fishes**. London Life Books Ltd.
- Conroy, D. A. and Herman, R. L. 1968. **Text Book of Fish Diseases**. T.F.H. (Gt. Britain) Ltd.
- Das, M. K. And R. K. Das. 1997. **Fish and Prawn Diseases,** Inland Fisheries Society of India, Barrackpore.
- Chakrabarthi, N. M. 1995. **Diseases of Cultivable Fresh Water Fishes and Their Control**. Daya Publishing House, New Delhi.
- Ellis, Anthony E. (Edr.) 1995. **Fish and Shell Fish Pathology**. Daya Publishing House, New Delhi.

Course out comes

After completion of this course, students

CO1 Understand the Characteristics of bacteria and viruses

CO2 Acquire knowledge on Aquatic Microbiology

CO3 Creating awareness on Diseases in finfish and shellfish

CO4 Knowledge on Parasites in fishes, Nutritional deficiency diseases and Environmental stress diseases

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	2	3	3	3	3	3	3	3	3	2	2
CO2	3	3	1	1	2	2	3	3	3	3	1	3
CO3	2	2	2	2	2	3	3	3	3	3	2	1
CO4	3	3	3	3	3	3	3	3	2	3	2	2

H-High-3, M- Medium-2, L- Low-1

CORE – THEORY AQC 302: FISH IMMUNOLOGY

Course objective

To enable the students to

- A quire knowledge on fish immunity
- Understand the structure and functional aspects, Immunoglobulin
- Know the principles and working application of Immuno diffusions
- Comprehensive knowledge on Immunising fish

AQC 302 : FISH IMMUNOLOGY

UNIT – I

1. **IMMUNE SYSTEM IN FISH:** Innate & acquired immunity- Advanced, primitive and unique features; specific and non-specific defence mechanisms.
2. **LYMPHOID SYSTEM IN FISH :** Stem cells, thymus, spleen, head, kidney and other lymph glands; lymphocyte subpopulation in fish

UNIT – II

3. Antigen - Types - Heptanes, Ag - Ab interactions
4. **IMMUNOGLOBULIN:** IgM structure and functional aspects; other Igs; Ig mediated immunity; antibody diversity.
5. **COMPLEMENT SYSTEM :** Classical & alternative

UNIT – III

6. **NON IG MEDIATED HUMORAL IMMUNITY:** Antigrowth factors, antienzymes, lysins, complement (properdin path way); agglutinins and opsonins.
7. **CRUSTACEAN IMMUNE SYSTEM**
8. **CELL MEDIATED IMMUNITY:** MHS class I & II, allograft rejection; anaphylactic hypersensitivity; delayed type hypersensitivity, lymphokines. Antibody probes in diagnosis of fish diseases & immunodiagnostic kits.

UNIT – IV

9. **IMMUNOTECHNOLOGY:** Immunodiffusions, immuno electrophoresis, radio immunoassay, ELISA, MLR, Hybridoma technique, immunoblotting.
10. **CONCEPT OF IMMUNISING FISH:** Vaccines and immunostimulants in fish adjuvants; features of vaccine development; vaccine delivery systems; identification of disease problems and potential vaccines; case study describing vaccination for furunculosis; commercial considerations. Management of aquacultural practices through immunological approach.

suggested readings :

- Nandini Shetty. 2000. **Immunology: Introductory Text Book** - New Age International (p) Ltd., Chennai.
- Karunasagar, I. 1999. **Aquaculture and Biotechnology**. Oxford IBH Publishers
- Goldsby. R.A., J. K. Thomas and B. A. Barbara, 2000. **Kuby Immunology**, IVth Edn., W. H. Freeman and Co., New York.
- **Fish & Shell Fish Immunology.** 1992. Vol. 2, No.1, Academic press.
- Kimbell, E. 1988. **Fundamentals of Immunology**.

Course out comes

To enable the students to

CO1 Understand the Immunity system in fish

CO2 Acquire knowledge on Immunoglobulin structure and functions

CO3 Creating awareness on Humoral immunity, Crustacean immune system and cell mediated immunity

CO4 Knowledge on Immuno technology and concept of immunizing fish

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	3	2	2	2	2	3	3	3	3	2	2
CO2	1	1	1	1	1	1	3	3	3	3	1	1
CO3	3	2	2	2	2	2	3	3	3	3	1	1
CO4	3	2	2	2	2	2	3	3	3	3	1	1

H-High-3, M- Medium-2, L- Low-1

GENERIC ELECTIVE – THEORY AQC 303A: CELL BIOLOGY AND GENETICS

Course objective

To enable the students to

- Ac quire knowledge on physic chemicals basis of heredity
- Understand the principles of genetic rationale in fish breeding
- Ac quire knowledge on Natural hybridization in fishes and Genetic diversity in fishes
- Knowledge on sex chromosomes in fishes

AQC 303A: CELL BIOLOGY AND GENETICS

UNIT – I

1. STRUCTURE OF PROKARYOTIC AND EUKARYOTIC CELLS: ultra-structure of animal cell;cell differentiation in animal cells. Structural organization of plasma membrane; membrane protein, cytoskeletal proteins; types of cell functions – transport of nutrients, osmosis and active transport.

2.CELL ORGANELLES: Organization and functions of endoplasmic reticulum, golgi complex, lysosomes, mitochondria, ribosomes, nucleus, and vacuoles.

UNIT – II

3. CHROMOSOMES: Structural organization, nucleosomes, chromonema, euchromatin, heterochromatin, centromere, kinetochore, telomeric organization.

4. Cell cycle, mitosis and meiosis; cell senescence and death.

UNIT – III

1. **PRINCIPLES AND PHYSICO CHEMICAL BASIS OF HEREDITY:** Phenotype and genotype, chromosomal basis of heredity; Mendel's laws of inheritance, **mutations** – types of mutations,molecular basis of mutation and its importance, chemical and physical mutagens, site directed mutagenesis.
2. **GENETIC RATIONALE IN FISH BREEDING**: Random genetic drift, inbreeding, measures to prevent random genetic drift and inbreeding; selective breeding programmes - selection of species and traits, choice of breeding strategy, methods of selection and evaluation of selection response, impacts of selective breeding programmes on aquaculture productivity.

UNIT – IV

7. Natural hybridization in fishes, consequences and evolutionary impacts of hybridization; artificial hybridization – hybridization in Indian carps and Chinese carps. Genetic diversity in fishes – natural genetic variation in fishes, stock concept, measuring genetic variation, importance of genetic diversity; threats to fish genetic diversity – fishing pressure, physical modification of habitat and pollution load, introduction of exotic fishes; genetic management of natural fish populations – goals and tasks and conservation approaches.

8. CYTOGENETICS OF FISHES : Chromosome preparation, staining of chromosomes, chromosome banding techniques (NOR banding, C-banding,G and R banding, Fluroscence *insitu* hybridization), trends in karyotype evolution, sex chromosomes in fishes.

Suggested reading :

- B. K. Padhi & R. K. Mandal, **Applied Fish Genetics**. Fishing Chimes, Vishakapatnam.
- Chourrout, D. 1987. **Genetic manipulations in fish: reviews of methods. In: Selection, hybridization and genetic engineering in aquaculture** (Ed. Tiews, K.) Vol. 2, Heenemann GmbH gesellschaft, Berlin. Pages 111 – 126.
- Carvalho G. R. and L. Hauser (1995). **Molecular Genetics in Fisheries**. Chapman and Hall, London.
- D. Frifielder : **Microbial genetics.**
- Alberts et al: **Molecular Biology of cells.**
- H. Lodish, A. Berk, S. L. Zipursky, P. Matsudaria, D. Baltimore and J. Damell. **Molecular Cell Biology**. W. H. Freeman & company, New York.

Course out comes

After completion of this course, students

CO1 Understand the structure of prokaroyotic and eukaryotic cells and cell organelles

CO2 Acquire knowledge on Chromosomes and Cell cycle

CO3 Creating awareness on Genetic rationale in fish breeding and physico chemical basis of heredity

CO4 Knowledge on Natural hybridization and cytogenetics of fishes

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	2	2	2	2	2	2	2	2	3	3	2	2
CO2	2	2	1	1	1	2	1	1	3	3	3	1
CO3	1	1	2	1	1	1	1	1	3	3	1	1
CO4	1	1	2	1	1	1	1	1	3	3	1	1

H-High-3, M- Medium-2, L- Low-1

GENERIC ELECTIVE AQC 303B: BIOINFORMATICS IN AQUACULTURE

Course objective

To enable the students to

- Understand bioinformatics applications in aquaculture
- Acquire knowledge on application of genetic maps
- Comprehensive knowledge on automated tools for phylogenetics analysis
- Understand applications of microarray technology

AQC 303 B: BIOINFORMATICS IN AQUACULTURE

UNIT - I

1. BIOINFORMATICS AN OVERVIEW: Definition and objectives of bioinformatics, major bioinformatics databases, data integration and data analysis, molecular biology and bioinformatics, central dogma of molecular biology, important definitions related to central dogma and overview of bioinformatics applications.

2. INFORMATION SEARCH AND DATA RETRIEVAL: Introduction, tools for web search, data retrieval tools, data mining of biological data bases.

UNIT – II

3. GENOME ANALYSIS AND GENE MAPPING: Genome analysis, gene mapping, sequence assembly problem, genetic mapping and linkage analysis, physical maps, cloning the entire genome, genome sequencing, applications of genetic maps.

4. TOOLS FOR SIMILARITY SEARCH AND SEQUENCE ALIGNMENT: Fasta, Blast, Filtering and gapped BLAST, PSI – BLAST, Comparison of running time for various programmes.

UNIT – III

5. ALIGNMENT OF PARIS OF SEQUENCES: Introduction, biological motivation of alignment problems, methods of sequence alignments, using scoring matrices, measuring sequence detection efficiency.

6. ALIGNMENT OF MULTIPLE SEQUENCES : Introduction, methods of multiple sequence alignment, evaluating multiple alignments; phylogenetic analysis – methods of phylogenetic analysis, tree evaluation, problems in phylogenetic analysis, automated tools for phylogenetic analysis.

UNIT – IV

7. GENE IDENTIFICATION AND PREDICTION: Introduction, basis of gene prediction, pattern recognition, gene prediction methods, other gene prediction tools.

8. GENE EXPRESSION AND MICROARRAYS: Introduction, working with DNA microarrays, clustering gene expression profiles, data sources and tools 2for microarray analysis, applications of microarray technology.

9. GENERAL APPLICATIONS OF BIOINFORMATICS IN AQUACULTURE.

Suggested readings :

- S. C. Rastogi, N. Mendiratta and P. Rastogi. 2004. **Bioinformatics – Concepts, Skills and Applications**. CBS Publishers and Distributors, New Delhi.
- Computers Today by Suresh K. Basandra 1999. Published by Galagotia Publications, Pvt. Ltd., New Delhi.
- Microsoft Office, by Setultz, 1997.
- Database Processing by D. M. Kroenke, Galgotia Publications, 1990.
- Claverie J.M and Notredame C.2003 Bioinformatics for dummies. Wiley Editor.
- Letovsky, S.I.1999 Bioinformatics. Kluwer Academic Publishers.
- Baldi, P and Brunk, S. 1998 Bioinformatics. The MIT press.
- Lesk, A.M. 2002 Introduction to Bioinformatics. Oxford University Press.
- Introduction to Biostatistics – By Sokal-Rohlf (2nd Edn) Freeman International Editor 1973.
- Bio-Statistics – An introductory Text-Goldstein, A The Macmillan Co., New York, 1971.
- Statistical Analysis in Biology by Mather, K Chapman and Hall, London, 1972.
- Probit Analysis by Finney, D. J. S. Chand & Co., Ltd., New Delhi.
- Biostatistics by Lewis Alvin 1971. Affiliated East West Press Pvt., Ltd., New Delhi.
- Statistical methods in Biology by Bailey Norman T. J. 1965. The English Language Book Society & The English
- University Press Ltd.

Course out comes

After completion of this course, students

CO1. Understand the Bioinformatics

CO2.Acquire knowledge on Genome analysis and gene mapping

CO3. Creating awareness on Alignment of pairs of sequences

CO4.Knowledge on Gene Identification and prediction

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	1	1	1	1	1	1	2	2	2	3	3
CO2	1	1	1	1	1	1	1	2	2	2	3	3
CO3	1	1	1	1	1	1	1	2	2	2	3	3
CO4	1	1	1	1	1	1	1	2	2	2	3	3

H-High-3, M- Medium-2, L- Low-1

PRACTICALS

AQC 304: MICROBIOLOGY AND FISH DISEASES

- Preparation and sterilization of microbial media.
- Quantitative determination of microorganisms by dilution plate technique.
- Staining methods of microorganisms.
- Antibiotic sensitivity.
- Isolation and characterization of intestinal pathogens.
- Measurement of the size of the cell.
- Collection and Preservation of Diseased Fish.
- External & Internal examination of diseased finfish and shellfish.
- Maceration and squash preparation of organs and microscopic observation.
- Identification of disease causing microbes.
- Identification of various diseases in finfish and shellfish
- Preparation of chromosomes from gill epithelium
- Observation of chromosomes from fish tissues.
- Preparation of chromosomes from scale and fin epithelium.
- Induction of ploidy variations in different tissues of fish.
- Chromosomal banding techniques.
- Observation of meiotic chromosomes from testis.
- Isolation of DNA from yeast.
- Isolation of RNA from yeast.
- Raising antibodies to fish antigen.
- Immunoelectrophoresis.
- Double immunodiffusion.

AQC: 305 SKILL DEVELOPMENT COURSE- FISH NUTRITION TECHNOLOGY

THEORY

Course objective

To enable the students to

- Provide knowledge for sustainable aquaculture
- Provide the students on field exposure to help them in understanding the Aquaculture practices. Effective utilization of aquatic and land resources.
- Provide the learners an experience in research for Aquaculture production.
- Enhancing skills of rural youth commercial fish farming and increasing their entrepreneurship opportunities, Providing means of livelihood through ommercial and industrial aquaculture.

UNIT-I: FISH NUTRITION AND FEED TECHNOLOGY 4 Credits

Module I: Nutritional requirements of cultivable fish and shellfish. Forms of feeds: wet feeds, moist feeds, dry feeds, mashes, pelleted feeds, floating and sinking pellets. Feed additives: binders, antioxidants, enzymes, pigments, growth promoters, feed stimulants. Feed storage, use of preservatives and antioxidants.

Module II: Feed evaluation - feed conversion ratio, feed efficiency ratio, protein efficiency ratio, net protein utilization and biological value.

Module III: Feeding devices and methods. Non-conventional feed ingredients and anti-nutritional factors. Digestive enzymes, feed digestibility. Factors affecting digestibility. Nutritional deficiency diseases.

UNIT- II: FEED MANAGEMENT&ECONOMICS 4 Credits

Module I: Feed Manufacture: Feed formulation and processing, On-farm feed manufacture, Commercial feed manufacture, Feed storage

Module II: Feeding Practices: Supplementary feed–theory and practice, Complete diet - theory and practice, Feeding methods and scheduling, ration size, feed performance and economics. culture and use of different live feed in shellfish hatcheries, Aquarium fish feeds

Module III: Introduction to fisheries economics, Farm production economics – production functions in capture and culture fisheries; Costs and returns – breakeven analysis of fish production system; factors of production, marginal cost and return, law of diminishing marginal return, returns to scale, economies of scale and scope, Revenue, profit maximization, measurement of technological change, farm planning and budgeting.

PRACTICALS

4 Credits

- Cultivable importance of fish & Shell fish Species
- Practices on pre-stocking and post stocking management.
- Analysis of water and soil samples.
- Design and layout of fresh water and brackish water farms, fish and shrimp hatcheries
- Visit to farms and hatchery.
- Estimation and calculations of production costs of fish/shrimp farm.
- Different types of filters.
- Determination of Temperature, pH, Turbidity.
- Total Alkalinity and total Hardness.
- Dissolved Oxygen
- Estimation of soil organic carbon
- Estimation of nitrogen in soil.
- Proximate composition analysis of feed ingredients and feeds.
- Preparation of artificial feeds using locally available feed ingredients.
- Estimation of FCR from feeding trials and preparation of feeding table.
- Estimation of growth parameters from feeding trials
- Collection, identification and isolation of live food organisms using various techniques
- Supplementary feeds Identification:

References

- Mathew Landau. 1995. Introduction to Aquaculture. Daya Publishing House, New Delhi.
- Pillay, T. V. R. 1993. Aquaculture: Principles and Practices. Fishing News Books. Black Well Scientific Publications.
- MPEDA, 1991. Hand Book on Shrimp Farming, Kochi, India.

- Jhingran, V. G. 1982. Fish and Fisheries of India. Hindustan Publishing Corporation, New Delhi. Chakrabarti, N. M. 1998. Biology, Culture and Production of Indian Major Carps. Narendra Publishing House, New Delhi.
- Coche, A. G. and J. F. Muir. 1996. Pond Construction and Fresh Water Fish Culture – Pond Farm Structures and Layouts – Simple Methods for Aquaculture. FAO. Daya Publishing House, New Delhi. Upadhyay, A. S. 1995. A Hand Book on Design, Construction and Equipments in Coastal Aquaculture (Shrimp Farming). Daya Publishing House, New Delhi.
- Wheaton, F. W. 1985. Aquaculture Engineering. MPEDA, Cochin.
- MPEDA 1990. Aquaculture Engineering and Water Quality Management. Cochin, India.
- You Tube Video
- De Silva SS & Anderson TA. 1995. *Fish Nutrition in Aquaculture*. Chapman & Hall Aquaculture Series.
- Guillame J, Kaushik S, Bergot P & Metallier R. 2001. *Nutrition and Feeding of Fish and Crustaceans.* Springer Praxis Publ.
- Halver J & Hardy RW. 2002. *Fish Nutrition*. Academic Press.
- Halver JE & Tiews KT. 1979. *Finfish Nutrition and Fish feed Technology*. Vols. I, II Heenemann, Berlin.
- Hertrampf JW & Pascual FP. 2000. *Handbook on Ingredients for Aquaculture Feeds*. Kluwer.
- Houlihan D, Boujard T & Jobling M. 2001. *Food Intake in Fish*. Blackwell.
- Lavens P & Sorgeloos P. 1996. *Manual on the Production and Use of Live Food for Aquaculture.* FAO Fisheries Tech. Paper 361, FAO.
- Nelson DL & Cox MM. 2005. *Lehninger Principles of Biochemistry*. WH Freeman.
- Huet J. 1986. *A text Book of Fish Culture*. Fishing News Books Ltd.
- ICAR. 2006. *Hand Book of Fisheries and Aquaculture*. ICAR.

- Jhingran V.G. 1991. *Fish and Fisheries of India*. Hindustan Publ. Corporation, India.
- Mcvey JP. 1983. *Handbook of Mariculture*. CRC Press.
- MPEDA: *Handbooks on culture of carp, shrimp, etc*.
- Pillay TVR. 1990. *Aquaculture- Principles and Practices.* Fishing News Books Ltd.,

Course Outcome:

On successful completion of the course, students will be able to:

CO1 Employment in specific area, Expand research ability

CO2 Get the knowledge of different types of Aquaculture practices

CO3 Build up capability in self-employment and income generation

CO4 Apply for various Governments, Non-Government Schemes for establishing an independent aquaculture farm.

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	3	3	3	3	3	1	1	1	1	3	1
CO2	3	3	3	1	3	1	2	2	1	1	2	2
CO3	3	3	3	3	3	3	1	1	1	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3

H-High-3, M- Medium-2, L- Low-1

OPEN ELECTIVE - AQC 306 (A): FISH PROCESSING TECHNOLOGY

Course objective

To enable the students to

1. Understand the Chemical composition of fish and shell fish
2. Know the principles and working application of fish preservations and package
3. Ac quire knowledge on different types of aquaculture freezers
4. Knowledge on processing of low cost fish and by products.

OPEN ELECTIVE - AQC 306: FISH PROCESSING TECHNOLOGY

UNIT-I

Chemical composition of fish and shellfish: moisture, protein, fat, carbohydrates, ash etc. Microbiology of fresh and processed fish: Morphology of bacteria: growth and reproduction of bacteria: effect of environmental factors like temperature, pH, oxygen, moisture, etc.

UNIT-II

Common bacteria present in fish; identification and isolation. Bacteria of sanitary significance.
Handling of fish: spoilage of fish and shellfish; effect of temperature on fish spoilage, use of ice;

UNIT - III

Solid carbon dioxide and liquid nitrogen in fish preservations; containers for packaging and transportation of fish, handling on board fishing vessels and on shore; use of chemical preservatives and irradiation in extending shelf life of fish and shell fish.
Canning: Principles of canning; canning materials; handling and preparation of fish and shellfish for canning; spoilage of canned fish; chemical and microbiological spoilage and their prevention.
Curing: Salting of fish-principles and practices; pickling; smoked fish; spoilage of cured fish.

UNIT-IV

Freezing of fish: Techniques of freezing; different types of freezers; changes during freezing and storage of fish; effects of freezing on proteins, lipids and bacteria, spoilage of frozen fish and shellfish; denaturation of proteins, lipid hydrolysis; fat oxidation, protection of frozen fish; glazing and wrapping; use of anti-oxidants; thawing of frozen fish, double freezing of fish; storage, transportation and distribution of frozen fish, industrial methods of freezing fish and shellfish; production and freezing of fish fillets, minced meat and fish fingers.

Byproducts: processing of low cost fish, minced meat, fish oil, fish meal, fish sausages, isinglass, glue, fish silage, chitosan, chitin pearl essence, alginates, agar and corals.

Text Books:

- R.R. Colwell (ed): Biotechnology in Marine Science, 1982.
- Aitikin, A: Fish handling & processing 2nd edition, Min. Agr. Fish and Food, U.K.,1982.
- Borgstorm, G. : Fish as Food Vol. I, III and IV, Academic Press, 1961, 1965
- Brandi, A.V.: Fish catching methods of the World, 3rd edition, Fishing News
- Books ltd. 1984.
- Connel, J.J.: Control of Fish Quality, Fishing News Books Ltd., 1975.
- Sanisburry, J.C.: Commercial Fishing Methods, Fishing News Books Ltd., 1971.

References:

- *Connell J.J.* : Advances in fish science and technology, Fishing News Books Ltd., 1980.
- Nedelec C.: FAO catalogue of small scale fishing gear, FAO (FNB)

Course out comes

After completion of this course, students

CO1 Understand the Chemical composition of fish and shell fish

CO2 Acquire knowledge on Common bacteria present in fish

CO3 Creating awareness on fish preservation and packaging

CO4 Knowledge on Freeing of fish and by products

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	2	3	2	3	2	1	1	1	3	3	3
CO2	2	1	2	1	1	1	3	3	1	3	2	1
CO3	3	1	3	3	1	1	3	1	1	3	3	3
CO4	1	1	1	1	1	2	1	1	1	3	3	3

H-High-3, M- Medium-2, L- Low-1

AQC 306 (B): POLLUTION AND TOXICOLOGY

Course objective

To enable the students to

- Ac quire knowledge on methods of toxicity testing factors
- Understand marine environment sewage pollution
- Understand Heavy metal pollution
- Verify Oil pollution ,biological impacts

AQC 306 (B): POLLUTION AND TOXICOLOGY

UNIT-I

Marine Pollution-definition- role of GESAMP- major pollutant- sources, transport path, dynamics. Toxicology- lethal and sub lethal effects of pollutants to marine organismsbioconcentration, bioaccumulation and biomagnifications- methods of toxicity testingfactors influencing toxicity-synergistic and antagonistic effects- role of microcosms and mesocosms.

UNIT II

Sewage pollution industrial, agricultural and domestic impact on marine environment, treatment methods. Detergents- composition- eutrophication and ecological significance- Plastics and Litter source and impact in the marine environment.

UNIT III

Heavy Metal pollution- sources, distribution, fate- analytical approaches; Pesticide pollution classification, sources, distribution, fate and ecological impacts with special reference to marine fishes, birds and mammals.

UNIT- IV

Oil Pollution- composition, sources, biological impacts on fishes, birds, mammals, treatment techniques. Thermal pollution- sources - uses of waste heat role of biocides, chlorine ecological impacts. Radioactive pollution- sources (natural and artificial) biological effects of radiation.

Environmental monitoring methods for critical pollutants-objectives status limitations biological indicators - natural bioaccumulations (mussel watch water quality assessment. Use of analytical instruments AAS, ICP, GLC, Spectrofluorometer for analyzing Petroleum hydrocarbon, Pesticides, Heavy metals etc.

Text books

- Clark R.B 1992. Marine pollution 3rd edition Clavendron, Press Oxford.
- Williams 1996. Introduction to Marine Pollution Control. John Wiley.
- Michael J. Kennish 1994. Practical Handbook on Estuarine and Marine

Pollution.

Reference Books

- Johnston, R. (ed), 1976. Marine Pollution, Academic Press, London.
- Goldberg, E. D. 1974. The Health of the oceans, UNESCO Press. Paris.
- Park, P .K, Kester D.R., J.W. Deudall and B.H Ketchum, 1983. Wastes in the
- Ocean. Vols. 1 to 3. Wiley Interscience Publishers, New York.

Course out comes

After completion of this course, students

CO1 Understand the Marine pollution

CO2 A quire knowledge on Sewage pollution

CO3 Creating awareness on Heavy metal pollution

CO4 Knowledge on Oil pollution

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	2	2	2	3	3	3	3	1	1	1	3
CO2	3	2	2	2	3	3	3	3	1	1	1	3
CO3	3	2	2	2	3	3	3	3	1	1	1	3
CO4	3	2	2	2	3	3	3	3	1	1	1	3

H-High-3, M- Medium-2, L- Low-1

CORE – THEORY: AQC 401: AQUACULTURE BIOTECHNOLOGY

Course objective

To enable the students to

- Understand structure and replication of DNA
- Acquire knowledge on Hormonal manipulation of genetic sex
- Comprehensive knowledge on techniques of analyzing the PCR in biotechnology and genetic engineering
- Acquire knowledge on Bioactive compounds from marine organisms and Cryopreservation of gametes.

Semester – IV

AQC 401 : AQUACULTURE BIOTECHNOLOGY

UNIT – I

1. Structure and replication of DNA: Principles of DNA isolation; DNA blotting

2. DNA : Transcription and translation

UNIT – II

3. CHROMOSOMAL ENGINEERING: Genome manipulation, polyploidy, gynogenesis, androgenesis, method of chromosomal manipulation, Induction of ploidy and evaluation.

Hormonal manipulation of genetic sex, strategy of sex reversal, management of hormone treatment, biological effects of sex reversal, integrated approach. Transgenic fish, candidate genes for transfer, making gene constructs, mechanism of gene transfer, characterization of transgenic fish, potential hazards and benefits.

UNIT – III

5. Recombinant DNA and gene cloning – cloning vectors for recombinant DNA, restriction enzymes for cloning, cloning in bacteria and eukaryotes, construction and screening of genomic and cDNA libraries.

6. Polymerase chain reaction and gene amplification - basic PCR and its modifications; applications of PCR in biotechnology and genetic engineering- DNA polymorphism, DNA fingerprinting, Nucleotide probes, mapping and gene sequencing: RAPD, RFLP. DNA bar-coding.

UNIT – IV

A) PHARMACOLOGY: Prospects – Bioactive compounds from marine organisms: Biomedical potential of marine natural products isolation and mode of action. Eicosonoids and related compounds from marine algae. Antitumour and cytotoxic compounds from marine organisms.

B) Cryopreservation of gametes: Implications of cryopreservation in Aquaculture. Bioremediation: Types of bioremediation and their importance; Role of Probiotics in Aquaculture.

Suggested readings :

- K. Padhi & R. K. Mandal, **Applied Fish Genetics**. Fishing Chimes, Vishakapatnam.
- P. S. Verma & V. K. Agarwal, 1999. **Concepts of Molecular Biology**,, S. Chand Company Ltd, NewDelhi.
- Cherfas, N. B. 1981. Gynogenesis in fishes. **In : Genetic bases of fish selection**. (Ed. Kirpichnikov, V. S.), Springerverlag, Berlin, pp. 255 – 273.
- Hackett, P. B. 1993. **The molecular biology of transgenic fish. In : Biochemistry and Molecular Biology of Fish**, (Eds. Hochachka, P., Mommsen, T.) Vol. 2, Elsevier Science Publishers, Amsterdam, pp. 207 – 240.
- Leung, L. K. P. and Jamieson, B. G. M. 1991. **Live preservation of fish gametes. In : Fish Evolution and Systematics : Evidence from spermatozoa** (Ed. Jamieson, B. G. M.) pp. 245 –295, Cambridge University Press.
- Old, R. W. and Primrose, S. B. 1994. **Principles of gene manipulation : An introduction to genetic engineering,** Blackwell Scientific Publications, Oxford.
- Balasubramanyam, D. et al. 1998. **Concepts in Biotechnology**, University Press.
- Gupta, P. K. 1999. **Elements of Biotechnology**, Rastogi Publications, Meerut.
- David H. Attaway and R.Oskar, 1993. **Marine Biotechnology**. Vol. I **Pharmaceutical**

and Bioactive Natural Products. Plenum Press, New York & London,500pp.

- Milton Fingerman. R.Nagabushanam and Man' – Frances Thompson, 1999. Recent Advances in **Marine Biotechnology**, Vol.I – 514pp. Vol.2-313 pp.Vol3-312pp.
- Ranga, M. M. 1999. **Animal Biotechnology**, Agrobios, Jodhpur, New Delhi.
- Karunasagar, **Aquaculture and Biotechnology** (for chapters11& 14).
- Ranga and Shammi . 1999. **Fish Biotechnology**

Course out comes

After completion of this course, students

CO1 Understand the Structure and replication of DNA

CO2 Acquire knowledge on Chromosomal Engineering

CO3 Creating awareness on Recombinant DNA and gene cloning

CO4 Knowledge on Pharmacology

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	1	1	1	2	1	1	2	3	3	3	3
CO2	1	1	1	1	1	1	1	3	3	3	2	2
CO3	1	1	1	1	1	1	1	3	3	3	2	2
CO4	3	2	3	1	1	3	1	1	2	3	3	3

H-High-3, M- Medium-2, L- Low-1

CORE – THEORY: AQC 402: ESSENTIALS OF BIOCHEMISTRY

Course objective

To enable the students to

- Acquire knowledge on structure and function of biomolecules
- Understand enzyme classification and their factors
- Attain knowledge on vitamins and minerls
- Understand bioenergetics models and energy budget

AQC 402: ESSENTIALS OF BIOCHEMISTRY

UNIT – I

1. BIOMOLECULES

A brief account of structure and function of protein, lipid and carbohydrate.

UNIT – II

2. ENZYMES

Nomenclature and classification; chemical nature of enzymes; coenzymes, properties of enzymes, factors affecting enzyme activity.

UNIT – III

3. METABOLISM

Interconversions of protein, lipid and carbohydrates; A general account of vitamins and minerals and their importance.

UNIT – IV

4. BIOENERGETICS

Definition and scope; bioenergetics model; structure of an energy budget; components of the energy budget – measurement of components; faecal losses – the absorption efficiency; excretory loses– the assimilation efficiency; metabolic loses; effects of environmental factors on metabolism – temperature, salinity, oxygen and other abiotic factors; examples of energy budgets.

Suggested readings :

- Furton, H. S. and S. Simonds. 1958. **General Biochemistry.** John Wiley and Sons, New York.
- Murray et. al. 2002. **Harper's Biochemistry** 25th Edn, Mc Grew Hill.
- Nelson, D. L. and Cox, M. M. 2000. **Lehninger Principles of Biochemistry.** MacMillan Worth Publishers.
- Robert J. Wootton. 1991. **Ecology of Teleostean Fishes.** Chapman & Hall.
- Sibly, R.M. and Calow, P.1986. **Physiological Ecology of Animals.** Blackwell, Oxford.

Course out comes

After completion of this course, students

CO1 Understand the Biomolecules

CO2 Acquire knowledge on Enzymes

CO3 Creating awareness on Metabolism

CO4 Knowledge on Bioenergetics

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	2	1	3	1	1	2	2	1	1	1	3	3
CO2	2	1	3	1	1	2	2	1	1	1	3	3
CO3	2	1	3	1	1	2	2	1	1	1	3	3
CO4	3	1	3	2	2	3	2	1	1	1	3	1

H-High-3, M- Medium-2, L- Low-1

GENERIC ELECTIVE AQC 403 A : COMPUTER APPLICATIONS, INFORMATION TECHNOLOGYAND BIOSTATISTICS IN AQUACULTURE

Course objective

To enable the students to

- Understand the classification of computers
- Knowledge on computer application
- Understand the scope of Biostatistics in aquaculture
- Understand the statistical analysis in research

AQC 403 A : COMPUTER APPLICATIONS, INFORMATION TECHNOLOGYAND BIOSTATISTICS IN AQUACULTURE

UNIT- I

1.INTRODUCTION TO COMPUTER

History of computers, classification of computers, computer generations; Input, output processing and storage devices – Floppy disk, hard disk, CD-ROM, DVD. Operating system – types of operating systems – MS DOS, WINDOWS; MS – ACCESS, FOXPRO.

UNIT- II

2.COMPUTER APPLICATIONS

Computer Graphics – graphic generation methods, uses of computer graphics, graphic forms; Internet access tools, Web searching, e-mail, File Transfer Protocol 9 FTP); Word processing and presentation software MS- WORD and MS- POWERPOINT, MS – EXCEL; Use of commonly available statistical packages, such as SPSS ANOVA etc.

UNIT – III

3. INTRODUCTION AND SCOPE OF BIOSTATISTICS

Definition and scope, collection, tabulation and presentation of data; measures of central tendency – mean, median and mode; measures of dispersion, mean deviation, standard deviation, co- efficient of variation; curve fitting; correlation and regression.

UNIT – IV

4. STATISTICAL ANALYSIS:

Normal probability distribution and its applications; students t- test; correlation coefficient; regression co-efficient; F-distribution; X^2 distribution; analysis of variance (ANOVA);Probit analysis.

Suggested readings :

- **Computers Today** by Suresh K. Basandra 1999. Published by Galagotia Publications, Pvt. Ltd., New Delhi.
- **Microsoft Office**, by Setultz, 1997.
- **Database Processing** by D. M. Kroenke, Galgotia Publications, 1990.
- **Introduction to Biostatistics** – By Sokal-Rohlf (2nd Edn) Freeman International Editor 1973.
- **Bio-Statistics** – **An introductory Text-**Goldstein, A The Macmillan Co., New York, 1971.
- **Statistical Analysis in Biology** by Mather, K Chapman and Hall, London, 1972.
- **Probit Analysis** by Finney, D. J. S. Chand & Co., Ltd., New Delhi.
- **Biostatistics** by Lewis Alvin 1971. Affiliated East West Press Pvt., Ltd., New Delhi.
- 9. **Statistical methods in Biology** by Bailey Norman T. J. 1965. The English Language Book Society & The English University Press Ltd.

Course out comes

After completion of this course, students

CO1 Understand the Introduction to computer

CO2 Acquire knowledge on Computer applications

CO3 Creating awareness on Introduction and scope of biostatistics

CO4 Knowledge on statistical analysis

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	1	1	1	1	1	1	1	1	1	3	1
CO2	1	1	1	1	1	1	1	1	1	1	3	1
CO3	1	1	1	1	1	1	1	1	1	1	3	1
CO4	1	1	1	1	1	1	1	1	1	1	3	1

H-High-3, M- Medium-2, L- Low-1

THEORY: AQC 403: B: AQUACULTURE ENGINEERING

Course objective

To enable the students to

- To learn the basic aspects of successful farm designing for effective management and optimum yield
- Students will learn about design and construction of Freshwater fish farm and brackish water shrimp farm
- Students will get an understanding of design and construction of Fish hatchery and Shrimp hatchery
- Students will get an understanding of design and construction of culture systems like Cages and Rafts, Pens and Enclosures, and Raceway Farms

UNIT – I

1. **Planning and Aquaculture Development:** Priorities, resources, technology, human resources, legal and environmental factors and organization of aquaculture.
2. **Selection of Sites for Aquaculture:** Criteria for site selection of fresh water and brackish water farms - land based and open water farms; quantity and quality of water, sources of pollution and conflicts.
3. **Farm/hatchery standards and bio-security measures**: Sanitary and Phyto-Sanitary (SPS) measures; Better Management Practices (BMP's)

UNIT – II

8. **Freshwater Fish Farm** - Design and construction: Layout of farm, size of the farm, division of the farm area; size, shape and depth of ponds; dike design, pond bottom and harvesting sump; water supply and drainage system of pond – pipes, sluice, monk, turn-down pipe; aerators and method of construction.
9. **Brackish water Shrimp Farm** - Design and construction: Layout designs, design of water management systems, design of water control structures, design of peripheral and internal dikes, water supply and drainage, method of construction.

UNIT – III

10. **Fish Hatchery -** Design, construction: Criteria for site selection of hatchery and nursery; Design and construction of Jar hatchery and Chinese hatchery system.
11. **Shrimp Hatchery** - Design and construction: Site selection and facilities required –

maturation tanks, spawning tanks, larval rearing tanks, live food culture tanks, water storage and filtration tank, aeration, seawater supply and piping system; Lay-out and construction.

UNIT – IV

12. **Cages and Rafts:** Design and construction.
13. **Pens and Enclosures:** Design and construction
14. **Raceway Farms:** Design and construction.

Reference books

- Bose AN. *et al*., 1991. *Coastal Aquaculture Engineering*. Oxford & IBH Publishing Co. Pvt. Ltd.
- Chakraborty C & Sadhu AK. 2000. *Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn*. Daya Publ. House
- CIFE. 1993. *Training Manual on Culture of Live Food Organisms for Aqua Hatcheries*. CIFE, Versova, Mumbai
- FAO. 2007. *Manual for Operating a Small Scale Recirculation Freshwater Prawn Hatchery*
- Hepher B & Pruginin Y. 1981. *Commercial Fish Farming.* John-Willey & Sons Inc.
- ICAR. 2006. *Handbook of Fisheries and Aquaculture*. ICAR.
- Ivar LO. 2007. *Aquaculture Engineering*. Daya Publ. House.
- Jhingran VG & Pullin RSV. 1985. *Hatchery Manual for the Common, Chinese and Indian Major Carps*. ICLARM, Philippines.
- Misra R and Dora KC. 2015. A text Book on Aquaculture Engineering, Narendra Publishing House, New Delhi.
- MPEDA. 1993. *Handbook on Aqua Farming - Live Feed. Micro Algal Culture.* MPEDA Publication
- Pilley, TVR & Dill, WMA. 1979. *Advances in Aquaculture*. Fishing News Books, Ltd. England.
- Pillay TVR & Kutty MN. 2005. *Aquaculture- Principles and Practices*. Blackwell.
- Stickney RR. 1979. *Principles of Warm water Aquaculture.* John-Willey & sons Inc.
- Thomas L. 1995. *Fundamentals of Aquacultural Engineering*. Chapman & Hall

- Thomas PC, Rath SC & Mohapatra KD.2003.*Breeding and Seed Production of Finfish and Shellfish.* Daya Publ.
- Wheaton FW. 1977. *Aquacultural Engineering*. John Wiley & Sons.

Course out comes

After completion of this course, students

CO1 Methods of planning for aquaculture development

CO2 Criteria to be followed for selection of aquaculture sites and

CO3 Important aspects of farm/hatchery standards and bio-security measures.

CO4 Knowledge on Design and construction

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	3	3	2	3	2	1	1	1	3	3	3
CO2	3	2	2	2	3	2	3	2	1	3	1	2
CO3	3	2	1	3	2	3	2	2	1	3	3	3
CO4	3	3	3	3	3	3	2	1	1	1	3	3

H-High-3, M- Medium-2, L- Low-1

PRACTICALS

AQC 404: BIOTECNOLOGY AND BIO CHEMICAL ESTIMATATIONS

- DNA Electrophoresis.
- Estimation of DNA by Diphenylamine reaction.
- Determination RNA by orcinol method.
- Separation of protein through Electrophoresis (PAGE).
- Separation of eyestalk peptides through HPLC.
- Absorption spectrum of DNA.
- Calculation of mean, median mode.
- Calculation of standard deviation and coefficient of variation.
- Calculation of Correlation co-efficient.
- Fitting of regression lines.
- Application of F-test.
- 12.Diagrammatic representation of statistical data.
- Estimation of protein lipid and total carbohydrates in fish tissues
- Estimation of amino acids and free fatry acids in fish tissues
- Estimation of oxidative enzymes in fish tissues
- Estimation of digestive enzymes in fish tissues
- Estimation of RNA and DNA in fish tissues.

AQC 405: PROJECT WORK/ DISSERTATION

Course objective

To enable the students to

- Effective utilization of aquatic and land resource
- Providing means of livelihood through commercial and industrial aquaculture.
- Provide knowledge for sustainable aquaculture.
- Provide the students on an field exposure to help them in understanding the Aquaculture practices.

AQC 405: PROJECT WORK/ DISSERTATION

Each student will be under the guidance of a Faculty member and the students will put in 80 hours of field oriented research work which mainly consists of visiting to the field for sample collection and analysing in the laboratory. Data collected is compiled and submitted as a dissertation to the Department. During Viva Voce the student has to present his work to the panel of examiners.

Course out comes

After completion of this course, students

CO1 Reproduce knowledge on aquaculture farming

CO2 Acquire knowledge on culture and diseases identification

CO3 Creating awareness on self – employment

CO4 Knowledge on aquaculture by products

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3

H-High-3, M- Medium-2, L- Low-1

AQC 406 (A) : GENERAL PRINCIPLES AND PRACTICES OF AQUACULTURE

Course objective

To enable the students to

- Understand types of culture systems in aquaculture
- Acquire knowledge on aquatic weeds
- Understand induced breeding and seed fish production
- Determined culture of Indian major carps

AQC 406 A : GENERAL PRINCIPLES AND PRACTICES OF AQUACULTURE

UNIT – I

1.Definition of Aquaculture: Types of culture, pond preparation and selection of species for culture.

2. Control of aquatic weeds and predators; management of fish ponds.

UNIT – II

3. Induced breeding and seed fish production in carps; transport of seed fish and breeders.

4. Food and feeding in fish - live feed and artificial feeds.

5. Measurement of growth : Length - weight relationship; determination of age in fishes; growth hormones

UNIT – III

6. Culture of Indian major carps and air breathing fishes.

7. Culture of shrimp and prawn.

8. Integrated fish farming; aquarium fish and their maintenance.

UNIT – IV

9. Bacterial and viral diseases of fish - causes, symptoms diagnosis and control measures.

10. Protozoan and fungal diseases and their control.

Suggested readings :

- Santhanam, R. et.al. 1990. **A Manual of Fresh Water Aquaculture** Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- Khanna, S. S. 1997. **An Introduction to Fishes**. Central Book Depot, Allahabad.
- Pillay, T. V. R. 1993. **Aquaculture : Principles and Practices**. Fishing News Books
- Jhingran, V. G. 1982. **Fish and Fisheries of India**. Hindustan Publishing Corporation, New Delhi
- MPEDA 1990. **Aquaculture Engineering and Water Quality Management**. Cochin, India.
- Piska, R. S. 1999. **Fisheries and Aquaculture**. Lahari Publications. Hyderabad.
- Conroy, D. A. and Herman, R. L. 1968. **Text Book of Fish Diseases**. T.F.H. (Gt. Britain) Ltd.

Course out comes

CO1. Understand the Definition of Aquaculture

CO2. Acquire knowledge on Induced breeding and seed fish production in carps

CO3.Creating awareness on Culture of Indian major carps

CO.4 Knowledge on Bacterial , viral , Protozoan and Fungal diseases

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	3	2	2	3	1	1	1	1	1	1	2
CO2	3	2	2	2	3	3	1	1	2	2	3	3
CO3	3	3	3	1	3	3	1	1	1	1	1	1
CO4	3	1	1	3	3	2	3	3	3	3	2	2

H-High-3, M- Medium-2, L- Low-1

AQC 406 (B): Fish Breeding and Hatchery Management

Course objective

To enable the students to

- Understand the life cycle of important shell fishes
- Know Induced maturation in penaeus monodon by eye stalk ablation
- Knowledge on reproductive hormones in crustaceans
- Understand health management hatcheries

AQC 406B: Fish Breeding and Hatchery Management

UNIT-I

Natural seed resources, site selection and collection methods. Life cycle of important shellfish (Penaeus monodon, P. vannamei, Macrobrachium rosenbergii, Scylla serrata, lobster, edible, oyster, pearl oyster, fresh water mussel, holothurians, sea horse, horse-shoe carb, Sepia, Loligo, cray fish etc.).

UNIT-II

Sexual maturity and breeding seasons of different species. Maturation stages of Macrobrachium rosenbergii and Penaeus monodon Induced maturation in Penaeus monodon by eye stalk ablation;

UNIT-III

Reproductive physiology. Reproductive harmones in crustaceans; Brood stock management of Penaeus monodon, P. vannamei and Macrobrachium rosenbergii.

UNIT-IV

Breeding and hatchery management of Penaeus monodon and Macrobrachium rosenbergii. Breeding and hatchery management of crabs and bivalves. Food and feeding of larval stages of important shellfishes. Health management in hatcheries.

Reference books:

- MPEDA, **Hand Book on Aquafarming** , Shrimps, lobsters, mudcrabs (1996).
- Nandi, N. C. and S. K. Pramanik. 1994. **Crabs and crab Fisheries of Sundarban**. Hindustan Publishing Corporation.
- Pillay, T. V. R. 1988. **Aquaculture, Principles and Practices**. Fishing News Books.
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Course out comes

After completion of this course, students

CO1. Understand the Natural seed resources

CO2.Acquire knowledge on Sexual maturity and breeding seasons of different species

CO3. Creating awareness on Reproductive physiology, Reproductive harmones in crustaceans

CO4. Knowledge on Breeding and hatchery management of penaeus monodon and Macrobrachium rosenbergii

CO-PO MAPPING

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	1	1	1	3	3	3	1	2	1	1	1
CO2	2	2	1	1	1	3	3	3	3	3	1	1
CO3	2	1	1	1	3	3	3	3	3	1	1	1
CO4	3	3	3	1	3	1	1	1	1	3	3	3

H-High-3, M- Medium-2, L- Low-1

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC 101 - Paper – I – CONCEPTS OF AQUATIC ECOLOGY

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Lotic and lentic Ecosystems

2. Zonation of the Sea

3. Thermal Optimum

4. Hypoxia

5. Sulphur Cycle

6. Phytobenthos and Zoobenthos

7. Standing Crop

8. Pyramid of biomasses

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Discuss indetail ecosystem with all features

(OR)

(b) Write a detailed account on Marine Ecosystem

10. (a) Discuss in detail the physical characterization of water

(OR)

(b)Answer the following

i. Adaptations of animals to varying oxyen tensions

ii. p^H concentration of water

11. (a) Illustrate the Nitrogen cycle and explain the trace elments

(OR)

(b)Discuss indetail the zones of aquatic vegetarian

12. (a) Write a detailed account on productivity

(OR)

(b)Narrate the different steps involved in the dynamics of Aquatic Ecosystem

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 102 - Paper – II – SYSTEMATICS AND EXTERNALANATOMY OF CULTIVABLE ORGANISMS

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Microridges
2. Scales in bony fishes
3. Chondrichthyes classification
4. Major groups of fresh water fish
5. Decapods classification
6. Commercially important molluscs
7. Morphology of shrimps
8. Appendages of Molluscs

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Classify the fishes upto sub-class level. Add a note on major groups of freshwater fishes.

(OR)

(b) Describe the salient features and distribution of freshwater fishes.

10. (a) Write a detailed notes on the basic structure of the skin in fishes. Add a note an dermal derivatives of skin.

(OR)

(b)Explain the morphology of chromatophores and their significance in fishes

11. (a) Describe the classification of commercially important crustaceans in

detail

(OR)

(b)Classify the mollusca upto sub-class level. Add a note on commercially important mollusks.

12. (a) Explain the appendages of prawns in detail. Add a note on its exoskeleton.

(OR)

(b)Give a detailed description on the external morphology of carbs. Add a note on their exoskeleton and appendages.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 103 A - Paper – III – FISH NUTRITION AND WATER QUALITY MANAGEMENT

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Zooplankton
2. Morphological adaptations for feeding in fishes
3. Detritivores
4. Off - flavor
5. Macrophytes
6. Liming rates for ponds
7. Algal die - offs
8. Destratification

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Define the important of nutrition and narrate nutritional needs of finishes.

(OR)

(b) Write a detailed account on food and feeding habits of prawns, shrimps and crabs.

10. (a) Discuss in detail different types of feeds.

(OR)

(b)Write a detailed note on feeding and fish production in relation to fate of nutrients in feed

11. (a) Discuss in detail the properties of chemical fertilizers in Aquaculture

(OR)

(b)Answer the following

i. Application of limiting material for ponds

ii. Residual effects of liming

12. (a) Discuss in detail oxygen budgets of fish pond

(OR)

(b)Define Aeration and explain the principles of aeration.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 103 B - Paper – IV ENVIRONMENTAL MONITORING AND BIODETERIORATION

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Indicator Organisms

2. Test Organisms

3. Monitoring Organisms

4. Macro fouling

5. Corrosion of metals

6. Red tides

7. Urban waste

8. Recycle of water

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Describe the global environmental monitoring methods

(OR)

(b) Give an account on the limitations for monitoring critical pollutants

10. (a) Give an account on the roll of biotechnology in environmental pollution control

(OR)

(b)Describe the costal development activities

11. (a) Give an account on micro and macro fouling

(OR)

(b) Describe the corrosion of metals and alloys in the sea

12. (a) Give an account on application of biotechnology in controlling the bio deterioration

(OR)

(b)Describe the Environmental monitoring methods for critical pollutants

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 104 A - Paper – IV – COASTAL AQUACULTURE

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Eyestalk Ablation

2. Lobster culture

3. Cray Fish double cropping

4. Mussels

5. Sea weeds importance

6. Mugic Cephalus

7. Handling & transport of fish

8. Sanitation in Processing Plants

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Describe the culture of P. Monodon

(OR)

(b) Give an account on the culture of Scylla Serrata

10. (a) Give an account on the culture of Procambarus Clarkii.

(OR)

(b)Describe the Culture of Edible Oysters

11. (a) Give an account on culture of Seaweeds

(OR)

(b) Describe the culture methods of Lates Calcarifer

12. (a) Give an account of Fish Preservation methods

(OR)

(b)Describe the different types of Fish products & Byproducts.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 104 B - Paper –IV – ORNAMENTAL FISH CULTURE

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Types of Ornamental fishes
2. Marine ornamental fishes
3. Transport of Ornamental fishes
4. Aquarium plants
5. Bacterial diseases
6. Ornamental fishes in india
7. Control measures of Bacterial diseases
8. Fungal diseases of ornamental fishes

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Discuss in detail the classification and characteristic features of common species of brackish water ornamental fishes

(OR)

(b)Discuss in detailed in construction and setting up of fresh water aquarium and its maintenance

10. (a) Describe the mass production of ornamental fishes

(OR)

(b) Discuss in detail:

i. Food and feeding in ornamental fishes

ii. Water quality maintenance

11. (a) Discuss in detail causes and symptoms of viral diseases of

aquarium fishes

(OR)

(b) Give a detailed account on aquarium fish and its maintenance

12. (a) Discuss in detail setting up of an export oriented ornamental fish unit.

(OR)

(b) Give a detailed account Economics of ornamental fish culture.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 104 B - Paper –IV – ORNAMENTAL FISH CULTURE

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Types of Ornamental fishes
2. Marine ornamental fishes
3. Transport of Ornamental fishes
4. Aquarium plants
5. Bacterial diseases
6. Ornamental fishes in india
7. Control measures of Bacterial diseases
8. Fungal diseases of ornamental fishes

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Discuss in detail the classification and characteristic features of common species of brackish water ornamental fishes

(OR)

(b)Discuss in detailed in construction and setting up of fresh water aquarium and its maintenance

10. (a) Describe the mass production of ornamental fishes

(OR)

(b) Discuss in detail:

i. Food and feeding in ornamental fishes

ii. Water quality maintenance

11. (a) Discuss in detail causes and symptoms of viral diseases of

aquarium fishes

(OR)

(b) Give a detailed account on aquarium fish and its maintenance

12. (a) Discuss in detail setting up of an export oriented ornamental fish unit.

(OR)

(b) Give a detailed account Economics of ornamental fish culture.

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II – SEMESTER

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 106 - Paper – I – HUMAN VALUES AND PROFESSIONAL ETHICS - I

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 100 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Moral Imagination

2. Nature of values

3. Tolerance

4. Civic virtues

5. Empathy

6. Autonomy

7. Satkdryavdda

8. Niskamma Karma

9. Reformative

10. Compensation

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

11. (a) Write an essay on nature and subject – matter of Ethics.

(OR)

(b) Write an essay on definition, characteristics, importance and types of values.

12. (a) Are Values in nature subjective or objective - discuss

(OR)

(b)Define good and bad and elucidate characteristics of good and bad

13. (a) Write an essay on justice, responsibility and freedom in human values

(OR)

(b)Define and describe Brahmacyarya, Aparigraha, and Moksha

14. (a) Write an essay on the Five Great Vows (Mahavratas) of Jainism

(OR)

(b)Define and describe Aparigraha, Dharma and Artha

15. (a) Explain the Impact of Religion on Values and Behaviour at work place.

(OR)

(b) What is the purpose of Criminal Justice? Write briefly on Reformative and Retributive theories of punishment.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 201 - Paper – I – PRINCIPLES OF AQUACULTURE

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Raft Culture

2. Integrated fish farming

3. Advances in Aqua engineering

4. Embankment ponds

5. Seed resources

6. Stocking density

7. Algal blooms

8. Ponderal Index

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Write a detailed note on origin and growth of aquaculture.

(OR)

(b).Explain the soil characterization and water sources for site selection

10. (a) Write a detailed account on the design and construction of harcheries

(OR)

(b)Describe in detail water budget of an excavated pond

11. (a) Write a note on biological characteristics of aquaculture species

(OR)

(b)Describe in detail different types of pre stocking management

12. (a) Discuss in detail the following

i. Apparent net protein utilization

ii. Biological value of protein

(OR)

(b)Explain the methods of determination of age in fishes shell - fishes.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 202 - Paper –II – PHYSIOLOGY OF CULTIVABLE ORGANISMS

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Absorption and assimilation
2. Respiratory pigments
3. Osmoregulation in marine fishes
4. Arteries and veins
5. Reproduction in crustaceans
6. Spawning
7. Significance of Juminescence
8. Viviparity.

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Explain various digestive enzymes in different cultivable organisms.

(OR)

(b).Write a detailed note on response of the respiratory system to external changes

10. (a) Describe the mechanism of excretion in fresh water and marine teleost's

(OR)

(b)Discuss in detail about the mechanical properties and regulation of cardiac activity.

11. (a) Write an essay on neuroendocrine regulation of mounting in crustaceans

(OR)

(b)Give an account on hormones and reproductive behavior in fishes

12. (a) Explain the biochemistry and regulation of light emission

(OR)

(b)Narrate an account on larval life and feeding habits of larvae in shellfish

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 203 A - Paper –III – FRESH WATER AQUACULTURE

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Carp fishes
2. Breathing fishes
3. Types of Hatcheries
4. Larval rearing
5. Pearl producing mollusus
6. Water quality management
7. Egg laying fishes
8. Aquarium fish diseases

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Discuss in detail the culture of Indian major carps.

(OR)

(b).Describe the culture of different exotic carps in detail

10. (a) Discuss in detail about Hypophysation of major carps in detail

(OR)

(b)Explain in detail the breeding and hatchery management along with larval rearing

11. (a) Write a detailed account on fresh water prawn culture

(OR)

(b)Discuss in detail on fresh water pearl culture in India and also in the world

12. (a) Write a detailed note on identification of commercial ornamental fishes and its Biology

(OR)

(b)Discuss in detail the preparation of supplementary feeds and mass production of ornamental fishes.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 204 A - Paper –IV – FISHERY ECONOMICS, EXTENSION AND ENVIRONMENTAL MANAGEMENT

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Aquatic ecosystem
2. Export policies
3. Input output relationship
4. Coast – return analysis
5. GIS
6. Community development
7. Price elasticity of demand
8. Risk and insurance

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Give an account on the input – output relationship in Aquaculture

(OR)

(b).Give a detailed account on market economics in relation to suppy and demand for fish

10. (a) Describe the economics of prawn and shrimp breeding farms

(OR)

(b)Give an account on the role of banks in the growth and development of aquaculture

11. (a) Describe the fisheries as a tool in rural development

(OR)

(b)Describe the planning and financing schemes for the development of fisheries

12. (a) What is the role of remote sensing in the assessment of aquatic pollution

(OR)

(b)Describe the eco friendly technologies used in aquaculture

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 204 B - Paper –III – LIMINOLOGY

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Ponds and lakes
2. Lentic environment
3. Plankonic organisms
4. Aquatic plants
5. Nekton
6. Benethos
7. Limnological role
8. Streams and rivers

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Discuss in detail the types of Inland water

(OR)

(b).Describe the Dynamic of lentic and lotic environments

10. (a) Discuss in detail the origin and diversity of lakes in India

(OR)

(b)Explain in detail the Physical and chemical conditions of lakes

11. (a) Write a detailed account on Influence of physical and conditions on living organisms in Inland waters

(OR)

(b)Discuss in detail on seasonal distribution of phytoplankton and zooplankton

12. (a) Write a detailed note on food of planktonic organisms

(OR)

(b)Discuss in detail the classification and zonation of aquatic plants..

III – SEMESTER

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 207 - Paper – I – HUMAN VALUES AND PROFESSIONAL ETHICS - II

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 100 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Moral Imagination

2. Nature of values

3. Tolerance

4. Civic virtues

5. Empathy

6. Autonomy

7. Satkdryavdda

8. Niskamma Karma

9. Reformative

10. Compensation

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

11. (a) Write an essay on nature and subject – matter of Ethics.

(OR)

(b) Write an essay on definition, characteristics, importance and types of values.

12. (a) Are Values in nature subjective or objective - discuss

(OR)

(b)Define good and bad and elucidate characteristics of good and bad

13. (a) Write an essay on justice, responsibility and freedom in human values

(OR)

(b)Define and describe Brahmacyarya, Aparigraha, and Moksha

14. (a) Write an essay on the Five Great Vows (Mahavratas) of Jainism

(OR)

(b)Define and describe Aparigraha, Dharma and Artha

15. (a) Explain the Impact of Religion on Values and Behaviour at work place.

(OR)

(b) What is the purpose of Criminal Justice? Write briefly on Reformative and Retributive theories of punishment.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 301 - Paper –I – MICROBIOLOGY AND FISH PATHOLOGY

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Major groups of micro organisms
2. Viruses characteristics
3. Probiotics
4. Food Stuffs
5. Dactylogyresis
6. Tumores in fishes
7. Aflatoxins in feed
8. Mass injections

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Define micro organisms and explain the classification and identification of micro organisms.

(OR)

(b).Discuss indetail the characterization of bacteria with details of its culture

10. (a) Illustrate the role micro organisms in soil and water its importance

(OR)

(b)Explain the role of micro organisms in preservation and spoilage of fish products.

11. (a) Illustrate the bacterial diseases in fish and Shell fishes

(OR)

(b)Discuss in detail the diagnosis and preventive measures of protozoan diseases in fishes

12. (a) Discuss in detail Helminth parasites in fishes?

(OR)

(b)Answer the following

i. Fish farming and public health

ii. Gas buble disease

iii.Trematode larve

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 302 - Paper –II – FISH IMMUNOLOGY

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Acquired immunity
2. Lymph glands
3. Antigen
4. Antibody diversity
5. Antigrowth factors
6. Lymphokines
7. ELISA
8. Potential Vaccines

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Discuss in detail specific and non specific defence mechanisms

(OR)

(b).Illustrate Lymphoid system in fish

10. (a) Write a detailed account on structure and functional aspects of immunoglobulin

(OR)

(b)Describe in detail classical and alternative complement system.

11. (a) Write a detailed account on Antigrowth factors and Antienzymes

(OR)

(b)Describe in detail crustaceans immune system

12. (a) Answer the following
    i. Immunodiffusions
    ii. Immunoblotting

iii. Radio immune assay

(OR)

(b) Discuss in detail management of aqua cultural practices with reference to immunological approach

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 303 - Paper –III – CELL BIOLOGY AND GENETICS

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Active Transport
2. Ribsomes
3. Mitosis and Meiosis
4. Cell senescence
5. Phenotype and Genotype
6. Genetic Drift
7. Sex Chromosmes in fishes
8. Menodel's laws of inheritance

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Explain Structural organization of plasma membrane

(OR)

(b).Write a note on structure and functions of mitochondria

10. (a) Explain the events involved in cell cycle

(OR)

(b)Discuss in detail the structural organization of chromosomes.

11. (a) What is mutation? Explain molecular mechanisms of mutation

(OR)

(b) Explain in detail the selective breeding procedures in aquaculture

12. (a) Explain the genetic biodiversity in fishes

(OR)

(b) Write a note on types of chromosomal banding techniques

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 305 B- Paper –III – BIOINFORMATICS IN AQUACULTURE

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Genome analysis
2. Genome mapping
3. Linkage analysis
4. Fasta
5. BLAST
6. Phylogenetic analysis
7. Microarray analysis
8. Data mining

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Explain major bioinformatics databases

(OR)

(b).Write a note on Central dogma of molecular biology

10. (a) Explain the Genetic mapping and linkage analysis

(OR)

(b)Discuss in detail the Tools for similarity search and sequence alignment

11. (a) Describe the methods of sequence alignment using scoring matrices

(OR)

(b) Explain in detail the methods of multiple sequence alignment

12. (a) Discuss the problems in phylogenetic analysis

(OR)

(b) Write a note on General applications of Bioinformatics in aquaculture

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 305 - Paper –IV – SKILL DEVELOPMENT PROGRAMME

(CBCS with effect from 2021-2022)

Time : 2 hours Maximum : 50 Marks

PART – A

Answer any **FIVE** questions. Each question carries 10 marks.

(Marks : 5x10=50)

1. Explain Nutritional requirements of cultivable fish and shellfish
2. Write a note on supplementary feeds in feed technology
3. Write briefly about feed evaluation
4. Describe feeding devices and methods in feed technology
5. What are the factors effecting digestibility
6. Discuss feed manufacture and storage
7. Explain commercial feeds in aquaculture
8. Describe feeding methods and add a note on aquarium fish feeds
9. Discuss fishery economics
10. Explain scope of farm planning and budgeting.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

THIRD SEMESTER - OPEN ELECTIVE

AQC: 306 (A) – Paper IV (A) FISH PROCESSING TECHNOLOGY

(CBCS with effect from 2021-2022)

Time : 3 hours
Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Moisture in shell fish
2. Microbiology of fresh fish
3. Bacteria in fish
4. Spoilage of fish
5. Fish preservation
6. Spoilage of canned fish
7. Types of freezers
8. Agar and corals

PART – B
(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Discuss in detail the morphology, growth and reproduction of Bacteria in fishes.

(OR)

(b) Write an essay on the chemical compos ion of shell fishes

10. (a)Discuss in detail the identification and isolation of bacteria in fishes.

(OR)

(b)Write different aspects associate in Handling of fishes

11. (a) Write a detailed account on chemical preservative using in fishes

(OR)

(b) Write a essay on curing of fishes in detail

V – SEMESTER

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 306 B - Paper – IV – POLLUTION AND TOXICOLOGY

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Biomagnifications
2. Eutrophication
3. Pesticide pollution
4. Thermal pollution
5. GESAMP
6. Bioaccumulation
7. Microcosms
8. Detergents

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Describe the sources dynamics of Marine pollution

(OR)

(b) Give an account on the lethal and sub lethal effects of pollutants to marine organisms

10. (a) Give an account on the Sewage pollution

(OR)

(b)Describe the Plastics and Litter source and impact in the marine environment

11. (a) Give an account on sources and distribution of heavy metal pollution

(OR)

(b) Describe the sources and composition of oil pollution

12. (a) Give an account on uses of waste heat role of biocides of thermal pollution

(OR)

(b)Describe the Environmental monitoring methods for critical pollutants

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 401 - Paper –I – AQUACULTURE BIOTECHNOLOGY

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. DNA blotting
2. What is translation
3. Gynogenesis
4. Characeristics of transgenic Fish
5. C DNA libraries
6. DNA barcoading
7. Eicosonids
8. Probiotics in Aquaculture

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Write a detailed note on the principles of DNA isolation

(OR)

(b).Explain the process involved in protein synthesis and compare it with prokaryotes and eukaryotes.

10. (a) Discuss in detail Genome manipulation

(OR)

(b)Define transgenic fish and discuss potential hazards and benefits.

11. (a) Write a detailed account on Recombinant DNA and gene cloning?

(OR)

(b) Discuss in detail DNA polymorphism and DNA fingerprinting.

12.(a) Write a detailed note on Bio active components from marine organisms

(OR)

(b)Discuss in detail types and importance of Bioremediation.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 402 - Paper –II – ESSENTIALS OF BIOCHEMISTY

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Types of carbohydrates
2. Note on proteins
3. Coenzymes
4. Role of enzymes
5. Role of minerals
6. βoxidation pathway
7. Energy budget
8. Examples of abiotic factors

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Write a detailed account on structure and functions of proteins

(OR)

(b).Explain Lipids - Discuss its structure and functions in detail

.

10. (a) Describe in detail the nomenclature and classification of enzymes

(OR)

(b)Illustrate the chemical nature and properties of enzymes.

11. (a) Discuss in detail the metabolism of carbohydrates

(OR)

(b)Give a detailed account on the role of vitamins and minerals in Metabolism

12. (a) Write a detaild note on environmental factors on metabolism

(OR)

(b) Define Bioenergetics and illustrate its model in detail

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 403 - Paper –III – COMPUTER APPLICATIONS, INFORMATION TECHNOLOGY AND BIOSTASTISTICS IN AQUACULTURE

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Hard Disk
2. FOXPRO
3. Internet access tools
4. MS - EXCEL
5. Presentation of data
6. Curve fitting
7. Correlation coefficient
8. Probit analysis

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Write an account on input, output processing and storage devices

(OR)

(b) Explain MS DOS and WINDOWS in detail.

10. (a) Discuss in detail the salient features of computer graphics and their applications

(OR)

(b) What are the advantages of SPSS and ANOVA in aquaculture

11. (a) Write an essay on measures of central tendency

(OR)

(b)Explain the correlation and regression in detail

12. (a) Describe the student t – test and add a note on regression co – efficent

(OR)

(b) Give an account on F – distribution X^2 distribution.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 403 B - Paper –II – AQUACULTURE ENGINEERING

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Layout of farm
2. Internal dikes
3. Jar hatchery
4. Spawning tanks
5. Filtration tank
6. Cages and Rafits
7. Raceway farms
8. Piping system

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Write a detailed account on Design and construction of freshwater fish farm

(OR)

(b).Explain the drainage system of freshwater fish ponds

.

10. (a) Describe in detail the Design and construction of Brackish water shrimp farm

(OR)

(b)Illustrate the Designer and construction of fish hatchery

11. (a) Discuss in detail the Design and construction of Shrimp hatchery

(OR)

(b)Give a detailed account on the seawater supply and piping system

12. (a) Write a detailed note on Design and construction of pens and enclosuers

(OR)

(b) Define raceway farms

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 406 (A) - Paper –IV – GENERAL PRINCIPLES AND PRACTICS OF AQUACULTURE

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Types of culture
2. Fish ponds
3. Transport of breeders
4. Artificial feeds
5. Air breathing fishes
6. Fish farming in India
7. Control measures of Bacterial diseases
8. Fungal diseases of fishes

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Discuss in detail selection of species for culture

(OR)

(b)Discuss in detail control of aquatic weeds and predators.

10. (a) Describe the transport of seed fish and explain seed fish production seed fish production in carps

(OR)

(b) Discuss in detail:

i. Food and feeding in fish

ii. Growth hormones in fishes

11. (a) Discuss in detail culture of shrimp and prawn

(OR)

(b) Give a detailed account on aquarium fish and its maintenance

12. (a) Discuss in detail different viral diseases in fishes and its diagnosis and control

(OR)

(b) Give a detailed account on protozoan diseases in fishes and its control measure.

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION

Branch XV – Aquaculture

AQC- 406 (B) - Paper –IV Fish Breeding and Hatchery Management

(CBCS with effect from 2021-2022)

Time : 3 hours Maximum : 80 Marks

PART – A

Answer any **FOUR** questions. Each question carries 5 marks.

(Marks : 4x5=20)

1. Penaeus monodon
2. Pearl oyster
3. Cray fish
4. Eye stalk ablation
5. Brood stock management
6. Health management in hatcheries
7. Macrobrachium rosenbergii
8. Fresh Water mussel

PART – B

(4X15=60)

Answer **ALL** questions. Each question carries 15 marks

9. (a) Discuss in detail site selection and collection methods of Natural seed

(OR)

(b)Discuss in detail Life cycle of *Penaeus varnamei*.

10. (a) Describe the Maturation stages of Macrobrachium rosenbergii

(OR)

(b) Discuss in detail the Induced maturation in *Penaeus monodon* by eye stalk ablation.

11. (a) Discuss in detail Reproductive hormones in crustaceans

(OR)

(b) Give a detailed account on Breeding and hatchery management of crabs

12. (a) Discuss in detail Food and feeding of larval stages of important shellfishes

(OR)

(b) Give a detailed account on Life cycle of edible oyster.

SRI VENKATESWARA UNIVERSITY: TIRUPATI
S.V.U COLLEGE OF SCIENCES
DEPARTMENT OF GEOGRAPHY



Course
M.Sc. GEOGRAPHY

Choice Based Credit System (CBCS)
Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

The Department of Geography, Sri Venkateswara University was established in the year 1972. Geography s a unique discipline integrating subjects from social sciences, Sciences and Technology which unfolds the hidden relations of society in space. Initially, Geographical knowledge was constructed around the physical basis of Geography and in course of time Geographical studies have expanded their focus on to human relations. As the time passed, the innovations in various fields of knowledge have had a definite impact on the subject and it started gearing itself up to face the new challenges. At end of the 20th century, the departments in the field of information Technology (IT) had a decisive influence in the making the subject relevant. In fact, the subject is redlining itself to face the challenges of globalization. Today, the subject is restructuring itself by integrating the new technologies. Geographical Information System (GIS), Remote Sensing, Photogrammentry etc., in course of time may emerge as the most important spatial science. The Revision of syllabus under CBCS system is suitable for the Research and Employment of the Students.

The department Received Grants under BSR and SAP Schemes. The Grants utilizing for strengthen the teaching and research facilities such as establishment of Remote Sensing and GIS laboratories with latest software's and other infrastructural facilities like power supply, LCD Projectors, water supply, Department Library and the strengthening of the existing cartographic lab. In this Department 48 M.Phil and 49Ph.D Degrees were awarded, more than 40 books are published in national and International.

Vision

- The Department of Geography will promote academic. Research, Employment, community development.
- We will provide a rigorous educational experience through innovative teaching, Research Programmes and employment opportunities in IT Industry.
- We will increase our visibility as a research department through faculty scholarship, research grant activities, international collaborations and fellowships for research scholars
- To update curriculum for competitive Examinations, Research linkage with Industries.

Mission

- To provide educators with effective and relevant professional development, support, and materials focusing on geographic concepts, content, and pedagogy.
- To educate legislators and education decision-makers at the local, state and national levels about the relevance of geography in the 21st century and to motivate and inspire action within the context of curriculum design, professional development, connections between elementary, secondary, and university systems, and professional associations.
- To cultivate awareness among parents of students and the public at large of the importance of geo-literacy and to actively engage citizens in the development of geo-literacy and the institutional structures that will support this mission.

Programme Specific Outcomes

- Compare and discusses the formation of large scale landforms involving both exogenous and endogenous processes.
- Know how human, physical and environmental components of the world interact.

Programme Outcomes

- To understand the concept of place and how it is connected to people's sense of belonging to the physical environment, landscape and culture.
- The main outcome is students can able to select different projection fordifferent geographical areas.
- Explain the importance of advanced cartography in map making and presenting.
- Acquire good knowledge about different procedure of map making and various projection system ofmap making by developing broad knowledge about latitude, longitude, meridians, parallels etc.
- Obtain the knowledge on fundamentals of atmospheric phenomena, global climate systems and climate change.
- Understand the atmosphere and climate are a critical part of the earth system, and climatic variability and change are central to the issue of current and future global environmental change.
- With the sound knowledge on the process, principles, effecting factors, techniques of Remote sensing student can understand interpretation of the data in much more accurate.
- Explain the elements of weather maps and analyse and interpret the weather maps
- Students can able to understand how to represent the data through different diagrams and graphs
- Students will demonstrate an understanding of current research within the breadth of geography, as well as more in depth knowledge of research in their specialty areas.

- Students will develop a solid understanding of the concepts of “space," “place” and “region” and their importance in explaining world affairs. To Provide a comprehensive introduction to basic concepts and key theoretical approaches in economic geography To Introduce economic geography as a dynamic, diverse and contested body of knowledge
- To enable you to apply this knowledge to key social and economic issues in the context of economic globalization

M.Sc. Geography 2021-22

SEMESTER - I

Sl. No	Components of Study	Title of the course	Title of the Paper	Contact hours	No. of Credits	IA Marks	End SEM Marks	Total
1.	Core Theory **(Mandatory)**	GEG - 101	Geomorphology	6	4	20	80	100
2.		GEG - 102	Cartography	6	4	20	80	100
3.	Compulsory foundation **(opt - 1)**	GEG – 103(A)	Economic Geography	6	4	20	80	100
		GEG – 103(B)	Human Geography					
		GEG – 103(C)	Environmental Geography					
4.	Elective foundation **(Opt - 1)**	GEG – 104(A)	Oceanography	6	4	20	80	100
		GEG – 104(B)	Computer Basics for Geography					
		GEG – 104(C)	Regional Geography of Andhra Pradesh					
5.	Practical - 1	GEG – 105	Map Projections	8	4	---	100	100
6.	Practical - 2	GEG – 106	Techniques of Mapping and map analysis	8	4	---	100	100
	TOAL			**40**	**24**	**80**	**520**	**600**
7.	AUDIT COURSE		Human Values and Professional Ethics- I	0	0	100	0	0

SEMESTER - II

Sl. No	Components of Study	Title of the course	Title of the Paper	Contact hours	No. of Credits	IA Marks	End SEM Marks	Total
1.	Core **(Mandatory)**	GEG - 201	Climatology	6	4	20	80	100
2.		GEG - 202	Geographical Thought	6	4	20	80	100
3.	Compulsory Foundation **(Opt - 1)**	GEG – 203(A)	Principles of Remote Sensing	6	4	20	80	100
		GEG – 203(B)	Geography of Tourism					
		GEG – 203(C)	Industrial Geography					
4.	Elective foundation **(Opt - !)**	GEG – 204(A)	Physical Geography of India	6	4	20	80	100
		GEG – 204(B)	Regional Geography of India					
		GEG – 204(C)	Social and Cultural Geography					
5.	Practical - 1	GEG – 205	Interpretation of Topographical (S.O.I., U.S and O.S) and Weather Maps	8	4	---	100	100
6.	Practical - 2	GEG – 206	Research Techniques		4	---	100	100
	TOAL			**40**	**24**	**80**	**520**	**600**
7.	AUDIT COURSE		Human Values and Professional Ethics- II	0	0	100	0	0

SEMESTER - III

Sl. No	Components of Study	Title of the course	Title of the Paper	Contact hours	No. of Credits	IA Marks	End SEM Marks	Total
1.	Core **(Mandatory)**	GEG – 301	Urban Geography	6	4	20	80	100
2.		GEG – 302	Geographical Information System (GIS)	6	4	20	80	100
3.	Generic Electives **(Opt - 1)**	GEG – 303(A)	Agricultural Geography	6	4	20	80	100
		GEG – 303(B)	Transport geography					
		GEG – 303(C)	Disaster Management Studies					
4.	Practical	GEG – 304	Geographical Information System (GIS)	8	4	---	100	100
5.	Skill Oriented Course **(Mandatory Theory & practical)**	GEG – 305	GPS Survey and Report	Theory (2)+ Practical's(4)	4	10	90 (40+50)	100
6.	Open Elective **(Opt - 1)**	GEG – 306 (A)	Regional Geography of Andhra Pradesh	6	4	20	80	100
		GEG – 306 (B)	Geographical Information System (GIS) & Global Positioning System (GPS) and Applications					
	TOAL			**24**	**24**	**90**	**510**	**600**

SEMESTER - IV

Sl. No	Components of Study	Title of the course	Title of the Paper	Contact hours	No. of Credits	IA/Viva Marks	End SEM Marks	Total
1.	Core **(Mandatory)**	GEG – 401	Regional Planning	6	4	20	80	100
2.		GEG – 402	Advanced Remote Sensing	6	4	20	80	100
3.	Generic Electives **(Opt - 1)**	GEG – 403(A)	Water and Soil Resources Management	6	4	20	80	100
		GEG – 403(B)	Political Geography					
		GEG – 403(C)	Research in Geographical Studies					
4.	Practical	GEG = 404	Remote Sensing Applications	8	4	---	100	100
5.	Multi Disciplinary course/Project Work	GEG – 405	Project Work and Viva Voce	0	4	20	80	100
6.	Open Elective **(Opt - 1)**	GEG – 406 (A)	Regional Geography of India	6	4	20	80	100
		GEG – 406 (B)	Principles of Remote Sensing					
Total				**32**	**24**	**100**	**500**	**600**

SEMESTER – I

CORE THEORY – 1

GEOMORPHOLOGY

Learning Objectives

- To show the landforms, landscape evolution, various land forming processes with respect to time, climate and tectonic regimes, the course shall further convey an understanding on land forming processes with different Geomorphic agents and processes on different temporal and spatial magnitude.
- To understand the concept of place and how it is connected to people's sense of belonging to the physical environment, landscape and culture.
- To understand the fundamental concepts of spatial interaction and diffusion, which explain how human activities are influenced by the concept of distance.
- To exposed to the nature of physical systems such as geomorphologic processes and natural hazards.
- To read and interpret information on different types of physical features maps.
- To learn how human, physical and environmental components of the world interact.
- To Examine Earth's plate tectonic framework. Explain the relationship between earthquakes and volcanoes

Learning Outcomes

After the completion of the course, Students will be able to

- Explain principal terms, definitions and theories in geomorphology.
- Explain the interior structure of the earth and geological time scale.
- Assess the cause and effect of disturbances in/on the earth.
- Explain different theories and models for landscape evolution with time.
- Describes the landform and landform processes in different climatic zones and tectonic regimes.
- Compare and discusses the formation of large scale landforms involving both exogenous and endogenous processes.
- Know how human, physical and environmental components of the world interact.

P.T.O

SYLLABUS

Unit I Nature, Definition, Scope and recent trends in Geomorphology: Rocks Origin, Classification and distribution, Interior of the Earth. Geological time -scale.

Unit II Earth movements: Epierogenic and Orogenic earth movements. Theories of continental drift , Apostasy and plate tectonics. earthquakes, volcanoes and their distribution.

Unit III Geomorphic agents and Processes: Weathering, Erosion, Mass wasting. Concept of cycle of erosion, Davis and Penck concepts in the evolution of Landforms.

Unit IV Geomorphic Processes: Erosional and depositional landforms made by a) rivers, b) Glaciers, c) wind, d) underground water, e) waves & currents.

Suggested Readings:

- Dayal, P. : A Text book of Geomorphology. Shukla Book depot, Patna, 1996.
- Monkhouse, F.J. : Principles of Physical Geography, Hodder and Stoughton, London, 1960.
- Sparks, B.W. : Geomorphology, Longmans, London, 1960.
- Strahler, A.N. and Strahler, A.H. : Modern Physical Geography : John Wiley & Sons, Revised edition 1992.
- Thornbury, W.D.Principles of Geomorphology, Wiley Eastern, 1969.
- Wooldridge, S.W. and Morgan, R.S. : The Physical Basis Geography– An outline of Geomorphology, Longman Green & Co, London, 1959.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	-	2	2	3	3
CO_2	3	3	3	3	3	3	3	-	2	2	3	3
CO_3	3	3	3	3	3	3	3	-	2	2	3	3
CO_4	3	3	3	3	3	3	3	-	2	2	3	3

CORE - THEORY-2

GEG 102: CARTOGRAPHY

Learning Objective

- To apprise the students to various aspects of cartography.
- To introduce the basic concepts and key theoretical approaches in Advanced Cartography.
- To describes the art and science of map making and map analysis.
- To teach the representation and conversions of scales.
- To provide the knowledge on map design, layout, lettering, toponomy, drawing surface and equipment.
- To give the clear picture on the changing process of map making from analogue to digital.

Learning Outcomes

After the completion of the course, Students will be able to

- Explain the importance of advanced cartography in map making and presenting.
- Acquire good knowledge about different procedure of map making and various projection system of map making by developing broad knowledge about latitude, longitude, meridians, parallels etc.
- Developing their quantitative application in geographical study which gives more accuracy in any geographical enquiry which can further helps students in conducting research activities.
- Perform map layout and map interpretation for any geographical area.
- Acquire knowledge of different method of surveying and map making by using proper tools and technique and can apply this knowledge in future research works.

P.T.O

SYLLABUS

Unit I Cartography –Definition. Cartography is a science of human communication; Scales – Methods of representation & conversions; Map projections –classification and choice of projections. Merits and demerits of cylindrical, conical, zenithal and conventional projections.

Unit II Semiology – Kinds of symbols– Mapping qualitative and quantitative point, Line and Area symbols. Types of maps and their uses. Topographical maps: Elements of topographical maps, scales and numbering of Toposheets.

Unit III Map design and layout – Theory of visual perception constraints and Restrictions in map design. Lettering and Toponomy. Mechanics of map construction: Drawing surfaces – Drawing Equipment.

Unit IV Mapping the qualitative and quantitative data. Thematic mapping; concept of map base, map compilations & generalizations. Concepts of Geographical Information System (GIS).

Suggested Readings

- Khan, Z.A. : Text book of practical geography, concept, New Delhi, 1998.
- Monkhouse, F.J. & Wilkinson, H.R. : Maps and Diagrams, Methuen, London, 1994
- Steers, J.A. : Map Projections, University of London Press, London Burrough,P.A. : Principles of geographic information systems for land resource assessment, Oxford University Press, New York, 1986.
- Fraser Taylor D.R. : Geographic Information Systems, Pergaman Press, Oxford, 1991.
- Star J and J. Estes : Geographic information systems. An introduction, Prentice Hall, Englewood Cliff, New Jersy, 1994.
- Misra, R.P. and Rames, A.: Fundamentals of Cartography, Mcmillan Co., New Delhi, 1986.
- Robinson, A.H. et al.: Elements of Cartography, John Wiley & Sons, U.S.A., 1995.
- Sarkar, A.K., Practical Geography : A systematic approach; Oriental Longman, Calcutta, 1997.
- Singh, R.L. and Dutt, P.K. Elements of Practical Geography, Kalyani publishers, New Delhi, 1979.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	1	2	2	2	3	1	2	2	3	3
CO_2	3	3	1	2	2	2	3	1	2	2	3	3
CO_3	3	3	3	3	1	3	3	1	1	3	3	3
CO_4	3	3	3	3	1	3	3	1	1	3	3	3

COMPULSORY FOUNDATION (OPT - 1)

GEG 103(A): ECONOMIC GEOGRAPHY

Learning Objectives

- To acquire knowledge about the concepts of resources, classification, models of natural resource processes, their use and misuse, conservation and management of resources for sustainable development
- To Provide a comprehensive introduction to basic concepts and key theoretical approaches in economic geography
- To Introduce economic geography as a dynamic, diverse and contested body of knowledge
- To enable you to apply this knowledge to key social and economic issues in the context of economic globalization
- To encourage to think about policy options for overcoming inequality and uneven development in
- the globalizing world.

Learning outcomes

After the completion of the course, Students will be able to

- Explain the importance of economic geography in analyzing the societies and economies work.
- Explain and apply key concepts and theoretical approaches in economic geography.
- Discuss and critically evaluate these concepts and theoretical approaches.
- Students will become sensitized to concept of resources.
- Students will become sensitized the classification of resources.
- Learn about use and misuse of resources.
- Will learn conservation methods and techniques.
- Showing an awareness and responsibility for the environment.
- Apply these concepts and theoretical approaches to key social and economic issues in the context of global economy.
- Discuss policy options for overcoming inequality and uneven development in the globalizing world.

P.T.O

SYLLABUS

Unit I Scope, content and recent trends in economic geography, relation of economic geography with economics and other branches of social sciences, classification of economies; sectors of economy (Primary, secondary and tertiary).

Unit II Natural resources: Nature and classification – renewable and non - renewable, biotic and abiotic, conservation of resources, changing nature of economic activities; mining, forestry, agriculture, industry, trade and transport.

Unit III Agricultural Resources: Spatial distribution of major food and cash crops of the world (rice, wheat, coffee, tea).Minerals resources- Classification of minerals (ferrous and non- ferrous).Major industries: Iron and Steel, Textiles, ship - building and their distribution

Unit IV Industrial location theory– Alfred Weber: Geographical factors in the development of major industries. Industrial policy of state and central government.

Suggested Readings:

- Boesch, H. : A Geography of World Economy, D. Van Nostrand Co., New York, 1964.
- Chapman, J.D. : Geography and Energy, Longman, London, 1989.
- Gregor, H.F. : Geography of Agriculture, Prentice Hall, New Jersey, USA, 1970.
- Griggs, D.B. : The Agricultural Systems of the World, Cambridge University Press, New York, 1974.
- Hartshome, T.N. and Alexander, J.W. : Economic Geography, Prentice Hall, New Delhi, 1988.
- Jones, C.F. and Darkenwald, G.G. : Economic Geography, McMilan Co., New York, 1975.
- Millar E.: Geography of Manufacturing, Prentice Hall, New York, 1962.
- Raza, M. and Agrawal, Y. : Transport Geography of India, Concept, New Delhi, 1986.
- Smith, D.M. : Industrial Location – An Economic Geographical Analysis, John Willey, New York, 1971.
- Thomas, R.S. : The Geography of Economic Activities, McGraw Hill, New York, 1962.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	2	3	1	3	1	3	3	1	3	3	3	3
CO_2	2	3	1	3	3	3	1	1	3	3	3	3
CO_3	1	3	3	1	1	1	3	3	1	3	3	3
CO_4	3	3	1	1	3	3	3	1	1	3	3	3

103 (B): HUMAN GEOGRAPHY

Learning Objective

- To apprise the students to various aspects of human resources and their importance.
- Provide a comprehensive introduction to basic concepts and key theoretical approaches in Population.
- To describe Describes migration and its impact on the regional human resources.

Learning Outcomes

After the completion of the course, Students will be able to

- Apprise the students to various aspects of human resources and their importance.
- Illustrate basic concepts and key theoretical approaches in population.
- Describes migration and its impact on the regional human resources.

SYLLABUS

UNIT I Definition, nature, origin and scope of human geography. Origin and evolution of human settlements.

UNIT II The patterns of population distribution of the world and India. Factors affecting the patterns of population distribution. Population Density.

UNIT III Trends of population growth of the world and India in the 20th century. Theories of population: Malthusian theory and Demographic Transition Theory.

UNITIV: Migration: Definition, types of migration internal and external, causes and Consequences of Migration, theories of migration – Lees theory. Problems and prospects of population growth; population policy and planning in India.

Suggested Redings :

- Garnier, B.J: Geography of population, Long man group ltd., London, 1966
- Bogue Donald.: Principles of Demography,JohnWiley and Sons, Newyark 1969.
- Chandana R.C,: A Geography of population – Concepts , concepts, determinants, Kalyani publishers, NewDelhi, 1986.
- Clark, John,I(E.d): Geography and population :Approaches and applications, Pergman press ltd. Oxford 1984.
- Mamoria, C.B.India's population problem, Kithab mahal, New Delhi,1981.
- Srinivasan, K.Basic demographic techniques and applications, Sage publications , New Delhi ,1998.
- Zelinsky Wilbur, A prologue of population of population Geography, prentice Hall , 1966.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	-	2	2	3	3
CO_2	3	3	3	3	3	3	3	-	2	2	3	3
CO_3	3	3	3	3	3	3	3	-	2	2	3	3
CO_4	3	3	3	3	3	3	3	-	2	2	3	3

GEG 103 (C): ENVIRONMENTAL GEOGRAPHY

Learning objectives:

- To create the environmental aptitude among students.
- To familiarize the students with concepts, issues, approaches about physical and social environment.
- To acquainted with contemporary environmental problems and challenges.
- To provide knowledge on Ecosystem, Biomes, food chain and hydrological cycle.

Learning Outcomes

After the completion of the course, Students will be able to

- Gain the knowledge on environmental aptitude
- Familiarize with concepts, issues, approaches about physical and social environment.
- Acquainted with contemporary environmental problems and challenges.
- Familiarized the knowledge on Ecosystem, Biomes, food chain and hydrological cycle.

SYLLABUS

UNIT I Nature, Scope and Significance of Environmental Studies; Concepts of Ecology, Ecological balance and the need for Ecological Approach.

UNIT II Concepts of Ecosystem : Structure, Classification and functioning of the ecosystem, Biomes, food web, food pyramid, Nutrient cycle, hydrological cycle.

UNIT III Impact of population growth on ecosystem. Agriculture, green revolution, HYV and pesticides. Man's impact on land, mining, coastal areas and transport.

UNIT IV Environmental impact assessment, Environmental reconstruction, management and planning, the need for interdisciplinary approach. The Role of GIS and Remote Sensing in Environmental Management.

Suggested Readings

- Turk. : Introduction to Environment Studies, Sanndora, 1980.
- Detwyler : Man's Impact on Environment, 1971.
- Strahler & Strahler, Geography of Man's Environment Wiley, 1977.
- Bennet : Man and Earth's Ecosystem, Wiley, 1975.
- Leopoid and Lune (Ed) : A procedure for evaluating environmental impact.
- Savindra Singh : Environmental geography– Prayagpustak Bhavan, Allahabad, 2000.
- Dikshit, R.D.: Geography and Teaching of the environment, geography department, Poona University, 1984.
- Agarwal, D.P. Man and Environment in India through ages, Book & Books, 1992.
- Gaur, R. : Environment and Ecology of Early Man in Northern India, R.B. Publication Corporation, 1987. Hoyt, J.B. Man and the Earth, Prentice Hall, U.S.A.; 1992.
- Singh, S. : Environmental Geography, Prayag Publications, Allahabad, 1991.
- Smith, R.L. : Man and his Environment : An Ecosystem approach, Harper & Row, London, 1992.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	1	2	2	2	3
CO_2	3	3	3	3	3	3	3	1	2	2	2	3
CO_3	3	3	3	3	3	3	3	1	2	2	2	3
CO_4	3	3	3	3	3	3	3	1	2	2	2	3

GEG 104(A): OCEANOGRAPHY

Learning objectives:

- To develop the understanding about concepts associated with hydrosphere with context to oceanic relief, surfaces and their distribution on earth.
- To provide the knowledge about physical principles, characteristics, oceanic deposits.
- To develop knowledge on the ocean currents and their movemental impact. .

Learning Outcomes

After the completion of the course, Students will be able to

- Examine and compare the different ocean and water bodies with their distinct oceanic bottom relief, circulation system and marine deposits
- Improve the knowledge on Coral reefs and their formation theories..

SYLLABUS

UNIT 1 Oceanography – nature, scope and development, distribution of land and Water.Relief of Ocean Basins – Hypsometry. The Continental Shelf, The Continental Slope, the Deep Sea Plains, Submarine Canyons – Characteristics, Origin and Distribution. General features of Bathymetry bottom relief of Pacific, Atlantic and Indian Ocean.

UNIT II Ocean water: Distribution of temperature, composition of salinity, density of sea level.

UNIT III Ocean currents: origin, causes and characterises; Atlantic, Indian, Pacific Ocean. Tides and waves.

UNIT IV Ocean deposits: sources, types and distribution of ocean deposits. Coral reefs: formation types, factors of growth.

Suggested Readings:

- Davis, R.J.A. 1986, Oceanography – An Introduction of the Marine Environment, Win C. Brown, Iowa.
- King, C.A., Oceanography for Geographers, Edward Arnold Pub.
- Murray, S.J., 1913, Ocean, A General account of the Science of the sea, Thorton Butter Worth, London.
- Siddhartha, K. 1999, Oceanography, A Brief Introduction, Kisalaya Pub. Pvt. Ltd., New Delhi..
- Singh, S. 2002, Physical Geography, Prayag Pub., Allahab6.Sharma & Vatal :
- Oceanography for Geographers Chaitanya Publishing House, Allahabad.
- Lal.D.S. Oceanography, chaitanya Publishing House, Allahabad,1994

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	1	3	3	3	3	3
CO_2	3	3	3	3	3	3	1	3	3	3	3	3
CO_3	3	3	3	3	3	3	1	3	3	3	3	3
CO_4	3	3	3	3	3	3	1	3	3	3	3	3

GEG 104 (B): COMPUTER APPLICATIONS IN GEOGRAPHY

Learning objectives:

- To develop the understanding about concepts associated computer applications and geographical relevance.
- To provide the knowledge about principles, characteristics of various computer programmes.
- To develop knowledge on how to use computers for geographical representations.

Learning Outcomes

After the completion of the course, Students will be able to

- Understand computer concepts and principles.
- Examine and compare the different computer programmes and usage of computers to geographical studies
- Improve the knowledge on computer net workings

SYLLABUS

UNIT I Introduction to computers , Definition, origin and Evolution, Characteristics, Limitations and Elements of Computers, Hard ware and Software.

Unit II M.S Office: M.S word and word processing – parts of word processecing, Moving and copying Window Toolbars, Creating, saving and closing Document- opening and editing of document text and Paragraph forming, Appling bullets and numbering, Creation of Table.

Unit III M.S.Excel: Features of M.S Excel-Spread sheet/work sheet, parts of M.S.Excel window Insertion and deletion of worksheet. Entering and editing date in work sheet. Different type of Function available in M.S.Excel -Templates, Charts, Graphs. Understanding Website and LAN

Unit IV Representation of Geographical Data Base: Rain fall, Temperature, Population, Crop Yielding, Land use and Land Cover. Tables, Graphs, Diagrams, Maps and PPT presentation.

Suggested Readings:

- Fundamentals of Computer(First Edition- 2009) Publisher: McGraw-Hill by Balaguruswamy
- Computer Fundamentals(Fourth Edition- 2007) Publisher: BPB Publications by Pradeep Sinha and Priti Sinha.
- Computer Fundamentals(First Edition-2010) Publisher: Pearson by Anita Goel
- Introduction to Computers (First Edition 2008) Publisher : Cengage Learning By Gary B.Shelly, Thomas J.Cashman and Misty E. Vermaat
- Fundamentals of Computers and Programming with C by A. K. Sharma DhanpatRai publications
- Computer Networks (4th Edition) by Andrew S. Tanenbaum
- Operating System Concepts, (6th Edition) by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	2	1	3	3	1	2	2	3	3
CO_2	3	3	3	2	1	3	3	1	2	2	3	3
CO_3	3	3	3	2	1	3	3	1	2	2	3	3
CO_4	3	3	3	2	1	3	3	1	2	2	3	3

GEG 104(C): REGIONAL GEOGRAPHY OF ANDHRA PRADESH

Learning objectives:

- To acquaint the students with re- organization of Andhra Pradesh and its newphysical, climate and drainage aspects. .
- To obtain the knowledge of demographic, irrigation and major crops.
- To understand Andhra Pradesh mineral and industrial aspects with transportation.
- To improve knowledge on the transportation and communication aspects of Andhra Pradesh

Learning Outcomes

After the completion of the course, Students will be able to

- Understand re- organization of Andhra Pradesh and its new physical, climate and drainage aspects. .
- Obtain the knowledge of demographic, irrigation and major crops.
- Understand Andhra Pradesh mineral and industrial aspects with transportation.
- Improved knowledge on the transportation and communication aspects of Andhra Pradesh

SYLLABUS

UNIT I: Re-organization of Andhra Pradesh Act -2014 Location and physical setting Major Physiographic Divisions– Soils, Vegetation, and Drainage – Climate Regions and their Characteristics.

UNIT II Population Distribution; Density, growth and problems. Agriculture Types. Irrigation and power; Multipurpose Projects, Major food grain crops.(Paddy, Jower and Ragi), major Commercial Crops (Cotton, Groundnut and Mango).

UNIT III Mineral Resources: Iron ore, Limestone and Petroleum, Industries: Iron and Steel, Cotton and IT. Industrial Regions and Special Economic Zones (SEZ) Andhra Pradesh.

UNIT IV Transportation and Communication – Road, Rail, Water (special reference to coastal Transport) and Air Transport. Communication net work in Andhra Pradesh.

Suggested Readings:

- Take from 401, 4, 5 from old syllabus.
- Structure, growth and prospects of Industries in Andhra Pradesh. Lotus publications, Varanasi-1989.
- Regional Geography of Andhra Pradesh– Telugu Academy.
- Andhra Pradesh year book -2010 -2015.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	2	3	2	1	3	2	2	3
CO_2	3	3	3	3	2	3	2	1	2	2	2	3
CO_3	3	3	3	3	2	3	2	1	3	2	2	3
CO_4	3	3	3	3	2	3	2	1	2	2	2	3

Practical – 1

GEG 105: MAP PROJECTIONS

Learning Objective

- To apprise the students about the art and science of map making and representation.
- To explains the usage of different types of projections
- To focus on the importance of scale and projection in the process of representing the earth surface

Learning Outcomes:

After the completion of the course, Students will be able to

- Explain the concept of map, scale and projection
- Student can explain the purpose of projection
- The main outcome of this course is students can able to select different projection for different geographical areas.

SYLLABUS

Unit I Introduction to Map projections; Zenithal Projections: Equi -distant; Equal area, Stereo graphics, Gnomonic.

Unit II Cylindrical Projections: Equi -distant, Equal area, Mercator, UTM, Gall's Projection

Unit III Conical Projections: One standard parallel, Two standard parallel; Bonne's, Polyconic.

Unit IV: International map projection: Sinusodial, interrupted. Sinusoidal Molweides; Interrupted – Molweides projections.

Suggested Readings

- Khan, Z.A. : Text book of practical geography : concept; New Delhi, 1998.
- Misra, R.P. and Ramesh, A. : Fundamentals of Cartography, Concept, New Delhi, 1989.
- Singh, R.L. : Map work and practical geography; central book depot; Allahabad, 1972.
- Steers, J.A. : Map projections, University of London Press, London

Practical – 2

GEG 106: TECHNIQUES OF MAPPING AND MAP ANALYSIS

Learning Objective

- To apprise the students about the Terrain mapping techniques
- To project the representation of the landforms by using contour lines
- To explains the methods of slope analysis
- To develop the knowledge on the thematic maps
- To Understand the data representation through the diagrammatic form and log graphs

Learning Outcomes

After the completion of the course, Students will be able to

- Students can able to Represent the landforms with contour lines
- Student can perform profiles which are drawn from landforms through contours
- Student can represent the slope analysis models
- Students can able to understand how to represent the data through different diagrams and graphs

SYLLABUS

. UNIT I Interpolation of contours. Landforms represented by contours. Profiles: Serial, Superimposed, Projected, Composite.

UNIT II Slope Analysis: Smith's and Wentworth's Methods.

UNIT III Thematic mapping: Dot method, Isopleths and Iso –Chromatic method; Choropleth and Choro-Chromatic methods; Flow method.

UNIT IV Bar Diagrams: Simple, Compound, Superimposed, Graphs: Trilinear, Semi log;Log-log., Diagrams -Pyramid, Pie. Hyther-graph, Climo-graph, Ergo-graph, Band–graph. Frequency polygon.

Suggested Readings

- Misra, R.P. and Ramesh, A. : Fundamentals of Cartography, concept, New Delhi,1989.
- Monkhouse, F.J.H.R. and Wilkinson: Maps and diagrams; Methuen and Co.,London,1984.
- Peter Toyne & Peter Newby, T.: Techniques in human geography; MacMillan,London, 1972.
- john Byogott: An introduction to map work and practical geography, universityTutorial press Ltd., London .

Audit Course

HUMAN VALUES AND PROFESSIONAL ETHICS – I

Unit I	Definition and Nature of Ethics – its relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics-Goals – Ethical Values in various Professions.
Unit II	Nature of Values-Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders, Character and Conduct.
Unit III	Individual and society: Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non Possession) and Aparigraha (Nonstealing).Purusharthas (Cardinal virtues)- Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).
Unit IV	Bhagavad Gita – (a) Niskama karma. (b) Buddhism – The Four Noble Truths – Arya astanga marga, (c) Jainism – Mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.
Unit V	Crime and Theories of punishment – (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Suggested Readings:

- John S Mackenjie: A Manual of ethics.
- "The Ethics of Management": by Larue Tone Hosmer, Richard D. IrwinInc.
- "Management Ethics – integrity at work" by Joseph A. Petrick and John F. Quinn, Response Books: NewDelhi.
- "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
- Harold H. Titus: Ethics for Today.
- Maitra, S.K: Hindu Ethics.
- William Lilly: Introduction to Ethics.
- Sinha: a Manual of Ethics.
- Manu: Manu Dharma Sastra or the institute of Manu: Comprising the Indian system of Duties: Religious andCivil(ed) G.C. Haughton.
- Susruta Samhita: Tr. Kaviraj Kunjanal, Kunjanal Brishagratha, Chowkamba Sanskrit Series. Vol. I,II,III,Varanasi VOL. I OO, 16-20, 21-32, and 74-77 only.
- Caraka Samita: Tr. Dr. Ram Karan Sharma and Vaidya Bhagavan Dash, Chowkamba Sanskrit Series Office,Varanasi. I,II,III VOL. I, PP 183-191.
- Ethics, Theory and Contemporary issues, Barbara Mackinnon, Wads Worth/Thomson Learning 2001.
- Analyzing Moral issues, Judith A. Boss, Mayfield Publishing Company ,1999.
- An Introduction to Applied Ethics (Ed.) John H. piet and Ayodhya Prasad, Cosmo Publications.
- Text book for Intermediate logic, Ethics and Human Values, Board of Intermediate Education & TeluguAcademic Hyderabad.
- I.C Sharma Ethical Philosophy of India. Nagin & Co. Julundha

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	2	2	2	2	3	2	2	1	2	2	2	2
CO_2	1	3	2	2	3	3	3	1	3	2	2	2
CO_3	2	1	3	2	2	1	2	1	2	2	2	2
CO_4	3	3	3	1	3	3	3	1	2	2	2	3

SEMESTER – II

CORE THEORY-1

GEG 201: CLIMATOLOGY

Learning Objective

- To introduce to the students the fundamentals of atmospheric phenomena, global climate systems and climate change.
- The atmosphere and climate are a critical part of the earth system, and climatic variability and change are central to the issue of current and future global environmental change.
- To grasp the techniques for modeling the climate, covering both theoretical and technical aspects.
- To understand the dynamics of the atmosphere and the overall climatologically system.
- To be able to analyse and interpret climatic data and classification of climate

Learning Outcomes

After the completion of the course, Students will be able to

- Obtain the knowledge on fundamentals of atmospheric phenomena, global climate systems and climate change.
- Understand the atmosphere and climate are a critical part of the earth system, and climatic variability and change are central to the issue of current and future global environmental change.
- Grasp the techniques for modeling the climate, covering both theoretical and technical aspects.
- Understand the dynamics of the atmosphere, the ocean and the overall climatologically system.
- Able to analyze and interpret climatic data and classification of climate

P.T.O

SYLLABUS

UNIT I Nature and scope of climatology. Composition and structure of the Atmosphere – Insulation – heat balance, green house effect – vertical and Horizontal, distribution of Temperature.

UNIT II Atmospheric Pressure – Pressure gradient – Pressure belts – vertical and Horizontal distribution of pressure – winds – monsoons and cyclones.

UNIT III Water vapor- Humidity – Relative, absolute and specific humidity – condensation and types, cloud types, types of Rainfall – Koppen's and Thornthwaite's scheme of climatic classification.

UNIT IV Theories of Climatic changes – Astronomical or Orbital Theory, Continent Displacement Theory. Micro Climates – agro climate, urban climate, global warming, heat Island, health hazards. Weather Forecasting - Problems and Prospects of weather Forecasting in India.

Suggested Readings

- Crittch Field, J.H. : General Climatology, Prentice Hall, India, New Delhi, 1993.
- Lal, D.S. : Climatology, Chaitanya Publishing House, Allahabad, 1986.
- Garrison, T. : Oceanography – An introduction to Marine Science. Books / Cole, Pacific Groue, USA,2001.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	2	2	3	2	1	2	2	2	3
CO_2	3	3	3	2	2	3	2	1	2	2	2	3
CO_3	3	3	3	2	2	3	2	1	2	2	2	3
CO_4	3	3	3	2	2	3	2	1	2	2	2	3

CORE THEORY-2

GEG 202: GEOGRAPHICAL THOUGHT

Learning Objective

- To acquaint the students with the Geographical philosophy. and the Methodology and historical development of geography as a professional field.
- The idea is to address the spirit and purpose of the changing geographies and to what we as geographers contribute towards knowledge production.
- To developing critical thinking and analytical approaches and Students will acquire an understanding of and appreciation for the contributions of the eminent geographers to the subject.
- To provide the knowledge on the quantitative revolution in the geographical studies.

Learning Outcomes

After the completion of the course, Students will be able to

- Understand the evolution of geography over the decades.
- Students will demonstrate an advanced understanding of the historical development of geographical studies.
- They can understand the major current philosophical and theoretical debates in geography.
- Students will demonstrate an understanding of current research within the breadth of geography, as well as more in depth knowledge of research in their specialty areas.
- Students will develop a solid understanding of the concepts of “space," “place” and “region” and their importance in explaining world affairs.
- Improve knowledge on the quantitative revolution in the geographical studies.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	3	2	3	3
CO_2	3	3	3	3	3	3	2	1	3	2	3	3
CO_3	3	3	3	3	3	3	2	1	3	2	3	3
CO_4	3	3	3	3	3	3	2	1	3	2	3	3

P.T.O

SYLLABUS

UNIT I Ancient Geography – Contributions of Greeks and Romans Medieval Geography– contributions of Arab Geographers, Modern Geography– Contribution of Immanuel Kant, Alexander Von Humboldt and Carl Ritter.

UNIT II Contributions of German Geographers : Friedrich Ratzel, Ferdinand Von Ritchthofen, Albrecht Penck and Alfred Hettner and French geographers: Vidal de la blache, Elisee Reclus, Jean Brunhes and Emmanual de Martonne. Asian geographers with special reference to Indian geographers

UNIT III Dualism in Geography-Systematic and regional Geography. Determinism and Possibilism; Geography as a natural science and social science.

UNIT IV Quantitative revolution– causes and consequences. Behavioral geography. Laws, Theories and Models in Geography.

Suggested Readings

- Dikshit, R.D. (ed.) : The Art & Science of Geography – Integrated Readings, Prentice Hall of India, New Delhi, 1994.
- Hartshome, R. : Perspective on nature of Geography, Rand MeNally & Co., 1959.
- Husain, M. : Evolution of Geographic thought, Rawat Pub., Jaipur, 1984.
- Minshull, R. : The Changing nature of Geography, Hutchinson University Library, London, 1970.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	1	3	2	3	3
CO_2	3	3	3	3	3	3	3	1	3	2	3	3
CO_3	3	3	3	3	3	3	3	1	3	2	3	3
CO_4	3	3	3	3	3	3	3	1	3	2	3	3

COMPULSORY FOUNDATION (OPT - 1)
GEG 203(A): PRINCIPLES OF REMOTE SENSING

Learning Objective

- To focus on history and evolution of Remote sensing.
- To explains the principle involved in remote sensing i.e. the Electromagnetic spectrum, reflection, refraction, diffusion, absorption and interaction with earth's atmosphere.
- To give the technical knowledge of satellite system.
- To provide knowledge on the platforms and instruments used for remote sensing.
- To give light on Areal Remote sensing and satellite Remote sensing.
- To explains about the specifications of sensors.

Learning Outcomes

After the completion of the course, Students will be able to

- Understand the principles of remote sensing and its techniques.
- Student will be able to know the apply the technique of remote sensing in varies fields.
- Student can apply the knowledge in getting authentic data by performing pre and post analysis in aerial remote sensing.
- Student will analysis the changes on earth surface with the image interpretation and visual interpretation techniques.
- With the sound knowledge on the process, principles, effecting factors, techniques of Remote sensing student can understand interpretation of the data in much more accurate.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	2	2	2	3	1	1	2	1	1	2
CO_2	3	3	2	2	2	3	1	1	2	1	1	2
CO_3	3	3	2	2	2	3	1	1	2	1	1	2
CO_4	3	3	2	2	2	3	1	1	2	1	1	2

P.T.O

SYLLABUS

UNIT I Introduction to Remote Sensing: History, Development and Principles. Stages in Remote sensing Process. Energy Sources and Radiation Principles-Energy Interaction in the Atmosphere. Atmospheric Windows. Energy Interaction with Earth Surface features. Electromagnetic Spectrum. Spectral reflectance patterns of Earth surface features in different wavelengths.

UNITII Thermal Remote Sensing: Thermal sensors and characteristics, Interpretation of thermal images, Emissivity conservation, Thermal inertia considerations, Factors effecting analysis of thermal images. Estimation of land surface temperature.

UNITII Microwave Remote Sensing: Microwave Remote Sensing and its advantages. Active and passive systems. Platforms and sensors. Active Microwave systems: Basic principles of radar, radar equation, Resolution, Range, Phase and Angular measurements, Microwave scattering and its measurement, Relationships between scene and sensor parameters. Imaging systems, Imagery – their characteristics and interpretation.

UNIT-IV. Satellite Remote Sensing: Types of Satellites, Orbits: Types of Orbits, and Orbital Characteristics. Platforms: types of Platforms in Remote sensing. Sensors-Definition,Types of Sensors in Remote sensing. Scanning mechanism. Resolutions: Definition, Spectral, Spatial, Temporal and Radiometric resolutions of Satellites. Characteristics of Indian Remote Sensing Satellites(I.R.S)

Suggested Readings

- American Society of Photogrammetry : Manual of Remote Sensing, ASP, Falls Church, V.A. 1983.
- Barrett, E.C. and L.F. Curtis : Fundamentals of Remote Sensing and Air Photo Interpretation, Mcmillan, New York, 1992.
- Compbell, J. : Introduction of Remote Sensing, Guilford, New York, 1989.
- Curran, Paul, J. : Principles of Remote Sensing, Longman, London, 1985.
- Leuder D. : Aerial Photographic Interpretation: Principles and Application, McGraw Hill, New York, 1959.
- Rao D.P. (eds.) : Remote Sensing for Earth Resources, Association of Exploration Geophysicist, Hyderabad, 1998.
- Thomas M. Lillesand and Ralph W. Kefer, Remote Sensing and Image Interpretation. John Wiley & Sons, New York, 1994.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	2	2	2	1	1	2	2	3	2	2	2	2
CO_2	2	2	2	1	1	2	2	3	2	2	2	2
CO_3	2	2	2	1	1	2	2	3	2	2	2	2
CO_4	2	2	2	1	1	2	2	3	2	2	2	2
CO_5	2	2	2	1	1	2	2	3	2	2	2	2

GEG 203(B): GEOGRAPHY OF TOURISM

Learning objectives:

- To provide introduction on Scope and subject matter of Tourism, Types of tourism. Tourism environment and Heritage.
- To give Knowledge on tourism and economic importance.
- To provide Understanding on Tourism and its Impact on Human Resources development.
- To provide knowledge on infrastructural and facilities development for tourism.

Learning Outcomes

After the completion of the course, Students will be able to

- Understand the evolution of tourism geography over the decades.
- Students will demonstrate understanding of the tourism and economic importance.
- They can understand the tourism impact on the HRD.
- Students will develop a concrete understanding of tourism and infrastructural need.

SYLLABUS

UNIT-I Tourism: Definition, nature and Scope Tourism. Types of tourism. Tourism environment and Heritage

UNIT-II Economic important of Tourism. status of national and the state of Andhra Pradesh in Tourism Development.

UNIT-III Human resource Development due to tourism -Apprenticeship, Training in Institutions of Computer Technology. Tourism as service based smokeless and non - export industry in India.

UNIT-IV Infrastructural development of Tourism and recreation - Accommodation, Food Facilities,Travel and Transport (palace on wheels), Drinking water, sanitation, security, banking, marketing and foreign exchange. Planning and policies of Tourism in India and Andhra Pradesh

Suggested Ridings:

- Kaul,C.N; Dynamics of Tourism . A trilogy in three volumes sterling publishers1985.
- Alister mathuson and Geefry hall – Tourism: Economic, Physical and social impact- longman, 1982.
- Chib, som ,N.-perspectives on Tourism in India.
- Bukart,A.J. and Medilik , S- Tourism: past , present and feature.
- Norval , A.j . The tourist Industry.
- PILLAI,R.N.- Tour and Pligrimage in India.
- Ram ACHARYA- Tourism and cultural heritage of India.
- KAUL.S.N –Tourism in India: all tourist Guide and Reference book 1977.
- Negi J.M.S. Tourism and hotelring : A world wide industry 1982, New Delhi :Gitanjali. Publication
- Bhatia ,A.K, - Tourism development :Principal and practices.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	2	2	2	1	1	2	2	3	2	2	2	2
CO_2	2	2	2	1	1	2	2	3	2	2	2	2
CO_3	2	2	2	1	1	2	2	3	2	2	2	2
CO_4	2	2	2	1	1	2	2	3	2	2	2	2
CO_5	2	2	2	1	1	2	2	3	2	2	2	2

GEG203(C): INDUSTRIAL GEOGRAPHY

Learning objectives:

- To develop the understanding about industrial Geography.
- To familiarize the students with industrial location theories, in industrial geography.
- To provide knowledge on industrial classification.
- To enhance knowledge on industrial regions and imbalances in India.

Learning Outcomes

After the completion of the course, Students will be able to

- Understanding about industrial Geography.
- Can familiarize the students with industrial location theories, in industrial geography.
- Improve the knowledge on industrial classification.
- Enhance knowledge on industrial regions and imbalances in India.

SYLLABUS

UNIT I Definition, Nature and scope of industrial Geography, significance of Industrial Geography, Industries; Introduction and definition.

UNITII Major geographical factors for industrial locations. Theories of Industrial location: August Losch and Isard.

UNITIII Classification of Industries: Resource based, agro based, Information Technology (IT). Multitasked: Small scale and large scale industries.

UNIT IV Industrial Regions: Industrial development in India, Industrialization in Andhra Pradesh. Regional imbalances.

Suggested Readings:

- Israd,W.: Introduction to regional sciences.Prentice Hall .
- Smith,D.M. : Industrial location, willay international edition -1971
- Alexander J.N.:Economic Geograpy. Prentice Hall.
- Estall,R.C.& industrial activity and Economic Geography, R.O.Buchanan Hatchinson university libraray, London
- SINHA,B.N. industrial geography of India
- Thoman ,Concling and yeats:The Geography of Economic activity, M.c graw Hill company.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	1	3	3	3	3
CO_2	3	3	3	3	3	3	3	1	3	3	3	3
CO_3	3	3	3	3	3	3	3	1	3	3	3	3
CO_4	3	3	3	3	3	3	3	1	3	3	3	3

GEG204(A): PHYSICAL GEOGRAPHY OF INDIA

Learning objectives:

- To develop the understanding about physical features of Indian Geography.
- To familiarize the students with physiography, Drainage, Climate, soil and natural vegetation of India.

Learning Outcomes

After the completion of the course, Students will be able to

- Conceptualize the elements of physical features of Indian geography.
- Visualize and recognize the major topographical, geological, soil and natural vegetation regions of India.
- examine the various issues, problems and challenges associated with these physical regions.

SYLLABUS

UNIT I Physiography: Major Physiographic Divisions of India; Extra- Peninsula: Its Structure Relief and the Evidences Regarding its Present Day Evolution; Evolution, Structure and Relief; of Peninsula, Indo Gangetic Plain, Western Coast, Eastern Coast and Islands.

UNIT II Drainage System: Himalayan and peninsular drainage - The Indus, Brahmaputra, Ganga the Godavari and Krishna River Systems; differences between the Himalayan and Peninsular Drainage.

UNIT III Climate: Origin and Mechanisms of Indian Monsoon - Classical and Modern Views of origin; Effects of El-Nino and La-Nina on Indian Monsoon. Koppen's and Thornthwaite classification of Indian Climate.

UNIT IV Soils and Forest: classification, erosion and conservation; Saline and Alkaline Soils - measures of reclamation; Problems and developmental programs of Indian Forestry.

Suggested Readings:

- Spate, O.H.K., & Learrmonth, A.T.A., India & Pakistan, London.
- Puri, G.S., Indian forest Ecology, New Delhi.
- Ray Chaudhary, S.P. Land and soil, New Delhi
- The Gazetteer of India Vo 1,.1
- Krishnan, M.B. : Geology of India, Higginbothams, Madras.
- Das, P.K., The Monsoon, New Delhi
- Wadia, D.N., Geology of India, London.
- Memoria, C.B. : Economic and Commercial Geography of India, Shirlal Agarwaland Co., Agra, 1991.
- Alam, S.M. : Planning atlas of Andhra Pradesh.
- Khullar: India, A comprehensive Geography. Kalyani Publishers , New Delhi.1989.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	1	3	3	3	3	3	3	1	3	3	3	3
CO_2	2	1	3	3	2	3	3	1	3	3	3	3
CO_3	1	1	3	3	3	2	3	1	3	3	3	3
CO_4	3	3	1	3	3	3	3	1	3	3	3	3

GEG204(B): REGIONAL GEOGRAPHY OF INDIA

Learning objectives:

- To conceptualize the regional approaches and to examine regional differentiation in the study of Indian Geography.
- To expose to historical, economic, cultural, social and physical characteristics of India.
- To provide an introduction to the regions of the India in terms of both their uniqueness and similarities. .

Learning Outcomes

After the completion of the course, Students will be able to

- Developed the art of regionalization technique while focusing about diversity of Indian region.
- visualized and recognized about regional identities and socio-cultural dimension of regionalization to address the issues and concern needed for regional planning.

SYLLABUS

UNIT I Location and Regional Geographical Setting; Region; Development and Types- formal region, nodal region, functional region. Regionalization – Causes, methods and techniques used for regionalization.

Unit: II Mineral Resources – Coal, Iron ore and petroleum. Industries: Iron and Steel, Oil refinery and Paper industries; Industrial Regions of India.

Unit III Agriculture – Agriculture Types, Systems and Productivity. Regionalization of Agriculture - methods and techniques used in the analysis of crop combination regions. Agricultural policies in India

Unit IV Population; Distribution, Density growth and problems, population policies in India; Irrigation; Multipurpose projects. Power – Hydral, Thermal, Solar and Wind

Suggested Readings

- Spate, O.H.K., & Learrmonth, A.T.A., India & Pakistan, London.
- Puri, G.S., Indian forest Ecology, New Delhi.
- Ray Chaudhary, S.P. Land and soil, New Delhi
- The Gazetteer of India Vo 1,.1
- Krishnan, M.B. : Geology of India, Higginbothams, Madras.
- Das, P.K., The Monsoon, New Delhi
- Wadia, D.N., Geology of India, London.
- Memoria, C.B. : Economic and Commercial Geography of India, Shirlal Agarwal and Co., Agra, 1991.
- Alam, S.M. : Planning atlas of Andhra Pradesh.
- Khullar: India, A comprehensive Geography. Kalyani Publishers , New Delhi.1989.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	2	3	1	2	3	1	3
CO_2	2	2	2	2	3	3	2	1	3	2	3	3
CO_3	1	3	3	2	3	1	3	2	2	1	2	2
CO_4	3	1	3	3	1	3	2	1	3	3	3	3

GEG204(C): SOCIAL AND CULTURAL GEOGRAPHY

Learning objectives:

- To understand the theoretical emergence of social geography, social well being, gender issues, social differentiation and regional dimensions of sociological changes.
- To demographic, social and cultural attributes of Earth such as migration, social relations and cultural identity

Learning Outcomes

After the completion of the course, Students will be able to

- Assess the casual role of Geography in production of different social groups and shaping of their unique features.
- Evaluate the emerging social spaces, stratification, social well being, and issues of social justice through spatial perspective.

SYLLABUS

UNIT I Social Geography – Nature and Scope – Social Structure and processes – concept of space and place – social well being – quality of life – social exclusion and inclusion.

UNIT II Ethnicity, tribe, dialect, language, caste and religion - Spatial distribution- World and India.

UNIT III Cultural Geography- Nature and scope; culture complex and regions; cultural heritage, interactions, diffusion, ecology and imperialism.

UNIT IV India's Cultural Setting: Historical perspective of Indian culture; Racial, linguistic, ethic diversities and religious minorities; Inter-regional, intra-regional and international migration and associated problems; Health indicators.

Suggested Readings:

- Robestein J.H. & Robert S. Barren (1990) the cultural Landscape An Introduction to Human Geography, Prentice Hall of India Pvt. Ltd. New Delhi – 1.
- Singh R.Y. (2003) Geography of Settlements. Rawat Publications, Jaipur.
- Hussain M. (1999) Human Geography, 2nd Edition, Rawat Publication, Jaipur .
- TirthaRanjit (2002) Geography of India 2nd Edition, Rawat Publication, Jaipur.
- www.fortunecity.com/victorian/updike/188.culture.
- www.utexas.edu/depts/grg/sanders/GRG305/industrialgeography.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	2	3	2	2	3	3	3	1	3
CO_2	3	3	2	2	3	1	2	2	3	2	3	3
CO_3	1	3	1	2	3	3	3	2	2	1	3	3
CO_4	3	3	3	3	1	3	3	1	3	3	3	3

Practical - 1

GEG 205: INTERPRETATION OF TOPOGRAPHICAL(S.O.I., U.S and O.S) AND WEATHER MAPS

Learning objectives

- To provide understanding and interpretation Skills of different Topographical maps.
- To improve the knowledge on Indian weather maps and Interpretation skills.

Learning Outcomes

After the completion of the course, Students will be able to

- Explain the elements, scale and numbering of Topographical maps
- Analyse and interpret the physical and cultural features from Indian, U.S and O.S Toposheets.
- Explain the elements of weather maps and analyse and interpret the weather maps

SYLLABUS

UNIT I	Indian Topographical Maps – Introduction, Numbering, importance, and usage
UNIT II	Interpretation of physical features and cultural features Survey of India (SOI).
UNIT III	Interpretation of physical features, cultural features U.S. and O.S. Toposheets.
UNIT IV	Interpretation of Weather maps (India): elements and interpretation.

Suggested Readings

- John Bygott : An introduction to map work and practical geography, UniversityTutorial Press Ltd., London, 1974.
- Mishra, R.P. and Ramesh, A. : Fundamentals of Cartography, Concept, New Delhi,1989.
- Singh, R.L.: Map work and practical geography, control Book depot, Al lahabad,1972.

Practical - 2

GEG 206: RESEARCH TECHNIQUES

Learning objectives

- To provide an understanding for the student on statistical concepts to include measurements of location and dispersion, and correlation analysis.
- To calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data cases.
- To sensitize the different Research and agricultural techniques.

Learning outcomes:

After the completion of the course, Students will be able to

- Keeping in view the nature of data and purpose of study and to make a rational choice amongst listed various statistical methods.
- Students shall know how to organize, manage, and present data.
- Understand and use different research techniques in their researches and day to day needs.
- Use different agricultural methods in their research and needed situations.

SYLLABUS

UNIT I Frequency Distribution, Measures of Central Tendency; Arithmetic Mean, Median, Mode

UNIT II Measures of dispersion: Mean deviation, Quartile deviation, Standard deviation, Correlation- Rank Correlation

UNIT III Network analysis: Alfa, Beta, Gama, Eta, Theta indices, Centrality,Connectivity and shortest path matrix analysis.

UNIT IV Nearest neighbor distance analysis, Crop combination and Drainage basin Morphometry

Suggested Readings

- Aslam Mahmood–Statistical Methods in Geographical Studies, Publication, New Delhi, 1977.
- Cole, J.P. & King, DAM – Quantitative Methods in Geography, John Wiley andSons, New York, 1968.
- Gregory, K.J. and Walling, D.E. Drainage basin form and process: AGeomorphologic approach; Amold; London 1973.
- Peter Davis: Science in geography, Science Series– 3, Data description and presentation, Oxford University Press, London, 1975.
- Peter Toyne and Peter Newby, T.: Techniques in Human geography, MacMillan, London, 1972.
- Singh Jasbir and Dhillon, S.S. : A gricultural geography, TATA Mc Graw Hill,New Delhi, 1984.
- Singh, R.L. Mapwork and practical geography, central book depot, Allahabad,1972.
- Singh, R.L. Elements of Practical Geography, Kalyani Publishers, 1992.
- Toyni, P. and Newby, Techniques of Map, Longman, London, 1965

Audit Course

HUMAN VALUES AND PROFESSIONAL ETHICS – II

Unit I Value Education –Definition – relevance to present day – Concept of Human Values – Self introduction – Self esteem. Family Values – Components, structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Unit II Medical ethics- views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit III Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions, Characteries of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit IV Environmental ethics- Ethical theory, man and nature – Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

Unit V Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities Feminist ethic, surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television Movies and Internet.

Suggested Readings:

- John S Mackenjie: A Manual of ethics.
- "The Ethics of Management": by Larue Tone Hosmer, Richard D. IrwinInc.
- "Management Ethics – integrity at work" by Joseph A. Petrick and JohnF. Quinn, Response Books: New Delhi.
- "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
- Harold H. Titus: Ethics for Today.
- Maitra, S.K: Hindu Ethics.
- William Lilly: Introduction to Ethics.
- Sinha: a Manual of Ethics.
- Manu: Manu Dharma Sastra or the institute of Manu: Comprising the Indian system of Duties: Religious and Civil(ed) G.C. Haughton.
- Susruta Samhita: Tr. Kaviraj Kunjanal, Kunjanal Brishagratha, Chowkamba Sanskrit Series. Vol. I,II,III, Varanasi VOL. I OO, 16-20, 21-32, and 74-77 only.
- Caraka Samita: Tr. Dr. Ram Karan Sharma and Vaidya Bhagavan Dash, Chowkamba Sanskrit Series Office, Varanasi. I,II,III VOL. I, PP 183-191.
- Ethics, Theory and Contemporary issues, Barbara Mackinnon, Wads Worth/Thomson Learning 2001.
- Analyzing Moral issues, Judith A. Boss, Mayfield Publishing Company ,1999.
- An Introduction to Applied Ethics (Ed.) John H. piet and Ayodhya Prasad, Cosmo Publications.
- Text book for Intermediate logic, Ethics and Human Values, Board of Intermediate Education & Telugu Academic Hyderabad.
- I.C Sharma Ethical Philosophy of India. Nagin& Co. Julundhar.

SEMESTER – III
CORE THEORY-1
GEG 301: URBAN GEOGRAPHY

Learning objectives:

- To deal with the concept of urban settlements and evolution of urban population and to provide concept of Urban studies.
- To explain the cause and effects of growth in urban population.
- To explain the theories involved in classifications of towns and relationship between townsand cities and their population.
- To understand patterns of World urbanization with reference to India

Learning out comes:

After the completion of the course, Students will be able to

- Learn the concept of urban settlements and evolution of urban population and to provide concept of Urban studies.
- Understand the cause and effects of growth in urban population
- Explains the theories involved in classifications of towns and relationship between towns and cities and their population.
- Distinguish patterns of Worldurbanization with reference to India.

P.T.O

SYLLABUS

UNIT I Urban Geography : Definition, Nature and scope. Urban growth, structure and slums. Urban settlements - Impact of the Industrial revolution on location, spacing and size of urban settlements

UNIT II Origin and evolution of cities: Ancient, Medieval and Modern cities. Primate city, Metropolis; Megalopolis and Conurbation, The concept of Smart Cities and Satellite towns, Patterns of towns and city's.

;.

UNIT III Urban Hierarchy, Rank– size relationship, Nearest Neighbor analysis– classification of towns with special reference to functional classification. Urban Morphology - Theory's: Concentric Zone, Multiple-nuclei, Central Place and Sector Theory.

UNIT IV Rural – urban relationships, rural - urban fringe, urban decay, urban sprawl urban renewal. The concept of city – region: Urban Um-land and hinter land; Pattern of world urbanization with special reference to India and Andhra Pradesh.

Suggested Readings

- Johnson, J.H., Urban Geography. An Introductory Analysis, Pergaman Press, Oxford, 1967.
- Murphy, R. : The American City : an Urban Geography McGraw Hill, 1966.
- Dickinson, R.E. : City and Region, Routledge and Kegen, Paul Ltd., London, 1964
- Mayer and Cohen : Readings in Urban Geography, Central Book Depot., Allahabad.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	1	3	3	1	2	1	3	3	3	1
CO_2	3	3	1	3	3	3	3	1	3	3	3	3
CO_3	3	3	1	3	3	3	2	1	3	3	3	2
CO_4	3	3	1	3	1	3	3	1	3	3	3	1

CORE THEORY-2

GEG 302: GEOGRAPHICAL INFORMATION SYSTEM (GIS)

Learning objectives:

- To understand the evolution of GIS.
- To focus on collection, analyzing, interpretation andresenting the data related to Earth.
- To explains the types of data collection with respective to time and terrain and Data base management and retrieving the data from different sources.
- To provides the theoretical knowledge on the Modeling surfaces and integration of Remote sensing with GIS.
- To provide knowledge on GIS applications in different sectors.

Learning Outcomes:

After the completion of the course, Students will be able to

- Understand the evolution of GIS**.**
- focus on collection, analyzing, interpretation andresenting the data related to Earth.
- Differentiate the types of data collection with respective to time and terrain and Data base management and retrieving the data from different sources**.**
- Improve knowledge on the Modeling surfaces and integration of Remote sensing with GIS.
- Develops knowledge on GIS applications in different sectors.

P.T.O

SYLLABUS

UNIT I GIS: Definitions and Development – Computer Components of GIS (Hardware and Software) – General Data Base concepts of Spatial and Non - spatial data - Elements of Spatial data - Sources of Spatial data – Data quality for GIS – Errors and Error variations in GIS.

UNIT II GIS Data Management: Data Base Management Systems (DBMS) Data BaseModels. Data input methods – Spatial Data structures: Raster data and Vector data – Structures – GIS Data Analysis: Spatial measurementmethods Reclassification – Buffering – Overlay Analysis.

UNIT III Modeling Surfaces: Co- or di na tes, Generation of DEM, DTM and TIN models – Spatial Interpolation – GIS output generation – Integration of Remote Sensing and GIS. Network Analysis.

UNIT IV GIS applications: GIS as a Decision Support System – GIS as a Land Information System – GIS as a Disaster Management and Emergency Response System - Resource management applications - Facility Management application – Urban Management application.

Suggested Readings

- Aronoff S. Geographic Information System : A Management Perspective, DDLPublication, Ottawa. 1989.
- Burrough P.A. Principles of Geographic Information Systems for Land ResourceAssessment. Oxford University Press, New York, 1986.
- Fraser Taylor D.R. Geographic Information System. Pergamon Press, Oxford, 1991.
- Maquire D. J.M.F. Goodchild and D.W. Rhind (eds.) Geographic InformationSystems : Principles and Application. Taylor & Francis, Washington, 1991.
- Mark S. Monmonier. Computer – assisted Cartography. Prentice – Hall, EnglewoodCliff, New Jersey, 1982.
- Peuquet D.J. and D.F. Marble, Introductory Reading in Geographic InformationSystems. Taylor & Francis, Washington, 1990.
- Star J. and J. Estes. Geographic Information Systems : An Introduction. PrenticeHall, Englewood, Cliff, New Jersey, 1994.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	2	2	2	1	1	2	2	2	2	2	2	2
CO_2	2	3	2	1	1	2	2	2	2	2	2	2
CO_3	2	2	2	3	2	3	2	2	2	2	2	2
CO_4	1	3	2	1	2	3	2	2	2	2	2	2
CO_5	2	2	3	2	2	3	2	3	2	2	2	2

GENERIC ELECTIVE (Opt-1)

GEG-303(A): AGRICULTURAL GEOGRAPHY

Learning objectives:

- To focus on evolution of Agriculture through at the different ages and approaches.
- To understand the concepts and importance of determinants in different cropping patterns.
- To understand agricultural location theories also the problem and prospects of Indian Agriculture .

Learning Outcomes:

After the completion of the course, Students will be able to

- Know evolution of Agriculture through at the different ages and approaches.
- Understand the concepts and importance of determinants in different cropping patterns.
- Differentiate the Determinants of Agriculture
- Understand agricultural location theories also the problem and prospects of Indian Agriculture .

SYLLABUS

UNIT I Nature, Scope, significance and development of Agricultural Geography. Approaches to the study of agricultural geography; Origin and evolution ofagriculture.

UNIT II Determinants of agriculture – Physical, Socio -economic, technological andpolitical; concepts and methods of land use classification.

UNIT III Concepts and methods of Agriculture: Crop combination; Crop concentration; Crop diversification; agricultural productivity; agricultural typology.

UNIT IV Agricultural location theory – Von Thunen and its modifications. Concepts of agricultural region and agricultural regionalization. Whittlesey's agricultural systems of the world. Agricultural regions of India. Green revolution, HYV; Problems and prospects of Indian agriculture.

Suggested Readings

- Bayliss Smith,T.P.: The Ecology of Agricultural Systems. Cambridge University Press, London, 1987.
- Berry, B.J.L. et al. : The Geography of Economic Systems. Prentice Hall, NewYork, 1976.
- Dyson, T. : Population and Food – Global Trends and Furure Prospects. Routledge,London, 1996.
- Gregor, H.P. : Geography of Agriculture. Prentice Hall, New York, 1970.
- Grigg, D.B. : The Agricultural Systems of the World. Cambridge University Press,New York, 1974.
- Hartshorn, T.N. and Alexander, J.W. : Economic Geography. Prentice Hall, NewDelhi, 1988.
- Morgan, W.B. and Norton, R.J.C. : Agricultural Geography. Mathuen, London,1971.
- Singh, J. and Dhillon, S.S. : Agricultural Geography, Tata McGraw Hill Pub., NewDelhi, 1988.
- Tarrant, J.R : Agricultural Geography. Wiley, New York, 1974

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	2	2	2	1	1	2	2	3	2	2	2	2
CO_2	2	2	2	1	1	2	2	3	2	2	2	2
CO_3	2	2	2	1	1	2	2	3	2	2	2	2
CO_4	2	2	2	1	1	2	2	3	2	2	2	2
CO_5	2	2	2	1	1	2	2	3	2	2	2	2

GEG-303(B) TRANSPORT GEOGRAPHY

Learning objectives:

- To focus on evolution and development of transport through at the different ages and approaches.
- To understand the concepts and importance of determinants of transport patterns.
- To understand transport theories also the problem and prospects of Indian transport .

Learning Outcomes:

After the completion of the course, Students will be able to

- Know evolution and development of Transport through at the different ages and approaches.
- Understand the concepts and importance of determinants in different transport patterns.
- Differentiate the Determinants of transport and trade.
- Understand transport theories also the problem and prospects of Indian transport. .

P.T.O

SYLLABUS

UNIT I Nature, scope, significance and development of transport geography. Factors for development of transport system; economic, social, cultural and institutional. Different types of Transportation-their merits and demerits Factors controlling the cost of transport.

UNIT II Transport: Structure, accessibility and flow models; network structure, graph theoretic measures, measurement of accessibility, models of network change, linear programming and gravity models.

UNIT III Theories related to freight route structure. Bases of spatial interaction, Complementarily, intervening opportunities and transferability. Patterns of movement

UNIT IV Transport policy and planning in India. Urban transport: growth and problem of urban transportation. Environmental degradation: vehicular pollution and congestion alternatives to the transport system in mega cities.

Suggest Readings:

- Chorley R.J. &Hagett P.: Models in Geography Methuen & Co. London. 1967.
- Hurst, M.E.(ed.): Transportation Geography, McGraw-Hill, 1974.
- Hagget, F and Chorlley, R.J. Network Analysis', Edward Arnold, London, 1968.
- Hay, A.: Transport Economy, MacMillan, London, 1973.
- Hoyle, B.S.(ed): Transport and Development, MacMillan, London, 1973.
- Raza, M. and AgrawalY.P. :Transport Geography of India, Concept, New Delhi, 1985.
- Robison H &Bamford C.G.: Geography of Transport Machdonals& Evans. London 1978.
- Taffe, E.J. & Gauthier (Jr.) H.L. Geography of Transportation, Prentice-Hall, Englewood Cliffs, N.J., 1973.
- Ullman E.L.: American Commodity Flow University of Washington Press 1957.
- White H.P. and Senior, M.L. Transport Geography, Longman, London, 1983.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	2	2	2	2	2	2	3	2	2	2	2
CO_2	3	2	2	2	2	2	1	2	2	2	2	2
CO_3	3	2	2	2	1	2	3	2	2	2	2	2
CO_4	3	2	2	2	1	2	3	2	2	2	2	2
CO_5	2	2	2	1	1	2	3	2	2	2	2	2

GEG-303(C) DISASTER MANAGEMENT STUDIES

Learning objectives:

- To develop the skill of understanding about natural calamities and disaster and also realize the consequences as well as preparedness.
- To create awareness on human and natural disasters
- To understand classification of disasters and its impacts

Learning Outcomes:

After the completion of the course, Students will be able to

- Develop the skill of understanding about natural calamities and disaster and also realize the consequences as well as preparedness.
- Improve awareness on human and natural disasters
- Understand classification of disasters and its impacts and management of disasters

SYLLABUS

UNIT I: Disaster: Meaning and Concept, types of Disasters. Natural disasters: Earthquakes Hazardous effects, Volcanic eruptions – Hazardous effects.Certain case studies.

UNIT II: Cyclones and floods : cyclone related parameters and effects on land and sea-damage assessment. Causes of flood and food prone area analysis –damage assessment. Certain case studies.

UNIT III (a) Droughts and desertification: Types of droughts – factors influencing droughts – land use and groundwater level changes – delimiting drought prone areas.

(b)Main induced disasters: Deforestation and environmental degradation,urbanization, industrial development and environmental pollution. Types of pollution : air pollution, water pollution, soil pollution and noise pollution.

UNIT IV Disaster management: Pre and post disaster operations of Earthquakes, cyclones, floods, droughts, forest fires. The role of Remote Sensing and GIS in disaster management studies.

Suggested Readings

- Savindra Singh, Environmental Geography, Prayag Pintak Bhavan, Allahabad,2006.
- Singh, L.R., Singh, Savindra, Tiwari, R.C. and Srivastava, R.P.: EnvironmentalManagement (edited), Allahabad University, 1983.
- Singh, Savindra : Flood hazards and environmental degradation; A case study ofthe Gomathi River, in environmental management, Allahabad University, 1983.
- John, A. Mattlews : Natural hazards and environmental change. Bill Mcguire, Ian Mason, 2002.
- Nimpuno, K : Disasters and Social Response, ITC, 1989.
- Hooja, R. and Joshi, R. : Desert, Drought and Development Studies in ResourceManagement and Substainability: Rawat Publications, Jaipur, 1994.
- Aronaff, S : Geographic Information Systems; A Management Perspective, DDLPublications, Ottawa, 1989.
- Barrett, E.C. and Curtis, L.F.: Fundamentals of Remote Sensing and Air photointerpretation, Mcmillan, New York, 1992.
- Bring, N., Dhal and Ms. Sunita Dhal : Can GIS and Disaster Management Systemhelp, GIS India? Vol.9, No.1, January -February, 2000.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	2	2	1	3	2	2	3	3	2	2	2	2
CO_2	3	2	3	1	1	3	2	3	2	2	2	2
CO_3	3	2	2	2	3	2	2	3	2	2	2	2
CO_4	3	2	2	2	3	3	2	3	2	2	2	2
CO_5	2	2	3	1	1	2	2	3	2	2	2	2

PRACTICAL

GEG-304: GEOGRAPHICAL INFORMATION SYSTEM(GIS)

Learning objectives:

- To acquaint knowledge the about especially Geographic Information System (GIS) softwares.
- To develop the skill of geo-referencing and creation of different data files.
- To improve the practical knowledge on attribute data and linkage.
- To develop the skill on analysis methods of GIS.

Learning Outcomes:

After the completion of the course, Students will be able to

- Acquaint knowledge the about especially Geographic Information System (GIS) softwares.
- Develop the skill of geo-referencing and creation of different data files.
- Improve the practical knowledge on attribute data and linkage.
- Develop the skill on analysis methods of GIS.

SYLLABUS

UNIT I GIS Capabilities

UNIT II Introduction to ARC GIS Software

(a) Arc Map, (b)Arc Catalogue.(c) Arc Tool box, (d)Table of Contents,(e)Arc Scan

UNIT III Geo-Referencing.

UNIT IV Creation of File Geo data base, Personal Geo -data base, shape file. – Data Base generation – Spatial data generation – Digitization (Polygon, line and point) and Non -spatial data.

UNIT –V Attribute data base and linkage of data Base.

UNIT VI GIS-Analysis Methods

(a) Buffering, (b) Map overlay,(c) Interpolation, (d) Contours,(e), Slope, (f) DEM

Suggested Readings

- Ian Heywood et al. An Introduction to Geographical Information Systems,Addison Wesley Longman Ltd. 1998.
- Mishra, H.C.; GIS Handbook, GIS India, Hyderabad, 1996.
- Peter A. Burrough and Rachael A. McDonnell; Principles of GeographicalInformation Systems; Oxford University Press, New York, 1998.
- Star J and J. Estes; Geographic Information Systems; An Introduction, PrenticeHall, Englewood Cliff, New Jersey, 1994.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	2	2	2	2	3	2	2	2	2	2	1
CO_2	3	1	2	2	2	3	2	2	2	2	3	2
CO_3	3	1	2	2	2	3	2	2	2	2	3	3
CO_4	3	1	2	2	2	3	2	3	2	2	2	2
CO_5	2	1	2	2	1	2	2	3	2	2	2	2

SKILL ORIENTED COURSE

(MANDATORY THEORY & PRACTICAL)

GEG-305: GLOBAL POSITIONING SYSTEM (GPS) DIGITAL SURVEY AND REPORT

Learning objectives:

- To develop the skill of understanding GPS and Survey.
- To create awareness on post processing of GPS data and collection of data from GPS survey.
- To develop skill of report writing by using GPS data and software and hardware.

Learning Outcomes:

After the completion of the course, Students will be able to

- Develop the skill of understanding GPS and Survey.
- Generate awareness on post processing of GPS data and collection of data from GPS survey.
- Develop skill of report writing by using GPS data and software and hardware.

SYLLABUS

(THEORY)

UNIT-I Global Positioning System (GPS) - Basic concept, system architecture, space segment, user segment; GPS Signals:- Signal structure, selective availability; GPS coordinate frames Time references: Geodetic and Geo centric coordinate systems, world geodetic 1984 (WGS 84), GPS time.

UNIT-II GPS Applications - Field Data collection, Navigation, Aviation, Marine, Rail, Roads and highways, Space, Survey mapping, Defense, Agriculture, Environment.

(PRACTICAL)

UNIT III Introduction to GPS systems: Hardware, Software. Field procedures of GPS.

UNIT IV GPS surveying. Data collection procedures: Point, Line and Area data collection. Post processing of the GPS data. GPS and GIS integrations output preparation. Report.

Suggested Readings:

- Bailey, T. and Gatrell, A. C. (1995): Interactive Spatial Data Analysis. Longman ,Harlow.
- Dorling, D. and Fairborn, D. (1997): Mapping. Ways of Representing the World. Longman, Harlow.
- Fraser Taylor, D.R. (1980): The Computer in Contemporary Cartography. John Wiley and Sons, New York.
- Fraser Taylor, D.R. (ed.) (1983): Graphic Communication and Design in Contemporary Cartography. John Wiley and Sons, New York.
- Kanetkar, T.P. and Kulkarni, S.V. (1967): Surveying and Levelling, Part II, A.V.G. Prakashan, Poona.
- Keates, J.S. (1973): Cartographic Design and Production, Longman Group Ltd.
- Mailing, D.H. (1973): Co-ordinate Systems and Map Projections. George Philip and Sons Ltd.
- Rhind, B. and Adams, T. (ed.) (1983): Computers in Cartography. British Cartographic Society, London.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	2	2	2	1	1	2	2	3	2	2	2	2
CO_2	2	2	2	1	1	2	2	3	2	2	2	2
CO_3	2	2	2	1	1	2	2	3	2	2	2	2
CO_4	2	2	2	1	1	2	2	3	2	2	2	2
CO_5	2	2	2	1	1	2	2	3	2	2	2	2

OPEN ELECTIVE (OPT - 1)

GEG 306(A): REGIONAL GEOGRAPHY OF ANDHRA PRADESH

Learning objectives:

- To develop the understanding about physical features of Andhra Pradesh..
- To familiarize the students with physiography, Drainage, Climate, soil and natural vegetation of Andhra Pradesh.
- To visualise the population, mineral and transportation structures in Andhra Pradesh

Learning Outcomes:

After the completion of the course, Students will be able to

- Develop the understanding about physical features of Andhra Pradesh..
- Familiarize the students with physiography, Drainage, Climate, soil and natural vegetation of Andhra Pradesh.
- Visualise the population, mineral and transportation structures in Andhra Pradesh

SYLLABUS

UNIT I: Re-organization of Andhra Pradesh Act -2014 Location and physical setting – Major Physiographic Divisions– Soils, Vegetation, and Drainage – Climate Regions and their Characteristics.

UNIT II Population Distribution; Density, growth and problems. Agriculture Types. Irrigation and power; Multipurpose Projects, Major food grain crops.(Paddy, Jower and Ragi), major Commercial Crops (Cotton, Groundnut and Mango).

UNIT III Mineral Resources: Iron ore, Limestone and Petroleum, Industries: Iron and Steel, Cotton and IT. Industrial Regions and Special Economic Zones (SEZ) Andhra Pradesh.

UNIT IV Transportation and Communication – Road, Rail, Water (special reference to coastal Transport) and Air Transport. Communication net work in Andhra Pradesh

Suggested Readings:

- Take from 401, 4, 5 from old syllabus.
- Structure, growth an d prospects of Industries in Andhra Pradesh. lotuspublications, Varanasi - 1989.
- Regional Geography of Andhra Pradesh – Telugu Academy.
- Andhra Pradesh year book -2010-2015

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	1	3	3	3	3
CO_2	3	3	3	3	3	3	3	1	3	3	3	3
CO_3	3	3	3	3	3	3	3	1	3	3	3	3
CO_4	3	3	3	3	3	3	3	1	3	3	3	3

GEG306 (B): GEOGRAPHICAL INFORMATION SYSTEM

(GIS) & GLOBAL POSITIONINGSYSTEM (GPS) AND APPLICATIONS

Learning objectives:

- To understand the evolution of GIS and GPS.
- To focus on collection, analyzing, interpretation andresenting the data related to Earth.
- To explains the types of data classification in GIS.
- To provides the theoretical knowledge on the Modeling surfaces and integration of Remote sensing with GIS.
- To provide knowledge on GIS and GPS applications in different sectors.

Learning Outcomes:

After the completion of the course, Students will be able to

- Understand the evolution of GIS**.**
- Focus on collection, analyzing, interpretation andresenting the data related to Earth.
- Differentiate the types of data
- Improve knowledge on the Modeling surfaces and integration of Remote GPS with GIS.
- Develop knowledge on GIS and GPS applications in different sectors.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

SYLLABUS

UNIT I: GIS - Definition, History, Development and components. GIS Data Generation :- Spatial and Non Spatial Data; Data structures : Raster and Vector; Geo-coordinate system; Data analysis: Measurement & Connectivity, Interpolation , Classification. TIN, DTM ,DEM Modals.

UNIT II: GIS Applications - GIS as a decision support system, management of information system, land information system, Urban planning management, Disaster management and Emergency Response System, Resource management applications, Network applications, facility management applications.

UNIT-III Overview of GPS - Basic concept, system architecture, space segment, user segment; GPS Signals:- Signal structure, Anti Spoofing (AS), selective availability; GPS coordinate frames Time references: Geodetic and Geo centric coordinate systems, world geodetic 1984 (WGS 84), GPS time.

UNIT-IV GPS Applications - Field Data collection, Navigation, Aviation, Marine, Rail, Roads and highways, Space, Survey mapping, Defense, Agriculture, Environment.

Suggested Readings:

- Burrough, P.A., 1986, Geographical Information System for land Resources System, OxfordUniv. Press, UK.
- Fotheringham, S.; Rogerson, P. (ed.), 1994. Spatial analysis and GIS. Taylor and Francis,London, UK.
- Laurini, Robert and Dierk Thompson, 1992, Fundamentals of Spatial Information Systems, Academics Press, ISBN 0-12-438380-7.
- Maguire,D.J.; Goodchild, M.F.; Rhind,D.W. 1991.Geographical information System,Longman, London,UK
- Siddiqui, M.A.; 2006, Introduction to Geographical Information System, Sharda PustakBhavan,
- Allahabad. Siddiqui, M.A.; 2011, Concepts and Techniques of Geoinformatics, Sharda Pustak Bhavan,Allahabad.
- G S RAO, Global Navigation Satellite Systems, McGraw-Hill publications, New Delhi, 2010
- B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, 'GPS – Theory and Practice',Springer – Wien, New York (2001).
- James Ba – Yen Tsui, 'Fundamentals of GPS receivers – A software approach', John Wiley& Sons (2001).
- Bradford W. Parkinson,James J. Spiker Jr, 1996. Global Positioning System: Theory andApplications, Vol I and II, American Institute of Aeronautics and Astronautics: Washin.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

SEMESTER – IV

CORE THEORY-1

GEG 401: REGIONAL PLANNING

Learning objectives:

- To apprise the concept of Region and its planning.
- To explains the types of regions and regional hierarchy.
- To explains the types of regional planning and planning process.
- To the people participation in planning process and role of Panchayat Raj system
- To explain the resource based and physiographic based regional planning.

Learning Outcomes:

After the completion of the course, Students will be able to

- Acquire a solid base of knowledge in the principles and practices Regional planning.
- The skills necessary for the effective practice of planning, including its purpose, meaning elements of plans; adoption, administration, and implementation of plans.
- Develop the values necessary for the effective practice of planning, including problem-solving skills; research skills; written, graphical, and oral skills; computational skills.
- Learn the values and ethical standards affecting the practice of planning.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

P.T.O

SYLLABUS

UNIT I Regional Planning: Definition, Nature and scope. Concept of Region; Changing concept of the region from an inter -disciplinary view – point; concepts of regionalism and regionalization. Types of Regions: Formal and functional, uniform and Nodal, single purpose and composite regions, regional hierarchy and special purpose regions.

UNIT II Types of Planning- Sectoral, Temporal; short term, long term and Multilevel planning and planning process. Government planning polices.

UNIT III Decentralized Planning: Peoples participation in the Planning process; Panchayathi Raj system. Theories of development- Spatial and Non spatial.

UNIT IV Physical resource and special purpose regions: River valley regions, hilly and tribal regions, drought prone regions, Special Economic Zones and metropolitan regions.

Suggested Readings

- Sundaram, K.V. : Urban and Regional Planning, Vikas Publishing house, NewDelhi, 1977.
- Misra, R.P. and Sundaram, K.V. : Rural Area Development, Sterling Publishers,New Delhi, 1979.
- Misra, R.P., Urs, D.V. and Nataraj, V.K. : Re gional Planning and NationalDevelopment, Vikas Publishers, New Delhi, 1978.
- Misra, R.P. : Regional Planning Concepts, Techniques and case studies,Prasaranga Press, University of Mysore, Mysore, 1969.
- Sengupta, P. and Galina Sdasyuk : Economic Regionalisa tion of India: Problemsand Approaches, Census of India, Monogram, New Delhi, 1968.
- Planning Dept. Government of Andhra Pradesh : Planning and Development ofBackward Regions – A Case Study of Rayalaseema.
- Mishra, R.P. et al. Multi-Level Planning : Heritag e Publishers, Delhi, 1980.
- Bhat, L.S. et al. Micro-Level Planning : A Case Study of Kamal Area, Haryana, K.BPublications, New Delhi, 1976.
- Friedmann, J. and Alonso, W. : Regional Development and Planning – A Reader, M.I.T. Press, Cambridge Mass, 1967.
- Kuklinski, A.R. (ed.) : Growth Poles and Growth Centres in Regional Planning,Mouton, The Hague, 1972.

CORE THEORY-2

GEG 402: ADVANCED REMOTE SENSING

Learning objectives:

- To give broad knowledge on photogrammetry, Principle, process, platforms and techniques and Aerial photographs.
- To provide knowledge on software and hardware required for digital image processing, image enhancement and restoration techniques.
- To understand the application of remote Sensing and Photogrammetry in various fields of study.

Learning Outcomes:

After the completion of the course, Students will be able to

- Demonstrate knowledge of the foundations and theories of Photogrammetry, aerial photography and remote sensing.
- Acquire knowledge of physical geography and the methods and techniques for observing, measuring, recording and reporting on geographic phenomena.
- Demonstrate their competence to work individually and as a team to develop and present a client-driven GIS solution.
- Prepared to apply their skills in professional careers.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

P.T.O

SYLLABUS

UNIT I Photogrammetry : Introduction; Geometric elements of vertical photographs; scales of Aerial photographs; scale distortions; Flight planning; Relief displacement; parallax measurement; Orthophotography and rectification – principles and procedures.

UNIT II Digital Image Processing: Introduction to digital image processing; Image processing system characteristics: Hardware and Software; Image restoration Techniques: Restoring line dropouts, Restoring periodic line striping, Restoring line offsets, Filtering random noise; Radiometric corrections and Geometric corrections in image processing.

UNIT III Image Enhancement Techniques: Contrast enhancement, Density slicing, Edge enhancement, Merging data sets, Synthetic stereo images; Digital mosaics. Information extraction techniques: Principal – component (P.C) transformation analysis, Ratio images, Multispectral classification, Change -detection images.

UNIT IV Remote Sensing Applications to Geographical Studies: Land use/Land cover mapping; water resources; Geomorphological, waste land studies, Urban and Regional Planning.

Suggested Readings:

- American Society of Photogrammetry : Manual of Remote Sensing, ASP, FallsChurch, V.A. 1983.
- Barrett, E.C and L.F. Curtis : Fundamentals of Remote Sensing and Air PhotoInterpretation, Mcmillan, New York, 1992.
- Compbell, J. : Introduction to Remote Sensing, Guilford, N ew York, 1989.
- Curran, Paul, J. : Principles of Remote Sensing, Longman, London, 1985.
- Hord, R.M. : Digital Image Processing of Remotely Sensed Data; Academic NewYork, 1989.
- Luder D. : Aerial photography Interpretation : Principles and Applications, Mc Graw Hill, New York, 1959.
- Pratt, W.K Digital Image Processing, Wiley, New York, 1978.
- Rao, D.P. (Eds) : Remote Sensing for Earth Resources, Associate of Exploration Geophysicist, Hyderabad, 1998.
- Thomas, M. Lillesand and Ralph W. Kefer : Remote Sensing and Image Interpretation, John Willey & Sons, New York, 1994.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	1	2	2	3	3
CO_2	3	3	3	3	3	3	3	1	2	2	3	3
CO_3	3	3	3	3	3	3	3	1	2	2	3	3
CO_4	3	3	3	3	3	3	3	1	2	2	3	3

GENERIC ELECTIVE (Opt-1)

GEG-403(A): WATER AND SOIL RESOURCES MANAGEMENT

Learning objectives:

- To apprise the students to various water resources related aspects and hydrological cycle.
- To focus on ground water and soil specifications.
- To develop skill of water and soil management and to study on some case studies .

Learning Outcomes:

After the completion of the course, Students will be able to

- Apprise the students to various water resources related aspects and hydrological cycle.
- Focus on ground water and soil specifications.
- Develop skill of water and soil management and to study on some case studies.

SYLLABUS

UNIT I Water as a focus of geographical interest, Inventory and distribution of world's water resources (Surface and Subsurface); World Hydrological cycle- precipitation and its Measurement, water balance studies.

UNIT II Groundwater: Origin, Occurrence and Vertical distribution; water quality: Physical, biological and chemical properties for irrigation, domestic and industrial purposes.

UNIT III Water Resources Management: conjunctive use of surface and ground water resources; watershed management. Methods of irrigation. Water harvestingtechniques: Formation of new Check dams, tanks, Perculation tanks/Pits and Counter trenches etc.

UNIT IV Soils: Process of soil formation and soil development. Soil profiledevelopment. Properties of soil – Physical, morphology, texture, structure and chemical properties. Soil erosion – degradation and conservation. Management of saline and alkaline soils.

Suggested Readings

- Dakshinamur thy, C. et al., Water Resources of India and their utilization in Agriculture, Indian Agriculture Research Institute, New Delhi, 1973.
- Bunting, B.T. : The Geography of Soils; Hutchinson, London, 1973.
- Foth, H.D and Turk, L.M. : Fundamentals of Soil Science s, John Wiley, New York,1972.
- Jones, J .A. : Global Hydrology : Processes, Resources and Environmental Management, London, 1997.
- Matter, J.R. Water Resources Distribution, Use and Management, John Wiley,Marylane, 1984.
- Singh, R.A and Singh, S.R. Water Man agement. Principles and Practices, Tara Publication, Varanasi, 1979.
- Tideman, E.M. Watershed Management : Guidelines for Indian Conditions, Omega, New Delhi, 1996.
- Todd, D.K.: Ground Water Hydrology, John Wiley, New York, 1959.
- Sarma, Hydrdogy, Dhanpat Roy & Sons, New Delhi.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	1	3	2	3	3
CO_2	3	3	3	3	3	3	3	1	3	2	3	3
CO_3	3	3	3	3	3	3	3	1	3	2	3	3
CO_4	3	3	3	3	3	3	3	1	3	2	3	3

GENERIC ELECTIVE (Opt-1)

GEG-403(B): POLITICAL GEOGRAPHY

Learning objectives:

- To explain the historical evolution, of discipline of Political Geography..
- To help to understand about theoretical models related to geopolitics and geo- strategy.
- To provide the knowledge about political attributes that evolved with territorial structure and geographic influence like state, nation, boundary, elections, and frontier of world in general and India in particular.

Learning Outcomes:

After the completion of the course, Students will be able to

- Apprise the Students will be able to critically examine the geographical bases of political studies.
- Able to evaluate and correlate different theories with contemporary geopolitical and geo-strategic issues.

P.T.O

SYLLABUS

UNIT I Definition, Nature and scope of political geography. Influence of location, size and shape in political Geography.

UNIT-II Geographic elements and the state: influence of physical, Human and Economic elements. Geo-strategic Theories: Mahan, Mackinder and Spykman.

UNIT-III Themes in Political geography : State, Nation, Land locked state, and Nation Building :Formation of Frontiers and boundaries, classification of boundaries. colonialism, De colonialism, Neo colonialism, federalism and other forms of Governance.

UNIT-IV Geopolitical significance of India and the Indian Ocean, maritime boundaries. The Changing political map of India, unity in diversity, centripetal and centrifugal forces, stability and instability. International disputes.

Suggested readings:

- Prescott, J.R.V: Political Geography, Methuen, London, 1972.
- Gohen,S.B:Geogrphy of Political in a devide world , Open university press,U.K.1973.
- Sukhwal,B.L. : India -A Political Geography, Ahmadabad, 1971.
- Gohen,S.B. Background to political geography, Museum Press, London, 1967.
- Maszid Hussain: Political Geography of India, New Delhi.
- De Blij, H.J. and Glassner, Martin: Systematic Political Geography, Johyn Wiley, New York, 1968.
- Dikshit, R.D. :Political Geography A contemporary perspective, Tata McGraw Hill, New Delhi, 1996.
- Dikshit, R.D. : Political geography: A century of6 7. 8. progress, Sage, New Delhi, 1999.
- Taylor, Peter. Political Geography, Longman, London, 1985.
- Deshpande, C.D. India -A Regional Interpretation Northern Book Centre, New Delhi, 1992.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	3	2	2	3
CO_2	3	3	3	3	3	3	2	1	3	2	2	3
CO_3	3	3	3	3	3	3	2	1	3	2	2	3
CO_4	3	3	3	3	3	3	2	1	3	2	2	3

GENERIC ELECTIVE (Opt-1)

GEG-403(C): RESEARCH IN GEOGRAPHICAL STUDIES

Learning objectives:

- To explain the historical evolution, of research in Geographical studies.
- To help to understand about ethics, methods and factors in geographical research.
- To provide the knowledge about forms of research and design.
- To illustrate research methods and data collection.
- To acquaint research analysis and report writing.

Learning Outcomes:

After the completion of the course, Students will be able to

- Explain the historical evolution, of research in Geographical studies..
- Understand about ethics, methods and factors in geographical research.
- Improve the knowledge about forms of research and design.
- Illustrate research methods and data collection.
- Acquaint research analysis and report writing.

P.T.O

SYLLABUS

UNIT I — Research: Meaning, definitions, objectives, characteristics, types, Research ethics approaches, significance, research and scientific methods, criteria of research, Recent trends in Geographical Studies: physical and human geography. Review of literature, review of literature.

UNIT II — Forms of Research: Research problems: selecting the research Problem, defining the problem. Research paper, Article, Workshop, Seminars, Conference and Symposia. Research design: Meaning, need important concepts and development relating to research design.

UNIT III — Research methodology: Data collection and methods. Sampling methods: Random Sampling, stratified sampling. Collection of Primary data: Observation method, interview method, Case study method, questionnaire and secondary data.

UNIT IV — Hypothesis: Basic concepts concerning testing of hypothesis. limitations of the tests of hypothesis. Interpretation procedure. Report writing - significance of report writing, different steps in report writing, layout of the research report, types of reports, conclusion, findings and suggestions. Bibliography, appendices, Plagiarism.

Suggested Readings:

- Gilbert, N. 2001: Researching Social Life, Sage, London.
- Flowerdew, R. and D. Martin 2005: Methods in Human Geography: A Guide for students doing a research project, Prentice Hall, New York.
- Clifford, N.J. and G. Valentine 2003: Key methods in Geography, Sage, London.
- Leedy, P. D. and J.E. Ormrod 2001: Practical Research: Planning and Design.

Web resources:

http://www.acm.org intute.ac.uk/socialsciences/

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	3	2	3	3
CO_2	3	3	3	3	3	3	2	1	3	2	3	3
CO_3	3	3	3	3	3	3	2	1	3	2	3	3
CO_4	3	3	3	3	3	3	2	1	3	2	3	3

PRACTICAL

GEG 404: REMOTE SENSING APPLICATIONS

Learning objectives:

- To explain practical knowledge on Remote sensing applications...
- To help to understand Visual and digital interpretation of satellite Images.
- To illustrate interpretation of Aerial photos.
- To acquaint knowledge on allocation of RS in different fields and sectors.

Learning Outcomes:

After the completion of the course, Students will be able to

- Explain practical knowledge on Remote sensing applications...
- Understand Visual and digital interpretation of satellite Images.
- Illustrate interpretation of Aerial photos.
- Acquaint knowledge on allocation of RS in different fields and sectors.

SYLLABUS

UNIT I Techniques of Visual Interpretation;

UNIT II Marginal Information of Satellite Imageries

UNIT III Interpretation of Satellite Imageries: Visual Interpretation; WaterResources, Lineaments, Land use / Land cover – Landforms – WasteLand. Digital Image Interpretation- Subset Supervised classification and Un- Supervised classification change Detection.

UNIT IV Aerial photo interpretation

- Vision test – Stereo Test with Stereoscopes
- Interpretation of Physical Features
- Interpretation of Cultural Features

Suggested Readings

- Curran, Paul, J. : Principles of Remote Sensing: Longman, London, 1985.
- Gautam N.C. et al. Space Technology and Geography; National RemoteSensing Agency, Hyderabad, 1994.
- Thomas M. Lillesand and Ralph, W. Keffer; Remote Sensing and imagesinterpretation, John Willey & Son s, New York, 1994.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	2	3	2	3	3
CO_2	3	3	3	3	3	3	2	2	3	2	3	3
CO_3	3	3	3	3	3	3	2	2	3	2	3	3
CO_4	3	3	3	3	3	3	2	2	3	2	3	3

MULTI DISCIPLINARY COURSE/PROJECT WORK

GEG 405: INTERNSHIP PROJECT WORK AND VIVA VOCE

Learning objectives:

- To help to understand geo spatial technologies applications in different geographical areas.
- To assist to select the project and completing project and report writing.

Learning Outcomes:

After the completion of the course, Students will be able to

- Develop geo spatial technologies applications in different geographical areas.
- Understand Selection of the project, complete the project and report writing.

SYLLABUS

- The students of M.Sc. Geography 4th Semester have to collaborate with various firms/ Companies/ Research organizations /NGOs and complete internship on Geospatial techniques
- The students of M.Sc. Geography 4th Semester may have to be selected a specific theme/topic for a Project Work based on the internship completed. The students may select some of the following themes for their project.

Land Evaluation	**h**. Health Studies
Land-use / Land cover Analysis	**i**. Infrastructure Studies
Water Sources	**j**. Vegetation Studies
Slope Studies	**k**. Transportation net work
Climatic Change	**l**. Cropping pattern
Settlement Studies	**m**. Urban studies etc
Agriculture Studies	

- GIS, GPS & RS methods have to be used with appropriate primary and secondary data.
- The students should follow the research guidelines by reading Research Methodology beforetaking up the Project Work.
- The Project should be around 50 pages including photos, references and tables.
- Project work must include quality maps, diagrams and flowcharts.
- The project report should include followings:

Title of the project	**f**) Data sources
Introduction	**g**) Materials and Method,
Review of literature	**h**) Results & Discussion
Study Area	**i**) Conclusion
Objectives	**j**) Appendices
	k) Bibliography

Above work has to be done with the consultation of the staff-in-charge. Viva-Voice would be conducted at the semester end.

Suggested Readings:

- Archer J.E. &dalton T.H. (1968): The fields work in Geography, E.t. Batsford Ltd., London.
- Haring, Lloyed (1975): Scientific Geographic Research W C. Brow Company USA.
- Johnes, P.A. (2008): Field Work in Geography, Longman.
- Kothari C.R (1996): Research Methodology, Vishwas Prakashan, New Delhi

➢ Misra R.P. (1991): Research Methodology in Geography, concept pub. New Delhi.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

OPEN ELECTIVE (OPT - 1)

GEG 406(A): REGIONAL GEOGRAPHY OF INDIA

Learning objectives:

- To explain practical knowledge on Regional aspects of India...
- To help to understand Indian mineral resources and their distribution..
- To illustrate Indian agriculture and cropping techniques.
- To acquaint knowledge on allocation of RS in different fields and sectors.

Learning Outcomes:

After the completion of the course, Students will be able to

- Explain practical knowledge on Remote sensing applications...
- Understand Visual and digital interpretation of satellite Images.
- Illustrate interpretation of Aerial photos.
- Acquaint knowledge on allocation of RS in different fields and sectors.

SYLLABUS

Unit I India: Location and Regional Geographical Setting of India**;** Development of Regional Studies; concept of region; Types of Region - formal region, nodal region, functional region. Regionalization-process, methods and techniques used for regionalization of formal regions and functional regions.

Unit I India: Mineral Resources – Coal, Iron ore and petroleum, Industries: Iron and Steel, Oil refinery and Paper industries; Industrial Regions of India.

Unit III Indian Agriculture – Green Revolution in Indian agriculture. Agriculture Types; Irrigation and Power; Multipurpose Projects. Major food grain crops; Rice and Wheat; Major commercial crops – Coffee and Tea. Regionalization of Agriculture - methods and techniques used in the analysis of crop combination regions, agricultural productivity regions.

Unit IV India: Population Distribution; Density growth problems, over population and population policies in India; Transportation and types and trade in regional context.

Suggested Readings

- Spate, O.H.K., & Learrmonth, A.T.A., India & Pakistan, London.
- Puri, G.S., Indian forest Ecology, New Delhi.
- Ray Chaudhary, S.P. Land and soil, New Delhi
- The Gazetteer of India Vo 1,.1
- Krishnan, M.B. : Geology of India, Higginbothams, Madras.
- Das, P.K., The Monsoon, New Delhi
- Wadia, D.N., Geology of India, London.
- Memoria, C.B. : Economic and Commercial Geography of India, Shirlal Agarwal and Co., Agra, 1991.
- Alam, S.M. : Planning atlas of Andhra Pradesh.
- Khullar: India, A comprehensive Geography. Kalyani Publishers, New Delhi.1989.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	2	1	2	2	3	3
CO_2	3	3	3	3	3	3	2	1	2	2	3	3
CO_3	3	3	3	3	3	3	2	1	2	2	3	3
CO_4	3	3	3	3	3	3	2	1	2	2	3	3

OPEN ELECTIVE (OPT - 1)

GEG 406(B): PRINCIPLES OF REMORE SENSING

LearningObjective

- To provide knowledge on history and evolution of Remote sensing
- To explains the principle involved in remote sensing i.e. the Electromagnetic spectrum, reflection, refraction, diffusion, absorption and interaction with earth's atmosphere.
- To provide knowledge on the platforms and sensors and instruments used for remote sensing
- To explain about the specifications remote sensing different satellites

Learning Outcomes

After the completion of the course, Students will be able to

- Develop knowledge on history and evolution of Remote sensing
- Explains the principle involved in remote sensing i.e. the Electromagnetic spectrum, reflection, refraction, diffusion, absorption and interaction with earth's atmosphere.
- Understand knowledge on the platforms and sensors and instruments used for remote sensing
- Illustrate about the specifications remote sensing different satellites.

P.T.O

SYLLABUS

UNIT I Introduction to Remote Sensing: History, Development and Principles Stages in Remote sensing Process..Stages in Remote Sensing Process. Energy Sources and Radiation Principles-Energy Interaction in the Atmosphere. Atmospheric Windows. Energy Interaction with Earth Surface features. Electromagnetic Spectrum. Spectral reflectance patterns of Earth surface features in different wavelength

UNIT II Aerial Remote Sensing - History and Types of Aerial Photographs Scales of Aerial Photographs Geometry of Aerial Photographs, Scale Distortions Photographic Resolution Aerial Photo interpretation Techniques-Photo recognition ,Photo Interpretation Equipment.

UNIT III Satellite Remote Sensing: Types of Satellites, Orbits: Types of Orbits, and Orbital characteristics Platforms: types of Platforms in Remote sensing .Sensors-Definition, Types of sensors in Remote sensing. Scanning mechanism. Resolutions: Definition, Spectral ,Spatial, Temporal and Radiometric resolutions of Satellites.

UNIT IV Characteristics of Indian Remote Sensing Satellites(I.R.S),LANDSAT ,etc Principles of Image Interpretation: Elements of Image Interpretation, Digital Image Processing. Applications in Land use Land Cover Mapping and Urbanisation

Suggested Readings

- Lillisand T.M and Keifer R.W, (1994), Remote Sensing and Image Interpretation, Jhon Willey & sons, New York.
- Rampall, K.K. (1999), hand book of Aerial Photography and Interpretation, Concept Publishing Co., New Delhi.
- Sabins, F.F. Jr, (1987), Remote Sensing; Principles and Interpretation, W.h. Freeman & Co., New York.
- Jenson R. Jhon, (2003), Remote Sensing of the Environment-An Earth Resource Perspective, Pearson Education Pvt. Ltd., Indian Branch, Patparganj, Delhi, India.
- LRA Narayanan, Remote sensing and its Applications, (1999), Universities Press (India) Ltd., Hyderabad.
- http://rst.gsfc.nasa.gov/Front/tofc.html.
- http://earthobsevatory.nasa.gov/Library/RemoteSensing

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	3	3	3	3	2	3	2	3	3
CO_2	3	3	3	3	3	3	3	2	3	2	3	3
CO_3	3	3	3	3	3	3	3	2	3	2	3	3
CO_4	3	3	3	3	3	3	3	2	3	2	3	3

M.Sc. Geography 2021-22

SEMESTER - I

SI. No	Components of Study	Title of the course	Title of the Paper	Contact hours	No. of Credits	IA Marks	End SEM Marks	Total
1.	Core Theory **(Mandatory)**	GEG - 101	Geomorphology	6	4	20	80	100
2.		GEG - 102	Cartography	6	4	20	80	100
3.	Compulsory foundation **(opt - 1)**	GEG – 103(A)	Economic Geography	6	4	20	80	100
		GEG – 103(B)	Human Geography					
		GEG – 103(C)	Environmental Geography					
4.	Elective foundation **(Opt - 1)**	GEG – 104(A)	Oceanography	6	4	20	80	100
		GEG – 104(B)	Computer Basics for Geography					
		GEG – 104(C)	Regional Geography of Andhra Pradesh					
5.	Practical - 1	GEG – 105	Map Projections	8	4	---	100	100
6.	Practical - 2	GEG – 106	Techniques of Mapping and map analysis	8	4	---	100	100
	TOAL			**40**	**24**	**80**	**520**	**600**
7.	AUDIT COURSE		Human Values and Professional Ethics- I	0	0	100	0	0

SEMESTER - II

Sl. No	Components of Study	Title of the course	Title of the Paper	Contact hours	No. of Credits	IA Marks	End SEM Marks	Total
1.	Core **(Mandatory)**	GEG - 201	Climatology	6	4	20	80	100
2.		GEG - 202	Geographical Thought	6	4	20	80	100
3.	Compulsory Foundation **(Opt - 1)**	GEG – 203(A)	Principles of Remote Sensing	6	4	20	80	100
		GEG – 203(B)	Geography of Tourism					
		GEG – 203(C)	Industrial Geography					
4.	Elective foundation **(Opt - !)**	GEG – 204(A)	Physical Geography of India	6	4	20	80	100
		GEG – 204(B)	Regional Geography of India					
		GEG – 204(C)	Social and Cultural Geography					
5.	Practical - 1	GEG – 205	Interpretation of Topographical (S.O.I., U.S and O.S) and Weather Maps	8	4	---	100	100
6.	Practical - 2	GEG – 206	Research Techniques		4	---	100	100
	TOAL			**40**	**24**	**80**	**520**	**600**
7.	AUDIT COURSE		Human Values and Professional Ethics- II	0	0	100	0	0

SEMESTER - III

Sl. No	Components of Study	Title of the course	Title of the Paper	Contact hours	No. of Credits	IA Marks	End SEM Marks	Total
1.	Core **(Mandatory)**	GEG – 301	Urban Geography	6	4	20	80	100
2.		GEG – 302	Geographical Information System (GIS)	6	4	20	80	100
3.	Generic Electives **(Opt - 1)**	GEG – 303(A)	Agricultural Geography	6	4	20	80	100
		GEG – 303(B)	Transport geography					
		GEG – 303(C)	Disaster Management Studies					
4.	Practical	GEG – 304	Geographical Information System (GIS)	8	4	---	100	100
5.	Skill Oriented Course **(Mandatory Theory & practical)**	GEG – 305	GPS Survey and Report	Theory (2)+ Practical's(4)	4	10	90 (40+50)	100
6.	Open Elective **(Opt - 1)**	GEG – 306 (A)	Regional Geography of Andhra Pradesh	6	4	20	80	100
		GEG – 306 (B)	Geographical Information System (GIS) & Global Positioning System (GPS) and Applications					
	TOAL			**24**	**24**	**90**	**510**	**600**

SEMESTER - IV

Sl. No	Components of Study	Title of the course	Title of the Paper	Contact hours	No. of Credits	IA/Viva Marks	End SEM Marks	Total
1.	Core **(Mandatory)**	GEG – 401	Regional Planning	6	4	20	80	100
2.		GEG – 402	Advanced Remote Sensing	6	4	20	80	100
3.	Generic Electives **(Opt - 1)**	GEG – 403(A)	Water and Soil Resources Management	6	4	20	80	100
		GEG – 403(B)	Political Geography					
		GEG – 403(C)	Research in Geographical Studies					
4.	Practical	GEG = 404	Remote Sensing Applications	8	4	---	100	100
5.	Multi Disciplinary course/Project Work	GEG – 405	Project Work and Viva Voce	0	4	20	80	100
6.	Open Elective **(Opt - 1)**	GEG – 406 (A)	Regional Geography of India	6	4	20	80	100
		GEG – 406 (B)	Principles of Remote Sensing					
Total				**32**	**24**	**100**	**500**	**600**

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF GEOLOGY



Course

M.Sc. GEOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

Sri Venkateswara University offers M.Sc., Geology programme, under Choice Based Credit System (CBCS). The CBCS enables the students to select choice of subjects as per her /his interest and requirement. Acquiring knowledge in the related discipline is advantageous to the students. The CBCS program is framed in such a way that to impart more Knowledge in the field of Geological sciences.

Geology is an inter-disciplinary subject which enables to understand the earth processes and its treasures. It incorporates inputs from almost all science disciplines. Geologists are mainly involved in the exploration and extraction of natural resources viz., minerals, rocks, fossil fuel and water. In the fast growing world geologists will have to play a vital role in building the nation. Geologists can also engage in geological research, which has immense potential in the current scenario.

Vision of the Department

- The Geology department of the University seeks to provide the highest levels of education through continuous revision and expansion of our educational, research, and outreach programs in order to produce well-trained, competent, academic and professional geoscientists capable of responding to societal needs.

Mission of the Department

- The Geology Department will develop in each student, critical thinking, enthusiasm, initiative and the necessary skills to become lifelong students of Earth Sciences. Emphasis will be placed on learning basic concepts and techniques through research, in an environment that promotes the development of professionals with social, cultural and humanistic sensibility as well as profound ethical values. In this way, the department will contribute to the

enrichment of science and society through the creation and dissemination of new knowledge through scientific research.

Program Specific Outcomes (PSOs)

- Learn the essential properties of Earth's components, including its core, mantle, asthenosphere, lithosphere, atmosphere, hydrosphere, and biosphere and also demonstrate mastery of the conceptual framework for understanding earth system processes and the development of earth's features overtime.
- Acquiring geologic data in the field, laboratory, satellites and big data from data banks, analyzing and interpreting the data through application of scientific method.
- Capable of applying advanced and current concepts and methods of the geosciences to formulate and solve complex geological problems.
- Students are capable of understanding the impact of a geo-engineering solution in global and societal context.
- Apply knowledge and techniques from allied fields, including mathematics, chemistry, physics, biology, geoengineering, and computing, to solve geological constraints in societal context.

Program Objectives

- **Education and Training:** Provide an excellent preparation for a career in professional practice in industrial or environmental Earth Sciences, research in Geosciences, and specialist areas of other physical and natural sciences.
- **Communication Skills:** Skills to communicate in written, numerical, graphical and verbal forms, in ways that are appropriate to different audiences and indifferent situations, ranging from scientific and industry reports, to group and individual oral presentations, and from blogs and outreach articles, to news articles and essays.

- **Critical Thinking:** Acquire an understanding of the concept in geology and related disciplines and an ability to understand, integrate, and extend it so that all fundamental geological concepts are accessible.

- **Problem Solving:** Skills to recognise and articulate a problem and then apply appropriate conceptual frameworks and methods to solve it.

- **Analytical Reasoning:** A broad knowledge base in geology and related disciplines such as chemistry, physics, biology and mathematics needed to provide insight into these Earth processes

- **Research – Related Skills:** Develop a research design, which has an appropriate problem related to earth sciences but may incorporate some scientific methods, ability to plan and write a research paper.

- **Self and Time Management:** Time management skills are developed through interaction with the assessment process for submission of continuous assessment material.

- **Leadership and Team Work:** Ability to contribute effectively to team objectives and interact productively with others both in project-related settings and in meetings.

- **Scientific Reasoning:** Develop a systematic understanding of both core areas and advanced topics in the study of the Earth and view the Earth from new and challenging perspectives of time, space, process and pattern.

- **Digital Literacy:** Ability of advanced Word skills and advanced GIS, statistics, databases, spreadsheets, digital drawing through online workbooks and workshops

- **Moral and ethical values:** The degree to which every student engages with these themes will vary but it is important that all think especially about ethical issues.

- **Life – long Learning:** Ability to blend academic and practical skills and to transfer such skills to other domains of one's life and work.

Program Outcomes (POs)

- To develop an in-depth knowledge and skills in qualitative and quantitative research methods through laboratory, field and web modes of learning.

- Recognize the need for sustainable use of earth resources, and value environmental, indigenous and other community perspective on geological activities.

- Apply geological knowledge and critical thinking skills to identify a problem and to describe a strategy for handling.

- Synthesize geological data on arrange of spatial and temporal scales to make interpretations that allow for scientific uncertainty.

- Work effectively and professionally in multidisciplinary teams as a member and a leader and be able to manage and analyze complex ethical issues.

Program Educational Objectives (PEOs)

- Creative, innovative educators and learning facilitators, who master geological Science, have the ability to use information technology to keep up with developments in geological science.

- Reviewers of geological problems, both experimentally and/or literature studies and publish the results in scientific forums and journals.

- Examiner of problems related to the earth sector (extraction, mitigation, and conservation) factual and applicable, providing solutions to these earth problems conceptually.

- Planning and implementing staff in the exploration-production/extraction industry, and mitigation and conservation of geological resources.

- Entrepreneurs whose business fields are related to commodities or equipment in the extraction, mitigation, and conservation of geological resources.

- Staff to heads of agencies related to regulation, supervision, and policy makers in the extraction, mitigation and conservation of geological resources.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI
SVU COLLEGE OF SCIENCES
MASTER OF SCIENCE
DEPARTMENT OF GEOLOGY
P.G. DEGREE PROGRAMME (CBCS) REGULATIONS – 2016
AMENDED AS PER NEP – 2020

SEMESTER – I

S.No.	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / week	No. Of Credits	IA Marks	Sem End Exam Marks	Total
1	**Core**	GEO.101	Crystallography and Mineralogy	6	4	20	80	100
2		GEO.102	Igneous Petrology	6	4	20	80	100
3	**Compulsory Foundation**	GEO.103a	Structural Geology	6	4	20	80	100
		GEO.103b	Fundamentals of Geophysics	6	4	20	80	100
		GEO.103c	Micropalaeontology & Oceanography	6	4	20	80	100
4	**Elective Foundation**	GEO.104a	Geomorphology	6	4	20	80	100
		GEO.104b	Meteorology & Climate Change	6	4	20	80	100
		GEO.104c	Energy Resources	6	4	20	80	100
5.	**Practical - I**	GEO.105P	Crystallography and Mineralogy & Structural Geology and Geotectonics/ Fundamentals of Geophysics/ Micropalaeontology & Oceanography	6	3	15	60	75
6	**Practical - II**	GEO.106P	Igneous Petrology & Geomorphology/ Meteorology & Climate Change/ Energy Resources	6	3	15	60	75
7	**Practical - III**	GEO.107P	Geological Field Survey and Training Programme	6	2	10	40	50
	Total			42	24	120	480	600
8	**Audit Course**	Human Values and Professional Ethics - I		0	0	100	0	0

Note:

1) ***Students have to choose one paper each from Compulsory Foundation and Elective Foundation.***

2) ***MOOC online courses will be available in the SWAYAM and SWAYAM PRABHA MHRD web portal. Interested students may register for MOOC with the approval of the DDC but it will be considered for the award of the grade as open elective only giving extra credits.***

SEMESTER – II

S.No.	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / week	No. Of Credits	IA Marks	Sem End Exam Marks	Total
1	**Core**	GEO.201	Sedimentary Petrology	6	4	20	80	100
2		GEO.202	Stratigraphy and Palaeontology	6	4	20	80	100
3	**Compulsory Foundation**	GEO.203a	Geochemistry and Isotope Geology	6	4	20	80	100
		GEO.203b	Marine Geology	6	4	20	80	100
		GEO.203c	Computer Applications and Geostatistics	6	4	20	80	100
4	**Elective Foundation**	GEO.204a	Remote sensing and GIS	6	4	20	80	100
		GEO.204b	Environmental Geology	6	4	20	80	100
		GEO.204c	Gemology	6	4	20	80	100
5.	**Practical - I**	GEO.205P	Sedimentary Petrology & Geochemistry and Isotope Geology/ Marine Geology/ Computer Applications and Geostatistics	6	3	15	60	75
6	**Practical - II**	GEO.206P	Stratigraphy and Palaeontology & Remote sensing and GIS/ Environmental Geology/ Gemology	6	3	15	60	75
7	**Practical - III**	GEO.207P	Geological Field Survey and Training Programme	6	2	10	40	50
	Total			42	24	120	480	600
8	**Audit Course**	Human Values and Professional Ethics - II		0	0	100	0	0

Note:

1) ***Students have to choose one paper each from Compulsory Foundation and Elective Foundation.***

1) ***MOOC online courses will be available in the SWAYAM and SWAYAM PRABHA MHRD web portal. Interested students may register for MOOC with the approval of the DDC but it will be considered for the award of the grade as open elective only giving extra credits.***

SEMESTER - III

S.No.	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / week	No. Of Credits	IA Marks	Sem End Exam Marks	Total
1	**Core**	GEO.301	Metamorphic Petrology	6	4	20	80	100
2		GEO.302	Economic Geology and Mineral Economics	6	4	20	80	100
3	**Generic Elective**	GEO.303a	Watershed Management	6	4	20	80	100
		GEO.303b	Photogrammetry					
		GEO.303c	Dimensional stones and Construction materials					
4	**Practical - I**	GEO.304P	Metamorphic Petrology, Economic Geology and Mineral Economics & Watershed Management / Photogrammetry / Dimensional stones and Construction materials	6	2	10	40	50
5	**Skill Oriented Course**	GEO.305	Surveying and Field Geology	6	2	10	40	50
6	**Practical - II**	GEO.306P	Surveying and Field Geology	6	2	10	40	50
7	**Practical - III**	GEO.307P	Geological Field Survey and Training Programme	6	2	10	40	50
8	**Open Elective**	GEO.308a	Earth System Processes	6	4	20	80	100
		GEO.308b	Medical Geology					
Total				42	24	120	480	600

Note:

1) **Students have to Choose One Paper under Generic Elective.**

SEMESTER – IV

S.No.	Components of Study	Title of the Course	Title of the Paper	Credit Hrs / week	No. Of Credits	IA Marks	Sem End Exam Marks	Total
1	**Core**	GEO.401	Hydrogeology and Engineering Geology	6	4	20	80	100
2		GEO.402	Mineral Exploration and Ore Beneficiation	6	4	20	80	100
3	**Generic Elective**	GEO.403a	Mining Geology	6	4	20	80	100
		GEO.403b	Digital Image Processing					
		GEO.403c	Water Resources Management					
4	**Practical - I**	GEO.404P	Hydrogeology and Engineering Geology, Mineral Exploration and Ore Beneficiation & Mining Geology / Digital Image Processing / Water Resources Management	6	2	10	40	50
5	**Multi Disciplinary Course / Project Work**	GEO.405	Environmental Impact Assessment and Management/**Project Work**	6	4	20	80	100
6	**Practical - II**	GEO.406P	Geological Field Survey and Training Programme	6	2	10	40	50
7	**Open Elective**	GEO.407a	Fuel Geology	6	4	20	80	100
		GEO.407b	Natural hazards and Disaster Management					
	Total			42	24	120	480	600

Note:

1) ***Students have to Choose One Paper under Generic Elective.***

2) ***The project work shall be evaluated at the end of the IV semester with 80 marks for the report and 20 marks for the Viva-Voce with a maximum of 100 marks.***

I SEMESTER

CORE: GEO.101

CRYSTALLOGRAPHY AND MINERALOGY

Course Learning Objectives:

1. To give students the description of elements of crystallography, crystal structures, symmetry and symmetry functions of different crystal systems and respective minerals.
2. To identify the mineralogical composition of geological materials in order to help to reveal their origin and evolution.
3. Describe the concepts of optical phenomena in thin sections of minerals.
4. Aims to provide knowledge on the structural, chemical identification of the common rock forming minerals and demonstrative how minerals make up Igneous and Metamorphic rocks.

UNIT – I:

Elements of crystallography – Derivation of the 32 crystal classes - Hermann – Maugin symbols -Twinning in crystals – X-ray crystallography.

UNIT – II:

General principles of optics: Refringence – Birefringence, pleochroism, Extinction and measurements of extinction angles, Optical ellipsoids (a) Fresnel's ellipsoid and (b) Fletchers indicatrix, optic axial angle and optic sign, Interference figures – Uniaxial and Biaxial figures, and optic anomalies.

UNIT – III:

Structure of silicates - Isomorphism and Polymorphism - Structure, Chemistry, physical and optical characters and paragenesis of the following mineral groups: Quartz, Feldspars, Feldspathoids, Aluminium silicates, Garnet, Epidote, Olivine, Pyroxene, Amphibole, and Mica.

UNIT – IV:

Structure, chemistry, physical and optical characters and paragenesis of the following Ore minerals: Iron, Aluminium, Copper, lead, and Zinc - Study of the following minerals: Beryl, Apatite, Sphene, Tourmaline, Talc and Spinel.

Course Outcomes

1. Students will be able to describe crystal structures, crystal symmetry and twinning
2. Students will learn the use of X-ray crystallography to determine the arrangement Atoms in a crystal.
3. Students will be able to identify the mineralogical composition of geological materials by studying some of the optical properties and techniques in order to reveal their origin and evolution.
4. Students will get thorough knowledge about the physical chemical and optical Characteristics of minerals could lead to the discovery of new uses for Earth's mineral resources.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	H	M	H	H	L	L	H	M	L	M
CO2	M	L	H	M	H	H	M	L	H	M	L	L
CO3	H	M	H	L	H	H	L	M	H	L	L	M
CO4	H	L	H	L	H	H	L	M	H	L	L	M

H: High; M: Medium; L: Low

Textbooks/Reference Books:

1. Paul F. Kerr, 1959: Optical Mineralogy; McGraw-Hill Inc., U.S.
2. A.N Winchell, 2011: Elements of Optical Mineralogy: An Introduction to Microscopic Petrography, Nabu Press.
3. F.C. Phillips, 2011: An Introduction to Crystallography; Read Books Publ.
4. F.D. Bloss, 1961: An Introduction to the methods of Optical Crystallography; Harcourt School.
5. R.C. Emmons, 1959: The Universal stage; Geological Society of America.
6. W.E. Ford, 1932: Dana's Text Book of Mineralogy; CBS Publishers.
7. Keith Frye, 1974: Modern Mineralogy; Prentice-Hall Inc.
8. W.A. Deer, R.A. Howie, J. Zussman, 2013: An Introduction to Rock-forming minerals, Mineralogical Society of Great Britain & Ireland.

PRACTICAL:

1. Crystallography: Identification of crystal models of 32 crystal classes and their crystals.
2. Megascopic Identification of rock forming minerals.
3. Microscopic Identification of rock forming minerals.
4. Determination of Optic axial angle (2V).
5. Determination of Optic orientation (Z^C).
6. Determination of extinction angle. Determination of Anorthite content of the Plagioclase.

CORE: GEO.102

IGNEOUS PETROLOGY

Course Learning Objectives

1. Knowledge on origin, physical and chemical characteristics and types of magma.
2. To impart knowledge on igneous processes, formation, structures, textures and classification of Igneous rocks – historic perspective and the IUGS system.
3. To understand the Bowen's reaction series and its application to petrogenesis of Igneous rocks by different magmatic processes.
4. To understand the phase equilibrium and crystallization of Uni, Binary and Tertiary systems.
5. To understand the physical and chemical processes that produce the different Igneous rocks types and their petrogenesis and distribution in the earth's crust and mantle.

UNIT – I: Introduction to Magmas - Origin, characteristics and types of magma – Physical Properties of Magma – Bowen's Reaction Principle – Magmatic differentiation: Partial Melting, Fractional crystallization, Volatile transport, Liquid immiscibility, Magma mixing and Assimilation.

UNIT – II: Introduction to Igneous Petrology – Formation of Igneous rocks - Structures and Textures of Igneous rocks - Classification of Igneous rocks: Mode and Norm, CIPW Classification, IUGS system, The Irvine – Baragar classification.

UNIT – III: Gibbs Phase Rule – Lever Rule - Phase Equilibria in Igneous Systems; Phase Rule to the One (Uni) Component Systems – Two (Bi) Component Systems; Binary System with complete Solid Solution, Binary Eutectic System, Binary Peritectic Systems, The Alkali Feldspar System – Three (Tri) Component Systems; Di-Ab-An, Di-Fo-Si, Di-Fo-An, and Fo-An-Si.

UNIT – IV: Petrogenetic Significance of Igneous textures - Petrography and Petrogenesis of major Igneous rock types with examples of Ultramafic, Komatite, Basalt, Anorthosite, Layered intrusions, Granites, Alkaline rocks, Carbonatites, Lamprophyres, Ultramafic related rocks, Pegmatites and Kimberlites.

Course Outcomes

1. Acquire knowledge on the evolution of magma by different processes takes place from origin to emplacement with respect to different tectonic settings.
2. Explain Igneous processes, formation, structures, classification and significance of texture in explaining rock history.
3. Obtain knowledge on the crystallizing phase equilibrium of multi component magma system.

4. Identify different Igneous rocks both in hand specimens and thin sections in terms of their petrogenesis by studying the petrographic characteristics.

CO – PO Mapping:

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	M	M	H	M	M	L
CO2	H	H	H	H	H	H	M	M	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L
CO4	H	H	H	H	H	H	M	M	H	M	M	L

Textbooks/Reference Books:

1. Carmichael, Ian S. E, Turner, Francis J and Verhoogen, John, 1974: Igneous petrology, McGraw-Hill, New York.
2. John, D. Winter, 2001: An Introduction to Igneous and Metamorphic Petrology, Prentice Hall Inc.
3. Ronald, D. Frost and Carol, D. Frost, 2014: Essentials of Igneous and Metamorphic Petrology, Cambridge University Press.
4. Myron, G. Best, 2003: Igneous and metamorphic petrology, 2nd edition, Blackwell Publishing Company.
5. Hughes, C.J., 1982: Igneous petrology, Elsevier Science Publishing Company.
6. Chatterjee, S.C., 1974: Petrography of the igneous and metamorphic rocks of India, McMillan Co. Of India, Madras.
7. D.W. Hyndman, 1986 – Petrology of Igneous and Metamorphic rocks, 2nd Edition, McGraw-Hill Co., New York.
8. Francis, J. Turner and Verhoogen, 2004: Igneous and metamorphic Petrology, CBS Publishers.
9. Philpotts A.R. and J. Jay Ague, 2009: Principles of igneous and metamorphic petrology, 2nd edition, Cambridge University Press.

PRACTICAL:

1. Megascopic and microscopic examination of igneous rocks.
a) Different types of granites, pegmatites, syenites, anorthosites, dunites, peridotites, pyroxenites, basalts, andesites, rhyolites, trachytes, phonolites, kimberlites, dolerites, lamprophyres.
2. Modal analysis of some important igneous rocks and their classification.
3. Calculation of CIPW Norm
4. Variation diagrams: Harker and Niggli
5. Discriminate diagrams of Pearce and Cann.

COMPULSORY FOUNDATION: GEO.103a

STRUCTURAL GEOLOGY

Course Learning Objectives

1. To understand how earth's rocks deform at different levels of the lithosphere and develop basic appreciation of rock deformation at different conditions and scales to understand the difference between brittle and ductile deformation regimes.
2. To study the diverse and types of structures in the field to uncover information about the history of deformation (strain) in the rocks to understand the stress field, with emphasis on the regional geology.
3. To understand the tectonic aspects and characteristic features of plutons and to understand the origin of cleavage, schistosity, lineation and their relation to major structures.
4. To understand the Shear zones and their characteristics and textural features typical of Shear zones

UNIT – I: Concept of Stress and Strain: Analyses of Stress and Stress ellipsoid; Analyses of Strain and Strain ellipsoid - Types of Deformation - Mechanics of Plastic Deformation. – Factors controlling behaviour of Materials – Failure by Rupture; Experimental data, Relation of Rupture to Stress, Relation of Rupture to Strain.

UNIT – II: Description of Folds – Nomenclature of Folds – Fold Systems – Recognition of Folds – Mechanics of Folding – Description and Classification of Faults; Criteria for recognition of Faults; Mechanics of Faulting - Normal Faults - Thrust Faults – Strike-Slip Faults – Causes of Folding and Faulting.

UNIT – III: Geometric and Genetic classification of Joints - Unconformities – Salt Domes – Tectonic aspects of Plutons - Emplacement of Large Plutons – Introduction to Cleavage and Schistosity; Terminology for Cleavage and Schistosity; Origin of Cleavage; Relation of Cleavage and Schistosity to Major Structures – Nature of Lineation; Relation of Lineation to Major Structures and Origin.

UNIT – IV: Shear Zones – General Characteristics; Geometries; Types of Shear Zones; Mylonites and Types of Mylonites; Strain in Shear Zones; Crystallographic Preferred Fabrics; Foliation Patterns; Mica Fish; Rotation of Inclusions; Pressure Shadows and Types of Pressure Shadows; Geometry of Fibres; Determining Sense of Shear from Pressure Shadows and Fibres; Porphyroclasts and Porphyroblasts.

Course Outcomes:

1. Able to demonstrate a basic understanding of stress, strain, rheology of earth's lithosphere and comprehends how to describe and classify brittle and ductile structures.
2. Able to describe, identify and analyze the folds, faults and joints and their effects on outcrop pattern.

3. Measure, plot and interpret structural field data and can relate these to geological Maps and knows how to read geological maps and geological cross-section.
4. Obtain knowledge of shear zone characteristics and textures which are usually highly Mineralized zones.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H	M	M	H	M	M	L
CO2	H	M	H	H	H	H	H	M	H	M	M	L
CO3	H	M	H	H	H	H	H	M	H	M	M	L
CO4	H	M	H	H	H	H	H	M	H	M	M	L

Textbooks/Reference Books:

1. Badgley, P.C. 1965: Structural and Tectonic principles, Harper & Row; First Edition
2. Bayly B. 1992, Mechanics in Structural geology, Springer Verlag.
3. Billings M.P. 1968: Structural geology, printice-Hall of India, Private Ltd., New Delhi.
4. George, H. Davis and Stephen, J. Reynolds 1996: Structural geology of rocks and region, 2nd Edition, John Wiley & Sons, Inc. New York.
5. Blen, A Van Dar Pluijm and Stephen Marshak 1955: Earth Structure, 2nd Edition, W. W. Norton & Company.
6. Gass, I.G, Peter, J. Smith and Wilson. R.C.L., 1971: understanding the Earth, Artemis Press.
7. Hobbs, B.E, Means, W.D. and Williams P.F., 1976: An outline of Structural geology. John Wiley & Sons, Inc, New York.
8. Ramsay, J.G., 1967: Folding and fracturing of rocks. Mcgraw-Hill, New York, USA.

PRACTICAL:

1. Structural Problems concerning Dip and strike and Three point problems
2. Estimation of thickness – Depth of ore body.
3. Determination of Throw/Heave/Stratigraphic separation etc., related to faults.
4. Preparation and interpretation of Geological maps and sections
5. Preparation of contour diagrams.
6. Recording and plotting of field data.

COMPULSORY FOUNDATION: GEO.103b

FUNDAMENTALS OF GEOPHYSICS

Course Learning Objectives

1. To understand the interrelationship between geology and geophysics
2. To know how geophysics helps to explain geodynamical features of the earth
3. To understand the general and exploration geophysics
4. Basic concepts of geophysical methods and integrated approach

UNIT –I

Gravity methods: Gravity potential and field due to different simple bodies and structures - Field procedure - Bouguer gravity anomalies, interpretations & field-cases - Applications of the gravity method.

UNIT - II

Magnetic methods: Magnetic properties of rocks, geomagnetic field, field procedure, measurement of magnetic anomalies, interpretation - Applications of the magnetic method - Seismic method: Seismic waves and wave propagation, Wave attenuation and amplitude - Seismic refraction surveying, layered earth refraction studies - Seismic reflection surveying

UNIT – III

Electrical method: Self potential, earth resistivity, different arrays, profiling & sounding techniques, interpretation & field cases - Induced polarization - Telluric & electromagnetic methods - Ground Penetrating Radar (GPR).

UNIT – IV

Subsurface geophysical methods, Borehole logging: Drilling and its effects on the formations - The measurement of strata dip, borehole inclination and diameter - The self-potential log, Resistivity logs, Radioactivity logs, The sonic log, The temperature log.

Course Outcomes

1. Get knowledge on fundamentals and relationship between geology and physics
2. Acquire knowledge on how geophysics helpful in understanding and explaining the geodynamical features of the earth.
3. Understanding the basic concepts of geophysical methods such as gravity, magnetic, electrical and other sub-surface geophysical methods and integrated approach

Textbooks/Reference Books:

1. El Arabi H. Shendi, 2007; Introduction of Geophysics
2. Lowri,W., 2007: Fundamentals of Geophysics, Cambridge University Press.
3. Dobrin, M.B and Savit,C.H.,1988. Introduction to Geophysical Prospecting, McGraw-Hill.
4. Grant, F.S.and West,G.F.,1965. Interpretation Theory in Applied Geophysics, McGraw Hill, New York.
5. Murthy, L.Y.R. and Mishra, D.C., 1989. Interpretation of Gravity Magnetic Anomalies in Space and Frequency Domain, AEG publication, Hyderabad, India
6. Nettleton, L.L., 1976. Gravity and Magnetics in Oil Prospecting, McGraw Hill.
7. Parasnis, D.S., 1966. Mining Geophysics, Elsevier.
8. Patra, H.P. and Mallick, K., 1980. Geosounding Principles Vol. I Time layering Geoelectric Soundings. Amsterdam: Elsevier.
9. Telford, W.M., Geldart, L.P.and Sheriff, R.E.,1990.Applied Geophysics Cambridge
10. Alan, E. Mussett, Khan, M.A. 2000. Looking in to the earth: An introduction to geological geophysics, Cambridge University Press.
11. Telford, W.M., Geldart, L.P. and Sheriff, R.E., 1990. Applied geophysics. Cambridge University Press.

PRACTICAL:

1. Interpretation of gravity anomaly curve in terms of depth and shape of the object.
2. Determination of palaeopoles using palaeomagnetic data.
3. Interpretation of magnetic anomaly data.
4. Plotting of VES curve & ERT data and its interpretation.
5. Interpretation of S.P. anomalies & I.P. data.
6. Interpretation of seismic velocity of the layer and depth of the body using seismic refraction data and Interpretation of seismic profile data.
7. Well log interpretation and correlation
8. Determination of the epicentre distance of an earthquake and interpretation of Travel–Time curves.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M									
CO2	M	L	M									
CO3	M	L	M									
CO4	H	L	H									

H: High; M: Medium; L: Low

COMPULSORY FOUNDATION: GEO.103c

MICROPALAEONTOLOGY AND OCEANOGRAPHY

Course Learning Objectives

1. To give the students basic knowledge of microfossils and their geological applications. It will provide an extended basis for more advanced studies in palaeontology and stratigraphy of basin developments.
2. To gain knowledge about the (palaeo) environmental and (palaeo) climatic meaning. Skills development on methods and techniques of biostratigraphy and palaeobiology, applied to the microfossils.
3. To know the techniques in Applying Micropaleontology in hydrocarbon exploration
4. To give an overview of the science of oceanography and how it is practiced to integrate all specific concepts of oceanography into a multidisciplinary analysis of the Earth

UNIT - I

Definition and scope of the subject; Relationship of micropaleontology with ocean sciences; Modern field and laboratory techniques in the study of microfossils (collection, sampling and processing techniques, scanning electron microscopy and mass spectrometry); A brief account of the concepts and methods for the development of micropaleontological indicators useful in reconstruction of history of past, environmental changes and biostratigraphic correlation.

UNIT - II

Types of Microfossils - Calcareous Microfossils: (i) Foraminifera - Planktic foraminifera, their modern biogeography, outline of morphology, significance in Cenozoic oceanic biostratigraphy and paleoceanographic, paleoclimatic interpretations; Benthic foraminifera - their brief morphology and application in bottom water paleoceanography and paleobathymetric reconstructions; Larger foraminifera, their outline of morphology and application in Indian stratigraphy; (ii) Calcareous nannofossils - outline of morphology, modern biogeography and their application in oceanic biostratigraphy and paleoceanographic, paleoclimatic reconstructions; (iii) Ostracoda - outline of morphology and wall structure, their significance in environmental studies and oceanic biostratigraphy; (iv) Pteropoda - a brief introduction, application of pteropods in reconstruction of the Quaternary oceanography and climate; A brief introduction of calpionellids and calcareous algae.

UNIT - III

Siliceous Microfossils: Radiolaria, diatoms and silicoflagellate; outline of morphology, modern biogeography, their environmental significance and application in biostratigraphy - Phosphatic Microfossils: Conodonts; outline of morphology, paleoecology, geological significance and biological affinities; Stratigraphic significance of conodonts with special

reference to India - Application of Micropaleontology in hydrocarbon exploration - Determination and correlation of paleofacies by microfossils - Interpretation of sea floor tectonism from micropalaeontological evidence.

UNIT - IV

History of development of oceanography - Sampling of modern ocean biogenic flux including sediment trap sampling - Methods of measuring properties of sea water - Temperature and salinity distribution (horizontal and vertical) in ocean waters - Dissolved gases in sea water; factors affecting the concentration of gases in sea water - Carbon dioxide equilibria, precipitation and dissolution of carbonates – Biological, chemical, physical interactions in the oceans - Oxygen minimum layer in the ocean - concept of thermohaline circulation; formation of bottom waters - water masses of the world oceans.

Course Outcomes

1. Obtain knowledge of the main systematic groups of microfossils, its distribution and (palaeo) environmental and (palaeo) climatic meaning. Skills development on methods and techniques of biostratigraphy and palaeobiology, applied to the microfossils
2. Application of knowledge and understanding: Collect, organize and analyze descriptive data of microfossils and associated sedimentary materials using adequate concepts, methodologies and techniques.
3. Acquire knowledge in applying the micropalaeontological techniques in the exploration of hydrocarbons.
4. Get knowledge on the principles involved in the generation of waves and tides and evaluate their effects on coastal processes and marine ecosystems. Summarize the major physical and chemical properties of seawater and how each affects marine life.

Textbooks/Reference Books:

1. P.K. Saraswati and M.S. Srinivasan (2016): Micropaleontology: Principles and Applications, Springer.
2. Arnold (2002): Quaternary Environmental Micropaleontology (Ed. Simon K. Haslett), Oxford
3. B.U. Haq and, A. Boersma (1998). Introduction to Marine Micropaleontology, Elsevier.
4. P.R. Pinet (1992): Oceanography: An introduction to the Planet Oceans, West Pub, Co
5. Bignot, G. (1985): Elements of Micropalaeontology; Graham and Trotman Ltd., London.
6. David Tolmazin (1985): Elements of Dynamic Oceanography, Allen and Unwin
7. Grant Gross, M. (1977): Oceanography; A view of the Earth, Prentice Hall.
8. John Houghton (1997): Global Warming, Cambridge Univ. Press.
9. Jones, T.P. and Rowe, T.P. (1999): Fossil plants and spores, Modern

Techniques, Geological Soc. of London.

PRACTICAL:

1. Techniques of separation of microfossils from matrix;
2. Types of microfossils - calcareous, siliceous, phosphatic and organic walled microfossils; SEM applications in micropaleontology;
3. Study of surface ultra structures of foraminifera;
4. Study of important planktic foraminifera useful in surface water, paleoceanography and oceanic biostratigraphy;
5. Study of larger benthic foraminifera useful in Indian stratigraphy with special reference to Cenozoic petroliferous basins of India;
6. Important palynomorphs of Cretaceous and Paleogene age.
7. Depth biotopes and estimation of palaeo depth of the ocean using benthic foraminiferal assemblages;
8. Identification of modern and ancient surface water mass with the help of planktic foraminiferal assemblages;
9. Identification of benthic foraminifera characteristic of Low oxygen environment; Identification of Planktic foraminifera characteristic of warm and mixed layer, thermocline and deep surface water of the modern oceans;
10. Study of modern surface water, mass assemblages of planktic foraminifera from Indian Ocean, Atlantic Ocean and Pacific Ocean.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	L								
CO2	M	L	M	L								
CO3	M	L	M	L								
CO4	H	L	H	M								

H: High; M: Medium; L: Low

ELECTIVE FOUNDATION: GEO. 104a

GEOMORPHOLOGY

Course Learning Objectives

1. To understand the processes that shape the landforms around us and how these depend on climate, tectonic regime outline.
2. To understand and apply geomorphological concepts to problems of slope instability and try to identify the factors responsible for landslide occurrences in various environments and techniques to minimize the mass wasting.
3. To know the evolution of landforms and depositional and erosional landforms of various geological agents.
4. Application of geomorphological concepts in economically important projects.

UNIT – I: Historical background of geomorphology –Fundamentals of geomorphic concepts –Geomorphic significance of weathering; soils and its profile, formation of soils – Mass wasting and its geomorphic significance; creep, solifluction, patterned ground, earth flows, mud flows, debris avalanches, landslides, subsidence forms

UNIT – II: Evolution of landforms; endogenous and exogenous forces, role of lithology, peneplanation, rejuvenation of landforms – Fluvial geomorphic cycle; streams and valleys, valley development, classification of valleys – Drainage patterns and their significance; types of drainage patterns – Morphometric analysis of the drainage basin.

UNIT – III: Depositional and erosional landforms; Fluvial, Aeolian, Glacial, and Coastal – Karst topography - Topography of Ocean floors; geomorphic features on continental shelves and slopes, submarine canyons, classification of sea valleys – Topography of Deep sea floors – Theories and origin of Barrier Reefs and Atolls.

UNIT – IV: Introduction to Paleogeomorphology; Relict land forms – Buried land forms – Exhumed land forms – Application of Geomorphology to Hydrology, Economic geology, Engineering projects and Oil Exploration.

Course Outcomes

1. Able to explain conceptual approaches in geomorphology.
2. Able to describe land forms and land forming processes in different climate zones and tectonic regimes.
3. Able to explain different theories and models for landscape evolution.
4. Obtain knowledge in recognizing and minimizing the mass wasting.
5. Able to apply geomorphological concepts in economically important projects

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	L	M	M	L	L	H	L	M	L
CO2	M	L	M	L	M	M	L	L	H	L	M	L
CO3	M	L	M	L	M	H	M	M	H	M	M	H
CO4	H	L	H	M	M	H	L	M	H	M	M	L
CO5	M	L	M	L	M	M	L	L	H	L	M	L

H: High; M: Medium; L: Low

Textbooks/Reference Books:

1. Holmes. A, (1972): Principles of Physical Geology, The English language Book society and Nelson
2. Thornbury. W.D, (2004): Principles of Geomorphology, 2 Edition, CBS Publishers and Distributors Pvt. Ltd., New Delhi
3. Robert, S.A. and Sujanne, P.A., (2010): Geomorphology – The mechanics and chemistry of landscapes. Cambridge University Press.
4. Huggett Richard John (2007): Fundamentals of Geomorphology. 2nd Edn, Taylor & Francis.
5. Bloom. A.L., (1992): Surface of the Earth. Prentice Hall India, New Delhi.
6. Savindra Singh, (1998): Geomorphology, CBS Publishers and Distributors Pvt. Ltd., New Delhi
7. Kale, V.S., and Gupta, A. (2005): Introduction to Geomorphology. Orient Blackswan Pvt. Ltd.

PRACTICAL:

1. Study of topographic sheets and preparation of physiographic description of an area
2. Study of soil profile of any specific area
3. Study of contour-variations and elevations on toposheets.
4. Identification, classification and preparation of drainage basin map on toposheet.
5. Morphometric analysis of the drainage basin:
    a. Linear aspects
    b. Aerial aspects and
    c. Relief aspects.
6. Calculation of slope and preparation of slope map of a basin

ELECTIVE FOUNDATION: GEO.104b

METEOROLOGY AND CLIMATE CHANGE

Course Learning Objectives

1. To produce graduates who possess quantitative, scientific reasoning skills that can be applied to atmospheric problems.
2. To understand the skills for interpreting and applying atmospheric observations and knowledge of the atmosphere and its evolution.
3. Learn explain short- and medium-term weather forecasts based on sound meteorological principles.
4. To understand the physical basis of the natural greenhouse effect and the way various human activities are increasing emissions of the natural greenhouse gases.
5. To understand and explain the causes of climate change

UNIT - I

Meteorology: branches and applications - Energy spectra of sun and earth, long wave radiation, Global radiation balance, Solar energy - Atmosphere: Composition and structure of atmosphere, Layered structure of atmosphere – influences of air temperature, Surface temperature, daily cycle of temperature, annual cycle of temperature - Precipitation processes.

UNIT - II

El Nino: Introduction, upwelling. El Nino, La Nina events and consequences: Detection and prediction of El Nino - Weather forecasting: Persistence, trends, climatology, analog and numerical weather prediction methods - Forecasting surface features: Anti cyclone, cyclone, cold front and warm.

UNIT - III

Climate Change: Introduction, definition - Classification of climate; - Climatic changes through geological time, Assessing climate change, Human intervention on climate change - Greenhouse effect, greenhouse gases, Climatic change and global warming, Kyoto protocol.

UNIT - IV

Causes of climate change: Ocean circulation pattern, Changes in compositions of atmosphere, Changes in solar radiation - Impact of climate change: Rising of CO_2, impact on atmospheric circulation & weather pattern – biosphere – hydrosphere – Sea level changes, Adaptation provinces.

Course Outcomes

1. Possess scientific reasoning skills that can be applied to atmospheric problems and learn to explain short- and medium-term weather forecasts based on sound meteorological principles.

2. Explore El Nino impact and interpret weather forecasting.
3. Appraise climate change and predict it from geological records.
4. Explore impact of climate change.

Textbooks/Reference Books:

1. Alan, H. Strahler and Arthur, N.Strahler1992: Modern Physical Geography, Fourth Edition, John Wiley & Sons. Inc
2. Alan Strahler and Arthur Strahler (2002): Physical Geography, 2nd edition, John Wiley &Sons Inc.
3. Byers (2005), Meteorology, The Encyclopedia of Britannia, 15th Ed.
4. Dorothy J. Meeritts and Andrew De(1997): Wet & Kirsten Menking, Environmental Geology – W.H. Freeman and Company, New York
5. Horace General, (1994): Meteorology, McGraw Hill., New York
6. John, M. Das (1995): The Monsoons, National Book House Trust, New Delhi (Third Edition)
7. Rev. Fr. S. Ignacimuthu (2010): Environmental Studies, MJP, Publishers,
8. Travis Hudson (2012): Living with Earth-An Introduction to Environmental Geology, PHIL earning Private Ltd.

PRACTICAL:

1. Calculate average precipitation for given catchment area using various methods.
2. Calculate Potential evapotranspiration of a meteorological station
3. Calculate Runoff for given catchment area using empirical formula
4. Compute optimum number of rain gauges for given catchment area.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	L	M							
CO2	M	L	M	L	M							
CO3	M	L	M	L	M							
CO4	H	L	H	M	M							

H: High; M: Medium; L: Low

COMPULSORY FOUNDATION: GEO.104c

ENERGY RESOURSES

Course Learning Objectives

1. To understand the basics of renewable energy sources like Solar, Wind, Wave, Coal, Petroleum and Atomic energy.
2. To assess the formation and distribution of reserves of Sources of Energy
3. To develop skill to characterise the energy resources based on feasibility

UNIT – I

Historical perspective of the Energy and its use – Principles of Renewable Energy – Solar Radiation and Green house Effect – Solar Water Heating - Solar Thermal Applications – Hydropower – Wind Resource and Wind Power Technology - Biomass Resources from Photosynthesis – Bioenergy Technologies - Wave Power; Tidal-current and Tidal-range Power - Types of geothermal source - Applications, Exploration, Distribution of geothermal energy - Geothermal sources in India: Future scenario

UNIT – II

Coal: Physical, chemical and optical properties of coal - Changes in properties of coal with metamorphism - Classification of coal in terms of Rank, Grade and Type – Petrology and Palynology of Coal - Conditions of formation of coal and coal seams - Industrial utilization of coal - Coal resources of India.

UNIT – III

Petroleum: Composition and physical characteristics of petroleum, fuels and other by-products of petroleum -Source rock types and examples – Origin and migration of petroleum – Entrapment of petroleum– seal rocks; structural traps; stratigraphic traps – petroleum resources and reserves – Petroliferous basins of India - exploration and exploitation of petroleum.

UNIT – IV

Concept of atomic energy - Radioactive minerals - Mode of occurrence and association of atomic minerals in nature - Geochemical abundance of radioactivity in crustal rocks, Productive geological horizons of atomic minerals in India - Nuclear raw material resources of India - Usage of nuclear energy.

Course Outcomes

1. Explain about Renewable Energy resources and importance.
2. Able to understand the types and its characteristics of energy resources
3. Analyse the potential of energy sources and their scope and limitations.

Textbooks/Reference Books:

1. John Twidell and Tony Weir, 2015: Renewable Energy Resources, Routledge.
2. Renu Dhupper, 2015: Textbook of Energy Resources and Management, CBS Publishers.
3. Andrew, L. Simon, 1975: Energy Resources, Elsevier Inc.
4. Kothari, D.P. et. al., 2011: Renewable Energy Sources and Emerging Technologies, Prentice Hall, India.
5. Navani J.P., and Sapra Sonal, 2015: Non-conventional Energy Resource; S. Chand & Company.

PRACTICAL:

1. Megascopic characterization of banded coals;
2. Proximate analysis of coals;
3. Completion of outcrops in the given maps and calculation of coal reserves;
4. Microscopic examination of polished coal pellets (identification of minerals in coal)
5. Megascopic and Microscopic study of cores and well cuttings;
6. Study of geological maps and sections of important oilfields of India;
7. Calculation of reserves
8. Section correlation and identification of hydrocarbon prospect
9. Panel and Fence diagrams or energy resources.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M									
CO2	M	L	M									
CO3	M	L	M									
CO4												

H: High; M: Medium; L: Low

PRACTICAL SYLLABUS

PRACTICAL I – GEO.105P:

CRYSTALLOGRAPHY AND MINERALOGY & STRUCTURAL GEOLOGY/FUNDAMENTALS OF GEOPHYSICS/MICROPALEONTOLOGY AND OCEANOGRAPHY

Course Objectives:

1. To understand 32 crystal classes and their crystals.
2. To study different rock forming minerals and perceive their implications
3. To determine the optical properties of the crystals
4. To study different structural maps and their interpretation
5. To identify topographic and structural aspects
6. To prepare the structural maps and reports

Course Outcomes: Students will be able to:

1. Identify various crystal forms shown by minerals belonging to different crystal system.
2. Demonstrate how the crystal structure of minerals affects the external morphology and physical properties of a mineral (e.g. crystal symmetry, crystal habit).
3. Understands the importance of minerals to society and to the study of the Earth.
4. Explain how the properties of chemical elements and their bonds regulate the structure and composition of minerals.
5. Determine of strike and dip, Borehole problems and apparent dip, plunge and pitch of linear structures.
6. Prepare and Interpret of geological maps and Reports

CRYSTALLOGRAPHY AND MINERALOGY

1. Crystallography: Identification of crystal models of 32 crystal classes and their crystals.
2. Megascopic Identification of rock forming minerals.
3. Microscopic Identification of rock forming minerals.
4. Determination of Optic axial angle (2V).
5. Determination of Optic orientation (Z^C).
6. Determination of extinction angle
7. Determination of Anorthite content of the Plagioclase

STRUCTURAL GEOLOGY

1. Structural Problems concerning Dip and strike
2. Estimation of thickness – Depth of ore body.
3. Determination of Throw/Heave/Stratigraphic separation etc., related to faults.
4. Preparation and interpretation of Geological maps and sections
5. Preparation of contour diagrams.
6. Recording and plotting of field data

FUNDAMENTALS OF GEOPHYSICS:

1. Interpretation of gravity anomaly curve in terms of depth and shape of the object.
2. Determination of palaeopoles using palaeomagnetic data.
3. Interpretation of magnetic anomaly data.
4. Plotting of VES curve & ERT data and its interpretation.
5. Interpretation of S.P. anomalies & I.P. data.
6. Interpretation of seismic velocity of the layer and depth of the body using seismic refraction data and Interpretation of seismic profile data.
7. Well log interpretation and correlation
8. Determination of the epicentre distance of an earthquake and interpretation of Travel–Time curves.

MICROPALEONTOLOGY AND OCEANOGRAPHY

11. Techniques of separation of microfossils from matrix;
12. Types of microfossils - calcareous, siliceous, phosphatic and organic walled microfossils; SEM applications in micropaleontology;
13. Study of surface ultra structures of foraminifera;
14. Study of important planktic foraminifera useful in surface water, paleoceanography and oceanic biostratigraphy;
15. Study of larger benthic foraminifera useful in Indian stratigraphy with special reference to Cenozoic petroliferous basins of India;
16. Important palynomorphs of Cretaceous and Paleogene age.
17. Depth biotopes and estimation of palaeo depth of the ocean using benthic foraminiferal assemblages;
18. Identification of modern and ancient surface water mass with the help of planktic foraminiferal assemblages;

19. Identification of benthic foraminifera characteristic of Low oxygen environment; Identification of Planktic foraminifera characteristic of warm and mixed layer, thermocline and deep surface water of the modern oceans;
20. Study of modern surface water, mass assemblages of planktic foraminifera from Indian Ocean, Atlantic Ocean and Pacific Ocean.

PRACTICAL II – GEO.106P:

IGNEOUS PETROLOGY AND GEOMORPHOLOGY/METEOROLOGY AND CLIMATE CHANGE/ENERGY RESOURCES

Course objective:

1. To identify various Igneous and metamorphic rocks in hand specimen and in petrological thin section.
2. To understand the petrological data and their interpretation
3. To understand different landform features and their analysis to interpret the genesis and tectonic evolution
4. To analyse the morphometric parameters of the basin

Course Outcomes:

Students will be able to:

1. Differentiate rocks based on the physical, chemical and optical characteristics
2. Interpret chemical data, textural data and structural data of different rock types.
3. Analyse different geomorphic features from topographic maps and elevation models
4. Prepare the soil profile of the area
5. Estimate the morphometric parameters of the drainage

IGNEOUS PETROLOGY

1. Megascopic and microscopic examination of igneous rocks.

a) Different types of granites, pegmatites, syenites, anorthosites, dunites, peridotites, pyroxinites, basalts, andesites, rhyolites, trachytes, phonolites, kimberlites, dolerites, lamprophyres.

2. Modal analysis of some important igneous rocks and their classification.
3. Calculation of CIPW Norm
4. Variation diagrams: Harker and Niggli
5. Discriminate diagrams of Pearce and Cann.

GEOMORPHOLOGY

1. Study of topographic sheets and preparation of physiographic description of an area
2. Study of soil profile of any specific area
3. Study of contour-variations and elevations on toposheets.
4. Identification, classification and preparation of drainage basin map on toposheet.
6. Morphometry analysis of the drainage basin:

a. Linear aspects

b. Aerial aspects and

c. Relief aspects.

7. Calculation of slope and preparation of slope map of a basin

METEOROLOGY AND CLIMATE CHANGE

1. Calculate average precipitation for given catchment area using various methods.
2. Calculate Potential evapotranspiration of a meteorological station
3. Calculate Runoff for given catchment area using empirical formula
4. Compute optimum number of rain gauges for given catchment area.

ENERGY RESOURCES

1. Megascopic characterization of banded coals;
2. Proximate analysis of coals;
3. Completion of outcrops in the given maps and calculation of coal reserves;
4. Microscopic examination of polished coal pellets (identification of minerals in coal)
5. Megascopic and microscopic study of cores and well cuttings;
6. Study of geological maps and sections of important oilfields of India;
7. Calculation of reserves
8. Section correlation and identification of hydrocarbon prospect
9. Panel and Fence diagrams or energy resources

PRACTICAL III – GEO.107P:

GEOLOGICAL FIELD SURVEY AND TRAINING PROGRAMME

Course objective:

1. To identify various Igneous and metamorphic rocks in hand specimen
2. To understand the association of the rocks and their structural aspects
3. To identify different landform features and associated structural features
4. To understand mapping techniques and interpretation of field data

Course Outcomes: Students will be able to:

1. Differentiate rocks based on the physical characteristics
2. Interpret geological maps.
3. Recognize different geomorphic features
4. Prepare the soil profile of the area
5. Carry out mapping in different geological terrains, different types of data collection

Exercises

1. Identification and petrogenetic studies of minerals and rocks in the field.
2. Study of attitude of geological formations in the field.
3. Identification of folds, faults, unconformities and joint systems of the geological formations in the field.
4. Identification and study of various landforms in the field.
5. Observation of profiles of various soils in the field.
6. Preparation of field report (draft) incorporating the above said geological characteristics in the field.

Audit Course:

HUMAN VALUES AND PROFESSIONAL ETHICS – I

Course Learning Objectives

1 To provide Human Values and Ethics relating to Religion, Business, Law, Media and Environment.

2 To provide in depth knowledge about the Moral and ethical values to interpretation in their day to day activities of life.

UNIT – I

Definition and Nature of Ethics - Its relation to Religion –Politics –Business Law - Medicine and Environment - Need and Importance of Professional Ethics – Goals – Ethical Values In various Professions.

UNIT – II

Nature of Values - Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values - Analysis of basic moral concepts: rights, ought, duty, obligation, justice, responsibility and freedom, Good behaviour and respect for elders, Character and Conduct.

UNIT – III

Ahimnsa (Non-Violence), Satya (Trub), Brahmacharya (Celibacy), Asteya (Non Possession) and Aparigraha (Non- stealing), Purusharthas (Cardinal virtues), Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desire), Moksha (Liberation).

UNIT – IV

Bhagavad Gita - Niskama karma. (b) Buddhism; The Four Noble Truths – Aryaastanga marga, (c) Jainsim - mahavratas and anuvratas - Values Embedded in Various Religions, Religious Tolerance, Gandhain Ethics.

UNIT – V

Crime and Theories of punishment - (a) Reformative, Retributive and Deterrent (b) Views on manu and Yajnavalka.

Course Outcomes

1 After completion of this course the students will be able to know the importance of Ethics and Human Values in various professions.

2 Students also will get in depth knowledge and understanding of moral values and ethical code of the Indian Society. Especially embedded in various scriptures.

Textbooks/Reference Books:

1. Join, S. Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D Irwin Inc.
3. "Management Ethics – Integrity at work' by joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H Titus: Ethics for Today
6. Maitra. S.K. Hindu Ethics
7. William. Lilly: Introduction of Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C. Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit Series, Vol I, II & III, Varanasi, Vol 100, 16-20, 21-32 and 74-77 only.
11. Charaka Samhita: Tr. Dr. Ram Karam Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics: Theory and Contemporary Issues, Barbara Mackinnon, Wardsworth/Thomson Learning 2001.
13. Analyzing Moral Issue, Judith, A Boss, Mayfield, Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed) John H Piet and Ayodyha Prasad, Cosmo Publications.
15. Text Book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C., Sharma Ethical Philosophy of India Nagin & Co, Jalandhar.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L										
CO2	M	L										
CO3	M	L										
CO4	H	L										

H: High; M: Medium; L: Low

II SEMESTER

CORE: GEO.201

SEDIMENTARY PETROLOGY

Course Learning Objectives

1. Aim is to study ‘’Sediments’ to derive information on the depositional conditions which acted to deposit rock unit.
2. To establish the relation of the individual rock units in a basin to understand the evolution of the sedimentary sequences.
3. To learn different sedimentary environments.

UNIT- I:

History of Sedimentology – Nature and Origin of Sedimentary Rocks – Sedimentary Processes: Subaerial Weathering Processes and Products, Submarine Weathering Processes and Products – Fundamentals of Fluid Flow – Particle Transport by Fluids – Particle Transport by Sediment Gravity Flows.

UNIT – II

Sedimentary Textures: Grain Size, Particle Shape, Fabric – Sedimentary Structures: Internal Organization and Structure of Beds, Bedding Plane Markings and Structures, Deformed and Disturbed Bedding, Stromatolites and Other Biogenic Structures, Diagenetic Structures.

UNIT – III

Petrogenesis of Sedimentary Rocks: Texture, Structure and Petrography of Clastic, Volcaniclastic, Conglomerates, Breccias, Sandstone and Shale – Non-Clastic: Limestone - Sedimentary Environment and Facies: Concept - Sedimentary Facies association methods – Characteristics of Continental-Desert, Fluvial, Glacial, Lacustrine and Deltaic Environments - Marine Littoral and Barrier complex Depositional Environment.

UNIT – IV

Basin Analysis, Tectonics and Sedimentation: Mechanisms of Basin Formation, Plate tectonics and Basins, Techniques of Basin Analysis, Applications of Basin Analysis – Sedimentary Basins of India.

Course Outcomes

1 Able to identify different sedimentary rocks in both hand specimens and thin section and derive information on the depositional conditions and environments.

2 Able to study the sequence of sedimentary rock strata and describe the tectonic framework of sedimentation to understand the earth’s history including palaeoclimatology and history of life.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	H	H	M	H	M	M	H	M	M	L
CO2	H	M	H	H	M	H	M	M	H	M	M	L

Textbooks/Reference Books:

1. Leeder, M., 1999. Sedimentology and Sedimentary Basins From Turbulence to Tectonics. Blackwell, Oxford.
2. Lindholm, R., (1988) A practical approach to Sedimentology. Blackwell publication.
3. Gary Nicols, (2009): Sedimentology and Stratigraphy, 2nd Edn., Wiley-Blackwell.
4. Pettijohn, F.J., (1975) Sedimentary rocks. Harper and Row Publ., New Delhi
5. Selley, R.C.,(2000) Applied sedimentology, 2nd Edn., Academic Press,
6. Sengupta, S.M, (2007), Introduction to Sedimentology, CBS Publishers & Distributors, New Delhi.
7. Sam Boggs. Jr. (2009): Petrology of Sedimentary Rocks, 2nd Edn. Cambridge University Press.
8. Sam Boggs, Jr. (2006): Principles of Sedimentology and Stratigraphy, 4th Edn., Prentice Hall, New Jersey.
9. Donald. R. Prothero, and Fred Schwab (2014): Sedimentary Geology, 3rd Edn, W.H. Freeman & Company, New York.

PRACTICAL:

1. Megascopic study of sedimentary rocks and their identification through characteristic features.
2. Granulometric analysis of unconsolidated sediments and interpreting their modes of transport, and environments of deposition.
3. Petrographic study of clastic and non-clastic rocks and interpreting textural properties, depositional environments and diagenesis.
4. Separation and analysis of heavy minerals from unconsolidated sediments and understanding provenance.
5. Construction of facies succession and depositional models with facies characteristics

CORE: GEO.202

STRATIGRAPHY AND PALAEONTOLOGY

Course Learning Objectives

1. To make the students to understand basic principles and nomenclature of Stratigraphy methods of Stratigraphy correlation and geological time scale.
2. To know the classification, lithology, structures of major stratigraphic units with economic importance.
3. Major stratigraphic boundary problems with reference to India.
4. To acquire skills on identification, classification and documentation of palaeobiota.
5. Acquire knowledge on morphology, classification and evolutionary trends of invertebrate fossils.
6. Describe evolutionary, separation and classification of different microfossils and application of micropalaeontological techniques in hydrocarbons exploration.

UNIT-I:

Recent developments in stratigraphic classification - stratigraphic nomenclature-lithostratigraphy, biostratigraphy and chronostratigraphy - Archaean cratonic nucleii of Peninsular India (Dharwar, Singhbhum, and Aravalli cratons) - Proterozoic mobile belts (Central Indian Tectonic Zone, Aravalli-Delhi and Eastern Ghats).

UNIT- II:

Brief account of classification, lithology, structures and fossil content with economic importance of Archaean, Puranas - Phanerozoic stratigraphy of India, Tertiary, Siwaliks and Indo-Gangetic alluvium - Concept of sequence stratigraphy - Rates of sediment accumulation - Unconformities.

UNIT- III:

Fossil record and geological time scale - Modes of preservation of fossils and concept of taphonomy; evolutionary trends in Trilobites, Gastropods, Mollusca, Cephalopoda, Brachiopoda, and Echinodermata – Micropaleontology: methods of preparation of microfossils - Morphology of microfossil groups (Foraminifera, Ostracoda) - Gondwana plant fossils and their significance.

UNIT- IV:

Applications of paleontological data in stratigraphy, paleoecology and paleoclimatology - Environmental significance of fossils - Use of microfossils in interpretation of sea floor tectonism - Application of micropaleontology in hydrocarbon exploration - Oxygen and Carbon isotope studies of microfossils and their use in paleoceanographic and paleoclimatic interpretation.

COURSE OUTCOMES

1. Students would have acquired comprehensive knowledge on principles of Stratigraphy, correlation methods classification of stratigraphic units, tectonic framework of India and Geological timescale.
2. Ability to give an account of various stratigraphic units and give stratigraphic column distribution in India, fossil content and economic importance of given geological formation.
3. Apply standard stratigraphic codes while preparing geological reports
4. Describe morphology, classification, evolutionary trends of Invertebrate fossils with geological and geographic distribution and paleoecological and paleo-enviromental relevance.
5. Ability to identify, classify and describe the morphology of the invertebrate fossils and plant fossils.
6. Application of fossils in establishing the age of the rock unit, correlation with other area, and Use of fossil in finding mineral deposits.
7. Ability to apply micropalaeotological techniques in hydrocarbon exploration.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	M	H	M	H	M	H	H	M	M	L
CO2	H	M	M	H	M	H	L	H	H	M	M	L
CO3	H	M	M	H	M	H	H	H	H	M	H	L
CO4	H	M	M	M	M	H	M	H	H	M	M	L
CO5	H	M	M	H	M	H	M	H	H	M	M	L
CO6	H	M	M	H	M	H	L	H	H	M	M	L
CO7	H	M	H	H	M	H	M	H	H	M	M	L

TEXTBOOKS/REFERENCE BOOKS:

1. Krumbein, W.C. & solss, L.L., 1951; stratigraphy and Sedimentation; W.H.Freeman and company.
2. Carl, O. Dunbar & John Rodgers., 1957: Principles of Stratigraphy; John Wiley.
3. M.S. Krishnan, 2012: Geology of India & Burma; CBS Publishers
4. Wadia, D.N., 1953: Geology of India, ST. Martin's Press Inc., New York.
5. Ravindra Kumar, 1985: Fundamentals of Historical Geology and stratigraphy; New Age Publishers
6. R.C. Mehdiratta: Geology of India, Pakistan, Bangladesh & Burma.
7. Purana basins of peninsular India – published by geological society of India, Bangalore.
8. Gondwana of India, Special volume Published by Gondwana society of India.
9. Geo karnataka , Centenary Volume, Published by Mysore geological department.

PRACTICAL:

Stratigraphy practical:

1. Study of rocks in Hand specimens from Precambrian terrain of India.
2. Showing boundaries of the Precambrian terrains of India on map.
3. Stratigraphic and Palaeogeographic maps with special reference to India.
4. Identification of stratigraphic rocks in hand specimen.
5. Preparation of lithology and their correlation, correlation problems.

Palaeontology practical:

1. Morphological descriptions, systematics and illustrations of representative fossils belonging to Trilobita, Gastropoda, Bivalvia, Cephalopoda, Brachiopoda, and Echinodermata.
2. Interpretation of palaeoclimate and palaeoenvironment based on fossil data
3. Biostratigraphic zonal assignment.
4. Identification of source reservoir and facies with fossil data.

COMPULSORY FOUNDATION: GEO.203a

GEOCHEMISTRY AND ISOTOPE GEOLOGY

Course Learning Objectives

1. This course first lays out the basic principles and techniques of modern geochemistry understanding processes in aqueous systems and the behaviour of trace elements in magmatic systems.
2. Introduces radiogenic and stable isotope geochemistry and illustrates their application to such diverse topics as determining geologic time, ancient climates. The focus then broadens to the formation of the solar system, the Earth, and the elements themselves.

UNIT- I:

Definition, scope and development of geochemistry - Geochemical classification of elements; Goldschmidt's classification of elements - Fractionation of elements in minerals/rocks - Geochemical principles - Geochemical cycle – Meteorites: classification, mineralogy, age and origin.

UNIT-II:

Chemical composition and characteristics of atmosphere, lithosphere, hydrosphere - Fick's laws of diffusion and activity composition relation (Roult's and Henry's law) - Application of trace elements in petrogenesis - Principles of equilibrium and Rayleigh fractionation - REE patterns, Eh and pH diagrams and mineral stability

UNIT- III:

Cosmic abundance of elements - Geochemical evolution of the earth - Distribution of major, minor and trace elements in crust and mantle - Mantle reservoirs - Geochemistry of water and water-rock interaction.

UNIT-IV:

Isotope geology: Isotopes and the periodic table - Stable Isotopes: Oxygen Isotopes, Sulfur Isotopes, Carbon Isotopes – Radioactivity and geochronology and brief outline of Rb-Sr, K-Ar and radiocarbon (C^{14}) systems.

Course outcomes

1. Understand the behavior of elements in a geochemical context and relate this knowledge to how elements redistribute within the Earth.
2. Learn to interpret and explain interactions between Earth reservoirs.
3. Understand and interpret the major processes that form and modify the Earth's crust and mantle.
4. Use isotopes to trace geological processes and age date specific events.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	M	H	M	M	L
CO2	H	H	M	H	H	H	M	M	H	M	M	L
CO3	H	M	M	H	M	H	H	H	H	M	H	L
CO4	H	M	M	M	M	H	M	H	H	M	M	L

Textbooks/Reference Books:

1. Manson, B. and Moore, C.B. 1991: Introduction to Geochemistry, Willey Eastern.
2. Krauskopf, K.B., 1967: Introduction to Geochemistry. McGraw Hill.
3. Faure. G., 1986: Principles of Isotope geology. John Wiley.
4. Henderson, P., 1987: Inorganic Geochemistry, Pergamon Press.
5. Arthur H. Brownlow, 1979. Geochemistry. Prentice-Hall, Inc. Englewood Cliffs, N.J

PRACTICAL:

1. Methods of the chemical analysis of rocks and minerals.
    a. Spectrophotometric methods
    b. Flame photometric methods
    c. Titrimetric methods.
2. Chemical analysis of water samples.
3. Graphical representation of water analyses data and classification of natural waters.
4. Classification of groundwater for use in drinking, irrigation and industrial purposes.
5. Estimation of organic matter of soils and water.

COMPULSORY FOUNDATION: GEO.203b

MARINE GEOLOGY

Course Learning Objectives

1. To introduce the basic knowledge on ocean environment and processes associated in it.
2.To understand the Ocean floor tectonics
3. To develop skills to classify Coastal morphology
4. To estimate the sediments and marine deposits

UNIT – I

History of Marine Geology ,Waves, tides, currents, turbidity currents, long shore currents, rip currents, circulation - Wave Action: wave reflection, refraction and diffraction – Seiche and tsunamis – Coastal Zone Morphology (Estuaries, deltas, bays, raised beaches, features of wave erosion and deposition, tombolos, mudbanks) – Deep sea Morphology (Continental shelf, Continental slope, abyssal plains, seamounts, guyots, fracture pattern.

UNIT – II

Littoral processes – Evolution of headlands and bays – Beaches – Raised and sunken features – Evolution and classification of sea coasts and shore lines: Terrestrial, lacustrine, Shallow marine, deep sea - Siliciclastic versus carbonate sedimentation - Deep ocean silica burps - shelf-to-basin transport phenomena turbidities and gravity flows – Submarine groundwater discharge.

UNIT – III

Causes of marine regression and transgression – Description of important regressions and transgressions in the geological past – Eustasy – Origin and distribution of ocean basins – Palaeoceanography - Ocean floor tectonics: Characteristics of Oceanic Plate – Geologic processes along Oceanic Plate boundaries – Seafloor Spreading – Evidence – lithospheric plates – Divergent plate boundaries – Trenches as convergent plate boundaries – Subduction zones– Transform fault boundaries.

UNIT – IV

Marine sedimentation – Sources, types and distribution of marine sediments – Transport of sea bottom sediment – Rate of deposition – Mineral resources: Marine phosphorite, glauconite, barium sulphate concretions, Polymetallic nodules– Gas hydrates – Beach placers: Terrigenous, Biogenic and Chemical Types – Placer Deposits - Distribution of temperature, salinity and density - Coastal zone regulation in India – India as Pioneer Investor in Seabed mining

Course Outcomes

1. Explain different types of the world oceans and their fundamental properties;
2. Classify and explain the physiographic provinces of the oceans
3. Understand the physical and other geological processes going on in the world ocean
4. Interpret the various types of data and manage the coastal environments.

Textbooks/Reference Books:

1. King, C.A.M., (1975): Introduction to Marine Geology and Geomorphology. Edward Arnold, London.
2. Radhakrishnan, V., (1996): General Geology, V.V.P. Publishers, Tuticorin.
3. Seabold, E. and Berger, W.H., (1982): The Sea Floor, Springer Verlag.
4. Kuenen, Ph. H., 1950. Marine Geology. John Wiley and Sons.
5. Shepard, F.P., (1978): Geological Oceanography, Heinmann, London.
6. Harper and Row. Kurekian, K.K., 1990: Ocean, Prentice Hall. New Jersey.
7. Svedrup, J.F., (1969): The Ocean, A Scientific American book, W.H. Freeman and company, San Francisco.
8. Kennett, J.P. (1982): Marine Geology. Prentice Hall., New Jersey.
9. Weisberg, C.P. (1979): Oceanography. McGraw Hill., New York.

PRACTICAL:

1. Beach profile measurements.
2. Mechanical analysis of sediments and calculation of statistical parameters.
3. Analysis of Bathymetric charts.
4. Study of topographic features of ocean floor
5. Estimation of sedimentation rates
6. Determination of physical and textural properties of marine sediments.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	L								
CO2	M	L	M	L								
CO3	M	L	M	L								
CO4	H	L	H	M								

H: High; M: Medium; L: Low

COMPULSORY FOUNDATION: GEO.203c

COMPUTER APPLICATIONS AND GEOSTATISTICS

Course Learning Objectives

1. To introduce the basic knowledge of Computer applications and statistics related to Geology
2. To understand various methods to store and analyze the geological data using computer applications
3. To develop skills to interpret the geological data based on statistical methods
4. To estimate the quantity of geological resources to assess the economic importance.

UNIT – I

Documentation in MS Word - Working with basic formulas and tables in MS Excel - Preparation of presentation in MS Power Point – Image manipulation and drawing

UNIT – II

Database Management Systems – open source software's used in earth sciences

UNIT – III

Statistical applications:

Frequency Distribution, frequency curve and its characteristics – Mean, Median and Mode, Relationship between mean, median and mode - Cumulative frequency: Characteristics of cumulative frequency curve, Applications of cumulative Frequency curves.

UNIT - IV

Variance, Standard Deviation, Covariance, Coefficient of variation, Skewness and kurtosis - Binomial distribution: Characteristics, Approximating, uses. Sampling - Simple Random sampling, Restricted Random sampling – Grid sampling, Stratified sampling, Cluster sampling.

Course Outcomes

1. Comprehend the database related to field geological data
2. Prepare and Interpret graphical and pictorial data
3. Exposure to some selected software's related to geology

Textbooks/Reference Books:

1. D. D. Sharma, 2002: Geostatistics with applications in Earth Sciences, Capital Publishing Company, New Delhi.
2. Saroj, K. Pal, 1998: Statistics for Geoscientists, Concept Publishing Company.
3. Rajaraman, V. 2014: Introduction to Computers; PHI Learning.
4. Rons Mansfield, 2001: Working in MS Office, McGraw Hill.
5. Singh, M.P.: Computer Fundamentals, Foundation Publishing House.

PRACTICAL:

1. Calculation of mean; median and mode;
2. Calculation of Variance, Standard Deviation, Covariance, Coefficient of variation, Skewness and kurtosis.
3. Calculations using Formulas in Excel
4. Preparation of Graphs in Excel
5. Working with animations in Power point
6. Preparation of project / paper presentation in Power point

CO – PO Mapping:

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CO1	M	L	M									
CO2	M	L	M									
CO3	M	L	M									
CO4	H	L	H									

H: High; M: Medium; L: Low

ELECTIVE FOUNDATION: GEO.204a

REMOTE SENSING AND GIS

Course Learning Objectives

1. To learn basics of aerial remote sensing and its applications.
2. To understand the physics of electromagnetic spectrum and learn satellite remote sensing.
3. To learn characteristic features of Multi spectral remote sensing present satellites of world and application of Remote Sensing for important economically deposits.
4. To have training in GIS components models and applications.

UNIT- I:

Basic concepts and fundamentals of aerial photography - Scale of photography, Aerial cameras, factors influencing image quality, side lap and overlap, mosaicing of Aerial photographs, stereoscopy, estimation of dip and slope - Aerial photo interpretation for Geology; Techniques of interpretation; Recognition elements, Convergence of evidence for interpretation of Geology.

UNIT- II:

Basic concepts and fundamentals of Remote sensing - Electromagnetic energy and its sources - Interaction of EM radiation with atmosphere - Interaction of EM radiation with earth's surface - Atmospheric windows - different spectral regions useful for Remote sensing.

UNIT- III:

Sensors – platforms, Multispectral Remote sensing in Micro wave regions, Remote sensing in Thermal infrared regions, remote sensing satellites and their pay load characteristics - Application of remote sensing for gold, diamond and groundwater exploration.

UNIT- IV:

GIS: Hardware and software in GIS – spatial and non spatial data, Raster and vector data structures – Data conversions - Comparison of raster and vector data - Elements of GIS: Data capture, Verification and processing, data storage - Data base management systems: Types, merits and demerits - Data manipulation analysis and spatial modelling – Output format and generation.

Course Outcomes

1 Develop knowledge in basics of Remote Sensing interpretation keys and applications.
2 Formulate the relationship between EMR and satellite Remote Sensing.
3 Application for Remote Sensing for important economic deposits.
4 Operate GIS data model and demonstrate GIS techniques for various applications.
5 Apply RS and GIS techniques to analyze the various geological materials.

CO - PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	H	H	H	M	M
CO2	H	H	H	H	H	H	H	H	H	H	M	M
CO3	H	H	H	H	H	H	H	H	H	H	M	M
CO4	H	H	H	H	H	H	H	H	H	H	M	M
CO5	H	H	H	H	H	H	H	H	H	H	M	M

Text books/Reference Books:

1. Sabbins, F. F., 2007: Remote sensing – Principles and application; Waveland Print, INC.
2. Richard, G. Ray, 1960: Aerial photographs in Geologic interpretations, Report, USGS, U.S. Govt. Print. Off.
3. Bandat, H.F.V. 1962: Aero geology; Gulf Publ. Co., Houston, Texas.
4. Victor, C. Miller. 1961: Photogeology; McGraw – Hill, New York.
5. Siegal, B.S & Gillespie, A. R. (Eds), 1980: Remote sensing in Geology; John Wiley.
6. Aronoff, S., 1989: Geographical Information System: A management perspective. DDL Publication, Ottawa, 1989.
7. Burrough, P.A., 1986: Principles of Geographic Information System for Land resource assessment, Oxford University Press, New York

PRACTICAL:

1. Aerial photo interpretation: Scale, height and slope from the aerial photos; study of inclined and vertical photographs.
2. Interpretation of satellite images – False colour composites.
3. Visual image interpretation and extraction of thematic layers.
4. Identification of structures and lineaments.
5. Study of land use and land cover and demarcation of drainage basin.
6. Identification of Rock types and minerals.
7. GIS software's – ARC INFO, ARC-GIS, ILWIS etc.,
8. Preparing data sets for input in GIS environment.
9. Analysis and manipulation of data in GIS.
10. Integration of spatial and temporal data.

ELECTIVE FOUNDATION: 204b

ENVIRONMENTAL GEOLOGY

Course Learning Objectives

1. To understand natural hazards and its impacts
2. To prepare students towards environmental concerns, issues, and impacts of climate change
3. To find the ways to deal with environmental problems associated mainly various types of pollutants
4. To apply the knowledge for efficient environmental decision-making, management and sustainable development.

UNIT – I: Fundamental concepts of Environmental Geology – Internal structure of the Earth – Plate tectonics and Environmental Geology – Rocks and Minerals – Ecology and Geology: Ecology for Geologists, Geology and Biodiversity, Ecological Restoration - Hazards, Disasters, and Natural Processes – Evaluating Hazards: Linkages, Disaster Prediction and Risk Assessment – The Human response to Hazards – Global Climate and Hazards – Population Increase, Land Use Change and Natural Hazards.

UNIT – II: Earthquakes: Magnitude and Intensity, Plate Boundary Earthquakes, Earthquake Processes, Earthquake Shaking, Earthquake Cycle, Earthquakes Caused by Human Activity, Earthquake Risk and Prediction – Tsunami: Effects of Tsunamis and Linkages to other Natural Hazards, Minimizing the Tsunami Hazard – Volcanic Activity: Volcanism and Volcanoes, Volcanic Features, Volcanic Hazards – Forecasting Volcanic Activity.

UNIT – III: Rivers and Flooding: Streams and Rivers, Sediments in Rivers – River Velocity, Discharge, Erosion, and Sediment Deposition, Effects of Land use Changes, Channel Patterns and Flood Plain Formation, River Flooding, Urbanization and Flooding, Nature and Extent of Flood Hazards, Adjustments to Flood Hazards – Landslides: Slope Processes and Types of Landslides, Slope Stability, Human use and Landslides, Minimizing the Landslide Hazard – Coastal Hazards: Coastal Processes, Coastal Erosion, Coastal Hazards and Engineering Structures, Human Activity and Coastal Erosion, Perception of adjustment to Coastal Hazards.

UNIT – IV: Water Pollution: An Overview of Water Pollution, Water Pollutants, Surface water Pollution and Treatment, Groundwater Pollution and Treatment, Water Quality Standards, Wastewater Treatment – Air Pollution: Historical Overview, Public Health Importance of Air Pollution, Sources and Types of Air Pollutants, Industrial Air Pollution, Risk Assessment, Air Pollution Prevention and Control - Mineral Resources and Environment: Minerals and Human use, Geology of Mineral Resources, Environmental Impact of Mineral Development, Recycling Mineral Resources.

Course Outcomes

1. Explain different aspects of environment and local, regional and global environmental problems.
2. Classify and explain the environmental pollution and disaster control technologies
3. Prepare, interpret and implement environment projects

***Text Books/Reference Books*:**

2. Edward, A. Keller (2012): Introduction to Environmental Geology, Pearson Printice Hall, New Jersey, USA.
3. Bennett, M.R. B., Doyle, P. (1997) Environmental Geology By. John Wiley & Sons, NewYork.
4. Rekha Ghosh and D.S., Chatterjee: Environmental Geology – Geoecosystems Protection in Mining Areas, Capital Publ. Co., New Delhi.
5. Carla W. Montgomery WCH Wm. C, (1989). Environmental Geology, Brown Publishers Dubuque, Iowa
6. Chiras, D.D, (1989) Environmental Science – A framework for decision making, Addison – Wesley Publishing Company. New York.,
7. Davis, N. et. al., (1976) Environmental Geosciences, John Wiley and sons, New York.,
8. Detwler, T.R, (1971) Man's Impact on Environment, McGraw Hill
9. Keith, L. H. (1996) Principles of Environmental Sampling. ACS Professional Reference book, Amer. Chem. Soc., Washington DC.
10. Khoshoo, T. L. (1988) Environmental Concerns and Strategies By. Ashish Publ. New Delhi.
11. Montgomery, C.W., (1989) Environmental Geology, Brown publications.
12. Ray, P.K. and Prasad, A.K. (1995) Pollution and Health. Wiley Eastern Publ., New Delhi.
13. Strahler, A.N.,(1973) Environmental Geology, John Wiley and sons, New York.
14. Subramanian,V. (2002) A Textbook in Environmental Science, Narosa Publishing House, New Delhi
15. Valdiya, K.S. (1987) Environmental Geology – Indian Context. McGraw Hill Publ.

PRACTICAL:

1. Study the nature of river flooding and construction of Hydrographs
2. Study of flood prone areas in river basins from maps
3. Study of coastal regions of India from satellite images
4. Procedure to estimate the earthquake magnitude by graphical method
5. Study of plate boundaries, seismic and volcanic zones from maps
6. Map drawing and interpretation of seismic zones in India
7. Study of soil types and soil erosion in India from maps
8. Analyses procedures for a few elements and compounds of water.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	M							
CO2	M	L	M	M	M							
CO3	M	L	M	M	M							
CO4	H	L	H	H	H							

H: High; M: Medium; L: Low

ELECTIVE FOUNDATION: GEO.204c

GEMOLOGY

Course Learning Objectives

1. To learn origin, classification, and gemstone resources and their stratigraphic units in India.
2. To learn and examine the nature, quality and rarity of the gemstones
3. To understand the physical and optical properties of gemstones
4. To give an idea about the gemstone testing instruments
5. To gain knowledge and to provide skills to become a successful gemmologist

UNIT – I: Introduction to Gemology – Relation to Mineralogy and Crystallography - Lithological association of Gemstones in India–What is a Gem: Precious and Semi-Precious Stones–Gem- bearing stratigraphic Units in India – Gemstone Resources of India.

UNIT – II: Criteria for recognition of gemstones – Virtues of gemstones; Colours, Optical Properties, Hardness, Fractures, Inclusions, Zoning, Brittleness, Pleochroism, Clarity, Amenability for cutting and polishing – 4 C's – Processing of gemstones – Styles of Cutting; Cabochon cut, Rose cut, Brilliant cut, zircon cut, step, trap or emerald cut and mixed cuts.

UNIT – III: Determination of various physical properties in the laboratory: Hardness, Specific gravity, Reflectivity and Reflectance, Dispersion, Lustre, Streak – Measurement of Refractive index – Colour distinction - Enhancement and treatments – enhancement methods: coloured and colourless impregnation, Dyeing, Bleaching and its identification - Methods of treatment – Laser drilling, Irradiation, Heat treatment, Surface modifications, Diffusion treatment and its identification – Composites; Types, Classification and Identification.

UNIT – IV: Uses of gemstones in jewellery, medicine, health and customs –Important Gem Species: Diamond, Corundum, Ruby, Beryl, Chrysoberyl, Cat's Eye, Alexandrite, Topaz, Spinel, Garnets, Tourmaline, Peridot, Zircon, Varieties of Quartz Group – Sphene, Feldspar, Lapis Lazuli - Synthetic Gems.

Course Outcomes

1. The course is focussed on a comprehensive learning in gemology
2. Understands the formation, classification and properties to final the grading and evaluation.
3. Knowledge in order to identify original gemstones and stimulants
4. Acquire skills which will be useful to them in gem industry

Textbooks/Reference Books:

1. Karanh, R.V. (2000): Gem and gem industry in India, Memoir 45, Geological Society of India, Banglore.
2. Anderson, B.W (1990): Gem testing (10th edition), Butterworth Scientific, London.
3. Babu, T.M., (1998):Diamonds in India, Geological society of India, Bangalore
4. Hall, C. (1994): Gemstone, Dorling Kindesley, London.
5. Deer, W.A., Houre, R. A. and zussman, S. (1992). An Introduction to rock forming minerals, ELBS, London.
6. Kerr, P.F. (1997): Optical mineralogy, 4th Ed. McGraw Hill Book & Co, New York,
7. Peter Read (1991): Gemmology 2nd Ed., Butter worth - Heinemanu Ltd. Lundu.
8. Peter Read: Gems 5th Ed. Butterworth, London
9. Richard Laddicoat (1987), Handbook of gem identification - G.I.A.
10. Santa Monica., Edward Gubelin (1986): Photo Atlas of Including Gem Stones – ABC Edition, Zurich, Gem Testing10^{th} Ed.
11. Anderson, B.W. (1990): Gemstone Enhancement 2ndEdition, Butterworth Scientific London.
12. Nassau, K. (1994): Gemstone Enhancement; Butterworths, London.
13. Webster, Robert, 1980: Gems, 5th Ed, Butterworths, London.
14. Hall, C., Gemstones.
15. Dorling Kindersley, (1994): Read, P. Gemmology. Butterworth Heinemann,
16. O' Donoghue, M. (1999): Identification of Gemstones.

PRACTICAL:

1. Megascopic Identification of Gem Minerals: Physical and Optical properties:
2. Megascopic Identification of polished or finished Gemstones.
3. Microscopic studies of some important gem minerals using petrological microscope.
4. Determination of Refractive Index, and distinction between natural and synthetic gemstones.
5. Distribution and Occurrence of Gemstones with special reference to Andhra Pradesh.
6. Gem cutting and polishing techniques.

.**CO – PO Mapping:**

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	M							
CO2	M	L	M	M	M							
CO3	M	L	M	M	M							
CO4	H	L	H	H	H							

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PRACTICAL I – GEO.205P:

SEDIMENTARY PETROLOGY & GEOCHEMISTRY AND ISOTOPE GEOLOGY/MARINE GEOLOGY/COMPUTER APPLICATIONS AND GEOSTATISTICS

Course objective:

1. To identify various sedimentary rocks in hand specimen and in petrological thin section.
2. To analyse the unconsolidated sediments through granulometric studies
3. To understand different depositional environment and correlation of different sections
4. To identify methodologies for water sample collection and analysis
5. To differentiate the suitability of water for various purposes

Course Outcomes: Students will be able to:

1. Differentiate sedimentary rocks based on physical and granulometric studies
2. Identify different depositional environments.
3. Interpret the water analysis and conclude the suitability of water
4. Suggest the remedial measures for the suitability of water

SEDIMENTARY PETROLOGY

1. Megascopic study of sedimentary rocks and their identification through characteristic features.
2. Granulometric analysis of unconsolidated sediments and interpreting their modes of transport, and environments of deposition.
3. Petrographic study of clastic and non-clastic rocks and interpreting textural properties, depositional environments and diagenesis.
4. Separation and analysis of heavy minerals from unconsolidated sediments and understanding provenance.
5. Construction of facies succession and depositional models with facies characteristics

GEOCHEMISTRY AND ISOTOPE GEOLOGY

1. Methods of the chemical analysis of rocks and minerals.
    - Spectrophotometric methods
    - Flame photometric methods
    - Titrimetric methods.
2. Chemical analysis of water samples.
3. Graphical representation of water analyses data and classification of natural waters.
4. Classification of groundwater for use in drinking, irrigation and industrial purposes.
5. Estimation of organic matter of soils and water.

MARINE GEOLOGY:

1. Beach profile measurements.
2. Mechanical analysis of sediments and calculation of statistical parameters.
3. Analysis of Bathymetric charts.
4. Study of topographic features of ocean floor
5. Estimation of sedimentation rates
6. Determination of physical and textural properties of marine sediments.

COMPUTER APPLICATIONS AND GEOSTATISTICS:

1. Calculation of mean; median and mode;
2. Calculation of Variance, Standard Deviation, Covariance, Coefficient of variation, Skewness and kurtosis.
3. Calculations using Formulas in Excel
4. Preparation of Graphs in Excel
5. Working with animations in Power point
6. Preparation of project / paper presentation in Power point

PRACTICAL II – GEO.206P:

STRATIGRAPHY AND PALAEONTOLOGY & REMOTESENSING AND GIS/ENVIRONMENTAL GEOLOGY/GEMOLOGY

Course objective:

1. To understand stratigraphic rocks and their depositional setting
2. To study the boundary problems of the Precambrian terrain
3. To study the Morphological characters of various fossils
4. To analyse the palaeoclimate and palaeoenvironment based on fossil data
5. To introduce the knowledge of studying satellite imagery and its interpretation in terms of geologic features on ground
6. To provide exposure to the GIS tool

Course Outcomes: Students will be able to:

1. Identify different rocks from Precambrian terrain of India.
2. Understand the problems associated with the Precambrian-Cambrian boundary
3. Differentiate fossils based on the fossil data
4. Apply the palaeontological information to make palaeobiological interpretation
5. Identify and interpret the terrain features on satellite image and topographic sheet
6. Apply the integrated knowledge of remote sensing, GIS, GPS

STRATIGRAPHY AND PALAEONTOLOGY

1. Study of rocks in Hand specimens from Precambrian terrain of India.
2. Showing boundaries of the Precambrian terrains of India on map.
3. Stratigraphic and Palaeogeographic maps with special reference to India.
4. Identification of stratigraphic rocks in hand specimen.

5. Preparation of lithology and their correlation, correlation problems.
6. Morphological descriptions, systematics and illustrations of representative fossils belonging to Trilobita, Gastropoda, Cephalopoda, Brachiopoda, and Echinodermata.
7. Interpretation of palaeoclimate and palaeoenvironment based on fossil data
8. Biostratigraphic zonal assignment.
9. Identification of source reservoir and facies with fossil data.

REMOTESENSING AND GIS

1. Aerial photo interpretation: Scale, height and slope from the aerial photos; study of inclined and vertical photographs.
2. Interpretation of satellite images – False colour composites.
3. Visual image interpretation and extraction of thematic layers.
4. Identification of structures and lineaments.
5. Study of land use and land cover and demarcation of drainage basin.
6. Identification of Rock types and minerals.
7. GIS software's – ARC INFO, ARC-GIS, ILWIS etc.,
8. Preparing data sets for input in GIS environment.
9. Analysis and manipulation of data in GIS.
10. Integration of spatial and temporal data.

ENVIRONMENTAL GEOLOGY

1. Study the nature of river flooding and construction of Hydrographs
2. Study of flood prone areas in river basins from maps
3. Study of coastal regions of India from satellite images
4. Procedure to estimate the earth quake magnitude by graphical method
5. Study of plate boundaries, seismic and volcanic zones from maps
6. Map drawing and interpretation of seismic zones in India
7. Study of soil types and soil erosion in India from maps
8. Analysis procedures for a few elements and compounds of water

GEMOLOGY:

1. Megascopic Identification of Gem Minerals: Physical and Optical properties:
2. Megascopic Identification of polished or finished Gemstones.
3. Microscopic studies of some important gem minerals using petrological microscope.
4. Determination of Refractive Index, and distinction between natural and synthetic gemstones.
5. Distribution and Occurrence of Gemstones with special reference to Andhra Pradesh.
6. Gem cutting and polishing techniques.

PRACTICAL III – GEO.207P:

Course objective:

1. To identify various sedimentary rocks in hand specimen
2. To recognise the gradation of sediments and their structural aspects
3. To identify stratigraphic sequences of the geological formations.
4. To understand collection procedures of sediments, fossil data and water samples
5. To carry out the ground truth verification of the sampling stations and test sites

Course Outcomes: Students will be able to:

1. Differentiate sedimentary rocks based on the physical characteristics
2. Interpret the sediments at its in-situ conditions
3. Recognize different stratigraphic sequences
4. Collect the samples in the field as per the guidelines for laboratory analysis
5. Prepare the field report based on the ground truth verifications

Exercises

GEOLOGICAL FIELD SURVEY AND TRAINING PROGRAMME

1. Identification of Sedimentary rock formations and study of sedimentation processes in the Sedimentary basins.
2. Study of sorting or gradation process of the sediments.
3. Identification of various stratigraphic sequences of the geological formations.
4. Identification, study and collection of shell organisms in the coastal areas.
5. Collection of water samples from various sources and also rock samples for geochemical analysis in the laboratory.
6. Ground truth verification of thematic maps prepared based on the satellite data.
7. Preparation of field report (draft) incorporating the above said geological characteristics in the field.

AUDIT COURSE:

HUMAN VALUES AND PROFESSIONAL ETHICS – II

Course Learning Objectives

1. To provide the knowledge about the value oriented education, Medical ethics, family values and ethics and Moral code of Indian society.
2. To provide the business ethics, environmental and social ethics followed and practiced in Indian society.

UNIT – I

Value Education: Definition, Relevance to present day – Concept of Human Values: Self introspection, Self esteem - Family values: Components, Structure and responsibilities of family - Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society - Caring for needy and elderly – Time allotment for sharing ideas and concerns.

UNIT – II

Medical ethics: Views of Charaka, Sushruta and Hippocrates on moral responsibility of medical practitioners - Code of ethics for medical and healthcare professionals – Euthanasia - Ethical obligation to animals - Ethical issues in relation to health care professionals and patients - Social justice in health care, human cloning, problems of abortion - Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT – III

Business ethics: Ethical stands of business, Immoral and illegal practices and their solutions - Characterizes of ethical problem in management, ethical theories, causes of unethical behaviour, ethical abuses and work ethics.

UNIT – IV

Environmental ethics: Ethical theory, Man and nature, Ecological crisis, Pest control, Pollution and waste - Climate change, Energy and population, Justice and environmental health.

UNIT – V

Social ethics: Organ trade, Human trafficking, Human rights violation and social disparities - Feminist ethics: Surrogacy/pregnancy, Ethics of media, Impact of Newspapers, Television, Movies and Internet.

Course Outcomes

1 After completion of this course the students will be able to follow and practice good behaviour with human values and moral support to their elderly family members.

2 They also aware and get knowledge about medical ethics how the doctors will behave with patients, what type of ethics should be followed by business people. They also get in through knowledge about the protection of environment social ethics like family ethics, the role of print and electronic media in prevention and protection of Human rights in Indian society.

Textbooks/Reference Books:

1. Join, S. Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D Irwin Inc.
3. "Management Ethics – Integrity at work' by joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold, H. Titus: Ethics for Today
6. Maitra, S.K. Hindu Ethics
7. William Lilly: Introduction of Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharama Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit Series, Vol I, II & III, Varanasi, Vol 100, 16-20, 21-32 and 74-77 only.
11. Charaka Samhita: Tr. Dr. Ram Karam Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics: Theory and Contemporary Issues, Barbara Mackinnon, Wardsworth/Thomson Learning 2001.
13. Analyzing Moral Issue, Judith, A Boss, Mayfield, Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed) John H Piet and Ayodhha Prasad, Cosmo Publications.
15. Text Book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C. Sharma., Ethical Philosophy of India Nagin & Co Julundhar.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	M							
CO2	M	L	M	M	M							
CO3	M	L	M	M	M							
CO4	H	L	H	H	H							

H: High; M: Medium; L: Low

III SEMESTER

CORE: GEO.301

METAMORPHIC PETROLOGY

Course Learning Objectives

1. to propane knowledge on metamorphic processes, kinds of metamorphism, classification nomenclature, structures and textures of metamorphic rocks.
2. Metamorphic grades, zones, facies and facies series. Mineralogical phase rule and phase diagram.
3. Contact and Regional metamorphic facies and their mineral assemblages and genesis of granulites and charnockites.
4. Metamorphic differentiation processes and origin of migamtites and study the classic regional metamorphic regions of the world and paired metamorphic belts.
5. Mineralization associated with metamorphic processes.

UNIT – I: Introduction to Metamorphism – Limits of Metamorphism - Metamorphic processes - Kinds of Metamorphism - Agents of Metamorphism. - Classification and Nomenclature of Metamorphic rocks. - Structures and Textures of Metamorphic rocks.

UNIT – II: Grades and Zones of Metamorphism – Concepts, Classification and Description of Metamorphic Facies – Mineralogical Phase Rule – Graphical Representation of Metamorphic Mineral Parageneses; Compositional Plotting, ACF, AKF, AFM phase diagrams

UNIT – III: Contact Metamorphic Facies: Hornfels, Sanidinite – Regional Metamorphic Facies: Zeolite, Greenschist, Blueschist, Amphibolite, Granulite, Ecologite – Genesis of Granulites and Charnockites - Anatexis and Origin of Migmatites - Regional Metamorphism and Paired Metamorphic Belts.

UNIT – IV: Metamorphic Reactions in Carbonate Rocks: Metamorphism of Siliceous Dolomitic Limestones, Formation of Wollastonite - Metamorphism of Pelitic Rocks – Metamorphism of Ultramafic Rocks – Metamorphism of Mafic Rocks

Course Outcomes

1. Identify metamorphic minerals in thin section and interpret met textures and able to comment on met grade and types of metamorphism.
2. Describe identify and classify metamorphic rocks in hand samples based on mineral assemblages and textures.
3. Plotting quantitative and qualitative mineral and mineral to infer the metamorphic conditions and processes study of metamorphic rocks on chemical system.
4. Establish relation between metamorphism and plate tectonics.
5. Establish metamorphic reaction principles of economically important ores and minerals associated with metamorphic processes.

CO –PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	M	M	H	M	M	L
CO2	H	H	H	H	H	H	M	M	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L
CO4	H	H	H	H	H	H	M	M	H	M	M	L
CO5	H	H	H	H	H	H	M	M	H	M	M	L

Textbooks/Reference Books:

1. John, D. Winter, 2001: An Introduction to Igneous and Metamorphic Petrology, Prentice Hall Inc.
2. Ronald, D. Frost and Carol, D. Frost, 2014: Essentials of Igneous and Metamorphic Petrology, Cambridge University Press.
3. Myron, G. Best, 2003: Igneous and metamorphic petrology, 2nd edition, Blackwell Publishing Company.
4. Chatterjee, S.C., 1974: Petrograpy of the igneous and metamorphic rocks of India, McMillan Co. Of India, Madras.
5. B. Bhaskara Rao, 1986– Metamorphic petrology, CRC Press
6. Turner F.J., 1981: Metamorphic petrology, McGraw-Hill
7. Congillen, 1982: Metamorphic Geology, London : Allen &Unwin,
8. Francis, J. Turner and Verhoogen, 2004: Igneous and metamorphic Petrology, CBS Publishers.
9. Winkler H.G.F. 1976: Petrogenesis of metamorphic rocks, Springer-Verlog, New York, Inc.
10. Philpotts, A.R. and J. Jay Ague, 2009: Principles of igneous and metamorphic petrology, 2nd edition, Cambridge University Press.
11. Bruce, W.D. Yardly, 1989 – An introduction to metamorphic petrology, Prentice Hall.
12. D.W. Hyndman, 1986 – Petrology of Igneous and Metamorphic rocks, 2nd Edition, McGraw-Hill Co., New York.

Practical:

1. Megascopic and microscopic examination of metamorphic rocks.
   a. Different types of schists, gneisses, amphibolites, granulites, eclogites, slates, marbles and quartzites.
   b. Arranging metamorphic rocks according to the facies of metamorphism.
2. Construction and interpretation of ACF diagrams.
3. Construction and interpretation of AKF and AFM diagrams.

CORE: GEO.302

ECONOMIC GEOLOGY AND MINERAL ECONOMICS

Course Learning Objectives

1. Various processes of formation of economic mineral deposits
2. To understand the genetic controls exerted by physical and chemical processes on ore formation in various geological settings through geological time scale.
3. Geology, mineralogy, occurrence genesis and distribution of metalliferous deposits with case studies.
4. Geology, occurrence genesis and distribution of coal petroleum and other industrial minerals.

UNIT- I:

Processes of formation of mineral deposits – magmatic concentration, metasomatism, hydrothermal process, sedimentation, residual and mechanical concentration, oxidation, supergene enrichment, sublimation, evaporation.

UNIT- II:

Ore deposition - physical and chemical controls of ore fluids and their migration - Metallogenic epochs and provinces with special reference to India - Classification of mineral deposits; UNFC Classifications - Mineralization through geological time scale.

UNIT- III:

Geology, nature of occurrence, mineralogy, genesis and distribution of the following ore deposits with case studies of Iron, Chromite, Copper, Pb-Zn and Bauxite - Geology, nature of occurrence, genesis and distribution of Coal and Petroleum deposits - Magnesite deposits - Mica deposits - Baryte deposits - Asbestos deposits - Mineral resources of Andhra Pradesh.

UNIT – IV

Mineral economics and its concepts - Tenor, grade and specification - Strategic, critical and essential minerals – National mineral policy.

Course Outcomes

1 This course has links directly with industry and share the knowledge about a wide range of ore deposits.
2 Offers a detailed study of origin of economic mineral deposits its identification properties and distribution in India.
3 Comprehensive knowledge in reflection light optic and ore textures.
4 Acquire practical knowledge on microchemical techniques for identification ores and estimation of ore reserves.

CO-PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	M	H	H	M	M	H	M	L	L
CO2	H	H	H	M	H	H	M	M	H	M	L	L
CO3	H	H	H	M	H	H	M	M	H	M	L	L
CO4	H	H	H	M	H	H	M	M	H	M	L	L

Textbooks/Reference Books:

1. Mead L. Jenson, Bateman, A. M. 1981: Economic Mineral deposits – John Wiley, New York.
2. Krishna Swamy, S. and Sinha, R.K. 1988: India's Mineral resources – Oxford & IBH, New Delhi.
3. K.V.G.K. Gokhale, 1973: Ore deposits of India, Thompson Press (India) Publ.
4. R.K. Sinha & N.L. Sharma. 2019: Mineral Economics, 4th Edn, Oxford & IBH, New Delhi.
5. Paul Ramdohr, 1970: Ore minerals and their intergrowth, Elsevier
6. R.L. Stanton, 1972: Ore petrology, McGraw-Hill Book Company, New York.
7. Charles, F. Park, Jr., and Roy, A. MacDiarmid, 1964: Ore deposits, W.H. Freeman & Co.

PRACTICAL:

1. Megascopic study of structures and fabrics of different Ore minerals and Industrial minerals.
2. Mineralogical and textural studies of common Ore minerals Under Ore microscope and their paragenetic significance.
3. Microchemical techniques for identification of Ores.
4. Exercises on mine sampling and determination of tenor and estimation of Ore reserves.
5. Analyze data on mineral production, use and export.

GENERIC ELECTIVE: GEO.303a

WATERSHED MANAGEMENT

Course Learning Objectives

1. To provide basics of watershed management
2. To apply the mitigation techniques of land erosion
3. To develop water harvesting techniques based on the terrain conditions
4. To implement the approach of people's participation in watershed management

UNIT-I

INTRODUCTION OF WATERSHED

Objectives of watershed development - Characteristics of watershed – Principles of watershed – Effects of watershed on community – Delineating the watershed – Basic data on watersheds –Need for watershed development – Watershed development programmes in India – Watershed Atlas

UNIT-II

EROSION, DEGRADATION and LAND MANAGEMENT

Types and Factors affecting erosion - Effects and control methods of erosion - Estimation of soil loss due to erosion - Universal soil loss equation –Degradation agents – Impact of the degradation of watersheds– Land use and land capability studies - Management of Agricultural, Forest, Grassland and wild land - Reclamation of saline and alkaline soils.

UNIT-III

WATER HARVESTING: Concept of Rainwater harvesting - water harvesting structures - Guidelines for construction of harvesting structures – Success stories of water harvesting structures –Role of peoples participation in construction and management of harvesting structures– Rain water harvesting from roof top

UNIT-IV

PLANNING AND MANAGEMNT

Elements of watershed management – Planning and Implementation of watershed Management activities – Multidisciplinary approach for watershed management – Impact of watershed Management.

Course Outcomes

1. Explain the importance of watershed management
2. Classify and explain the different water harvesting techniques
3. Use modern tools for land erosion control
4. Develop or improve the people's participatory approach for sustainable development and management of watersheds.

CO –PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	M	M	H	M	M	L
CO2	H	H	H	H	H	H	M	M	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L
CO4	H	H	H	H	H	H	M	M	H	M	M	L

Textbooks/Reference Books:

1. Rajora, R., (1998), Integrated Watershed Management, Rewat Publications, New Delhi.
2. Tideman, E.M., (1996): Watershed Management: Guidelines for Indian Conditions, Omega Scientific Publishers, New Delhi.
3. Lal. S., (2004), Watershed Development, Management and Technology, Mangal Deep Publications.
4. Paranjape, S. et. al., (1998), Watershed Based Development: A Source Book, Bharat Gyan Vigyan Samathi, New Delhi.
5. Suresh, R., (2002), Soil and Water Conservation Engineering, Standard Publishers and Distributers, Delhi.
6. Kakade, B.K., (2002), Soil and Water Conservation Structures in Watershed Development Programs, BAIF Development Research Foundation, Pune.

PRACTICAL:

1. Delineation of Watershed boundary and micro watershed boundaries of study area using toposheets
2. Watershed coding as watershed atlas of India

3. Quantitative analysis of watershed characteristics and parameters
4. Water budgeting of watersheds
5. Determination of infiltration rate from a controlled plot experiment
6. Calculation of Runoff using SCS-CN method.

GENERIC ELECTIVE: GEO.303b

PHOTOGRAMMETRY

Course Learning Objectives

1. To provide basics of photogrammetry and its application in geological surveying
2. To apply the techniques of photo interpretation
3. To perform basic computations of distance and heights of the objects
4. To implement the GPS based survey approach

UNIT – I

Basic concept of Photogrammetry – Principle – Types of photographs – Geometric elements of aerial photographs– Scale –Planning & Execution of Photographic Flights– Aerial mosaics -Stereoscopy–Determination of horizontal ground length, direction and angles from photo coordinates - Relief and Tilt Displacement on vertical aerial photographs –Elements of aerial photo interpretation..

UNIT – II

Introduction to Analytical Photogrammetry: Image measurements, Control points, Collinearity condition, Coplanarity condition, Space resection by collinearity, Space intersection by collinearity, Analytical Stereo model, Analytical Interior Orientation, Analytical Relative Orientation, Analytical Absolute Orientation, Analytical Self-calibration.

UNIT – III

Principles of digital photogrammetry –Digital Terrain Model generation – Image correlation – Image matching – Digital Orthophoto generation - Image measurements, Orientation procedures, Epipolar geometry,–DEM quality assessment –Applications of Digital photogrammetry in GIS –Link between GIS and Digital Photogrammetry.

UNIT - IV

Establishing horizontal & vertical controls, Ground control surveys by GPS, Pass Points for Aerotriangulation, Sequential construction of Strip model from Independent models, Aerotriangulation by simultaneous Transformations, Bundled Adjustment by GPS control, Triangulation with Satellite images, Computational strategies for triangulation - Principles of LIDAR and its applications.

Course Outcomes

1. Explain the importance of photogrammetry and its relationship to land surveying and mapping
2. Classify and prepare maps on different scales
3. Use stereoscope to interpret the elements on the aerial photographs

Textbooks/Reference Books:

1. Wilfried Linder, 2006: Digital Photogrammetry – A Practical course, 2nd Edition, Springer.
2. Paul, R. Wolf and Bon A. Dewitt, 2000: Elements of Photogrammetry (3ed), McGraw Hill
3. Morris M. Thompson, Editor-in-Chief, 1966: Manual Photogrammetry
4. J. Chris. McGlone, Edward, M. Mikhail, James, S. Bethel, 2004: Manual of Photogrammetry, American Society for Photogrammetry and Remote Sensing, Bethesda, MaryLand, USA.

PRACTICAL:

1. Testing stereo vision
2. Use of lens stereoscope and mirror stereoscope
3. Visual interpretation of aerial photographs
4. Stereoscopic viewing of stereo-pairs
5. Determination of vertical exaggeration
6. Use of parallax bar for height calculation from aerial photographs
7. Calculation of scale of the photographs Marking principal point and conjugate principal point on the stereopairs.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	M							
CO2	M	L	M	M	M							
CO3	M	L	M	M	M							
CO4	H	L	H	H	H							

H: High; M: Medium; L: Low

GENERIC ELECTIVE: GEO.303c

DIMENSIONAL STONES AND CONSTRUCTION MATERIALS

Course Learning Objectives

1. To introduce the knowledge on dimensional stones and construction materials
2. To classify dimensional stones and construction materials
3. To inquire suitability of the dimensional stones of construction materials

UNIT – I

Dimensional Stones: Criteria for selection of Dimensional Stones, Importance of Dimensional Stones in Archaeological Monuments – Dimensional Stone: Indian Scenario – Granite Industry in India – Dimensional Stones through Geological Time Scale – Granite Trade in South India.

UNIT – II

Dimensional Stone Varieties – Characteristics of Dimensional stone –Distribution of Dimensional Stones in India –Distribution of Dimensional Stones in Andhra Pradesh – Export and Import Qualities.

UNIT – III

Construction Materials: Varieties of Construction Materials – Ornamental and Construction Materials in Indian History – Distribution of Building Materials in Andhra Pradesh – Conservation of Commercial Rock Deposits/Monumental/Building Stones.

UNIT – IV

Engineering properties of rocks, Behaviour of rock on application of stresses: Stress and its type; Strain and its type Application of Strain and stress curve; Mohr's Circle and Stress Transformation.

Course Outcomes

1. Explain the distribution of dimensional stones and occurrence of construction materials
2. Classify dimensional stones and construction materials
3. Assess the suitability of various dimensional stones and construction materials

Textbooks/Reference Books:

1. Blyth, F.G.H. and Defreites, M.A., 1984: A Geology for Engineers
2. Krynine, D.P. and Judd, W.R., 1957: Principles of Engineering Geology.
3. Bell, F.G., 1999: Geological Hazards, Routledge, London.
4. Vikram, K., 1986: Directory of Dimensional Stones.
5. Raman, P.K., Mineral Resources of Andhra Pradesh.
6. Information Dossier on Regional Evaluation of Dimension Stone Granite in Andhra Pradesh, 1999: Geological Survey of India, OPAP.

PRACTICAL:

1. Prepare Charts of various dimensional stones found in India
2. Examine Physico-Mechanical Properties of dimensional stones
3. Prepare Charts on Environmental impact of mining for dimensional stones with all remedial measures.
4. Preparation of rock sample for testing in laboratory
5. Grading of fine aggregates
6. Grain size distribution of fine aggregate
7. Grain size distribution of coarse aggregate
8. Determination of crushing value of coarse aggregate

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	M							
CO2	M	L	M	M	M							
CO3	M	L	M	M	M							
CO4	H	L	H	H	H							

H: High; M: Medium; L: Low

SKILL ORIENTED COURSE: GEO.305

SURVEYING AND FIELD GEOLOGY

Course Educational Objectives

1. To provide basic knowledge on chain, compass, plane table, theodolite, other field equipment and Aerial photographs
2. To analyze the Measurement techniques, aerial photographs and equipment used in land surveying
3. to design and problem solving skills in surveying using surveying equipments and techniques.
4. To demonstrate knowledge and understanding of the geological report

UNIT- I: Scales, Measurement of distances with the survey instruments - Chain survey: Principles, offsets, cross staff, obstacles in chaining Compass Survey - Prismatic Compass - Surveyors' compass: Traverse with chain and compass–Methods of plane tabling, the two point problems, and the three point problems.

UNIT- II: Principles of leveling, Different type of level, Classification of leveling - Measurement of angles, Heights and Distances using Theodolite - Traverse survey with the Theodolite – Principle of Total station; Measurement of Distance, Area, Height, Angles, Gradients, Traversing, Contouring using Total station - Applications of using Total Station

UNIT- III: General basics of field geology - Field equipment and Safety – Introduction to field observations at different scales – The Field Notebook - Plotting Geological features on a Base map – Recording Palaeontological Information, Structural Information, Features of Sedimentary rocks, Igneous rocks and Metamorphic rocks.

UNIT- IV: Mapping geological features on Aerial Photographs – Geological mapping with the Alidade and Plane Table – Making a geological map from Aerial photographs – Preparing Geological reports - Making a Geological Map – Recording Numerical data and use of instruments in the field – Photography and Sampling.

Course Outcomes

1 Understand the use of different surveying instruments, field equipment, aerial photographs and their use.
2 Compute the area and earthwork for different works by using surveying instruments
3 Analyze surveying techniques, tools, survey data and geological reports
4 Prepare contour maps, geological maps and reports
5 Solve survey issues using proper survey and interpretation.
6 Use appropriate modern tools in surveying and mapping

CO –PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	M	M	H	M	M	L
CO2	H	H	H	H	H	H	M	M	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L
CO4	H	H	H	H	H	H	M	M	H	M	M	L
CO5	H	H	H	H	H	H	M	M	H	M	M	L
CO6	H	H	H	H	H	H	M	M	H	M	M	L

Textbooks/Reference Books:

1. T.P. Kanetkar and S.V. Kulkarni: Surveying & Levelling, Vol. I, R Agor Books.
2. B.C. Punmiya, 2017: Surveying and Levelling, McGraw-Hill Education.
3. Robert, R. Compton, 1962: Manual of field geology, John Wiley & Sons, New York.
4. Frederick, H. Lahee, 1961: Field geology, McGraw-Hill Company, New York.

PRACTICAL:

Surveying

1. Plotting of area using Cross staff
2. Determination of area by radiation method using compass
3. Longitudinal and cross–sectioning of a road profile using levelling instrument
4. Measurement of heights and distances using theodolite
5. Determination of areas using theodolite
6. Contouring using total station

Field geology

1. Identification of the rocks and their outcrop pattern in the field
2. Measurement of attitude of beds in and around engineering project site / mining area.
3. Identification of the landforms and geological information using toposheets of an engineering project site / mining area.

OPEN ELECTIVE: 308a

EARTH SYSTEM PROCESSES

Course Learning Objectives

1. To explore the fundamental interactions of the geosphere, hydrosphere, atmosphere and biosphere.
2. The unit is designed to provide a strong scientific foundation for understanding and contextualizing studies of the environment, human impacts and sustainable practice and management of resources.

UNIT – I

Introduction to various branches of Earth Sciences - Solar System: Origin of Solar system, Meteors and Meteorites - Age of the Earth –Earth Dynamics: Interior of the Earth, Composition of the Earth, Seismic waves, Plate Tectonics, Landslides, Volcanoes.

UNIT – II

Sea waves, Tides, Ocean currents - Geological work of seas and oceans - Tsunami and its causes, Warning system and mitigation.

UNIT – III

Hydrogeology: Hydrological cycle, Aquifers – Groundwater fluctuations and Groundwater composition - Glaciology: Glacier types, Different types of glaciers, Landforms formed by glacier - Rock, Mineral, Batholiths, Dyke, Sill, Folds, Faults, Joints, Unconformity.

UNIT – IV

Structure and composition of atmosphere, Atmospheric circulation, Green house effect and global warming, Carbon dioxide sequestration - Geological work of wind –Steps to maintain clean and pollution free atmosphere with governing laws, precautionary measures against disasters.

Course Outcomes

1. The interaction between the Earth's spheres, relevant processes and environmental changes.
2. Knowledge and understanding Recapitulate processes in the different spheres.
3. Describe the connections and feedback between the Earth's spheres. Explain theconnection between Earth System processes and global environmental changes.

4. A basic understanding of the Earth as a holistic system knowledge of the main components of the Earth system and their interactions
5. The interactions between biological, chemical, and physical processes that shape and define the Earth System.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	M	H	M	M	L
CO2	H	H	M	H	H	H	M	M	H	M	M	L
CO3	H	M	M	H	M	H	H	H	H	M	H	L
CO4	H	M	M	M	M	H	M	H	H	M	M	L
CO5	H	H	M	H	H	H	M	M	H	M	M	L

Textbooks/Reference Books:

1. Holme's Principles of Physical Geology. (1992): Chapman & Hall.
2. Emiliani, C, (1992): Planet Earth, Cosmology, Geology and the Evolution of Life and Environment, Cambridge University Press.

OPEN ELECTIVE: 308b

MEDICAL GEOLOGY

Course Learning Objectives

1. To provide knowledge and skills on the interpretation of the geological impact on geographical distribution of diseases in the environment, and on human and animal health
2. To understand the basics of minerals and their influence on human health, flora and fauna.
3. To assess the occurrence of various elements and its cyclic movement through the abiotic-biotic environment

UNIT-I

General characteristics of tropical, subtropical environments - Rock weathering and soil formation - Weathering and formation of secondary minerals - Chemistry of weathering of ultra-basic rocks - Fundamental Relationship of Public Health and Geological Processes - Environmental Biology - Natural Distribution and Abundance of Elements - Anthropogenic Sources - Uptake of Elements on Chemical and Biological Perspective and its functions - Geological Impacts on Nutrition.

UNIT-II

Radon in Air and Water, Arsenic in Groundwater and the Environment - WHO and BIS Standards for drinking water - Fluoride in Natural Waters, soils, sediments, plants - Bioavailability of fluoride, Dental fluorosis, Skeletal fluorosis, Water Hardness and Health Effects, Geochemical basis for tropical endomyocardial fibrosis (EMF) - Effect of water hardness on urinary stone formation 58 (urolithiasis) - Types of stones: Calcium oxalate, Calcium phosphate, Uric acid, Magnesium ammonium phosphate stones, Cysteine.

UNIT-III

The iodine cycle in the environment - Iodine in drinking water, Iodine in food, Iodine Deficiency Disorders (IDD), Endemic cretinism, Goitrogens - The nitrogen cycle, Nitrate as fertilizers and environment, Nitrogen loading in rice fields, Nitrates from human and animal wastes, Nitrates and Methemoglobinemia, Nitrates and cancer - Bioavailability of Elements in Soil - Selenium Deficiency and Toxicity in the Environment - Natural Aerosolic Mineral Dusts and Human Health - Animals and Medical Geology - The Impact of Micronutrient Deficiencies in Agricultural Soils and Crops on the Nutritional Health of Humans.

UNIT-IV

Environmental Toxicology; Environmental Epidemiology, Environmental Medicine, Environmental Pathology, Speciation of Trace Elements - Techniques and Tools of GIS in Human Health Studies, Investigating Vector - Borne and Zoonotic Diseases with Remote

Sensing and GIS - Mineralogy of Bones, Inorganic and Organic Geochemistry Techniques - Histochemical and Microprobe Analysis in Medical Geology.

Course Outcomes

1. Explain about relationship of human Health and Geological Processes.
2. Able to understand the importance of the Water quality standards and impact of micronutrient deficiencies in soils and crops on human health
3. Analyse the interaction of abundance of elements and geological effects.

Textbooks/Reference Books:

1.C.B., Dissanayake and R. Chandrajith (2009): Introduction to Medical Geology, Springer, London

2. H. Catherine, W. Skinner, Antony R. Berger (2003). Geology and Health: Closing gap, Oxford Univ. press, New York.

3. Iosif, F. Volfson, (2010): Medical Geology: Current Status and Perspectives, 2010, Russian Geological Society (ROSGEO) Publisher. Moscow.

4. K.S. Valdiya, (2004): Geology, environment, Society, University press (India), Hyderabad.

5. Lawrence K. Wang, Jiaping Paul Chen, Yung-Tse Hung, Nazih K. Shammas., (2009): Heavy Metals in the Environment, CRS Press, Taylor & Francis Group, Boca Raton, FL

6. M.M. Komatica., (2004): Medical Geology, Vol.2, Effects of geological environment on Human health, Elsevier, U.K.

7. Olle Selinus, B., Elsevier (2003): Essentials of Medical Geology (2005), Academic Press., U.K.

8. Olle Selinus, B., Finkleman, R.B., Jose, A. Centeno (2010): Medical Geology - Regional synthesis (2010), Springer, London.

9. Scott S. Olson., (1999) International Environmental Standards Handbook , CRC Press, London.CKE

10. William N. Rom., (2012). Environmental Policy and Public Health - Air Pollution, Global Climate Change, and Wilderness, by John Wiley & Sons, Inc. Published by Jossey Bass A Wiley Imprint.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	M							
CO2	M	L	M	M	M							
CO3	M	L	M	M	M							
CO4	H	L	H	H	H							

H: High; M: Medium; L: Low

PRACTICAL I – GEO.304P:

METAMORPHIC PETROLOGY, ECONOMIC GEOLOGY AND MINERAL ECONOMICS & WATERSGED MANAGEMENT/COMPUTER APPLICATIONS AND GEOSTATISTICS/DIMENSIONAL STONES AND CONSTRUCTION MATERIALS

Course objectives:

1. To identify various metamorphic rocks in hand specimen.
2. To provide the basic knowledge on Ore minerals and Industrial minerals.
3. To understand different ore sampling and differentiation
4. To analyse the watershed analysis and water budget of the basin

Course Outcomes: Students will be able to:

1. Differentiate metamorphic rocks and their facies
2. Interpret processes of formation, mode of occurrence and uses of ore minerals.
3. Estimate ore reserves and analyse the ore samples
4. Prepare the watershed maps and coding as per watershed atlas

METAMORPHIC PETROLOGY:

1. Megascopic and microscopic examination of metamorphic rocks.
    a. Different types of schists, gneisses, amphibolites, granulites, eclogites, slates, marbles and quartzites
2. Arranging metamorphic rocks according to the facies of metamorphism.
3. Construction and interpretation of ACF diagrams.
4. Construction and interpretation of AKF and AFM diagrams.

ECONOMIC GEOLOGY AND MINERAL ECONOMICS:

1. Megascopic study of structures and fabrics of different Ore minerals and Industrial minerals.
2. Mineralogical and textural studies of common Ore minerals Under Ore microscope and their paragenetic significance.
3. Microchemical techniques for identification of Ores.
4. Exercises on mine sampling and determination of tenor and estimation of Ore reserves.
5. Analyze data on mineral production, use and export

WATERSHED MANAGEMEN:

1. Delineation of Watershed boundary and micro watershed boundaries of study area using toposheets
2. Watershed coding as watershed atlas of India
3. Quantitative analysis of watershed characteristics and parameters
4. Water budgeting of watersheds
5. Determination of infiltration rate from a controlled plot experiment

6.Calculation of Runoff using SCS-CN method

PHOTOGRAMMETRY:

1. Testing stereo vision
2. Use of lens stereoscope and mirror stereoscope
3. Visual interpretation of aerial photographs
4. Stereoscopic viewing of stereo-pairs
5. Determination of vertical exaggeration
6. Use of parallax bar for height calculation from aerial photographs
7. Calculation of scale of the photographs Marking principal point and conjugate principal point on the stereopairs.

DIMENSIONAL STONES AND CONSTRUCTION MATERIAL:

1. Prepare Charts of various dimensional stones found in India
2. Examine Physico-Mechanical Properties of dimensional stones
    a. Prepare Charts on Environmental impact of mining for dimensional stones with all remedial measures.
3. Preparation of rock sample for testing in laboratory
4. Grading of fine aggregates
5. Grain size distribution of fine aggregate
6. Grain size distribution of coarse aggregate
7. Determination of crushing value of coarse aggregate

PRACTICAL II – GEO.306P:

Surveying and Field Geology

Course objectives:

1. To provide the basic knowledge on surveying equipments
2. To estimate the area of the area, height of the objects and distance between two objects.
3. To understand the topographic sheets and geological features in the field
4. To analyse the geological considerations in the construction area

Course Outcomes: Students will be able to:

1. Determine the area of the plot , heights of the objects and distances between two objects
2. Interpret the survey data
3. Analyse the geological conditions of the engineering site and mining area
4. Prepare the contour maps and identify landforms in the construction site

Practical Syllabus

1. Plotting of area using Cross staff
2. Determination of area by radiation method using compass
3. Longitudinal and cross–sectioning of a road profile using levelling instrument
4. Measurement of heights and distances using theodolite
5. Determination of areas using theodolite
6. Contouring using total station
7. Identification of the rocks and their outcrop pattern in the field
8. Measurement of attitude of beds in and around engineering project site / mining area.
9. Identification of the landforms and geological information using toposheets of an engineering project site / mining area.

PRACTICAL III - GEO.307P:

GEOLOGICAL FIELD SURVEY AND TRAINING PROGRAMME

Course objective:

1. To identify various metamorphic rocks in hand specimen
2. To recognise the occurrence of the economic minerals
3. To suggest suitable sites for rainwater harvesting sites.
4. To understand mining procedures and processes

Course Outcomes: Students will be able to:

1. Differentiate metamorphic rocks based on the physical characteristics
2. Recognize association and occurrence of economic minerals
3. Identify and Justify the suitable sites for rainwater harvesting sites
4. Suggest the requirement of mining equipment
5. Prepare the field report based on the ground truth verifications

Exercises

1. Observation of metamorphism in the geological formations.
2. Identification and study of Para and Ortho metamorphic activity in the metamorphic rocks.
3. Study of association and occurrence of economic minerals in the mining areas.
4. Identification of various Rain water Harvesting structures and their impact studies in a basin.
5. Field visit to quarry of dimensional stone mining areas to understand the mining procedures and processes.
6. Field exposure to latest equipments in the mining areas.
7. Preparation of field report (draft) incorporating the above said geological characteristics in the field.

IV SEMESTER

CORE: GEO.401

HYDROGEOLOGY AND ENGINEERING GEOLOGY

Course Learning Objectives

1. To provide the basics of hydrological properties of rock, aquifers, source of groundwater pollution and artificial recharge structures
2. To analyze the quality of water
3. To design the groundwater movement
4. To conduct groundwater investigations, to insist on the management of groundwater and methods of groundwater recharge
5. Role of geologist in engineering projects geological consideration for the selection of sites for major engineering projects.

UNIT – I

Precipitation, Runoff, Infiltration, Evaporation, Transpiration- Hydrological properties of rocks- Origin, Occurrence and Vertical Distribution of Ground water – Classification of aquifers - Geological Formations as Aquifers – Springs - Darcy's Law, Cone of Depression – Hydrographs - Water Table Contour Maps - Dispersion of Groundwater Tracers - Water Quality Standards: Analyses and Interpretation.

UNIT - II

Groundwater Exploration: Surface and Subsurface Geological, and Geophysical Methods of Groundwater Exploration - Hydrogeomorphic Mapping using various Remote Sensing Techniques - Artificial Recharge of Groundwater - Conjunctive use of Surface and Ground water.

UNIT – III

Role of geologist in the engineering projects - Engineering properties of rocks - physical characters of building stones, concrete and other aggregates –Rock as a Construction material – Geological consideration for the construction of dam and Reservoir sites -Types of dams, remedial measures for failure of dams and reservoirs - Case histories of some major dams: Nagarjuna Sagar, Srisailam and Bhakranangal.

UNIT – IV

Geological considerations in the selection of tunnels.–tunnelling – remedial measures for failure of dams and reservoirs–Influence of geological conditions on foundations and design of buildings - Geological considerations for the construction of roads/ highways and bridges - seismicity in India - geological consideration for earthquake resistant structures - Problems of groundwater in engineering projects.

Course Outcomes

1. Apply the knowledge of geological formations and the hydrological properties of rocks
2. Analyze the suitability of water for domestic, irrigation and industrial purposes Conduct geological and geophysical investigations and give recommendations for drilling of borewells.
3. Explain causes of pollution of groundwater give remedial measures to the society.
4. Use modern methods and appropriate techniques to carrying out geophysical studies and artificial recharge methods
5. Students will get critical knowledge on evaluation of geological condition at the major engineering project sites.

CO – PO Mapping

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H	H	H	H	H	H	H
CO2	H	H	H	H	M	H	H	H	H	H	H	H
CO3	H	H	H	H	M	H	H	H	H	H	H	H
CO4	H	H	H	H	M	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	M	M	H	M	M	L

Textbooks/Reference Books:

1. Schward and Zhang, 2003: Fundamentals of Groundwater, John Willey and Sons.
2. Todd, D.K., 2004: Ground Water Hydrology, John Wiley & Sons, New York.
3. Davies, S.N. and De-West, R.J.N., 1966: *Hydrogeology*, John Wiley & Sons, New York.
4. Raghunath, H.M., 1987: *Ground Water*, Wiley Eastern Ltd., Calcutta.
5. Driscoll, F.G., 1988: *Ground Water and Wells*, UOP, Johnson, Div. St. Paul. Min. USA.
6. Fetter, C.W., 1984: *Applied Hydrogeology*, McGraw-Hill Book Co., New York.
7. Fitts, C.R., 2013: *Groundwater Science*, Academic Press.
8. Freeze, R.A. and Cherry, J.A., 1979: *Groundwater*, Englewood Cliffs, NewJersey: Prentice-Hall.
9. Karanth, K.R., 1987: *Groundwater: Assessment, Development and Management*, Tata McGraw - Hill Pub. Co. Ltd.
10. Krynine & Judd., Principles of Engineering Geology and Geotectonics (Mc Graw Hill)
11. Parbin Singh., Engineering and General Geology
12. Blyth., Geology of Engineers (ELBS)
13. Sathya Narayanswami, B.S., Engineering Geology (Dhanpat Rai & Co.)
14. Rangwala, S.C., Engineering Materials

PRACTICAL:

1. Simple numerical problems related to: determination of permeability, Groundwater flow, Well hydraulics etc.
2 Preparation and interpretation of water level contour maps and depth to water level maps.
3. Study, preparation and analysis of hydrographs for differing groundwater conditions
4. Water potential zones of India (map study).
5. Graphical representation of chemical quality data and water classification (C-S and Trilinear diagrams).
6. Topomap study on topographic environment for ideal site and route selection for (i) Dams (ii) Reservoirs (iii) Canal alignment (iv) Check dams (v) Flood water storage, (vi) Ghat roads
7. Preparation of Merits, demerits & remedial measures based up on geological cross sections of project sites
8. Identification of building stones and rock metal and study for physical and engineering properties

CORE: GEO.402

MINERAL EXPLORATION AND ORE BENEFICIATION

Course Learning Objectives

1. Knowledge on energy resources and guides to locate ore bodies.
2. To enhance knowledge on various methods of exploration.
3. Knowledge on geophysical methods for ore reserve estimation
4. To impart knowledge on Ore beneficiation processes and techniques.

UNIT – I:

Conservation of minerals - Renewable and non-renewable resources - Guides to locate ore bodies: Physiographic, Lithologic, Mineralogical and Structural guides.

UNIT- II:

Stages of Exploration; Scope, Objectives and Methods of Prospecting - Regional Exploration: Geological, Geochemical and Geobotanical Methods - Geologic aspects of Drilling - Types of Drills - Drilling methods: Planning, Selection of Sites, Angle and Direction of Bore-holes.

UNIT – III

Methods of sampling - Weighting of samples and calculation of average grades - Mathematical and Statistical Methods - Ore Reserve Estimation - Geophysical Methods: Ground and Airborne Surveys; Gravity, Magnetic, Electrical and Seismic Methods of Mineral Exploration.

UNIT - IV

Ore Deposition - Physical and Chemical Controls of Ore fluids and their migration - Metallogenic Epochs and Provinces with Special reference to India – Ore beneficiation Processes - Physical Concentration Methods – Pre-treatment Processes: Drying, Calcination, Roasting, Agglomeration – Extraction via Flotation: Heap Leach Process, Smelting.

Course Outcomes

1 This course linked to industry and acquires knowledge on techniques to locate ore bodies, methods for mineral exploration and geologic aspects of drilling.
2 Acquire knowledge on geophysical methods for Ore reserve estimation.
3. Acquire knowledge on Ore beneficiation processes and techniques.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	M	M	H	M	M	L
CO2	H	H	H	H	H	H	M	M	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L

Textbooks/Reference Books:

1. Gokhale, K.V.G.K., and Rao, T.C., 1978: Ore deposits of India, Thompson Press, India.
2. Paul Ramdohr, 1970: Ore minerals and their intergrowth, Elsevier
3. R.L. Stanton, 1972: Ore petrology, McGraw-Hill Book Company, New York.
4. Lindgre, W: Ore deposits Stratabound Stratiform ore deposits, McGraw hill scientific company

PRACTICAL:

1. Preparation of Geological cross section based on Borehole data;
2. Laying down of stripping boundary on geological cross sections;
3. Calculation of geological and mineable ore reserves, mineable waste, and grade.
4. Interpretation of remote sensing data for mineral exploration.
5. Preparation of mineral maps of India,
6. Graphical representation of production, export and import of important minerals.

GENERIC ELECTIVE: GEO.403a

MINING GEOLOGY

Course Learning Objectives

1. To make students conversant with prevailing Mineral policies and acts
2. To understand different approaches of mineral exploration using different methods
3. To develop the capability to identify ore minerals and also design process flow charts in mineral processing.

UNIT- I

Mines and Minerals (Regulations and development) - Act ,1957 – National Mineral Policy - Mining Lease –Prospecting license – Renewal – Royalty and dead rent – Mineral concession rules (1960) – Certification of approval.

UNIT - II

Drilling: Percussion Drills, Rotary Drills, Miscellaneous Drilling methods, Drill Sampling, Accuracy of Sole Hole Sampling, Bore Hole Problems, Bore Hole Logging, Preservation and Sampling cares

UNIT – III

Mining methods: Classification of mining methods, Alluvial mining, Open cast mining or quarrying, Underground mining – Coal mining methods: Longwall advancing, Longwall retreating, Horizon mining, Strip mining and Miscellaneous mining.

UNIT - IV

Geochemical Prospecting: Metallic Mineral Deposits, Geochemical Field Techniques, Techniques used in Geobotanical Survey, Geochemical methods for Petroleum and Natural Gases Exploration – Ore Dressing: Crushing, Grinding, Sizing, Concentration; Washing and Scrubbing, Gigging, Tabling, Magnetic Separation, Electrostatic Separation – Flow Sheets: Chromite Gold, Copper and Lead and Zinc.

Course Outcomes

1. Confirm mining rules and regulations
2. Able to determine suitable mining methods
3. Analyse different ores and ore beneficiation processes.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	M	H	H	M	M	H	M	L	L
CO2	H	H	H	M	H	H	M	M	H	M	L	L
CO3	H	H	H	M	H	H	M	M	H	M	L	L

Textbooks/Reference Books:

1. Abbas & Abbasi - Reneawable Energy Resources & their Implication. (Prentice Hall India)
2. Arogyaswamy, R.N.P. (1994): Course in Mining Geology. Oxford IBH– New Delhi.
3. Gupta, H.K., and Rastogi, B.K. (1976). Elements of Mining Technology Dhanbad publishers, Dhanbad.
4. Mckinstry, H.E. (1980). Mining Geology, Prentice Hall, N.Y.
5. R.W. Marjoribanks (1997). Geological methods in Mineral Exploration and Mining, Chapman & Hall, London.

PRACTICAL:

1. Identification of anomaly
2. Concept of weighted average in anomaly detection
3. Geological cross-section
4. Models of reserve estimation
5. Study of existing mine plans and sketches

GENERIC ELECTIVE: GEO. 403b

DIGITAL IMAGE PROCESSING

Course Learning Objectives

1. To introduce the concepts of image processing and basic analytical methods to be used in image processing
2. To familiarize students with image enhancement and restoration techniques
3. To develop the capability to use GPS and DGPS instruments and technology

UNIT – I

Digital Number/pixel value - Image Rectification - Types of errors (Geometric, Radiometric and Atmospheric errors) – Corrections (Geometric, Radiometric and Atmospheric) – Image resampling – Resampling techniques - Computation of radiance and reflectance

UNIT – II

Image Registration - Image Enhancements, Spatial Enhancement, Radiometric Enhancement, Spectral Enhancement, Principal Component Analysis – Image Classifications: Digital Supervised classification, Unsupervised classification - Reclassification Processing and Feature Extraction – Data merging.

UNIT – III

Basic concepts of Global Navigational Satellite Systems (GNSSs) – Principle of GPS – Components of GPS - Source of GPS Errors and biases, Advantages and disadvantages of GPS surveying – GPS positioning types – Absolute positioning- Applications of GPS

UNIT – IV

Differential positioning – DGPS Measuring Techniques (Static, Rapid Static, Kinematic, Real Time Kinematic), Application of DGPS.

Course Outcomes

1. Analyze images in the frequency domain using various transforms.
2. Evaluate the techniques for image enhancement and image restoration.
3. Use GPS and DGPS techniques to various projects

Textbooks/Reference books:

1. Bernhardsen, T., 2002: Geographic Information Systems – An introduction. Wiley India.
2. Bonham, G. F and Carter. Geographic Information system for Geoscientists - Modelling with GIS, Elsevier.
3. Chandra, A.M. and Ghosh, S.K. 2007: Remote Sensing and Geographical Information Systems. Narosa Publishing House.

4. Estors, J.E. and Senger, L.W., 1974: RemoteSensing. Hamilton Publishing Company.
5. George Joseph: Fundamentals of Remote Sensing. Universities Press, Hyderabad.
6. Gupta, R. P. 2003: RemoteSensing Geology. Springer.
7. Heywood, I., Cornelius, S. and Carver, S. 2011: An Introduction to Geographical Information Systems, Pearson Prentice Hall, London.
8. Lillesand, T.M. and Keifer, R.W., 1979: Remotesensing and Image interpretation. John Wiley and Sons.
9. Lo C. P. and Yeung, A. K. W. 2002: Concepts and Techniques of Geographic Information Systems. Prentice Hall.
10. Panda, B. C. 2005: Remote Sensing – Principles and Applications. Viva Books Private Limited, New Delhi.
11. Pandey, S.N. 2001: Principles and Applications of Photogeology. New Age International (P) Limited Publishers, New Delhi.
12. Reddy, A.M., 2006: Textbook of Remote Sensing and Geographical Information Systems. B S Publications.
13. Rees W.G., 2001: Physical principles of Remote Sensing. Cambridge University Press.
14. Sabins, F.F., 1985: Remote Sensing–Principles and Applications. Freeman.
15. Seigal, B.S. and Gillespie, A.R., 1980: Remote sensing in Geology, John Wiley & Sons, 1980.

PRACTICAL:

1. Reading and Displaying satellite data from BIL, BSQ and BIP Formats
2. Generating False Colour Composite (FCC)
3. Extracting area of Interest (AOI)
4. Generating Histogram of various bands
5. Georeferencing the base image
6. Geometric correction of satellite image
7. Enhancement using different Filtering techniques,
8. Unsupervised Classification and Supervised Classification
9. Change detection study

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	M							
CO2	M	L	M	M	M							
CO3	M	L	M	M	M							
CO4	H	L	H	H	H							

H: High; M: Medium; L: Low

GENERIC ELECTIVE: GEO. 403c

WATER RESOURCES MANAGEMENT

Course Learning Objectives

1. To introduce the fundamentals of groundwater flow
2. To learn the hydraulics of various types of wells
3. To develop the skills to conduct groundwater investigations
4. To understand the impacts of seawater intrusion

UNIT- I:

Hydrologic cycle; Hydrological properties of rocks - Types of Aquifers: Unconfined, Confined, Semi Confined & Perched-Groundwater movements: Sub surface movement, Base flow, Effluent flow and influent flow - Darcy's law, Reynold's number, Laminar flow and turbulence flow.

UNIT - II

Pumping test: Objectives, layout of the test and measurements - Pumping Tests Methods, Estimation of T & S by Theis, Jacob and Theis Recovery, Methods, Specific Capacity Method by Slither's Method

UNIT - III

Water level fluctuation: Water Table fluctuations and causative factors; Water table and Piezometric surface and its fluctuations - Water Table Contour maps - Well types, drilling methods

UNIT - IV

Surface investigation of groundwater - Subsurface investigation of groundwater - Artificial recharge of groundwater: Concept and methods - Saline water intrusion in aquifers: Saline water intrusion, Ghyben – Herzberg relation between fresh and saline water, Prevention and control of salt water intrusion in the coastal aquifers.

Course Outcomes

1. Explain the distribution of groundwater
2. Estimate the yield of the wells
3. Assess the quantity and quality of groundwater

Textbooks/Reference Books:

1. Groundwater Hydrology by Todd, D.K. John Wiley & Sons. New York.
2. Hydrogeology by Karanth, K.R., Tata McGraw Hill Publ Co New Delhi.
3. Ground water assessment, Development and Management by Karanth K.R. Tata, McGraw Hill Publ. Co. New Delhi.
4. Keller, E.A., 1978. Environmental Geology. Bell and Howell, USA.
5. Subramanian, V., 2001.Textbook in environmental Science, Narosa Publication, New Delhi.
6. Hydrogeology by Davis, S.N. and Dewiest, R.J.M. John wiley & Son New York.
7. Ground Water by Raghunath, H. M. Wiley Eastern Ltd. New Delhi.
8. Groundwater Resources evaluation by Walton, W.C. McGraw Hill Publ. Co. New Delhi.
9. Groundwater Hydrology by Bouwer, H., McGraw Hill Book Co. New Delhi.
10. Davies, S.N. and De Wiest, D.R., (1966), Hydrogeology-John Wiley& sons, Inc, New York, 463p.
11. Fetter, C.W., (1990), Applied Hydrogeology-McGraw Hill, Publisher, New Delhi.
12. Freeze, R.A. and John, A., (1979), Groundwater, Cherry, Prentice Hall, Inc, 604p.
13. Handa, O.P (1984). Groundwater Drilling, Oxford & I.B.H. Publishing Co.
14. Hiscock, K., (2005), Hydrogeology, Principles and Practice, Blackwell Publishing, 389p.
15. Kazmann, (1973), Modern Hydrology, Harper and sons Publishers, New Delhi.
16. Manning, J.C., (2007). Applied Principles of Hydrology, CBS Publishers and Distributers, New Delhi.
17. Reddy and Rami, J.P., (2008). A Textbook of Hydrology, University Science Press, Bangalore.
18. Schwartz, F.W and Zhang, H., (2003). Fundamentals of groundwater, John Wiley& sons, Inc, New York, 583p.
19. Shaw, E.M., (1994). Hydrology in Practice, 3rd edition, Chapman and Hall, London, 569p.
20. Tolman, C. (1972). Groundwater, McGraw Hill Book Company.
21. Walton, W.C. (1970). Groundwater Resource Evaluation, McGraw Hill Book Company.

PRACTICAL:

1. Problems on Hydrological properties of rocks
2. Finding groundwater flow direction
3. Prepare groundwater level contours
4. Calculation of drawdown
5. Calculate yield of a well
6. Calculation of lag time

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	M							
CO2	M	L	M	M	M							
CO3	M	L	M	M	M							
CO4	H	L	H	H	H							

H: High; M: Medium; L: Low

MULTIDISCIPLINARY COURSE: GEO. 405

ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

Course Learning Objectives

1. To impart knowledge on concept of environmental impact assessment
2. To prepare the database for planning and management of EIA
3. To develop the skills to prepare mitigation measures
4. To understand the Various Acts related to Environment audit

UNIT - I

Concept and Scope of EIA – Elements and methodologies of EIA – Classification of environmental parameters – Public participation in environmental decision making process – Planning and management of EIA – Criteria for the selection of EIA methodology

UNIT- II

Procurement of relevant soil quality data, impact prediction, assessment of impacts significance, Identification and incorporation of mitigation measures

UNIT- III

Procurement of relevant Air, Wild life and other Ecosystem quality data, impact prediction, assessment of impacts significance, Identification and incorporation of mitigation measures

UNIT - IV

Need of Environmental audit – Importance of environmental legislation – Classification of environmental audit – Audit data and report - The Air Act – The Environmental Protection Act – The water Act – Wild life Act - Case studies.

Course Outcomes

1. Explain and evaluate the EIAM report
2. Estimate the cost benefit ratio of a project
3. Assess the risks and impacts of a project
4. Identify suitable EIA methodology

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	M	M	H	M	M	L
CO2	H	H	H	H	H	H	M	M	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L
CO4	H	H	H	H	H	H	M	M	H	M	M	L

Textbooks/Reference Books:

1. H.S. Bhatia, 2003: A Text Book of Environmental Pollution and Control - Galgotia Publications (P) Ltd, New Delhi.
2. Larry, W. Canter, 1977: Environmental Impact Assessment - McGraw-Hill publications.
3. Anjaneyulu, Y. and Manickam, V, 2017: Environmental Impact Assessment Methodologies – B.S. Publication.
4. Balakrishna Moorthy, 2008: Environmental Management, 2nd Edn – PHI Publications.
5. B.B. Hosetti, and A. Kumar, 1998: Environmental Impact Assessment and Management - Daya Publishing house.

OPEN ELECTIVE: GEO.407a

FUEL GEOLOGY

Course Learning Objectives

8. To impart knowledge about the origin, composition and accumulation of petroleum; reservoir rock types and reservoir traps.
9. To know geology of oil bearing basins of India, position of oil and gas in India and future prospects and economic scenario.
10. To educate about the coal characteristics, geographical distribution of coal and detailed geology of coal fields of India.
11. To enlighten about the occurrence and association of atomic minerals, methods of prospecting and Nuclear power stations country and future prospects.

UNIT- I:

Petroleum: Composition – nature - origin: inorganic and organic theories - migration (primary and secondary) and accumulation of oil and gas - Geographic locations - petroleum reservoir rocks - Reservoir rock types, Geological age of reservoir rocks - Reservoir traps - Classification of traps, anticlinal theory - Structural traps caused by folding, faulting and fracturing.

UNIT- II:

Primary stratigraphic traps - Fluid traps, Salt domes, Salt plugs, Cap rocks and association traps: Origin, reservoir conditions - Oil bearing basins of India - Geology of the productive oil fields of India - Position of oil and natural gas in India - Future prospects and economic scenario.

UNIT- III:

Coal: Definition, origin, sedimentology of coal bearing strata - Rank, grade and type of coal - Chemical characterization: Proximate and ultimate analysis - Coal forming epochs in the geologic past - Geological and geographical distribution of coal in India - Detailed geology for important coal fields in India.

UNIT- IV:

Atomic minerals: Mode of occurrence and association of atomic minerals in nature - Atomic minerals as source of energy - Methods of prospecting and productive geological horizons in India - Nuclear power stations of country and future prospects - Atomic fuels and environment.

Course Outcomes

1. The course offers a detailed study about natural fuels like coal and petroleum their formation and distribution especially in sedimentary basins.
2. Students shall benefit to have basic ideas about formations, nomenclature in constitution of coal working detail of distribution of coals and coal industry in India, Sufficient idea offormation and entrapment of oil and gas.
3. Get elaborate knowledge about occurrence of atomic minerals in nature, methods of prospecting, atomic fuels and environment.

CO – PO Mapping

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H	H	M	H	M	M	H
CO2	H	H	H	H	M	H	H	M	H	M	M	H
CO3	H	H	H	H	M	H	H	M	H	M	M	H

Textbooks/Reference Books:

1. Taylor, G.H., Teichmueller, M., Davis, A., Diesel, C.F.K. and others, 1998: Organic Petrology, Berlin – Stuttgart.
2. Selley, R.C., 1985: Elements of Petroleum Geology, Academic Press
3. Chandra, D., Singh, R.M and Singh, M.P: Textbook of Coal
4. Singh, M.P: Coal and Organic Petrology
5. Stach, E, Mackowsky, M.T.H, Taylor, H.H and others, 1982: Stach's Textbook of Coal Petrology
6. Durrance, E.M., 1986: Radioactivity in Geology: Principles and Applications, Ellis Horwood Ltd.
7. Scott, A.C., (1987): Coal and Coal-bearing strata: Recent Advances. The geological Society of London, Publication no. 32, Blackwell scientific Publications.
8. Holson, G.D. and Tiratso, E.N., (1985): Introduction to Petroleum Geology. Gulf Publishing, Houston, Texas.
9. North, F.K., (1985): Petroleum Geology. Allen Unwin.
10. Dahlkamp, F.J., (1993): Uranium Ore Deposits. Springer Verlag.
11. VBoyle, R.W., (1982): Geochemical prospecting for Thorium and Uranium deposits, Elsevier.

OPEN ELECTIVE: GEO.407b

NATURAL HAZARDS AND DISASTER MANAGEMENT

Course Learning Objectives

1. To understand the origin and types of disasters
2. To Compare hazards, disasters and associated natural phenomena and their interrelationships, causes and their effects
3. To build skill to respond to disasters

UNIT - I

Natural Hazard - definition - Earth's processes: catastrophic geological hazards: study of floods, Landslides, Earthquakes, Volcanism and avalanches – with a view to assess the magnitude of the problem, prediction and perception of the hazards - Laws and regulations towards hazard management.

UNIT - II

Earthquakes: Definition - seismic waves, intensity and magnitude, Richter scales, Seismograph, seismogram, seismicity in Indian region, mitigation measures and management, Preparation of seismic hazard map – **Tsunamis:** Causes, General characteristics, Predictability, effects, Possible Risk Reduction Measures – **Volcanoes:** Definition, types, mitigation measures and management - **Avalanche:** Definition, types, mitigation - **Flood:** Definition, causes, vulnerable zones in India, Mitigation measures and management

UNIT - III

Coastal Hazards: Introduction, Coastal Processes, Coastal erosion, mitigation measures and management - **Landslides:** Types, Causes and mechanism, Vulnerable zones in India, mitigation measures and management – **Cyclone:** Definition, Causes, Vulnerable zones in India, mitigation measures and management - **Soil erosion:** Soil formation, Soil classification, Factors influencing Soil erosion, Hazards of Soil erosion – **Drought:** Types, Mitigation Measures.

UNIT - IV

Pre-planning for a Disaster: Internal Actions, External Actions – Eliminating, minimizing and shifting risks – Developing an Action plan – Developing the written plan – Effective Communication – Selecting the right people – Training for Success – Media control - Shareholder factor – **After a Disaster**; Minimizing the Damage – Governmental reactions – Disaster Preparedness Assessments.

Course Outcomes

1. Identify the natural and environmental disasters, its causes and apply preventive measures.
2. Adopt the laws and regulations towards hazard management
3. Able to prepare controls of mitigating toward natural disasters.

Textbooks/Reference Books:

1. K. S. Valdiya, 2013: Environmental Geology, McGraw Hill Education (India)
2. D. Collins Larry, R. and Schneid Thomas, D., 2000: Disaster Management and Preparedness, Taylor and Francis.
3. Goel, S.L. and Kumar Ram, 2000: Disaster Management, Deep and Deep Publications.
4. Living with Risk: A global review of disaster reduction initiatives, 2004 Vision, United Nations.
5. Parasuraman, S., 2004: India Disasters Report: Towards a Policy Initiatives, Oxford University Press.

CO – PO Mapping:

POs → COs↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	M							
CO2	M	L	M	M	M							
CO3	M	L	M	M	M							
CO4	H	L	H	H	H							

H: High; M: Medium; L: Low

PRACTICAL I – GEO.404P:

HYDROGEOLOGY AND ENGINEERING GEOLOGY, MINERAL EXPLORATION AND ORE BENEFICIATION & MINING GEOLOGY / DIGITAL IMAGE PROCESSING / WATER RESOURCES MANAGEMENT

Course objective:

1. To determine the hydrogeological aspects of aquifers
2. To estimate the ore reserves, mineable waste, and grade.
3. To understand the topographic sheets and mining plans
4. To analyse the remote sensing data and suitability of building stones

Course Outcomes: Students will be able to:

1. Prepare and analysis of hydrographs
2. Interpret the topographic sheets remote sensing data for mineral exploration.
3. Analyse the water quality data and mining plans
4. Prepare the mining plans and geological reports for engineering constructions

HYDROGEOLOGY AND ENGINEERING GEOLOGY

1. Simple numerical problems related to: determination of permeability, Groundwater flow, Well hydraulics etc.
2. Preparation and interpretation of water level contour maps and depth to water level maps.
3. Study, preparation and analysis of hydrographs for differing groundwater conditions
4. Water potential zones of India (map study).
5. Graphical representation of chemical quality data and water classification (C-S and Trilinear diagrams).
6. Topomap study on topographic environment for ideal site and route selection for (i) Dams (ii) Reservoirs (iii) Canal alignment (iv) Check dams (v) Flood water storage, (vi) Ghat roads
7. Preparation of Merits, demerits & remedial measures based up on geological cross sections of project sites
8. Identification of building stones and rock metal and study for physical and engineering properties

MINERAL EXPLORATION AND ORE BENEFICIATION:

1. Preparation of Geological cross section based on Borehole data;
2. Laying down of stripping boundary on geological cross sections;
3. Calculation of geological and mineable ore reserves, mineable waste, and grade.
4. Interpretation of remote sensing data for mineral exploration.

5. Preparation of mineral maps of India,
6. Graphical representation of production, export and import of important minerals.

MINING GEOLOGY:

1. Identification of anomaly
2. Concept of weighted average in anomaly detection
3. Geological cross-section
4. Models of reserve estimation
5. Study of existing mine plans and sketches

DIGITAL IMAGE PROCESSING:

1. Reading and Displaying satellite data from BIL, BSQ and BIP Formats
2. Generating False Colour Composite (FCC)
3. Extracting area of Interest (AOI)
4. Generating Histogram of various bands
5. Georeferencing the base image
6. Geometric correction of satellite image
7. Enhancement using different Filtering techniques,
8. Unsupervised Classification and Supervised Classification
9. Change detection study

WATER RESOURCES MANAGEMENT:

1. Problems on Hydrological properties of rocks
2. Finding groundwater flow direction
3. Prepare groundwater level contours
4. Calculation of drawdown
5. Calculate yield of a well
6. Calculation of lag time

PRACTICAL II – GEO.406P: GEOLOGICAL FIELD SURVEY AND TRAINING PROGRAMME

Course objectives:

1. To provide basic knowledge on yield test of a bore well
2. To identify suitable sites for the construction of bridge , dam and other construction sites
3. To understand mining procedures and processes
4. To suggest suitable mining operations in open cast and underground mining

Course Outcomes: Students will be able to:

1. Select pumping wells and observation wells for yield test
2. Identify and Justify the suitable sites for construction of an engineering structures
3. Analyze the mining operations
4. Prepare the field report based on the ground truth verifications

Exercises

1. To carryout yield test of a bore well in the field.
2. Collection of water level data of various wells in the field.
3. Visit to a dam or a bridge or any other major engineering structures to understand the geological conditions in and around the engineering structures.
4. Visit to open cast or underground ore forming rock mining areas to understand the mining operations.
5. Preparation of field report (draft) incorporating the above said geological characteristics in the field.

MODEL QUESTION PAPER

(*Revised syllabus w.e.f. 2021 – 2022 for campus students*)

M.Sc. DEGREE EXAMINATION – 2022

FIRST SEMESTER

SUBJECT: GEOLOGY

PAPER I - GEO.101: CRYSTALLOGRAPHY AND MINEROLOGY

Time: 3hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Twinning in crystals.
2. Symmetrical Elements.
3. Optical Anomalies.
4. Birefringence.
5. Chain Silicates.
6. Polymorphism.
7. Petrogenesis of Iron
8. Explain physical properties of Tourmaline

SECTION – B

Answer ALL questions. All Questions carry equal marks ***4 X 15 = 60 M***

9. a) Derivation of 32 crystal classes

(or)

b) What is twinning in crystals? Explain types of twinning in crystal systems.

10. a) Describe and briefly explain uniaxial and biaxial figures.

(or)

b) Briefly explain Fresnel's ellipsoid with neat sketch.

11. a) Describe briefly the silicate structures with neat sketches.

(or)

b) Physical and optical properties of pyroxene Group.

12. a) Briefly explain the physical, chemical characters and petrogenesis of the Lead and Zinc ore minerals.

(or)

b) Briefly explain the physical, chemical characters and petrogenesis of the Copper ore minerals.

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MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FIRST SEMESTER

SUBJECT: GEOLOGY

PAPER II – GEO.102: IGNEOUS PETROLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Bowen's Reaction Principles
2. Fractional Crystallization
3. Columnar Joints
4. Irvine – Baragar Classification
5. Gibbs Phase Rule
6. Lever Rule
7. Komatite
8. Kimberlites

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Describe the Origin, characteristics and types of magma

   OR

   b) Explain the Magmatic differentiation processes

10. a) Describe briefly the Igneous rock classifications

    OR

    b) Describe the textures of Igneous rocks with neat sketches

11. a) Describe the application of phase rule to the Unicomponent system

OR

b) Explain the phase equilibrium in the Di-Fo-Si system.

12. a) Give a note on Petrogenetic Significance of Igneous textures

OR

b) Explain the petrography and petrogenesis of Basalt

.

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FIRST SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.103a: STRUCTURAL GEOLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Stress ellipsoid
2. Types of Deformation
3. Recumbent and Isoclinal Folds
4. Types of faults on the basis of Rake of the net slip
5. Genetic classification of Joints
6. Types of Schistosity
7. Types of Shear zones
8. Porphyroclasts

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Explain in detail the Mechanics of Plastic deformation

   OR

   b) Discuss the Experimental data on Failure by Rupture

10. a) Describe the nomenclature of folds with neat sketches

    OR

    b) Explain the Criteria for recognition of faults in the field

11. a) Define Unconformity and Explain different types of Unconformities with sketches

    OR

b) Discuss relation of Cleavage and Schistosity to major structures

12. a) Explain how to Determine Sense of Shear from Pressure Shadows and Fibres

OR

b) Describe the Foliation patterns in shear zones

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FIRST SEMESTER

SUBJECT: GEOLOGY

PAPER III - GEO 103 b: FUNDAMENTALS OF GEOPHYSICS

Time: 3 hrs **Max.Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Gravity potential
2. The law of Universal Gravitation
3. Seismic waves
4. Brief note on Geomagnetism
5. Electromagnetic Noise
6. Briefly explain the Electrical Properties
7. Define Apparent Polar Wandering
8. Self-Potential log.

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Enumerate the Interpretation of Gravity Anomalies

OR

b) Explain the Seismic Reflection Surveying

10. a) Write a note on Bouguer gravity anomalies. Describe the applications of Gravity method

OR

b) Give a brief account on Magnetic Surveying Instruments

11. a) Explain in detail the Vertical Electrical Sounding (VES) Method with neat sketch

OR

b) Explain the Constant separation traversing interpretation method with diagram

1. a) Explain in detail the drilling and its effects on the formations

OR

b) Give an account on Resistivity and Radioactivity logs.

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

SECOND SEMESTER

SUBJECT: GEOLOGY

PAPER III - GEO 103c: MICROPALAEONTOLOGY AND OCEANOGRAPHY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Scope of Micropalaeontology
2. Sampling techniques of Microfossils
3. Brief morphology of Benthic Foraminifera
4. Application of Foraminifera in Paleobathymetric reconstruction.
5. Brief morphology of Radiolaria
6. Conodonts
7. Salinity in ocean waters
8. History of development of Oceanography

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Give a brief note on the field and laboratory techniques in the study of microfossils

OR

b) Write a brief note on the concepts and methods useful in the environmental changes and Biostratigraphic correlation

10. a) Discuss the significance of Foraminifera in oceanic biostratigraphy interpretations.

OR

b) Give an outline of morphology and wall structure of Ostracoda and environmental significance.

11. a) Discuss the modern biogeography of Diatoms and application in biostratigraphy

OR

b) Explain the application of microfossils in hydrocarbon exploration

12. a) Brief the history of development of Oceanography and explain the methods of measuring properties of sea water.

OR

b) Explain the concept of Thermohaline and formation of bottom waters.

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FIRST SEMESTER

SUBJECT: GEOLOGY

PAPER IV – GEO.104a: GEOMORPHOLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Fundamentals of Geomorphic Concepts
2. Describe the formation of Soils
3. Explain Valley formation and Valley development
4. Role of lithology in evolution of landforms
5. Fluvial erosional land forms
6. Origin of Barrier Reefs and Atolls
7. Write a note on Buried land forms
8. Significance of Geomorphology in Economic Geology

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Explain the Geomorphic significance of Weathering and describe major soil groups

   OR

   b) Describe Mass Wasting and its significance in geomorphology

10. a) Give a brief note on Fluvial Geomorphic Cycle

    OR

    b) Explain types of Drainage Patterns with neat sketches

11. a) Explain the depositional features of Glaciers with neat sketches

    OR

b) Describe in detail the topography of Deep Sea Floors

12. a) Define Palaeogeomorphology and describe its characteristic features

OR

b) Give a detailed account on Application of Geomorphology to Oil Exploration

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FIRST SEMESTER

SUBJECT: GEOLOGY

PAPER IV - GEO 104b: METEOROLOGY AND CLIMATE CHANGE

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Define Meteorology and explain scales in Meteorology
2. Energy Spectra of Sun and Earth
3. Composition of Atmosphere
4. El Nino
5. Climatology
6. Green House effect
7. Changes in Solar Radiation
8. Sea level changes

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Explain the branches of Meteorology and its applications

   OR

   b) Give a detailed note on Earth's Radiation Balance

10. a) Define El Nino and explain its events and consequences

    OR

    b) Explain the Weather Forecasting methods

11. a) Explain the effects classification of Climate

OR

b) Give an account on Climatic changes through geological time

12. a) Explain the causes of Climatic change

OR

b) Give a detailed note on impact of climate change

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FIRST SEMESTER

SUBJECT: GEOLOGY

PAPER III - GEO 104 c: ENERGEY RESOURCES

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. nergy and its Uses
2. Solar Radiation
3. Impact of metamorphism on Coal
4. Physical and Optical properties of Coal
5. Composition and Physical characteristics of Petroleum
6. Origin of Petroleum
7. Geochemistry of Uranium
8. Usage of Nuclear Energy

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Give an account on Hydropower energy and technology

   OR

   b) Explain the Wind resource and Wind power technology

10. a) Explain in detail the classification of Coal

    OR

    b) Describe in detail the Coal resources of India

11. a) Explain the effects of geological agents on the properties of Reservoir rocks

    OR

b) Give an account on Entrapment of Petroleum

12. a) Give an account on geochemical abundance of radioactivity in crustal rocks

OR

b) Give a detailed note on nuclear raw material resources of India

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

SECOND SEMESTER

SUBJECT: GEOLOGY

PAPER I – GEO.201: SEDIMENTARY PETROLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Brief note on Origin of Sedimentary Rocks
2. Fundamentals of Fluid Flow
3. Explain factors to determine the Shape of the grains in Sedimentary rocks
4. Ripple Marks
5. Classification of Sandstones
6. Concept of Sedimentary facies
7. Sediments of Tide dominated Shelves
8. Mechanisms of Basin formation

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Describe the Sedimentary processes

   OR

   b) Explain the process of Particle Transport by Sediment Gravity Flows.

10. a) Explain the techniques used in Measuring the Size of the Siliciclastic grains

    OR

    b) Describe the classification of Sedimentary rocks based on Stratification and Bedforms.

11. a) Explain the Diagenesis of Carbonate Sedimentary rocks

    OR

    b) Explain in detail the Depositional Environment of Fluvial Systems

12. a) Explain the Depositional setting, Sedimentary processes and Sediment characteristics of Carbonate deposits

OR

b) Give a Brief note on Sedimentary Basins in India

MODEL QUESTION PAPER

(Revised Syllabus w.e.f.2021-2022 for campus Students)

M.Sc., DEGREE EXAMINATION-2022

SECOND SEMESTER

SUBJECT: GEOLOGY

PAPER II – GEO.202: STRATIGRAPHY AND PALAEONTOLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Lithostratigraphy
2. Biostratigraphy
3. Economic importance of Vindhyans
4. Indo-Gangetic alluvium
5. Concept of Taphonomy
6. Mode of preservation of fossils
7. Uses of microfossils
8. Palaeoclimatic interpretation

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9 a) Give an account of recent developments in stratigraphic classification and it's nomenclature

(OR)

b) Write an essay on Archaean cratonic nuclei of Peninsular India

10 a) Brief an account of classification, lithology, structures and it's fossil content with economic importance of Cuddapahs

(OR)

b) Write an essay on phanerozoic Stratigraphy of India

11 a) Describe the morphological characters and time range of evolutionary trends in Trilobites

(OR)

b) Briefly explain the fossil record and geological time scale

12 a) Write an essay on role of foraminifera in hydrocarbon exploration

(OR)

b) Give an account of environmental significance of fossils and trace fossils

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MODEL QUESTION PAPER

(Revised Syllabus w.e.f.2021-2022 for campus Students)

M.Sc., DEGREE EXAMINATION-2022

SECOND SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.203a: GEOCHEMISTRY AND ISOTOPE GEOLOGY

Time: 3 hrs **Max. Marks:80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks 4 X 5 = 20 M

1. Scope of Geochemistry
2. Geochemical principles
3. Structure of Atmosphere
4. Applications of Trace elements
5. Cosmic abundance of elements
6. Mantle reservoirs
7. Sulfur Isotopes
8. Dating method of K-Ar

SECTION – B

Answer ALL questions. All questions Carry equal Marks 4 x 15 = 60 M

9. (a) What are Meteorites? Give a detailed account on the classification and mineralogy of Meteorites.

Or

(b) Describe the Geochemical classification of elements.

10. (a) Explain the structure, composition and characteristics of atmosphere.

Or

(b) Write an essay on principles of equilibrium Rayleigh fractionations.

11. (a) Give an account of Geochemical evolution of Earth?

Or

(b) Briefly explain the distribution of major, minor and trace elements in crust and mantle.

12. (a) What are stable Isotopes? Describe the carbon and sulfur Isotopes. Add a note on its importance in the Geological studies.

Or

(b) What is radioactivity? Write a detailed note on Rb-Sr and K-Sr systems.

MODEL QUESTION PAPER

(Revised Syllabus w.e.f.2021-2022 for campus Students)

M.Sc., DEGREE EXAMINATION-2022

SECOND SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.203b: MARINE GEOLOGY

Time: 3 hrs **Max. Marks:80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Turbidity currents
2. Features of Wave erosion
3. Evolution of Beaches
4. Evolution of terrestrial shorelines
5. Sea-floor Spreading
6. Trenches
7. Types of Marine sediments
8. Gas Hydrates

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. (a) Explain the coastal zone morphology.

   Or

   (b) Describe the Deep sea morphology

10. (a) Explain the Evolution of Headlands and Bays

    Or

(b) Describe the evolution and classification of Sea coasts.

11. (a) Explain in detail the causes of marine transgression and regression

Or

(b) Describe the origin and distribution of Ocean basins

12. (a) Write an essay on marine mineral resources

Or

(b) Explain the coastal zone regulations in India

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

SECOND SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.203c: COMPUTER APPLICATIONS AND GEOSTATISTICS

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks 4 X 5 = 20 M

1. what is mail merge
2. write four short cuts in word
3. What are types of Databases
4. Name some open source software used in Geology
5. Mean
6. Median
7. Standard Deviation
8. Sampling plan

SECTION – B

Answer ALL questions. All questions Carry equal Marks 4 x 15 = 60 M

9. a) List the steps for formatting of text and tables MS Word.

OR

b) Explain the steps to prepare a chart in Excel using with assumed monthly rainfall data of two rain guage stations for ten years

10. a) Discuss the characteristic properties of a database

OR

b) Write the uses of some software's used in geological investigations

11. a) What are the characteristics of a frequency curve? Applications of cumulative frequency curves

OR

b) Define a frequency distribution. Write the importance of frequency distribution

12. a) Differentiate the Skewness and Kurtosis

OR

b) Write the characteristics of grid sampling and stratified sampling

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

SECOND SEMESTER

SUBJECT: GEOLOGY

PAPER IV – GEO.204a: REMOTESENSING AND GIS

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Side lap and overlap.

2. Mosaic.

3. EMR.

4. Atmospheric Windows.

5. Remote sensing satellites.

6. Active and Passive remote sensing.

7. Raster and Vector data.

8. Elements of GIS.

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Explain aerial photography, mosaicing of aerial photographs, and stereoscopy.

(OR)

b) Recognition elements of Aerial photographs with reference to geology.

10. a) Interaction of EM radiation with atmosphere.

(OR)

b) Explain briefly about the atmospheric window regions useful for remote sensing.

11. a) Give a detail account of different remote sensing platforms and their limitations .

(OR)

b) Applications of Remote sensing techniques in Ground water Exploration.

12. a) Explain various kinds of GIS data.

(OR)

b) Give an account of open source GIS software's and their applications.

MODEL QUESTION PAPER

(Revised Syllabus w.e.f.2021-2022 for campus Students)

M.Sc., DEGREE EXAMINATION-2022

SECOND SEMESTER

SUBJECT: GEOLOGY

PAPER IV – GEO.204b: ENVIRONMENTAL GEOLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Concept of Environmental geology
2. Ecology for geologists
3. Earthquake magnitude
4. Types of volcanoes
5. Effects of landuse changes due to rivers
6. Types of landslides
7. Water pollutants
8. Sources of air pollutants

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. (a) Describe in detail the relationship of Geology and Biodiversity

Or

(b) Write an essay on global climatic changes and hazards.

10. (a) Explain the earthquake processes, risk and mitigation measures.

Or

(b) What is Tsunami? Explain its prediction and hazards

11. (a) Describe the river flooding and Geomorphological changes

Or

(b) Write in detail about the coastal hazards

12. (a) Explain the water pollution processes and waste water treatment

Or

(b) Explain industrial air pollution, risk assessment and measures of control

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

SECOND SEMESTER

SUBJECT: GEOLOGY

PAPER IV – GEO.204c: GEMOLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Scope of Gemology

2. What is a Gem?

3. Describe Importance of colours in Gemstones

4. Discuss the presence of inclusions in Gemstones

5. Impregnation in gemstones

6. Physical properties of gemstones

7. Polymorphs of Carbon

8. Medicinal uses of Gems

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Write an essay on distribution of Gemstones in India

(OR)

b) Give an account of Gem- bearing stratigraphic Units in India

10. a) Briefly explain the Virtues of gemstones

(OR)

b) Discuss about Processing of gemstone

11. a) Write an essay on Determination of various physical properties in the laboratory

(OR)

b) Explain Enhancement methods

12. a) Write about Mineral Chemistry, structures and colour variations in Diamond

(OR)

b) Uses of gemstones in jewellery, medicine, health and customs

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

THIRD SEMESTER

SUBJECT: GEOLOGY

PAPER I – GEO.301: METAMORPHIC PETROLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Limits of Metamorphism
2. Kinds of Metamorphism
3. Mineralogical Phase Rule
4. Zones of Metamorphism
5. Contact Metamorphic Facies
6. Blueschist Facies
7. Describe Formation of Wollastonite
8. Role of CO_2 in Very low-grade Metamorphism of Mafic rocks

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Describe the role of Agents in Metamorphism

   OR

   b) Describe the textures of metamorphic rocks with neat sketches

4. a) Explain the classification and description of Metamorphic Facies.

   OR

   b) Describe the construction and plotting of mineral paragenesis in ACF diagram

5. a) Describe the Contact metamorphic Facies

OR

b) Explain the genesis of Granulites

12. a) Explain the Metamorphism of ultramafic MgO-SiO_2-CO_2-H_2O System.

OR

b) Explain the Metamorphism of Pelites at Very-low and Low-Grade metamorphism

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

THIRD SEMESTER

SUBJECT: GEOLOGY

PAPER II – GEO.302: ECONOMIC GEOLOGY AND MINERAL ECONOMICS

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Sublimation.

2. Mechanical concentration.

3. Metallogenic epochs.

4. Objectives of UNFC Classification.

5. Copper deposits of Andhra Pradesh.

6. Economic significance of Mangampeta.

7. Objectives of National Mineral Policy.

8. Tenor and Grade.

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Classification of mineral deposits with reference to Bateman

(OR)

b) Briefly explain about oxidation and supergene enrichment process with a neat diagram.

10. a) Give a detailed account of UNFC Classification.

(OR)

b) Give a brief note on Mineralization through geological timescale.

11. a) Explain briefly about chromite deposits of India.

(OR)

b) Nature of occurrence, genesis and distribution of Coal and Petroleum deposits in India.

12. a) Explain the role of essential minerals in mineral economics of a country .

(OR)

b) History of National Mineral Policy and its importance.

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

THIRD SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.303a: WATERSHED MANAGEMENT

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Four objectives of Watershed management
2. Principle of watershed
3. Types of erosion
4. Control methods of erosion
5. Advantages of Rainwater harvesting structures
6. Types of harvesting structures
7. Elements of Watershed management
8. Impact of watershed management

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Discuss the Characteristics of watershed management

   OR

   b) Explain the importance of watershed management

10. a) What is a soil loss equation and discuss in detail

    OR

    b) List the degradation agents of watersheds.

11. a) Write the selection criteria of check dams with neat sketch

    OR

    b) Discuss the role of harvesting structures in groundwater resources

12. a) Discuss the significance of planning and implementation of watershed management

OR

b) Write the multidisciplinary approach of watershed management

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

THIRD SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.303b: PHOTOGRAMMETRY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Types of Photographs
2. Stereoscopy
3. Collinearity condition
4. Image measurements
5. Image maching
6. Epipolar Geometry
7. Explain GPS
8. Pass points for Aerotriangulation

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Note on basic concepts of Photogrammetry. Explain planning and Execution of Photographic flights.

   OR

   b) Describe in detail the elements of aerial photo interpretation.

10. a) Explain Collinearity and Coplanarity conditions in Photogrammetry

    OR

    b) Give a brief note on various analytical orientations

11. a) Define Digital photogrammetry. Explain the generation of Digital Orthophoto.

    OR

    b) Discuss the applications of Digital Photogrammetry in GIS.

12. a) Describe the Ground control surveys by GPS.

OR

b) Write an essay on principles of LIDAR and its applications.

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

THIRD SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.303c: DIMENSIONAL STONES AND CONSTRUCTION MATERIALS

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Meaning of Dimensional stones
2. Types of natural stones
3. Dimensional stones in Rayalaseema Region
4. Some examples of Dimensional stones
5. Conservation of commercial rock Deposits
6. Construction Materials
7. Stress and Strain in Rocks
8. Stress curve

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x15 = 60 M***

9. (a) Write an essay on criteria for selection of Dimensional stones.

Or

(b) Describe the importance of Dimensional stones Archaeological monuments.

10. (a) Briefly explain the various types of the Dimensional stones in Andhra Pradesh and Telangana

Or

(b) Write an essay on export and import qualities of Dimensional stones in India.

11. (a) Briefly explain the Ornamental and Construction materials in Indian History.

Or

(b) Distribution of Building Materials in Andhra Pradesh.

12. (a) Explain the Engineering Properties and Behaviour of the Rocks.

Or

(b) Write an essay on Mohr's circle and Stress Transformation.

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

THIRD SEMESTER

SUBJECT: GEOLOGY

PAPER IV – GEO.305: SURVEYING AND FIELD GEOLOGY

Time: 3 hrs **Max. Marks: 40**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks 4x 3 =12M

1. Types of scales
2. Principle of surveying
3. Classification of levelling
4. Scale in theodolite
5. Basic field kit for geologists
6. List of uses with clinometer
7. Elements of aerial photographs
8. Importance of geological report

SECTION – B

Answer ALL questions. All questions Carry equal Marks 4 x 7 = 28 M

9. a) What are the sources of errors in chain survey? What precautions would guard against them?

   OR

   b) Enlist the obstructions in a compass survey and explain the methods to overcome them.

10. a) How would you set up plane table at a station? Explain the various steps of setting.

    OR

    b) Explain in detail the temporary adjustments of a dumpy level

11. a) Write the uses of field kit for geologist. Discuss the procedure of sampling Procedure and field note preparation.

OR

b) List the basic elements to be noted and measured in the field for various geological surveys.

12. a) What is a base? Discuss the structural elements useful in geological projects

OR

b) Discuss the scale of aerial photographs and their applications

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

THIRD SEMESTER

SUBJECT: GEOLOGY

PAPER V – GEO.308a: EARTH SYSTEM PROCESSES

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Meteorites
2. Seismic waves
3. Sea waves
4. Tsunami
5. Land form
6. Unconformity
7. Global warming
8. Atmosphere

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Write an essay on classification and types of Meteorites

(OR)

b) Describe the theory of Plate tectonics

1. a) Explain in detail the geological work of seas

(OR)

b) Define Tsunami. Explain its causes and mitigation measures

2. a) Define a fault, write an essay on the classification of faults

(OR)

b) Define a glacier. Discuss the types and geological activities of glaciers

12. a) Write an essay on global warming and its mitigation.

(OR)

b) Write an account of the composition and structure of atmosphere

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FOURTH SEMESTER

SUBJECT: GEOLOGY

PAPER V - GEO.308b: MEDICAL GEOLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Natural distribution of elements
2. Rock weathering and soil formation
3. Skeletal fluorosis
4. Effect of water hardness on human health
5. Iodine cycle in drinking water
6. Nitrates and its health effects
7. Environmental medicine.
8. Mineralogy of bones

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Explain the weathering processes and products. Give a note on fundamental relationship between human health and geological processes

OR

a) Write an essay on natural distribution and abundance of elements

10. a) Explain the Geochemical basis for tropical endomyocardial fibrosis (EMF)

OR

b) Discuss the WHO and BIS standards of drinking water of Radon, Arsenic and Fluoride

11. a) Explain the Iodine cycle and give a note on Iodine Deficiency Disorders

OR

b) Write an essay on Bioavailability of elements in soils.

12. a) Give a note on techniques and tools in GIS on human health studies

OR

b) Explain the Histochemical and Microprobe Analysis in Medical Geology

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FOURTH SEMESTER

SUBJECT: GEOLOGY

PAPER I – GEO.401: HYDROGEOLOGY AND ENGINEERING GEOLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Infiltration and Transpiration
2. Darcy's law
3. Vertical Electrical Sounding
4. Well logging
5. Physical characters of Building stones
6. Types of Dams
7. Briefly explain seismicity in India
8. Geological considerations for the construction of Bridges

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Explain the hydrological properties of rocks

(OR)

b) Describe in detail the occurrence and vertical distribution of groundwater

10. a) Explain the Electrical Resistivity method of groundwater exploration

(OR)

b) Discuss the characteristic features of Conjunctive use of groundwater

11. a) Describe the engineering properties of rocks

(OR)

b) Discuss the geological considerations for the selection of site for the dam construction

12. a) Discuss the geological conditions for the foundation and design of buildings

(OR)

b) Give a detailed note on problems of groundwater in engineering projects

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FOURTH SEMESTER

SUBJECT: GEOLOGY

PAPER II – GEO.402: MINERAL EXPLORATION AND ORE BENEFICIATION

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Renewable resources
2. Mineralogical guides to locate resources
3. Objectives of mineral exploration.
4. Describe types of drills
5. Methods of sampling
6. Magnetic method of mineral exploration
7. Ore controls and guides
8. Physical and chemical controls of ore fluids.

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Write an essay on conservation of minerals

   Or

   b) Explain the role of structural guides to locate the mineral resources

10. a) Briefly explain the Geobotanical methods of surface and sub surface explorations on different scales.

    Or

    b) Give a detailed an account of various types of drilling

11. a) Write a detailed note on seismic methods of mineral exploration

    Or

    b) Write an essay on calculations of statistical method

12. a) Write an essay on metallogenic epochs and provinces with special reference to India.

    Or

    b) Briefly explain the Ore beneficiation processes

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FOURTH SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.403a: MINING GEOLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Definition of mining.
2. Mining lease and regulations.
3. Rotary Drills
4. Bore hole logging.
5. Alluvial mining.
6. Longwall Advancing.
7. Washing and Scrubbing
8. Magnetic Separation.

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. (a) Write an essay on Mineral Concession Rules, 1960.

Or

(b) Briefly explain the National Mineral Policy in India.

10. (a) Write an essay on various types of drilling methods.

Or

(b) Explain briefly about Drill sampling, Preservation and Sample cares

11. (a) Explain in detail the Open cast mining methods

Or

(b) Write an essay on Coal mining methods

12. (a) Discuss about the various types of Geochemical prospecting methods

Or

(b) Give an account on Ore dressing processes

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FOURTH SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.403b: DIGITAL IMAGE PROCESSING

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Atmospheric errors
2. Reflectance
3. Spatial Enhancement
4. Supervised classification
5. Principle of GPS
6. Absolute positioning
7. Source of GPS errors
8. DGPS kinematic measuring

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. (a) Explain the process of Image Rectification

Or

(b) Describe the image resampling techniques

10. (a) Give in detail the image enhancement techniques

Or

(b) Describe in detail the various image classifications

11. (a) Explain Basic concepts of Global Navigational Satellite Systems

Or

(b) Explain the components of GPS and its applications

12. (a) Describe the DGPS measuring techniques

Or

(b) Write an essay on applications of DGPS

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FOURTH SEMESTER

SUBJECT: GEOLOGY

PAPER III – GEO.403c: WATER RESOURCES MANAGEMENT

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Confined and unconfined aquifers
2. Effluent and Influent flows
3. Methods of pumping tests
4. Yield of a well
5. Differentiate water levels and water table
6. Factors influencing the water level fluctuation
7. Why saline water intrusion occurs
8. List the types of rainwater harvesting structures

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Discuss the hydrological properties of rocks

   OR

   b) How many types of aquifers are present and their characteristics?

10. a) Explain the procedure of Theis recovery test

    OR

    b) Explain the procedure of specific capacity method by Slither's method

11. a) What is a Peizometric head? Discuss the factors affecting the Peizometric head

    OR

    b) What are the types of wells and Discuss different drilling methods?

12. a) Discuss various surface investigation methods for groundwater

OR

b) Write the prevention and control methods of salt water intrusion in coastal aquifers.

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FOURTH SEMESTER

SUBJECT: GEOLOGY

PAPER IV – GEO.405: ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Elements of Environmental Impact Assessment and management
2. Concept of EIAM
3. Significance of Soil data in EIAM studies
4. Assessment of impact on soils
5. Significance of Air quality data in EIAM studies
6. Mitigation measures of impact on ecosystem
7. Environmental audit data
8. Air Act

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Classification of environmental parameters in EIA studies

OR

b) Explain the role of public participation in environmental decision making process

10. a) Write the procedure for the Identification and incorporation of mitigation measures in case of Soil quality

OR

b) Write the procedure for impact prediction and assessment of impact's significance done in case of water quality

11. a) Write the procedure for impact prediction and assessment of impact's significance done in case of Air quality

OR

b) Write the procedure for impact prediction and assessment of impact's significance done in case of Ecosystems

12. a) Discuss the classification of environmental audit in detail

OR

b) Write a note on Water act and Environmental protection act

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FOURTH SEMESTER

SUBJECT: GEOLOGY

PAPER V – GEO.407a: FUEL GEOLOGY

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Origin of Petroleum
2. Geographic locations of Petroleum
3. Origin of cap rocks
4. Salt domes
5. Hydrocarbon evaluation
6. Coal petrology
7. Radioactive minerals
8. Occurrence of atomic minerals

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) Write an essay on surface and subsurface occurrence of petroleum and gas

(OR)

b) Describe the migration and accumulation of oil and gas

10. a) Describe various types of stratigraphic traps with neat sketch

(OR)

b) Enumerate the geology of the oil fields in India

11. a) Write an essay on preparation of coal for industrial propose

(OR)

b) Discuss about Indian coal reserves and production of coal in India

12. a) Write a detailed note on Atomic fuels and environment

(OR)

b) Give an account of productive geological horizons of atomic minerals of India

MODEL QUESTION PAPER

(*Revised Syllabus w.e.f. 2021-2022 for Campus Students)*

M.Sc. DEGREE EXAMINATION - 2022

FOURTH SEMESTER

SUBJECT: GEOLOGY

PAPER V - GEO.407b: NATURAL HAZARDS AND DISASTER MANAGEMNET

Time: 3 hrs **Max. Marks: 80**

SECTION – A

Answer any FOUR of the following questions. All questions carry equal marks ***4 X 5 = 20 M***

1. Earthquake Magnitude and Intensity
2. Define Avalanche. Explain the causes of Avalanche.
3. Tsunami
4. Seismic waves and Richter Scale
5. Coastal processes
6. Define Flood and explain its causes
7. Pre-planning for a Disaster
8. Media control in an emergency and Disaster preparedness plan

SECTION – B

Answer ALL questions. All questions Carry equal Marks ***4 x 15 = 60 M***

9. a) List out and Briefly describe different geological hazards

   OR

   b) Discuss the Governing Laws and Regulations towards Hazard Management

10. a) Define Earthquake. Explain its causes, mitigation measures and management

    OR

    b) Define Volcano and explain mitigation measures and management in Volcanic Regions.

11. a) Define Avalanche. Explain its types and mitigation measurements to control the disaster.

OR

b) Discuss causes of Coastal erosion and its mitigation measures and management

12. a) Explain the Pre-planning measures for a disaster management

OR

c) Discuss in detail how to minimize the damage after a disaster.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF HOME SCIENCE



Course

M.Sc. FOOD SCIENCE NUTRITION AND DIETETICS

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

The Department of Home Science established in the year 1963 as first of its kind in the state of Andhra Pradesh and celebrated golden jubilee in the year 2013. Ms Dorothy M. Pearson, a Canadian Home Scientist was largely instrumental to start the post graduate programmes in Home Science at Sri Venkateswara University, Tirupati. The committed founder stalwarts and the successive faculty members with immense foresight established the pioneering activities of teaching, research and extension in the department. The department from its inception has thrived to offer new insights through academic reforms and outreach activities. The commitment of the faculty has contributed practice based teaching, action research, technology development and extension outreach activities for the development of students. The department stocks eight patents of which two patents awarded. The Ministry of food processing granted 10 crores for the establishment Food testing laboratory with NABL accreditation.

Department Vision

To be a premiere centre for excellence in higher education in the areas of specialization fostering nurturing and building careers for students and to be an apex body playing a pivotal role in planning and monitoring community development.

Department Mission

Empowering students in capacity building skills through teaching, research and extension activities in making socially responsible citizens along with employability.

Department Objectives

- Enable the students to understand the interrelation of Food and Health,
- To foster knowledge across the life span in inter connected Human Development factors to become efficient counselors and early childhood educators
- Develop sensitivity towards the community problems and train the students in Extension and outreach activities.
- To focus on training students in application of techniques to process and preserve the food.

Program Specific Outcomes

S No	Program Specific Outcomes
PSO1	Identify and select sources of credible information in Nutrition and dietetics.
PSO2	Apply and incorporate the principles of nutrition and dietetics in community, hospital and real world situations and problems.

Programme Objectives

- To provide human resource in the field of Food Science, Nutrition and dietetics to cater the needs of the Community at local, regional and National levels.
- To give skill and hands on experience in the thrust areas of the programme and prepare students for research.
- To give training both in theory and practical for higher studies and competitive exams.
- To facilitate by giving quality education for employability, entrepreneurship and skill development.
- To inculcate the corporate social responsibility by profession and personal development there by developing the community by various curriculum and co-curricular activities.
- To conduct field studies, Internship and project work as part of curriculum for developing data base for interventions and further studies and help policy makers to improve the health status of the population in the community.

Programme Outcomes

After successful completion of the program, the student is able to:

S. No	Program Outcomes
PO1	Apply knowledge in Food science nutrition and dietetics to understand the chemical components- nutrients and non-nutrient constituents their physico chemical and functional properties, spoilage, processing, preservation, packaging of different foods. To assess nutritional status of individuals in various life-cycle stages and determine nutrition-related problems and diseases by applying knowledge of metabolism and nutrient functions, food sources, and physiologic systems in community, hospital, and in any situations.
PO2	Identify and understand different problems related to food science, food microbiology, food adulteration and nutritional problems in different stages of life in health and disease- its consequences and dietary management and apply knowledge to tackle these problems.
PO3	Design food products applying the principles of food science and nutrition to meet the challenges of nutritional problems.
PO4	Conduct research in different fields of nutrition using human and animal models, designing new food products, food service establishments.
PO5	Apply appropriate techniques to design, process, preserve, analyze and authenticate the different components of foods and food products.
PO6	Function effectively in different facets as dietitian, quality control systems, food analysts, research and development, food product designing, different food service establishments, and policymaking
PO7	Communicate effectively Nutrition information in person and with community. Acquire skills in writing research report, documentation, case studies, seminar presentations, group discussions, and marketing strategies.
PO8	Describe social and environmental dimensions within nutrition and the life sciences. Able to demonstrate the National and International food laws, regulations and safety standards in application of food additives to ensure safe food.
PO9	Know Professional and social ethics as researcher, dietitian, community mentor, food

	business operator.
PO10	Apply knowledge of Nutrition and food science for sustainable development of the society in terms of socio cultural aspects, attitudes, and practice balanced diet in health and disease, food quality and safety regulations, food adulteration, food safety and hygiene.
PO11	Develop and design their own food business plan in terms of food business operators and food service establishments.
PO12	Learn new concepts of Nutrition science in global perspective and prepare themselves for lifelong learning process.

Programme Educational Objectives (PEO)

To enable students to:

- Understand the relationships between Food Science, Nutrition and Metabolism.
- Gain knowledge on fundamental science involved in Food science, food processing and preservation, food quality, developing diet plans for different age groups and disease conditions.
- Acquire skills in applying knowledge of Food science, Nutrition, and therapeutic nutrition in community and human health.
- Interpret nutritional research through informed knowledge of food science, nutrition and diet therapy in community and health.

CHOICE BASED CREDIT SYSTEM (C.B.C.S), SYLLABUS AND SCHEME OF EXAMINATION

(WITH EFFECT FROM THE ACADEMIC YEAR 2021)

M.SC., FOOD SCIENCE NUTRITION AND DIETETICS (FSND)

I SEMESTER

S.No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	FSND 101	Food Chemistry and Analysis	6	4	20	80	100
2	Core	FSND 102	Clinical Nutrition and Dietetics-I	6	4	20	80	100
3	Compulsory Foundation	FSND 103 -A	Food Science and Experimental Foods	6	4	20	80	100
		FSND 103- B	Baking Technology	6	4	20	80	100
4	Elective Foundation	FSND 104 -A	Community Nutrition	6	4	20	80	100
		FSND 104 -B	Nutrition during Life span	6	4	20	80	100
5	Practical -I	FSND 105	101+103-A/103-B	3+3/3	4	--	--	100
6	Practical - II	FSND 106	102+104-A/104-B	3+3/3	4	--	--	100
	Total				24			600
7	FSND 107: Human Values and Professional Ethics-I (Audit course)*			0	0	100	0	0

***Audit Course- Zero Credit under Self Study**

FSND 101: FOOD CHEMISTRY AND ANALYSIS
(COMMON TO M.SC. FOOD SCIENCE NUTRITION & DIETETICS AND MS FOOD TECHNOLOGY COURSE)

COURSE OBJECTIVES

-To enable the students to:

1. Acquire knowledge on chemical composition of different foods.
2. Understand the physical, chemical, and functional properties of foods.
3. Know the principles and working applications of different analytical techniques associated with food.
4. Perform skills in qualitative and quantitative estimation of nutrients in different foods.

CORE –THEORY

UNIT-I: Water Chemistry and Dispersed Systems

- Water chemistry – Structure of Water, Free, Bound and Entrapped Water.
- Water Activity and Relative Vapour pressure– Definition and measurement, factors affecting water activity, Moisture sorption isotherms, Hysteresis and Moisture Determination.
- Dispersions- Food as dispersed systems, Liquid dispersions.
- Colloids- Definition, Characteristics of Colloids, Gels, Emulsions, Foams.

UNIT-II: Carbohydrates and Lipids

- Carbohydrates – Classification , Structure, Physico – Chemical properties of
- Monosaccharide's-Pentoses, and Hexoses,
- Oligosaccharides – Di Saccharides-Maltose, Lactose, Sucrose – Crystallisation of sugars, Polysaccharides – Starch-Amylose and Amylopectin- Gelatinisation of starches and Hydrolysis of starch, Cellulose and Pectin- Structure and properties.
- Lipids – Nomenclature, classification – Milk fats, Animal fats, Vegetable fats.
- Physical properties – Crystallization, Plasticity
- Chemical properties – Thermal decomposition, Chemistry of Frying, Hydrogenation, Inter esterification, Rancidity of fats.

UNIT-III: Proteins and Amino Acids

- Proteins and amino acids – Classification, Structure, Physical properties.
- Functional properties –
    - Protein Denaturation
    - Protein hydration, Solubility,
    - Interfacial properties,
    - Emulsification and foaming, Gelation,
    - Dough formation.

UNIT-IV: Food Analysis

- Introduction to food analysis- Methods of sampling, Determination of Total ash, Principles and methods of chemical analysis
- Carbohydrates – Qualitative and Quantitative analysis of starch and sugars.
- Proteins – Electrophoresis, Micro-Kjeldahl method.
- Fats – Analysis of solid and liquid fats, Rancidity.
- Determination of Vitamin and Minerals – Vitamin-C, Iron, Phosphorus, Calcium.
- Basic principles and applications of spectroscopy- UV, UV- visible, AAS, AES.
- Chromatography- principles and applications of Chromatography- HPLC, GC/ MS and LC/ MS.

REFERENCES

1. Lillian Hoagland Meyer. (2019).Food Chemistry", First Edition, CBS publishers and Distributors, New Delhi.
2. Fennema R. (2019). Food Chemistry. Marcel Dekker Inc. New York.
3. Ranganna S. (2019). Handbook of analysis and quality control for fruits and vegetables, 2nd edition. Tata McGraw Hill.
4. Nielsen S.S. (2002). Introduction to the chemical analysis of foods, CBS Publishers and Distributers, Pvt. Ltd.

COURSE OUTCOMES

-After completion of this course, students will be able to:

CO1 Acquire knowledge on the physico chemical properties of compounds in foods.

CO2 Apply the functional properties of foods in processing and preservation.

CO3 Perform skills in qualitative and quantitative estimation of nutrients in different foods.

CO4 Describe the chemical components and their functions in Food applications.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H			M	M							H	
CO2	H	H			M	H							H	
CO3	H				H	H		L				L		H
CO4	H				M	M		L				L		H

H-High-3, M- Medium-2, L- Low-1

FSND 102: CLINICAL NUTRITION AND DIETETICS-I

COURSE OBJECTIVES

-To enable the students to:

1. Understand the concepts of nutrition, its relation to health.
2. Describe the role and responsibilities of Dietitian in Hospital.
3. Apply Knowledge related to Therapeutic modification of diets and diet planning.
4. Plan and prepare diet for different diseases conditions.

CORE THEORY

UNIT- I: Diet Counseling and Therapeutic Diets

Dietician and Diet Counseling

- Dietetics, Dietician: Definition, types, role and responsibilities of dietician.
- Diet counseling: Theories and Approaches to counseling- Reality Theory, Cognitive- Behavioral approach, Directive and non-directive Counseling.
- Counseling strategies: Individual and Group counseling.
- Motivation and Intervention model in diet counseling.
- Activities that facilitate behavioral change.

Therapeutic Diets

- Definitions: Normal diets, Therapeutic modifications of the normal diets.
- Principles in planning therapeutic diets, use of food guides and food exchange systems.
- Progressive diets: Routine/Regular hospital diets, Liquid diets, Soft diets
- Special feeding methods: Enteral and Parenteral Nutrition, Types, methods and formulation of feedings.

UNIT -II: Dietary Management in Metabolic Disorders

- Diabetes Mellitus: classification, Etiology, symptoms, Diagnosis, complications, Glycemic index and load, Dietary management of Diabetics, hypoglycemia.
- Inborn Errors of Metabolism Phenylketonuria (PKU), Maple syrup urine disease (MSUD), Galactosemia, Tyrosinemia, Homosystinuria.
- Overweight and Obesity: Classification, Etiology, assessment, factors affecting weight gain, Consequences. Management of Obesity- Dietary and Lifestyle Modifications, Preventive Aspects.

UNIT -III: Dietary Management in

- Physiologic/Metabolic Stress: Phases of stress, Consequences, Dietary management in stress, stress relieving foods.
- Surgery: Pre and post-operative dietary management.
- Febrile Conditions: Types, metabolic changes, Dietary management in fever.
- Burns: classification, causes, assessment, complications, Dietary management.
- Cancer: Types, etiology, symptoms, Diagnosis, nutrition therapy and Dietary management.
- HIV/AIDS: Pathogenesis, stages, etiology, symptoms, diagnosis, Dietary management.

UNIT-IV: **Food and Drug Interactions**

- Risk factors for food and drug interactions.
- Effect of food on drug therapy.
- Effect of drug on food and nutrition.
- Modifications of drug action by food and nutrition.
- Effect of drug on nutritional status.

REFFERENCES

1. Whitney NE, Cataldo BC, Rolses RS. (1987). Understanding Normal and Clinical Nutrition" West Pub.Company. St Paul, New Yok, Los Angeles, San Fransisco.
2. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Dietherapy, 10th Edition, W.B. Saunders Ltd.
3. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition inHealth and Disease, 9th Edition, Williams and Wilkins.
4. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/MosbyCollege Publishing.
5. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins. (2007). Nutrition in Clinical Practice, Second Edition.

COURSE OUTCOMES

- After completion of this course, students will be able to:

CO1 Apply the concepts of Therapeutic nutrition in different diseases.

CO2 Modification of the diets appropriate to the patients in different diseases.

CO3 Planning and preparation of diets for different disease conditions.

CO4 Able to provide Diet counselling.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H	H	M								M	H	H
CO2	H	H	H	M								M	H	H
CO3	H	H	H	H						M		L	H	H
CO4	H	H	H	H		H	H		M	M		L	H	H

H-High-3, M- Medium-2, L- Low-1

FSND 103-A: FOOD SCIENCE AND EXPERIMENTAL FOODS

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

COURSE OBJECTIVES

-To enable the students to:

1. Acquire knowledge on Plant and Animal foods composition, processing and preservation of nutritive values.
2. Understand the principles of cookery of different foods and methods of evaluation.
3. Apply knowledge about different processing techniques on nutritive quality of foods.
4. Apply skills in standardisation of foods using different processing techniques.

COMPULSORY FOUNDATION- THEORY

UNIT I: Foods of Plant Origin

- Cereals and Millets: Structure, Composition and functional properties.
- Pectin and Gums: Functional role in food products and its applications.
- Baking process: Cereal flours, Flour mixes dough and batter, Leavening agents, role of ingredients in baking process.
- Pulses and Legumes: Composition, anti-nutritional factors, Effect of cooking.
- Vegetables and Fruits: Classification, Composition, Pigments and Flavors constituents - Cooking effect, Browning reaction.

UNIT II: Foods of Animal Origin

- Milk: Composition, Kinds of milk and Functional properties of Milk.
- Egg: Structure, composition and Functional properties of eggs.
- Meat and Poultry: Structure, Muscle composition,Heat-induced changes in meat,Tenderness – Tenderizers.
- Fish and Marine foods: Classification and Composition and cooking.

UNIT III: Starch, Sugars and Fats

- Starch: Characteristics, Gelatinization, Factors affecting gelatinization, modified food starches-Applications.
- Sugars: Types of sugars and sugar syrups, Crystallization of sugars, Sugar cookery and applications.
- Fats and oils: Sources, Composition, Absorption, Functional properties of fat-Melting point, Smoke point and flash point.

UNIT IV: Sensory Evaluation

- Sensory Attributes of food quality and its characteristics.
- Requirements to conduct sensory evaluation- Sensory panel, Preparing and Presenting Samples for Testing, Panel booth.
- Sensory Tests – Analytical and Affective Tests.

REFERENCES

1. Vaclavik, V. A., Christian, E. W., & Campbell, T. (2008). *Essentials of food science* (Vol. 42). New York: Springer.
2. Khatkar, B. S. (Ed.). (2007). *Food Science and Technology*. Daya Books.
3. Srilakshmi, B. (2003). *Food science*. New Age International.
4. Khader, V. (2019). *Text book of food science and technology*. Indian council of agricultural research.
5. Belle Lowe.(1998).*Experimental Cookery*, John Wiely& Sons, INC, New York.
6. SethiMohini.(2011).*Food Science: Experiments and Application*, second edition, Jain book Agency, New Delhi.
7. N.ShakuntulaManay& M. Shadaksharswamy. (2001).*Foods- Facts and Principles*, second edition, New Age International Publishers, New Delhi.
8. Norman N Potter.(2007).*Food Science*, Fifth edition, An Aspen Publication, Mariland.

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Acquire knowledge on the functional properties of Plant and Animal foods.

CO2 Standardize the weights and measures of various food items.

CO3 Demonstrate the role of ingredients in cookery.

CO4 Apply different techniques in evaluation of food.

CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	H											H	H	H
CO2	H		H		H		H		H		M	H	H	H
CO3	H	M	H	M	H					M		H	H	H
CO4	H	M	H	L	H	M	H		H		M	H	H	H

H-High-3, M- Medium-2, L- Low-1

FSND 103-B: BAKING TECHNOLOGY

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

COURSE OBJECTIVES:

To enable the students to:

1. Understand the concept and technology of baking.
2. Learn the role of different ingredients in baking process
3. Familiarize with processing techniques of various bakery products
4. Develop skills in organizing and maintenance of a baking industry.

GENERIC ELECTIVE - THEORY

UNIT-I: Bakery Industry

- Introduction, current status, growth rate, and economic importance of Bakery Industry in India.
- Baking: Principles, baked foods, Baking temperatures, Knowledge and working of various types of oven, baking equipment; Roasting: Principles of roasting, roasting equipment;
- Formulations, processing (mixing, fermentation, rounding, proofing, sheeting, moulding, baking, depanning etc.), equipments, packaging, storage and quality testing of bakery products

UNIT-II: Baking Technology

- Types and grades of wheat flour, Wheat flour proteins and importance of gluten in manufacture of bakery products.
- Role of ingredients in bakery products- sugars, fats, leavening agents, additives and other ingredients.
- Types of Bakery Products and Technology for their Manufacture – dough and batters; Dough rheology.

UNIT-III: Bakery Products

- Hard wheat Products: bread- Ingredients, various types of bread, equipments and types of mixing methods, preparation of bread, Product quality characteristics, faults and corrective measures of bread.

- Soft wheat Products: cookies, crackers, biscuits– Ingredients, types, equipments, method of preparation, Product quality characteristics, faults and corrective measures.
- Ingredient used in Cake Making, types and varieties, equipments, cake making methods, Product quality characteristics, faults and corrective measures of cakes.
- Other bakery products: using very hard wheat. Pizza, pastry and its types.

UNIT- IV: Modified Bakery Products

- Modified bakery products: high fiber, low sugar, low fat, gluten free bakery products.
- Decoration of baked foods – Icing and Fillings, its types and applications in bakery. Role of other ingredients used in icing and fillings.
- Staling and Nutrient Losses in Bakery Products.

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COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Acquire knowledge on bakery industry and products.

CO2 Comprehend the technology of processing of bakery products.

CO3 Demonstrate the skills in various types of bakery items.

CO4 Comprehend the technology of processing in handling the bakery.

CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	H		H		H	H	H		H	H		H	H	H
CO2	H		H		M		H	M	H		H	H		H
CO3	H		H		H	H				L	H		H	H
CO4	M		H			H	H		M		H	H	H	

H-High-3, M- Medium-2, L- Low-1

104-A: COMMUNITY NUTRITION

(Common to all Specializations of M.Sc. Home Science and MS Food Technology Course)

COURSE OBJECTIVES

-To enable the students to:

1. Know about nutrients in food and their functions.
2. Understand the consequences of deficiency of taking nutrients.
3. Apply skills for planning diets for nutritional disorders.
4. Apply the techniques to assess the nutritional status of different age groups.

ELECTIVE FOUNDATION – THEORY

UNIT-I: Food Composition - Grouping

- Food Groups – Classification – food composition
- Nutritive values of different foods, Functions of foods and nutrients – cereal grains, millets, pulses, nuts and oil seeds fruits and vegetables, milk and milk products, meat, egg, poultry and fish, spices and condiments.
- Menu planning– Definition, Principles, Factors affecting menu planning

UNIT-II: Assessment of Nutritional Status of the Community

- Need - Methods of Assessment - (a) Direct Methods - (i) Diet Surveys (ii) Anthropometric Assessment - (iii).clinical and (iv). Biochemical Assessment.
- (b) Indirect Methods - Vital Statistics - Merits and Demerits of methods -
- Nutrition surveys - longitudinal and cross sectional - Family, individual and institutional surveys - Techniques for assessment of age - use of reference standards for the assessment of nutritional status.

UNIT- III: Major Nutrition Problems of the Community

- Nutrition Through Life Span – Infancy, Early and late childhood, Adolescence, Adulthood and Ageing – Nutritional requirements and Recommended Dietary Allowances (RDA)– Justification for special needs during periods of growth and development, pregnancy and lactation – significance of breast feeding .
- Malnutrition and under nutrition- PEM/CED, obesity- deficiencies vit-A, iron /iodine - Etiology –Symptoms - Government programmes to eradicate PEM,

vitamin-A, Iron and Iodine deficiencies – Principles of planning diets for different conditions of malnutrition .

UNIT-IV: Strategies to Combat Malnutrition

- Food security – Definition – Management of food insecurity - -Food Fortification and enrichment.
- Food Assistance and Food Supplementation - Policies and Programmes of the Government - Governmental Policies and Programmes - Food Assistance and Food Supplementation Programmes - Public Distribution System (PDS) - Food For Work (FFW), Special Nutrition Programme (SNP), School Lunch Programme (SLP), Mid Day Meal Programme (MMP), Balawadi Nutrition Programme (BNP), Integrated Child Development Services (ICDS).
- Nutrition Education - Importance - Approaches Media and Methods.

REFERENCES

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COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Know the nutritional problems of the community.

CO2 Acquire knowledge about food groups, RDA and steps in planning a diet.

CO3 Skills in planning and calculating nutritive values for different nutritional disorders.

CO4 Understand the skills in assessing the nutritional status by different methods for different age groups.

CO-PO Mapping

Cours	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO
CO1	H	H		M			M					M	H	
CO2	H	H	H	M			H					M	H	
CO3	H	H	H	M					M			M		H
CO4	H	H	H	M			H		M			M		H

H-High-3, M- Medium-2, L- Low-1

104-B: NUTRITION DURING LIFE SPAN

(Common to all Specializations of MSc Home Science and MS Food Technology Course)

COURSE OBJECTIVES

- To enable the students to:

1. Gain knowledge on the importance of nutrition during life span.
2. Enlighten the principles and working applications during dietary modifications.
3. Comprehensive knowledge on analysing the nutritional requirements.
4. Apply Computational skills in the Nutritional allowances during life span.

ELECTIVE FOUNDATION –THEORY

UNIT-I:Nutrition during Pregnancy & Lactation:

- Nutrient requirement during pregnancy, intake and gaps, prenatal and antenatal nutritional importance, metabolic adjustments in pregnancy.
- Nutrition intervention and pregnancy outcome, Nutritional management, problems and Complications.
- Nutritional requirements during lactation, physiology of milk production, effects of lactation on Nutrition composition of Human-Milk,
- Factors affecting breast milk quality and comparative advantages & disadvantages of breast and formula feeding.

UNIT-II:Nutrition during Infancy & Early child hood period:

- Nutritional requirements, concerns and overall development during Infancy.
- Need for infant formulae, types of infant formulae, care in Preparation, and importance of preparation of weaning foods.
- Home prepared versus commercial weaning foods, Feeding problems-Lactose and cow's milk protein intolerance.
- Pre-school children: Age, growth & development, nutrient requirements, Intake and gaps. Effects of Macro & Micro nutrient malnutrition on physical and mental development.

UNIT-III: Nutrition during School-going children & Adolescents:

- Dietary patterns and factors to be considered. Implications of childhood obesity and other nutritional concerns. Healthy food choices during childhood.

- Growth during adolescence, nutritional requirements, hormonal influences, age of menarche-factors affecting, physiological problems and nutritional issues in adolescence.
- Nutritional requirements and RDA. Behavioural characteristics and feeding problems.

UNIT-IV: Nutrition during adulthood and old age:

- Nutritional requirements for adult man and woman. Nutritional concerns, RDA, nutritional guidelines and work efficiency. Physiological changes in aging, effects of aging on nutritional health.
- Modification in diet, feeding old people. Nutritional concerns in old age and their management.

REFERENCES

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COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Acquire knowledge on nutritional requirements at various stages.

CO2 Apply the knowledge of nutrition during planning and preparation of diet.

CO3 Assess and compare diet and nutritional requirements relative to age, developmental and disease status.

CO4 Evaluate nutrition products for composition, quality, and appropriateness of use and formulate dietary interventions to address nutritional deficiencies.

CO-PO Mapping

Cours	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO
CO1	H	H		M			M					M	H	
CO2	H	H	H	M			H					M	H	
CO3	H	H	H	M					M			M		H
CO4	H	H	H	M			H		M			M		H

H-High-3, M- Medium-2, L- Low-1

105 – PRACTICAL I FOOD CHEMISTRY AND ANALYSIS AND FOOD SCIENCE AND EXPERIMENTAL FOODS/BAKING TECHNOLOGY

101 - FOOD CHEMISTRY AND ANALYSIS

COURSE OBJECTIVES

- To enable the students to:

1. Acquire hands on experience in qualitative and quantitative analysis of different foods.
2. Develop Skill in nutrient analysis of foods

PRACTICALS:

1. Volumetric analysis of Acids and Bases
2. Determination of Moisture
3. Qualitative analysis of Carbohydrates, Hydrolysis of Starch.
4. Determination of starch and sugars
5. Qualitative analysis of Proteins and Amino acids
6. Estimation of proteins - Micro-Kjeldahl method
7. Qualitative analysis of fats and oils.
8. Determination of fat in solid and liquid foods.
9. Determination of Total ash
10. Estimation of Calcium
11. Estimation of Phosphorus
12. Estimation of Iron
13. Estimation of Vitamin C

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Perform skills in qualitative and quantitative estimation of nutrients in different foods.

CO2 Describe the chemical components and their functions in Food applications.

103 A – FOOD SCIENCE AND EXPERIMENTAL FOODS

COURSE OBJECTIVES

- To enable the students to:

1. Acquire skill in effect of cookery on physical, chemical and sensory properties of foods.
2. Understand the application of standardization and experimentation on different food groups

PRACTICALS:

1. Standardization of weights and measures of various foods
2. Starch cookery- Structure, gelatinization and factors affecting gelatinization
3. Baking –Determination of gluten content, Preparation of plain cake and evaluation by subjective and objective methods.
4. Pulse cookery – effect of different cooking methods
5. Vegetable and fruit – Effect of time, temperature, media and cooking methods on pigments, Enzymatic Browning- Preventive measures.
6. Sugar cookery- stages of sugar cookery and its application in Indian sweet making, fondant preparation.
7. Fats and oils – Smoke points, oil absorption and mayonnaise preparation.
8. Milk cookery - factors affecting milk cookery- Temperature, pH, acid, base, coagulation factor.
9. Egg and Meat cookery – Egg white foams, methods of cooking egg and Meat, role of tenderizers in meat cooking.
10. Sensory Evaluation of food- preparation of score card, threshold tests, sensory testing.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Demonstrate the role of ingredients in cookery.

CO2 Apply different techniques in evaluation of food.

103 B BAKING TECHNOLOGY

COURSE OBJECTIVES - To enable the students to:

1. Develop skill in formulation, standardization and evaluation techniques in bakery products.
2. Understand the concepts in the baking process.

PRACTICALS:

1. Introduction of tools and equipments of bakery products.
2. Determining the gluten content.
3. Preparation of Biscuits and Cookies.
4. Preparation of Doughnuts and Muffins.
5. Preparation of Bread and Bun.
6. Preparation of Pizza.
7. Preparation of various Types of Cakes.
8. Preparation of Filling and Icings.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Demonstrate the skills in preparation of various types of bakery items.

CO2 Develop the skill and comprehend the technology of processing in handling the bakery.

106 – PRACTICAL II CLINICAL NUTRITION AND DIETETICS -I AND COMMUNITY NUTRITION/NUTRITION DURING LIFE SPAN

102– CLINICAL NUTRITION AND DIETETICS – I

COURSE OBJECTIVES

- To enable the students to:

1. Apply Knowledge related to Therapeutic modification of diets and diet planning.
2. Plan and prepare diet for different diseases conditions.

PRACTICALS:

1. Planning and preparation of Progressive Diets
    a. Clear Fluid Diet.
    b. Full Fluid Diet,
    c. Soft Diet,
    d. Regular Diet,
2. Therapeutic Adaptations of Normal Diet
    a. High and Low-calorie diet,
    b. High and Low Protein Diet.
    c. Low fat and Low Cholesterol Diet.
    d. High and Low Fiber Diet,
    e. Sodium Restricted Diet,
    f. Low Carbohydrate Diet.
3. Preparation of case study analysis and reports
4. Planning and preparation of diets for Diabetes- Type-I, II, Gestational Diabetes.
5. Planning and preparation of diets for Overweight and Obesity
6. Planning and preparation of pre and post-operative diets
7. Planning and preparation of diets for febrile conditions
8. Planning and preparation of diets for burns
9. Planning and preparation of diets for Cancer
10. Planning and preparation of diets for HIV/AIDS

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Planning and preparation of diets for different disease conditions.

CO2 Able to provide Diet counselling.

104 A COMMUNITY NUTRITION

COURSE OBJECTIVES

- To enable the students to:

1. Apply the techniques to assess the nutritional status of different age groups.
2. Apply skills for planning diets for nutritional disorders.

PRACTICALS:

1. Assessment of Nutritional Status using Anthropometry,
2. Assessment of Nutritional Status using Dietary method
3. Planning of Diets for Different Nutritional Deficiencies like PEM, Anemia, Vit-A.
4. Planning and Preparation of Programmes for Significant Days like Breast Feeding Week, Nutrition Week, World Food Day.
5. Study of the following through visits
   - Govt School Lunch Programme
   - ICDS Programme
   - Anganwadi Training Centers.
6. School Lunch Programme at Sri Venkateswara University Laboratory Nursery School.
7. Community Nutrition Programme Planning - Introduction, Identification of problem, nutritional assessment, analysis of causes, resources, constraints, selection of interventions, setting a strategy, implementations, evaluation of the programme

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Skills in planning and calculating nutritive values for different nutritional disorders.

CO4 Understand the skills in assessing the nutritional status by different method different ag

groups.

104 B NUTRITION DURING LIFE SPAN

COURSE OBJECTIVES

- To enable the students to:

1. Apply Computational skills in the Nutritional allowances during life span.
2. Develop skill in planning and preparation of diets for different age groups.

PRACTICALS:

1. Planning and preparation of diet for pregnant women.
2. Planning and preparation of diet for lactating women.
3. Planning and preparation of weaning foods.
4. Planning and preparation of diet for pre-school child.
5. Planning and preparation of diet for school going child.
6. Planning and preparation of diet for adolescent.
7. Planning and preparation of diet for adult.
8. Planning and preparation of diet for old age.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Assess and compare diet and nutritional requirements relative to age, developmental and disease status.

CO2 Evaluate nutrition products for composition, quality, and appropriateness of use and formulate dietary interventions to address nutritional deficiencies.

FSND 107: HUMAN VALUES AND PROFESSIONAL ETHICS – I

(REVISED SYLLABUS WITH EFFECT FROM 2021 ONWARDS)

COURSE OBJECTIVES

-To enable the students to:

1. Define the term 'ethics', 'good and bad values', crime and punishment and religious tolerance.
2. Understand the importance of good character, conduct and values embedded in various religions.
3. Apply knowledge of professional ethics and correlate the concepts in addressing the ethical issues outside the class room.
4. Demonstrate knowledge of ethical values in non-class room activities, internships and field work and resolve the moral issues. .

AUDIT COURSE- THEORY

Unit-I:

- Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment.
- Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

Unit-II:

- Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom.
- Good behavior and respect for elders, Character and Conduct.

Unit-III:

- Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha(Non- stealing).
- Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires). Moksha(Liberation).

Unit-IV:

- Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths – AryaAstangamarga, (c) Jainism- mahavratas and anuvratas.
- Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.
- Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

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13. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications
14. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.

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16.

COURSE OUTCOMES

- After studying the course, students will able to:

CO1 Define the term 'ethics', 'good and bad values', crime and punishment and religious tolerance.

CO2 Understand the importance of good character, conduct and values embedded in various religions.

CO3 Apply knowledge of professional ethics and correlate the concepts in addressing the ethical issues outside the class room.

CO4 Demonstrate the ability to face difficult situations in non-class room activities, internships and field work and resolve them confidently.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H						L	H	H			H		
CO2						M			H			H		
CO3						H		H	H			H		
CO4						H		H	H			H		

H-High-3, M- Medium-2, L- Low-1

II SEMESTER

S.No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	FSND 201	Nutritional Bio chemistry	6	4	20	80	100
2	Core	FSND 202	Clinical Nutrition and Dietetics-II	6	4	20	80	100
3	Compulsory Foundation	FSND 203- A	Food Microbiology and Safety	6	4	20	80	100
		FSND 203 B	Nutrition in Emergencies And Disaster Management	6	4	20	80	100
4	Elective Foundation	FSND 204 A	Research Methodology	6	4	20	80	100
		FSND 204 B	Statistics and Computer Applications	6	4	20	80	100
5	Practical –I	FSND 205	201+203-A/203-B	3+3/3	4	--	--	100
6	Practical – II	FSND 206	202+204-A/204-B	3+3/3	4	--	--	100
	Total			-	24			600
7	FSND 207: Human Values and Professional Ethics-II (Audit course)*			0	0	100	0	0

***Audit Course- Zero Credits under Self Study**

SEMESTER- II

FSND 201: NUTRITIONAL BIOCHEMISTRY

COURSE OBJECTIVES

- To enable the students to:

1. Understand the metabolism of nutrients in human physiology.
2. Acquire knowledge on factors affecting digestion, absorption of nutrients.
3. Create awareness on enzymes and its role in nutrient metabolism.
4. Apply skills in analyzing enzymes and its metabolites.

CORE THEORY

UNIT- I: Metabolism of Carbohydrates and Lipids

- Carbohydrates: Functions, digestion and absorption of carbohydrates. Carbohydrate metabolism- Glycolysis, Glycogenolysis, glycogenesis and Gluconeogenesis.
- Lipids: Functions, digestion and absorption of lipids. □oxidation of fatty acids and Cholesterol Metabolism. Lipids of biological significance - Lipoproteins and prostaglandins in health and disease.

UNIT- II: Proteins and Amino Acids

- Functions, digestion and absorption of proteins.
- Metabolism of amino acids - Amino Acid decarboxylation, Tran's peptidation. Urea cycle, creatine and Creatinine - biosynthesis.
- Nucleic acid - DNA, RNA, Bases - Purines and Pyrimidines, Synthesis of Nucleic Acids - Steps of replication - Initiation, Elongation and Termination. Protein biosynthesis.
- Enzymes – Classification, structure, functions of enzymes; factors affecting enzyme activity.
- Integration of metabolism of carbohydrates, fats and proteins, Electron Transport Chain (ETC), Oxidative Phosphorylation.

UNIT-III: Vitamins

- Fat Soluble Vitamins A, D, E and K: Absorption, Transportation, Metabolism, physiological and biochemical functions
- Absorption, Transportation, Metabolism, physiological and biochemical functions of Water-Soluble Vitamins-Thiamine, Riboflavin, Niacin, Pyridoxine, Folic acid, Pantothenic acid, Vitamin C.

UNIT- IV: Minerals and Trace elements

- Absorption, Transportation, Metabolism, Physiological and biochemical functions, of Calcium, Phosphorus, Iron, Iodine, Zinc, Sodium, Potassium,Chloride and Flourine
- Electrolytes.

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8. Jayaraman, J. (1981). Laboratory Manual in Biochemistry," New Age International Publishers.

COURSE OUT COMES - After completion of this course, students will be able to:

CO1 Understand the metabolism of food and nutrients in humans.

CO2 Know metabolism of nutrients in healthy and disease individuals.

CO3 Acquire skills in Qualitative and quantitative estimation of metabolites in biological fluids.

CO4 Know Skills in analysing enzymes and its metabolites.

CO-PO Mapping

Cours	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PS0	PSO
CO1	H	H		H										
CO2	H	H		H										
CO3	H			H	H	M						M		
CO4	H			H	H	M						M		

H-High-3, M- Medium-2, L- Low-1

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FSND 202: CLINICAL NUTRITION AND DIETETICS-II

COURSE OBJECTIVES

- To enable the students to:

1. Understand the dietary principles for various diseases.
2. Comprehend knowledge in Dietary modifications for the management of diseases.
3. Application of principals in preparation and service of diets to the patients.
4. Able to assess the case studies and construct the diet charts.

CORE THEORY

UNIT- I: Dietary Management in Gastro Intestinal Tract Disorders

- Diseases of the Upper Gastro intestine - Gastro Esophageal Reflux Disease (GERD), Esophagitis, Hiatal Hernia.
- Diseases of the Stomach: Gastritis, Peptic Ulcer, Dumping syndrome.
- Diseases of intestine: Inflammatory bowel disease, Celiac disease, Irritable bowel syndrome, Short bowel syndrome
- Common GI problems: Diarrhea, constipation, Flatulence, Food sensitivities.

UNIT- II: Dietary Management in Disorders of Hepato –Bilary Tract

- Disorders of liver: Hepatitis, Hepatic Steatosis, Cirrhosis, Hepatic encephalopathy.
- Gallbladder Disorders**:** Chollelithiasis, Cholecystitis.
- Disorder of pancreas: pancreatitis.

UNIT- III: Dietary Management in –

- Cardiovascular Disorders **-**Dyslipidemia, Atherosclerosis, Coronary Heart disease (CHD), Hypertension (HT), Congestive Heart Failure, Angina pectoris, myocardial infraction (MI), Rheumatic Heart Disease (RHD).

- Renal Disorders-Nephrotic syndrome, glomerular nephritis, renal failure, Nephrolithiasis, urinary tract infection, dialysis.

UNIT-IV: Dietary Management in -

- Neurological Disorders –Migraine syndrome, Alzheimer's disease, Parkinson's disease.
- Musculoskeletal and Rheumatic Disorders- Osteoporosis, Osteoarthritis, Rheumatoid Arthritis, Gout.

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4. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/MosbyCollege Publishing.
5. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins. (2007). Nutrition in Clinical Practice Second Edition.
6. ShubhanginiA.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.

COURSE OUT COMES

- After the completion of the course, the students will able to:

CO1 Apply the concepts of threupatic modification of diets for the diseases.

CO2 Calculate nutrients and modifiy diets for the diseases.

CO3 Skills in Planning and preparation of diets for different disease conditions.

CO4 Able to know patient Diet service management and counselling.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H				M	M		M	M		M	H	
CO2	H	H				M	M		M	M		M	H	
CO3	H	H	M	H		H	H		H	M		M		H
CO4	H	H	M	H		H	H		H	M		M		H

H-High-3, M- Medium-2, L- Low-1

FSND 203-A: FOOD MICROBIOLOGY AND SAFETY

(COMMON TO MSC FOOD SCIENCE NUTRITION & DIETETICS AND MS FOOD TECHNOLOGY COURSE)

COURSE OBJECTIVES

- To enable the students to:

1. Obtain knowledge about important genera of microorganisms associated with food.
2. Acquaint food contaminants and their sources.
3. Understand the various factors associated with growth, food spoilage and food-borne diseases of different microorganisms.
4. Demonstrate the use of standard methods and procedures for the microbiological analysis of food.

COMPULSORY FOUNDATION- THEORY

UNIT- I: Introduction to Food Microbiology

- Classification and growth of microorganism, factors affecting microbial growth.
- General characteristics, structure, classification, morphological characteristics, cultural characteristics of bacteria, fungi, virus, protozoa, and algae.
- Role of Harmful and beneficial microorganisms in food.

UNIT -II: Food Contamination and Spoilage

- General principles underlying spoilage: causes of spoilage, classification of foods based on spoilage and changes caused by microorganisms.
- Sources of contamination and types of spoilages among plant origin foods:
  - Cereals, Legumes, nuts and oil seeds
  - Fruits and Vegetable products
  - Spices and condiments

UNIT- III: Food Contamination and Spoilage of Animal origin and Processed Foods

- Sources of contamination and types of spoilages among :
  - Milk and Milk products
  - Eggs, poultry and Meat
  - Fish and Other sea foods

- Sugars and sugar products
- Processed foods

UNIT- IV: Food Borne Diseases and Food Safety

- Food borne diseases – Food Infection and Intoxication Sources of infection of food by pathogenic organisms and physiological action, Signs and symptoms of various Bacterial Food-borne poisoning and Non-bacterial food-borne poisoning.
- Food safety: concept, factors affecting food safety, biological hazards.
- Applications of Food Microbiology- probiotics, prebiotics, microbial enzymes, fermentation process.

REFERENCES

1. Jay, J. M., Loessner, M. J., & Golden, D. A. (2008). *Modern food microbiology*. Springer Science & Business Media.
2. Banwart, G. (2012). *Basic food microbiology*. Springer Science & Business Media.
3. Matthews, K. R., Kniel, K. E., & Montville, T. J. (2017). *Food microbiology: an introduction*. John Wiley & Sons.
4. Adams,M.R. and Moss,M.O.(2003). *Food Microbiology*, Second edition, Panima Publishing Corporation, New Delhi.
5. James,M.Jay.(2005). Modern *Food Microbiology*, 4th edition, CBS publishers and Distributors, New Delhi.
6. William.C.Frazier and Denni, S.C. Westhoff. (2004). *Food Microbiology*, 4th edition, Tata MCGraw-Hill publishing company Ltd, New Delhi.

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Identify the important genera and factors associated with food spoilage.

CO2 Elucidate the food contaminants in different types of food commodities.

CO3 Describe the characteristics of food borne diseases, infections and intoxications and their identification.

CO4 Demonstrate the use of standard methods and procedures for the microbiological analysis of food.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H									H	H	H	H
CO2	H	H		M							M	H	H	H
CO3	H	H										H	H	H
CO4	H	H			M			M			H	H	H	H

H-High-3, M- Medium-2, L- Low-1

FSND 203--B: NUTRITION IN EMERGENCIES AND DISASTER MANAGEMENT

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

COURSE OBJECTIVES

- To enables the students to:

1. Understand the emergency situations in natural and manmade disasters.
2. Gain knowledge on nutrition surveillance and treatment in emergencies.
3. Knowledge on planning nutrition relief and rehabilitation in emergencies.
4. Explain concepts on Epidemiology and its application in planning programs during emergencies.

GENERIC ELECTIVE- THEORY

UNIT-I: Disasters

- Natural/Manmade disasters resulting in emergency situations:Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies, Factors giving rise to emergency situation in these disasters.
- Nutritional problems in emergencies in vulnerable groups: Causes of malnutrition in emergency situations, Major deficiency diseases in emergencies, Protein – Energy Malnutrition / Starvation / Under Nutrition, Specific Nutrient deficiencies - Energy, Vitamins, Minerals
- Communicable disease: Surveillance and treatment.Control of communicable diseases in emergencies – Role of immunization and sanitation.

UNIT-II: Assessment

- Assessment and surveillance of Nutritional status in emergency affected populations: Scope of assessment of malnutrition in emergencies,

Indicators of malnutrition. Clinical signs for screening acute malnutrition, Anthropometric assessment of nutritional status.

- Indicators and cut-offs indicating seriously abnormal nutrition situation: Weight for height based indices, MUAC, social indicators.
- Organization of nutritional surveillance and individual screening.

UNIT-III: Nutritional Relief and Rehabilitation

- Assessment of food needs in emergency situations, Food distribution strategy – Identifying and reaching the vulnerable group – Targeting Food Aid.
- Mass and Supplementary Feeding, Therapeutic Feeding, Special foods/rations for nutritional relief, Local production of special foods, Local foods in rehabilitation
- Organisation of mass feeding/general food distribution, Feeding centers, Transportation and food storage, Sanitation and hygiene, Evaluation of feeding programmes, Household food security and nutrition in emergencies
- Public nutrition approach to tackle nutritional problems in emergencies

UNIT-IV: Nutritional Epidemiology

- Introduction to Epidemiology – types of epidemiology, collection of epidemiological data, secondary routine date, Descriptive epidemiology, Cross sectional Analysis, prevalence and incidence, risk factors, risks and odds, relative and attributable risks
- Principles of Nutritional Epidemiology, Measurement issues, Measurement of disease, Occurrence and Measurement of association, Exposure and outcome, Socio demographic and Psycho social variables.
- Design and Planning of Nutritional Epidemiological studies – assessing and supplying And Evaluating Epidemiological studies – Discussion of selected case studies.

REFERENCES

1. World Disasters Report – Focus on Public Health, International Federation of Red Cross and Red Crescent Societies.
2. Disasters – International Public Nutrition and Emergencies: The Potential for improving practice. Special Issue – Vol.23/4, Dec. 1999.

3. Guidelines and Research publications of OXFAM, WFP, Rome. 1999. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of ICMR. 2010.
4. Dr.M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition theBangalore Printing and Publishing Co Ltd Bangalore 560018.
5. ShubhanginiA.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Macgraw Hill Education Private Limited New Delhi.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Acquire knowledge in nutritional problems in natural and man made disasters.

CO2 Assess the nutritional status in emergency and plan surveillance and treatment to the affected.

CO3 Acquire knowledge on nutrition epidemiology.

CO4 Plan and Execute nutrition rehabilitation in emergencies.

CO-PO MAPPING

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO
CO1	H								H	H		H	H	
CO2	H	M		M					H	H		H		
CO3	H		M	M			M	M				H		H
CO4	H		H			M			H			H		

H-High-3, M- Medium-2, L- Low-1

FSND 204-A: RESEARCH METHODOLOGY

(Common to All branches of Home Science and MS Food Technology Course)

COURSE OBJECTIVES

- To enable the students to:

1. Get awareness about terms like 'variables', 'hypothesis', research 'and recognize the purpose of doing research.
2. Understand different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research.
3. Critically apply knowledge to select a sample by using different sampling methods like probability and non-probability sampling.
4. Develop a research proposal in the appropriate scientific style.

ELECTIVE FOUNDATION-THEORY

UNIT – I : Research Purpose and Types

- Research – Significance, meaning, objectives, Approaches,
- Research process, Criteria of good research, Variable- types
- Types of Research: Historical, descriptive, experimental, case study, survey research, participatory research, Fundamental, applied and action, exploratory research.
- Research hypothesis-Characteristics of good hypothesis.
- Research Design – Meaning, Need, Concepts, Principles and Types of research design

UNIT – II: Research Problem and Sample design

- Definition and Identification, Necessity and Selection of Research problem, Technique involved in defining the research problem.

- Population and Sample – Implications, Steps, Criteria and Characteristics of a good design
- Sampling Methods : *Probability sampling*- Simple random, systematic random sampling, two Stages and multi stage sampling, cluster sampling and *Non-probability sampling* - Purposive, quota and volunteer sampling / Snowball Sampling.

UNIT –III : Methods of Data Collection

- Primary and Secondary Data, Selection of appropriate method for data collection
- Different Methods and techniques of data collection - Interview, Observation, Social mapping, Participatory assessment Techniques, Observation check list, Questionnaire, Interview schedule, Group discussions, Case studies

UNIT –IV: Measurement Scales

- Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement,Technique of Developing Measurement Tools, Scaling, Meaning of Scaling,Scale Classification Bases,Important Scaling Techniques.

- Research Proposal – Preparation.

REFERENCES

1. Kothari, C.R. (2004).:*"Research Methodology (Methods and Techniques)"*. New Age International (p) Ltd., New Delhi.
2. Bandarkar, P.L. and Wilkinson T.S. (2000) :*"Methodology and Techniques of Social Research"*, Himalaya Publishing House, Mumbai.
3. Batnagar, G.L. (1990) :*"Research Methods and Measurements in Behavioural and Social Sciences",* Agri. Cole publishing Academy, New Delhi.
4. BajPai S.M. (1987). *"Methods of Social Survey and Research"*KitabGhat, Kanpur-3
5. Black, T.R. (1999).:*"Doing Quantitative Research in the Social Sciences"*, Sage Publications, New Delhi.
6. Dev Doss R.P. and Kulandavel K (1985).*"Hand book of methodology of research"* Oxford Press,

7. Goode J.W. and Hatt P.K. *"Methods in Social Science Research"* Mc. Graw hill-Co. New York.
8. Sharma S.R. (1994). *"Statistical methods in Educational Research"*, Anmol Publications Pvt. Ltd., New Delhi.

COURSE OUTCOMES - After studying the course, students will able to:

CO1. Define terms like 'variables', 'hypothesis' ,research'and state the purpose of doing research

CO2. Understand different types of search and can compare the advantages and dis-advantages of each type of research

CO3. Critically know the procedures for identifying an ideal sample for scientific research.

CO4. Prepare a research proposal in the appropriate scientific style .

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H			H		H	M		M		M	H		
CO2				H		H	H				M	H		
CO3		L		H		H			M		H	H		
CO4				H		H	H		H			H		

H-High-1, M- Medium-2, L- Low-3

204 -B: STATISTICS AND COMPUTER APPLICATIONS

(Common to All branches of Home Science and MS Food Technology Course)

COURSE OBJECTIVES

- To enable the students to:

1. Get awareness about the scope of statistics in research.
2. Understand the concepts of inferential statistics like t-test, chi-square, Correlation and Variance.
3. Critically apply knowledge of application of statistics in data analysis.
4. Apply skills in using computer applications for data analysis

ELECTIVE FOUNDATION-THEORY

UNIT- I: Statistics

- Statistics: Meaning, Definition and Scope, limitations – Role of statistics in Research
- Descriptive Statistics: Classification and tabulation of data, Graphic and diagrammatic presentation of data, measurement of central tendency, variation and dispersion, Normal distribution, Frequency distribution, histogram, frequency polygons, curve ogive
- Levels of Significance

UNIT – II: Inferential statistics

- 't' test for large samples (mean and proportions) and small samples
- Chi square test for significance and association
- Analysis of variance-one way, two way

- Correlation, coefficient of correlation, rank correlation

UNIT – III: Computer Applications I

- Introduction to Computer-Block diagram, PC and its components, Memory capacity, Physical storage of data, various devices, Hardware and software operating- DOS commands for file handling.
- MS Office and its component – Word and its applications/ creating documents, editing spell check, auto correct and print preview, creating tables and sorting data in tables, mail merge and its usage.

UNIT – IV: Computer Applications II

- MS Excel for data analysis - Work sheet and its structure, data entry, editing, Sorting filtering and copying.
- Statistical functions in Excel – Data analysis park for performing descriptive statistics, t-test, ANOVA, Correlation and regression.
- Graphs in Excel – Various types of graphs, editing graphs.

REFERENCES

1. Kothari, C.R. (2004).:*"Research Methodology (Methods and Techniques)".* New Age International (p) Ltd., New Delhi.
2. Bandarkar, P.L. and Wilkinson T.S. (2000) :*"Methodology and Techniques of Social Research"*, Himalaya Publishing House, Mumbai.
3. Batnagar, G.L. (1990) :*"Research Methods and Measurements in Behavioural and Social Sciences",* Agri. Cole publishing Academy, New Delhi.
4. BajPai S.M. (1987). *"Methods of Social Survey and Research"*KitabGhat, Kanpur-3
5. Black, T.R. (1999).:*"Doing Quantitative Research in the Social Sciences"*, Sage Publications, New Delhi.
6. Dev Doss R.P. and Kulandavel K (1985).*"Hand book of methodology of research"* Oxford Press,
7. Goode J.W. and Hatt P.K. *"Methods in Social Science Research"* Mc. Graw hill-Co. New York.
8. Sharma S.R. (1994). *"Statistical methods in Educational Research"*, Anmol Publications Pvt. Ltd., New Delhi.

COURSE OUTCOMES - After studying the course, students will able to:

CO1. Define terms like 'frequency distribution', 'Variance' , 'Correlation' and its scope in research data

CO2. Understand different types of statistics that are used in research data.

CO3. Critically know the calculations of different statistics of research data.

CO4. Apply skills in using computer applications for data analysis.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H			H		H	M		M		M	H		
CO2				H		H	H				M	H		
CO3		L		H		H			M		H	H		
CO4				H		H	H		H			H		

H-High-1, M- Medium-2, L- Low-3

205 – PRACTICAL I NUTRITIONAL BIOCHEMISTRY AND FOOD MICROBIOLOGY AND SAFETY/NUTRITION IN EMERGENCIES AND DISASTER MANAGEMENT

201 – NUTRITIONAL BIOCHEMISTRY

COURSE OBJECTIVES

- To enable the students to:

1. Acquire skills in analyzing the biochemical parameters in blood and serum.
2. Appraise the normal and abnormal levels of biochemical parameters in different conditions.

PRACTICALS:

1. Estimation of Blood glucose.
2. Estimation of Serum Proteins by Biuret
3. Estimation of Serum Triglycerides.
4. Estimation of Serum Cholesterol.
5. Estimation of Serum Iron
6. Estimation of Haemoglobin
7. Microscopic Examination of Blood Smear for types of blood cells.
8. Estimation of Packed cell volume in the blood.
9. Estimation of Serum Calcium.
10. Normal and abnormal urine analysis.

COURSE OUTCOMES - After studying the course, students will able to:

CO1 Acquire skills in Qualitative and quantitative estimation of metabolites in biological fluids.

CO2 Know Skills in analysing the biochemical levels and its relation to normal and abnormal conditions.

203-A FOOD MICROBIOLOGY AND SAFETY

COURSE OBJECTIVES

- To enable the students to:

1. Demonstrate the use of standard methods and procedures for the microbiological analysis of food.
2. Understand the techniques for identification, isolation and confirmation of microbes in fresh and processed foods.

PRACTICALS:

1. Laboratory safety rules and precautions
2. Familiarization with Instruments used in Microbiological Lab, their principles and working.
3. Sterilization methods
4. Sampling techniques
5. Isolation techniques
6. Various types of media preparation and Methods of sterilization of media
7. Microbial Staining Techniques
8. Microbial examination of fresh food products: Identification, isolation and confirmation
9. Microbial examination of processed foods: Identification, isolation and confirmation.
10. Detection of E.coli from food sample

COURSE OUTCOMES

- After studying the course, students will able to:

CO1 Skill development in standard methods and procedures for the microbiological analysis of food.

CO2 Acquaint with skill of preparing and sterilization techniques of media.

203-B NUTRITION IN EMERGENCIES AND DISASTER MANAGEMENT

COURSE OBJECTIVES

- To enable the students to:

1. Explain concepts on Epidemiology and its application in planning programs during emergencies.
2. Skill development in rapid assessment techniques.

PRACTICALS:

1. Collection of epidemiological data-a hands on experience.
2. Selection and Rapid assessment of nutritional status in a community.
3. Case study approach on causative factors and management of communicable diseases.
4. Planning and formulation of nutrient dense foods.
5. Survey on adherence to immunization schedule and vaccines.

COURSE OUTCOMES

- After studying the course, students will able to:

CO1 Acquire knowledge on nutrition epidemiology procedures.

CO2 Plan and Execute nutrition rehabilitation in emergencies.

206 – PRACTICAL II CLINICAL NUTRITION AND DIETETICS AND RESEARCH METHODOLOGY/STATISTICS AND COMPUTER APPLICATIONS

202 – CLINICAL NUTRITION AND DIETETICS – II

COURSE OBJECTIVES

- To enable the students to:

1. Application of principals in preparation and service of diets to the patients.
2. Able to assess the case studies and construct the diet charts.

PRACTICALS:

1. Planning and preparation of diets for Upper gastro intestinal disorders-Gastritis, Peptic Ulcer
2. Planning and preparation of diets for Lower gastro intestinal disorders- Celiac Disease Diarrhea, constipation
3. Planning and preparation of diets for Liver- Hepatitis, Hepatic Steatosis, Cirrhosis
4. Planning and preparation of diets for Hypertension, Atherosclerosis, Coronary Heart disease
5. Planning and preparation of diets for Nephrotic syndrome, glomerular nephritis
6. Planning and preparation of diets for Nephrolithiasis,
7. Planning and preparation of diets for dialysis
8. Planning and preparation of diets for Alzheimer's disease, Parkinson's disease
9. Planning and preparation of diets for Osteoporosis, Osteoarthritis, Rheumatoid Arthritis, Gout
10. Preparation of Diet charts.

COURSE OUTCOMES

- After studying the course, students will able to:

CO1 Skills in Planning and preparation of diets for different disease conditions.

CO2 Able to know patient Diet service management and counselling.

204-A RESEARCH METHODOLOGY

COURSE OBJECTIVES

- To enable the students to:

1. Critically apply knowledge to select a sample by using different sampling methods like probability and non-probability sampling.
2. Develop a research proposal in the appropriate scientific style.

PRACTICALS

1. Identification of different variables in specialization of study.
2. Framing of hypothesis-Null and alternate Hypothesis
3. Preparation of schedule/questionnaire.
4. Preparation of research proposal
5. Study of an article in a journal-Abstract, Methodology, Results and Bibliography

COURSE OUTCOMES - After studying the course, students will able to:

CO1 Critically know the procedures for identifying an ideal sample for scientific research.

CO2 Prepare a research proposal in the appropriate scientific style.

204-B STATISTICS AND COMPUTER APPLICATIONS

COURSE OBJECTIVES

- To enable the students to:

1. Critically apply knowledge of application of statistics in data analysis.
2. Apply skills in using computer applications for data analysis

PRACTICALS

1. Graphic and diagrammatic presentation of data.
2. Calculation of Averages- Arithmetic mean, mode and median.
3. Calculation of Standard deviation and 't' test for large and small samples.
4. Calculation of Correlations.
5. Calculation of chi square to find out significance of association.

COURSE OUTCOMES - After studying the course, students will able to:

CO1 Critically know the calculations of different statistics of research data.

CO2 Apply skills in using computer applications for data analysis

FT-207: HUMAN VALUES AND PROFESSIONAL ETHICS - II

(Revised Syllabus with effect from 2021 onwards)

COURSE OBJECTIVES

- To enable the students to:

1. Associate the terms 'value education' 'self-introspection' and 'self-esteem' which are the core aspirations of all human beings.
2. Understand the importance of ethics in different fields like medical, business, environment and social ethics and ethics of media.
3. Apply the knowledge to assess issues and problems in each profession and correlate the concepts in addressing the ethical issues while choosing and joining a profession.
4. Develop all round and well balanced personality of the students and shapes them to become morally finer, socially responsible and physically fit persons of the society.

AUDIT COURSE- THEORY

UNIT-I:

- Value Education- Definition - relevance to present day - Concept of Human Values -self introspection – Self-esteem - Family values-Components, structure and responsibilities of family.
- Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-II:

- Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and health care professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients.
- Social justice in health care, human cloning, problems of abortion. Ethical issues

in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT-III:

- Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions.
- Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

UNIT-IV:

- Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste.
- Climate change, Energy and population, Justice and environmental health.

Unit-V:

- Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics. Surrogacy/pregnancy.
- Ethics of media- Impact of Newspapers, Television, Movies and Internet.

REFERENCES

1. John S Mackenjie: A manual of ethics.
2. The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. Chowkarnba Sanskrit series. VolLlI and Ill, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
6. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
7. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
8. Analyzing Moral.Issues, Judith A. Boss. May Field Publishing Company - 1999.
9. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications
10. Text Book for Intermediate First Year Ethics and Human Values. Board of

Intermediate Education- Telugu ~ Akademi, Hyderabad.

COURSE OUTCOMES

-After studying the course, students will able:

CO1 Associate the terms 'value education' 'self-introspection' and 'self-esteem' which

are the core aspirations of all human beings.

CO2 Understand the importance of ethics in different fields like medical, business, environment and social ethics and ethics of media.

CO3 Apply the knowledge to assess issues and problems in each profession like medical, business , environment and social ethics and ethics of media and correlate the concepts in addressing the ethical issues while choosing and joining a profession.

CO4 Apply skills for anger management, care of elderly, environmental protection and

thereby develop well balanced personality and will contribute to society as morally finer, socially responsible and physically fit persons.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H											H		
CO2									H			H		
CO3	L								H			H		
CO4		M			M			L	H			H		

H-High-3, M- Medium-2, L- Low-1

III SEMESTER

S.No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	FSND 301	Food Processing and Preservation Technology	6	4	20	80	100
2	Core	FSND 302	Advances in Human Nutrition	6	4	20	80	100
3	*Generic Elective	FSND303-A	Nutrition Assessment Techniques	6	4	20	80	100
		FSND303-B	Public Health Nutrition					
4	Practical	FSND 304	301+302	6	4	--	--	100
5	**Skill Oriented Course	FSND 305	Institutional Food Service Management(T)+Practicals (P)	3+6	4	10	90 (40+50)	100
6	***Open Elective	FSND306-A	Fundamentals of Food, Nutrition and Health	6	4	20	80	100

		FSND 306-B	Dynamics in Food Preparation					
	Total				24			600

***Generic Elective – Student has to choose any one paper**

****Internship is mandatory**

*****Open Elective – Offered by Department to other Department students**

Note: Interested student may register for MOOCS with the approval of DDC

FSND- 301: FOOD PROCESSING AND PRESERVATION TECHNOLOGY

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

COURSE OBJECTIVES

-To enable the students to:

1. Understand the principles and scope of food processing and preservation.
2. Get an overview on various techniques/methods in food processing and preservation.
3. Acquire knowledge of emerging technologies and their applications in food processing and preservation.
4. Equip with skills required for process and preserve various food products.

CORE THEORY

UNIT- I: Food Processing and Preservation – An Introduction

- Need, Purpose, Principles and Methods of food processing and preservation. Definitions
- Traditional Methods of food processing and preservation.
- Preservatives and Additives –Definitions, Classification, applications, permissible limits and safety aspects.

UNIT-II: Methods of Food Processing and Preservation

- Processing and preservation by Heat - Principles of thermal processing, blanching, pasteurization, UHT processing, thermal sterilization, canning, extrusion.
- Processing and preservation by Cold- Refrigeration and freezing, methods of freezing, effect on quality of foods.
- Processing and preservation by Drying and Dehydration -Types, Methods and their suitability for different food products.
- Processing and preservation by Concentration – Types, Methods and their suitability for different food products.

UNIT- III: Processing and Preservation by Fermentation

- Definition, types, Importance, Technology, Benefits and Limitations.
- Processing and preservation of fermented foods – Cereal and pulse products, Fruits and Vegetables, Milk products, meat products, Beverages.

UNIT- IV: Advanced Food Processing Technologies

- Irradiation, High Pressure Processing, Pulse Electric Field, Microwave, Ohmic Heating, Reverse Osmosis, Ultra Filteration and Membrane Processing.
- Minimal Processing, Edible Coatings and Films, Encapsulation, Nano technology Hurdle Technology, Artificial Intelligence (AI) Technologies and Advanced Robotics in Food Industry.

REFERENCES

1. Fellows,P. and Ellis,H. (1990). Food Processing Technology: Principles and Practice,New York.
2. ShafiurRahman, (2011), Hand book of food preservation, CRC Press, Newyork.
3. Harry. W. Von Loesecke.(1998). Drying and dehydration of Foods, Allied Scientific,NewDelhi.
4. Jelen,P.(1985). Introduction to Food Processing, Prentice Hall, Reston Virginia, USA.

5. Lewis, M.J. (1990). Physical Properties of Food and Food Processing Systems,Woodhead, UK.
6. Norman, N. Potter, Joseph H. Hotchkiss.(1996). Food Science, 5th edition, CBS Publishers &Distributors, New Delhi.
7. Rama swamy,H. and Marcote,M. (2005).Food processing- principals and applications, CRC Press, Newyork

COURSE OUTCOMES -After the completion of the course, the students will be able to:

CO1 Conceptualize principles of traditional and novel food processing and preservation technology.

CO2 Understand the applications and limitations of food processing and preservation technology.

CO3 Comprehend the functions and applications of food preservatives and additives.

CO4 Apply appropriate technologies to process and preserve the foods to extend their shelf life.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H				H						M	H	H	H
CO2	H	M			H			L			M	H	H	H
CO3	H			M	H			H	H	M	H	H	H	H
CO4	H		H	H	H	M		L	H		H	H	H	H

H-High-3, M- Medium-2, L- Low-1

FSND 302: ADVANCES IN HUMAN NUTRITION

COURSE OBJECTIVES

- To enable the students to:

1. Know the advance concepts of nutrition of Brain, Immunity and Sports.
2. Understand the concepts of dietary management in endemic nutrition problems.
3. Create knowledge on the dietary management during emergencies.
4. Planning and preparation of foods in special needs like space, high altitudes and low temperatures.

CORE THEORY

UNIT-I: Nutrition, Brain and Behaviour

- Brain – Structure, composition and functions and neurological tests-EEG, PET, MRI.
- Neurotransmitters- Nutrient precursors of neurotransmitters – Tryptophan, tyrosine, choline and lecithin
- Role of neurotransmitters in Brain function
- Role of Nutrients on Brain growth and development

UNIT-II: Nutrition and Immunity

- Innate and Acquired immunity – Primary and secondary immune response, Active and Passive, Antigen, Antibody Cell mediated immunity, Humoral immunity-Formation, maturation and activation of B and T cells, Immune effectors system-cytokines complement system, K cells and NK cells, Cell mediated effectors response,
- Role of nutrients in immunity
- Effect of malnutrition on immunity

UNIT-III: Endemic Nutrition Problems and their Management

- Flurosis – Aetiology, prevalence, symptoms and nutritional management
- Iodine deficiency disorders - Aetiology, prevalence, symptoms and nutritional management
- Osteoporosis - Aetiology, prevalence, symptoms and nutritional management.

UNIT-IV: Principles of Nutrition and management systems in Disasters and Emergencies and Special Environments.

Nutrition in Disasters

- Disaster management –Natural and Man made Disasters.
- Assessment of food needs in emergency situations.
- Food distribution strategy – Identifying and reaching the vulnerable group
- Targeting Food Aid.
- Mass and Supplementary Feeding / Special foods/rations for nutritional relief
- Food and Nutrition security
- Nutrition in Special needs-High altitudes and Low temperatures.
- Space nutrition.

REFERENCES

1. Whitney and Sharon RadyRolfes. (1999). Understanding Nutrition" (8th edition) An International Thomson Publishing Company, Albnay, New York, USA, Wadsworth Publishing Company.
2. M.S. Bamiji, N. PrahladRao and VinodiniReddy . (1998). Text Book of Human Nutrition" Oxford and IBFI Publishing Co. Pvt. Ltd., New Delhi.
3. Heather Hedrick Fink, Alan E. mike sky. (2012). Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America.

4. Michelle McGuire, Kathy A Beer man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, WadsworthCengage Learning, Belmont, USA.
5. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. (2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderbad.
6. Nutrient Requirements andRecommended Dietary Allowance forIndians A Report of The Expert Group of ICMR.2010.
7. Dr.M. Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.

COURSE OUT COMES

- After the completion of the course students will be able to:

CO1 Acquire knowledge on advanced nutrition concepts and management

CO2 Demonstrate and apply the concepts and designing foods for brain, immunity and sports.

CO3 Skills to manage the diet in emergency situations.

CO4 Present knowledge on designing foods for special needs.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H					M			M		M	H	
CO2	H	H		H			M			M		M	H	
CO3	H	H	H	H		M						M		H
CO4	H	H	H	H		H						M		H

H-High-3, M- Medium-2, L- Low-1

FSND 303 -A: NUTRITION ASSESSMENT TECHNIQUES

COURSE OBJECTIVES

- To enable the students to:

1. Understand the methods of nutritional status assessment.
2. Apply knowledge on assessment techniques of protein quality in diets
3. Plan nutrition research using animal models.
4. Design nutrition research using Human models.

GENERIC ELECTIVE- THEORY

UNIT-I: Assessments of Nutritional Status

i. **Direct methods**: Anthropometric, Biochemical, Clinical, Dietary assessments.

- Anthropometric assessment: Introduction, Definition, Methods of measurements, Standardizations Classification of Nutritional status.
- Biochemical assessment: Need for Biochemical test, Interpretation of biochemical test, Types of test.
- Clinical assessments: Assessment of clinical signs in various disorders.
- Dietary Assessments: Types of Diet surveys, methods of Diet surveys, analysis and interpretation, problems in Diet surveys and solutions.

ii. **Indirect method**: Vital statistics and other Records

UNIT-II: Methods of Estimation of Protein Quality

- Protein efficiency ratio (PER), Digestibility co efficient, Biological value (BV), Net Protein Utilization (NPU), Net protein Ratio (NPR), Chemical score, protein Digestibility corrected Amino Acid Score (PDCAAS), Net Dietary Protein Calories Percent (NDPCP).

UNIT-III: Growth studies: Animal Models

- Role of animal models in nutrition research; need for extrapolation of animal research results to human populations; Maintenance of animal laboratory; maintenance of records; Principles of formulation of diets- classification and composition.
- Growth and development of rats- role of different protein levels of the diet protein sources of the diet- body weight changes- feeding techniques- calculation of PER.
- Biological Assays with animal models: metabolic and balance studies: (for protein quality): Biological value- formulation of objectives, composition of diets- collections of urine and fecal, food intake assessment, determination of food and urine and fecal nitrogen – calculations of endogenous nitrogen – digestibility co-efficient (DC) and Biological value (BV).

UNIT-IV: Growth and Metabolic Studies with Human Subjects

- Principles, objectives.
- Growth studies with infants on feeding different protein sources. (case study experiences and report of research studies)
- Growth studies with preschool children, school children and adolescents: Effect of supplementation
- Nitrogen balance studies, in growing children, adolescents and adults- Procedure for conducting metabolic and balance studies and interpretation of results.

REFERENCES

1. Mahatab.S. Bamiji, N. PrahladRao and VinodiniReddy . (2001). Text Book of Human Nutrition" Oxford and IBFI Publishing Co. Pvt. Ltd., New Delhi.
2. Swaminathan M. (1995).Advanced Text book on "Food and Nutrition" (Applied aspects) Vol. II BAPPCO, The Bangalore Printing and Publishing Co. Ltd., (Chapters 21, 24) Bangalore.

3. Tara Gopaldas and SubhadraSeshadri.(1997). Nutrition, Monitoring and assessment, Oxford University Press, New Delhi .
4. Whitney. E.N, and S.R.Rolfes. (1999). `Understanding Nutrition', (8th edition) Chap. 6 and Appendix `J'.Measures of Protein Quality - West/Wadsworth.
5. Ruth .L. Pyke and Myrtle .L. Brown. (1997). Nutrition an Integrated approach, Chapter 15, Wiley eastern Publications, New Yark.
6. Mayanard, L.A and J.K. Loosli. (1992). Animal Nutrition, 5th edition McGraw Hill book company, New York

COURSE OUTCOMES - After the completion of the course students will be able to:

CO1 Assess nutritional status using ABCD techniques.

CO2 Apply advance research techniques in dietary assessment.

CO3 Do nutrition research using animal models.

CO4 Design nutrition research using human models.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H			H	M		M					H	H	
CO2	H			H	M		M					H	H	
CO3	H			H			M					H		H
CO4	H			H			M					H		H

H-High-3, M- Medium-2, L- Low-1

FSND 303-B: PUBLIC HEALTH NUTRITION

COURSE OBJECTIVES

- To enable the students to:

1. Gain insight into the public health problems and their implications.
2. Acquire skills in organizing and evaluating nutrition projects in the community.
3. Appreciate the national and international contribution towards nutrition improvement in India.
4. Apply different assessment techniques for nutritional screening.

GENERIC ELECTIVE-THEORY

Unit- I: Public Health Nutrition – An Overview

- Concept and importance of public health nutrition
- Public health issues and problems
- Health care system in India
- Role of public nutritionist in health care delivery

Unit-II: Strategies to combat Public Health Problems

- Improving food and nutrition security - Green White and Blue revolution
- Nutrition education - Principles of planning –, where, when, whom, Kitchen garden, food fortification, food enrichment, PDS, PHC

Unit-III: Nutrition Intervention programmes

- National Nutrition Policy Preschool feeding programme, ICDS, MDM, SNP, WNP, ANP, BNP, NNAPP, FNB, NIDDCP
- National Program for Prevention of Blindness due to Vitamin A Deficiency

Unit-IV: Strategies to combat malnutrition

- International organizations concerned with food and nutrition: FAO, WHO, UNICEF, CARE, AFPRO, CWS, CRS World Bank and others.
- National organizations concerned with Food and Nutrition: ICMR, ICAR, CHEB, CSWB, SSWB
- Economics of Nutrition: Malnutrition and its economic consequences; Economics in Nutrition – Food security, food production and food pricing.

REFERENCES

1. Gulani, K.K. 2005. Community Health Nursing.1st Edition.Kumar Publishing House.New Delhi.Pp – 662 to 664.

2. Gupta M.C., Mahajan B.K. 2003. Textbook of Preventive and Social Medicine.ThirdEdition.Jaypee Brothers Medical Publishers. New Delhi. India. Pp- 355-357.

3. Kishore J. 2007. National Health Programmes of India.7th Edition Century Publication.NewDelhi.Pp- 340-361.

4. .Oxford textbook of Public Health Ed. Roger Detels, James Mcewen, Robert Beaglehole,andHeizo Tanaka Oxford University Press (OUP) 4th Edition: 2002.

5. Public Health at the Crossroads – Achievements and Prospects. Robert BeagleholeandRuth Bonita 2nd Edition Cambridge University Press

6. Maxcy-Rosenau-Last Public Health & Preventive Medicine, Fourteenth Edition Ed RobertWallace, MD, et al.

7. Epidemiology and Management for Health Care: Sathe , P.V. Sathe, A.P., PopularPrakashan, Mumbai, 1991

8. International Public Health: Diseases, Programs, Systems, and Policies by MichaelMerson, Robert E Black, Anne J Mills - Jones and Bartlett Publishers

9. Preventive and Social Medicine, K Park, BansaridasBhanot Publishing House.

COURSE OUTCOMES

- After studying the course, students will able to:

CO1 Demonstrate systematic knowledge and understanding of the commonly occurring nutritional problems.

CO2 Gain awareness on the basic nutrition intervention programmes by national and international organizations.

CO3 Describe the various strategies to combat malnutrition.

CO4 Apply different assessment techniques for nutritional screening.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H			H	M		M					H	H	
CO2	H			H	M		M					H	H	
CO3	H			H			M					H		H
CO4	H			H			M					H		H

H-High-3, M- Medium-2, L- Low-1

304 PRACTICAL

301 FOOD PROCESSING AND PRESERVATION TECHNOLOGY

COURSE OBJECTIVES:

To enable the students to**:**

1. Equip practical skills in different processing and preservation techniques of foods
2. Understand the planning and preparation of foods in special needs.

PRACTICALS:

1. Market survey of processed and preserved foods and to study the methods of processing, preservation, Additives and preservatives used, shelf life, cost and form of availability.
2. Preservation of food by traditional methods using sugar, salt and turmeric powder etc.
3. Preservation by using Chemical preservatives.
4. Preparation of Jams, Jellies, fruit Juices, Squashes, Sauces and bottling – Shelf life study.
5. Pickling with a variety of foods - Shelf life study.
6. Drying and dehydration of foods.
7. Refrigeration, Freezing and freeze drying of foods.
8. Extrusion processing.
9. Processing and preservation of fermented products.
10. Visits to different commercial food processing units and Industries.

302 ADVANCES IN HUMAN NUTRITION

PRACTICALS:

1. Planning and preparation of Brain foods.
2. Demonstration of Electroencephalogram (EEG)
3. Identification of various immune cells by morphology – Leishman staining, Giemsa staining, Differential counts, Total counts.
4. Planning and preparation of antioxidant rich foods.
5. Iodine testing in salt and Flourine testing in water.
6. Demonstration of BMD and DEXA.
7. Planning and preparation of calcium rich diets for Osteoporosis.
8. Assessment of household food and nutrition security and calculation of Hunger Index.
9. Planning and preparation foods for Astronauts.
10. Planning and Preparation of foods for High altitudes and Low temperatures.

REFERENCES:

1. Rama swamy,H. and Marcote,M. (2005).Food processing- principals and applications, CRC Press, Newyork

2. Whitney and Sharon RadyRolfes. (1999). Understanding Nutrition" (8th edition) An International Thomson Publishing Company, Albnay, New York, USA, Wadsworth Publishing Company

Course outcomes: After studying the course, students will able to:

CO1: Apply of appropriate technologies to process and preserve different foods to extend the shelf life.

CO2: Demonstrate and present the skills in designing foods for special needs.

FSND 305: INSTITUTIONAL FOOD SERVICE MANAGEMENT (SKILL ORIENTED COURSE)

COURSE OBJECTIVES

- To enable the students to:

1. Understand the different types and management of food services and exposure to the dietary department in a hospital setting.
2. Acquire knowledge on finance, personnel management, duties and responsibilities of dietitians.
3. Gain skills to act in a variety of capacities in clinical, administrative, and community settings.
4. Apply skills on quantitative food production and planning diet plans for different diseases by placing in hospitals.

SKILL ORIENTED COURSE- THEORY

UNIT-I: Introduction to food service Industry, management and types of Food service establishments.

- Principles, functions and types of food service management.
- Need and importance
- Tools of Management.

- Management of resources.
- Laboratory support services in food safety.

UNIT-II: Financial and Personnel Management

- Definition and scope of financial management.
- Cost concept, cost control and pricing.
- Book keeping and accounting.
- Personnel Management - Recruitment, selection and Induction, Job analysis, description Monitoring work employee facilities and benefits, Inservice Training. Skills required to operate and manage food service system.

PRACTICALS:

1.Visit to a Fast-food Center.

2.Visit to a Railway Canteen.

3. Visit to a Hostel.

4. Visit to a Hospital Canteen.

5. Visit to a Star Hotel.

6. Quality Control in various stages of Food Service.

7. Layout design of Food Service establishment and principles of Food Service.

INTERNSHIP:

1. A full time 45 days internship in a multi-specialty hospital under a registered dietitian during the semester wherein the student should undergo training in dietary department and should understand the duties of dietitian and working of dietary department.

2. The student should report 3 case studies on any diseases and should submit a report on internship and case study for evaluation.

3. Internship Report

A Report to be maintained and submitted for evaluation- the contents of the report should contain Hospital- History, Organization, Departments, Functions, types of feeds, supervision

and preparation of feeds, Schedule & Services with emphasis to dietary department, Case Study–3disease with teaching aids, Internship Outcome.

CONTENTS OF THE REPORT

- Hospital-History, Dietary department.
- Nutritional status and Diagnostic tests
- Drawing-up of patients prescription
- Discharge diet plans and follow-up where possible
- Acceptability and compliance
- Preparation of teaching aids
- Monitoring patients progress for any 3 diseases

REFERENCES

1. Ronald Kinton and victor cesarani (1992),"The theory of catering", Butler and Tanner Ltd. France and London.
2. Mohinisethi and Surjeet Mohan (1993), "Catering management - An integrated approach", second edition, Wiley easteem limited, New Delhi.
3. Ramesh V. Bhat and R. NageswaraRao (1996), "Food safety", Bappco (Ltd). Mysore, Banglore.
4. Ramesh V. Bhat and R. NageswarRao (1992), "Food safety in public catering", NIN, ICMR, Hyderabad.
5. Gulani, K.K. 2005. Community Health Nursing. 1st Edition. Kumar Publishing House New Delhi. Pp – 662 to 664.
6. Gupta M.C., Mahajan B.K. 2003. Textbook of Preventive and Social Medicine. Third Edition. Jaypee Brothers Medical Publishers. New Delhi. India. Pp- 355-357.

COURSE OUTCOMES

- After completion of this course, students will be able to:

CO1 Gain knowledge in management of food service establishments.

CO2 Knowledge on skills in finance and personnel management.

CO3 Acquire skills in planning diets for different diseases.

CO4 Apply skills as a competent Dietitian

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H			H							H	H	H	
CO2	H			H							H	M	H	
CO3						H			H		H	M		H
CO4						H			H		H	M		H

H-High-3, M- Medium-2, L- Low-1

FSND 306-A: FUNDAMENTALS OF FOOD, NUTRITION AND HEALTH

COURSE OBJECTIVES - To enable the students to:

1. Gain knowledge on foods, food groups, balanced diet for different age groups.
2. Understand the importance of macro and micronutrients in daily diet.
3. Comprehend knowledge on deficiency symptoms of different nutrients.
4. Apply skills to assess nutritional problems in community.

OPEN ELECTIVE- THEORY

UNIT-I: Food Composition

- Food groups – Classification – food composition and nutritive values of different foods, Functions of foods. Balanced Diet, RDA for all age groups.

UNIT-II: Macronutrients

- Carbohydrates: Definition, classification, food sources, Function in human body, Recommended Daily Allowance (RDA) and importance of fibre.
- Fats and Oils: Definition, classification, saturated and unsaturated fatty acids, cholesterol, Food sources, requirements, RDA and biological functions.
- Protein: Definition, classification, essential and non-essential amino acids, protein quality, supplementary value of protein, food sources, RDA and functions.

UNIT-III: Micronutrients

- Vitamins: Definition, classification
- Fat soluble Vitamins (A, D, E,K)- Functions, sources, RDA, Deficiency diseases and symptoms.
- Water soluble Vitamins (B complex and C): Functions, sources, RDA, Deficiency diseases and its symptoms.
- Macro minerals: Calcium, phosphorous, sodium, potassium, chloride- sources, biological functions, factors affecting availability, Deficiency diseases and symptoms.
- Micro minerals:Copper, zinc, Iron, Iodine and fluorine in human nutrition, biological functions, factors affecting availability, Deficiency diseases and symptoms.

Unit - IV: Major Nutritional Problems of the Community:

- Malnutrition - PCM, Obesity, micronutrient malnutrition, government programs to eradicate PCM, Vitamin-A, Iron and Iodine deficiencies, principles of planning diets for different conditions of malnutrition.

REFERENCES

1. Swaminathan, M. (1999). Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
2. Mahtabs. Bamji and N.PralhadRao. (2004). "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi,
3. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian.(2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderbad.
4. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of Indian Council Medical Research.2010.

COURSE OUT COMES

- After studying the course, students will able to:

CO1 Acquire knowledge on food groups and functions of food.

CO2 Gain knowledge on importance of macro and micronutrients in different age groups.

CO3 Identify signs and symptoms of different nutrient deficiencies.

CO4 Apply skills to assess nutritional problems in community.

FSND 306-B: DYNAMICS IN FOOD PREPARATION

COURSE OBJECTIVES

- To enable the students to:

1. Learn the principles of safe food preparation and food pyramid.
2. Understand the role of foods in cookery.
3. Apply knowledge about effect of cooking on nutrients.
4. Estimate the effects of cooking on Nutrients.

OPEN ELECTIVE- THEORY

UNIT-I: Introduction

- Definitions in food science.
- Composition and functions of foods.
- Food pyramid.
- Principles of safe food preparation.

UNIT-II: Cooking Process

- Objectives of Cooking.
- Preliminary preparations.

- Cooking methods- Moist heat methods, Dry heat methods; Fat as medium of cooking, Microwave cooking.
- Effect of cooking on Nutrients.

UNIT-III: Cooking Equipments

- Types of cooking equipments- Grill, Boiler, Oven and Microwave. Mechanical processing equipments- Vegetable Peeler, Chopper, Mixer, Slicing machine and mincing equipment.
- Non cooking equipment: Refrigerator.

UNIT-IV: Role of foods in Cookery

- Role of cereals, pulses, fats/oils, milk and milk products, flesh foods, sugars, vegetables, fruits and spices in cookery.

REFERENCES

1. Srilakshmi,B.(2001).*Food Science*, 2nd edition New Age International (P) Ltd., Publishers, Bangalore, Chennai & Hyderabad.
2. Swaminathan, M.(1979).*Food science and Experimental foods*. Ganesh & Co., Madras.
3. Dr.M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
4. ShubhaginiA.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.

COURSE OUT COMES – After completion of the course, students will able:

CO1 Acquire knowledge on Food Pyramid.

CO2 Identify Role of foods on Cookery.

CO3 Gain knowledge on methods of Cooking.

CO4 Estimate the effects of cooking on Nutrients.

IV SEMESTER

S.No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	FSND 401	Food Safety Standards and Quality Control	6	4	20	80	100
2	Core	FSND 402	Food Product Development and Marketing	6	4	20	80	100
3	*Generic Elective	FSND 403-A	Nutrition for Health and Fitness	6	4	20	80	100
		FSND 403-B	Geriatric Nutrition					

4	Practicals	FSND 404	401+402	6	4	--	--	100
5	Multi Disciplinary Course	FSND 405	Technology of Packaging(T+P)	3+6	4	20	80	100
6	**Open Elective	FSND 406-A	Child Growth and Development	4	4	20	80	100
		FSND 406-B	Disaster Management					
	Total				24			600

***Generic Elective- Students has to Choose One**

****Open elective –Offered by Department to other department Students.**

NOTE: Interested Students may Register for MOOCS with the approval of DDC.

SEMESTER- IV

FSND 401: FOOD SAFETY STANDARDS AND QUALITY CONTROL

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

COURSE OBJECTIVES

-To enable the students to:

1. Understand the current food safety standards rules and regulations.
2. Gain knowledge on desirable and undesirable constituents and contaminants in foods.
3. Critically explains on subjective and objective methods.
4. Develop skills for quality analysis and quality assurance of food quality

CORE THEORY

UNIT-I: **Food Quality, Assessment and evaluation.**

- Definition and Physico Chemical attributes.
- Subjective methods; Sensory/ Organoleptic evaluation-Difference, Preference and Scoring tests.
- Objective methods of evaluation.
- Chemical methods of evaluation.
- Microbial methods of evaluation.

UNIT-II: Food quality Standards

- Food Safety Standards Authority of India (FSSAI)- Rules and Regulations- Food products Standards and additive regulations, Prohibition and sales regulations, Packaging and Labelling regulations, Alchoholic beverages Regulations, Fortification food regulations, Food / Health supplements and Nutraceutical regulations and Organic food regulations.
- Food Licensing and Registration system
- International Food Safety Standards- ISO, CODEX, HACCP- Principles.

UNIT-III: Food Contaminants

- Food contaminants- Definition, Classification- Physical, Chemical, Biological Contaminants
- Unintentional /Undesirable constituents-Naturally occurring contaminants, Heavy metals, pesticide residues, products of microbial growth, Health hazarads.
- Intentional/ Desirable constituents-chelating agents, acids, bases, buffer systems and salts; stabilizers, thickners, polyhydrocalcinols, anticaking, firming, clarifying and bleaching agents; antioxidants, non- nutritional sweeteness, antimicrobial agents, Gases and propellants.

UNIT-IV: Food contaminants and Standards of Quality

- Contaminants and quality standards in Milk and Milk products
- Contaminants and quality standards Fruit and Vegetable products
- Contaminants and quality standards Meat, Poultry, Eggs and Fish
- Contaminants and quality standards Fats and Oils
- Contaminants and quality standards Spices and Condiments.

- Contaminants and quality standards Water and Beverages.
- Contaminants and quality standards Food grains and Flours
- Contaminants and quality standards of Sweeteners- Sugar, Jaggery, Honey.

REFERENCES

1. VanishaNambiar. (2004). A Text book on "Food Contamination and Safety " ANMOL Publications Pvt.Ltd. New Delhi .
2. S.N.Mahindru . (2004). Food Safety –Concept and Reality, APH Publishing corporation, Ansari road ,Darya ganj, New Delhi.
3. Rajesh Mehta and J.George . (2005). Food Safety Regulation concerns and Trade – The developing country perspective ,Mac millan India Ltd.
4. Amerine, M.A.,Pangborrn RM, and Roessler BB. (1965). Principles of Sensory evaluation of foods", Academic press New York.
5. The prevention of food adulteration Act, 1954 and Prevention of food adulteration Rules, 1955. (1998). Federation of Indian Industry, New Delhi.
6. Norman N. Potter, Joseph H. Hotchkiss (1996) "Food Science" 5th Edition.CBS Publishers and Distributors, New Delhi.
7. https://www.fssai.gov.in

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Gain knowledge in current rules and regulations of food safety standards and quality assurance.

CO2 Identify the contaminants and additives in foods.

CO3 Select the appropriate analytical technique when presented with a problem.

CO4 Demonstrate practical proficiency in a food quality analysis.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H						H				H	H	
CO2	H	H						H				H	H	

CO3	H	M		L	H	L		H				H		H
CO4	H	M		L	H	L		H				H		H

H-High-3, M- Medium-2, L- Low-1

FSND- 402: FOOD PRODUCT DEVELOPMENT AND MARKETING

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

COURSE OBJECTIVES

- To enable the students to:

1. Illustrate the new product categories in food market and their characteristics.
2. Elucidate the process of new food product development in food industry.
3. Exemplify various specialty food products and their applications.
4. Acquire the skill to design and development of new food product and analyse the quality of the product.

CORE THEORY

UNIT- I: New Food Products

- New food product: Definition, Characteristics, Need for New food product development.

- Classification of new food products: Line extensions - Repositioning of existing products - New form of existing product - Reformulation - New packaging - Innovative products - Creative products and Value added products.

UNIT-II: New Food product development

In Food Industry

- Ideation/Idea generation, Consumer research, Product design and Formulation.
- Process development: Prototype development and scale up.
- Quality assessment of new developed products: Evaluation-Shelf Life Testing.
- Packaging and labeling.

In Food ingredient and service Industry

- Characteristics, Consumers and Costumers, market places.
- Development of products for food service and ingredient industries.
- Quality and Safety of the products.

UNIT-III: Food Product Commercialization and Marketing

- Costing and Pricing, Test Market, Advertising and promotions, Product launching, Product life cycle.
- Entrepreneurship, concept, Types, qualities and functions of an entrepreneur.
- Ethics and Intellectual property/ Patents in food product development.

UNIT-IV: Food Products with reference to

- Health foods, Medical foods, Therapeutic foods, Herbal foods, Fortified foods.
- Infant foods, Geriatric foods, Sports drink.
- Functional foods, Designer foods and Nutraceuticals.
- Probiotics, Prebiotic and Symbiotics.

REFERENCES

1. Debashri, Ray.(2002). *Nutritional Challenge and Total Quality Management*, 1st edition;Sarup and Sons, New Delhi.
2. Gordon W.Fuller (2011), New Food Product development, 3rd edition, CRC press, Newyork.
3. Graf, E. and Saguy, I.S. (1991).*Food Product Development: From Concept to the Market Place*, Van Nostrand Reinhold New York.

4. Howard R.Moskowitz,(2009), An integrated approach to new product development, CRC press, Newyork.
5. Man, C.M.D. and Jomes, A.A.(1994).*Shelf life Evaluation of Foods*, Blackie Academic and Professional, London.
6. Mike Stringer and Colin Dennis.(2002). *Chilled foods A comprehensive guide*, 2nd edition ,Woodhead publishing limited, Cambridge, England, 2000.
7. Oickle, J.G. (1990).*New Product Development and Value Added*, Food Development Division Agriculture, Canada.

COURSE OUTCOMES - After the completion of the course, the students will be able to:

CO1 Apply a product development process to generate ideas, develop concept to test market.

CO2 Design food and nutritional label of food products.

CO3 Demonstrate the skills to conduct the organoleptic evaluation of food product.

CO4 Work collaboratively with a team in food product development.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H		H		H	H	H		H	H	H	H	H	H
CO2	H		H		M		H	M	H		H	H	H	H
CO3	H		H		H	H				L	H	H	H	H
CO4	M		H			H	H		M		H	H	H	H

H-High-3, M- Medium-2, L- Low-1

FSND 403-A: NUTRITION FOR HEALTH AND FITNESS

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

COURSE OBJECTIVES

- To enable the students to:

1. Define the concepts of Health, Nutrition, physical activity, physical fitness and methods of evaluation.
2. Understand the Energy metabolism pathways during physical activity.
3. Describe the role of macronutrients in physical performance, weight management and obesity.
4. Explains the nutritional needs in different sports and the role of national agencies.

GENERIC ELECTIVE-THEORY

UNIT-I: Physical Fitness and its Evaluation

- Definitions- Nutrition, Health, Physical activity and Physical Fitness.
- Health benefits of Physical activity and Recommendations,
- Components of physical fitness to overall health-Cardiovascular Fitness, Muscular strength, Muscular Endurance, Flexibility, and Body composition.
- Assessment criteria of age specific fitness and health status- Evaluation of physical fitness- FITT Principles-Talk test, Target heart rate, Borg scale.

UNIT-II: Energy Metabolism in Physical Activity and Weight Management.

- Aerobic and Anaerobic metabolic pathways-ATP-Creatine Phosphate pathway(ATP-CP), Creatine Phosphate(CP), Lactic acid cycle, Glycolysis, Krebs cycle(TCA), Gluconeogenesis.
- Energy requirements and assessment of energy expenditure based on physical activity, Carbohydrate Loading.
- Special conditions- Weight management and Obesity-Dietary modifications-Restricted energy and fat diets, Low glycemic diets, Formula diets and meal replacement programs.

UNIT-III: Nutritional and Physical Performance

- Nutritional Requirements during Exercise- Carbohydrate, Fat, Protein-Recommendations- Before, During and After exercise.
- Carbohydrate utilization during exercise, Role of protein and fat in daily training and competitive performance.
- Vitamins and Minerals-Importance and Recommendations.
- Fluid–Recommendations, Importance and Consequences of Fluid balance. Hydration in pre, during and post exercise.

UNIT-IV: Sports Nutrition

- Classification of sports events and RDA for sports person.
- Nutritional requirements and special needs of sports person, pre, during, post sports events, water and electrolyte balance, ergogenic aids.
- Endurance and fatigue in sports performance.

- Assessment-Kinanthropometry**:** Definition; Introduction; Body size and proportion; Somatotyping; Circumferences; Skinfold measurement sites and determining body composition; Applications. Role of National agencies towards improvements of sports performance.

REFERENCES

1. Shils, M.E., Olson, J.A., Shike, N. and Ross, A.C.(Ed)(1999). Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
2. Whitney, E.N. and Rolfes, S.R.(1999). Understanding Nutrition, 8th Edition, West/Wadsworth, An International Thomson Publishing Co.
3. McArdle, W.Katch, F. and Katch, V. (1996). Exercise Physiology, Energy, Nutrition and Human Performance, 4th edition, Williams and Wilkins, Philadelphia.
4. Ira Wolinsky(ed) (1998). Nutrition in Exercise and Sports, 3rd Edition, CRC Press.
5. Mahtabs.Bamji and N.PralhadRao. (2004).Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi.
6. Heather Hedrick Fink, Alan E. mike sky. (2012). Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America.
7. Michelle McGuire, Kathy A Beer Man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA

COURSE OUTCOMES

- After completion of this course, students will be able to:

CO1 Gain knowledge on concepts of physical activity and physical fitness.

CO2 Describe the energy metabolism pathways in physical activity.

CO3 List the role of macronutrients in physical performance.

CO4 Demonstrate the importance of nutrients in Sports.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	M										M	H	
CO2	H	M										L	H	
CO3	H		H									L		H
CO4	H			M	M							M		H

H-High-3, M- Medium-2, L- Low-1

FSND 403-B: GERIATRIC NUTRITION

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

COURSE OBJECTIVES

- To enable the students to:

1. Understand the physiological changes and theories of ageing.
2. Gain knowledge on importance and consequences of diet in elderly.
3. Create awareness on degenerative diseases, life style genesis and its management through diet.
4. Able to explain government programs and policies for elderly.

GENERIC ELECTIVE- THEORY

UNIT-I: Changes in Ageing

- The process of Ageing – Physiological biochemical and body compositional changes – Theories of ageing. Socio-cultural and psychological aspects of ageing – Health seeking behaviour of the elderly.

UNIT-II: Nutritional requirements

- Food and Nutritional needs of the elderly – Dietary management – Special problem of women – menopausal, post-menopausal. Problems; Early nutrition and nutrition and health in later years.

UNIT-III: Diseases of Ageing

- Chronic degenerative diseases and nutrition and health problems of the elderly – their etiology – genesis life style and living condition, management, prevention and control.

UNIT-IV: Programmes

- Policies and programmes of the government and NGO sectors pertaining to the elderly – old age homes – Day care and recreation centers – their need and scope.

REFERENCES

1. Sharma, O.P. (Ed.) (1999): Geriatric Care in India – Geriatrics and Gerontology: A Textbook, M/S. ANB Publishers.
2. Mahtabs.Bamji and N.PralhadRao. (2004). Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi.
3. Heather Hedrick Fink, Alan E. mike sky. (2012). Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America.
4. Michelle McGuire, Kathy A Beer man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, WadsworthCengage Learning, Belmont, USA.
5. Swami Nathan M. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.

6. ShubhanginiA.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Acquire knowledge on process of ageing.

CO2 Describe diet plans for different disease conditions in elder people.

CO3 Illustrate the available government benefits for elder people.

CO4 Plan diet according to recommendations for elder people.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H											H	
CO2	H	H							M	M			H	
CO3	H	H	M			M			M	M				H
CO4						H						M		H

H-High-3, M- Medium-2, L- Low-1

404 PRACTICAL FOOD SAFETY AND QUALITY CONTROL AND FOOD PRODUCT DEVELOPMENT

401 FOOD SAFETY STANDARDS AND QUALITY CONTROL

COURSE OBJECTIVES

- To enable the students to:

1. Understand the techniques of qualitative and Quantitative analysis of quality of different foods.
2. Develop skills in identifying the techniques of identifying adulterants in foods.

PRACTICALS:

Assessment of quality parameters and adulterants in different foods

1. Survey of label information of foods in market

2. Cereals, Pulses and Flours – Label information, detection of adulterants
3. Fats and oils – Label information, Adulterant tests, Iodine number and FFA Value
4. Fruit and vegetable products – Label information, Acidity , TSS, Sugars
5. Coffee and Tea, Honey – Label information, Detection of Adulterants
6. Milk and milk products- Label information, COB test, Acidity, MBRT, Detection of adulterants.
7. Spices and Condiments- Label information, Detection of adulterants.
8. Determination of different Preservatives
9. Determination of different Colors
10. Document preparation for the approval of FSSAI.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1: Acquire techniques in assessing the quality of foods

CO2: Understand the methods of identifying the adulterants in foods

402 FOOD PRODUCT DEVELOPMENT AND MARKETING

COURSE OBJECTIVES

- To enable the students to:

1. Acquire practical skill in developing and analyzing a food product.
2. Develop skill in different stages of product development

PRACTICALS:

New Food Product Development and Marketing

1. Ideation.
2. Concept Development.
3. Market research.
4. Formulation and Standardization.
5. Acceptability studies.
6. Shelf life Studies.

7. Costing and Pricing.
8. Food and Nutrition labeling and packaging.
9. Development of Product Promotion strategies.
10. Test Marketing.

REFERENCES:

1. Amerine, M.A.,Pangborrn RM, and Roessler BB. (1965). Principles of Sensory evaluation of foods", Academic press New York.
2. https://www.fssai.gov.in
3. Man, C.M.D. and Jomes, A.A.(1994).*Shelf life Evaluation of Foods*, Blackie Academic and Professional, London.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1: Develop skills in Product development

CO2: Gain Knowledge in different stages of product development and evaluation

405: TECHNOLOGY OF PACKAGING

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

COURSE OBJECTIVES

To enable the students to:

1. Provide knowledge on packaging and packaging materials
2. An overview of the scientific and technical aspects of food packaging.
3. Enable the students to understand the regulations of packaging and packaging material testing.
4. Apply skills of new innovations in food packaging to improve product stability and/or to extend the product shelf-life.

MULTI- DISCIPLINARY COURSE-THEORY

UNIT- I: Introduction and Types of Packaging

- Principles of food packaging, Functions of packaging; Type of packaging materials- Paper and Paperboard, types of paper, Glass, Metal and Plastic- Thermosets and Thermoplastics.
- Selection of packaging material for different foods. Methods of packaging and packaging equipment.
- Packaging-Food Interactions**:** Factors affecting flavor absorption, the role of the food matrix, the role of differing packaging materials, Flavor modification and sensory quality.

UNIT- II: Food Packaging System

- Active and Intelligent Packaging Techniques**:** Active packaging techniques, intelligent packaging techniques, Consumers towards and novel packaging.
- Aseptic Packaging Technology**-**advances, systems and its food applications, packaging for high pressure processing.
- Oxygen, ethylene and other scavengers**:** Oxygen scavenging technology, Selecting the right type of oxygen scavenger, Ethylene scavenging technology, Carbon dioxide and other scavengers.

PRACTICALS:

1. Classification of various packages based on material and rigidity.
2. Measurement of thickness of packaging materials.
3. Measurement of basic weight and grammage of paper and paperboards.
4. Measurement of water absorption of paper and paper boards (Cobb Test).
5. Measurement of grease resistance of papers.
6. Drop test, Box compression test.
7. Measurement of grease resistance of papers.
8. Head space analysis of packaged food.

REFERENCES

1. Robertson GL,(2012) *Food Packaging – Principles and Practice*, CRC Press Taylor and Francis

2. Ahvenainen. R. (2003).*Novel Food Packaging Techniques*:CRC Publications.

3. RaijaAhvenainen (2003) *Novel food packaging techniques*, Published by Woodhead Publishing Limited.

4. F. A. Paine and H. Y. Paine (1992) *A Handbook of Food Packaging*, 2nd edn Blackie Academic and Professional, London.

COURSE OUTCOMES

- After the completion of the course, the students will able to:

CO1 Exposure about packaging, packaging materials and packaging methods.

CO2 Comprehend the overview of the scientific and technical aspects of food packaging

CO3 Acquire knowledge on regulations of packaging and testing.

CO4 Apply skills of new innovations in food packaging to improve product stability and/or to extend the product shelf-life.

CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	H		L									H	H	H
CO2	H		L					M			L	H	H	H
CO3	H		L					H			H	H	H	H
CO4		H	H		H			M	M	M	H	H	H	H

H-High- 3, M- Medium- 2, L- Low- 1

FSND406-A: CHILD GROWTH AND DEVELOPMENT

COURSE OBJECTIVES - To enable the students to:

1. Know the terms growth , development and stages of development across life span
2. Understand the characteristics of children at different stages of childhood
3. Explain the different developments like physical, cognitive, language and social development during childhood.
4. Apply knowledge to understand normal development and developmental delays during childhood.

OPEN ELECTIVE -THEORY

UNIT-I: Foundations of Development

- Understanding the terms Child, Growth, Development, Child Development, Human Development, and Developmental tasks.
- Principles of Child Development and Factors influencing growth and Development of Children.

- Determinants of Development - Role of Heredity and Environment in Development
- Stages of Development across life span and domains of development.

UNIT-II: Infancy

- Infancy – Characteristics
- Sensory- Motor activities
- Language Development
- Socio-emotional development.

Unit-III: Early Childhood

- Early Childhood Period –Characteristics
- Physical Development
- Cognitive development
- Emotional and Social development

UNIT-IV: Middle Childhood

- Middle/ Late Childhood Period-Characteristics
- Physical development
- Cognitive development.
- Emotional and Social development

REFERENCES

1. Berk, L. E. (2007). Child Development. Prentice-Hall of India Pvt.Ltd, New Delhi.
2. Feldman, R.S. (2011).Understanding Psychology, Tenth Edition. Tata MCGraw Hill Education Private Limited, McGraw- Hill, New Delhi.
3. Hallahan, D.P. and Kauffman, J.M. (1991). Introduction to exceptional children. 5th ed. Allyn and Bacon, Boston.
4. Hurlock – E.B. (1990) Child Development , Tata McGraw Hill Company Ltd, New York. McGraw- Hill, New Delhi.
5. Rozario, J. and Karanth, P. (2003). Learning disability in India. Sage publication, New Delhi.
6. Santrock, J. W. (2013). Child Development. Tata McGraw Hill Company Ltd, New Delhi.
7. Singh, A. (Ed).(2015). Foundations of Human Development: A life span approach. Tata McGrawHill ,New Delhi.

8. Prasad, J. and Prakash, R. (1996). Education of handicapped children, problems and solution. Kanishka publication distribution. New Delhi.

COURSE OUTCOMES

- After completion of the course, students will able to:

CO1 Define the terms growth and development, and stages of development across life span

CO2 Understand the characteristics of of children at different stages of childhood.

CO3 Critically explain different developments like physical, cognitive, language and social development during childhood

CO4 Apply knowledge to understand normal development and developmental delays during childhood to assess all round development during childhood

FSND 406-B: DISASTER MANAGEMENT

COURSE OBJECTIVES

- To enable the students to:

1. Know about natural disasters: manmade disasters; chemical hazards; National and International strategies to mitigate disaster management.
2. To understand natural disasters (like floods, drought, cyclone, earthquakes, global warming etc); Nuclear disasters; Biological disasters;.
3. Explain the efforts made by the NGOs, Community based organizations and local administration in disaster management.
4. Discriminate disaster responses of Armed forces and Police.

OPEN ELECTIVE- THEORY

UNIT-I: Natural Disasters

- Meaning and nature of natural disasters, their types and effects.

- Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves.
- Climatic Change: Global warming, Sea Level rise, Ozone Depletion.

UNIT-II: Man Made Disasters

- Nuclear disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution.
- Deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT-III: Chemical Hazards

- Release of Toxic chemicals.
- Sedimentation processes.
- Global Sedimentation Problems.
- Regional Sedimentation Problems, Sedimentation and Environmental Problems.

UNIT-IV: Disaster Management

- Efforts to mitigate Natural Disasters at National and Global levels.
- International Strategy for Disaster reduction.
- Concept of disaster management, National Disaster Management framework; financial arrangements
- Role of NGOs, Community-based organizations, and Media. Central, State, District and local Administration; Armed forces in Disaster response
- Disaster response: Police and other organizations.

REFERENCES

1. Gupta, H.K. (2003). *Disaster management*. Indian National Science Academy. Orient Blackswan.
2. Hodgkinson, P.E. & Stewart, M. (1991). *Coping with catastrophe: A handbook of disaster management*.
3. Routledge. and Sharma, V.K. (2001). *Disaster management*. National Centre for Disaster Management, India.

Course Outcomes –

After the completion of the course, the students will be able to:

CO1 Gain in-depth knowledge about natural disasters; manmade disasters; chemical hazards: disaster management.

CO2 Design and administer a schedule for collection of Information regarding the roles of NGOs, Community based organizations , central state, District and local Administration, Police and armed forces, in Disaster management.

CO3 Illustrate the efforts made by the NGOs, Community based organizations and local administration in disaster management.

CO4 Discriminate disaster responses of Armed forces and Police.

Table. 1.1.1. Details of Courses Addressing Local, National, Regional and Global Developmental Needs (2021-22)

I. Local Needs:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Clinical Nutrition and Dietetics I	102	2021
	230	Community Nutrition	104A	2021
	230	Food Microbiology and Safety	203A	2021
	230	Food Processing and Preservation Technology	301	2021
	230	Nutrition Assessment	303A	2021

		Techniques		
	230	Food Safety Standards and Quality Control	401	2021
	230	Food Product Development and Marketing	402	2021
	230	Nutrition for Health and Fitness	403A	2021

II. National Initiatives/Needs

National Green Energy Initiatives:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

National Biotechnology Initiatives:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Geographical Integration System (GIS) Initiatives:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

National Digital Initiatives:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Environment & Sustainability:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Community Nutrition	104A	2021
	230	Advanced Human Nutrition	302	2021

Initiatives on water Resources:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Agricultural Sustainability:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Health Promotions:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Community Nutrition	104A	2021
	230	Public health Nutrition	303B	2021
	230	Nutrition for Health and Fitness	403A	2021

Initiatives on Nano vision:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Translational Mission:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Sarva Siksha Abhiyan:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Rural Development:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

III. Regional Needs:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

M Sc Food Science Nutrition and Dietetics	230	Clinical Nutrition and Dietetics I	102	2021
	230	Community Nutrition	104A	2021
	230	Food Microbiology and Safety	203A	2021
	230	Food Processing and Preservation Technology	301	2021
	230	Nutrition Assessment Techniques	303A	2021
	230	Food Safety Standards and Quality Control	401	2021
	230	Food Product Development and Marketing	402	2021
	230	Nutrition for Health and Fitness	403A	2021

III. Global Needs:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Clinical Nutrition and Dietetics I	102	2021
	230	Community Nutrition	104A	2021

	230	Food Microbiology and Safety	203A	2021
	230	Food Processing and Preservation Technology	301	2021
	230	Nutrition Assessment Techniques	303A	2021
	230	Food Safety Standards and Quality Control	401	2021
	230	Food Product Development and Marketing	402	2021
	230	Nutrition for Health and Fitness	403A	2021

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

Certified that the syllabus of the following list of programmes has been revised during the Academic year 2021-2022.

S.No	Name of the Programme	Programme Code	Name of courses Revised

1	Home Science- FSND	230	
2			

Dean CDC **Registrar**

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

DEPATMENT OF HOME SCIENCE

1.1.2. Minutes of the Board of Studies Meeting.

Venue: HOD Chamber **Date: 03-04-2021**
Time: 11.00 AM

Members present:

S.NO	Name of the Faculty Member	Designation

1		**BOS Chairman**
2		**HOD Home Science**
3		**Member**
4		**Member**
5		**Member**

Agenda: **1.** Finalization of syllabus for M. Sc Home Science for its introduction from the Academic year 2021-2022.

2. Any other item

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Resolutions:

1. The M.Sc. zoology syllabus prepared as per Outcome Based Education (OBE) has been discussed and by following the suggestions/Improvements were incorporated as suggested by members of BOS and External Experts.

2. Under National Educational Policy (NEP), skill development and multidisciplinary courses were introduced at III and IV semester, respectively.

3. Course curriculum contents were discussed at length and M.Sc. Zoology programme syllabus was drafted.

Based on the above considerations, the BOS members unanimously resolved to approve and recommended the Revised Syllabus with effect from the Academic Year 2021-2022.

Signatures:

S.NO	Name of the Faculty Member	Signature
1.		
2.		
3.		



SRI VENKATESWARA UNIVERSITY:: TIRUPATI

1.3.4. Department of Home Science

Field visit Project Report (2021-2022)

Name of the Student :

Register Number :

Course : M.Sc. Home Science

Certified that this is the Bonafide Field visit project carried out by the candidate during 17, & 18th February, 2022 by students of Department of Biotechnology, Sri Venkateswara University, Tirupati for the Academic year 2021-2022.

Faculty Member In-charge Head of the Department/ Co-Ordinator

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

Table. 1.3.1. Courses which address Professional Ethics, Gender, Human values, Environment and sustainability into the curriculum.

A. Professional Ethics:

Programme Name	**Programme Code**	**Course Name**	**Course Code**	**Year of Introduction**	**Description of the course addressing Professional Ethics**
M Sc Food Science		Human Values and	FSND 107	2021	Definition and Nature of Ethics- Its

Nutrition and Dietetics		Professional Ethics-I			relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.
M Sc Food Science Nutrition and Dietetics		Human Values and Professional Ethics-II	FSND	2021	Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and health care professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.
M Sc Food Science Nutrition and Dietetics		Food Product Development	FSND 402	2021	Ethics and Intellectual property/ Patents in food product development.

B. Gender:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction	Description of the course addressing Gender issues

M Sc Food Science Nutrition and Dietetics		Community Nutrition	FSND 104A	2021	Nutrition Through Life Span – Infancy, Early and late childhood, Adolescence, Adulthood and Ageing – Nutritional requirements and Recommended Dietary Allowances (RDA)– Justification for special needs during periods of growth and development, pregnancy and lactation – significance of breast feeding.
M Sc Food Science Nutrition and Dietetics		Nutrition during life span	FSND 104B	2021	Nutritional requirements for adult man and woman. Nutritional concerns, RDA, nutritional guidelines and work efficiency. Physiological changes in aging, effects of aging on nutritional health.

C. Human Values:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction	Description of the course addressing

					Human Values
M Sc Food Science Nutrition and Dietetics		Human Values and Professional Ethics-I	FSND 107	2021	Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom. Good behavior and respect for elders, Character and Conduct.

D. Environment & Sustainability:

Programme Name	**Programme Code**	**Course Name**	**Course Code**	**Year of Introduction**	**Description of the course addressing Professional Ethics**

Table. 1.3.2. Number of value added courses for imparting transferable and life skills offered due to the last five years (10).

Table.1.3.3. Average Percentage of students enrolled in the courses under 1.3.2 above (10).

I / II / III / IV / V years:

Name of the Programme	Name of the value added course offered (With 30 or more contact hours)	Course Code	Year of offering	Number of times offered during the year	Duration of the Course	Number of students enrolled in the year	Number of students completed the course in the year
M Sc Food Science Nutrition and Dietetics	Food Microbiology and Safety	FSND 203-A	2021	Once	II - semester	55	Not yet completed
	Research Methodology	FSND 204-A	2021	Once	II - semester	55	Not yet completed
	Statistics and Computer Applications	FSND 204-B	2021	Once	II - semester	55	Not yet completed
	Food Safety Standards and Quality Control	FSND 401	2021	Once	IV - semester	55	Not yet completed
	Food Product Development and Marketing	FSND 402	2021	Once	IV - semester	55	Not yet completed

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Table.1.3.2.1. Mentor-Mentee guidance of value-added course enrolment of students.

I / II / III / IV / V years: 2017/2018/2019/2020/2021

Value added course Title: ex: PCR Technology

S. No	Name of the faculty member	Name of the student	Register Number
1	Prof. M. S. Reddy	1	
		2	
		3	
		4	
		5	
		6	
		7	
		8	
		9	
		10	
2		1	
		2	
		3	
		4	

		5	
		6	
		7	
		8	
		9	
		10	

Certified that the following list of value added courses were approved and conducted by Sri Venkateswara University, Tirupati develop the Academic year 2021-2022.

S. No	Name of the Programme	Name of the value Added Course	Course Code	Number of students Enrolled
1				
2				
3				

Dean CDC **BOS Chairman** **Registrar**

1.1.3. Employability / Entrepreneurship / Skill Development – Mapping (2021-22)

S. No.	Name of the Programme	Course Code	Title of the Course	Years of Introduction	Employability	Entrepreneurship	Skill
1	M Sc Food	FSND-	Food Chemistry and	2021	√		

	Science Nutrition and Dietetics	101	Analysis				
2	M Sc Food Science Nutrition and Dietetics	FSND - 102	Clinical Nutrition and Dietetics-I	2021			√
3	M Sc Food Science Nutrition and Dietetics	FSND - 103A	Food Science and Experimental Foods	2021			√
4	M Sc Food Science Nutrition and Dietetics	FSND - 103B	Baking Technology	2021	√		√
5	M Sc Food Science Nutrition and Dietetics	FSND - 104A	Community Nutrition	2021			√
6.	M Sc Food Science Nutrition and Dietetics	FSND - 104B	Nutrition during Life span	2021			√
7.	M Sc Food Science Nutrition and Dietetics	FSND - 105	Practical I 101+103A/103B	2021	√		√
8.	M Sc Food Science Nutrition and Dietetics	FSND - 106	Practical II 102+104A/104B	2021	√	√	√
9.	M Sc Food Science Nutrition and Dietetics	FSND - 107	Human Values and Professional Ethics-I	2021			√
10.	M Sc Food Science Nutrition and Dietetics	FSND - 201	Nutritional Bio chemistry	2021			√
11	M Sc Food Science Nutrition and Dietetics	FSND - 202	Clinical Nutrition and Dietetics-II	2021	√	√	
12	M Sc Food Science Nutrition and Dietetics	FSND - 203A	Food Microbiology and Safety	2021	√		√
13	M Sc Food Science Nutrition and Dietetics	FSND - 203B	Nutrition in Emergencies And Disaster Management	2021			√

14	M Sc Food Science Nutrition and Dietetics	FSND - 204A	Research Methodology	2021			√
15	M Sc Food Science Nutrition and Dietetics	FSND - 204B	Statistics and Computer Applications	2021			√
16	M Sc Food Science Nutrition and Dietetics	FSND - 205	Practical I 201+203A/203B	2021	√		√
17	M Sc Food Science Nutrition and Dietetics	FSND - 206	Practical II 202+204A/204B	2021	√	√	√
18	M Sc Food Science Nutrition and Dietetics	FSND - 207	Human Values and Professional Ethics-II	2021			√
19	M Sc Food Science Nutrition and Dietetics	FSND - 301	Food Processing and Preservation Technology	2021	√		
20	M Sc Food Science Nutrition and Dietetics	FSND - 302	Advances in Human Nutrition	2021			√
21	M Sc Food Science Nutrition and Dietetics	FSND - 303A	Nutrition Assessment Techniques	2021			√
22	M Sc Food Science Nutrition and Dietetics	FSND - 303B	Public Health Nutrition	2021			√
23	M Sc Food Science Nutrition and Dietetics	FSND - 304	301+302	2021	√		
24	M Sc Food Science Nutrition and Dietetics	FSND – 305	Institutional Food Service Management(T)+Practicals (P)	2021	√		
25	M Sc Food Science Nutrition and Dietetics	FSND - 306A	Fundamentals of Food, Nutrition and Health	2021			√
26	M Sc Food Science	FSND - 306B	Dynamics in Food Preparation	2021			√

	Nutrition and Dietetics						
27	M Sc Food Science Nutrition and Dietetics	FSND - 401	Food Safety Standards and Quality Control	2021	√		
28	M Sc Food Science Nutrition and Dietetics	FSND - 402	Food Product Development and Marketing	2021	√		
29	M Sc Food Science Nutrition and Dietetics	FSND - 403A	Nutrition for Health and Fitness	2021	√		
30	M Sc Food Science Nutrition and Dietetics	FSND - 403B	Geriatric Nutrition	2021			√
31	M Sc Food Science Nutrition and Dietetics	FSND - 404	401+402	2021	√	√	√
32	M Sc Food Science Nutrition and Dietetics	FSND-405	Technology of Packaging(T+P)	2021			√
33	M Sc Food Science Nutrition and Dietetics	FSND - 406A	Child Growth and Development	2021			√
34	M Sc Food Science Nutrition and Dietetics	FSND - 406B	Disaster Management	2021			√

1.1.3. Average Percentage of Courses having focus on Employability / Entrepreneurship / Skill development during the last five years (10)

1.2.1. Percentage of New Courses introduced of the Total number of courses across all programmes offered during the last five years (30)

S.	Course	Title of the Course	Years of	Activities/Content with direct bearing on

No.	Code		Introduction	Employability/Entrepreneurship /Skill development
1	FSND 101	Food Chemistry and Analysis	2021	I. Acquire knowledge on chemical composition physical, chemical, and functional properties of Water, carbohydrate, Protein and Fats. II. Understand the principles and working applications of different analytical techniques associated with food. III. Perform skills in qualitative and quantitative estimation of nutrients in different foods. IV. This course gives an hands on experience which will help student to become food analyst at local, regional, national and global levels.
2	FSND 102	Clinical Nutrition and Dietetics-I	2021	I. Understand the concepts of nutrition and its relation to health. II. Describe the role and responsibilities of Dietitian in Hospital. III. Apply Knowledge related to Therapeutic modification of diets and Plan and prepare diet for different diseases conditions. IV. This will help the students to get placements in hospitals and also start their own diet and nutrition clinics.
3	FSND 103 -A	Food Science and Experimental Foods	2021	I. Acquire knowledge on Plant and Animal foods composition, and processing techniques on nutritive quality of foods. II. Understand the principles of cookery of different foods and methods of evaluation. III. This course is prerequisite for skill development in Food Product development. IV. Standardization and experimentation on different foods leading to physical, chemical and sensory changes can be understood leading to become food research analyst in industries at local, regional, national levels.
4	FSND 103- B	Baking Technology	2021	I. The process of baking and role of different ingredients for different baked products in this course will help the students to develop skills as entrepreneurs. II. The concepts and knowledge on process of baked products supply chain helps students for employability in baking industries.
5	FSND 104 -A	Community Nutrition	2021	I. Understand about nutrients in food, their functions and consequences of deficiency. II. Apply skills for planning diets for nutritional disorders like PEM, Iron, Vitamin A and Iodine. III. Develop the knowledge of techniques to assess the nutritional status of different age groups. IV. Acquire knowledge on government programs to prevent nutritional disorders according to regional and national needs.
6	FSND 104 -B	Nutrition during Life span	2021	I. Acquire knowledge on the importance of nutrition during life span. II. Enlighten the principles and working applications during dietary modifications and menu planning.

				III. Comprehensive knowledge on analyzing the nutritional requirements. IV. Evaluate diets for comparison with RDA and formulate dietary interventions to address nutritional deficiencies.
7	FSND 105	Practical I 101+103-A/103-B	2021	I. Develop skills in quantitative and qualitative analysis of foods. II. Apply skills in standardization of foods using different processing techniques. III. Acquire skills in processing, preparation and evaluation of bakery products.
8	FSND 106	Practical II 102+104-A/104-B	2021	I. Acquire hands on experience in Therapeutic modifications of diet for different diseases by planning, preparing and evaluating. II. Acquire community assessment skills in terms of anthropometry, dietary, clinical and biochemical for various disorders and planning programs for important days. III. Apply Computational skills in the Nutritional allowances during life span.
9	FSND 107	Human Values and Professional Ethics-I	2021	
10	FSND 201	Nutritional Bio chemistry	2021	I. Understand the metabolism of nutrients such as carbohydrates, proteins, lipids, minerals and vitamins in human physiology. II. Acquire knowledge on factors affecting digestion, absorption of nutrients. III. Create awareness on enzymes and its role in nutrient metabolism. IV. Gain knowledge on role of vitamins and minerals as coenzymes in metabolism.
11	FSND 202	Clinical Nutrition and Dietetics-II	2021	I. Understand the concepts of dietary principles for various diseases. II. Comprehend knowledge in Dietary modifications for the management of diseases. III. Application of principals in preparation and service of diets to the patients. IV. Able to assess the case studies and construct the diet charts.
12	FSND 203- A	Food Microbiology and Safety	2021	I. Acquire knowledge about important genera of microorganisms associated with food. II. Acquaint with food contaminants and their sources. III. Understand the various factors associated with growth, food spoilage and food-borne diseases of different microorganisms. IV. Gain knowledge on the characteristics of food borne diseases, infections and intoxications and their identification.
13	FSND 203 B	Nutrition in Emergencies And Disaster Management	2021	I. Understand and assess the emergency situations related to food and Nutrition in natural and manmade disasters. II. Acquire knowledge on nutrition surveillance and treatment in emergencies. III. Gain Knowledge on planning nutrition relief and rehabilitation in emergencies. IV. Develop skills in Nutritional epidemiological studies.

14	FSND 204 A	Research Methodology	2021	I. Understand the concept of doing research about terms like 'variables', 'hypotheses, and 'research '. II. Gain knowledge on different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research. III. Critically gain knowledge to select a sample by using different sampling methods like probability and non-probability sampling. IV. Develop a research proposal in the appropriate scientific style.
15	FSND 204 B	Statistics and Computer Applications	2021	I. Understand about the scope of statistics in research. II. Acquire knowledge on the concepts of inferential statistics like t-test, chi-square, Correlation and Variance. III. Gain knowledge on basics in computer and its application in statistics. IV. Develop skill in computing statistics by using statistical software.
16	FSND 205	Practical I 201+203-A/203-B	2021	I. Develop skill and hands on experience in analysis of biochemical parameters in blood and serum. II. Demonstrate and develop skills in the use of standard methods and procedures for the microbiological analysis of food. III. Develop skill in planning and Execution of nutrition epidemiological and rehabilitation studies in emergencies.
17	FSND 206	Practical II 202+204-A/204-B	2021	I. Explain concepts on Epidemiology and its application in planning programs during emergencies. II. Critically apply knowledge of application of statistics in data analysis. III. Apply skills in using computer applications for data analysis
18	FSND 207	Human Values and Professional Ethics-II	2021	
19	FSND 301	Food Processing and Preservation Technology	2021	I. Understand the principles and scope of food processing and preservation. II. Get an overview on various techniques/methods in food processing and preservation. III. Acquire knowledge of emerging technologies and their applications in food processing and preservation. IV. Acquaint knowledge on advanced food preservation technologies.
20	FSND 302	Advances in Human Nutrition	2021	I. Appraise the advance concepts of nutrition of Brain, Immunity and Sports. II. Understand the concepts of dietary management in endemic nutrition problems. III. Create knowledge on the dietary management during emergencies. IV. Understand the process and relation of

					immunity and nutrition
21	FSND303-A	Nutrition Assessment Techniques	2021	I. II. III. IV.	Understand the methods of nutritional status assessment like Anthropometry, Biochemical, Clinical and Dietary. Apply knowledge on assessment techniques of protein quality in diets Understand and Plan nutrition research using animal models. Design nutrition research using Human models.
22	FSND303-B	Public Health Nutrition	2021	I. II. III. IV.	Acquire insight into the public health problems and their implications. Develop skills in organizing and evaluating nutrition projects in the community. Appreciate the national and international contribution towards nutrition improvement in India. Apply different assessment techniques for nutritional screening.
23	FSND 304	301+302	2021	I. II.	Equip with skills required for process and preserve various food products. Planning and preparation of foods in special needs like space, high altitudes and low temperatures.
24	FSND 305	Institutional Food Service Management(T)+Practicals (P)	2021	I. II. III. IV.	Gain knowledge on the different types and management of food services and exposure to the dietary department in a hospital setting. Acquire knowledge on finance, personnel management, duties and responsibilities of dietitians. Gain skills to act in a variety of capacities in clinical, administrative, and community settings. Develop skills on quantitative food production and planning diet plans for different diseases by placing in hospitals.
25	FSND306-A	Fundamentals of Food, Nutrition and Health	2021	I. II. III. IV.	Gain knowledge on foods, food groups, balanced diet for different age groups. Understand the importance of macro and micronutrients in daily diet. Comprehend knowledge on deficiency symptoms of different nutrients. Develop skills and hands on experience to assess nutritional problems in community.
26	FSND306-B	Dynamics in Food Preparation	2021	I. II. III. IV.	Learn the principles of safe food preparation and food pyramid. Understand the role of foods in cookery. Apply knowledge about effect of cooking on nutrients. Estimate the effects of cooking on Nutrients.
27	FSND 401	Food Safety Standards and Quality Control	2021	I. II. III. IV.	Understand the current food safety standards rules and regulations. Gain knowledge on desirable and undesirable constituents and contaminants in foods. Critical analysis on subjective and objective methods of quality of food. Develop skills for quality analysis and assurance of food.
28	FSND	Food Product	2021	I.	Illustrate the new product categories in food

	402	Development and Marketing		market and their characteristics. II. Elucidate the process of new food product development in food industry. III. Exemplify various specialty food products and their applications. IV. Acquire the skill to design and development of new food product and analyze the quality of the product.
29	FSND 403-A	Nutrition for Health and Fitness	2021	I. Define the concepts of Health, Nutrition, physical activity, physical fitness and methods of evaluation. II. Understand the Energy metabolism pathways during physical activity. III. Describe the role of macronutrients in physical performance, weight management and obesity. IV. Explains the nutritional needs in different sports and the role of national agencies.
30	FSND 403-B	Geriatric Nutrition	2021	I. Understand the physiological changes and theories of ageing. II. Gain knowledge on importance and consequences of diet in elderly. III. Create awareness on degenerative diseases, life style genesis and its management through diet. IV. Acquaint with the government programs and policies for elderly.
31	FSND 404	401+402	2021	
32	FSND 405	Technology of Packaging(T+P)	2021	I. Provide knowledge on packaging and packaging materials II. An overview of the scientific and technical aspects of food packaging. III. Enable the students to understand the regulations of packaging and packaging material testing. IV. Apply skills of new innovations in food packaging to improve product stability and/or to extend the product shelf-life.
33	FSND 406-A	Child Growth and Development	2021	I. Know the terms growth, development and stages of development across life span II. Understand the characteristics of children at different stages of childhood III. Explain the different developments like physical, cognitive , language and social development during childhood. IV. Apply knowledge to understand normal development and developmental delays during childhood.
34	FSND 406-B	Disaster Management	2021	I. Know about natural disasters: manmade disasters; chemical hazards; National and International strategies to mitigate disaster management. II. To understand natural disasters (like floods, drought, cyclone, earthquakes, global warming etc); Nuclear disasters; Biological disasters III. Explain the efforts made by the NGOs, Community based organizations and local administration in disaster management.

				IV. Discriminate disaster responses of Armed forces and Police.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

First Semester

(CBCS for the students admitted from 2021-22 onwards)

Paper-I: FSND - 101: FOOD CHEMISTRY AND ANALYSIS

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Differentiate free, bound and entrapped water.
2. What are emulsions? Explain.
3. What is Pectin and write the properties.
4. Write the principle and application of Electrophoresis.
5. Explain the Chemistry of frying in foods.
6. Explain the hydrogenation of fats.
7. What are Amylose & Amylopectin and draw the structure.
8. Write any two identification tests of amino acids.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks: 4x15=60

9. (a). Describe the determination of moisture in foods.

(or)

(b).Write the characteristics of colloids.

10. (a).Discuss the physical & chemical properties of lipids.

(or)

(b). Give the classification and discuss the physico- chemical properties of carbohydrates

11. (a).Explain the chemistry of hydration and dough formation of proteins.

(or)

(b). Classify proteins with suitable examples and write about protein denaturation.

12. (a).Explain the principle and estimation of protein by microkjeldahl method.

(or)

(b). Write the principle and applications of GC/ MS.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

First Semester

(Specialization 'A'; Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-II: FSND:102- CLINICAL NUTRITION AND DIETETICS-I

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Describe the role of a dietitian.
2. Write about Galactosemia.
3. Enlist diet counseling objectives
4. Explain directive counseling method.
5. Define TPN. Explain the mode of TPN.
6. Write about glycemic index of foods.
7. Write about the uses of Food Exchange Lists in planning therapeutic diet.
8. General principles of routine hospital diet.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks: 4x15 =60

9. (a). What are the professional qualifications and requirements of dietitians?

(or)

(b). Write about the therapeutic modifications of Normal diet.

10. (a)Explain the principles and modification of diet in Diabetes Mellitus.

(or)

(b). Explain the principles and modification of diet in Obesity.

11. (a). Explain Etiology Clinical symptoms Dietary management of HIV.

(or)

(b). Explain the principles and modification of diet in Burns

12. (a). Explain the effect of drugs on nutritional status of an individual.

(or)

(b). Explain the effect of drugs on food intake, digestion and absorption.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

First Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-III: FSND 103-A: FOOD SCIENCE AND EXPERIMENTAL FOODS

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time: 3 hours Max Marks: 80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks 4x5=20

1. Write about the composition of dough and Batters.
2. What are leavening agents?
3. Explain the structure of egg.
4. Write about the classification of poultry.
5. Explain in detail about the crystallization of sugars.
6. Define rancidity in fats.
7. Write about sensory attributes of foods.
8. Write about the requirements for subjective evaluation.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a). Describe the factors affecting gelatinization.

(or)

(b).Write the classification of vegetables? Explain about the pigments and flavour constituents present in the vegetables.

10. (a).Write in detail about the kinds of milk.

(or)

(b).Give the structure of muscle and explain the post mortem changes occurred in meat.

11. (a). What are the raw materials used in confectionery and discuss their role?

(or)

(b).Explain the functional properties of fat and their use in food preparations.

12. (a).Explain in detail about the sensory testing procedures and tests.

(or)

(b). Write about the panel and selection criteria for different types of panel in sensory evaluation.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

First Semester

(CBCS for the students admitted from 2021 onwards)

Paper:III- FSND103-B: BAKING TECHNOLOGY

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time: 3 hours Max Marks: 80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks: Marks: 4x5=20

1. Write the economic importance of bakery industry.
2. Principal of Baking.
3. Write the types of wheat flour.
4. Differentiate dough and batter.
5. Briefly write about cookies preparation procedure.
6. List down the hard and soft wheat bakery products.
7. Write the types of fillings and icings.
8. Short note on gluten free bakery products

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks:4x15 =60

9. (a) Explain the various equipment used in bakery processing and its importance.

(Or)

(b) Discuss the importance of packaging and quality factors of bakery products.

10. (a) Enumerate the importance of various ingredient used in bakery.

(Or)

(b) Explain various rheological properties associated with bakery items.

11. (a) Explain in detail about bread processing and its types.

(Or)

(b) Discuss about common faults and Corrective measures in bread and cakes.

12. (a) Write the common reasons for nutrient losses in bakery products.

(Or)

(b) Explain in detail about various decorative items in bakery and its preparation.

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Model Question paper

M.Sc., (Home Science) Degree Examination

(Common to all Specializations of M.Sc Home Science and MS Food Technology Course)

First Semester

(CBCS for the students admitted from 2021-22 onwards)

Paper-IV 104-A: COMMUNITY NUTRITION

Time : 3hours Max.Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Classification of foods.
2. Write a short note on Recommended dietary allowances.
3. Define Vital Statistics.
4. Write short note on Nutritional assessment.
5. Significance of breast feeding.
6. Clinical symptoms of Vitamin A & C deficiencies.
7. Mid-Day Meal programme.
8. What is Public distribution system.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks: 4x15 =60

9. (a) Explain about food groups, food composition and nutritive value of different foods.

(or)

(b) Define meal planning, principles and factors affecting meal planning.

10. (a).Describe briefly the methods of anthropometric measurements in altering nutritional status of the community.

(or)

(b). Explain the advantages and dis advantages of the Biochemical method of assessment of nutritional status.

11. (a) Discuss physiological changes that occur during pregnancy and state the nutritional requirements during pregnancy.

(or)

(b). State the RDA for an adolescent girl. Plan a menu and give justification.

12. (a) Discuss about food security, food fortification and enrichment.

(or)

(b) Write in detail about ICDS.

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Model Question paper

M.Sc., (Home Science) Degree Examination

First Semester

(CBCS for the students admitted from 2021-22 onwards)

Paper: 104-B: NUTRITION DURING LIFE SPAN

(Common to all Specializations of M Sc Home Science and MS Food Technology Course)

Time: 3 Hrs Max: 80 Marks

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

2. Write the effects of lactation on nutritional composition of Human milk.
3. What are the factors that affect the breast milk quality?
4. Explain the need for infant formulae.
5. Discuss the importance of nutrition for Pre-school children.
6. Write the nutritional issues in Adolescence.
7. Discuss the Nutritional requirements for School-going children.
8. Write the effects of aging on nutritional health.
9. Explain the nutritional concerns in old age and their management pregnancy outcome.

Part – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

10. (a). Explain about Nutritional intervention and pregnancy outcome & write the advantage and disadvantages of breast and formulae feeding.

    (Or)

    (b). Discuss about the nutritional requirements during pregnancy and lactation? Write about common complications and problems.

11. (a).What are the effects of macro & micro nutrient malnutrition on physical and mental health?

    (Or)

    (b). Discuss about various types of Infant formulas and common problems during infancy.

12. (a). Explain the importance of nutritional requirement and RDA and discuss the importance of implications of child obesity.

    (Or)

(b). Write in detail about various physiological problems during adolescence.

13. (a).Discuss the modification in diet, feeding old people. Nutritional requirement for adult man and woman.

(Or)

(b). Explain the principles to be considered while planning and preparation of diets of elderly.

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Model Question paper

M.Sc., (Home Science) Degree Examination

First Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-VII: FSND :107 – HUMAN VALUES AND ETHICS – I

Time: 3 Hrs **Max: 100 Marks**

Part – A

Answer any four questions

Each question carry equal marks **Marks 4X5=20**

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks **Marks 4X15 = 60**

9. a)
   (Or)
   b)
10. a)
    (Or)
    b)

11. a)
    (Or)
    b)
12. a)
    (Or)
    b)

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Second Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-I: FSND: 201- NUTRITIONAL BIOCHEMISTRY

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Describe Essential Amino Acids.
2. What is Glycogenolysis?
3. Write the Classification of enzymes.
4. What is the function of thyroid hormones?
5. Describe Biochemical classification of vit- A deficiency.
6. Write about the functions & RDA-of Thiamine & Riboflavin.
7. Write a note on ketone bodies..
8. What is the relationship between calcium and phosphorus?

SECTION- B

Answer ALL questions

Each Question carries 15 Mark Marks:4x15

=60

9.(a) .Describe the TCA Cycle.

(or)

(b). Enumerate the cholesterol metabolism in the sequential order.

10.(a). Discuss the function of Lipoproteins and prostaglandins in health and disease.

(or)

(b). Explain the mechanisms of hormonal action and enumerate the role of any two hormones in human metabolism.

11.(a).Write out the fat soluble vitamins and explain the physiological functions of any two vitamins.

(or)

(b).Describe the role of Iron, Folic Acid and Vitamin B_{12} in human nutrition.

12.(a).Write the sources and physiological functions and metabolism of Iodine.

(or)

(b).Discuss requirements and deficiency symptoms of Calcium, Phosphorus and Vitamin D.

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Model Question paper

M.Sc., (Home Science) Degree Examination

Second Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper:II- FSND: 202- CLINICAL NUTRITION AND DIETETICS-II

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. List down the Risk factors for Cardiovascular Disorders.
2. What are the Dietary Principles for Gout?
3. Write the types of Diarrhea and the dietary management.
4. Write about Glomerulonephritis.
5. What is the etiology of peptic ulcer?
6. Write the dietary management for Osteoporosis.
7. Describe the GERD.
8. What is GFR?

SECTION- B

Answer ALL questions

Each Question carries 15 Mark Marks:4x15 =60

9.(a). Describe the dietary management of Inflammatory bowel disease.

(or)

(b). Explain the principles of diet in constipation and Flatulence. Describe their dietary management.

10.(a).Describe the dietary management of Cirrhosis of liver.

(or)

(b).What is cholecystitisandchollelithiasis. Describe their etiology, diagnosis and dietary Management?

11.(a).Write the role of n-3 and n-6 fattly acids in prevention of coronary heart diseases.

(or)

(b).Explain the need and nutritional requirements during dialysis.

12.(a). What are the nutritional considerations in Alzheimer's disease?

(or)

(b). Explain the etiology of Rheumatic Disorders and write the Nutritional consideration In Rheumatoid Arthritis.

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Model Question paper

M.Sc (Home Science) Degree Examination

Second Semester

(Specialization 'A'; Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021 onwards)

Paper:III- FSND: 203-A FOOD MICROBIOLOGY & SAFETY

(Common Paper to MSc. Food Science Nutrition and Dietetics and MS Food Technology)

Time: 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Role of Microorganism in food industry.
2. Write the general Characteristics of bacteria.
3. Describe the different types of food spoilage.
4. How cereals and cereal products are contaminated.
5. Write the contamination sources of milk.
6. Describe the common spoilages in fish.
7. Write a short note on food borne infections.
8. How microbiology and food safety is related.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks 4x15 =60

9. (a) Explain the factors affecting microbial growth.

(or)

(b) Discuss about classification, morphological and cultural characteristics of viruses.

10. (a)Write the principles underlying food spoilage and discuss the common spoilages in fruits

and vegetables.

(or)

(b). Describe the common food spoilages and common microbial spoilages in cereals and cereal products.

11. (a). Discuss the sources of contamination and spoilages in flesh foods.

(or)

(b). Enumerates the spoilages and sources of contamination in sugars and processed foods.

12. (a) Discuss in detail about various food borne intoxications with examples.

(or)

(b) Write in detail about food microbiology applications.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

FSND 203-B: NUTRITION IN EMERGENCIES AND DISASTER MANAGEMENT

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Famine.
2. Immunization.
3. MUAC.
4. Nutritional surveillance.
5. Targeting Food Aid.
6. Special foods/rations for nutritional relief.
7. Epidemiological data.
8. Psycho socio variables.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks: 4x15 =60

9.(a). Discuss the causes of malnutrition in emergency situations and major deficiency diseases in emergencies.

(or)

(b).What are the communicable diseases that occur during emergencies? Discuss in detail about any one disease treatment and control.

10.(a). Discuss in detail about the nutritional assessment and surveillance in emergency affected
populations.

(or)

(b). Write about methods of organizational surveillance and individual screening during emergencies.

11.(a). Write in detail about the assessment of food needs in emergency situations.

(or)

(b). Discuss in detail about the food storage and house hold food security in emergencies.

12.(a). What is Nutritional epidemiology? Discuss in detail about design and planning of nutritional epidemiological studies.

(or)

(b). Discuss in detail about types of epidemiology and collection of epidemiological data.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Second Semester

(Common to All branches of Home Science and MS Food Technology Course)

(CBCS for the students admitted from 2021-22 onwards)

Paper-IV: FSND 204-A:RESEARCH METHODOLOGY

Time:3 hrs Max:80 Marks

SECTION- A

Answer any four questions

Each question carry equal marks Marks:4X5=20

1. Define research. Enumerate the significance of research.
2. Explain the need and features of a good research design.
3. Write about Quota and snow ball sampling.
4. Describe case study as a research technique.
5. What is meant by primary and secondary data?
6. Give an account of Nominal scale.
7. What is Social mapping?
8. Write about Observation check list.

SECTION- B

Answer all questions

Each question carry equal marks Marks: 4 X 15=60

9. (a).Write in detail about types of research.

(Or)

(b).Write about the types of research design.

10.(a).Explain in detail about the definition , identification and selection of research problem.

(Or)

(b). Define qualitative research and explain the types of qualitative research.

11.(a). What is data? Explain in detail different methods of data collection.

(Or)

(b). Describe in detail about the Observation and Interview methods of data collection.

12.(a). What are Measurement scales? Explain its significance in statistical analysis?

(Or)

(b). Explain in detail about the steps in preparing a research proposal.

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SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Second Semester

(Common to All branches of Home Science and MS Food Technology Course)

(CBCS for the students admitted from 2021-22 onwards)

Paper-IV: FSND 204-B: STATISTICS AND COMPUTER APPLICATIONS

Time:3 hrs Max: 80 Marks

SECTION- A

Answer any four questions

Each question carry equal marks Marks:4X5=20

1. Frequency distribution.
2. Histogram.
3. Rank correlation.
4. Mean.
5. File handling.
6. Computer software.
7. What is data analysis?
8. Descriptive statistics.

SECTION- B

Answer all questions

Each question carry equal marks Marks: 4 X 15=60

9. (a). What is a *t*-test? When it is used and for what purpose(s)? Explain by means of examples. (Or)

(b). In a test given to two groups of students, the marks obtained were as follows: *First Group* 18 20 36 50 49 36 34 49 41 *Second Group* 29 28 26 35 30 44 46 Examine the significance of difference between mean marks obtained by students of the above two groups. Test at five per cent level of significance.

10. (a). 200 digits were chosen at random from a set of tables. The frequencies of the digits were: Digit 0 1 2 3 4 5 6 7 8 Frequency 18 19 23 21 16 25 22 20 21 Calculate χ^2.(Or)

(b). What is Chi-square text? Explain its significance in statistical analysis.

11.(a). What is data? Explain in detail the data processing and analysis in computers.

(Or)

(b). Describe in detail about the PC and its components.

12.(a). What is an excel sheet? Explain its significance in statistical analysis?

(Or)

(b). Explain in detail about the steps in preparing different graphs in computers.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Second Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-VII: FSND: 207 – HUMAN VALUES AND PROFESSIONAL ETHICS - II

Time: 3 Hrs **Max: 100 Marks**

Part – A

Answer any four questions

Each question carry equal marks **4X5=20 Marks**

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks **Marks 4X15 = 60**

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Third Semester

(Specialization 'A'; Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-I:FSND 301: FOOD PROCESSING AND PRESERVATION TECHNOLOGY

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Write the traditional methods of food preservation.
2. Write about the need and purpose of food processing.
3. Explain the Process of blanching of fruits &Vegetables.
4. Define Thermal death time and thermal Death Rate.
5. Explain the importance of fermentation.
6. Give a short notes on extrusion.
7. What are the intermediate moisture foods?
8. Write the advantages and disadvantages of Irradiation.

SECTION- B

Answer ALL questions

Each Question carries 15 Mark Marks: 4x15 =60

9. (a)Explain in detail about the principles & methods of food processing and preservation.

(or)

(b).What is food preservative? Classify the preservatives with examples? Describe their functional applications in foods.

10.(a). Write in detail about processing of wine and explain.

(or)

(b).Write the role of fermentation in bread making?

11.(a). Explain the process of ohmic heating &Discuss the role of it in food processing.

(or)

(b). What is meant by nanotechnology & Explain its applications in foods?

12.(a). What are the various methods of preservation using low temperatures?

(or)

(b).What are the various methods of preservation using high temperatures?

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Third Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-IIFSND - 302: ADVANCES IN HUMAN NUTRITION

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Write the composition and functions of the brain.
2. Describe the role of folic acid in brain growth and development.
3. What is the effect of malnutrition on immunity?
4. Write about role of NK cells in immunity.
5. What are the iodine deficiency disorders?
6. Define osteoporosis and write the etiological factors.
7. Write the consequences of high fluorine content in water.
8. What are the dietary requirements for astronauts?

SECTION- B

Answer ALL questions

Each Question carries 15 Mark Marks: 4x15 =60

9. (a). Explain the role of neurotransmitters in brain function.

(or)

(b).Describe the role of essential nutrients on brain growth and development.

10. (a). Discuss in detail about the acquired immunity.

(or)

(b).Illustrate the importance of the nutrients in bringing immunity.

11. (a). What are the symptoms of fluorosis and describe the measures of nutritional Management?

(or)

(b). Write the dietary principles and management in Osteoporosis.

12. (a). Write about the nutrition management systems during Disasters.

(or)

(b). What are the nutrient requirements and dietary modifications at low temperature conditions ?

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Third Semester

(Specialization 'A'; Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-III SND303-A: NUTRITION ASSESSMENT TECHNIQUES

Time : 3 hours MaxMarks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Write short note on in- vivo and in -vitro techniques.
2. Briefly discuss about immunological studies.
3. What is the role of animal models in nutrition research?
4. Classify the formulation diets and give the principles.
5. How the population survey is carried out to assess dietary intakes of nutrients?
6. What are the techniques of measuring body composition?
7. Mention about ethics in nutrition research.
8. What is the role of computer applications in nutrition research?

SECTION- B

Answer ALL questions

Each Question carries 15 Mark Marks: 4x15 =60

9. (a) Describe in detail about the metabolic and bioavailability studies.

(or)

(b).Differentiate between longitudinal and cross sectional studies with examples.

10. (a).What are the measures to be taken to maintain the animal laboratory in good condition?

(or)

(b).How the effect of supplementation can be studied to assess the growth and development?

11. (a).Explain the methods of protein quality estimation.

(or)

(b). Describe in detail about the nutrient balance studies.

12. (a).What are the techniques of collecting biological fluids from Human Nutrition Research ?

(or)

(b).Explain the collection and analytical techniques of food samples.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Third Semester

(Specialization 'A'; Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-III- FSND 303-B: PUBLIC HEALTH NUTRITION

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Public health problems.
2. Green revolution
3. PDS.
4. Vitamin A deficiency.
5. BNP.
6. Food fortification.
7. Food security.
8. Food Pricing.

SECTION- B

Answer ALL questions

Each Question carries 15 Mark Marks 4x15 =60

9.(a). Write about concept and importance of public health Nutrition.

(or)

(b). Discuss the role of public health nutritionist in health care delivery.

10.(a). Discuss in detail how green and blue revolutions helped in improving food and nutrition security in India.

(or)

(b).What is nutrition education? Discuss in detail the principles and factors affecting nutrition education?

11.(a). What are national nutrition intervention programs in India? Write about the most success program in India in terms of planning, implementation and evaluation.

(or)

(b). Discuss in detail about ICDS and NIDDCP.

12.(a). Discuss in detail about the role of international organizations in combating malnutrition globally.

(or)

(b). Discuss the status of malnutrition in India and role of ICMR in combating malnutrition.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Third Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021 onwards)

Paper:V- FSND: 305 INSTITUTIONAL FOOD SERVICE MANAGEMENT

(Skill Oriented Course)

Time: $1^{1/2}$ hours Max Marks: 40

SECTION- A

Answer any TWO of the Following

Each question carries 5 marks Marks: 2x5=10

1. Discuss the need and importance of Food service establishments.
2. List different types of food service establishments.
3. Define financial management.
4. Describe the records to be maintained in motels.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks 2x15 =30

5. (a). Briefly describe the principles and functions of food service Management.

(or)

(b). What are the resources to be Managed in the food science establishments?

6. (a). Discuss the importance of book keeping accounting in food service establishment

(or)

(b). Describe the various strategies to be adopted for the management of personnel in foodservice industries

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Third Semester

Open Elective

(CBCS for the students admitted from 2021 onwards)

Paper-VI:FSND 306-A: FUNDAMENTALS OF FOOD , NUTRITION AND HEALTH

Time: 3 Hrs **Max: 80 Marks**

Part – A

Answer any four questions

Each question carry equal marks **(4X5=20 Marks)**

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks(4X15 = 60 Marks)

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Third Semester

Open Elective

(CBCS for the students admitted from 2021-22 onwards)

Paper-VI: FSND 306-B: DYNAMICS IN FOOD PREPARATION

Time: 3 Hrs **Max: 80 Marks**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-I FSND401: FOOD SAFETY STANDARDS AND QUALITY CONTROL

(Common to M.Sc., Food Science Nutrition and Dietetics & MS Food TechnologyCourse)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Differentiate between subjective Evaluation and objective Evaluation.
2. Write about triangle test.
3. Define organic foods as per FSSAI.
4. Write arethe powers of Food inspectors.
5. Write about lead toxicity.
6. What are stabilizers?
7. What are common adulterants in milk?
8. How adulterants can be detected in Honey?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks 4x15 =60

9.(a). Write an account of methods of objective evaluation to assess the Food quality.

(or)

(b). Write the most common microbial tests of food evaluation.

10.(a).Describe about the rules and regulations Packaging and Labelling.

(or)

(b). Discuss about the International Food Standards CODEX and HACCP principles.

11.(a).Write a short notes on desirable constituents of anticaking agents and propellants.

(or)

(b). Classify the food contaminants based on the type in food with examples.

12.(a).Describe the methods of identifying the common contaminants in fats and oils.

(or)

(b).What are the major contaminants in meat, poultry, Eggs and fish? How can they be eliminated during Preservation and storage?

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

(CBCS for the students admitted from 2021-22 onwards)

Paper:II- FSND402: FOOD PRODUCT DEVELOPMENT AND MARKETING

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Define new food product give the characteristics of a new product.
2. What is the importance of developing new product at an industrial level?
3. How recipe development and scale up is carried out in a food industry.
4. Differentiate between packing and packaging and note down the principles.
5. What are the nutritional and health needs to be considered in product development?
6. Differentiate between prebiotics and probiotics.
7. Define ethics and mention the guidelines of ethics while developing a food product.
8. Define patents. What the procedures to be followed to receive food patents.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks: 4x15 =60

9 .(a).Classify the various food products emerging into the food marketing.

(or)

(b).What are the factors affecting food product development?

10.(a).Explain in detail about the different phases of food product development.

(or)

(b).Define Idea generation and discuss the internal and external sources of ideas.

11.(a).Describe the characteristics and consumer aspects of food ingredient industry. Explain.

(or)

(b). Describe the characteristics and consumer aspects of food service industry. Explain.

12.(a). Discuss about the requirement of therapeutic and an value added foods.

(or)

(b). Enumerate the functional and Neutraceuticals foods in detail.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

(CBCS for the students admitted from 2021-22 onwards)

Paper: III: FSND 403-A - NUTRITION FOR HEALTH AND FITNESS

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Define the cardiac and muscle endurance.
2. What is BORG Scale?
3. Write briefly glycolysis energy pathway.
4. What is BMI? How do you assess the BMI?
5. How do you calculate protein requirements for different levels of exercise?
6. Write the importance of vitamins in exercise.
7. Write pre fluid requirements for an athlete.
8. Write the importance of Ergogenic foods in sports performance.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks 4x15 =60

9.(a).Explain about the interrelationship between physical fitness and health.

(or)

(b). How do you assess fitness using FITT principle?

10.(a). Explain in detail the fat metabolism before, during and after exercise.

(or)

(b). Explain how the anaerobic energy cycles contribute energy during heavy exercise.

11.(a). Write the role of macro nutrients in supporting physical activity.

(or)

(b).What are the adverse health effects of dehydration or hypo hydration?

12. (a).Describe the assessment of nutritional status of sports person.

(or)

(b).What is Kinanthropometry, explain different measurements?

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Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-III: FSND 403-B :GERIATRIC NUTRITION

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

2. Theories of ageing
3. Body composition changes of elderly
4. Post-menopausal problems
5. RDA for elderly
6. Health problems of elderly
7. Degenerative diseases of elderly
8. Old age homes
9. Recreation centers for elderly

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks 4x15 =60

10. (a). Discuss in detail about the physiological and biochemical changes of elderly.

(or)

(b). Discuss in detail about socio-cultural and psychological aspects of ageing.

11. (a). Write about the food and nutritional needs of the elderly.

(or)

(b). Discuss in detail about the post-menopausal problems of women.

12. (a). Discuss in detail about the neurological problems of elderly.

(or)

(b). Discuss in detail about the health problems of the elderly.

13. (a). Write in detail about the policies and programmes of the government for elderly.

(or)

(b). Discuss about the status of old age homes, day care centers and recreation centers for elderly.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Fourth Semester

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

(CBCS for the students admitted from 2021-22 Onwards)

Paper-IV:405: TECHNOLOGY OF PACKAGING

Time : 1.30 hours Max Marks:40

SECTION- A

Answer any TWO of the Following

Each question carries 5 marks Marks: 2x5=10

1. Write about the Principles and Functions of Food Packaging
2. Enlist different Types of Packaging materials used for Food Packaging?
3. Explain in brief about

   A) Water Vapor Transmission Rate B) Gas Transmission Rate
4. What are the different factors affecting Flavor Absorption ?

SECTION- B

Answer ALL questions

Each Question carries 15 Mark Marks: 2x15 =30

5.(a). Write in detail about Thermosets and Thermoplastics?

(OR)

(b). What are the different Methods used for Food Packaging?

6 (a)What is meant by Barcode? Explain in brief about Barcoding and their Types?

(OR)

(b). Explain in detail about the role of Food Matrix in Packaging- Food Interactions?

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

Open Elective

(CBCS for the students admitted from 2021-22 onwards)

Paper-VI: 406-A: CHILD GROWTH AND DEVELOPMENT

(Open Elective)

Time: 3 Hrs **Max: 80 Marks**

Part – A

Answer any four questions

Each question carry equal marks **(4X5=20 Marks)**

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks **(4X15 = 60 Marks)**

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

Open Elective

(CBCS for the students admitted from 2021-22 onwards)

Paper-VI: 406- -B: DISASTER MANAGEMENT

Time: 3 Hrs **Max: 80 Marks**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal mark (4X15 = 60 Marks)

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF HOME SCIENCE



Course

M.Sc. HUMAN DEVELOPMENT AND CHILD WELFARE

Choice Based Credit System (CBCS)

Academic Year 2023– 24

Amended as per NEP-2020

SRI VENKATESWARA UNIVERSITY COLLEGE OF SCIENCES
DEPARTMENT OF HOME SCIENCE
CHOICE BASED CREDIT SYSTEM (C.B.C.S) SYLLABUS
(WITH EFFECT FROM THE ACADEMIC YEAR 2021 -2022 onwards)
M. Sc. HUMAN DEVELOPMENT AND CHILD WELFARE (HDCW)

About the Department

The Department of Home Science established in the year 1963 as first of its kind in the state of Andhra Pradesh and celebrated golden jubilee in the year 2013. Ms Dorothy M. Pearson, a Canadian Home Scientist was largely instrumental to start the post graduate programmes in Home Science at Sri Venkateswara University, Tirupati. The committed founder stalwarts and the successive faculty members with immense foresight established the pioneering activities of teaching, research and extension in the department. The department from its inception has thrived to offer new insights through academic reforms and outreach activities. The commitment of the faculty has contributed practice based teaching, action research, technology development and extension outreach activities for the development of students. The department stocks eight patents of which two patents awarded. The Ministry of food processing granted 10 crores for the establishment Food testing laboratory with NABL accreditation.

Vision

To be a premiere centre for excellence in higher education in the areas of specialization fostering nurturing and building careers for students and to be an apex body playing a pivotal role in planning and monitoring community development.

Mission

The Department of Home Science is committed to empower the students in capacity building skills through teaching, research and community oriented extension activities, thereby widening the scope for self development and Employability and preparing themas socially useful and responsible citizens.

Department Objectives:

- Enable the students to understand the interrelation of Food and Health.
- To foster knowledge across the life span in inter connected Human Development factors to become efficient counselor and early childhood educator.
- Develop sensitivity towards the community problems and train the students in extension and out reach activities.
- To focus on training students in application of techniques to process and preserve the food.

The department of Home Science has been adopting the systematic procedure for development, revision and implementation of the curriculum for four different post-graduate programmes offered viz., **Food Science Nutrition and Dietetics (FSND), Human Development and Child Welfare (HDCW), Extension Management and Communication Technology (EMCT) and Food Technology (FT)** . Following the regulations of the S.V University all the academic programmes are structured keeping in mind the aspirations of the students and changing trends in higher education. The learning out comes of each course are framed such that they help students to gain theoretical knowledge as well as skills to meet local, national and global trends. The curriculum of each course has practicals, field visits, visit to institutions and a mandatory internship programme, which focus on imparting essential skills and hands-on experience and experiential learning thereby can excel when they get employment in Government and Non-Government Organizations to work individually as well as in teams. The cross cutting issues namely, technology, gender, child rights, human values and professional ethics are incorporated in core theories and electives to enable the students to lead a purposeful and independent life filled with moral and ethical values . Majority of the courses offered across all programmes do focus on nurturing employability/entrepreneurship/skill development. The outcomes of each programme have the emphasis on commitment to the contribution to the interest of the society as a whole and perform well in their careers.

The academic programmes, research and extension activities are planned and executed meticulously so as to reflect the vision and mission of the Department, focusing on the empowerment of students through quality education by updating syllabus with current trends and

providing appropriate knowledge and skills compete at the global level. The Department through motivated staff always strives towards reaching proficiency through teaching and community oriented extension programmes.

Human Development and Child Welfare (HDCW) programme has been contextualized and embedded in the broader perspective of life span development. HDCW is unique in its interdisciplinary focus on individuals and families over a lifespan, especially in the stages of pre-natal period, early childhood , late childhood , adolescence, adulthood and late adulthood . It also focuses on education , management and rehabilitation of children with developmental challenges and about organization and management of centers for human welfare.

Programme Specific Outcomes (PSO)

After completion of this programme the students will able to;

PSO1.	Apply skills, knowledge and goal setting toward employment in the fields of **early childhood education** as pre-school teachers, pre-school coordinators and pre-school teacher trainers , as **special educators** in schools and colleges, as **counsellors** inschools and mental health institutions, and as **supervisors and extension officers** in Government and Non-government organizations catering to the welfare of children. The students also can establish centres for human welfare – crèche, Play centres,guidance and counselling centres, foster cares and day care centres for both children and elderly citizens.
PSO2.	The students of HDCW play an important role in protecting the wellness of individuals and communities. By working to design programs and implement interventions, they help to ensure that people are able to access the resources they need in order to reach their full potential. They help parents and community in early identification of developmental delays and behavior disorders among children and can suggest suitable referral services.

Human Development and Child Welfare (HDCW) specialization has the following programme objectives.

Programme Objectives

To enable the students to:

- Know about holistic development of individuals and families over the lifespan period with a special focus on early foundation years.
- Understand the reasons for behavioral and psychological problems among people and role of counselling in solving problems.
- Explain about importance of interventions for early developmental delays to improve physical, cognitive and psycho-social wellbeing of children, and role of parents and community .
- Prepare schedules to collect data through interview and case study approaches and understand reasons for problems related to lifespan development.
- Plan suitable Teaching Learning Materials (TLM) based on appropriate approaches to teach pre-school children for all round development. Explain appropriate educational strategies that support learning of differently abled students.
- Distinguish and can explain the problems related to children, family and society . Gains knowledge about different child welfare programmes and organizations catering to the welfare of children.
- Communicate effectively and accurately, using written, visual, and verbal means to present class reports, research reports and pre-school teaching practice. Develop skills in verbal and non-verbal communication in preparation and presentation of IEC while working with children and communities to disseminate information related to human development aspects.
- Estimate normal and delayed mile stones of development among children . Assess impact of different parenting styles on children's behaviour and explore reasons for problem behaviour .
- Apply knowledge of ethical principles in the context of counselling practice , research and psychological testing .

- Appraise different Government and non-government programmes and services for rehabilitation of children, indigent families and elderly.
- Plan activities and programmes to promote all round development among normal pre-schools children and also for management of special children. Practice counseling skills for professional and personal development.
- Create goal setting toward employment in the fields of early childhood education as pre-school teachers, pre-school coordinators and pre-school teacher trainers , as special educators in schools and colleges and as counsellors. Apply skills, knowledge in schools and mental health institutions in Government and Non-government organizations catering to the welfare of children.

Programme Outcomes (PO)

After successful completion of the program, the student is able to:

S.No	Programme Outcomes
PO No. 1	**Apply knowledge of theory and research for holistic development of** individuals and families over the lifespan period with a special focuses on early foundation years.
PO No. 2	Identify, understand and **solve the behavioural and psychological problems** with a mastery of counselling skills thereby increase students' control over the decisions that affect their lives both within and outside the household.
PO No. 3	Capable to **design,** implement and evaluate interventions for early developmental delays to improve physical, cognitive and psycho-social wellbeing of children, their parents and elderly people.
PO No. 4	Utilize theory based knowledge and methods to address real life problems and to collect data, analyze and understand **solutions for problems** related to lifespan development.

PO No. 5	Create suitable teaching learning materials, select and **apply appropriate approaches** to teach pre-school children for all round development. Apply research **innovations and appropriate educational strategies** that support learning of differently abled students.
PO No. 6	Able to employ critical thinking to resolve the problems efficiently related children, family and society either **independently** or with the support of concerned authorities. Ability to guide and lead needy people in the **community/work setting** in the right direction
PO No. 7	**Communicate effectively** and accurately, use written, visual, and verbal means to present class reports, research reports and pre-school teaching practice. Develop skills in verbal and non-verbal communication in preparation and presentation of IEC while working with children and communities to disseminate information related to human development aspects.
PO No. 8	**Demonstrate understanding of knowledge** related to normal and delayed mile stones of development of children , impact of different parenting styles on children's behaviour and reasons for problem behaviour and responsibilities as **Human Development Expert** to disseminate same to parents , teachers and significant others in the community.
PO No. 9	Demonstrate **ethical** principles in the context of counselling practice and psychological testing by following unbiased and truthful actions in all aspects of assessments and maintaining confidentiality of case studies while doing documentation and publication.
PO No.10	Understand the availability of Government and non-government programmes and services for rehabilitation of children , indigent families and elderly and through intervention programmes provide **sustainable** solutions and build resilient families and communities.
PO No.11	**Demonstrate knowledge and understanding of management of pre-schools,** welfare institutions for children and needy people/elderly, education of special children and counseling practice, with innovative, appropriate, advanced techniques, skills, and

	modern psychological tools with an understanding of limitations.
PO No. 12	Recognize the need for self-motivated **life-long learning** for the holistic development for meeting their professional and personal needs in varying environment and changing contexts.

Programme Educational Objectives (PEO)

To enable students to:

- Describe the distinctive growth and development of individuals from conception to late adulthood, as well as to understand developmental challenges through scientific measures and to provide stimulating environment and intervention for needy people for their optimum development.
- Create suitable teaching learning materials, select and apply appropriate approaches to teach pre-school children for all round development. Apply research innovations and appropriate educational strategies that support learning of differently abled students, understand the availability of Government and Non-government programmes and services for rehabilitation of children, indigent families and elderly.
- Facilitate the students to work professionally and efficiently in academics, research, curriculum development, management of institutions and welfare programmes, training, extension and community services related to human development.
- Develop effective skills in counseling with theoretical background and provide intervention by learning to deal with personal and family issues through scientific measures like psychological tests, case study approach, research methodologies and practical sessions on promotion of counseling skills.
- Apply the skills knowledge and goal setting toward employment in the fields of early childhood education as pre-school teachers, pre-school coordinators and pre-school teacher trainers, as special educators in schools and colleges, as counsellors in schools and mental health institutions, and as supervisors and extension officers in Government and Non-government organizations catering to the welfare of children.

SRI VENKATESWARA UNIVERSITY COLLEGE OF SCIENCES

DEPARTMENT OF HOME SCIENCE

CHOICE BASED CREDIT SYSTEM (C.B.C.S) SYLLABUS AND SCHEME OF EXAMINATION

(WITH EFFECT FROM THE ACADEMIC YEAR 2021 -2022 onwards)

M.Sc. HUMAN DEVELOPMENT AND CHILD WELFARE (HDCW)

SEMESTER-I

Sl. No.	Components of Course	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	**Core**	HDCW-101	Advanced Study of Human Development -I	6	4	20	80	100
2	**Core**	HDCW-102	Curriculum for Early Years	6	4	20	80	100
3	**Compulsory Foundation**	HDCW-103-A	Family Dynamics	6	4	20	80	100
		HDCW-103-B	Gender Issues in Human Development and Family Relations					
4	**Elective Foundation**	HDCW-104-A	Community Nutrition	6	4	20	80	100
		HDCW-104-B	Nutrition during Life Span					
5	**Practical –I**	HDCW-105	101+ 103-A / 103-B	3+3 / 3	4	-	-	100
6	**Practical- II**	HDCW-106	102 + 104-A / 104-B	3+3 / 3	4	-	-	100
7	**Total**				**24**			**600**
8		HDCW-107	Human Values and Professional Ethics -I *(Audit Course)	0	0	100	0	0

***Audit course – Zero credits under self-study**

SEMESTER-II

Sl. No.	Components of Course	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	**Core**	HDCW-201	Quality Standards in ECE	6	4	20	80	100
2	**Core**	HDCW-202	Theories of Human Development and Behaviour	6	4	20	80	100
3	**Compulsory Foundation**	HDCW-203-A	Parent and Community Education	6	4	20	80	100
		HDCW-203-B	Infant Development and Stimulation					
4	**Elective Foundation**	HDCW-204-A	Research Methodology	6	4	20	80	100
		HDCW-204-B	Statistics and Computer Application					
5	**Practical –I**	HDCW-205	201 + 203-A / 203-B	3+3/3	4	-	-	100
6	**Practical- II**	HDCW-206	202 + 204-A / 204-B	3+3/3	4	-	-	100
7	**Total**				**24**			**600**
8	***Audit Course**	HDCW-207	Human Values and Professional Ethics -II	0	0	100	0	0

***Audit course – Zero credits under self-study**

SEMESTER-III

Sl. No.	Components of Course	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	**Core**	HDCW-301	Child Study Techniques	6	4	20	80	100
2	**Core**	HDCW-302	Children with Developmental Challenges	6	4	20	80	100
3	***Generic Elective**	303-A	Organization and Management of Child Welfare Institutions	6	4	20	80	100
		303-B	Child and Human Rights					
4	**Practical**	HDCW-304	301 + 302	6	4	-	-	100
5	****Skill Oriented Course**	HDCW – 305	Life Skills Education (Theory) + (Practicals)	3+6	4	10	90 (40+50)	100
6	*****Open Elective**	HDCW 306 –A	Fundamentals of Food, Nutrition and Health	6	4	20	80	100
		HDCW 306-B	Dynamics in Food Preparation					
7	**Total**				24			600

Internship is mandatory

*Generic Elective – Student has to choose any one paper

** Internship is mandatory

***Open Elective – Offered by Department to other Department students

Note: Interested student may register for MOOCS with the approval of DD

SEMESTER-IV

Sl. No.	Components of Course	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	**Core**	HDCW -401	Guidance and Counseling in Human Development	6	4	20	80	100
2	**Core**	HDCW -402	Advanced Study of Human Development -II	6	4	20	80	100
3	***Generic Elective**	HDCW -403-A	Rehabilitation and Management of Children with Special Needs	6	4	20	80	100
		HDCW -403-B	Gerontology					
4	**Practicals**	HDCW-404	401 + 402	6	4	-	-	100
5	**Multi-disciplinary/ Project Work**	HDCW-405	Human Recourse Management ((Theory) + (Practicals)	3+6	4	10	90 (40+50)	100
	Project work			-	-	40	60	100
6	****Open Elective**	406-A	Growth and Development During Early Years	6	4	20	80	100
		406-B	Disaster Management					
7	**Total**			36	24			600

* Generic Elective – Student has to choose any one Paper

** Open Elective - Offered by Department to other Department students

Note: Interested student may register for **MOOCS** with the approval of DDC

DEPARTMENT OF HOME SCIENCE

M. Sc. HUMAN DEVELOPMENT AND CHILD WELFARE

CHOICE BASED CREDIT SYSTEM (CBCS)

(With effect from academic year 2021 – 2022 onwards)

SEMESTER – I

HDCW 101: ADVANCED STUDY OF HUMAN DEVELOPMENT - I

COURSE OBJECTIVES:

To enable the students to:

1. Know the terms 'child development', 'human development', genes, chromosomes, 'Gene engineering' and pre-diagnostic tests.
2. Describe the developmental tasks of children from infancy to adolescence period.
3. Relate different domains of child development and critically apply knowledge to explain milestones of physical, emotional, social and cognitive development of children from infancy to adolescence period.
4. Assess physical, social, emotional and cognitive development of children from early childhood to adolescent period

CORE –THEORY

UNIT – I Biological foundations of Human Development

- Human development – Basic concepts and issues. Genetic foundation- Genes; chromosomes.
- Role of Heredity and Environment on development. Heredity and environment correlations-Epigenetic view
- Pre-Natal Development– Genetic and environmental determinants – chromosomal and Gene linked abnormalities
- Pre-natal Diagnostic tests,. Gene engineering and Genetic Counseling
- Course of Pre-natal development
- Perspectives of Lifespan Development

UNIT – II Development During Early Years

- Infancy and babyhood -Assessing the infant development -New born reflexes, Needs and Developmental tasks.
- Milestones of development during Infancy and baby hood. – Physical, Social, Emotional, Language and Cognitive development.
- Early Childhood years – Needs and development tasks
- Milestones of development during Early childhood– Physical, Social, Emotional, Language and Cognitive development.

UNIT– III Late childhood

- Late childhood - Needs and developmental tasks – Physical, social, emotional and cognitive development during Late Childhood years.
- Moral Development and reasoning during school age
- Peer relationship
- Determinants of Puberty – Psychological implications of early and late maturation.

UNIT – IV Adolescence

- Adolescence - Definition, Needs and developmental tasks- Physical and Physiological changes, Emotional Maturity –Socio emotional development in Adolescence
- Peer relationship
- Moral Development and reasoning during adolescence
- Parent- Adolescent relationship – Attachment and conflict.
- Challenges and Problems of Adolescents

REFERENCES

1. Berk, E.L. (2001).*Child development*, Prentice Hall of Indics, New Delhi.
2. Cole, M. and Cole,R.S. (1998).*The development of children*, W.H. Free man and company, New York.
3. Damon,W. and Lerner,R.M.(2008).*Child and adolescent development- an advanced course*, Wiley Publishers.
4. Mussen, P.H., ConpaKapan, J. and Hussain. (1987).*Child development*, Halt rinehant and Winston Inc.
5. Santrock, J.W. (1981). *Life span development*, Brown Bench mall.
6. Suriakanthi,A. (2009).*Child development*, Kavitha publications, Gandhigram, Tamilnadu.

JOURNALS

1. Child Development
2. PRACHI Journal
3. Psycho Lingua
4. Indian Journal of Psychology

COURSE OUTCOMES

After completion of the course, students will be able to:

CO1 Define the terms ‘child development’, ‘human development’, genes, chromosomes and pre-natal diagnostic tests.

CO2 Explain the developmental tasks of children from infancy to adolescence.

CO3 Apply the knowledge of milestones of physical, emotional, social and cognitive development of children from infancy to adolescence to relate development process at different stages.

CO4 Assess different developments like physical, social, emotional and cognitive development of children from early childhood to adolescent period using simple tests and adjustment problems among adolescents using a standardized scale.

CO_PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3								3	2
CO2	3		3		3		3	3		2			3	3
CO3	3		3		3	2		3	2				3	3
CO4	3		3	2	3		3		3	3	2	3	3	2

H-High (3), M- Medium (2), L- Low (1)

HDCW 102 -CURRICULUM FOR EARLY YEARS

COURSE OBJECTIVES:

To enable the students to:

1. Understand the terms 'ECE', 'ECCE' and 'ECD'
2. Infer the importance of curriculum in early child hood education.
3. Critically explain the importance of emergent literacy , numeracy , creativity and readiness for children's all round development
4. Plan ECE programmes according to different pedagogies and prepare teaching, learning materials for effective implementation of ECE programme.

CORE - THEORY

UNIT-I Early Childhood Education-Literacy and Numeracy

- Definitions of ECE, ECCE, and ECD - Need for ECCE-Importance of Brain development and stimulation during early years. Objectives of pre – school education
- Curriculum for ECCE- Curriculum -Definition, Importance, Indicators of effective curriculum
- Literacy and language Development–Informal talk, Storytelling- Importance - Elements of story –Methods and techniques of storytelling
- Numeracy- Pre –number concepts- categorization, Classification, sequential thinking, seriation and activities to promote problem solving and reasoning during early years.

UNIT-II Curriculum for ECCE -Creativity, Dramatization and Science Skills

- Creativity- Definition- Importance- Stages in creativity- Different Creative activities and their functions –Role of teacher in fostering creative activities.
- Dramatization-Importance -Types of dramatic play-Role of teacher
- Science Skills –Exploring with multiple senses- Aesthetic experiences- Appreciating nature - Topics for Science experience – Role of teacher

UNIT-III Curriculum for ECCE -School Readiness, Music and Play

- School Readiness Concept- Ready children, Ready school and Ready Family.
- Music – Importance — Criteria for selection of songs. − Creating environment for musical growth. − Developmental stages in musical activities − simple musical instruments useful in nursery school –Role of teacher
- Play-definition- Mile stones of play, Types of play and values of play. Promoting pro-social behavior in class room.

UNIT-IV Programme Planning and Pedagogical Approaches in ECE Programme Planning

- Need and importance of programme planning in ECE
- Principles of Programme planning, Long term and Short term, Planning – Yearly plan, Weekly schedule and Daily routine
- Pedagogical Approaches for Curriculum to Pre-school Education- Theme Based Approach, Activity based approach.
- Pedagogical Approaches -Developmentally Appropriate Approach, Project Method and integrated approach.

REFERENCES

1. Audey Curtis and Maureen O'Hagan. (2008). *Care and education in early childhood: A student's guide to theory and practice*, 2nd Edition.
2. Grewal, J.S. (1984). *Early childhood education – Formulations and practices*, National psychological corporation, Agra.
3. Jeanne M.Machado and Helen C.Meyer. (1984). *Early childhood practicum guide*, Deleme Publishers, New York.
4. Lucille lindbers and Rita Swedlow. (1979). *Early childhood education – A guide for observation and participation,* John Wiley of sons., New York
5. Leeper*et al*., (1970). *Good schools for young children – A guide for working with three, four, five years old children*, second edition, McMillan Co, New York.
6. Mohanty, J. and Mohanty,B. (1996). *Early childhood care and education (ECCE)*, Deep and Deep Publications, New Delhi.

7. Sen Gupta, M. (2009).*Early childhood care and education*, PHI Learning Pvt. Ltd.,

JOURNALS

1. Experiments in Education
2. Edutracks
3. Journal of Community Guidance and Research
4. Perspectives in Education

Course Outcomes

After completion of the course, students will able to:

CO1 Realize the significance of brain development during early years and importance of play during pre-school age.

CO2 Describe the importance of curriculum and activities to promote literacy and numeracy among pre-school children.

CO3 Critically explain the importance of different curricular aspects for children's all round development.

CO4 Plan a day's activities and weekly activities for pre-school children and prepare different teaching, learning materials for effective implementation of ECE programme.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		2		3		3				3	3	3	1
CO2					3		3	2			3	3	3	3
CO3					3		3	2			3	3	3	3
CO4					3		3	3			3	3	3	3

H-High(3), M- Medium(2), L-Low(1)

HDCW 103-A: FAMILY DYNAMICS

COURSE OBJECTIVES:

To enable the students to:

1. Know about the terms "Family" "Family life cycle" 'Single family' and 'family crisis'.
2. Understand the changing pattern of Indian family and ethics in family research.
3. Critically explain the laws related marriage and family and role of family counselling centre in providing marital counselling.
4. Assess issues in family like marital adjustments and family crisis through schedules and case study methods.

COMPULSORY FOUNDATION –THEORY

UNIT- I Family

- Family -Definition-Family as component of social system; and as an Institution - Functions of family.
- Different stages of family life cycle, Developmental tasks during family lifecycle- Role expectations at various stages.
- Traditional Indian family -Impact of social change on family and changing patterns in Indian families-Factors influencing, Advantages and disadvantages of changing family patterns.
- Different approaches to family studies -Current issues for research in Indian family -Ethics in family research.
- Theories of family-Functionalism theory, Conflict theory and Symbolic interaction theory.

UNIT-II Family Interactions

- Marital adjustments-Areas of adjustment- Factors influencing marital adjustment, marital adjustment over life cycle. Marital stability and marital quality-Positive and negative dimensions.

- Family communication.-Role of communication in family relationships.
- Factors affecting family interactions- Strategies for improving family communication and interpersonal relations.

UNIT –III Family Variations and Family under Stress

- Family Variations -Dual career families and Women headed Families, Single parent or Binuclear families, Child less families, Divorced families and adaptive families.
- Family as an institution under stress- Family crisis-Disorganized and Re-organized families
- Family resilience and protective factors for promotion of family resilience. - Family counseling centers.
- Family Therapy-Behavioural Family Therapy, Communication Family Therapy.

UNIT-IV Acts and policies related to Marriage and Family

- Hindu Marriage Act, Special Marriage Act
- Dowry prohibition Act
- Domestic violence Act
- P.N.D.T (Pre-Natal Diagnostic Technique Act – 1994).Regulation and Prevention of Misuse.
- National policies and programs for family welfare- Janani Surakshya Yojana, National Health Policy.

REFERENCES

1. Kulkarni, S. (1988). *Parent education perspectives and approaches*
2. Kumud Desai. (1981).*Indian Law of marriage and divorce*, N.M. Tirupati Pvt. Ltd.,
3. Raju, M.L. and Krishna, G.R. (1996).*Future of India family challenges for social work education*.
4. Bharat S. 1996. Family Measurement in India. Sage Publ.
5. Roger L. (2004). Family Therapy - A Constructive Framework. Sage Publ.

6. White JM & Klein DM. 2007. Family Theories. Sage Publ**.** Bridget A. W. Lydia D, Melissa M. B, (2017), Introduction to Human Development and Family Studies, Taylor and Fancis Ltd.
7. Christine A. P., Kevin R. B. andSharon J. P. (2016), Families & Change: Coping With Stressful Events and Transitions, SAGE Publications, Inc.
8. Pauline E. B., Chalandra M. B. and Jay A. M. (2014) Family Stress Management: A Contextual Approach, SAGE Publications, Inc.
9. Froma and Walsh (2017), Strengthening Family Resilience, Third Edition, Guilford Press.
10. Radosveta D., Michael B., Fons V., (2016), Global Perspectives on Well-Being in Advances Families, Springer Pvt. Ltd.
11. Martha J. C. and Jeanne G. B. (2016), Conflict and Cohesion in Families: Causes and Consequences (Advances in Family Research Series), Routledge Publisher.

JOURNALS

1. Journal of Education
2. Journal of Parenting
3. Journal of Community Guidance and Research

Course Outcomes:

After studying the course, students will able to:

CO1 Define the terms Family, Family life cycle, single family and family crisis.

CO2 Discuss the changing pattern of Indian family and Ethics in family research.

CO3 Critically explain the laws related marriage and family and role of family counseling centre in providing marital counselling.

CO4 Assess issues like marital adjustments and family crisis through schedules and case study methods.

CO_PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2									2	
CO2	3	3		2		2	2	3	3	3				
CO3	3	3		2		2	2		3	3	3	2	3	3
CO4	3	3		2		1	3		3	3		3	3	3

H-High(3), M- Medium(2), L- Low(1)

HDCW103-B: GENDER ISSUES IN HUMAN DEVELOPMENT ANDFAMILY RELATIONS

COURSE OBJECTIVES:

To enable the students to:

1. Know about the gender related concepts
2. Understand the theories and gender issues in human development
3. Critically explain the role of values and ethics in family relations.
4. Assess the gender differences in three generations and role of gender in media.

COMPULSORY FOUNDATION –THEORY

UNIT I Concept of gender

- Gender and its biological and socio-cultural connections.
- Importance of gender differences in human development.
- Gender theories- gender orientation theory of Sandra Bem,
- Gender schema theory, theory of ego development and gender.

UNIT II Gender issues in family

- Demographic challenges to family ecology,
- Gender issues in family involvement and cohesiveness (socialization, family roles, responsibilities and family adjustment)
- Impact of gender roles,
- Responsibilities and socialization practices.

UNIT III Role of Values and ethics in family relations

- Working towards family solidarity and social well being
- Role of values and ethics in the promotion of happy family life.

- Role of family in the process of socialization of the children.

UNIT IV Trends in gender role orientation

- Changing trends in gender role orientation,
- Socio- economic and cultural impact on family and society.
- Gender sensitization
- Importance of gender equality

REFERENCES:

1.Channa K. 1988. *Perspective in Indian Development:Socialization, Education and Women: Exploration in Gender Identity.* Orient Longman.

2. Coltrance S. 1997. *Gender and Families.* Fine Forge Press.

3. Gherardi S. 1995. *Gender Symbolism and OrganizationalStructures.* Sage Publ.

4.Narsimhan S. 1999. *Empowering Women An Alternative Strategy for Rural India.* Sage Publ.

COURSE OUTCOMES:

After studying the course, students will able to:

CO1 Define the concepts of gender.

CO2 Discuss the gender issues in human development

CO3 Critically explain the role of values and ethics in family relations.

CO4 Apply the skills in assess the gender differences in three generations and role of gender in media.

CO_PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2									2	
CO2	3	3		2		2	2	3	3	3				
CO3	3	3		2		2	L		2	2	3	2	3	3
CO4	3	3		2		1	3		2	3		3	3	3

H-High(3), 2- Medium(2), L- Low(1)

HDCW 104- A: COMMUNITY NUTRITION

(Common to all specializations of M.Sc., Home Science and M.S Food Technology)

COURSE OBJECTIVES

To enable the students to:

1. Know about nutrients in foods and their functions
2. Understand the consequences of deficiency of taking nutrients.
3. Comprehend knowledge on the role of nutrients in different stages of human life and methods nutritional assessment.
4. Identify the signs and symptoms of different nutrient disorders in community.

ELECTIVE FOUNDATION – THEORY

UNIT-I Food Composition - Grouping and Menu Planning:

- Food Groups – Classification – food composition, properties, characteristics and nutritive values of different foods, Functions of foods and nutrients – cereal grains, millets, pulses, nuts and oil seeds fruits and vegetables, milk and milk products, meat, egg, poultry and fish, spices and condiments.
- Nutrition Through Life Span – Infancy, Early and late childhood, Adolescence, Adulthood and Ageing – Nutritional requirements and Recommended Dietary Allowances (RDA)– Principles of menu planning appropriate to age and stage of life span.

- Justification for special needs during periods of growth and development, pregnancy and lactation – significance of breast feeding –

Unit – II Assessment of Nutritional Status of the Community:

- Need - Methods of Assessment –
- Direct Methods - (i) Diet Surveys (ii) Anthropometric Assessment - (iii).clinical and (iv). Biochemical Assessment
- (b) Indirect Methods - Vital Statistics - Merits and Demerits of methods -
- Nutrition surveys - longitudinal and cross sectional - Family, individual and institutional surveys - Techniques for assessment of age - use of reference standards for the assessment of nutritional status.

Unit – III Major Nutrition Problems of the Community:

- Malnutrition and under nutrition- PEM/CED, obesity- deficiencies vit-A, iron /iodine - Etiology –Symptoms –
- Government programmes to eradicate PEM, vitamin-A, Iron and Iodine deficiencies –
- Principles of planning diets for different conditions of malnutrition

Unit – IV Strategies to Combat Malnutrition:

- Food security – Definition – Management of food insecurity - -Food Fortification and enrichment.
- Food Assistance and Food Supplementation - Policies and Programmes of the Government - Governmental Policies and Programmes.
- Food Assistance and Food Supplementation Programmes - Public Distribution System (PDS) - Food For Work (FFW), Special Nutrition Programme (SNP), School Lunch Programme (SLP), Mid Day Meal Programme (MMP), Balawadi Nutrition Programme (BNP), Integrated Child Development Services (ICDS).
- Nutrition Education - Importance - Approaches Media and Methods

REFERENCES

1. Davidson and Passmore R., Brock, J.F., and Truswell, A.S. (1979). *Human Nutrition and Dietetics,* 7th ed. New York. Churchill Living stone.
2. Gopalan, C. (1992). *Basic issues in combating malnutrition*- NFI Publication.
3. Gopalan, C. (1990). *Women nutrition in India*. NFI Publication.

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5. Mehtab S. Bamji. (1996).*Text book of human nutrition*, Oxford & IBH Co.PVT.LTD, New Delhi,
6. WHO.(1981).*Measuring change in nutritional status* - (NCHS Standards)
7. Monograph on Integrated Training on National Programmes for Mother and Child Development of Women and Child Department, Government of India, New Delhi.
8. Seymour L. HarpenM.D.(1979).*Quick reference to clinical nutrition*
9. Suitor, C.W. and Hunter, M.F. (1980).*Nutrition principles and application in health promotion*, J.B. Lippincot Company, Philadelphia
10. Swaminathan, M. (1990). *Essentials of food and nutrition*, Vol. I and Vol. II Ganesh and co. Madras

JOURNALS AND PROCEEDINGS

1. World review of Nutrition and Dietetics. S. Karger New York and Sydney 1959 onwards.
2. Proceedings of Nutrition society of India. ICMR. NIN Hyderabad, India 1969 onwards.
3. Nutrition Quarterly Journal (ICMR) NIN, Hyderabad.
4. The Indian Journal of pediatrics.
5. The American Journal of clinical nutrition.
6. Journal of Human Nutrition / Applied Nutrition.
7. Future' quarterly journal / UNICEF.
8. Monographs and other publications by ICMR, WHO, FAO, UNICEF and UNESCO,
9. Nutrition Foundation of India.

COURSE OUTCOMES

After completion of this course, students will be able to:

CO1 Know the nutritional problems of the community.

CO2 Acquire knowledge about food groups, RDA and steps in planning a diet.

CO3 Apply skills in planning and calculating nutritive values for the foods and recipes.

CO4 Identify the signs and symptoms of different nutrient disorders in community.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3					3				3		2		3
CO2	3		2	3		1						2		3
CO3		3	3	3		2	2		2	3		3		3
CO4		3	3	3		3	2			3		3		3

H-High(3), M- Medium(2), L- Low(1)

HDCW 104-B: NUTRITION DURING LIFE SPAN

(Common to all specializations of M.Sc., Home Science and M.S Food Technology)

COURSE OBJECTIVES

- To enable the students to:

1. Gain knowledge on the importance of nutrition during life span
2. To do computation of nutrient allowances during life span.
3. Enlighten the principles and working applications during dietary modifications.
4. Comprehensive knowledge on analysing the nutritional requirements.

ELECTIVE FOUNDATION – THEORY

UNIT-I: Nutrition during Pregnancy & Lactation:

- Nutrient requirement during pregnancy, intake and gaps, prenatal and antenatal nutritional importance, metabolic adjustments in pregnancy.
- Nutrition intervention and pregnancy outcome, Nutritional management, problems and Complications.
- Nutritional requirements during lactation, physiology of milk production, effects of lactation on Nutrition composition of Human-Milk,
- Factors affecting breast milk quality and comparative advantages & disadvantages of breast and formula feeding.

UNIT-II: Nutrition during Infancy & Pre-school children:

- Nutritional requirements, concerns and overall development during Infancy.
- Need for infant formulae, types of infant formulae, care in Preparation, and importance of preparation of weaning foods.
- Home prepared versus commercial weaning foods, Feeding problems-Lactose and cow's milk protein intolerance.

- Pre-school children: Age, growth & development, nutrient requirements, Intake and gaps. Effects of Macro & Micro nutrient malnutrition on physical and mental development.

UNIT-III: Nutrition during School-going children & Adolescence:

- Dietary patterns and factors to be considered. Implications of childhood obesity and other nutritional concerns. Healthy food choices during childhood.
- Growth during adolescence, nutritional requirements, hormonal influences, age of menarche-factors affecting, physiological problems and nutritional issues in adolescence.
- Nutritional requirements and RDA. Behavioural characteristics and feeding problems.

UNIT-IV: Nutrition during adulthood and old age:

- Nutritional requirements for adult man and woman. Nutritional concerns, RDA, nutritional guidelines and work efficiency. Physiological changes in aging, effects of aging on nutritional health.
- Modification in diet, feeding old people. Nutritional concerns in old age and their management.

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1. Seth V and Singh K. Diet planning through life cycle: Part 1. Elite publishing house pvt ltd, New Delhi. 2006.
2. Mahtab S. Bamji, Kamala Krishna Swamy and G N V Brahmam. Text book of Human Nutrition. Oxford and IBH Publishing, New Delhi. 2009.
3. Michelle McGuire, Kathy A Beer Man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA
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5. Whitney, E.N. and Rolfes, S.R.(1999). Understanding Nutrition, 8th Edition, West/Wadsworth, An International Thomson Publishing Co.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Acquire knowledge on nutritional requirements at various stages.

CO2 Apply the knowledge of nutrition during planning and preparation of diet.

CO3 Assess and compare diet and nutritional requirements relative to age, developmental and disease status.

CO4 Evaluate nutrition products for composition, quality, and appropriateness of use and formulate dietary interventions to address nutritional deficiencies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2			2					2	3	
CO2	3	3	3	2			3					2	3	
CO3	3	3	3	2					2			2		3
CO4	3	3	3	2			3		2			2		3

H-High-3, M- Medium-2, L- Low-1

HDCW-105: Practical –I -Advanced Study of Human Development (101) + Family Dynamics (103-A)/ Gender Issues in Human Development and Family Relations (103-B)

101-Advanced Study of Human Development

COURSE OBJECTIVES:

1. Acquire skills to assess physical, social, emotional and cognitive development of children from early childhood to adult period
2. Assessment of adjustment problems among adolescents using standardized schedules.

PRACTICALS

1. Observation of infants.
2. Recording all round development of children below 5 years
3. Assessment of cognitive development during late childhood years.
4. Assessment of social development during late childhood years.
5. Assessment of Emotional Maturity during adolescence.
6. Assessment of adjustment problems during adolescence.
7. Preparation/collection of materials for infant stimulation.

COURSE OUT COMES

1. Assess skills to assess physical, social, emotional and cognitive development of children from early childhood to adult period
2. Assessment of adjustment problems among adolescents using standardized schedules.

103-A FAMILY DYNAMICS

COURSE OBJECTIVES:

To enable students to**:**

1. Acquire skills to assess family relationships and also communication patterns in a family.
2. Assess issues in families like marital adjustments and family crisis through schedules and case study methods.

PRACTICALS

1. Assessment of Family relationships
2. Assessment of developmental tasks at different stages of family
3. Assessment of communication patterns in families
4. Case studies of marital disharmony- divorce
5. Assessment of marital adjustment in families
6. Case studies of women headed families
7. Collecting tools to study family dynamics

COURSE OUT COMES

After completion of course students will be able to :

C01 – Apply skills to assess family relationship and communication patterns in a family

C01 – Analyze the reasons for family crisis and utilize the knowledge while providing Counseling to couples and families.

103-B GENDER ISSUES IN HUMAN DEVELOPMENT AND FAMILY RELATIONS

COURSE OBJECTIVES:

To enable;

1. Apply the skills to assess the gender differences in three generations and gender in media.
2. Assessment of gender socialization practices by parents and gender role orientation among adolescents

PRACTICALS:

1. Gender analysis of mass media content, books, television and films.
2. Interview children and parents to study gender socialization practices.
3. Administering gender role orientation scale to adolescents /women interpreting the results.
4. Case study of three-generation families to identify the differences in the gender orientation roles and responsibilities.
5. Case studies for gender role performance.

Course Outcomes:

1. Apply the skills to assess the gender differences in three generations and gender in media.
2. Assessment of gender socialization practices by parents and gender role orientation among adolescents

HDCW-106: PRACTICAL –II- CURRICULUM FOR EARLY YEARS (102) + COMMUNITY NUTRITION (104-A)/NUTRITION DURING LIFE SPAN (104-B)

102-CURRICULUM FOR EARLY YEARS

COURSE OBJECTIVES:

To enable students to;

1. Plan ECE programme according to pedagogies and prepare teaching learning materials for effective implementation for ECE programme.
2. Prepare materials to promote literacy and numeracy for pre-school children and know about different creative activities for young children.

PRACTICALS

1. Observation of a day's Programme in Nursery School/ Anganwadi center.
2. Planning a week programme based on Theme approach.
3. Planning a day's programme based on Developmentally appropriate approach.
4. Preparation / collection of materials for teaching emergent literacy for pre-school children (Story books, Picture cards etc).
5. Preparation/ collection of materials for teaching Numeracy for pre-school children.
6. Planning Creative activities for pre-school children.

Practical Outcomes:

1. Plan a day's activities and weekly activities for pre-school children and prepare different teaching learning materials for effective implementation of ECE programme.
2. Prepare materials to promote literacy and numeracy for pre-school children and plan different creative activities for young children.

104 –A COMMUNITY NUTRITION

COURSE OBJECTIVES

- To enable the students to:

1. Apply the techniques to assess the nutritional status of different age groups.
2. Apply skills for planning diets for nutritional disorders.

PRACTICALS:

1. Assessment of Nutritional Status using Anthropometry,
2. Assessment of Nutritional Status using Dietary method
3. Planning of Diets for Different Nutritional Deficiencies like PEM, Anemia, Vit-A.
4. Planning and Preparation of Programmes for Significant Days like Breast Feeding Week, Nutrition Week, World Food Day.
5. Study of the following through visits
   - Govt School Lunch Programme
   - ICDS Programme
   - Anganwadi Training Centers.
6. School Lunch Programme at Sri Venkateswara University Laboratory Nursery School.
7. Community Nutrition Programme Planning - Introduction, Identification of problem, nutritional assessment, analysis of causes, resources, constraints, selection of interventions, setting a strategy, implementations, evaluation of the programme

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Skills in planning and calculating nutritive values for different nutritional disorders.

CO4 Understand the skills in assessing the nutritional status by different method different age

groups.

104 -B NUTRITION DURING LIFE SPAN

COURSE OBJECTIVES

- To enable the students to:

1. Apply Computational skills in the Nutritional allowances during life span.
2. Develop skill in planning and preparation of diets for different age groups.

PRACTICALS:

1. Planning and preparation of diet for pregnant women.
2. Planning and preparation of diet for lactating women.
3. Planning and preparation of weaning foods.
4. Planning and preparation of diet for pre-school child.
5. Planning and preparation of diet for school going child.
6. Planning and preparation of diet for adolescent.
7. Planning and preparation of diet for adult.
8. Planning and preparation of diet for old age.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Assess and compare diet and nutritional requirements relative to age, developmental and disease status.

CO2 Evaluate nutrition products for composition, quality, and appropriateness of use and formulate dietary interventions to address nutritional deficiencies.

HDCW 107: HUMAN VALUES AND PROFESSIONAL ETHICS - I
(AUDIT COURSE)

COURSE OBJECTIVES

To enable the students to:

1. Define the term 'ethics' , 'good and bad values', crime and punishment and religious tolerance.
2. Understand the importance of good character, conduct and values embedded in various religions.
3. Apply knowledge of professional ethics and correlate the concepts in addressing the ethical issues outside the class room .
4. Demonstrate knowledge of ethical values in non-class room activities, internships and field work and resolve the moral issues.

Unit-I Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

Unit-II Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom. Good behavior and respect for elders, Character and Conduct.

Unit-III Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)- Dharma (Righteousness), Artha (Wealth), Kama(Fulfillment Bodily Desires). Moksha (Liberation).

Unit-IV Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths – AryaAstangamarga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.

Unit-V Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

REFERENCES

1. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
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3. Maitra, S.K: Hindu Ethics
4. William Lilly: Introduction to Ethics
5. Sinha: A Manual of Ethics
6. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Halighton.
7. SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. Chowkarnba Sanskrit series. VolLlI and Ill, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
8. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
9. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
10. Analyzing Moral.Issues, Judith A. Boss. May Field Publishing Company - 1999.
11. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications

COURSE OUTCOMES:

After studying the course, students will able to:

CO1 Define the term ‘ethics’, ‘good and bad values’, crime and punishment and religious tolerance.

CO2 Understand the importance of good character, conduct and values embedded in various religions.

CO3 Apply knowledge of professional ethics and correlate the concepts in addressing the ethical issues outside the class room.

CO4 Demonstrate the ability to face difficult situations in non-class room activities, internships and field work and resolve them confidently.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2							2			2	3	
CO2	3	2							2	1		2		
CO3	3	2							2			2		3
CO4	3	2		2		3			2			3		3

H-High (3), M- Medium (2), L- Low(1)

II SEMESTER

DEPARTMENT OF HOME SCIENCE

M. Sc. HUMAN DEVELOPMENT AND CHILD WELFARE

CHOICE BASED CREDIT SYSTEM (CBCS)

(With effect from academic year 2021-22 onwards)

HDCW 201: QUALITY STANDARDS IN ECE CENTERS

COURSE OBJECTIVES:

To enable the students to:

1. Identify Government, private and voluntary Initiatives that are offering ECE.
2. Understand principles of quality standards and the ideal requirements for establishing a pre-school.
3. Explain Personal and professional competencies of ECCE Educator and qualities of ECE supervisors.
4. Plan a day's activities for pre-school children, prepare Teaching Learning Materials and participate as student teacher in S.V.U Laboratory nursery school

CORE -THEORY

UNIT I Quality Standards in ECCE Centres

- Early childhood Initiatives – Government, Private and Voluntary Initiatives.
- Quality Standards – Importance - Principles of Quality Standards, Key domains of Quality Standards in India-
- Quality Assurance in ECE –Process quality and Structural quality
- ECCE in National Educational Policy 2020

UNIT II Infrastructure / Physical Environment

- Ideal requirements for establishment of a preschool - Location, Site and Building plan, Rooms, Ventilation etc – Indoor and outdoor Space requirements.
- Other Facilities- Sanitary, Storage and Drinking water .
- Learning/ Activity corners – reading and story book corner , Dramatic play corner , puzzles and blocks corner , creative corner, science corner and music corner.
- Essential learning and Play Materials – outdoor and indoor- Selection and Maintenance of Equipment
- Promotion of Child Friendly Environment –Significance, characteristics and aspects of child friendly schools

UNIT III ECCE Educator and Other personnel

- Personal and professional competencies of ECCE Educator.
- Role of teacher in different Philosophies- Montessori, Reggio Emilia and Froebel's kindergarten.
- Goals of Student Teacher, Common problems of student teachers.
- Other Personnel in ECCE Centers-Supportive staff , helper, cook , driver etc

UNIT IV Supervision and Monitoring in ECE Centers

- Supervision-Need and Purpose in ECE setting- Principles of effective supervision.
- Monitoring- Meaning and need for monitoring in ECE
- Records and Registers in ECE center – need and importance – Types of records and registers-Child related , staff and School related.
- Home School relationship – Home visits, PTA meetings and Informal meetings

REFERENCES

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2. Bilman, J. and Sherman, J.(2003). *Observation and participation in early childhood settings*, Allyn and Bacon, New York.
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4. Grewal, J.S. (1984). *Early childhood education – formulations and practices*, National psychological corporation, Agra.
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6. Many Crawl Day and Ronald K. Parker. (1980). *The pre –school in action exploring early childhood programs*, second edition, Allyn and Bacon Inc. Boston, London.
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8. Sen Gupta, M. (2009).*Early childhood care and education*, PHI Learning Pvt. Ltd.,

JOURNALS

1. Edutracks
2. Experiments in Education
3. Journal of Community Guidance and Research
4. Perspectives in Education
5. Psycho-lingua

COURSE OUTCOMES:

After studying the course, students will able to:

CO1 Locate pre-schools run by Government, private and voluntary Initiatives at local, Level and gain knowledge of different initiatives at District, state and national levels.

CO2 Explain principles of quality standards and the ideal requirements for establishing a pre-school.

CO3 Apply knowledge to become a competent of ECCE Educator and Supervisor to monitor pre-schools.

CO4 Plan a day's activities for pre-school children, prepare Teaching Learning Materials (TLM) and to demonstrate skills of good pre-school teacher and

Pre-school coordinator.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3					1					3		3	
CO2			2		3	3	2				3		3	
CO3	3		3	2	3	3	2				3	3	3	3
CO4	3		3		3	3	3	3			3	3	3	

H-High(3), M- Medium(2), L- Low(1)

HDCW 202: THEORIES OF HUMAN DEVELOPMENT AND BEHAVIOR

COURSE OBJECTIVES

To enables the students to:

1. Describe the meaning of 'theory', characteristics of theory and different theoretical approaches to human development.
2. Understand the role of unconsciousness in usage of 'defense mechanisms' , stages in cognitive development and role of learning in determining behavior .
3. Relate principles of different theories, and explain the reasons for mal adaptive behavior.
4. Apply the knowledge of theories to understand the behavior of individuals and also in extending counseling.

CORE –THEORY

Unit - I Introduction to Theory and Psycho-Dynamic Theories

- Definition, Relation between concept, Theory and Hypothesis – Inductive and deductive reasoning, Characteristics of a theory, Functions of a theory.
- Major theoretical approaches to Human Development
- Freud's Psychoanalytical theory, key concepts of psycho analytical theory, Structural model of personality. Psycho-sexual stages of personality development.
- Defense mechanisms-Definition -Different defenses - Contribution and criticism of Freudian theory.

Unit - II Psycho-Social and Cognitive theories

- Psycho-social theory of Erickson – concept and basis of development, Psycho-social stages of life.
- Cognitive Development Theories- Piaget's theory of Cognitive Development - concepts, cognitive mechanism, cognitive structure and different stages of cognitive development.
- Howard Gardner's Multiple Intelligence theory.

Unit - III Behavioural and Ecological Systems Theories

- Basic learning Principles – Pavlov Classical conditioning theory.
- Behavioural approach of Watson. Operant conditioning by Skinner and Thorndike.
- Social-Learning theory by Albert Bandura
- Ecological Systems theory of Urie Bronfrenbrenner.

Unit – IV Moral, Attachment and Self Theories

- Kohlberg's theory of Moral Development-
- Chomsky's theory of Language Development- Key Principles of Chomsky's Model of Language Acquisition-
- Vygotsky Sociocultural Theory of Cognitive Development
- Bowlby's Attachment theory-The Stages of Attachment-factors that influence attachment.
- Abraham Maslow's self-actualization theory-The Hierarchy of Needs-Characteristics of a self-actualized person.

REFERENCES

1. Hall CS and LindZay, G. (1985).*Theories of personality*, 3rd edition, Wiley Eastern Limited, New York.
2. Murray Thomas. (1999).*Comparing theories of Human development*, Saga Publication.
3. Narayan Rao, S. (1992).*Counseling and guidance*, 2nd Edition, Tata Mcgraw hill Co,
4. Miller P H (2016). Theories of Developmental Psychology. Worth Publishers, New York.
5. Newman B and Newman R (2007). Theories of Human Development. Rutledge, New Jersey.

6. Sailkind N J (2004). An Introduction to Theories of Human Development. Sage Publications, New Delhi.
7. Neil J. S, (2016), Theories of Human Development and Behavior, SAGE Publications Inc
8. Barbara M. N, (2016), Theories of Human Development Second Edition, T&F/Routledge publisher.

JOURNALS

1. Psycho Lingua
2. Indian Journal of Psychology
3. Journal of Psychometric
4. British Journal of Guidance.
5. Journal of Counselling Psychology.
6. The School Counsellor.
7. Journal of Community Guidance and Research.

COURSE OUTCOMES

After completion the course, students will able to

CO1 Describe the meaning of a 'theory', characteristics of theory and different theoretical approaches to human development.

CO2 Understand principles of Freud's, Erickson's, Bandura and Allport's personality theories, learning theories of Pavlov and Watson's , cognitive development theories of Piaget and Gardner's multiple intelligence theory, Kohlberge and Piaget's theories of moral development and theories of language and attachment .

CO3 Relate principles of different theories, and explain the reasons for maladaptive behavior.

CO4 Apply the knowledge of theories to understand the behavior of individuals and also in extending counseling.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3				3			3	3		
CO2	3	3		3				3			3		3	3
CO3	3	3						3			3		3	3
CO4	3	3		3				3	2		3		3	3

High-(3), Medium -(2), Low -(1)

HDCW 203 -A : PARENT AND COMMUNITY EDUCATION

COURSE OBJECTIVES

To enable the students to:

1. Know about the concept of parenting, need for parent education in difficult circumstances
2. Identify different child rearing practices and different parenting styles adopted by parents
3. Explain critically about impact of different parenting styles on children's behavior
4. Develop educational materials and apply skills to plan, conduct and organize parent education programmes in community and PTA meetings in school.

CORE -THEORY

UNIT-I Parent Education - Approaches

- Setting goals of parent education – Broad goals and specific goals
- Theoretical approaches to parent education- Dreikur's Democratic approach , Berne's Transactional analysis , Skinner's behaviour Modification approach and Ginott's Humanistic approach.

- Formulating curricula for parent education –Parent Initiated, Teacher Initiated and Action Oriented Curricula.
- Need and Importance of parent education in India.

UNIT-II Parent Education -Methods

- Methods of parent education in Preschool settings- Direct and Indirect, Basic approaches to communication – Group – Mass and mini group, Individual approach, Multimedia approach, Distance and home approach.
- Planning, organizing and evaluation of group educational programmes.
- Role of teacher as parent educator- Importance of Parent Teacher Association (PTA) meetings.
- Parent involvement in community programmes.

UNIT-III Parent Education – Child Rearing Practices

- Importance of Child rearing practices- Role of culture and environment in child rearing practices
- Changing role of parents in parenting. -Role of father in child rearing.
- Parenting Styles -democratic, authoritative, authoritarian- Impact of parenting styles on children's behaviour

UNIT-IV Special Target groups for Parent Education –

- Strategies and Management skills for parents to deal with normal children and children of developmental delays and disabilities.
- Strategies and Management skills for Parents of Economically and socially disadvantaged children
- Strategies and Management skills for Parents of - Developmentally challenged Children- Physically challenged and Mentally challenged children,
- Strategies and Management skills for Parents of Adopted children.- Single parent- Father headed and mother headed families- Dual career parents.

REFERENCES

1. Fine, Rarving.(1980).Handbook on Parent Education.
2. Kulkarni, S. (1986).Introduction to Educational Technology, Oxford and I.B.H. Publishing Co.
3. Kulkarni, S. (1988).Parent Education Perspectives and Approaches.
4. Paul Choudary. (1995).Child Welfare and Development, Atma Ram and Sons, New Delhi.
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8. McConnell, Charlie (2002). Community Learning and Development: The Making of an Empowering Profession. Edinburgh: Community Learning Scotland/PAULO. ISBN 0-947919-75-9.

COURSE OUTCOMES

After completion of the course, students will able to:

CO1 Know about the concept of parenting, need for parent education in difficult circumstances.

CO2 Identify different child rearing practices and different parenting styles adopted by Parents.

CO3 Explain critically about impact of different parenting styles on children's behavior.

CO4 Developing educational materials and apply skills to plan, conduct and organize parent education programmes in community and PTA meetings in school.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2			3		3		3					3	3
CO2			3	3		3		3		3	2			3
CO3		1		3		3	3	3						3
CO4			2	3	2	3	3	3					3	3

H-High(3), M- Medium(2), L- Low(1)

HDCW 203-B: INFANT DEVELOPMENT AND STIMULATION

COURSE OBJECTIVES

To enable the students to:

1. Know the terms 'child rearing practices', 'stimulation' and identifies the importance of attachment during infancy period.
2. Understand the importance of culture, role of father and grandparents in child rearing practices.
3. Apply knowledge of stimulation activities for physical, language, cognitive and social development of infants.
4. Plan stimulating activities for infants and prepare them using indigenous materials.

GENERIC ELECTIVE - THEORY

UNIT I New Born and Infant Development

- New born behavior
- New born capacities
- Sleeping Patterns of new born
- Early deprivation and enrichment-impact on Infant's development

UNIT II Child Care Practices

- Importance of child rearing practices
- Role of environment in child rearing
- Types of child rearing-role of culture
- Child care Practices –Massage, Bathing Toilet Training and
- Sleeping patterns
- Role of father's in child rearing

UNIT III Stimulation

- Stimulation - Definition, Importance, Early experiences and developmental consequences, Family and environmental stimulation.
- Stimulation to nurture holistic development
- Activities for physical development

- Activities for social and emotional developments
- Activities for language development
- Activities for cognitive development

UNIT IV Early Interaction

- Early interaction, a beginning in attachment formation
- Course of attachment –
- Attachment theory
- Dyadic versus multi caring
- Supportive care – Role of grandparents,
- Role of child care centres

REFERENCES

1. Caldwell. (1981). *Infant stimulation – Assessment; Role of environment*, University of Kansas, USA,
2. Stone L.J., Smith, T.H. and Murphy, C.B. (1974). *The competent infant,*GreatBritain,Tavistock Publications.
3. Super C.H. (1981).*Cross Cultural Research on infancy*, In H. Triandis and Heron (Eds), Handbook of Cross Cultural Psychology, Vol. 4, 17-53, Bostoan: AllynBacon.
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5. Swaminathan. (1998). The*First five years: A critical perspective on early childhood carry and education in India*. New Delhi: Sage.

JOURNALS

1. Journal of Pediatrics
2. Journal of Abnormal Child Psychology
3. Journal of Child Development

COURSE OUTCOMES

After completion of P the course, students will able to:

CO1 Define the terms 'child rearing practices', 'stimulation' and identifies the importance of attachment during infancy period.

CO2 Understand the importance of culture, role of father and grandparents in child rearing practices.

CO3 Apply knowledge of stimulation activities for physical, language, cognitive and social development of infants

CO4 Plan stimulating activities for infants and prepare them using indigenous materials

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3	3				2					3	3
CO2	3		3			3		2						3
CO3	3		3	3				2					3	3
CO4	3		3		2			2						3

H-High(3), M- Medium(2), L- Low(1)

HDCW 204-A: RESEARCH METHODOLOGY

(Common to All branches of Home Science and MS Food Technology Course)

COURSE OBJECTIVES

To enable the students to:

1. Get awareness about terms like 'variables', 'hypothesis', research 'and recognize the purpose of doing research.
2. Understand different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research.
3. Critically apply knowledge to select a sample by using different sampling methods like probability and non-probability sampling.
4. Develop a research proposal in the appropriate scientific style.

ELECTIVE FOUNDATION-THEORY

UNIT – I : Research Purpose and Types

- Research – Significance, meaning, objectives, Approaches,
- Research process, Criteria of good research, Variable- types
- Types of Research: Historical, descriptive, experimental, case study, survey research, participatory research, Fundamental, applied and action, exploratory research.
- Research hypothesis-Characteristics of good hypothesis.
- Research Design – Meaning, Need, Concepts, Principles and Types of research design

UNIT – II: Research Problem and Sample design

- Definition and Identification, Necessity and Selection of Research problem, Technique involved in defining the research problem.
- Population and Sample – Implications, Steps, Criteria and Characteristics of a good design

- Sampling Methods : *Probability sampling* **-** Simple random, systematic random sampling, two Stages and multi stage sampling, cluster sampling and *Non-probability sampling* - Purposive, quota and volunteer sampling / Snowball Sampling.

UNIT –III : Methods of Data Collection

- Primary and Secondary Data, Selection of appropriate method for data collection
- Different Methods and techniques of data collection - Interview, Observation, Social mapping, Participatory assessment Techniques, Observation check list, Questionnaire, Interview schedule, Group discussions, Case studies.

UNIT –IV: Measurement Scales

- Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques
- Research Proposal – Preparation.

PRACTICALS

1. Identification of different variables in specialization of study.
2. Framing of hypothesis-Null and alternate Hypothesis
3. Preparation of schedule/questionnaire.
4. Preparation of research proposal
5. Study of an article in a journal-Abstract, Methodology, Results and Bibliography

REFERENCES

1. Kothari, C.R. (2004).:*"Research Methodology (Methods and Techniques)".* New Age International (p) Ltd., New Delhi.
2. Bandarkar, P.L. and Wilkinson T.S. (2000) :*"Methodology and Techniques of Social Research"*, Himalaya Publishing House, Mumbai.
3. Batnagar, G.L. (1990) :*"Research Methods and Measurements in Behavioural and Social Sciences",* Agri. Cole publishing Academy, New Delhi.
4. BajPai S.M. (1987). *"Methods of Social Survey and Research"*Kitab Ghat, Kanpur-3

5. Black, T.R. (1999).:*"Doing Quantitative Research in the Social Sciences"*, Sage Publications, New Delhi.
6. Dev Doss R.P. and Kulandavel K (1985).*"Hand book of methodology of research"* Oxford Press,
7. Goode J.W. and Hatt P.K. *"Methods in Social Science Research"* Mc. Graw hill-Co. New York.
8. Sharma S.R. (1994). *"Statistical methods in Educational Research"*, Anmol Publications Pvt. Ltd., New Delhi.

COURSE OUTCOMES

After studying the course, students will able to:

CO1. Define terms like 'variables', 'hypothesis', research'and state the purpose of doing research

CO2. Understand different types of search and can compare the advantages and dis-advantages of each type of research

CO3. Critically know the procedures for identifying an ideal sample for scientific research.

CO4. Prepare a research proposal in the appropriate scientific style.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			3		3	2		2		2	3	2	
CO2				3		3	3				2	3	3	
CO3		1		3		3			2		3	3	3	1
CO4				3		3	3		3			3	3	3

H-High-1, M- Medium-2, L- Low-3

HDCW 204-B: STATISTICS AND COMPUTER APPLICATIONS

(Common to All branches of Home Science and MS Food Technology Course)

COURSE OBJECTIVES

To enable the students to:

1. Get awareness about the scope of statistics in research.
2. Understand the concepts of inferential statistics like t-test, chi-square, Correlation and Variance.
3. Critically apply knowledge of application of statistics in data analysis.
4. Know about the application of computers in research process.

ELECTIVE FOUNDATION-THEORY

UNIT- I: Statistics

- Statistics: Meaning, Definition and Scope, limitations – Role of statistics in Research
- Descriptive Statistics: Classification and tabulation of data, Graphic and diagrammatic presentation of data, measurement of central tendency, variation and dispersion, Normal distribution, Frequency distribution, histogram, frequency polygons, curve ogive
- Levels of Significance

UNIT – II: Inferential statistics

- 't' test for large samples (mean and proportions) and small samples
- Chi square test for significance and association
- Analysis of variance-one way, two way
- Correlation, coefficient of correlation, rank correlation

UNIT – III: Computer Applications I

- Introduction to Computer-Block diagram, PC and its components, Memory capacity, Physical storage of data, various devices, Hardware and software operating- DOS commands for file handling.

- MS Office and its component – Word and its applications/ creating documents, editing spell check, auto correct and print preview, creating tables and sorting data in tables, mail merge and its usage.

UNIT – IV: Computer Applications II

- MS Excel for data analysis - Work sheet and its structure, data entry, editing, Sorting filtering and copying.
- Statistical functions in Excel – Data analysis park for performing descriptive statistics, t-test, ANOVA, Correlation and regression.
- Graphs in Excel – Various types of graphs, editing graphs

REFERENCES

1. Kothari, C.R. (2004).:*"Research Methodology (Methods and Techniques)".* New Age International (p) Ltd., New Delhi.
2. Bandarkar, P.L. and Wilkinson T.S. (2000) :*"Methodology and Techniques of Social Research"*, Himalaya Publishing House, Mumbai.
3. Batnagar, G.L. (1990) :*"Research Methods and Measurements in Behavioural and Social Sciences",* Agri. Cole publishing Academy, New Delhi.
4. BajPai S.M. (1987). *"Methods of Social Survey and Research"*KitabGhat, Kanpur-3
5. Black, T.R. (1999).:*"Doing Quantitative Research in the Social Sciences"*, Sage Publications, New Delhi.
6. Dev Doss R.P. and Kulandavel K (1985).*"Hand book of methodology of research"* Oxford Press,
7. Goode J.W. and Hatt P.K. *"Methods in Social Science Research"* Mc. Graw hill-Co. New York.
8. Sharma S.R. (1994). *"Statistical methods in Educational Research"*, Anmol Publications Pvt. Ltd., New Delhi.

COURSE OUTCOMES

After studying the course, students will able to:

CO1. Define terms like 'frequency distribution', 'Variance' , 'Correlation' and its scope in research data

CO2. Understand different types of statistics that are used in research data.

CO3. Critically know the calculations of different statistics of research data.

CO4. Know the use of computer applications in research process.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			3		3	2		2		2	3		
CO2				3		3	3				2	3	1	
CO3		1		3		3			2		3	3	2	1
CO4				3		3	3		3			3	1	2

H-High-1, M- Medium-2, L- Low-1

PRACTICAL –I HDCW 205 QUALITY STANDARDS IN ECE (201) + PARENT AND COMMUNITY EDUCATION (203-A)/INFANT DEVELOPMENT AND STIMULATION (203-B)

201-QUALITY STANDARDS IN ECE

COURSE OBJECTIVES:

This course helps the students to;

1. Apply skills to evaluate personal and professional qualities of a pre school teacher.
2. Plan a day' s activities for pre school children, prepare teaching learning materials.

PRACTICALS

1. Observation of indoor and outdoor equipment in a pre-schools of different sectors
2. Evaluation of pre-school teacher/ Student teacher using a scale
3. Observation of records and registers maintained in a pre-school
4. Student Teacher participation in a pre-school
    - Planning programme
    - Preparation of Audio-Visual Aids
    - Implementation of programme
    - Evaluation of Student Teacher's Participation

Course Outcomes:

After studying the course ,student will able to ;

CO1: Plan a day's activities for pre-school children based on theme approach and developmentally appropriate approach.

CO2: Prepare teaching learning(TL) material and demonstrate skills which helps to to establish pre-schools as entrepreneurs and to serve as pre-school teachers and coordinators in Government and Non-government organizations.

203-A PARENT AND COMMUNITY EDUCATION

COURSE OBJECTIVES:

This course helps the students to;

1. To plan and prepare education materials for parent education programme.
2. To conduct parent education programme and evaluate.

PRACTICALS

1. Planning, Organizing and Evaluation of PTA meeting in urban, rural, slum areas
2. Preparing an interview schedule to study the knowledge and attitudes of parents on child care practices
3. Assessment of child rearing practices adopted by parents
4. Assessment Adolescents perception of parenting styles adopted by their parents
5. Sensitizing parents on behavioural problems and management techniques.

6.Preparation of educational material for community participation

COURSE OUTCOMES:

After studying the course ,student will able to ;

1. To plan ,prepare education materials for parent education programme.
2. To plan ,conduct and evaluate parent education programmes

203-B INFANT DEVELOPMENT AND STIMULATION

COURSE OBJECTIVES:

This course helps the students to;

1. To plan stimulation activities for infants.
2. To prepare infant stimulation materials using indigenous materials..

PRACTICALS

- Observation of Infants
- Preparation/collection of materials for infant stimulation.
- Assessment of child rearing practices in different religions
- Development of infant stimulation materials for
    - Physical development
    - Social development
    - Language development
    - Cognitive development
- Assessment of role of grandparents in child rearing practices

COURSE OUTCOMES:

After studying the course ,student will able to ;

1. To plan stimulation activities for infants.

To prepare infant stimulation materials using indigenous materials

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PRACTICAL –II HDCW 206 THEORIES OF HUMAN DEVELOPMENT AND BEHAVIOUR (202) + REASEARCH METHODOLOGY (204-A)/STATISTICS AND COMPUTER APPLICATION (204-B)

202-THEORIES OF HUMAN DEVELOPMENT AND BEHAVIOUR

COURSE OBJECTIVES:

This course helps the students to;

1. Apply the knowledge of theories to understand the behavior of individuals.
2. Explain the reasons for maladaptive behavior by assessment , analyzation and comparison of different personalities.

PRACTICALS

1. Assessment of personality using a standardized scale
2. Analyzing Film/ TV/ Book/ characters –Assessment of usage of various defense mechanisms by characters.
3. Analyzing Film/ TV/ Book/ characters –Analyzing Humanistic perspective of any character striving to reach maximum potential.
4. Analyzing Film/ TV/ Book/ characters –Social cognitive perspective –Analyzing an instance where characters have observed, evaluated and imitated the behavior.
5. Comparisons of different personality theories .

COURSE OUTCOMES:

After studying the course ,student will able to ;

1. Assess personality of individuals using different techniques.

2. Apply skills of personality theories in counselling when they join as a counsellors in schools, colleges and mental health institutions.

204-A RESEARCH METHODOLOGY

COURSE OBJECTIVES

- To enable the students to:

1. Critically apply knowledge to select a sample by using different sampling methods like probability and non-probability sampling.
2. Develop a research proposal in the appropriate scientific style.

PRACTICALS

1. Identification of different variables in specialization of study.
2. Framing of hypothesis-Null and alternate Hypothesis
3. Preparation of schedule/questionnaire.
4. Preparation of research proposal
5. Study of an article in a journal-Abstract, Methodology, Results and Bibliography

COURSE OUTCOMES - After studying the course, students will able to:

CO1 Critically know the procedures for identifying an ideal sample for scientific research.

CO2 Prepare a research proposal in the appropriate scientific style.

204-B STATISTICS AND COMPUTER APPLICATIONS

COURSE OBJECTIVES

- To enable the students to:

1. Critically apply knowledge of application of statistics in data analysis.
2. Apply skills in using computer applications for data analysis

PRACTICALS

1. Graphic and diagrammatic presentation of data.
2. Calculation of Averages- Arithmetic mean, mode and median.
3. Calculation of Standard deviation and 't' test for large and small samples.
4. Calculation of Correlations.
5. Calculation of chi square to find out significance of association.

COURSE OUTCOMES

- After studying the course, students will able to:

CO1 Critically know the calculations of different statistics of research data.

CO2 Apply skills in using computer applications for data analysis.

HDCW 207- HUMAN VALUES AND PROFESSIONAL ETHICS - II

(AUDIT COURSE)

COURSE OBJECTIVES

To enable the students to:

1. Associate the terms 'value education' 'self-introspection' and 'self-esteem' which are the core aspirations of all human beings.
2. Understand the importance of ethics in different fields like medical, business, environment and social ethics and ethics of media.
3. Apply the knowledge to assess issues and problems in each profession and correlate the concepts in addressing the ethical issues while choosing and joining a profession.
4. Develop all round and well balanced personality of the students and shapes them to become morally finer, socially responsible and physically fit persons of the society.

AUDIT COURSE - THEORY

Unit - I Value Education

- Definition - relevance to present day - Concept of Human Values - self introspection – Self-esteem - Family values-Components, structure and responsibilities of family- Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

Unit - II Medical ethics

- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia,

Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion.

- Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit - III Business ethics

- Ethical standards of business-Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit – IV Environmental ethics

- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

Unit – V Social ethics

- Organ trade. Human trafficking. Human rights violation and social disparities, Feminist ethics. Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

REFERENCES

1. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Halighton.
2. SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. ChowkarnbaSanskrit series. VolLlI and Ill, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
3. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
4. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
5. Analyzing Moral. Issues, Judith A. Boss. May Field Publishing Company - 1999.
6. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications

7. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.
8. I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar

COURSE OUTCOMES

After completion of the course, students will able:

CO1 Associate the terms 'value education' 'self-introspection' and 'self-esteem' which are the core aspirations of all human beings.

CO2 Understand the importance of ethics in different fields like medical, business, environment and social ethics and ethics of media.

CO3 Apply the knowledge to assess issues and problems in each profession like medical, business, environment and social ethics and ethics of media and correlate the concepts in addressing the ethical issues while choosing and joining a profession.

CO4 Apply skills for anger management, care of elderly, environmental protection and thereby develop well balanced personality and will contribute to society as morally finer, socially responsible and physically fit persons.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1									3			3	2	2
CO2									3			3	2	2
CO3									3			3	2	2
CO4		2				2			3			3	2	2

H-High(3), M- Medium(2), L- Low(1)

SEMESTER III

HDCW 301: CHILD STUDY TECHNIQUES

COURSE OBJECTIVES

To enable the students to:

- Recognize the concepts of of IQ, Personality and Psychological tests
- Understand about different types of Psychological tests and about reliability and validity of Psychological tests
- Apply knowledge to use tests of intelligence and Projective Techniques to measure the intelligence and personality of individuals.
- Assess the physical, psychomotor, social and Cognitive development / intelligence of children using different standardized tools.

CORE -THEORY

UNIT I Child Study

- Psychological Tests – Nature, Characteristics and Uses of Psychological Tests – Significance of child study techniques,
- Types of Psychological tests
- Approaches to child study techniques

UNIT II Assessment Techniques

- Assessment – Definition, Functions of assessment, Domains of assessment, Stages of Assessment.
- Scale construction- Standardization through scientific methods- Item analysis, Reliability- types and Validity - types

- Norms and Interpretation of Test scores
- Importance of rapport in Testing.
- Ethical issues in assessment

UNIT III Assessment of Physical and Cognitive abilities

- Assessment of Physical Development -Gesell's Motor development schedule and anthropometric measurements-reference standards
- Assessment of Mental Ability-Raven's Progressive Matrices Test, Seguin Form Board Test, Wechsler's Scale of Intelligence, Alexander Pass a- long test
- Paper Pencil Test- Draw a Person Test

UNIT IV Assessment of Personality–Direct, projective techniques and Alternative assessment techniques

- Personality Assessment - Meaning, types of personality tests- Direct and projective techniques.
- Direct Techniques-Cattle 16PF
- Projective techniques- Rorschach Ink Blot Test, Children's Anxiety picture Test, and Word Association Test
- Alternative Assessment Techniques-Alternative Assessment Techniques – Observation, anecdotal records, Portfolio, Interview, Case Study, Check lists and Rating Scales.

REFERENCES

1. Gregory R J (2004). Psychological Testing - History, Principles and Applications. 4th Ed., Pearson Education, Atlantic.
2. Gumbiner J (2003). Adolescent Assessment. John Wiley & Sons, New Jersey.
3. Kumar R (2014). Research Methodology - A Step by Step Guide for Beginners, 4th Ed., Sage Publications, New Delhi.
4. Miller L A and Macintire S A and Lovler R L (2012). Foundations of Psychological Testing - A Practical Approach. 4th Ed., Sage Publications, New Delhi.
5. Anasthasi, A. (1984).*Psychological testing*, Macmillan Company, London.
6. Mangal, S.K. (1987).*Psychological foundations of education*, Prakash brothers, New Delhi.

7. Mussen, P.H. (1980).*Hand Book of research methods in child development* , Wiley, Eastern Pvt. Ltd.
8. Gulati R &Gugnani A.1994 Child Development - A practical Manual. Phoenix Publ.
9. Kothari CR.1999, Research Methodology - Methods and Techniques.
10. WishwaPrakashan. Sharma RA. 1999. Essentials of Measurement in Education and Psychology.

JOURNALS

1. Journal of Psychometry
2. PRACHI Journal
3. Psycho Lingua
4. Indian Psychological Review

COURSE OUTCOMES

After completion of the course, students will able to:

CO1 Define the concepts of IQ, Personality and Psychological tests

CO2 Explain about types of psychological tests and also about methods of obtaining reliability and validity of psychological tests

CO3 Apply knowledge to use tests of intelligence to measure the intelligence and Projective Techniques to assess personality of individuals.

CO4 Assess the physical, psychomotor, social and Cognitive development / intelligence of children using different Psychological tools.

CO_PO mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3	2					3		3					3
CO3		2	3	3		3			3		3	2	3	3
CO4	3	3	3	3		2	2	2	3		2	2	3	3

H-High(3), M- Medium(2), L- Low(1)

HDCW 302: CHILDREN WITH DEVELOPMENTAL CHALLENGES

COURSE OBJECTIVES

To enable the students to:

1. Define the terms ‘disability’, ‘impairment’, ‘handicapped’ and ‘Juvenile delinquency’.
2. Understand the classification of children with developmental challenges and explain causes for various impairments like visual, hearing impairment, speech and language disorders among children and legislations for their welfare.
3. Apply knowledge of principles of assessment of children with disabilities to plan for their management.
4. Assess the characteristics of gifted children, children with speech disorders and children with learning disability in local elementary school using simple assessment tests.

COMPULSORY FOUNDATION -THEORY

UNIT I Developmentally Challenged - Classification

- Definition and concepts of children with developmental challenges/ disabilities/ impairments, delays and handicapped.
- Classification of children with developmentally challenged
- Professionals working for developmentally challenged children
- Current status of Disabilities in Indian context

UNIT II Differently Abled Children

- Gifted children-Definition, Screening and Identification, Characteristics, Educational programmes.
- Mentally Challenged -Definition and classification, Causes, Identification, Characteristics, Contemporary educational provisions.
- Learning disability – Definition, Causes, Identification, types of educational

approaches.

- Autism Spectrum Disorder- Definition, Causes, Characteristics, Identification, types of educational approaches.
- Attention Deficit Hyperactive Disorder-Definition, Causes, Characteristics, Identification, types of educational approaches.

UNIT III Children with Impairments

- Visual impairment- Definition, classification, Causes, Characteristics, Educational consideration for the visually impaired children.
- Hearing impairment- Definition, classification, Causes, Characteristics, Methods of educating learning impaired.
- Children with Physically challenged- Definition, classification, problems, adaptive equipment, early intervention.
- Speech and language disorders-Nature, classification of speech disorders. Language disorders- Causes, Identification, Characteristics-Management.

UNIT IV Emotional or Behavioural Disorders among Children

- Behaviour problems - Nature of behavioural problem, types, characteristics--Management of children with behaviour problems.
- Juvenile Delinquency, Abused/ neglected children -Characteristics and causes.
- Policies, Government Provisions, concessions and facilities, legislations and programmes for developmentally challenged children.

REFERENCES

1. Chauhan,S.S. (1989). *Education of exceptional children*, Indus Publishing Company, New Delhi.
2. William L.Heward and Michael D.Orlandsky. (1992). *Exceptionalchildren*,Macmillan publishing Company, Inc., New York.
3. Gargiulo (2003). Special education in contemporary society – An introduction to exceptionality, Thompson Wordsworth.
4. Heward, W.L. (2013). Exceptional children – An introduction to special education – Pearson.

5. Hegarty S (2002). Education and Children with Special Needs. Sage Publications, New Delhi.
6. M.S. Thambirajah (2011) Developmental assessment of the school- Aged child with developmental disabilities- A clinician Guide, Jessica Keinsley Publication
7. Mian Wang, George H.S. Singer (2016) Supporting Families of children with developmental disabilities-Evidence based and emerging practices, Oxford University Press
8. David dossetor, Donna White and Lesley Whatson (2011) Mental health of children and adolescents with intellectual and developmental disabilities A frame work for professional practice, Paperback
9. Megan Mc Donald and Samuel W. Logan (2017) Health and children with disabilities, Front Public Health, 5: 175, doi: 10.3389/fpubh.2017.00175
10. Richard M. Gargiulo, Jennifer L. Kilgo, (2019), An introduction to young children with special needs.
11. Cindy Watson, (2017), Special Education, A beginners guide to serving all students, University of North Texas Libraries

JOURNALS

1. Abnormal Psychology
2. Exceptional children
3. Clinical psychology
4. Abnormal Child Psychology
5. Journal of Special education

COURSE OUTCOMES

After completion of the course, students will able to:

CO1 Define the terms 'Disability', 'Impairment' and ' Handicapped' and explain the Classification of children with developmental challenges.

CO2 Understand about causes for various impairments like visual, hearing impairment, speech and language disorders among children and legislations for their welfare.

CO3 Apply knowledge of principles of assessment of children with disabilities for

individualized education plans and their management.

CO4 Grade the children as gifted and learning disabled in an elementary school using simple tests.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	3	1	3	2	3				3		1	2
CO2	2	3	3	3	3	2	3	3	3	3	3		3	3
CO3	1	3	3	3	3	2	3	3	3	3	3	1	3	3
CO4	1	3	3	2	2	2	3	L	3		3		3	3

H-High(3), M- Medium(2), L- Low(1)

HDCW 303-A : ORGANISATION AND MANAGEMENT OF CHILD WELFARE INSTITUTIONS

COURSE OBJECTIVES

To enables the students to:

1. Define the 'concept of 'child welfare' 'integrated approach' and 'supervision'.
2. Understand the need for effective communication skills with children, personnel and parents to manage institutions catering to child welfare.
3. Critically explain the national and international organizations working for child welfare
4. Apply knowledge as supervisors to monitor different child welfare institutions.

GENERIC ELECTIVE- THEORY

UNIT- I History

- Child welfare-concept- Goals-History of child welfare in India.
- Charter of children's rights
- Liberation of child labour and changing philosophy and concept of programs and services for children.
- Integrated approach to child welfare- Meaning and Importance

UNIT-II National and International Organization

- Organization catering to child welfare-Principles, objectives and significance of institutions,

- Government and voluntary organizations for children in India.-National organizations-I.C.C.W, CSWB, NIPCCD, NCERT, ICSW, National Society for children, Balbhavan Society - Functions and services.
- NGO's -RASS, Action Aid, S.O.S.
- International Organizations for child welfare - UNICEF, WHO, FAO, CARE.

UNIT- III Administration and Management of Child Welfare Institutions

- Development of effective communication skills with children, personnel, parents and other adults
- Management, of child Welfare institutes-Administration, organization structure of institutions – creches and pre-schools.
- Administration, organization structure of Day care centres, home for destitute, play centres, hobby centres and recreation centres.

UNIT-IV Monitoring and Supervision of Child Welfare Institutions

- Supervision -Definition, types; importance, objectives, Principles of Supervision of child welfare organizations.
- Supervisory styles -Responsibilities and qualities of supervisors
- Monitoring -Need for monitoring-Steps in monitoring of an organization.
- Evaluation- Purpose-Steps in evaluation-Development of evaluation schedule.

REFERENCES

1. NIPCCD. (1985).*Approaches to perspective plan on child development*
2. Alfred D. Souja. (1973). Children *in India*, *critical issues in human development*, Indian Social Science Research Institute, Delhi.
3. Kumar, R.(2002).*Child Development in India*, Ashish Publishing House, New Delhi, Reprint
4. Paul Choudary, D. (1995). *Child welfare and development*, Atmaram and Co. New Delhi.
5. Tara Alibaig. (1979). *OurChildren*,Publication division, Ministry of information and Broad Casting Govt. of India.

JOURNALS

1. Social Welfare
2. Yojana
3. Balak
4. Indian Journal of Extension Education.

COURSE OUTCOMES

After completion of the course, students will able to

CO1 Define the 'concept of 'child welfare' 'integrated approach' and supervision.

CO2 Understand the need for effective communication skills with children, personnel and parents to manage institutions.

CO3 Explains the objective of the national and international organizations like I.C.C.W, CSWB, NIPCCD,
NCERT, ICSW, UNICEF, WHO, FAO and CARE.

CO4 Apply knowledge to monitor child welfare institutions like - crèches, pre-schools, day care centres, and orphanages. Home for destitute, play centres, hobby centres and recreational centres.

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3								3		3	3
CO2			3	2			3				3	3	3	3
CO3			3	2	3					3	3		3	3
CO4			1		3	3				3	3		3	3

H-High(3), M- Medium(2), L- Low(1)

HDCW 303-B: CHILD AND HUMAN RIGHTS

COURSE OBJECTIVES

This course helps the students to:

1. Define the concept of 'human rights', 'child rights' and 'women rights'.
2. Identify and classify different types of human rights.
3. Critically explains demographic distribution of children in difficult circumstances.
4. Articulate different issues faced by women in India.

GENERIC ELECTIVE - THEORY

UNIT-I Definition and Evolution of Rights

- Human rights
- Child rights
- Women's rights
- Charter
- Convention
- Policy

UNIT-II Status of Indian Children

- Demographic distribution
- Gender disparities (infanticide, foeticide, girl child)
- Children in difficult circumstances
- Children of prostitutes, child prostitutes, Child labour, street children, refugee children, Abused and neglected children
- Child trafficking

UNIT-III Status of Women

- Status of women in India
- Forms of violation of women's rights
- Violence against women in home, works places and society.
- Sexual harassment, rape
- Health and nutrition based deprivations

- Crime against women
- Political discrimination

UNIT-IV Classification of Human Rights

- Moral rights
- Legal rights
- Civil and political rights
- Social emotional and cultural rights
- International convention of Human rights and Advocacy for Human Rights

REFERENCES

1. Digumarti, B.R. and Digumarti, P.L.(1998).*International Encyclopedia of Women* (vol.1) New Delhi: Discovery.
2. Government of India. (1992b). *National Plan of Action: A commitment to theChild*, Department of women and child Development, New Delhi.
3. Government of India. (1993c), *Education for All: The Indian Scenario*, Department of Education, New Delhi.
4. Government of India (1993b), *Ministry of Finance, Economic Survey 1992-93,* New Delhi.
5. Government of India (1994), *Ministry of Finance, Economic Survey 1993-94*, New Delhi.
6. Government of Tamil Nadu (1993). *Dr. J. Jayalalita15 pointprogramme for child werfare*, Department of Social Welfare and Nutrious Meal Programme, Madras.
7. Kudchedkar, S.(1998). *Violence against women: women against violence*. Delhi: Pencraft International.
8. National Institute of Nutrition. (1993). *Nutrition Trends in India*, National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.
9. National Institute of Public Cooperation and Child Development (1993). *A Statistics on children in India Packet Book 1993*, New Delhi.

COURSE OUTCOMES

After completing the course, students will able to:

CO1 Define the concept of 'human rights', 'child rights' and 'women rights'.

CO2 Identify and classify different types of human rights like moral, legal, civil, political, socio-emotional and cultural rights

CO3 Critically explains demographic distribution of children in difficult circumstances like Children of prostitutes, child prostitutes, child labour, street children, refugee children, abused and neglected children

CO4 Articulate different issues faced by women and children like violence against women in home, work places and society, sexual harassment, rape, child abuse and nutrition based deprivations.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2		2												
CO3							3					3	3	3
CO4										2		2	3	3

H-High(3), M- Medium(2), L- Low(1)

PRACTICAL – HDCW-304 CHILD STUDY TECHNIQUES (301) + CHILDREN WITH DEVELOPMENTAL CHALLENGES (302)

301- CHILD STUDY TECHNIQUES

COURSE OBJECTIVES

This course helps the students to;

1.Assess the intelligence of children using standardized tests.

2.Apply skills to assess personality using projective techniques.

PRACTICALS

1. Assessment of physical and motor development of infants & toddlers
2. Anthropometric Assessment of psycho-motor development of infants & toddlers
3. Development of scales/ checklist
4. Standardization of scales/tools in terms of reliability and validity
5. Assessment of Intelligence of children using Intelligence tests
6. Assessment of personality by using inventory

COURSE OUTCOMES

After studying the course, students will able to ;

CO1. Assess the intelligence of children using Alexander's Pass-A-long Test, Raven's Progressive Matrices Test , Seguin Form Board Test and Draw- a -person test and calculate I.Q of sample children.

CO2. Apply skills to assess personality using projective techniques.

302- CHILDREN WITH DEVELOPMENTAL CHALLENGES

COURSE OBJECTIVES

This course helps the students to;

1. Students understand the method of collecting case studies from the institutions catering to the needs of children with special needs.

2. Apply skills to assess gifted children, children with speech disorders and children with learning disability in local elementary school using simple assessment tests.

PRACTICALS

1. Institutional visits to collect case studies of the following.
    a) Mentally Challenged
    b) Hearing Impaired
    c) Visual impaired
    d) Orthopedically handicapped
    e) Socially maladjusted
2. Identification of the following challenges in school age children.
    a) Gifted
    b) Speech disorders
    c) Learning disabled
3. Institutional visit to plan and implement intervention programmes for any one type of challenged.

COURSE OUTCOMES

After studying the course, students will able to ;

CO1: Students acquire the skills of collecting information from institutions catering to the needs of Children with special needs.

CO2: Students identify gifted children, children with speech disorder by using check list from local Schools.

HDCW 305 –LIFE SKILLS
(SKILL ORIENTED COURSE)

Marks (T=50+P= 50)

COURSE OBJECTIVES:

To enable the students to:

1. Define different life skills essential for positive and adaptive behaviour
2. Infer the importance of effective communication to maintain inter-personal and intra-personal communication
3. Critically explain about emotional intelligence and strategies to cope up with stress and emotions
4. Apply knowledge related to Life skills in personal and professional life.

SKILL ORIENTED COURSE -THEORY

Unit I Life Skills – Meaning and Significance

- Life skills -Definitions WHO- Core Life Skills -Decision Making, Problem Solving, Critical Thinking, Effective Communication Skills, Creative Thinking, Interpersonal relationships, Self-awareness, Empathy, Coping with Stress and Emotions.
- Categories of Life Skills - Social skills and Negotiation skills, Thinking skills and Coping Skills.

Social Skills and Negotiation Skills

- Self-awareness – Definition, Need, SWOT Analysis – Jo-Hari Window - strategies to improve Self-awareness.
- Empathy – Difference between Empathy and Sympathy, Strategies to improve empathy skills for improving negotiations

- Effective Communication and Interpersonal relationships – Types of communication – Verbal, Non-verbal communications, Effective Communication: Assertiveness, Effective Listening, Barriers of Communication,

Unit II. Thinking Skills

- Problem Solving – Defining a problem, steps in problem solving skills, Analytical thinking.
- Critical Thinking and Creative Thinking –Definition and Strategies for developing critical and creative thinking.
- Decision Making -Importance, steps in Decision Making- Six Thinking Hats for decision making.

Coping Skills

- Emotional Skills –Emotional intelligence –concept and areas -Characteristics of an emotionally intelligent person.
- Coping with Emotions – Positive and Negative emotions – Strategies for Management of emotions.
- Coping with Stress – Reasons and effects of stress, Strategies for coping up with stress.

PRACTICALS

1. Listening skills -Exercises for Probing-listening- Understanding and Interpreting
2. Speaking Skills – Preparing videos and assessment of speaking skills
3. Non-Verbal Communication- Mono acting
4. SWOT Analysis
5. Jo-Hari Window exercise
6. Six Thinking Hats for Decision making exercise
7. Empathy games
8. Problem solving exercises

INTERNSHIP

- One month to Two months internship in any institute during the semester wherein the student should undergo training to get hands-on -experience .
- Internship Report - A Report to be maintained and submitted for evaluation- The contents of the report should contain the skills learnt, Tools used for assessment , Practice sessions report and Internship Outcome.

REFERENCES:

1. Dahama O.P., Bhatnagar O.P, (2005). Education and Communication for Development, (2nd Edn.), Oxford& IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Debra McGregor, (2007).Developing Thinking; Developing Learning - A guide to thinking skills in education, Open University Press, New York, USA

3.. Nair .V. Rajasenan, (2010). Life Skills, Personality and Leadership, Rajiv Gandhi National Institute of Youth Development, Tamil Nadu.

4. Stella Cottrell, (2005). Critical Thinking Skills: Developing Effective Analysis and Argument, Palgrave Macmillan Ltd., New York
5. Prakash B. (Ed). (2003). Adolescence and life skills Common Wealth Youth Program, Asian Center, Common wealth Secretariat. New Delhi: Tata McGraw Hill.
6. Nair. A. Radhakrishnan, (2010). Life Skills Training for Positive Behaviour, Rajiv Gandhi National Institute of Youth Development, Tamil Nadu.

7. RGNIYD. (2008). Facilitators Manual on Enhancing Life Skills. Tamil Nadu

COURSE OUTCOMES

After studying the course, students will able to

CO1 Define different life skills essential for positive and adaptive behaviour

CO2 Infer the importance of effective communication to maintain inter-personal and intra-personal communication

CO3 Critically explain about strategies to cope up with stress and emotions by using knowledge of emotional intelligence.

CO4 Apply knowledge related to Life skills in personal and professional life

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	3	3	3	L	L	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3

H-High(3), M- Medium(2), L- Low(1

HDCW 306-A: FUNDAMENTALS OF FOOD, NUTRITION AND HEALTH

COURSE OBJECTIVES:

To enable the students to:

1. Know about foods, food groups, balanced diet for different age groups.
2. Understand the importance of macro and micronutrients in daily diet.
3. Apply comprehend knowledge on deficiency symptoms of different nutrients.
4. Apply skills to assess nutritional problems in community.

OPEN ELECTIVE- THEORY

UNIT-I Food Composition

- Food groups – Classification –
- food composition and nutritive values of different foods,
- Functions of foods.
- Balanced Diet,
- RDA for all age groups.

UNIT-II Macronutrients

- Carbohydrates: Definition, classification, food sources, Function in human body, Recommended Daily Allowance (RDA) and importance of fiber.
- Fats and Oils: Definition, classification, saturated and unsaturated fatty acids, cholesterol, Food sources, requirements, RDA and biological functions.
- Protein: Definition, classification, essential and non-essential amino acids, protein quality, supplementary value of protein, food sources, RDA and functions.

UNIT-III Micronutrients

- Vitamins: Definition, classification
- Fat soluble Vitamins (A, D, E, K) - Functions, sources, RDA, Deficiency diseases

and symptoms.

- Water soluble Vitamins (B complex and C): Functions, sources, RDA, Deficiency diseases and its symptoms.
- Macro minerals: Calcium, phosphorous, sodium, potassium, chloride- sources, biological functions, factors affecting availability, Deficiency diseases and symptoms.
- Micro minerals: Copper, zinc, Iron, Iodine and fluorine in human nutrition, biological functions, factors affecting availability, Deficiency diseases and symptoms.
- **Unit - IV: Major Nutritional Problems of the Community:**
- Malnutrition - PCM, obesity, micronutrient malnutrition,
- Government programmes to eradicate PCM, vitamin-A, iron and iodine deficiencies,
- Principles of planning diets for different conditions of malnutrition.

REFERENCES - TEXT BOOKS

1. Swaminathan, M. (1999). Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
2. Mahtabs. Bamji and N.PralhadRao. (2004). "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi,
3. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian.(2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderbad.
4. MadhuSharma. (2013). Pediatric Nutrition in Health and Disease, Jaypee Brother‟s Medical Publishers (P) Ltd New Delhi London Philadelphia Panama.
5. M Swami Nathan .(2010). Food and Nutrition Volume-1 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
6. M Swami Nathan .(2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
7. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of Indian Council Medical Research.2010.
8. Dietary guidelines for Indians- a manual. National institute of nutrition. Hyderabad. 2011.

9. David L. Kartz. (2008). Nutrition in Clinical Practice. Lippincott Williams and Wilkins. USA.
10. Whitney E. N. (1983). Understanding normal and clinical nutrition. West publishing company. USA.

JOURNALS AND PROCEEDINGS

- World review of Nutrition and Dietetics. S. Karger New York and Sydney 1959 onwards.
- Proceedings of Nutrition society of India. ICMR. NIN Hyderabad, India 1969 onwards.
- Nutrition Quarterly Journal (ICMR) NIN, Hyderabad.
- The Indian Journal of pediatrics.
- Journal of Human Nutrition / Applied Nutrition.
- Future' quarterly journal / UNICEF.
- Monographs and other publications by ICMR, WHO, FAO, UNICEF and UNESCO, Nutrition Foundation of India.
- Indian Journal of Nutrition and dietetics, Coimbatore, India.

COURSE OUTCOMES

After completion of this course, students will be able to:

CO1	Acquire knowledge on food groups and functions of food.
CO2	Gain knowledge on importance of macro and micronutrients in different age groups.
CO3	Identify signs and symptoms of different nutrient deficiencies.
CO4	Illustrate the nutritional problems in community.

HDCW 306- B: DYNAMICS IN FOOD PREPARATION

COURSE OBJECTIVES

To enable the students:

1. Learn the principles of safe food preparation and food pyramid.
2. Understand the role of foods in cookery.
3. Apply knowledge about effect of cooking on nutrients.
4. Able to differentiate different cooking equipment and role of different food items in cookery.

OPEN ELECTIVE- THEORY

UNIT-I: Introduction

- Definitions in food science.
- Composition and functions of foods.
- Food pyramid.
- Principles of safe food preparation.

UNIT-II: Cooking Process

- Objectives of Cooking.
- Preliminary preparations.
- Cooking methods- Moist heat methods, Dry heat methods; Fat as medium of cooking, Microwave cooking.
- Effect of cooking on Nutrients.

UNIT-III: Cooking Equipments

- Types of cooking equipments- Grill, Boiler, Oven and Microwave. Mechanical processing equipments- Vegetable Peeler, Chopper, Mixer, Slicing machine and mincing equipment.
- Non cooking equipment: Refrigerator.

UNIT-IV: Role of foods in Cookery

- Role of cereals, pulses, fats/oils, milk and milk products, flesh foods, sugars, vegetables, fruits and spices in cookery.

REFERENCES

1. Srilakshmi,B.(2001). *Food Science*, 2nd edition New Age International (P) Ltd., Publishers, Bangalore, Chennai & Hyderabad.
2. Swaminathan, M.(1979).*Food science and Experimental foods*. Ganesh & Co., Madras.
3. Dr.M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
4. Shubhangini A.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.

COURSE OUT COMES

After completion of this course, students will be able to:

CO1 Acquire knowledge on Food Pyramid.

CO2 Identify Role of foods on Cookery.

CO3 Gain knowledge on methods of Cooking.

CO4 Estimate the effects of cooking on Nutrients.

SEMESTER IV

HDCW 401: GUIDANCE AND COUNSELLING IN HUMAN DEVELOPMENT

COURSE OBJECTIVES

To enable the students to:

1. Describe and differentiate the terms the terms 'guidance' and 'counseling'
2. Understand the qualities and skills of a good counselor and different approaches to counseling
3. Critically explain therapies, techniques of counseling, process of counseling and ethics in counseling
4. Apply counseling skills and cognitive therapies to practice counseling process.

CORE -THEORY

UNIT-I Guidance and Counselling

- Guidance– Meaning, Definition, Nature – Need for guidance-Principles of guidance and Functions of guidance .
- Types of guidance – Educational, Vocational, Personal, and Social guidance.
- Individual and Group Guidance -Advantages and limitations of guidance.
- Counselling - Meaning, Definition, Relationship and difference between guidance and counseling, Need for counseling .
- Individual and Group counselling –Merits and Limitations.

UNIT-II Counselling Process

- Counselling -Elements of counseling -Counsellor- Characteristics, qualities of a good counselor, Skills -Attending, Active listening -SOLER-Empathy, Probing, Responses- EISPU- Professional ethics in counseling.
- Preparation for counselling-Pre-counselling interview- Physical setting, Privacy-Counselling relationship.

- Counselling Process- Stages in Counselling process
- Variables affecting the counselling process-Characteristics of the client, Characteristics of the counsellor- Personal and professional variables .

UNIT-III Approaches and Therapies to Counseling –I

- Directive , Non-directive and Eclectic counseling
- Psychoanalytic approach - Psycho- therapy –Key techniques -Demerits of psycho-therapy,
- Cognitive Behavioural Counseling - Meaning , Core Principles- Rational Emotive Behaviour therapy (REBT)-Goals-Role of counsellor
- Cognitive Behaviour Therapy (CBT)- Meaning- Cognitive restructuring or reframing, journaling and thought records, Relaxation and stress reduction techniques.
- Comparison of REBT and CBT- Limitations

UNIT-IV Approaches and Therapies to Counseling-II

- Behavioristic approach –Behaviour modification techniques – Systematic

  Desensitization, Reinforcement, Modeling, Shaping and token economy-merits and -demerits of behavior therapy
- Humanistic approach- Carl Roger's self-theory,–Personality Development and the Self-Concept-Ideal Self vs. Real Self.
- Therapy based on humanistic approach -Client centered therapy –Techniques-Genuineness and congruence, Unconditional positive regard, Empathetic understanding-Benefits of Client-Centered Therapy
- Transactional Analysis (TA) - Ego states of personality-Parent, adult, child-Goals - Role of counsellor. Benefits of Transactional Analysis Psychotherapy.

PRACTICALS

1. Visit to local counselling/ Child Guidance clinic and observation of cases
2. Analysis of real self and Ideal self using Semantic Differential Scale
3. Practice of Counselling skills -SOLER
4. Practice of Counselling skills -EISPU
5. ABC functional analysis using work sheets
6. Analyzing and reframing emotions using 'Thought Record Sheet

REFERENCES

1. Kiruba Charles and Jyothsna. (2013). *Guidance and counselling*, Neelkamal Publications Pvt. Ltd., New Delhi
2. Mukhopadhya. (1989).*Guidance and counselling*,(A Manual), Himalaya Publishing house Ltd, New Delhi
3. Narayana Rao. (2000). *Counselling and guidance*, 2nd Edition, Tata McGraw-Hill Publishing Ltd., New Delhi 2000.
4. Prashantham, B.J. (2005). *Indian case studies in therapeutic counselling*, 6th edition, Christian Counselling Center, Vellore.
5. Sitaram Jayaswal. (1990).*Guidance and counselling- An eclectic approach*, Prakashkendra, Lucknow.
6. Sunita Chhabra (2015), Guidance and Counseling, Gen Next Publications,
7. Marianne Mitchell Robert L. Gibson (2015), Introduction to Counseling and Guidance, (7th Edition), Pearson Publishing
8. Bharti Dimri, Manisha Minocha, Monika Auplish (2016), Guidance And Counselling, Bookman; First edition
9. Rao S. (2017), Counseling and Guidance, (3rd edition), McGraw Hill Education.

JOURNALS

1. British Journal of Guidance.
2. Counselling Psychologist.
3. Indian Journal of Clinical Psychology.
4. Journal of Counselling Psychology.
5. Personnel and Guidance.
6. The School Counsellor.
7. Journal of Community Guidance and Research.

COURSE OUTCOMES

After completion of the course, students will able:

CO1 Describe and differentiate the terms ‘guidance’ and ‘counselling’.

CO2 Understand the qualities and skills of a good Counselor and different approaches to counseling

CO3 Critically explain about different techniques and approaches to counseling like psycho -therapy, Behavior therapy, Cognitive therapies, and Transactional Analysis (TA), process of counseling and ethics in counseling

CO4 Apply counseling skills to practice counselling process

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H		H		H	H	H						H
CO2	H	H		H		H	H			H	M	H	M	H
CO3		H					H		H	H		H	H	
CO4		H		H		H	H			H	M	H	H	

H-High(3), M- Medium(2), L- Low(1)

HDCW402: ADVANCED STUDY OF HUMAN DEVELOPMENT-II

COURSE OBJECTIVES

To enable the students to:

1. Describe developmental tasks of early adulthood, middle adulthood, and late adulthood.
2. Understand the physical, physiological and psychological changes during different stages of adult hood.
3. Explain adjustments and problems during early, middle and late adulthood.
4. Assess needs, adjustments and problems during different stages of adulthood using questionnaires and case study methods.

CORE -THEORY

UNIT – I Early Adulthood

- Adulthood-Stages - demography on adult population in India
- Early Adulthood-Characteristics and Developmental tasks
- Adult growth and development-Biological, cultural and developmental perspective
- Adjustments – Vocational, Sexuality and marital adjustment
- Parenthood – Adjustment to parenthood – factors affecting adjustment to parenthood

UNIT – II Middle Adulthood

- Middle Adulthood**-** Characteristics and Developmental tasks
- Adjustment – Personal, Social and Vocational
- Role of family – Maintenance of family relations and Friendship
- Parenting adult offspring and their marriage, Health and Disease, Menopause in Women, Adult sexuality; Work and Career development

UNIT – III Late Adulthood

- Late Adulthood-Characteristics and Developmental tasks
- Physical, Physiological and Psychological changes
- Social relationship and family adjustment- Adjustment to retirement and singlehood

- Work and Retirement; Alternative life styles and Leisure time activities;

UNIT – IV Elderly

- Elderly-Characteristics and changes in cognitive abilities and Creativity
- Physical aspects of aging; Health and disease
- Mental health during elderly- Institutional living in the context of Indian culture
- Changes in family life cycle and social relationship-Problems of elderly and coping up strategies
- Safety issues during elderly-Death, dying and bereavement

LEARNING EXPERIENCES

1. Assessment of roles, responsibilities and satisfaction during young adulthood - case study.
2. Assessment of marital adjustment among young adults
3. Problems of adjustment during middle adulthood – case study.
4. Assessment of needs and problems of elderly.
5. Case study of elderly man and woman.
6. Visit to old age home – report and evaluation.

REFERENCES:

1. Lerner R M and Newell K M (2014). Handbook of Developmental Systems Theory and Methodology. Pp. 19-65. The Guilford Press, New York.
2. Rogoff B (2005). The Cultural Nature of Human Development. Oxford University Press, New York.
3. India. Sage Publications, New Delhi.
4. Sharma N and Chaudhary N (2009). Human development: Context and Processes. In G. Misra (Ed.), Psychology in India (Vol.I) Basic Psychological Processes and Human Development. Pp. 69-109. Pearson, New Delhi.
5. Robert V. Kail, John C. Cavanaugh (2012), Human Development : A Life Span View, 3rd Edition

6. Laura E. Berk (2013), Child Development, Ninth Edition, Pearson Publication
7. Carol K. Sigelman, Elizabeth A. Rider (2015), Human Development, Cengage Learning, ISBN: 9788131508220, 8131508226
8. Thomas Crandell, Corinne Crandell, James Vander Zanden (2009), Human Development, 9 Edition, McGraw-hill Publishing.
9. Robin Santos Doak (2011) Bridge: Genetic Disorders, Benchmark Education Company, LLC

JOURNALS

1. Child Development
2. PRACHI Journal
3. Psycho Lingua
4. Indian Journal of Psychology
5. Journal of Psychometric
6. Journal of Gerontology

COURSE OUTCOMES

After completion of the course, students will able to:

CO1 Describe developmental tasks of early adulthood, middle adulthood, and late adulthood

CO2 Understand the physical, physiological and psychological changes during early, middle and late adult hood

CO3 Explain adjustments and Problems during early and late adulthood.

CO4 Assess needs, adjustments and problems during different stages of adulthood using questionnaires and case study methods.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			3									2	3
CO2	3			3								2	3	3
CO3	3		3	3			2						2	
CO4	3		3	3			2			2			3	

H-High(3), M- Medium(2), L- Low(1)

HDCW 403-A: REHABILITATION AND MANAGEMENT OF CHILDREN WITH DEVELOPMENTAL CHALLENGES

COURSE OBJECTIVES

To enable the students to:

1. Describe the terms 'rehabilitation', 'community based rehabilitation', normalization integration, mainstreaming and inclusion.

2. Understand the role of government, voluntary organizations and community in management of children with developmental challenges.

3. Explain rehabilitation of children with developmentally challenges through multi-disciplinary approach

4. Apply practical skills in developing schedule and collecting case studies of children with developmental challenges

GENERIC ELECTIVE - THEORY

UNIT-I Early Identification of Children with Developmental Challenges

- Early identification of Children with Developmental Challenges- Concept, Need,
- Steps in assessment process – Identification, screening, diagnosis, programme
- Early Intervention – Types of early intervention and Linking assessment with intervention process.
- Intervention -Planning, placement, monitoring and evaluation.

UNIT-II Rehabilitation of Children with Developmental Challenges

- Rehabilitation –Definition and Concept-Vocational, educational and recreational rehabilitation of the children with developmental challenges
- Vocational, educational and recreational rehabilitation of Mentally challenged,

visually impaired, Hearing impaired children, and children with Learning disability.

- Vocational, educational and recreational rehabilitation of Orthopedically challenged children and Autism spectrum disorder
- Vocational, educational and recreational rehabilitation of Children with Social and emotional problems .

UNIT-III Management of Children with Developmental Challenges

- Management of Children with Developmental Challenges - Role of parents, Role of schools- Role of Government, Voluntary organizations and community .
- Concepts of Normalization and Integration, Mainstreaming and Inclusion, Special schools, Resource rooms, Individualized Family Service Plan (IFSP) and Individualized Education Programme (IEP)- parent – Teacher partnership.
- Multidisciplinary team approach -Services provided by different experts and their role.
- Therapeutic interventions- Clinical assessment, Physio therapy, occupational therapy, special education, speech therapy, hydro therapy play therapy and behaviour modification.

UNIT-IV Community Based Rehabilitation Services

- Definition, Basic concepts of community based rehabilitation and objectives.
- Sectors and Roles for the development of community based rehabilitation
- Essential ingredients for sustainability which CBR programmes
- Community based Rehabilitation- steps - Situation analysis, Planning and designing.
- Implementation of Community based rehabilitation management - monitoring and Evaluation. Community based rehabilitation management matrix.

REFERENCES

1. Bhatia, M.S. (1992). *Essentials of psychiatry*, New Delhi: CBS Publishers and Distributors.
2. Coleman, M.C. (1986). *Behaviour disorders theory and practice*, London: Prentice Hall.
3. Sankar, U. (1991). *Exceptional children*, New Delhi, Enkay Publication.
4. Hargrove, I. J. (1984). *Assessment of special education*, Prentice Hall Publication.
5. Mehta, D.S. 1983. Handbook of Disabled in India, New Delhi: Allied Publishers.
6. Cellier.(1979).*Teacher*,Macmillian Publications, London
7. Michel J. Curalnick. (1978).*Early intervention and the integration of handicapped*, University Park Press, London
8. Gargiulo (2003). Special education in contemporary society – An introduction to exceptionality, Thompson Wordsworth.
9. Heward, W.L. (2013). Exceptional children – An introduction to special education – Pearson.

JOURNALS

1. Disabilities and Impairment
2. Indian Journal of disabilities and rehabilitation
3. Psychological counselling.
4. Journal of Educational Psychology.

COURSE OUTCOMES

After completion of the course, students will able to:

CO1 Define the terms 'rehabilitation', 'community based rehabilitation' normalization integration, mainstreaming and inclusion

CO2 Explain the government, voluntary organizations that are managing children with developmental Challenges at local, district , state and national level.

CO3 Apply knowledge of rehabilitation of children who are mentally challenged, visually impaired, hearing impaired, learning disabled, gifted, orthopedically challenged, children with social and emotional problems and children with neurological problems

CO4 Prepare schedules to collect case studies from children with developmental challenges

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3							3			3	3
CO2			2			2	2	2		3	2		3	3
CO3		3	3	2	3		3			3	2	2	3	3
CO4			1	3				2		2	2			

H-High(3), M- Medium(2), L- Low(1)

HDCW 403-B: GERONTOLOGY

COURSE OBJECTIVES

To enable the students to:

1. Define stages of late adulthood, understand the characteristics of old age
2. Describe theoretical perspectives of aging and aging process,
3. Explain problems faced by elderly.
4. Apply knowledge to assess needs and problems of elderly at home and in institutions

GENERIC ELECTIVE - THEORY

UNIT I Process of Ageing

- Process of Ageing; Old age - definition, characteristics, needs.
- Demographic profile of elderly in India.

UNIT II Research trends in ageing

- Theories related to ageing
- interest's, attitudes, needs, mental health of elderly.
- Role of interplay of cultural forces family interactions.
- Economic, social, cultural forces.

UNIT III Problems faced by Elderly.

- Psychological,
- Physiological,
- Social, emotional problems - Causes, strategies for coping maintained positive mental health.

UNIT IV Welfare programmes for elderly -

- Role of Government and non-government agencies,
- Policy towards Elderly –
- Human right prospective.

REFERENCES:

1. Bhatia, H.S. (1983).*Aging and society*, Udaipur, The Aryas' Book Centre Publishers.
2. Krishnan, P. and Mahadevan, K. (1991). *Elderly population today: policies, problems and perspectives*, B.R.Publishing House, Delhi.
3. Binstock, H.R. and Sharma, E.(1985).*Handbook of aging and the social sciences*, New York.

JOURNALS:

1. Helpage India, Research and Development Journal (Quarterly), New Delhi.
2. Journal of Gerontology
3. Journal of Social Welfare

COURSE OUTCOMES

After completion of the course, students will able to:

CO1 Understand the concept of aging, changes/changing life style and adjustment pattern that takes place during late adulthood

CO2 Learn theoretical perspectives of aging and aging process, research trends and Methodological issues in Gerontology

CO3 Explain about welfare services for elderly.

CO4 Assess different types of problems during elderly and provide coping up strategies to maintain Positive mental health.

CO-PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3	3			2					1		3
CO2			3	3										3
CO3										3			3	3
CO4	3		3	2		3	2					2		3

H-High(3), M- Medium(2), L- Low(1)

PRACTICAL- HDCW:404 GUIDANCE AND COUNSELLING IN HUMAN DEVELOPMENT (401) + ADVANCED STUDY OF HUMAN DEVELOPMENT –II (402)

404- GUIDANCE AND COUNSELLING IN HUMAN DEVELOPMENT

COURSE OBJECTIVES

This course helps the students to;

1. Students apply skills in assessment of behavior problems among children, analysis of self and vocational interests using checklist and scales.

2. They apply counseling skills to practice to counseling process.

PRACTICALS

1. Visit to local counselling/ Child Guidance clinic and observation of cases
2. Analysis of real self and Ideal self using Semantic Differential Scale
3. Practice of Counselling skills -SOLER
4. Practice of Counselling skills -EISPU
5. ABC functional analysis using work sheets
6. Analyzing and reframing emotions using 'Thought Record Sheet.

COURSE OUTCOMES

After studying the course, students will able to;

Co1: Students assess behavior problems among children, understand their vocational interest and congruence between real self and ideal self.

Co2 : Practice of counseling process using different models, gives hands-on experience to serve as Counselors in mental health institutions.

402- ADVANCED STUDY OF HUMAN DEVELOPMENT –II

COURSE OBJECTIVES

This course helps the students to;

1. Apply skills to assess the problems and adjustments during late childhood period.
2. Collect case studies from elderly people.

PRACTICALS

1. Assessment of roles, responsibilities and satisfaction during young adulthood - case study.
2. Assessment of marital adjustment among young adults
3. Problems of adjustment during middle adulthood – case study.
4. Assessment of needs and problems of elderly.
5. Case study of elderly man and woman.
6. Visit to old age home – report and evaluation.

COURSE OUTCOMES

After studying the course, students will able to;

CO1: Assess needs, adjustments and problems during different stages of adulthood using schedules and questionnaires.

CO2: Apply skills to collect data using case study method.

HDCW-405: HUMAN RESOURSE MANAGEMENT

COURSE OBJECTIVES:

To enable the students to:

1. Know the meaning of Human resource management, human resource development and human resource planning.
2. Understand the importance of Human Resource Management and HR manager to the organization and employees.
3. Critically explain the functions of Human resource management.
4. Apply the skills in administering tests in selection and recruitment of staff.

MULTI -DISCIPLINARY- THEORY

UNIT-I Human Recourse Management

- Human Resource Management- Definition and Concept- Importance of Human Resource management - for the Organization, for the employees and Importance for the society.
- HR Manager -Essential Functions and Role of HR manager
- Objectives of Human Resource Management-Societal, Organizational, Functional and personnel objectives.
- Human Resource Planning and Human Resource Development - Meaning, Objectives and factors influencing.

UNIT-II Human Resource Functions

- Human Resource Functions -Job Analysis, Job description, job specification, recruitment, selection, placement and induction and socialization.
- Job Analysis- Meaning, Techniques of Job Analysis-Steps involved - Method to be Adopted to Collect the Information- Observation, Interview method, Questionnaires, Checklists, Group discussion etc.,-Advantages of job analysis and problems.

- Selection and Recruitment -Selection methods- Types and uses of tests- Aptitude and interest tests, Personality tests, Vocational inventory. -Steps in selection process- Situational and stress Interview -Reference checks and background verification-hiring decision.
- Placement and induction -Definition- Importance and objectives - Induction Process, -Difference between placement and induction-Principles-Benefits and problems.

PRACTICALS

1. Job analysis through Questionnaires- Development of questionnaires
2. Assessment of Personality using standard questionnaires
3. Assessment of Aptitude Using standard tests
4. Assessment of vocational interests using inventory
5. Development of Interview schedule for Assessing Strengths and Weaknesses
6. STAR Approach for Facing an Interview
7. Group discussion- Practice.

REFERENCES:

1. Ghosh Biswanath. (2007). Human Resources Development and Management, Vikas Publishing House Pvt. Ltd., New Delhi.
2. Rao, T. V. (1988). Alternative Approaches and Strategies of Human Resource Development ,
   Rawat Publications, New Delhi.
3. Udai Pareek Rao T.V. (2009). Designing and Managing Human Resource Systems, Oxford
   and IBH publishing Company Pvt. Ltd. New Delhi.
4. Gary Dessler, (2008). Human Resource Management, Prentice Hall of India, (11th Edn.), New
   Delhi.
5. John. P. Welson (2005). Human Resources Development, (2nd Edn.), Kogan Page Ltd., London.

6. Jon M. Werner, Randy L. DeSimone, (2006). Human Resources Development, (4th Edn.) , Thomson South Western.
7. Pareek Udai, (2008). Training Instruments in HRD and OD, Tata McGraw – Hill, New Delhi.

COURSE OUTCOMES:

After completion of the course, students will be able to:

CO1: Define the terms Human Resource Management, human resource development and human resource planning.

CO2: Understand the importance of Human Resource Management and HR manager to the organization and employees .

CO3: Critically explain the functions of Human resource management.

CO4: Apply the skills in administering tests in selection and recruitment of staff .

CO_PO Mapping

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1		2	2			3		3		3	3	3	
CO2				3			3		2		3	3	3	
CO3				3			3		3		3	3	3	
CO4	3			3			3		3		3	3	3	

H-High(3), M- Medium(2), L- Low(1)

HDCW 406-A: CHILD GROWTH AND DEVELOPMENT

COURSE OBJECTIVES

To enable the students to:

1. Know the terms 'growth' , 'development' and stages of development across life span
2. Understand the characteristics of children at different stages of childhood
3. Explain different developments like physical, cognitive, language and social development during childhood.
4. Apply knowledge to understand normal development and developmental delays during childhood.

OPEN ELECTIVE - THEORY

Unit -I Foundations of Development

- Understanding the terms Child, Growth, Development, Child Development, Human Development, and Developmental tasks.
- Principles of Child Development and Factors influencing growth and Development of Children.
- Determinants of Development - Role of Heredity and Environment in Development
- Stages of Development across life span and domains of development.

Unit - II Infancy

- Infancy – Characteristics
- Sensory- Motor activities
- Language Development
- Socio-emotional development.

Unit - III Early Childhood

- Early Childhood Period –Characteristics
- Physical Development
- Cognitive development
- Emotional and Social development

Unit - IV Middle Childhood

- Middle/ Late Childhood Period-Characteristics
- Physical development
- Cognitive development.
- Emotional and Social development

REFERENCES

1. Berk, L. E. (2007). Child Development. Prentice-Hall of India Pvt.Ltd, New Delhi.
2. Feldman, R.S. (2011).Understanding Psychology, Tenth Edition. Tata MCGraw Hill Education Private Limited, McGraw- Hill, New Delhi.
3. Hallahan, D.P. and Kauffman, J.M. (1991). Introduction to exceptional children. 5th ed. Allyn and Bacon, Boston.
4. DevDass, R.P. and Jaya, N. (1999). *A textbook on child development*, Mac Millan Co.
5. Hurlock, E.B. (1990).*Child development*, MC. Graw Hill Company Ltd, New York.
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7. Santrock, J. W. (2013). Child Development. Tata McGraw Hill Company Ltd, New Delhi.
8. Singh, A. (Ed).(2015). Foundations of Human Development: A life span approach. Tata Mc Graw Hill ,New Delhi.
9. Prasad, J. and Prakash, R. (1996). Education of handicapped children, problems and solution. Kanishka publication distribution. New Delhi.

COURSE OUTCOMES

After completion of the course, students will able:

CO1 Define the terms growth and development, and stages of development across life span

CO2 Understand the characteristics of children at different stages of childhood.

CO3 Critically explain different developments like physical, cognitive , language and social development during childhood

CO4 Apply knowledge to understand normal development and developmental delays during childhood to assess all round development during childhood

HDCW 406-B: DISASTER MANAGEMENT

COURSE OBJECTIVES

To enable the Student to:

1. Know about natural disasters: manmade disasters; chemical hazards; National and International strategies to mitigate disaster management.
2. Understand natural disasters (like floods, drought, cyclone, earthquakes, global warming etc); Nuclear disasters; Biological disasters;.
3. Illustrate the efforts made by the NGOs, Community based organizations and local administration in disaster management.
4. Discriminate disaster responses of Armed forces and Police.

OPEN ELECTIVE - THEORY

UNIT I Natural Disasters

- Meaning and nature of natural disasters, their types and effects.
- Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves,
- Climatic Change: Global warming, Sea Level rise, Ozone Depletion

UNIT II Man Made Disasters-

- Nuclear disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution,
- water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT III Chemical Hazards:

- Release of Toxic chemicals
- Sedimentation processes
- Global Sedimentation Problems
- Regional Sedimentation Problems, Sedimentation and Environmental Problems.

UNIT IV Disaster Management-

- Efforts to mitigate Natural Disasters at National and Global levels.
- International Strategy for Disaster reduction.
- Concept of disaster management, National Disaster Management framework; financial arrangements
- Role of NGOs, Community-based organizations, and Media. Central, State, District and local Administration; Armed forces in Disaster response
- Disaster response: Police and other organizations.

REFERENCES

1. Gupta, H.K. (2003). *Disaster management*. Indian National Science Academy. Orient Blackswan.
2. Hodgkinson, P.E. & Stewart, M. (1991). *Coping with catastrophe: A handbook of disaster management*.
3. Routledge. and Sharma, V.K. (2001). *Disaster management*. National Centre for Disaster Management, India.

COURSE OUTCOMES

After completion of the course, Students will be able to:

CO1 Gain in-depth knowledge about natural disasters; manmade disasters; chemical hazards: disaster management.

CO2 Design and administer a schedule for collection of Information regarding the role of NGOs, Community based organizations, central state, District and local Administration, Police and armed forces, in Disaster management

CO3 Illustrate the efforts made by NGOs, Community based organizations and local administration in disaster management.

CO4 Discriminate disaster responses of Armed forces and policies

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

First Semester

(Specialization 'B' – Human Development & Child Welfare

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 101 – ADVANCED STUDY OF HUMAN DEVELOPMENT-I

Time: 3 Hrs **Max: 80 Marks**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Write the importance of brain development during early years.
2. Enumerate the reflexes of a neonate.
3. Give an account of mile stones related to physical development during infancy and babyhood.
4. Write a short note on genes and chromosomes.
5. Explain the social developments during late childhood years.
6. Write about language development during early childhood years.
7. Write short notes on Peer relationships during adolescence.
8. Write about the concept of Gene engineering.

Part – B

Answer all questions

Each Question carries 15 Marks (4x15 =60 Marks)

9. (a) Discuss about genetic and chromosomal abnormalities during pre-natal period.

(Or)

(b) Explain in detail the interaction of heredity and environment on all-round development of children.

10. (a) Explain the language, emotional and cognitive development during infancy.

(Or)

(b) Describe the social and emotional developments during early childhood years.

11. (a) Write about the needs and characteristics of late childhood years.

(Or)

(b) What is puberty? Discuss the impact of onset of early and late puberty on child's Development.

12. (a) Define adolescence. Explain the physical and physiological changes during adolescence.

(Or)

(b) Discuss about Challenges during Adolescence.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

First Semester

(Specialization 'B' – Human Development& Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 102 – CURRICULUM FOR EARLY YEARS

Time: 3 Hrs **Max Marks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Differentiate and explain the terms ECE, ECCE and ECD.
2. Explain the significance of ECE.
3. Define curriculum and explain the indicators of effective curriculum.
4. Explain the importance of music in ECE curriculum.
5. Write about short term planning in ECE.
6. Write a short note on pre-number concepts.
7. Explain developmentally appropriate curriculum.
8. Enumerate values of play in ECE curriculum.

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. a) Describe the need and scope for early childhood education.

(Or)

b) Explain the importance of Brain development and stimulation during pre-school age.

10. a) Discuss the language experiences that can be provided in an ECE center.

(Or)

b) Write short notes on the following in ECE and explain the role of teacher in implementing the activities.

i) Readiness Programme ii) Science experience

11. a) Describe the objectives of ECE.

(Or)

b) Explain about principles of programme planning.

12. a) Write in detail a lesson plan based on theme based approach for 5 year old children.

(Or)

b) Explain about developmentally appropriate approach for early childhood education.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

MODEL QUESTION PAPER

M.Sc.(HOME SCIENCE) DEGREE EXAMINATION

First Semester

(Specialization 'B' – Human Development & Child Welfare

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 103-A: FAMILY DYNAMICS

Time: 3 hrs **Maximum Marks: 80**

PART- A

Answer any FOUR questions (4x5=20 Marks)

Each question carries equal marks

1. Write about different types of families.
2. What is family counseling centre ?
3. Write a short notes on Hindu marriage Act.
4. Explain about problems faced by Dual career families.
5. Write about Janani surakshya yojana scheme.
6. Explain the factors that influence the family interaction.
7. Discuss the advantages and disadvantages of changing family patterns in India.
8. Write a short note on marital stability.

PART-B

Answer all questions

Each question carry equal marks **(4x15=60 Marks)**

9. (a) Enumerate the functions of family.

Or

(b) Discuss the impact of social change on Indian families.

10. (a) Describe about stages of family life cycle. Discuss role expectations during different stages of family life cycle.

Or

(b) Explain about behavioural family therapy.

11. (a) Explain the factors that influence the marital adjustments.

Or

(b) Define communication? Discuss the role of communication in family relations.

12. (a) Give an account on National policies for family welfare.

Or

(b) Explain about Domestic Violence Act in India.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

MODEL QUESTION PAPER

M.Sc.(HOME SCIENCE) DEGREE EXAMINATION

First Semester

(Specialization 'B' – Human Development & Child Welfare

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 103-B- GENDER ISSUES IN HUMAN DEVELOPMENT AND FAMILY RELATIONS

Time: 3 hrs **Maximum Marks: 80**

PART- A

Answer any FOUR questions **(4x5=20 Marks)**

Each question carries equal marks

1. Define Gender sensitization.
2. Write a note on gender and its socio culture relation?
3. Write a short note on family ecology?
4. What are socialization practices?
5. Discuss the role of values in social webeing
6. Explain the gender differences in human development
7. Give an account to gender issues in family adjustments
8. What is gender discrimination?

PART-B

Answer all questions

Each question carry equal marks (4x15=60 Marks)

9. (a)Explain the gender schema theory.

Or

(b) Discuss the impact of gender roles on family relation.

10.(a) Discuss on gender analysis in mass media.

Or

(b) Enumerate on gender orientation theory sandra bem.

11. (a) Discuss the role of family in socialization

Or

(b) How does values and ethics impact on promotion of happy family life?

12. (a) Explain the changing trends in gender role orientation

Or

(b) Discuss on term “gender equality”

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

First Semester

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW- 104- A: COMMUNITY NUTRITION

(Common to all specializations of M.Sc., Home Science and M.S Food Technology)

Time: 3 hours **Max Marks:80**

Part- A

Answer any FOUR of the Following

Each question carries 5 marks (4 x5=20Marks)

1. Describe classification of foods with functions.
2. Write a short note on recommended dietary allowances.
3. Vital statistics.
4. Nutritional assessment.
5. Significance of breast feeding.
6. Clinical symptoms of Vitamin A&C deficiencies.
7. Describe about Mid-Day Meal programme.
8. Public distribution system.

Part- B

Answer ALL questions

Each Question carries 15 Marks (4x15=60 Marks)

9. (a) Explain about food groups, food composition and nutritive values of different foods.

(or)

(b) Define meal planning, principles and factors affecting meal planning.

10. (a) Describe briefly the methods of anthropometric measurements in altering nutritional status of the community.

(or)

(b) Explain the advantages and dis advantages of the Bio-chemical method of assessment of nutritional status.

11. (a) Discuss physiological changes that occur during pregnancy and state the nutritional requirements during pregnancy.

(or)

(b) State the RDA for an adolescent girl. Plan a menu and give justification.

12. (a) Discuss about food security, food fortification and enrichment.

(or)

(b) Write in detail about ICDS.

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MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

First Semester

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 104-B: NUTRITION DURING LIFE SPAN

(Common to all specializations of M.Sc., Home Science and M.S Food Technology)

Time: 3 Hrs **Max: 80 Marks**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Write the effects of lactation on nutritional composition of Human milk.
2. What are the factors that affect the breast milk quality?
3. Explain the need for infant formulae.
4. Discuss the importance of nutrition during Pre-school children.
5. Write the nutritional issues in Adolescence.
6. Discuss the Nutritional requirements in School-going children.
7. Write the effects of aging on nutritional health.
8. Explain the nutritional concerns in old age and their management pregnancy outcome.

Part – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

9. (a). Explain about Nutritional intervention and pregnancy outcome & write the advantage and disadvantages of breast and formulae feeding.

(Or)

(b). Discuss about the nutritional requirements during pregnancy and lactation? Write about common complications and problems.

10. (a).What are the effects of macro & micro nutrient malnutrition on physical and mental health?

(Or)

(b). Discuss about various types of Infant formulas and common problems during infancy.

11. (a). Explain the importance of nutritional requirement and RDA and discuss the importance of implications of child obesity.

(Or)

(b). Write in detail about various physiological problems during adolescence.

12. (a).Discuss the modification in diet, feeding old people. Nutritional requirement for adult man and woman.

(Or)

(b). Explain the principles to be considered while planning and preparation of diets.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Second Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 201 – QUALITY STANDARDS IN ECE CENTERS

Time: 3 Hrs **Max Marks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Write about importance of quality in ECE center.
2. Explain about indoor and outdoor space in an ideal nursery school.
3. Write about the method of provision of child friendly environment in ECE.
4. Enumerate principles selection of equipment for a pre school.
5. Write a short notes on goals of student teacher.
6. Give an account of Importance of Home visits in ECE.
7. Write about the role of other personnel in ECCE services.
8. Meaning and need for monitoring in ECCE services.

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. a) Explain the method of establishing quality assurance in ECE.

(Or)

b) Describe the principles of quality standards in ECE services.

10. a) Explain the method of establishment of child friendly environment in a nursery school.

(Or)

b) Give the ideal requirements for establishment of a pre-school.

11. a) Write the personnel and professional competencies of ECCE educator.

(Or)

b) Discuss the common problem of Student Teacher.

12. a) Define supervision. Enumerate the principles of effective supervision.

(Or)

b) Explain about different records and registers maintained in a pre school.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Second Semester

(Specialization 'B' – Human Development & Child Welfare

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 202 – THEORIES OF HUMAN DEVELOPMENT AND BEHAVIOR

Time: 3 Hrs **Max Marks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Write about the meaning and functions of theories.
2. What is meant by inductive and deductive reasoning?
3. Enumerate different defense mechanisms according to Freud's theory.
4. Explain Skinners operant conditioning theory.
5. Describe Chomsky's language theory.
6. Enumerate the characteristics of a self-actualized person.
7. Write about key principles of classical conditioning.
8. Write about stages of attachment in Bowlby's theory.

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. (a) Describe Erikson's psycho-social theory.

(Or)

(b) Explain Freud's Psycho-analytic theory.

10. (a) Describe the cognitive development theory of Jean Piaget.

(Or)

(b) Write in detail about Gardener's Multiple intelligence theory.

11. (a) Explain Ecological Systems theory of Urie Bronfrenbrenner.

(Or)

(b) Describe Social-Learning theory by Albert Bandura.

12. (a) Write about Kohlberg's theory of Moral Development.

(Or)

(b) Explain in detail about the self-actualization theory of Abraham Maslow.

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MODEL QUESTION PAPER

M.Sc.(HOME SCIENCE) DEGREE EXAMINATION

Second Semester

(Specialization 'B' – Human Development & Child Welfare

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 203- A :PARENT AND COMMUNITY EDUCATION

Time: 3 hrs **Max Marks: 80**

PART- A **(5x4=20 Marks)**

Answer any four questions

Each question carry equal marks

1. Explain the need for parent education.
2. Explain the role of father in child rearing.
3. Write about the need for parent education in India.
4. Write a note on parent initiated curriculum for parent education.
5. Give an account of problems faced by single parent families.
6. Enumerate the goals of parent education.
7. Explain the importance of parents involvement in community education programme.

8. Write a short note on changing role of parents.

Part-B (15x4=60 Marks)

Answer all questions

Each question carry equal marks

9. (a) Explain the theoretical approaches to parent education

(Or)

(b).Discuss the direct and indirect methods of parent education

10. (a) Explain the various steps involved in parent education programme.

(Or)

(b) Discuss the various parenting styles and its impact on children's behaviour

11. a) Describe criteria to evaluate the parent education programme

(Or)

(b) Explain steps involved in conducting Parent Teacher Association (PTA) meeting in a preschool

12. (a) Discuss and differentiate the strategies and management skills for parents to deal with normal children and children of developmental delays and disabilities.

(Or)

(b) Discuss about strategies for management of Physically challenged and mentally challenged children.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Second Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 203- B: INFANT DEVELOPMENT AND STIMULATION

Time: 3 Hrs **Max Marks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Write about the characteristics of infants.
2. Discuss the sleeping patterns of new born.
3. What is the importance of child rearing?
4. Why is baby massage important?
5. Explain the importance of stimulation.
6. List out stimulation activities for infant language development.
7. Explain about the Dyadic caring.
8. Why early interaction is important during infancy?

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. a) What is infant development? Write the new born behavior.

(Or)

b) Explain the impact of early deprivation on infant development.

10. a) Define the child rearing. Explain the types of child rearing.

(Or)

b) Write about role of environment in child rearing practices.

11. a) Discuss the stimulation to nurture holistic development.

(Or)

b) What is stimulation? Write about environmental stimulation.

12. a) Define attachment. Discuss about attachment theory.

(Or)

b) Explain about dyadic versus multi caring?

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Second Semester

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 204- A : RESEARCH METHODOLOGY

(Common to All branches of Home Science and MS Food Technology Course)

Time:3 hrs Max: 80 Marks

SECTION- A

Answer any four questions

Each question carry equal marks Marks:4X5=20

1. Define research. Enumerate the significance of research.
2. Explain the need and features of a good research design.
3. Write about Quota and snow ball sampling.
4. Describe case study as a research technique.
5. What is meant by primary and secondary data?
6. Give an account of Nominal scale.
7. What is Social mapping?
8. Write about Observation check list.

SECTION- B

Answer all questions

Each question carry equal marks Marks: 4 X 15=60

9. (a).Write in detail about types of research.

(Or)

(b).Write about the types of research design.

10.(a).Explain in detail about the definition , identification and selection of research problem.

(Or)

(b).Define qualitative research and explain the types of qualitative research.

11.(a). What is data? Explain in detail different methods of data collection.

(Or)

(b). Describe in detail about the Observation and Interview methods of data collection.

12.(a). What is Measurement scales? Explain its significance in statistical analysis?

(Or)

(b). Explain in detail about the steps in preparing a research proposal.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Second Semester

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 204-B : Statistics and Computer Applications

(Common to All branches of Home Science and MS Food Technology Course)

Time:3 hrs Max: 80 Marks

SECTION- A

Answer any four questions

Each question carry equal marks Marks:4X5=20

1. Frequency distribution.
2. Histogram.
3. Rank correlation.
4. Mean.
5. File handling.
6. Computer software.
7. What is data analysis?
8. Descriptive statistics.

SECTION- B

Answer all questions

Each question carry equal marks Marks: 4 X 15=60

9. (a). What is a *t*-test? When it is used and for what purpose(s)? Explain by means of examples.

(Or)

(b). In a test given to two groups of students, the marks obtained were as follows: *First Group* 18 20 36 50 49 36 34 49 41 *Second Group* 29 28 26 35 30 44 46 Examine the significance of difference between mean marks obtained by students of the above two groups. Test at five per cent level of significance.

10. (a). 200 digits were chosen at random from a set of tables. The frequencies of the digits were: Digit 0 1 2 3 4 5 6 7 8 Frequency 18 19 23 21 16 25 22 20 21 Calculate χ^2.

(Or)

(b). What is Chi-square text? Explain its significance in statistical analysis.

11.(a). What is data? Explain in detail the data processing and analysis in computers.

(Or)

(b). Describe in detail about the PC and its components.

12.(a). What is an excel sheet? Explain its significance in statistical analysis?

(Or)

(b). Explain in detail about the steps in preparing different graphs in computers.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Third Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 301 – CHILD STUDY TECHNIQUES

Time: 3 Hrs **MaxMarks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20Marks)

1. Write the significance of child study techniques.
2. Discuss the ethical issues in assessment.
3. Explain the importance of rapport in testing.
4. Write about rating scales.
5. Meaning of projective techniques? Write about word association test.
6. Explain about validity and types of validity.
7. Give an account of Seguin form board as assessment technique.
8. Discuss the functions of psychological tests.

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. a) Explain about cattle's 16 PF test.

(Or)

b) Write about different approaches to child study techniques.

10. a) What is assessment? Explain the stages of assessment.

(Or)

b) Discuss the steps in Construction of scale.

11. a) Write in detail about Alexander pass-a-long test.

(Or)

b) What is intelligence? Discuss about Wechsler's scale of intelligence.

12. a) Write about uses of projective techniques and explain about Rorschach ink blot test.

(Or)

b) Discuss about Good Enough draw a person test.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Second Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 302 – CHILDREN WITH DEVELOPMENTAL CHALLENGES

Time: 3 Hrs **Max Marks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Differentiate between Impairment and Disability. Give any three definitions of developmental challenges.
2. Write about management of services for children with behaviour problems.
3. Write about the characteristics of gifted children.
4. Define Learning Disability. Explain the causes for learning disability among children.
5. Define visual impairment and write the causes for visual impairment.
6. What are the early intervention programmes for children in crippled condition?
7. Explain the causes of juvenile delinquency.
8. Enumerate the policies and legislations for children with developmental challenges.

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. (a) Classify children with developmental challenges and give an account of professionals working for developmentally Challenged children.

(Or)

(b) Explain the current statistics of children with developmental challenges.

10. (a) Define and classify mentally challenged – Discuss the characteristics of children with mental challenges.

(Or)

(b) How will you identify children with learning disability. Explain different types of education approaches available for children with learning disability.

11. (a) Define hearing Impairment – Explain causes and classification of hearing impairment.

(Or)

(b) Describe the method of identification of children with speech and language disorders. Discuss the management techniques.

12. (a) Explain the characteristics of children in difficult circumstances. Discuss the causative factors for it.

(Or)

(b).Enumerate the government provisions, concessions and facilities for children with developmental Challenges.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Third Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 303-A: ORGANIZATION AND MANAGEMENT OF CHILD WELFARE INSTITUTIONS

Time: 3 Hrs **Max: 80 Marks**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Explain the concept of programmes and services for children.
2. Write short notes on NCERT and NIPCC.
3. Give and account of functions and services of RASS.
4. Define supervision and enumerate the objectives of supervision in child welfare.
5. Write short notes on ICCW.
6. What are the functions and services of CARE.
7. Write short notes on organization structure of p.re – school.
8. Write the principles and objectives of UNICEF

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. (a) Explain about the importance of integrated approach for child welfare programme.

(Or)

(b) Write about the charter of children's right.

10. (a) Give an account of existing government organizations for children in India.

(Or)

(b) Explain the services and functions provided by the voluntary organizations in India.

11. (a) Write in detail the principles, objectives and significance of any two international organizations related to child welfare.

(Or)

(b) Discuss about the administration, organization and management of crèche and home for destitute.

12. (a) How important is supervision in child welfare institutions? Discuss the roles and responsibilities of supervisor and do's and don'ts for supervision

(Or)

(b) Discuss different methods of development of effective communication skills with children, personnel and parents?

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Third Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 303–B: CHILD AND HUMAN RIGHTS

Time: 3 Hrs **Max Marks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Write about the articles related to child rights.
2. Explain the charter of human rights.
3. Discuss briefly the reasons for infanticide.
4. Describe the laws against child labour.
5. Write a note on violence against women at work places.
6. Write briefly on political discrimination favoring males/females.
7. Write a brief note on moral rights.
8. Give an account on the advocacy of human rights.

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. (a) Write an essay on human rights.

(Or)

(b) Discuss briefly on child's rights.

10. (a) Explain the status of children.

(Or)

(b) Explain in detail about children in difficult circumstances.

11. (a) Write on domestic violence against women and major contributing factors for it.

(Or)

(b) What are the various forms of violation of women's rights?

12. (a) Write an essay on classification of human rights.

(Or)

(b) Elaborate on the international convention of Human rights.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Third Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 305 -LIFE SKILLS

(Skill Oriented Course)

Time:1hrs 30 mins **Max Marks: 40**

Part – A

Answer any Two questions

Each question carry equal marks (2X5=10 Marks)

1. Define life skills and list out different life skills.
2. Define and differentiate between Sympathy and Empathy.
3. Enumerate steps in problem solving.
4. Write a short note on Emotional Intelligence.

Part – B

Answer all questions

Each question carry equal marks (2X15=30 Marks)

5. a) What is self-awareness? Discuss about SWOT analysis and strategies to improve self-awareness.

(Or)

b) Define Communication and explain types of communication.

6. a) Give an account of importance of decision making in personal and professional life. Explain steps involved in decision making process.

(Or)

b) What are the reasons for stress? Discuss the strategies to cope up with stress.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Third Semester

Open Elective

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 306 – A: FUNDAMENTALS OF FOOD, NUTRITION AND HEALTH

Time: 3 Hrs

Part – A

Max: 80 Marks

Answer any four questions

Each question carry equal marks **(4X5=20 Marks)**

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks **(4X15 = 60 Marks)**

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Third Semester

Open Elective

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 306- B: DYNAMICS IN FOOD PREPARATION

Time: 3 Hrs **Max: 80 Marks**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks **(4X15 = 60 Marks)**

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Fourth Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 401 – GUIDANCE AND COUNSELLING IN HUMAN DEVELOPMENT

Time: 3 Hrs **Max Marks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Define guidance . Explain the need for guidance.
2. Write briefly about educational guidance.
3. Give an account of elements of counselling.
4. Write short notes on skills necessary for counselling.
5. What is meant by electic counselling .
6. Elucidate limitations of Cognitive behaviour therapies.
7. Give an account on professional ethics in counseling.
8. Write about variables affecting the counselling process.

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. a) Explain about advantages and limitations of Individual and Group Guidance.

(Or)

b) Discuss in detail about difference between guidance and counselling.

10. a) Discuss different stages in Counselling Process.

(Or)

b) Describe personal and professional characteristics of a good counsellor.

11. a) What is Psycho-therapy ? Explain key techniques of psycho- therapy .

(Or)

b) Give a detailed account of Rational Emotive Behaviour therapy (REBT).

12. a) What is meant by Behaviour modification . Discuss about different behavior modification techniques.

(Or)

b) Explain the techniques of Client centered therapy.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Fourth Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 402– ADVANCED STUDY OF HUMAN DEVELOPMENT-II

Time: 3 Hrs **Max. Marks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Give short notes on parenthood.
2. Give an account of Vocational adjustment during early adulthood.
3. Write about menopause in women.
4. Describe adult sexuality during middle adulthood.
5. Explain the adjustments to retirement during late adulthood.
6. Explain the grand parenthood and intergenerational relationships during late adulthood Years.
7. Enumerate the cognitive changes during elderly.
8. Give an account of safety issues during elderly.

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. (a) Enumerate the developmental tasks and characteristics of early adulthood.

(Or)

(b) Discuss the adjustments to be made during early adulthood years.

10. (a) Enumerate the personal and social adjustments to be made during middle adulthood stage.

(Or)

(b) Describe the role of family in maintaining family relations and friendships during middle adulthood.

11. (a) Describe the physical, physiological and psychological changes during late childhood.

(Or)

(b) Describe the problems faced by elderly people and the suggestions for minimizing the problem.

12. (a) What is mental health? Discuss the strategies to maintain positive mental health of elderly.

(Or)

(b) Discuss the institutional living of elderly in the context of Indian culture.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Fourth Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 403-A: REHABILITATION AND MANAGEMENT OF CHILDREN WITH DEVELOPMENTAL CHALLENGES

Time: 3 Hrs **Max Marks: 80**

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Write about the need for early identification of children with developmental challenges.
2. Write short notes on diagnosis process of identifying children with developmental challenges.
3. Explain about the educational rehabilitation for visually impaired children.
4. Explain about the vocational rehabilitation for orthopedically challenged children.
5. Give an account on main streaming.
6. What do you know about the concept of normalization and integration?
7. Define community based rehabilitation and write its basic concepts.
8. Explain about roles and responsibilities of community based rehabilitation functionaries.

Part – B

Answer all questions

Each question carry equal marks (4X15=60 Marks)

9. (a) Enumerate different steps in assessment process for children with developmental challenges.

(Or)

(b) Discuss how multidisciplinary approach helps to rehabilitate the children with developmental challenges.

10. (a) Write about the importance of early intervention for children with developmental challenges.

(Or)

(b) Discuss about the educational rehabilitation for the gifted and learning disabled children.

11. (a) Explain the role of government and voluntary organizations in management of children with developmental challenges.

(Or)

(b) Describe about NIMH and NIHH organizations working towards children with developmental challenges.

12. (a) Explain the role of parent – teacher partnership in managing the children with developmentally challenges.

(Or)

(b) Explain about various community based rehabilitation services.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Fourth Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 403 –B: GERONTOLOGY

Time: 3 hrs **Max Marks**: **80**

PART- A

Answer any four questions

Each question carry equal marks **(4x5=20 Marks)**

1. Bring out the demographic profile of elderly in India.
2. What are the needs of the aged?
3. Role of interplay of cultural forces in family interactions.
4. Give an account of mental health during old age.
5. Enumerate the physiological problems of the aged.
6. Bring out the human rights perspective of the elderly.
7. Report of the case study done.
8. What are the Policy towards elderly?

Part-B **(4x15=60 Marks)**

Answer all questions

Each question carry equal marks

9. (a) Discuss the characteristics of the aged.

(Or)

(b) Bring out the developmental process of ageing.

10. (a) What are the theories related to ageing.

(Or)

(b) Write an essay on the attitude and mental health of elderly.

11. (a) What kind of strategies to be adopted by the elders to have peaceful life?

(Or)

(b) Write a report of a old age home you visited.

12. (a) Discuss the ongoing welfare programmes for the aged.

(Or)

(b) How does aged people are suffered in the human rights perspective.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Fourth Semester

(Specialization 'B' – Human Development & Child Welfare)

(CBCS with effect from academic year 2021 – 2022 onwards)

HDCW 405 - HUMAN RESOURCE MANAGEMENT

(Multi-Disciplinary Course)

Time:1hrs 30 mins **Max Marks: 40**

Part – A

Answer any Two questions

Each question carry equal marks (2X5=10 Marks)

1. Define Human resource management and explain its nature.
2. Define and differentiate between Human resource development and human resource planning
3. Enumerate the functions of HR manager
4. Write a short note on induction in HRM.

Part – B

Answer all questions

Each question carry equal marks (2X15=30 Marks)

5. a) What are functions of human resource management ?

(Or)

b) Describe the objectives of human resource management.

6. a) Give an account of tests that are used in selection process

(Or)

b) What is meant by job analysis? Discuss different steps involved and problems in job analysis.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

Fourth Semester

Open Elective

(CBCS with effect from the Academic Year 2021 -22 onwards)

HDCW 406-A: Child growth and Development

Time: 3 Hrs **Max: 80 Marks**

Part – A

Answer any four questions

Each question carry equal marks **(4X5=20 Marks)**

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks **(4X15 = 60 Marks)**

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF HOME SCIENCES



Course

M.Sc. EXTENSION MANAGEMENT AND COMMUNICATION TECHNOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

- The Department of Home Science established in the year 1963 as first of its kind in the state of Andhra Pradesh and celebrated golden jubilee in the year 2013. Ms Dorothy M. Pearson, a Canadian Home Scientist was largely instrumental to start the post graduate programmes in Home Science at Sri Venkateswara University, Tirupati. The committed founder stalwarts and the successive faculty members with immense foresight established the pioneering activities of teaching, research and extension in the department. The department from its inception has thrived to offer new insights through academic reforms and outreach activities. The commitment of the faculty has contributed practice-based teaching, action research, technology development and extension outreach activities for the development of students. The department stocks eight patents of which two patents awarded. The Ministry of food processing granted 10 crores for the establishment Food testing laboratory with NABL accreditation.

Department Vision

- To be a premiere centre for excellence in higher education in the areas of specialization fostering nurturing and building careers for students and to be an apex body playing a pivotal role in planning and monitoring community development.

Department Mission

- Empowering students in capacity building skills through teaching, research and extension activities in making socially responsible citizens along with employability.

Department Objectives

- Enable the students to understand the interrelation of Food and Health,
- To foster knowledge across the life span in inter connected Human Development factors to become efficient counselors and early childhood educators
- Develop sensitivity towards the community problems and train the students in Extension and outreach activities.
- To focus on training students in application of techniques to process and preserve the food.

Programme Specific Outcomes

- To raise the standard of living of the rural people by helping them in right use of their resources
- To train the students in extension techniques and communication technologies to enable them to transfer Home science information and technologies to rural families in such a way that people understand and adopt new ideas and improved methods for better family living.

Programme Objectives

Theprimaryobjectiveoftheprogramistoimpartqualityeducationinthesubjectof Extension Management and Communication Technology as a basic science and its applied branches to the students

- To provide strong foundation in Home Science Extension Management and Communication Technology and to endow the communication skills among students.
- To develop knowledge about recent trends in extension education at regional, national and global levels.
- To develop understanding on community development, panchayat raj and rural welfare.
- To provide deep understanding about policies and programmes for woman, children and youth in rural areas.
- To provide skills in participatory rural appraisal (PRA) techniques and understanding of transfer of technology.
- To conduct field studies and different projects of local and regional needs.

Programme Outcomes

- **(KB) A knowledge base for Home science**: Knowledge and competence in Sociology, Psychology, Education and Home science subjects appropriate to the Extension Education programmes
- **(PA) Problem analysis:** An ability to use appropriate knowledge and skills to identify and solve problems in community in order to reach the objectives and goals of Extension.
- **(Inv.) Investigation:** An ability to identify the needs and problems, prioritize, and develop a programme for community development.
- **(Des.) Design:** An ability to design solutions for different types of problems associated with different areas of Home science
- **(Tools) Use of PRA tools in Home science:** An ability to select and use of the PRA tools in Home science, and application of appropriate technologies necessary for conducting extension programmes in the community.
- **(Team) Individual and team work:** An ability to work effectively as a member and leader in the teams to meet the specific nutrition and health needs of the rural community.
- **(Comm.) Communication skills:** An ability to communicate effectively in the dissemination of Home science knowledge to society.
- **(Prof.) Professionalism:** An understanding of the roles and responsibilities of the professional Home scientist in society.
- **(Impacts.)** An ability to analyze social, economic, cultural and health aspects of the society.

- **(Ethics): Ethics and Equity:** An ability to apply ethical principles, professional ethics, norms of Home science Extension education and equity.
- **(Econ.): Economics and Project management:** An ability to appropriately incorporate economics and project management in research work and to understand their limitation.
- **(LL) Life-long learning:** An ability to identify and to address their own educational in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

Program Educational Objectives

- To produce competent graduates in the core areas of Extension management and communication technology with adequate, analytical capabilities and practical knowledge to attend to the current challenging tasks and to absorb futuristic trends.
- To provide strong foundation in Home science and endow with communication skills.
- To keep the students abreast with the modern and latest technologies
- To enhance the knowledge and skills continually throughout their career and to make them capable to adopt in diverse environment.
- To imbibe leadership qualities among the students to take up challenging roles in their career by ensuring professional ethics with higher sense of social responsibility.

SEMESTER-I

Sl. No.	Components of Course	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	**Core**	EMCT-101	Communication and Media Preparation (CMP)	6	4	20	80	100
2	**Core**	EMCT-102	Extension Education in Community Development (EECD)	6	4	20	80	100
3	**Compulsory Foundation**	EMCT-103a	Dynamics of Rural Society(DR)	6	4	20	80	100
		EMCT-103b	Dynamics of Group Behavior (DGB)					
4	**Elective Foundation**	EMCT-104a	Community Nutrition(CN)	6	4	20	80	100
		EMCT-104b	Nutrition during Life Span(NLS)					
5	**Practical –I**	EMCT-105	101+ 103a / 103b	3+3 / 3	4	-	-	100
6	**Practical- II**	EMCT - 106	102 + 104 a / 104 b	3+3 / 3	4	-	-	100
7	**Total**				**24**			**600**
8		EMCT-107	Human Values and Professional Ethics -I (HVPE) *(Audit Course)	0	0	100	0	0

***Audit course – Zero credits under self-study**

SEMESTER-II

Sl. No.	Components of Course	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	**Core**	EMCT-201	Community Organization and Leadership (COL)	6	4	20	80	100
2	**Core**	EMCT-202	Entrepreneurial Development and Empowerment of Women (ED)	6	4	20	80	100
3	**Compulsory Foundation**	EMCT-203a	Educational Technology(ET)	6	4	20	80	100
		EMCT-203b	Technology Transfer and Management (TTM)					
4	**Elective Foundation**	EMCT-204a	Research Methodology (RM)	6	4	20	80	100
		EMCT-204b	Statistics and Computer Application (SCA)					
5	**Practical –I**	EMCT-205	201 + 203a / 203b	3+3/3	4	-	-	100
6	**Practical- II**	EMCT-206	202 + 204 a / 204 b	3+3/3	4	-	-	100
7	**Total**				**24**			**600**
8	***Audit Course**	EMCT-207	Human Values and Professional Ethics –II (HVPE)	0	0	100	0	0

***Audit course – Zero credits under self-study**

SEMESTER-III

Sl. No.	Components of Course	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	**Core**	EMCT -301	Managerial Skills for Extension Professionals (MSEP)	6	4	20	80	100
2	**Core**	EMCT -302	Training and Development (T&D)	6	4	20	80	100
3	***Generic Elective**	EMCT 303a	Rural Development and Administration (RDA)	6	4	20	80	100
		EMCT 303b	Principles of Guidance and Counseling (PGC)					
4	**Practical**	EMCT -304	301 + 302	6	4	-	-	100
5	**Skill Oriented Course**	EMCT – 305	NGO Management (NGOM) (Theory) + (Practicals)	3+6	4	10	90 (40+50)	100
6	****Open Elective**	EMCT-306 –a	Fundamentals of Food, Nutrition and Health (FFNH)	6	4	20	80	100
		EMCT -306 b	Dynamics in Food Preparation (DFP)					
7	**Total**				24			600

Internship is mandatory

*Generic Elective – Student has to choose any one paper

Open Elective – Offered by Department to other Department studen Note:** Interested student may register for MOOCS with the approval of DDC

SEMESTER-IV

Sl. No.	Components of Course	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	**Core**	EMCT-401	Communication Technologies in Extension (CTE)	6	4	20	80	100
2	**Core**	EMCT -402	Participatory Programme Management (PPM)	6	4	20	80	100
3	***Generic Elective**	EMCT -403 a	Extension Management (EM)	6	4	20	80	100
		EMCT -403.b	Science & Technology for Rural Women (STW)					
4	**Practicals**	EMCT-404	401 + 402	6	4	-	-	100
5	**Multi-disciplinary/Project Work**	EMCT-405	Local Government in AP (LGAP) (Theory) + (Practicals)	3+6	4	10	90 (40+50)	100
	Project work			-	-	40	60	100
6	****Open Elective**	406.a	Disaster Management (DM)	6	4	20	80	100
		406.b	Growth and Development During Early Years (GDEA)					
7	**Total**			36	24			600

* Generic Elective – Student has to choose any one Paper

** Open Elective - Offered by Department to other Department students

Note: Interested student may register for **MOOCS** with the approval of DDC

SEMESTER – I

EMCT 101: COMMUNICATION AND MEDIA PREPARATION

COURSE OBJECTIVES

The Course helps the students to:

1. Understand Communication –Recent trends in Instructional technology : Extension literature
2. Analyze the role of different factors influencing and effecting communication process- Dyad setting small group and mass communication
3. Evaluate the Planning, Preparation and use of different teaching aids in teaching different groups of people and in different learning situations.

CORE –THEORY

UNIT- I: Communication:

- Communication**:** Meaning, definition, and importance of communication, scope of communication, principles of communication.
- Key elements of communication:
  1. Communicator.
  2. Message.
  3. Treatment of message
  4. Channel
  5. Audience. Basic principles of information processing: Encoding and Decoding.
- Functions of Communication: Information, Instructive persuasive and Integrative.
- Factors affecting fidelity of communication, Barriers to Communication -Social, Cultural and Psychological barriers and how to overcome them.
- Models of Communication: Shannon - Weaver's Model. Westley Maclean's model Leagan's Model and Berlo's Model. Feedback and its importance in Extension.

UNIT- II Types of Communication:

- Verbal Communication; Non-verbal communication; Small group communication; Public Communication; Dyadic Communication.
- Mass Communication and Interpersonal Communication;
- Problems in Communication.
- Organizational Communication - Concept and process.
- Patterns of communication in an organization - Downward Communication, Up-ward Communication, Cross Communication, Horizontal Communication.

UNIT-III Methods of Extension Teaching:

- Classification of teaching methods according to form and use.
- Different extension teaching methods; scope, advantages, limitations.
- Factors governing in the selection and use of the methods.
- Recent trends in Instructional technology, Community Study, simulations and games;
- Multi-media approach and Role playing.

UNIT- IV Audio-Visual Aids:

- Role of audio-visual aids in Home Science Communication; Classification of Audio-visual aids Planning; Preparation and use of different types of audio-visual aids; Merits and limitations; Factors influencing selection and use of audio-visual aids.
- Extension Literature - Simple writing for rural home makers, style, readability and utility: leaflet Pamphlet, Folder, Circular letter, Newsletter and Bulletin.
- Audio-Visual materials and Equipment Projectors: Overhead projector, still projector - Slides Films, Tape recorders, epidiascope, Radio, Film Projector, Television Laptops, Power Point Projection.

PRACTICALS:

1. Students will participate in simulation aspects and experiences to know the role of different factors influencing and effecting communication process in Dyad setting, small group and mass communication situation.
2. Planning, conducting and evaluation of different teaching methods.
3. Planning and preparation and use of different teaching aids.
4. Provision of experience for having variety of teaching techniques and aids in teaching different groups of people and in different learning situations.
5. Giving opportunity to use audio-visual equipment such as films, slides, opaque and Overhead projector.
6. Preparation of simple literature for rural families.

REFERENCE BOOKS:

1. Adivi Reddy, A. (1987).*Extension Education*, Sreelakshmi Press, Bapatla.
2. Dhama, O.P. and Bhatnagar, O.P.(1985). *Education and Communication for Development*, Oxford and IBH Publishing Co., New Delhi.
2. Sampath, K., PanneerSelvam, A.andSanthamma, S.(1995*). Introduction to Educational Technology*, 3rd edition, Sterling publishers Pvt. Ltd., New Delhi.

3. Adlar, R. and Towari, N. (1975).*Interpersonal Communication,* Halt Rinehart Winston, Sanfranscio.
4. Rogers, M.E. (1976).*Communication and Development critical Perspective,* Sage Publications. Beverly Hill, London.
5. KuppuSwamy, B.(1984). *Communication and Social Development in India,* Media Promotion and Publishing Pvt. Ltd., Bombay,.
6. SchrumWolber,(1978). *The Process and Effects of Mass Communication*, University of Illinoise, USA.
7. Ray, G.L.(1991).*Extension Communication and Management,*NayaPrakash, Calcutta,.
8. Schultz, G.B.(1989) . *Communicating in the small group*, Harper and Raw Publishers, New York.
9. Udaipareek, (1971). *Interpersonal Feedback for effective learning system,* New Delhi,.
11. Chakravarthy, S.R. (1977). *Audio-visual Aids in Education*, Sagar Publication, New Delhi.
12. Dale Edgar, A.V.(1989). *Method in teaching,* Holt Rinchart and Christon, Inc., New York, 3rd edition.
13. Kochhar, S.A. (1988).*Methods and technique of teaching*, Sterling Publisher Pvt. Ltd., New Delhi.
14. Holmes, C.(1968). *Visual aids in Nutrition Education,* PAO, Rome,.
15. Balan, K.R. and Rayudu, C.S. (1997). *Effective Communication,* Castle Books Pvt. Ltd., New Delhi.

JOURNALS:

1. Indian Journal of Extension Education
2. Journal of Communication
3. Journal of Home Economics
4. Journal of Nutrition Education
5. Indian Journal of Adult Education
6. Experiment in Education
7. Journal of Educational Research and Programming.
8. Khadi Gramodyog.

COURSE OUTCOMES:

After studying the course, students will be able to;

CO1. Gain Complete knowledge about communication; Extension teaching methods; recent trends in Instructional technology

CO2. Understand how to plan; prepare and use of different teaching aids in teaching different groups of people and in different learning situations

CO3.Analyze the role of different factors influencing and effecting communication process- Dyad setting small group and mass communication

CO4. Evaluate the Planning, Preparation and use of different teaching aids in teaching different groups of people and in different learning situations.

1	CO-PO Mapping													
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3				2		3					2		
	CO2		3	3	2		2		2		1	1	2		
	CO3			2								2			
	CO4			2				2					2		

H: High-3; M: Medium-2; L: Low-1

EMCT 102- EXTENSION EDUCATION IN COMMUNITY DEVELOPMENT

COURSE OBJECTIVES

The course helps the students to:

1. Know about extension education; historical review and recent trends in extension education.
2. Develop understanding on community development and panchayat raj system.
3. Acquire skill to study the community by using PRA techniques.
4. Sensitize students to develop the skill of critical analysis on various approaches of extension education.

CORE –THEORY

UNIT- I Extension Education:

- Concept Meaning, Objectives and Principles of Extension Education and Home Science Extension Education
- Historical review of Extension Education in India and Abroad; Role and qualities of an Extension worker;
- Integration between Teaching, Research and Extension;
- Role and Functions of Extension Educator.
- Qualities of extension educator;
- Role of Home Science in National Development, Home science extension personnel involved.

UNIT-II Community Development and Panchayat Raj:

- Meaning, Principles, Objectives, Scope and Philosophy of community development in India.
- Historical review of community development in India.
- Evolution of Panchayat Raj set up and functions at the central, state, District, Block and village level.
- Three tier system and the principle of Democratic decentralization;
- Problems of the community development and Panchayat Raj.
- Factors affecting community development work.

UNIT- III Community Participation:

- Meaning, Importance, Factors influencing community participation.
- Measures to improve community participation.
- Recent extension approaches: Rapid Rural Appraisal (RRA).
- Participatory Rural Appraisal (PRA),

- Child-to-child approach.
- Woman-to-Woman approach,

UNIT- IV - Five Year Plans and Social Welfare:

- Current five year plans - National and state approaches to Nutrition.
- Women and child welfare.
- Contributions of National and International Agencies for the development and Welfare of Women and Children.

PRACTICALS:

1. Visit to Blocks and villages to learn the setup and functions.
2. Visit to a nearby village to study the ongoing rural Development programmes through PRA technique.
3. Observation of the activities of Home-Science Extension workers.
4. Survey of the Problems faced by the women extension functionaries in carrying on their Day-to-day activities.
5. Planning and implementation of Nutrition education programmes through -
   a) Child-to-child approach.
   b) Woman-to-Woman approach
   c) Action plays.

REFERENCE BOOKS:

1. Dantwala, ML &Barmeda, J.N. (1990). *Rural Development Approaches and Issues,IndianAg.Dev.SinceIndependence*,Oxford&IBH.
2. Dhama,O.P.&Bhatnagar,O.P.(1991).*CommunicationforDevelopment,*Oxford&IBH.
3. Mondal,S.&Ray,G.L.(2007).*ATextBookofRuralDevelopment*,Kalyani.
4. Ray,G.L.(2006).*ExtensionCommunicationandManagement.*
5. Kalyani,
   Rivera,W.H.(1987).*AgriculturalExtensionWorldWideIssues,PracticesandEmergingPriorities*,CroomHelm.
6. Singh,H.1985.*RuralDevelopmentinIndia.*PrintWellPubl.
7. Singh,R.P.,Mathur,P.N.&KumarG.A.K.(1999).*ExtensionEducation–AHandbookforExtensionPersonnel.*IFWA,IARI,NewDelhi.
8. Swanson,B.E.,Bants,R.P.&Sofrenko,A.J.(1984).*ImprovingAgricultureExtension-AReference Manual.*FAO.
9. Vanden Ban, A.W.& Hawkins, H.S. (1988). *Agriculture Extension.* Longman Scientific

Technical.

JOURNALS:

1. Adult leadership
2. Kurukshetra
3. Yojana
4. Journal of Rural Development
5. Social Welfare
6. Indian Journal of Extension education
7. Indian Journal of Adult Education
8. Community development and Panchayat Raj Digest, NIRD, Hyderabad.
9. Rural Development Digest, NIRD, Hyderabad.

COURSE OUTCOMES:

After studying the course, students will be able to;

CO 1. Gain knowledge on recent trends in Extension education.

CO 2. Develop understanding on the community development and panchayat raj.

CO3. Acquire skill to study the community by using PRA techniques.

CO4. Sensitize students to develop the skill of critical analysis on various approaches of extension education

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3	2					2			1				
	CO2				3	3		2					2		
	CO3	3	2								1				
	CO4							2					2		

H: High-3; M: Medium-2; L: Low-1

EMCT 103: a) DYNAMICS OF RURAL SOCIETY

COURSE OBJECTIVES

The course helps the students to:

1. Know about social structure; characteristics of rural people; rural social problems - social institutions.
2. Understand the social change and the policies and programmes for social welfare and rural development.
3. Learn the factors affecting social change.
4. Gain insight about the welfare policies and programmes for rural society.

CORE –THEORY

UNIT- I Social Structure:

- Characteristics of rural people - Basic concept, society, community
- Rural-urban associations, Institutions - primary, secondary groups.
- Social structure and rural development.

Unit-II- Rural Social Problems

- Rural Social Problems – Poverty
- Population explosion
- Unemployment
- Malnutrition
- Illiteracy
- Social inequality.

UNIT- III Social Institutions

- Social Institutions: Meaning, purpose, general characteristics
- Types of social institutions – family
- Marriage, caste, class and their changing trends in the society.

UNIT- IV Social Change

- Social Change Meaning, nature and types, directions of social change.
- Impact of urbanization and industrialization on rural community.
- Role of women in Social change, factors affecting Social change.

PRACTICALS

1. Visit to the village to study about rural social structure.
2. Analysis of rural social problems in the village.
3. Studying about the functions of rural social institutions.
4. Study the functioning of women's organizations, youth clubs and farmers organizations.
5. Identification of women leaders in the villages and their role in decision making.

REFERENCE BOOKS

1. Vidyabhushan&D.R.Sachdeva (2014), "An Introduction to Sociology ", kitabmahal Distributors-New Delhi.
3. Ray, G.L. (1991).`*Extension Communication and Management'*, NayaPrakash, Calcutta.
4. Abdul Aziz., (1983).`*The Rural poor - Problems and prospects'.*Ashish Publishing House, New Delhi.
5. Arora, R.C.(1978).`*Industry and Rural development'*, S.Chand and Co. N.Delhi.
6. Singh, K.(1977). `*Principles of Sociology'*, Prakarshan Kendra.
7. Chowdhary, P. `*A hand book of social welfare'*, Atma Ram and Sons.
8. Dutt, R.M. and Sundaram, K.P.M.(1977). `*Indian Economy'*, NucrajPrakashan.
9. Agarwal, A.N. (1983).`*Indian Economy - Problems of Development and Planning'*, Vikas Publishing House, New Delhi.
10. Sundaram, K.P.M.(1983).`Introduction to Indian economy', R.Chand.
11. `The eighth Five Year Plan (1990-95)', Planning Commission, Govt. of India, New Delhi.
12. Muniaiah, G.C, (1983). `*Inequality and poverty',* Himalaya Publishing House, Bombay.
13. Ganaguli, B.N. (1977). `*Social development'*, Sterling Publishers Pvt. Ltd., New Delhi.
14. Vasant Desai, (1990). `*A study of Rural Economics'*, Himalaya Publishing House, N.Delhi.
16. Thakha, S. (1985). `*Poverty, inequality and unemployment in Rural India'*, S.R. Publishing Cooperation, Delhi,.
17. Doshi, S.L. and Jain, P.C.(1999).`*Rural Sociology'*, Rawat Publications, Jaipurr.

JOURNALS

1. KhadiGramodyog
2. Yojana
3. Kurukshetra
4. Social welfare
5. Journal of Rural development
6. Indian Journal of Extension Education

7. Social Change
8. Rural India

COURSE OUTCOMES:

After studying the course, students will be able to;

CO1. Gain knowledge about rural social structure and social institutions.

CO2. Understand the problems in rural areas; welfare policies and programmes for rural society.

CO3. Learn the factors affecting social change.

CO4 Analyze the factors affecting social change.

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO 1	PSO 2
	CO1	3	2						2				3		
	CO2			3	2	2									
	CO3			3					2						
	CO4		3						2				2		

H: High-3 M: Medium-2 L: Low-1

EMCT 103: b) DYNAMICS OF GROUP BEHAVIOUR

COURSE OBJECTIVES

The course helps the students to:

1. Know about the meaning characteristics, types and functions of groups.
2. Understand the group dynamics and group behavior.
3. Learn the factors affecting group management.
4. Gain insight about the team building, stress and conflict management.

CORE –THEORY

Unit- 1- Groups

- Meaning, characteristics, types and functions of groups.
- Stages and process of group formation.
- Group norms and structure

Unit-II- Group behavior

- Understanding individual, interpersonal and human behavior and its different dimensions
- Feeling, perception and assumptions that intervene in interpersonal interactions
- Group structure

Unit-III- Group Dynamics

- Group dynamics: Cooperation
- Competition
- Communication,
- Group pressure
- Group cohesiveness
- Leadership

Unit-IV- Group Management

- Managing group
- Team building
- Conflict management
- Stress management
- Active listening and feedback

PRACTICALS

1. Visit to village to understand the individual and group behavior
2. Analyze the group dynamics and leadership.
3. Analyze the group management, stress management and conflict management.
4. Identifying the role of communication in team building, conflict management and stress management.
5. Conducting focus group discussions and small group meetings.

REFERENCE BOOKS

1. Vidyabhushan&D.R.Sachdeva (2014), "An Introduction to Sociology ", kitabmahal Distributors-New Delhi.
3. Ray, G.L. (1991).`*Extension Communication and Management'*, NayaPrakash, Calcutta.
4. Abdul Aziz., (1983).`*The Rural poor - Problems and prospects'.*Ashish Publishing House, New Delhi.
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6. Singh, K.(1977). `*Principles of Sociology'*, Prakarshan Kendra.
7. Chowdhary, P. `*A hand book of social welfare'*, Atma Ram and Sons.
8. Dutt, R.M. and Sundaram, K.P.M.(1977). `*Indian Economy'*, NucrajPrakashan.
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10. Sundaram, K.P.M.(1983).`Introduction to Indian economy', R.Chand.
11. `The eighth Five Year Plan (1990-95)', Planning Commission, Govt. of India, New Delhi.
12. Muniaiah, G.C, (1983). `*Inequality and poverty',* Himalaya Publishing House, Bombay.
13. Ganaguli, B.N. (1977). `*Social development'*, Sterling Publishers Pvt. Ltd., New Delhi.
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16. Thakha, S. (1985). `*Poverty, inequality and unemployment in Rural India'*, S.R. Publishing Cooperation, Delhi,.
17. Doshi, S.L. and Jain, P.C.(1999).`*Rural Sociology'*, Rawat Publications, Jaipurr.

JOURNALS

1. KhadiGramodyog
2. Yojana
3. Kurukshetra
4. Social welfare
5. Journal of Rural development
6. Indian Journal of Extension Education
7. Social Change

8. Rural India

COURSE OUTCOMES:

After studying the course, students will be able to;

CO1. Gain knowledge about the meaning characteristics, types and functions of groups.

CO2. Understand the group dynamics and group behavior

CO3. Learn the factors affecting group management.

CO4 Analyze the process of team building, stress management and conflict management.

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3	2						2				3		
	CO2			2	1	2									
	CO3			3					2		1				
	CO4		3						2				2		

H: High-3 M: Medium-2 L: Low-1

EMCT 104: COMMUNITY NUTRITION

(COMMON TO ALL THE SPECIALIZATIONS OF M. SC HOME SCIENCE AND MS FOOD TECHNOLOGY)

COURSE OBJECTIVES

The course helps the students to:

1. Know about nutrients in food and their functions.
2. Understand the consequences of deficiency of taking nutrients.
3. Comprehend knowledge on the role of nutrients in different stages of human life and methods of nutritional assessment.
4. Learn the community level problems and policies.

ELECTIVE FOUNDATION – CORE THEORY

UNIT-I: Food Composition - Grouping and Menu Planning:

Food Groups – Classification – food composition, properties, characteristics and nutritive values of different foods, Functions of foods and nutrients – cereal grains, millets, pulses, nuts and oil seeds fruits and vegetables, milk and milk products, meat, egg, poultry and fish, spices and condiments.

Nutrition Through Life Span – Infancy, Early and late childhood, Adolescence, Adulthood and Ageing – Nutritional requirements and Recommended Dietary Allowances (RDA)– Principles of menu planning appropriate to age and stage of life span.

Justification for special needs during periods of growth and development, pregnancy and lactation – significance of breast feeding –

Unit – II: Assessment of Nutritional Status of the Community:

Need - Methods of Assessment - (a) Direct Methods - (i) Diet Surveys (ii) Anthropometric Assessment - (iii).clinical and (iv). Biochemical Assessment (b) Indirect Methods - Vital Statistics - Merits and Demerits of methods -Nutrition surveys - longitudinal and cross sectional - Family, individual and institutional surveys - Techniques for assessment of age - use of reference standards for the assessment of nutritional status.

Unit – III: Major Nutrition Problems of the Community:

Malnutrition and under nutrition- PEM/CED, obesity- deficiencies vit-A, iron /iodine - Etiology – Symptoms - Government programmes to eradicate PEM, vitamin-A, Iron and Iodine deficiencies.

Principles of planning diets for different conditions of malnutrition

Unit – IV: Strategies to Combat Malnutrition:

Food security – Definition – Management of food insecurity - Food Fortification and enrichment-.

Food Assistance and Food Supplementation - Policies and Programmes of the Government - Governmental Policies and Programmes.

Food Assistance and Food Supplementation Programmes - Public Distribution System (PDS) - Food For Work (FFW), Special Nutrition Programme (SNP), School Lunch Programme (SLP), Mid Day Meal Programme (MMP), Balawadi Nutrition Programme (BNP), Integrated Child Development Services (ICDS)

Nutrition Education - Importance - Approaches Media and Methods

PRACTICALS

1. Assessment of Nutritional Status using Anthropometry,
2. Assessment of Nutritional Status using Dietary method
3. Assessment of Nutritional Status using Clinical methods
4. Planning of and preparation of diet during pregnancy and lactation period
5. Planning of and preparation of diet during preschool & Elementary age
6. Planning of and preparation of diet during Adolescence
7. Planning of and preparation of diet during old age
8. Planning of Diets for Different Nutritional Deficiencies like PEM, Iron, Vit-A.
9. Planning and Preparation of Programmes for Significant Days like Breast Feeding Week Nutrition Week, World Food Day.
10. Study of the following through visits
    - Govt School Lunch Programme
    - ICDS Programme
    - Anganwadi Training Centers.
11. School Lunch Programme at Sri Venkateswara University Laboratory Nursery School.
12. Preparation of Visual Aids for Nutrition Education, and Method Demonstration on a Nutrition Recipe.

REFERENCES - TEXT BOOKS

1. Davidson and Passmore R., Brock, J.F., and Truswell, A.S. (1979). *Human Nutrition and Dietetics*, 7th ed. New York. Churchill Living stone.
2. Gopalan, C. (1992). *Basic issues in combating malnutrition*- NFI Publication.
3. Gopalan, C. (1990). *Women nutrition in India*. NFI Publication.
4. Jelliffe, D.B.(1966).*Assessment of nutritional status of the community*, WHO Monograph, Series No. 53. WHO Geneva
5. Mehtab S. Bamji. (1996).*Text book of human nutrition*, Oxford & IBH Co.PVT.LTD, New Delhi,
6. WHO.(1981).*Measuring change in nutritional status* - (NCHS Standards)
7. Monograph on Integrated Training on National Programmes for Mother and Child Development of Women and Child Department, Government of India, New Delhi.

8. Seymour L. HarpenM.D.(1979).*Quick reference to clinical nutrition*
9. Suitor, C.W. and Hunter, M.F. (1980).*Nutrition principles and application in health promotion*, J.B. Lippincot Company, Philadelphia
10. Swaminathan, M. (1990). *Essentials of food and nutrition*, Vol. I and Vol. II Ganesh and co Madras.

JOURNALS AND PROCEEDINGS

1. World review of Nutrition and Dietetics. S. Karger New York and Sydney 1959 onwards.
2. Proceedings of Nutrition society of India. ICMR. NIN Hyderabad, India 1969 onwards.
3. Nutrition Quarterly Journal (ICMR) NIN, Hyderabad.
4. The Indian Journal of pediatrics.
5. The American Journal of clinical nutrition.
6. Journal of Human Nutrition / Applied Nutrition.
7. Future' quarterly journal / UNICEF.
8. Monographs and other publications by ICMR, WHO, FAO, UNICEF and UNESCO,
9. Nutrition Foundation of India.

COURSE OUTCOMES:

After studying the course, students will be able to:

CO 1. Know the nutritional problems of the community.

CO 2. Acquire knowledge about food groups, RDA and steps in planning a diet.

CO 3. Skills in planning and calculating nutritive values for the foods and recipes.

CO 4 .Identify the signs and symptoms of different nutrient disorders in commun.

CO-PO MAPPING

Course outcome	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**	PSO 1	PSO 2
CO1	3	3				3				3		2	PSO 1	PSO 2
CO2	3	3				2						2		
CO3		3	3	3		2	2		2		2	2		
CO4		3	2	2		2	2				2	2		

H: High-3; M: Medium-2; L: Low-1

104-B: NUTRITION DURING LIFE SPAN

(Common to all Specializations of MSc Home Science and MS Food Technology Course)

COURSE OBJECTIVES

To enable the students to:

1. Gain knowledge on the importance of nutrition during life span.
2. Enlighten the principles and working applications during dietary modifications.
3. Comprehensive knowledge on analysing the nutritional requirements.
4. Apply Computational skills in the Nutritional allowances during life span.

ELECTIVE FOUNDATION –THEORY

UNIT-I:Nutrition during Pregnancy & Lactation:

- Nutrient requirement during pregnancy, intake and gaps, prenatal and antenatal nutritional importance, metabolic adjustments in pregnancy.
- Nutrition intervention and pregnancy outcome, Nutritional management, problems and Complications.
- Nutritional requirements during lactation, physiology of milk production, effects of lactation on Nutrition composition of Human-Milk,
- Factors affecting breast milk quality and comparative advantages & disadvantages of breast and formula feeding.

UNIT-II:Nutrition during Infancy & Early child hood period:

- Nutritional requirements, concerns and overall development during Infancy.
- Need for infant formulae, types of infant formulae, care in Preparation, and importance of preparation of weaning foods.
- Home prepared versus commercial weaning foods, Feeding problems-Lactose and cow's milk protein intolerance.
- Pre-school children: Age, growth & development, nutrient requirements, Intake and gaps. Effects of Macro &Micro nutrient malnutrition on physical and mental development.

UNIT-III: Nutrition during School-going children & Adolescents:

- Dietary patterns and factors to be considered. Implications of childhood obesity and other nutritional concerns. Healthy food choices during childhood.

- Growth during adolescence, nutritional requirements, hormonal influences, age of menarche-factors affecting, physiological problems and nutritional issues in adolescence.
- Nutritional requirements and RDA. Behavioural characteristics and feeding problems.

UNIT-IV: Nutrition during adulthood and old age:

- Nutritional requirements for adult man and woman. Nutritional concerns, RDA, nutritional guidelines and work efficiency. Physiological changes in aging, effects of aging on nutritional health.
- Modification in diet, feeding old people. Nutritional concerns in old age and their management.

REFERENCES

1. Seth V and Singh K. Diet planning through life cycle: Part 1. Elite publishing house pvt ltd, New Delhi. 2006.
2. Mahtab S. Bamji, Kamala Krishna Swamy and G N V Brahmam. Text book of Human Nutrition. Oxford and IBH Publishing, New Delhi. 2009.
3. Michelle McGuire, Kathy A Beer Man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA
4. Shils, M.E., Olson, J.A., Shike, N. and Ross, A.C.(Ed)(1999). Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
5. Whitney, E.N. and Rolfes, S.R.(1999). Understanding Nutrition, 8th Edition, West/Wadsworth, An International Thomson Publishing Co.

COURSE OUT COMES

After completion of this course, students will be able to:

CO1 Acquire knowledge on nutritional requirements at various stages.

CO2 Apply the knowledge of nutrition during planning and preparation of diet.

CO3 Assess and compare diet and nutritional requirements relative to age, developmental disease status.

CO4 Evaluate nutrition products for composition, quality, and appropriateness of use and formu dietary interventions to address nutritional deficiencies.

CO-PO MAPPING

Cours	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO
CO1	3	3		2			2					2	3	
CO2	3	3	3	2			3					2	3	
CO3	3	3	3	2					2			2		3

CO4	3	3	3	2			3		2			2		3

H-High-3, M- Medium-2, L- Low-1

EMCT-105- PRACTICAL - I

(EMCT 101+103A/ 103B)

COMMUNICATION AND MEDIA PREPARATION +DYNAMICS OF RURAL SOCIETY / DYNAMICS OF GROUP BEHAVIOR PRACTICALS

EMCT 101-COMMUNICATION AND MEDIA PREPARATION

OBJECTIVES:

1. Evaluate the Planning, Preparation and use of different teaching aids in teaching different groups of people and in different learning situations.
2. To evaluate the Planning, Preparation and use of different teaching aids in teaching different groups of people and in different learning situations

PRACTICALS:

1. Students will participate in simulation aspects and experiences to know the role of different factors influencing and effecting communication process in Dyad setting, small group and mass communication situation.
2. Planning, conducting and evaluation of different teaching methods.
3. Planning and preparation and use of different teaching aids.
4. Provision of experience for having variety of teaching techniques and aids in teaching different groups of people and in different learning situations.
5. Giving opportunity to use audio-visual equipment such as films, slides, opaque and overhead projector.
6. Preparation of simple literature for rural families.

OUTCOMES:

1. Analyze the role of different factors influencing and effecting communication process-Dyad setting small group and mass communication
2. Evaluate the Planning, Preparation and use of different teaching aids in teaching different groups of people and in different learning situations.

EMCT 103A-DYNAMICS OF RURAL SOCIETY

OBJECTIVES:

1. Learn the factors affecting social change.
2. Gain insight about the welfare policies and programmes for rural society.

PRACTICALS:

1. Visit to the village to study about rural social structure.
2. Analysis of rural social problems in the village.
3. Studying about the functions of rural social institutions.
4. Study the functioning of women's organizations, youth clubs and farmers organizations.
5. Identification of women leaders in the villages and their role in decision making.

OUTCOMES:

1. Learn the factors affecting social change.
2. Analyze the factors affecting social change.

EMCT 103B- DYNAMICS OF GROUP BEHAVIOR

OBJECTIVES:

1. Learn the factors affecting group management.
2. Gain insight about the team building, stress and conflict management.

PRACTICALS:

1. Visit to village to understand the individual and group behavior
2. Analyze the group dynamics and leadership.
3. Analyze the group management, stress management and conflict management.
4. Identifying the role of communication in team building, conflict management and stress management.
5. Conducting focus group discussions and small group meetings.

OUTCOMES:

1. Learn the factors affecting group management.
2. Analyze the process of team building, stress management and conflict management.

EMCT -106- PRACTICAL -II

(EMCT 102+104A/ 104B) EXTENSION EDUCATION IN COMMUNITY DEVELOPMENT +COMMUNITY NUTRITION / NUTRITION DURING LIFE SPAN PRACTICALS

EMCT 102-EXTENSION EDUCATION IN COMMUNITY DEVELOPMENT

OBJECTIVES:

1. Acquire skill to study the community by using PRA techniques.
2. Sensitize students to develop the skill of critical analysis on various approaches of extension education.

PRACTICALS:

1.Visit to Blocks and villages to learn the setup and functions.

2. Visit to a nearby village to study the ongoing rural Development programmes through PRA technique.
3. Observation of the activities of Home-Science Extension workers.
4. Survey of the Problems faced by the women extension functionaries in carrying on their Day-to-day activities.
5. Planning and implementation of Nutrition education programmes through -
   a) Child-to-child approach.
   b) Woman-to-Woman approach
   c) Action plays.

OUTCOMES:

1. Acquire skill to study the community by using PRA techniques.
2. Sensitize students to develop the skill of critical analysis on various approaches of extension education

EMCT 104A-COMMUNITY NUTRITION

OBJECTIVES:

1. Comprehend knowledge on the role of nutrients in different stages of human life and methods of nutritional assessment.
2. Learn the community level problems and policies.

PRACTICALS:

1. Assessment of Nutritional Status using Anthropometry,
2. Assessment of Nutritional Status using Dietary method
3. Assessment of Nutritional Status using Clinical methods
4. Planning of and preparation of diet during pregnancy and lactation period
5. Planning of and preparation of diet during preschool & Elementary age
6. Planning of and preparation of diet during Adolescence
7. Planning of and preparation of diet during old age
8. Planning of Diets for Different Nutritional Deficiencies like PEM, Iron, Vit-A.
    a. Planning and Preparation of Programmes for Significant Days like Breast Feeding Week Nutrition Week, World Food Day.
9. 10.Study of the following through visits
    - Govt School Lunch Programme
    - ICDS Programme
    - Anganwadi Training Centers.
10. School Lunch Programme at Sri Venkateswara University Laboratory Nursery School.
11. Preparation of Visual Aids for Nutrition Education, and Method Demonstration on a
    - Nutrition Recipe.

OUTCOMES:

1. Skills in planning and calculating nutritive values for the foods and recipes.
2. Identify the signs and symptoms of different nutrient disorders in communication.

EMCT 104 B -NUTRITION DURING LIFE SPAN

COURSE OBJECTIVES –

To enable the students to:

1. Apply Computational skills in the Nutritional allowances during life span.
2. Develop skill in planning and preparation of diets for different age groups.

PRACTICALS:

1. Planning and preparation of diet for pregnant women.
2. Planning and preparation of diet for lactating women.
3. Planning and preparation of weaning foods.
4. Planning and preparation of diet for pre-school child.
5. Planning and preparation of diet for school going child.
6. Planning and preparation of diet for adolescent.
7. Planning and preparation of diet for adult.
8. Planning and preparation of diet for old age.

COURSE OUTCOMES-

After completion of this course, students will be able to:

CO1 Assess and compare diet and nutritional requirements relative to age, developmental and dise status.

CO2 Evaluate nutrition products for composition, quality, and appropriateness of use and formulate die interventions to address nutritional deficiencies.

EMCT 107: HUMAN VALUES AND PROFESSIONAL ETHICS – I

AUDIT COURSE
(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)
COURSE OBJECTIVES

This course helps the students to:

1. Define the term 'ethics', 'good and bad values', crime and punishment and religious tolerance.

2. Understand the importance of good character, conduct and values embedded in various religions.

3. Apply knowledge of professional ethics and correlate the concepts in addressing the ethical issues outside the class room.

4. Demonstrate knowledge of ethical values in non-class room activities, internships and field work and resolve the moral issues.

AUDIT COURSE - THEORY

Unit-I: Definition and Nature of Ethics

- Definition and Nature of Ethics its relation to Religion, Politics, Business, Legal, Medical and Environment.
- Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

Unit-II:Nature of Values

- Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values.
- Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom.
- Good behavior and respect for elders, Character and Conduct.

Unit-III:

- Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha(Non- stealing).
- Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama(Fulfillment Bodily Desires). Moksha (Liberation).

Unit-IV:

- Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths – AryaAstangamarga.
- Jainism- mahavratas and anuvratas.
- Values Embedded in Various Religions, Religious Tolerance. Gandhian Ethics.

Unit-V: Crime and Theories of punishment-

- Reformative, Retributive and Deterrent.
- (b) Views on manu and Yajnavalkya.

REFERENCES:

1. John S Mackenjie: A manual of ethics.
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3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
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14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications
15. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar

COURSE OUTCOMES:

After studying the course, students will able to;

CO1. Define the term ‘ethics’, ‘good and bad values’, crime and punishment and religious tolerance.

CO2. Understand the importance of good character, conduct and values embedded in various religions.

CO3. Apply knowledge of professional ethics and correlate the concepts in addressing the Ethical issues outside the class room.

CO4. Demonstrate the ability to face difficult situations in non-class room activities, internships and field work and resolve them confidently.

CO-PO MAPPING

Course outcome	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**	Pso 1	pso 2
CO1	3									2		2		
CO2	3									2		2		
CO3	3									2		2		
CO4	3									1		1		

H: High-3; M: Medium-2; L: Low-1

COURSE: 201- COMMUNITY ORGANIZATION AND LEADERSHIP

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES

The Course helps the students to;

1. Know about community organization; Process of Community organization; basic rural Institutions; leadership;
2. Understand how to organize voluntary organizations of people and utilize them for rural development.
3. Analyze different patterns of leadership; techniques of identification of leaders; steps to organize youth clubs; Role of Panchayat in developing rural women.
4. Design the criteria for identifying leaders and appraise the ongoing programmes in the locality.

CORE –THEORY

UNIT-I Community Organization:

- Concept, meaning and scope of community organization
- Principles of community organization.
- Identifying the roles of individuals in the community.
- Role and qualities of community organizer.

Unit- II Basic Rural Institutions:

- Basic rural Institutions: School, Panchayat and Co-operative.
- Voluntary Organizations: MahilaMandals, Youth clubs, Farmer's clubs, and others- How to organize the above and utilize them for rural development.
- Skills and Techniques**:** Tools, Techniques and skills involved in community organization, skills in co-ordination and public relations.

UNIT-III Leadership:

- Concept, definition, roles and characteristics, function of a leader
- Determinants of effectiveness in leadership function (Ten `A's).
- Factors determining effectiveness of a leader, the bases of power for leadership
- Theories of leadership.
- Types of patterns of leadership, techniques of identification of leaders, training for leadership
- Methods of developing leadership and use of leaders for rural Development

UNIT- IV Rural Youth and Women:

- Rural youth: Youth group; social profile of youth; basic needs of young people; youth service schemes - National Service Scheme (NSS), Nehru Yuva Kendra, Rural Youth Clubs - Objectives, steps to organize a youth club.
- Rural Women: Classification, Role of women in Agriculture, Decision making of Rural women; Employment opportunities for Rural Women; Role of Panchayat in developing rural women

PRACTICALS:

1. Study of the community organization in the locality.
2. Study of the leadership patterns, especially among women, in a rural area.
3. Developing criteria for identifying leaders.
4. Observation and study of ongoing programmes.

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8. Harold, W. Boles and James, A. Davenport. (1975). *Introduction to Educational leadership,* Harper and Row Publishers, New York,.

JOURNALS:

1. Social change, council of social development, New Delhi.
2. Indian journal of Extension Education, Indian Society of Extension education, New Delhi.
3. Kurukshetra.
4. Adult leadership.
5. Social Welfare.
6. Rural Leadership.
7. KhadiGramodyog.
8. Rural India.
9. Journal of Rural Development.
10. Journal of Community guidance and research.

COURSE OUTCOMES:

After studying the Course, students will be able to;

CO1.Gain Complete Knowledge about community organization; Basic rural Institutions; Leadership; Voluntary organizations: Youth clubs.

CO2. Understand how to organize voluntary organizations of people and utilize them for rural development.

CO 3. Evaluate the role of Panchayats in developing rural women; youth and also the ongoing programmes in the locality.

CO4. Analyze different patterns of leadership; techniques of identification of leaders.

1	CO-PO Mapping													
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3					3		3	2			2		
	CO2		3	3	3	3			2	2			2		
	CO3	3	3							2			2		
	CO4			3		2				2					

H: High-3; M: Medium-2; L: Low-1

EMCT 202- ENTREPRENEURIAL DEVELOPMENT AND EMPOWERMENT OF WOMEN

COURSE OBJECTIVES

The course helps the students to:

1. Know about entrepreneurship development; status of women entrepreneurs in India; problems and concerns of women entrepreneurs.
2. Understand about the strategies for empowering women; rights of women; National Policy for empowerment of Women.
3. Realize the role of entrepreneurship in economic development.
4. Analyze the institutional support of entrepreneurship.

CORE –THEORY

UNIT- I Entrepreneurship and Development:

- Concept, Motivating factors of entrepreneurship.
- Traits and growth of entrepreneurship, Entrepreneurship and economic development.
- Women Entrepreneurs: Profile and Status of Women entrepreneurs in India, Problems and concerns of Women entrepreneurs.
- Schemes of Assistance to Entrepreneurs from Governmental and Non-Governmental Agencies.

UNIT- II Entrepreneurial Support Systems

- Self Help Groups (SHG), Association of Women Entrepreneurs of Karnataka (AWEK)
- National Alliance of Young Entrepreneurs (NAYE),
- The Working Women's Forum (WWF)
- Centre for Entrepreneurship Development (CED)
- Self-Employed Women's Association (SEWA)
- Khadi and Village Industries Corporation (KVIC).
- National Women's Development Corporation (NWDC)
- Entrepreneurial Development Institute (EDI)
- National Institute of Small Industry Extension Training (NISIET).

UNIT-III: Business Plan

- **Business Plan for Entrepreneurs**: Components of business plan, Development of business plan, Project Idea, Product Idea Scan, Technology.
- Marketing concept , Manufacturing, Money and Capital requirements,
- Finalizing the business and starting the enterprise.

UNIT-IV Women Empowerment

- Women Empowerment : Concept, Perceptions, Problems in empowering women, Strategies for empowering women,
- Rights of Women, National Policy for empowerment of Women.
- Women and Economic Development : Concept, economic contributions of women
- Women and Employment, Women in Rural Development, Women in Agriculture
- Empowerment of women and Economic development.

PRACTICALS:

1. Collecting case studies of women entrepreneurs.
2. Visit to enterprise run by women entrepreneurs and regional entrepreneurship support system.
3. Visit to Entrepreneurial Development Cell (Campus/Mahila University).
4. Preparation of Project proposal for a selected enterprise.

REFERENCES:

1. Paul Chowdhary, D.(1991).*Women Welfare and Development (A source book)*, Inter-India Publication, New Delhi.
2. SivakamaSundari, S.(1995). *Entrepreneurship Development for Rural Women'* (Vol.I), Asian and Pacific for Transfer of Technology, New Delhi,
3. Lakshmi Devi,'*Women Empowerment and Societal improvement'*, Anmol Publications, Pvt. Ltd., New Delhi,
4. Lakshmi Devi, `*Women and Development'*, Anmol Publications, New Delhi, 1998.
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8. Jaya K.P. `Women and Empowerment', Gyan Publishing House, New Delhi 1995.
9. Santhi, K. `Empowerment of Women', Annual publications Pvt., Ltd., Delhi 1998.
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17. SakunthalaNarasimhan, `*Empowering Women - An Alternative Strategy from Rural India*', Sage Publications, New Delhi, 1999.
18. JayakothaiPillai, `*Women And Empowerment'*, Gyan Publishing House, New Delhi, 1995.
19. BhaskaraRaodigumarti and Pushpalatha Rao Digumarti, (1999). `*Women, EducationAnd Empowerment'*, Discovery Publishing House, New Delhi

JOURNALS:

1. SEDME
2. Entrepreneurship Development
3. Yojana
4. Economic and Political Weekly
5. Social Welfare
6. Kurukshetra
7. Journal of Rural Development
8. Rural Development Digest

COURSE OUTCOMES:

After studying the course; students will be able to;

CO1. Gain knowledge about entrepreneurship development and factors influencing entrepreneurship development; prospects and problems of women entrepreneurs.

CO 2. Understand the project management; preparation of project proposal and project report.

CO3- Analyze the institutional support of entrepreneurship and the agencies promoting entrepreneurship.

CO4 Evaluate the role of entrepreneurship in economic development.

1	CO-PO Mapping														
	Pos Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	3	2	2	2		2					3	2		
	CO2		3	3	3	2				2					
	CO3	3		3						2		3	2		
	CO4		3		3		2						2		

H: High-3; M: Medium-2; L: Low-1

COURSE - EMCT 203-A) EDUCATIONAL TECHNOLOGY

COURSE OBJECTIVES

The course helps the students to:

1. Know about teaching learning process; forms and levels of teaching and learning; curriculum design and development.
2. Understand about the genesis and trends in modern education; evaluation of instructional effectiveness; ICT; video production and multimedia presentations.
3. Design a course curriculum; Preparation of lesson plans of selected topics.
4. Prepare and use of different instructional material; Exercises on teaching learning strategies; construction of competency based question paper and seminar organization.

COMPULSORY FOUNDATION –THEORY

UNIT-I Teaching Learning Process

- Teaching Learning Process: Meaning and characteristics of Teaching and Learning; Maxims of Teaching; Meaning and scope of Educational Technology.
- Stages, forms and levels of Teaching and Learning.
- Motivation: Concept, importance and techniques.

UNIT-II Teaching Learning Strategies and Curriculum Design

- Curriculum design and development; Lesson planning: concept and methodology;
- Teaching learning strategies**:** Microteaching, programmed instruction, simulation, role-play, team teaching, experiential learning, traditional media
- ICT, Video production and multimedia presentations.

UNIT-III Trends in Modern Education

- Genesis and trends in modern education.
- Management of formal and non-formal education in India.
- Vocationalization of Education; Distance education;
- Guidance and Counseling.

UNIT-IV

- Evaluation of Instructional effectiveness
- Competency based question paper
- Reliability and validity of question papers

PRACTICALS:

1. Designing a course curriculum; Preparation of lesson plans of selected topics.
2. Preparation and use of different instructional material.
3. Conducting selected teaching lessons; Exercises on teaching learning strategies; Reading and speech exercises; Construction of competency based question paper and seminar organization.

REFERENCES:

1. Kemp Jerrold, E.(1985). *Planning and Producing Audio Visual Materials*.
2. Kochhar SK. (1985). *Methods and Techniques of Teaching*. Sterling Publ.
3. Kulkarni SS. (1986). *Introduction to Educational Technology*. Oxford & IBH.
4. Robert Heinich(1990). *Instructional Media*. MacMillan.
5. VedanayagamEG.(1988). *Teaching Technology for College Teachers*. Sterling Publ.

COURSE OUTCOMES:

After studying the course, students will be able to;

CO1. Gain knowledge on designing a course curriculum; preparation of lesson plans; and visual aids.
CO2. Develop different instructional materials; exercises on teaching learning strategies; construction of competency based question paper.
CO3- Evaluation of instructional effectiveness; ICT; video production and multimedia presentations.
CO 4- Enhance the skill of construction of competency based question paper and seminar organization

1	CO-PO Mapping													
	Pos Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3			3			3					2		
	CO2				3			3		3			2		
	CO3	3						3							
	CO4		3					2		2			2		

H: High-3; M: Medium-2; L: Low-1

203- B) TECHNOLOGY TRANSFER AND MANAGEMENT

COURSE OBJECTIVES

The course helps the students to:

1. Know about Technology meaning and concept, systems of transfer of appropriate technology.
2. Understand the appropriateness of communication media in the system of technology transfer.
3. Analyze the constraints in transfer of technology.
4. Gain insight about the agencies and departments involved in the transfer of technology.

CORE –THEORY

UNIT- I Technology

- Technology- Meaning and concepts of Appropriate technology.
- Transfer of technology- meaning and concepts.
- Systems of transfer of technology- Knowledge generating system (KGS)
- Knowledge disseminating system (KDS)
- Knowledge consuming system (KCS)
- Input supplying agencies systems (ISAS)

Unit-II- Communication Media

- New communication strategy for transfer and adoption of Agriculture technology.
- Appropriateness of communication media in the system of technology transfer.
- Extension training in transfer of technology.

UNIT- III Agencies and Departments involved in TOT

- Agencies involved in TOT.
- Extension professional in TOT.
- Role of key communicators or local leaders in TOT.
- Private and public partnership in TOT.
- Role of ICAR, SAU, and government and non-government organizations involved in TOT.

UNIT- IV Constraints

- Constraints in Transfer of technology
- Analysis of transfer of technology
- Attributes of technology and its relation in TOT process.

PRACTICALS

1. Analysis on use of TOT in rural areas.
2. Visit to the village and identification of key communicators or local leaders in adoption of TOT.
3. Visit to TOT centres of ICAR , case studies of Public-Private partnerships.
4. Analysis of print and electronic media and their role in TOT.
5. Visit to a NGO to study the systems of Transfer of technology.

REFERENCES BOOKS

a. Chaturvedi, TN.1982. Transfer of technology among developing countries; Need for strengthening cooperation. Gitanjali. Publ. House
b. Dunn DD, 1978, Appropriate technology with a Human face, Macmillan pre
c. Ray, G.L. (2006).`*Extension Communication and Management'*, NayaPrakash, Calcutta.
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e. Singh, SN. 1991. Transfer of Technology to Small farmers: An Analysis of Constraints and experience.
f. Ray, G.L. (2006).`*Extension Communication and Management'*, NayaPrakash, Calcutta
g. Sundaram, K.P.M.(1983).`Introduction to Indian economy', R.Chand.
h. The eighth Five Year Plan (1990-95)', Planning Commission, Govt. of India, New Delhi.
i. Vasant Desai, (1990). `*A study of Rural Economics'*, Himalaya Publishing House, N.Delhi.
j. Doshi, S.L. and Jain, P.C.(1999).`*Rural Sociology'*, Rawat Publications, Jaipur

JOURNALS

1. KhadiGramodyog
2. Yojana
3. Kurukshetra
4. Social welfare
5. Journal of Rural development
6. Indian Journal of Extension Education
7. Social Change
8. Rural India

COURSE OUTCOMES:

After studying the course, students will be able to;

CO1. Gain knowledge about the Technology meaning and concept, systems of transfer of appropriate technology.

CO2. Understand the appropriateness of communication media in the system of technology transfer.

CO3. Analyze the constraints in transfer of technology.

CO4. Learn about the agencies and departments involved in the transfer of technology.

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3	3						2				3		
	CO2			2	2	2									
	CO3			3					2						
	CO4		3	3					2				2		

H: High-3 M: Medium-2 L: Low-1

EMCT 204: RESEARCH METHODOLOGY AND STATISTICS

(COMMON TO ALL SPECIALIZATIONS OF M.SC. HOME SCIENCE AND MS FOOD TECHNOLOGY)

COURSE OBJECTIVES-

To enable the students to:

1. Identify the terms like 'variables', 'hypothesis', research and inferential statistics in scientific research.
2. Understand different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research.
3. Critically apply knowledge to select a sample by using different sampling methods like probability and non-probability sampling.
4. Comprehend the application of inferential statistics and perform simple calculations of t-test, chi-square test and correlation.

ELECTIVE FOUNDATION - THEORY

UNIT – I: Research Purpose and Types

- Research – Significance, meaning, objectives, Approaches,
- Research process, Criteria of good research, Variable- types
- Types of Research: Historical, descriptive, experimental, case study, survey research, participatory research, Fundamental, applied and action, exploratory research.
- Research hypothesis-Characteristics of good hypothesis.
- Types of research design

UNIT –II: Methods of Data Collection and Sampling

- Different Methods and techniques of data collection: Interview, Observation, Social mapping, Participatory assessment Techniques, Data Gathering Instruments, Observation check list, Questionnaire, Interview schedule , Measurement scales.
- Sampling Methods :*Probability sampling*- Simple random, systematic random sampling, two Stages and multi stage sampling, cluster sampling and *Non-probability sampling* - Purposive, quota and volunteer sampling / Snowball Sampling.
- Research Proposal – Preparation.

UNIT- III: Statistics

- Statistics: Meaning, Definition and Scope, limitations – Role of statistics in Research
- Descriptive Statistics: Classification and tabulation of data, Graphic and diagrammatic presentation of data, measurement of central tendency, variation and dispersion, Normal distribution, Frequency distribution, histogram, frequency polygons.

UNIT – IV: Inferential Statistics

- Level of significance and normal curve.
- 't' test for large samples (mean and proportions) and small samples
- Chi square test for significance and association
- Analysis of variance-one way, two way
- Methods of Correlation- coefficient of correlation, rank correlation.

PRACTICALS:

1. Identification of different variables in specialization of study.
2. Framing of hypothesis-Null and alternate Hypothesis
3. Preparation of schedule/questionnaire.
4. Preparation of research proposal
5. Study of an article in a journal-Abstract, Methodology, Results and Bibliography
6. Graphic and diagrammatic presentation of data.
7. Calculation of Averages- Arithmetic mean, mode and median.
8. Calculation of Standard deviation and 't' test for large and small samples.
9. Calculation of Correlations.
10. Calculation of chi square to find out significance of association.

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2. Bandarkar, P.L. and Wilkinson T.S. (2000) :*"Methodology and Techniques of Social Research"*, Himalaya Publishing House, Mumbai.
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8. Sharma S.R. (1994). *"Statistical methods in Educational Research"*, Anmol Publications Pvt. Ltd., New Delhi.

COURSE OUTCOMES-

After studying the course, students will able to:

CO1 Define terms like 'variables', 'hypothesis', research' and state the purpose of doing research

CO2 Understand different types of search and can compare the advantages and dis- advantages of each type of research.

CO3 Critically know the procedures for identifying an ideal sample for scientific research.

CO4 Able to prepare a research proposal in the appropriate scientific style and can perform simple calculations of t-test, chi-square test and correlation.CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3			3		3	2		2		2	3	2	3
CO2				3		3	3				2	3	2	3
CO3		1		3		3			2		3	3	3	3
CO4				3		3	3		3			3		3

H-High-3, M- Medium-2, L- Low-1

EMCT-205 PRACTICAL- I (201 + 203A / 203B) COMMUNITY ORGANIZATION AND LEADERSHIP + EDUCATIONAL TECHNOLOGY/ TECHNOLOGY TRANSFER AND MANAGEMENT PRACTICALS

COMMUNITY ORGANIZATION AND LEADERSHIP

COURSE OBJECTIVES

The Course helps the students to;

1. Know about community organization; Process of Community organization; basic rural Institutions; leadership;
2. Understand how to organize voluntary organizations of people and utilize them for rural development.
3. Analyze different patterns of leadership; techniques of identification of leaders; steps to organize youth clubs; Role of Panchayat in developing rural women.
4. Design the criteria for identifying leaders and appraise the ongoing programmes in the locality.

PRACTICALS:

1. Study of the community organization in the locality.
2. Study of the leadership patterns, especially among women, in a rural area.
3. Developing criteria for identifying leaders.
4. Observation and study of ongoing programmes.

COURSE OUTCOMES:

After studying the Course, students will be able to;

CO1.Gain Complete Knowledge about community organization; Basic rural Institutions; Leadership; Voluntary organizations: Youth clubs.

CO2. Understand how to organize voluntary organizations of people and utilize them for rural development.

CO 3. Evaluate the role of Panchayats in developing rural women; youth and also the ongoing programmes in the locality.

CO4. Analyze different patterns of leadership; techniques of identification of leaders.

EDUCATIONAL TECHNOLOGY

COURSE OBJECTIVES

The course helps the students to:

1. Know about teaching learning process; forms and levels of teaching and learning; curriculum design and development.
2. Understand about the genesis and trends in modern education; evaluation of instructional effectiveness; ICT; video production and multimedia presentations.
3. Design a course curriculum; Preparation of lesson plans of selected topics.

Prepare and use of different instructional material; Exercises on teaching learning strategies; construction of competency-based question paper and seminar organization

PRACTICALS:

1. Designing a course curriculum; Preparation of lesson plans of selected topics.
2. Preparation and use of different instructional material.
3. Conducting selected teaching lessons; Exercises on teaching learning strategies; Reading and speech exercises; Construction of competency-based question paper and seminar organization.

COURSE OUTCOMES:

After studying the course, students will be able to;

CO1. Gain knowledge on designing a course curriculum; preparation of lesson plans; and visual aids.

CO2. Develop different instructional materials; exercises on teaching learning strategies; construction of competency-based question paper.

CO3- Evaluation of instructional effectiveness; ICT; video production and multimedia presentations.

CO 4- Enhance the skill of construction of competency-based question paper and seminar organization.

TECHNOLOGY TRANSFER AND MANAGEMENT

COURSE OBJECTIVES

The course helps the students to:

1. Know about Technology meaning and concept, systems of transfer of appropriate technology.
2. Understand the appropriateness of communication media in the system of technology transfer.
3. Analyze the constraints in transfer of technology.
4. Gain insight about the agencies and departments involved in the transfer of technology.

PRACTICALS

1. Analysis on use of TOT in rural areas.
2. Visit to the village and identification of key communicators or local leaders in adoption of TOT.
3. Visit to TOT centres of ICAR , case studies of Public-Private partnerships.
4. Analysis of print and electronic media and their role in TOT.
5. Visit to a NGO to study the systems of Transfer of technology.

COURSE OUTCOMES:

After studying the course, students will be able to;

CO1. Gain knowledge about the Technology meaning and concept, systems of transfer of appropriate technology.

CO2. Understand the appropriateness of communication media in the system of technology transfer.

CO3. Analyze the constraints in transfer of technology.

CO4. Learn about the agencies and departments involved in the transfer of technology.

EMCT-206 PRACTICALII

(202 + 204 A / 204 B)

ENTREPRENEURIAL DEVELOPMENT AND EMPOWERMENT OF WOMEN + RESEARCH METHODOLOGY/ STATISTICS AND COMPUTER APPLICATION PRACTICAL

COURSE OBJECTIVES

The course helps the students to:

1. Know about entrepreneurship development; status of women entrepreneurs in India; problems and concerns of women entrepreneurs.
2. Understand about the strategies for empowering women; rights of women; National Policy for empowerment of Women.
3. Realize the role of entrepreneurship in economic development.
4. Analyze the institutional support of entrepreneurship.

PRACTICALS:

1. Collecting case studies of women entrepreneurs.
2. Visit to enterprise run by women entrepreneurs and regional entrepreneurship support system.
3. Visit to Entrepreneurial Development Cell (Campus/Mahila University).
4. Preparation of Project proposal for a selected enterprise.

COURSE OUTCOMES:

After studying the course; students will be able to;

CO1. Gain knowledge about entrepreneurship development and factors influencing entrepreneurship development; prospects and problems of women entrepreneurs.

CO 2. Understand the project management; preparation of project proposal and project report.

CO3- Analyze the institutional support of entrepreneurship and the agencies promoting entrepreneurship.

CO4 Evaluate the role of entrepreneurship in economic development.

RESEARCH METHODOLOGY

COURSE OBJECTIVES

To enable the students to:

1. Identify the terms like 'variables', 'hypothesis',research and inferential statistics in scientific research.
2. Understand different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research.
3. Critically apply knowledge to select a sample by using different sampling methods like probability and non-probability sampling.
4. Comprehend the application of inferential statistics and perform simple calculations of t-test, chi-square test and correlation.

PRACTICALS:

1. Identification of different variables in specialization of study.
1. Framing of hypothesis-Null and alternate Hypothesis
2. Preparation of schedule/questionnaire.
3. Preparation of research proposal
4. Study of an article in a journal-Abstract, Methodology, Results and Bibliography
5. Graphic and diagrammatic presentation of data.
6. Calculation of Averages- Arithmetic mean, mode and median.
7. Calculation of Standard deviation and 't' test for large and small samples.
8. Calculation of Correlations.
9. Calculation of chi square to find out significance of association.

COURSE OUTCOMES-

After studying the course, students will able to:

CO1 Define terms like 'variables', 'hypothesis',research'and state the purpose of doing research

CO2 Understand different types of search and can compare the advantages and dis- advantages of each type of research.

CO3 Critically know the procedures for identifying an ideal sample for scientific research.

CO4 Able to prepare a research proposal in the appropriate scientific style and can perform simple calculations of t-test, chi-square test and correlation.CO-PO Mapping.

CORE –THEORY

EMCT- 207- HUMAN VALUES AND PROFESSIONAL ETHICS – II

(WITH EFFECT FROM ACADEMIC YEAR 2021- 22 ONWARDS)

AUDIT COURSE

COURSE OBJECTIVES

This course helps the students to:

1. Associate the terms 'value education' 'self-introspection' and 'self-esteem' which are the core aspirations of all human beings.
2. Understand the importance of ethics in different fields like medical, business, environment and social ethics and ethics of media.
3. Apply the knowledge to assess issues and problems in each profession and correlate the concepts in addressing the ethical issues while choosing and joining a profession.
4. Develop all round and well-balanced personality of the students and shapes them to become morally finer, socially responsible and physically fit persons of the society.

AUDIT COURSE- THEORY

Unit-I:Value Education

Value Education- Definition - relevance to present day - Concept of Human Values - self introspection – Self-esteem - Family values-Components, structure and responsibilities of family- Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

Unit-II:Medical Ethics

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit-III: Business Ethics

Business ethics- Ethical standards of business- Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit-IV: Environmental Ethics

Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

Unit-V: Social Ethics

Social ethics - Organ trade. Human trafficking. Human rights violation and social disparities, Feminist ethics. Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

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COURSE OUTCOMES:

After studying the course, students will able;

CO1. Associate the terms ‘value education’ ‘self-introspection’ and ‘self-esteem’ which

are the core aspirations of all human beings.

CO2. Understand the importance of ethics in different fields like medical, business , environment and social ethics and ethics of media.

CO3. Apply the knowledge to assess issues and problems in each profession like medical, business , environment and social ethics and ethics of media and correlate the concepts in addressing the ethical issues while choosing and joining a profession.

CO.4. Apply skills for anger management, care of elderly, environmental protection and thereby develop well balanced personality and will contribute to society as morally finer, socially responsible and physically fit persons.

EMCT: 301: MANAGERIAL SKILLS FOR EXTENSION PROFESSIONALS
(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)
COURSE OBJECTIVES

The course helps the students to:

1. Know about the conceptualization of management process and its major functions, managerial skil1; nature and importance for extension professionals.
2. Develop understanding about strategic planning: importance; steps and techniques in management; motivation techniques in organizational climate.
3. Learn creative problem solving techniques; stress management practices; and time management practices.
4. Develop skills regarding organizational management.

CORE - THEORY

UNIT-I Management Process

- Conceptualization of management process and its major functions;
- Management problems in extension organizations;
- Managerial skill, nature and importance for extension professionals.

UNIT-II Strategic Planning

- Strategic planning: importance, steps and techniques;
- Management by objective as applicable to extension organizations;
- Techniques of transactional analysis for improving interpersonal communication.

UNIT-III Problem Solving Techniques

- Creative problem solving techniques;
- Stress management practices;
- Total Quality Management (TQM);
- Time management practices;
- Management Information System.

UNIT-IV Motivation Techniques

- Motivation techniques in organizational climate
- Resource management: concept and methods

- Team building: process and strategies
- Mobilization and empowerment skills and SHGs formulation.

PRACTICALS

- Visit to the Extension Organizations and observation of the activities of Home-Science Extension personnel.
- Visit to the nearby SHGs and preparing a report on functioning of SHGs.
- Visit to selected village to study DWCRA, CMEY, SGSY, etc.
- Visit to study the functioning of KVKs.

FIELD PLACEMENT (MANDATORY)

- Survey of nearby village to study the socio-economic conditions; needs and problems of rural people specially the women and children.
- Identification of problems, prioritizing and preparing the Action Plan.
- Use of various training methodologies in rural areas- Lesson plans, Demonstrations, PRA technique, Role-play, Drama, Focus Group discussions etc for knowledge dissemination.
- Identifying the Agencies involved in rural development
- Use of extension teaching methods in the transfer of technologies to the rural families;
- Organizing groups and provides training on income generating activities and improve the standard of living of the rural people.

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COURSE OUTCOMES

After studying the course, students will be able to;

CO 1. Gain Knowledge on management process; strategic planning and its importance; steps and motivation techniques used in organizations.

CO 2. Understand the motivation techniques and team building process in Management.

CO 3. Learn creative problem solving techniques; stress management practices; and time

management practices.

CO4. Develop skills regarding organizational management.

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	POII	POI2	PSO1	PSO2
	CO1	3	2	2	2			3	3	2			2		
	CO2		3	3	2	2		3	2	2					
	CO3		3			2									
	CO4		3		2			3					2		

H: High-3; M: Medium-2; L: Low-1

EMCT 302 -TRAINING AND DEVELOPMENT

COURSE OBJECTIVES

The course helps the students to:

1. Know about the concept of training, goals of training; learning and types of learning, factors affecting learning among adults.
2. Understand the types and methods of learning; current trends in training methodologies; training strategies and designs.
3. Acquire skills in developing; selection and use of different training methods- case study; role play; and brain storming; etc.
4. Analyze the roles of a trainer; competencies of trainers; and trainer- trainee perceptions.

CORE –THEORY

UNIT- I: Training and Development:

- Concept of learning and types of learning, factors affecting learning among adults.
- Types and methods of learning, learning paradigms- learning knowledge, attitudes, skills, practices, values experiential, reflective learning, literative learning.
- Concept of training: Goals of training – self- development, action learning, transformation and organizational development, enhancing organizational effectiveness, team spirit.

UNIT- II:Training Methodologies:

- Current trends in training methodologies, organizational development approach, and competency-based training.
- Participatory training methodologies – aspects, advantages, limitations, implications for training process.
- Training administration**:** policies, guidelines, authority.

UNIT- III:Trainer and Trainee Interface:

- Roles of a trainer, counselor, coach, partner, facilitator, teacher, advisor, model, expert.
- Competencies of a trainer- attitudes, behavior traits – combining competencies of trainers, trainer – trainee perceptions.
- Factors affecting, implications on training, building and developing assertive skills.

UNIT- IV:Training Process:

- Different phases of training, conceptual models of training, systems approach to training: inputs, process, out puts.
- Training strategies and Designs: Training need assessment, planning training programmes, organizational environment, Training facilities and other resources.

- Training methods and interaction styles: Classification of training methods, their importance, uses and limitations- selecting, appropriate methods to suit situations and circumstances.
- Case study, role play, psychodrama, sensitivity, buzz group, group discussion, transactional analysis, business games etc.
- Evaluation types- evaluation for guiding, checking and monitoring for action.
- Frame work for evaluating training programmes, internal and external indicators.

PRACTICALS

1. Designing training programmes for different developmental goals.
2. Developing skills in selection and use of different training methods- case study, role play, psychodrama, buzz group, group discussion, transactional analysis, process work, micro labs, business games etc.
3. Organizing and conducting training programmes.
4. Evaluating training programmes
5. Visit to training and development organizations.

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COURSE OUTCOMES:

After studying the course, students will be able to;

CO 1. Gain knowledge on designing and evaluation of training programmes for different target groups.

CO 2. Develop the training modules for specific target groups and application of training methods and techniques.

CO3. Acquire skills in developing; selection and use of different training methods-

CO4. Analyze the roles of a trainer; competencies of trainers; and trainer- trainee perception

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3	3		3				2	2			2		
	CO2		2	2	3					2			2		
	CO3		3		3				2				2		
	CO4		3		3								2		

H: High-3; M: Medium-2; L: Low-1

EMCT 303 A): RURAL DEVELOPMENT AND ADMINISTRATION

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES

The Course helps the students to:

1. Know about administration in Extension and Rural Development: Coordination and Supervision in Rural Development Administration.
2. Understand the purpose and principles of Administration; Human Relation in Extension Administration:
3. Analyze the recent ongoing Rural Development Programmes in Gram Panchayat.
4. Evaluate the training and visit system; KVKs.

GENERIC ELECTIVE - THEORY

UNIT- I Administration:

- Meaning, Nature and purpose of administration in Extension and rural development.
- The principles of administration and organization.
- Human relation in extension administration.

UNIT-II Coordination:

- Meaning and importance, methods of bringing about co-ordination in Extension work, factors influencing co-ordination.
- Delegation of Authority and responsibility.
- Supervision**:** Importance, Principles, differences between supervision and control, Techniques of supervision
- Development of code of Ethics
- Competencies needed by extension personnel.

UNIT-III Rural Development Administration:

- The rural development administrative setup
- Functions
- Recent Rural Development Programmes: Objectives achievements and constraints.
- Integrated Rural Development Programme (IRDP), Development of Women and Children in Rural Areas (DWCRA), Training of Rural Youth for Self Employment (TRYSEM), Integrated Child Development Service (ICDS), Swarnajayanthi Gram Swarojgar Yojana (SGSY), Jahawar Gram Samridhi Yojana (JGSY) Employment Assurance Scheme (EAS), Million Wells Scheme (MWS), Ganga Kalyan Yojana (GKY) Prime Minister Rojgar Yojana (PMRY), Watershed Development Programme (WSDP), Krishi Vignanakendra (KVK), Beti bachaobetipadao, Maternity benefit scheme, Digital India, Skill India, Sukanya Samridhi yojana.

UNIT- IV Training

- Meaning, Need, Types and principles of Extension training.
- Training of different personnel.
- Agencies offering training for different personnel.
- Training and Visit System (T&V): Objectives of the T &V System, Basic assumption,
- Monitory and Evaluation, Organizational structure.

PRACTICALS:

1. Study the set up at different levels and function of different departments.
2. Visit to a near by Gram Panchayat to study the on young Rural Development programme.
3. Visit to nearby agencies offering Training.
4. Visit to selected village to study DWCRA, SHG, CMEY, SGSY, etc.,
5. Visit to a Village to study the functioning of NGOs.
6. Visit to nearby KVK to study its functioning

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COURSE OUTCOMES:

After studying the course, the students will be able to;

CO1. Gain in-depth knowledge about Administration in Extension and Rural Development; the importance of Co-ordination and Supervision in Rural Development Administration.

CO2. Analyze the functioning of KVKs, evaluate the training and visit system.

CO3-Understand the purpose and principles of Administration; Human Relation in Extension Administration:

CO4 -Analyze the recent Rural Development Programmes in the nearby Panchayats; functioning of KVKs.

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO111	PO12	PSO1	PSO2
	CO1	3	2				2		2						
	CO2		3	3	3	2				2			2		
	CO3			3	3			2		2			2		
	CO4		3		3					2			2		

H: High-3; M: Medium-2; L: Low-1

EMCT 303 B) - PRINCIPLES OF GUIDANCE AND COUNSELING (WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES

The course helps the students to:

1. Develop knowledge about the concept; purpose; functions and role of guidance; types of services in guidance programme, counseling and counseling theories.
2. Understand the group guidance and counseling; concept; characteristics; Individual v/s group techniques.
3. Assess the guidance programmes and counseling process in school and out of school settings.
4. Analyze the content of semi-structured, use of standard test of study habits and attitudes (SSHA) for analyzing the study habits and attitudes.

GENERIC ELECTIVE- THEORY

UNIT- I Guidance:

- Meaning, scope, purpose, functions and role of guidance, principles underlying guidance, Historical development of guidance.
- Types of services in a guidance programme:
  - Appraisal service - observation, interview, autobiography. Cumulative record, test data, socio-metric techniques.
  - **Informational service-**purpose, types, principles and material involved career planning and placement service.

UNIT- II Counseling:

- Meaning, purpose, scope, functions and role of counseling, principles underlying counseling, types of counseling, Historical development of counseling.
- Expectations and goals of counseling
- Roles and functions of counselor
- Characteristics of counselor and counselee
- Qualities of a good counselor
- Factors facilitating counseling relationships.

UNIT- III Counseling Theories:

- Directive, Non-directive, & Eclectic,
- Trait-factor and behavioral counseling.
- Role of non-verbal communication in counseling.

UNIT- IV Group Guidance and Counseling:

- Concept, characteristics, individual vs group techniques;
- Similarities and differences;
- Advantages and limitations.
- General principles for evaluation of guidance and counselling programme.

PRACTICALS

1. Identification of human potential.
2. Analysis of the content of semi-structured Autobiography.
3. Use of standard test of study habits and attitudes(SSHA) for analyzing, the study habits and attitudes.
4. Construction and use of Johari window technique to study the interpersonal perception.
5. Assessment of decision making styles.
6. Analysis of decision making grid.
7. Demonstration of the use of Differential Aptitude Test battery.

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25. Parricha, Prem, (1976).*Guidance and Counselling in Indian Higher Education*, NCERT, New Delhi, 1976.
26. Tolber,(1973). *Counselling for Career Development,* Houghton Mifflin, Co., Boston

JOURNALS

1. British Journal of Guidance.
2. Counselling Psychologist.
3. Indian Journal of Clinical Psychology.
4. Journal of Counselling Psychology.
5. Personnel and Guidance.
6. The School Counsellor.
7. Journal of Community Guidance and Research.

COURSE OUTCOMES:

After studying the course, students will be able to;

CO 1. Gain knowledge about the importance of guidance and counseling; types of services; counseling; types and theories of counseling.

CO 2. Understand group guidance; guidance programmes; evaluation in guidance and counseling.

CO 3. Assess the guidance programmes and counseling process in school and out of school settings.

CO4. Analyze the content of semi-structured Autobiography; use of standard test of study habits and attitudes (SSHA) for analyzing the study habits and attitudes.

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Pso1	Pso2
	CO1	3	3	3		3			2				2		
	CO2		3				3			2			2		
	CO3														
	CO4		3				2			2					

H: High-3 M: Medium-2 L: Low-1

PRACTICALS:

1. Survey of nearby village to study the socio-economic conditions; needs and problems of rural people specially the women and children.
2. Identification of problems, prioritizing and preparing the Action Plan.
3. Use of various training methodologies in rural areas- Lesson plans, Demonstrations, PRA technique, Role-play, Drama, Focus Group discussions etc for knowledge dissemination.
4. Identifying the Agencies involved in rural development
5. Study the role and functions of extension personnel.
6. Use extension teaching methods in the transfer of technologies to the rural families;
7. Organizing groups and provide training on income generating activities and improve the standard of living of the rural people.

1	CO-PO Mapping													
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	2	3	3	3	3	3	2	2	3	2	2	2		
	CO2		3	3	3	3		2		3			3		
	CO3		3		3			2					3		
	CO4				3			2					2		

H: High-3; M: Medium-2; L: Low-1

EMCT -304 PRACTICAL

(301 + 302)

MANAGERIAL SKILLS FOR EXTENSION PROFESSIONALS &TRAINING AND DEVELOPMENT PRACTICAL

MANAGERIAL SKILLS FOR EXTENSION PROFESSIONALS

COURSE OBJECTIVES

The course helps the students to:

1. Know about the conceptualization of management process and its major functions, managerial skil1; nature and importance for extension professionals.
2. Develop understanding about strategic planning: importance; steps and techniques in management; motivation techniques in organizational climate.
3. Learn creative problem solving techniques; stress management practices; and time management practices.
4. Develop skills regarding organizational management.

PRACTICALS

- Visit to the Extension Organizations and observation of the activities of Home-Science Extension personnel.
- Visit to the nearby SHGs and preparing a report on functioning of SHGs.
- Visit to selected village to study DWCRA, CMEY, SGSY, etc.
- Visit to study the functioning of KVKs.

COURSE OUTCOMES

After studying the course, students will be able to;

CO 1. Gain Knowledge on management process; strategic planning and its importance;

steps and motivation techniques used in organizations.

CO 2. Understand the motivation techniques and team building process in Management.

CO 3. Learn creative problem solving techniques; stress management practices; and time management practices.

CO4. Develop skills regarding organizational management.

TRAINING AND DEVELOPMENT PRACTICAL

COURSE OBJECTIVES

The course helps the students to:

1. Know about the concept of training, goals of training; learning and types of learning, factors affecting learning among adults.
2. Understand the types and methods of learning; current trends in training methodologies; training strategies and designs.
3. Acquire skills in developing; selection and use of different training methods- case study; role play; and brain storming; etc.
4. Analyze the roles of a trainer; competencies of trainers; and trainer- trainee perceptions.

PRACTICALS

1. Designing training programmes for different developmental goals.

2. Developing skills in selection and use of different training methods- case study, role play, psychodrama, buzz group, group discussion, transactional analysis, process work, micro labs, business games etc.

3. Organizing and conducting training programmes.

4. Evaluating training programmes

5. Visit to training and development organizations

COURSE OUTCOMES:

After studying the course, students will be able to;

CO 1. Gain knowledge on designing and evaluation of training programmes for different target groups.

CO 2. Develop the training modules for specific target groups and application of training methods and techniques.

CO3. Acquire skills in developing; selection and use of different training methods-

CO4. Analyze the roles of a trainer; competencies of trainers; and trainer- trainee perceptions

EMCT 305 – NGO MANAGEMENT

(SKILL ORIENTED COURSE)

(With effect from academic year 2021-22 onwards)

Marks (T=50+P= 50)

COURSE OBJECTIVES:

The course helps the students to:

1. Know about specific knowledge on project and NGO management.
2. Understand the basic concepts and principles involved in managing NGOs.
3. Enhance skills and techniques of Project evaluation / Resource mobilization.
4. Gain insight on project proposal writing and maintenance of records.

SKILL ORIENTED COURSE - THEORY

UNIT- I NGO Management:

- Management- meaning, definition.
- NGOs- meaning, definition, concept, types, functions.
- Approaches and models. Legal framework for establishing NGOs.
- Role of NGOs in Community development.

UNIT – II Project Management in NGOs:

- Project management in NGOs – concept meaning and types of projects.
- Project implementation and management, Identification and formulation of detailed project reports.
- Monitoring and evaluation (PERT and CPM). PRA tools and techniques.
- SWOC (Strength, weaknesses, opportunities and challenges) analysis.

PRACTICALS

1. Visit to the NGO-PASS, Tirupati to study the objectives and functions and to know about the beneficiaries, implementation of various projects of PASS.
2. Visit to the NGO- RASS, Tirupati to study the objectives and functions and projects of RASS.
3. Visit to NGO- Old Age homes, Tirupati and to study the reasons for joining old age homes. Collecting the case studies.
4. Visit to Family Counseling centres, Drug de-addiction centres, health and family care centres, Tirupati
5. Visit to DRDOs- SHGs, KVKs and the training centres for women and children.

INTERNSHIP (MANDATORY)

TEXT BOOKS

1) Clark John. (1991). Voluntary Organizations: Their Contribution to Development. London: Earth Scan.

2) Jain R.B. (1995). NGO's in Development Perspective. New Delhi: Vivek Prakasan

3) Sakararan and Rodrigues. (1983). *Handbook for the Management of Voluntary Organization.* Madras: Alfa

REFERENCES

1. Behera M. C. (2006). *Globalizing Rural Development*. New Delhi: Sage.

2. Chowdhry Paul. (1973). *Administration of Social Welfare Programmes in India*. Bombay: Somaiy.

3. Emmanuvel. S. Fermando. (1999). *Prospect from Problems. Mumbai*: St. Francis Xavier's Church.

4. Ginsbery Leon. H. (2001). *Social Work Evaluation – Principles and Methods*. Singapore: Allyn and Bacon.

5. Jack Rothman, John John E. Tropman. (2001). *Strategies of Community Intervention*. Illinois: P.E. Peacock.

COURSE OUTCOMES:

After studying the course, students will be able to;

CO1. Gain knowledge about project and NGO management.

CO2. To enhance skills and techniques of Project evaluation / Resource mobilization

CO3. Enable the students to gain first-hand exposure of working in theNGOs

CO4. Provide an opportunity to develop a right work attitude, self-confidence, interpersonal skills and ability to work as a team in a real organizational setting.

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11 (Econ)	POI2	PSO1	PSO2
	CO1	3	2						2				3		
	CO2			3	2	2									
	CO3			3		2							2		
	CO4		3		2								2		

H: High-3; M: Medium-2; L: Low-1

EMCT 306 A): FUNDAMENTALS OF FOOD, NUTRITION AND HEALTH

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES

The course helps the students to:

1. Gain knowledge on foods, food groups, balanced diet for different age groups.
2. Understand the importance of macro and micronutrients in daily diet.
3. Comprehend knowledge on deficiency symptoms of different nutrients.
4. Apply skills to assess nutritional problems in community.

OPEN ELECTIVE - THEORY

UNIT-I: Food Composition

- Food groups – Classification – food composition and nutritive values of different foods, Functions of foods.
- Balanced Diet, RDA for all age groups.

UNIT-II: Macronutrients

- Carbohydrates: Definition, classification, food sources, Function in human body, Recommended Daily Allowance (RDA) and importance of fibre.
- Fats and Oils: Definition, classification, saturated and unsaturated fatty acids, cholesterol, Food sources, requirements, RDA and biological functions.
- Protein: Definition, classification, essential and non-essential amino acids, protein quality, supplementary value of protein, food sources, RDA and functions.

UNIT-III: Micronutrients

- Vitamins: Definition, classification
- Fat soluble Vitamins (A, D, E, K) - Functions, sources, RDA, Deficiency diseases and symptoms.
- Water soluble Vitamins (B complex and C): Functions, sources, RDA, Deficiency diseases and its symptoms.
- Macro minerals: Calcium, phosphorous, sodium, potassium, chloride- sources, biological functions, factors affecting availability, Deficiency diseases and symptoms.
- Micro minerals: Copper, zinc, Iron, Iodine and fluorine in human nutrition, biological functions, factors affecting availability, Deficiency diseases and symptoms.

Unit - IV: Major Nutritional Problems of the Community:

- Malnutrition - PCM, obesity, micronutrient malnutrition, government programmes to eradicate PCM, vitamin-A, iron and iodine deficiencies
- Principles of planning diets for different conditions of malnutrition.

REFERENCES - TEXT BOOKS

1. Swaminathan, M. (1999). Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co Madras.
2. Mahtabs. Bamji and N.PralhadRao. (2004). "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi,
3. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian.(2012). Nutritive Value of Indian Foods National Institute of Nutrition, Indian Council Medical Research Hyderbad.
4. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of Indian Council Medical Research.2010.

COURSE OUTCOMES:

After studying the course, students will be able to

CO 1. Acquire knowledge on food groups and functions of food.

CO 2 .Gain knowledge on importance of macro and micronutrients in different age groups.

CO 3. Identify signs and symptoms of different nutrient deficiencies.

CO 4. Illustrate the nutritional problems in community.

CO-PO Mapping

Course Outcomes	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**	**PSO**	**PSO**
CO1	3											2		
CO2		2	2	2								2		
CO3	2		2	2								2		
CO4			3	2								2		

H: High-3; M: Medium-2; L: Low-1

FSND 306 B: DYNAMICS IN FOOD PREPARATION

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES

To enable the students to:

1. Learn the principles of safe food preparation and food pyramid.
2. Understand the role of foods in cookery.
3. Apply knowledge about effect of cooking on nutrients.
4 . Able to differentiate different cooking equipments and role of food items in cookery.

OPEN ELECTIVE - THEORY

UNIT-I: Introduction

- Definitions in food science.
- Composition and functions of foods.
- Food pyramid.
- Principles of safe food preparation.

UNIT-II: Cooking Process

- Objectives of Cooking.
- Preliminary preparations.
- Cooking methods- Moist heat methods, Dry heat methods; Fat as medium of cooking, Microwave cooking.
- Effect of cooking on Nutrients.

UNIT-III: Cooking Equipments

- Types of cooking equipments- Grill, Boiler, Oven and Microwave. Mechanical processing equipments- Vegetable Peeler, Chopper, Mixer, Slicing machine and mincing equipment.
- Non cooking equipment: Refrigerator.

UNIT-IV: Role of foods in Cookery

- Role of cereals, pulses, fats/oils, milk and milk products, flesh foods, sugars, vegetables, fruits and spices.

REFERENCES

1. Srilakshmi,B.(2001).*Food Science*, 2nd edition New Age International (P) Ltd., Publishers, Bangalore, Chennai & Hyderabad.
2. Swaminathan, M.(1979).*Food science and Experimental foods*. Ganesh & Co., Madras.
3. Dr.M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
4. ShubhanginiA.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.

COURSE OUTCOMES:

After completion of the course, students will able to :

CO1 Acquire knowledge on Food Pyramid.

CO2 Estimate the effects of cooking on Nutrients.

CO3 Gain knowledge on methods of Cooking.

CO4 Identify Role of foods on Cookery.

CO-PO Mapping

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	Pso 1	Pso 2
CO1	3											2		
CO2	3											2		
CO3		2	2	2								2		
CO4		3	2	2								2		

H: High-3; M: Medium-2; L: Low-1

EMCT 401 -COMMUNICATION TECHNOLOGIES IN EXTENSION

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES:

The course helps the students to:

1. Know about communication systems- interpersonal; organizational; public and mass communication.
2. Understand the concept; scope and relevance of media systems trends and techniques.
3. Analyze the definite role of advertising in modern marketing system.
4. Evaluate media systems in inter-relation of advertising and mass media systems and types of advertisements

CORE - THEORY

UNIT-I:Communication Systems:

- Types of communication systems- concept, functions and significance, interpersonal, organizational, public and mass communication.
- Elements, characteristics and scope of mass communication.
- Mass communication- models and theories; role of gatekeepers and opinion leaders.
- Visual communication- elements of visual design- colour, line form, texture and space;

UNIT-II: Traditional Media

- Traditional media: role in enhancing cultural heritage, co-existence with modern media systems and applicability in education and entertainment- puppetry, folk songs, folk theatre, fairs.
- Print media: books, newspapers, magazines, leaflets and pamphlets.
- Electronic media- radio, television, video, and computer based technologies.

UNIT-III: Media systems: Trends and Techniques

- Concept, scope and relevance of media in society.
- Functions reach and influence of media.
- Contemporary issues in media- women and media, human rights and media, consumerism and media.
- Outdoor media; exhibition, fairs and kiosks.
- Techniques of preparation of effective advertisements for various media.

UNIT-IV: Multimedia Applications

- Multimedia Applications- Definition, types and functions.
- Advantages of Digital Multimedia.
- Multimedia System- International media- email, internet, teleconferencing, video conferencing LCD Projector, video disc technology, virtual reality.

PRACTICALS

1. Planning and use of differentcommunication approaches.
2. Practical hands on experience in recent advances in print, electronicand new media.
3. Report on Multi media and emerging technologies, internet radio and web television.
4. Report on **impact** of new media on traditional media.
5. Online and netE-newspapers and editions, blogs, search engines, video logs, citizen journalism.
6. Evaluation of e-journals - advantages and disadvantages.

REFERENCES

1. Defluers and Dennis (1994): *Understanding Mass Communication*.
2. Gupta, S.S: Cases in Advertising and Communication Management in India.
3. Harper and Row (1989).*Main Currents in Mass Communication*, Agee, Adut and Emery.
4. Joseph, D. (1993).*The Dynamics of Mass Communication*.
5. McQuali, D.(1994).*Introduction to Mass Communication*, 3rd Edition, Sage Publication.
6. Ravindran. R.K. (1999).*Media and Society*.
7. Ravindran. R.K. (2000). *Media in Development Area.*
8. Schamm, W, (1988).*The story of Human Communication*, from cave painting to the Microchip.
9. Vivian, J. (1991).*Media of Mass Communication*.Wright, Wiinters and Zeiger: McGraw Hill, Advertising Management.
10. Zachariah, A. (1999). *Media Power, People, Politics and Public Interes*

COURSE OUTCOMES:

After studying the course, students will be able to;

CO 1. Gain knowledge about the communication systems; relevance of media in society; role and functions of communication systems.

CO 2. Understand the role of advertising in modern marketing systems; preparation and evaluation of media systems in advertising.

CO3. Analyze the definite role of advertising in modern marketing system; Media planning and scheduling; selection of media; ethics in mass media.

CO4.Analyze the Multimedia System- International media- email, internet, teleconferencing etc.,

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3	2	2	2			3	3	2			2		
	CO2		3	3	2	2		3	2	2					
	CO3		3			2			2						
	CO4			3		2							2		

H: High; 3 M: Medium; 2 L: Low 1

402: PARTICIPATORY PROGRAMME MANAGEMENT

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES:

The Course helps the students:

1. To know in detail about Programme planning in Extension; Programme Implementation; Programme Evaluation; Documentation.
2. To understand the importance of Programme Planning; the Preparation of plan of work; Purpose, types and tools of Evaluation; Programme planning and implementation.
3. To appraise ProgrammeEvaluation; documentation in Programme implementation.
4. To design and administer a schedule for collection of data : Analysis of data; Develop a Plan of work;

CORE -THEORY

UNIT- I Programming Planning:

- Meaning and importance of Participatoryproramme management in Extension
- Meaning and importance of programme planning
- Principles of Programme Planning
- Programme development cycle and its components; Identifying felt needs of people; Collection of baseline data.
- Plan of work: Components of a plan of work - Techniques of developing a plan of work
- Factors to be considered in preparing the plan of work.

UNIT- II Programme Implementation:

- Factors responsible for the successful conduct of the programme,
- Use of effective teaching methods.
- Role of officials and non-officials in programme-building.

UNIT-III Programme evaluation:

- Concept, Definition, meaning, purpose of evaluation
- Types of evaluation, built-in evaluation, self-evaluation, and external evaluation.
- Techniques of evaluation: Criteria of evaluation, tools of evaluation - interview schedule, observation schedule, rating scale, attitude, scale, score card, checklist, records, etc.
- Follow up: Need for follow up. Methods of follow up, making the programme self-sustaining.

UNIT- IV Documentation:

- Need for reporting and recording in extension.
- Procedures involved aspects to be stressed.
- Records and requisites to be maintained in programme planning and implementation.

PRACTICALS:

1. Preparation of a schedule to collect data.
2. Administration of the schedule and collection of data.
3. Analysis of data, location of needs and problems, fixing priorities and setting up objectives.
4. Developing a plan of work based on the needs located.
5. Discussion with field personnel - their experiences.
6. Developing evaluation techniques to be used.
7. Arranging for suitable follow up.
8. Conducting training programme for women.

REFERENCES – BOOKS

1. Adivi Reddy, A. (1987).*Extension Education,* Sreelakshmi Press, Bapatla.
2. Dhama, O.P. `Extension and Rural Welfare', Ram Prasad and Sons, Agra, 1986.
3. Dhama,O.P.andBhatnagar,O.P,(1985). *Education and Communication for Development,* Oxford and IBH Publishing Co., New Delhi.
4. Ray, G.L. (1991).*Extension Communication and Management*, NayaPrakash, Calcutta.
6. Rudramoorthy, B. *Extension in planning social change*- The Indian Experience, Allhad Publishers Pvt. Ltd., New Delhi.
7. Franklin, J.L. and Thrashes, J.M. (1976). *An introduction to programme evaluation*, John Weckly.
8. Desai, D.K. (1983). *Management in Rural Development,* Oxford and IBH Pvt. Ltd., New Delhi.
9. Haq, M.S.(1979). *Community development through Extension,* Changh Publication.
10. Krishna, M.(1983). *Project Planning in India*,IIPA, New Delhi.
11. Fernadezh and Tandon, R.(1981). *Participation, Research and Evaluation*, Indian Social Institute.
12. Singh, K.N.(1970). *Research in Extension Principles*, Indian Society of Extension Education, New Delhi.

JOURNALS

1. Indian Journal of Extension Education.
2. Journal of Rural Development.
3. Kurukshetra
4. Future, UNICEF

5. The Indian Journal of Home Science
6. GrameenaVikas.
7. Behavioural Sciences and Community Development, NIRD, Hyderabad.
8. Indian Journal of Public Administration, IIPA, New Delhi
9. Yojana

COURSE OUTCOMES:

After studying the Course, students will be able to;

CO1. Attain Knowledge about the Importance and Principles of Programme Planning; Programme Development cycle; plan of work; Programme implementation:

CO2.Understand designing and administering a schedule for collection of data; Analysis of data; Develop a plan of work.

CO3. Evaluation techniques to be used, could able to conduct a training programme for women, children, youth etc.

CO 4. Design and administer a schedule for collection of data : Analysis of data; Develop a Plan of work;

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3	3	3	3	2			2	2			2		
	CO2		3	3	3	3			2	2			2		
	CO3		3			2							2		
	CO4			3					2			2			

H: High;3 M: Medium;2 L: Low;1

EMCT 403 - A) EXTENSION MANAGEMENT

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES:

The course helps the students to:

1. Know about administration and management; process of management and organizational climate.
2. Understand the qualities and functions of extension personnel; Problems and issues of extension management in India.
3. Critical appraisal of management of various extension organizations
4. Analyze the management skills of extension personnel.

GENERIC ELECTIVE- THEORY

UNIT-I Administration and Management

- Concept of administration and management;
- Principles and theories of administration and management;
- Schools of management thoughts; Meaning, nature and scope of extension Management.

UNIT-II Process of Management

- Process of management: planning, organizing, staffing, directing-
- Communicating, co-ordination, controlling.
- Monitoring and evaluation.

UNIT-III Organizational Climate

- Organizational climate behaviour and development;
- Management by Objective (MBO).

UNIT-IV Extension System

- Qualities and functions of extension personnel;
- Extension system of ICAR, SAUs and state departments;
- Problems and issues of extension management in India;
- Critical appraisal of management of various extension organizations.

REFERENCES

1. Ahuja, KK. (1983). *Personnel Management.* Kalyani.
2. Dhama, OP &Bhatnagar, OP. (1991). *Education and Communication for Development.*
3. Grover I. (2002). *Extension Management.* AgrotechPubl.Oxford& IBH.

4. Ray GL. (2006). *Extension Communication and Management.* Kalyani.
5. Tripathi PC & Reddy RN. (1983). *Principles of Management.* Tata McGraw Publ.

COURSE OUTCOMES:

After studying the course, students will be able to;

CO1. Gain knowledge on administration and management; process of management; the basic elements in extension management.

CO2. Understand the qualities and functions of extension personnel; management skills required for extension personnel.

CO3. Critical appraisal of management of various extension organizations

CO4. Analyze the management skills of extension personnel.

1	CO-PO Mapping													
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO 1	PSO 2
	CO1	3	3	2				3	3	2			2		
	CO2		3	2	2		3	3	3				2		
	CO3	3	3		2					2					
	CO4			2	2								2		

H: High-3; M: Medium- 2; L: Low-1

EMCT 403- B) SCIENCE AND TECHNOLOGY FOR RURAL WOMEN

(WITH EFFECT FROM ACADEMIC YEAR 2021-22)

COURSE OBJECTIVES:

The course helps the students to:

1. Know about the Science and Technology for rural development; Energy saving devices- application of solar energy; bio-gas etc.,
2. Understand about the application of Science and Technology in Home science.
3. Appraise the safe water supply methods suitable for rural areas; health- hygiene and environmental sanitation.
4. Assess the agencies involved in research and application of Science and Technology.

GENERIC ELECTIVE- THEORY

UNIT- I

Appropriate Technology:

- Concept, meaning and importance of appropriate technology
- Science and Technology for rural development
- Appropriate technology Vs. traditional technology.

UNIT- II Application of Technology

- Application of Science and Technology in the Home Science
- Fuels used in the home - conventional and alternative - consumption patterns and trends in energy consumption - Conservation of energy through labour saving devices in the home.
- Biogas - Composition - Principles - types of plants - advantages, schemes for assistance.
- Solar devices for cooking, heating and cooling, schemes for popularizing solar devices.
- Smokeless chulahs - hay box and Janata refrigerator .

UNIT-III Health, Hygiene & Environmental sanitation

- Health, Hygiene and environmental sanitation.
- Safe water supply - methods suitable for rural areas.
- Water purification devices, pot chlorination of wells, sanitary toilets and Soak pit.

UNIT- IV Agencies involved

- The various governmental and non-governmental agencies involved in research and application of science and technology for rural development
- Department of Science and Technology (DST), Department of Indian Institutions of Technologies, Agricultural Universities, Krishi VignanKendras (KVK's) and private organizations.

PRACTICALS

1. Visit to units where biogas is in application.
2. Visit and Demonstration or use of Solar Cooker, Dyers, water heater and smokeless chulahs.
3. Study the activities of KVK's and Agricultural Universities.
4. Visit to Units for safe water supply and sanitary arrangements.
5. Use and care of selected labour saving equipment.

REFERENCES-BOOKS:

1. DagliVadilal, (1982). *Science and technology in India*, S. Chand and Company, New Delhi.
2. DayaMaheswar,(1983). *Energy - today and tomorrow,* Publications Rierman Government of India, New Delhi.
3. Halrey, D.S.(1967). *The coming age of solar energy,* sterling publishing, New Delhi.
4. Satsaugi, S. Prem and GautamVianykl. (1983).*Management of rural energy system'*, Gatgotia Publications, New Delhi,
5. *The five year plan*, Planning Commission, Government of India, New Delhi.
6. A citizens Report centre for science and environment, *The State of India's environment*, A citizens report centre for Science and Environment, New Delhi.
7. Myles, R.M. *Biogas Technology*, AFPRO (Action of Food Production), New Delhi.
8. *Fuel policy committee*. (1974). Report, Government of India, AFPRO,
9. Subramanian, S.K. (1977).*Biogas system in Asia*, Management Development Institute,
10. Smokeless Chulahs (1982).*Indian institute of technology*, New Delhi,
11. *Appropriate technology from N.R.D.C. of India*. (1979). Vol. I and II, National Research Development Corporation of India, New Delhi,

JOURNALS :

1. Energy - Technical Notes, MCRC, Publication Tharamoni, Madras - 600 013.
2. Energy Management - a quarterly journal of National Productivity council.
3. Indian Journal of Home Science.
4. Khadhigramodyog.
5. Kurukshetra.

6. Boiling Point.
7. Yojana

COURSE OUTCOMES:

After studying the course, students will be able to;

CO 1. Gain knowledge about the applied technologies for rural development with special focus on women.

CO 2. Understand the importance of safe water supply methods suitable for rural areas, health, hygiene and environmental sanitation;

CO3. Assess the agencies involved in research and application of Science and Technology.

CO4. Appraise the safe water supply methods suitable for rural areas; health- hygiene and environmental sanitation.

1	CO-PO Mapping													
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	3		3					2	2			2		
	CO2		3	3	2				2	2			2		
	CO3	3			2				2	2					
	CO4	3		3						2			2		

H: High-3; M: Medium- 2; L: Low-1

EMCT-404 Practicals

(401 + 402)

COMMUNICATION TECHNOLOGIES IN EXTENSION+ PARTICIPATORY PROGRAMME MANAGEMENT PRACTICALS

COMMUNICATION TECHNOLOGIES IN EXTENSION

COURSE OBJECTIVES:

The course helps the students to:

1. Know about communication systems- interpersonal; organizational; public and mass communication.
2. Understand the concept; scope and relevance of media systems trends and techniques.
3. Analyze the definite role of advertising in modern marketing system.
4. Evaluate media systems in inter-relation of advertising and mass media systems and types of advertisements.

PRACTICALS

1. Planning and use of different communication approaches.
2. Practical hands on experience in recent advances in print, electronic and new media.
3. Report on Multi media and emerging technologies, internet radio and web television.
4. Report on impact of new media on traditional media.
5. Online and netE-newspapers and editions, blogs, search engines, video logs, citizen journalism.
6. Evaluation of e-journals - advantages and disadvantages

COURSE OUTCOMES:

After studying the course, students will be able to;

CO 1. Gain knowledge about the communication systems; relevance of media in society; role and functions of communication systems.

CO 2. Understand the role of advertising in modern marketing systems; preparation and evaluation of media systems in advertising.

CO3. Analyze the definite role of advertising in modern marketing system; Media planning and scheduling; selection of media; ethics in mass media.

CO4.Analyze the Multimedia System- International media- email, internet, teleconferencing etc.,

PARTICIPATORY PROGRAMME MANAGEMENT

COURSE OBJECTIVES:

The Course helps the students:

1. To know in detail about Programme planning in Extension; Programme Implementation; Programme Evaluation; Documentation.
2. To understand the importance of Programme Planning; the Preparation of plan of work ; Purpose, types and tools of Evaluation; Programme planning and implementation.
3. To appraise Programme Evaluation; documentation in Programme implementation.
4. To design and administer a schedule for collection of data : Analysis of data; Develop a Plan of work;

PRACTICALS:

1. Preparation of a schedule to collect data.
2. Administration of the schedule and collection of data.
3. Analysis of data, location of needs and problems, fixing priorities and setting up objectives.
4. Developing a plan of work based on the needs located.
5. Discussion with field personnel - their experiences.
6. Developing evaluation techniques to be used.
7. Arranging for suitable follow up.
8. Conducting training programme for women.

COURSE OUTCOMES:

After studying the Course, students will be able to;

CO1. Attain Knowledge about the Importance and Principles of Programme Planning; Programme Development cycle; plan of work; Programme implementation:

CO2.Understand designing and administering a schedule for collection of data; Analysis of data; Develop a plan of work.

CO3. Evaluation techniques to be used, could able to conduct a training programme for women, children, youth etc.

CO 4. Design and administer a schedule for collection of data : Analysis of data; Develop a Plan of work;

EMCT 405 LOCAL GOVERNMENT IN ANDHRA PRADESH

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

MARKS (T=50+P= 50)

COURSE OBJECTIVES:

This course helps the students to:

1. Know about local government in Andhra Pradesh.
2. Understand the urban and rural local government, composition, powers and functions.
3. Evaluate committee systems in urban and rural local governments.
4. Assess people's participation in developmental programmes.

MULTI-DISCIPLINARYCOURSE - THEORY

UNIT – I Introduction

- Meaning, Nature, Scope, and importance of Local government.
- Evolution of local government in Andhra Pradesh.
- Salient features of 73rd and 74 amendment act with reference to A.P.
- Urban Local Government in A.P. – Composition, Powers and functions after 74th Constitutional Amendment Act.
- Rural Local Government in A.P. – Composition, Powers and functions after 73rd Constitutional Amendment Act.

UNIT-II Peoples Participation in Local Government

- People's participation in Developmental programmes in A.P.
- Bureaucracy in Urban and Rural Local Government in A.P.
- Source of Finance to local Government in A.P.
- State control and supervision over local Government.

PRACTICALS

1. Visit to panchayat office to observe and analyze the existing development programmes and to know the functions of panchayat.

2. Visit to Mandal office to study the ongoing development programmes for women and children.

3. Preparing a report on role of officials at village, mandal, and district level for implementation of various programmes.

4. Analyze the special programmes for poor and preparing a report on the existing programmes at village level.

5. Interaction with village women for assessing the extent of utilization of various schemes and programmes.

REFERENCES

1. De, D. and Jirli, B. (2010). A Handbook of Extension Education. Agrobios (India), Jodhpur.

2. O.P. Dhama and O.P. Bhatnagar (2006). Education and Communication for Development, ,New Delhi:Oxford and IBH Publishing Co.

3. Ray GL (1996) Extension Communication and Management, Calcutta, West Bengal: NayaPrakash Publications.

4. Jawaharlal Gupta (2013).Local Administration in India, RBSA publishers, Jaipur.

5. Maheswari, S.R (2003) Local Government in India, Lakshmi Narain Agarwal, Agra.

6. Pradeep Sach deva (1991). Dynamics of Municipal bodies, Associated publishers, New Delhi.

7. Hoshair Singh; State Supervision and control over Municipal Bodies, Associated publishers, New Delhi.

8. Hasan, Zoya, Politics and the State in India, Sage publications, New Delhi, 2000.

JOURNALS

1. Social Welfare
2. Yojana
3. Balak
4. Indian Journal of Extension Education.

COURSE OUTCOMES:

After studying the course, students will able to;

CO1. Know about local government in Andhra Pradesh

CO2. Understand the urban and rural local government, composition, powers and functions

.

CO 3 Analyze the committee systems in urban and rural local governments.

CO4. Assess people's participation in developmental programmes.

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO 1	PSO 2

	CO1	3	3						2	2			2		
	CO2		3	3	3	2			2	2			2		
	CO3	3		2					2	2			2		
	CO4	3		3			2						2		

H: High-3; M: Medium- 2; L: Low

EMCT - 406. A) CHILD GROWTH ANDDEVELOPMENT

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES:

To enable the students to:

1. Know the terms growth , development and stages of development across life span
2. Understand the characteristics of children at different stages of childhood
3. Explain the different developments like physical, cognitive , language and social development during childhood.
4. Apply knowledge to understand normal development and developmental delays during childhood.

OPEN ELECTIVE - THEORY

Unit I -Foundations of Development

- Understanding the terms Child, Growth, Development, Child Development, Human Development, and Developmental tasks.
- Principles of Child Development and Factors influencing growth and Development of Children.
- Determinants of Development - Role of Heredity and Environment in Development
- Stages of Development across life span and domains of development.

Unit II- Infancy

- Infancy – Characteristics
- Sensory- Motor activities
- Language Development
- Socio-emotional development.

Unit III - Early Childhood

- Early Childhood Period –Characteristics
- Physical Development
- Cognitive development
- Emotional and Social development

Unit IV - Middle Childhood

- Middle/ Late Childhood Period-Characteristics
- Physical development
- Cognitive development.
- Emotional and Social development

REFERENCES

1. Berk, L. E. (2007). Child Development. Prentice-Hall of India Pvt.Ltd, New Delhi.
2. Feldman, R.S. (2011).Understanding Psychology, Tenth Edition. Tata MCGraw Hill Education Private Limited, McGraw- Hill, New Delhi.
3. Hallahan, D.P. and Kauffman, J.M. (1991). Introduction to exceptional children. 5th ed. Allyn and Bacon, Boston.
4. Hurlock – E.B. (1990) Child Development , Tata McGraw Hill Company Ltd, New York. McGraw- Hill, New Delhi.
5. Rozario, J. and Karanth, P. (2003). Learning disability in India. Sage publication, New Delhi.
6. Santrock, J. W. (2013). Child Development. Tata McGraw Hill Company Ltd, New Delhi.
7. Singh, A. (Ed).(2015). Foundations of Human Development: A life span approach. Tata Mc Graw Hill ,New Delhi.
8. Prasad, J. and Prakash, R. (1996). Education of handicapped children, problems and solution. Kanishka publication distribution. New Delhi.

COURSE OUTCOMES:

After completion of the course, students will able to:

CO1.	Define the terms growth and development, and stages of development across
	life span
CO2.	Understand the characteristics of of children at different stages of childhood .
CO3.	Critically explain different developments like physical, cognitive , language

	and social development during childhood
CO4.	Apply knowledge to understand normal development and developmental
	delays during childhood to assess all round development during childhood

CO-PO Mapping														
Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
CO1		3						2	2			2		
CO2		3		3	2				2			2		
CO3								2	2					
CO4	3		3			2						2		

H: High-3; M: Medium-2; L: Low-1

EMCT-406 B): DISASTER MANAGEMENT

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

COURSE OBJECTIVES

The course helps the students to:

1. Know about natural disasters: manmade disasters; chemical hazards; National and International strategies to mitigate disaster management.
2. Understand natural disasters (like floods, drought, cyclone, earthquakes, global warming etc); Nuclear disasters; Biological disasters;.
3. Illustrate the efforts made by the NGO s, Community based organizations and local administration in disaster management.
4. Discriminate disaster responses of Armed forces and Police.

OPEN ELECTIVE - THEORY

UNIT I Natural Disasters

- Meaning and nature of natural disasters, their types and effects.
- Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves,
- Climatic Change: Global warming, Sea Level rise
- Ozone Depletion.

UNIT II Man Made Disasters-

- Nuclear disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution,
- Deforestation, Industrial waste, water pollution,
- Road accidents, rail accidents, air accidents, sea accidents.

UNIT III Chemical Hazards:

- Release of Toxic chemicals, Sedimentation processes, Global Sedimentation Problems
- Regional Sedimentation Problems

- Sedimentation and Environmental Problems.

UNIT IV Disaster Management-

- Efforts to mitigate Natural Disasters at National and Global levels. International Strategy for Disaster reduction.
- Concept of disaster management, National Disaster Management framework; financial arrangements
- Role of NGOs, Community-based organizations, and Media.

REFERENCES

1. Gupta, H.K. (2003). *Disaster management*. Indian National Science Academy. Orient Blackswan.
2. Hodgkinson, P.E. & Stewart, M. (1991). *Coping with catastrophe: A handbook of disaster management*.
3. Routledge. and Sharma, V.K. (2001). *Disaster management*. National Centre for Disaster Management, India.

COURSE OUTCOMES:

After studying the course, Students will be able to

CO1. Gain in-depth knowledge about natural disasters; manmade disasters; chemical hazards: disaster management.

CO2. Design and administer a schedule for collection of Information regarding the roles of NGOs, Community based organizations, central state, District and local Administration, Police and armed forces, in Disaster management.

CO 3. Illustrate the efforts made by the NGOs, Community based organizations and local administration in disaster management.

CO4. Discriminate disaster responses of Armed forces and Police

1	CO-PO Mapping														
	Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	POI2	PSO1	PSO2
	CO1	3	3	3				2		2			2		

	CO2		3	3	3	2			2	2			2		
	CO3	3	3			2		2			2				
	CO4		3	3		2			2	2			2		

H: High-3; M: Medium- 2; L: Low-1

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

First Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22 onwards)

EMCT 101-COMMUNICATION AND MEDIA PREPARATION

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Define communication
2. Write about different functions of communication
3. Write about Berlo's model of communication briefly
4. What is the role of audio – Visual aids in Home science communication
5. Give an account of problems in communication
6. Write shot notes on feed back in Extension
7. Classify the extension teaching methods and give examples
8. What is meant by "Treatment of message"?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9. (a).List the key elements of communication and explain each of them with suitable examples

(or)

(b).Describe the group methods of extension teaching

10. (a)What are the models of communication- Explain diagrammatically

(or)

(b)Discuss your view- points for improving communication methods in Home science Extension

11. (a).Classify audio-visual aids and explain the merits and demerits of audio- visual aids

(or)

(b). Describe the recent trends in instructional technology

12.(a).Classify and describe the teaching methods according to form and use

(or)

(b).Describe the role of print media in Extension communication.

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

First Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22 onwards)

EMCT 102-EXTENSION EDUCATION IN COMMUNITY DEVELOPMENT

Time: 3 Hours **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks: 4x5=20 Marks

1.Write the historical review of extension education in India and abroad.

2.Discuss the different objectives of extension education briefly

3.Explain in detail about participatory rural appraisal

4.Describe about the importance and factors influencing community participation.

5.Write about three-tier system of administration

6.Explain briefly about the democratic decentralization.

7.Short note on current five year plan and women welfare.

8.What are all factors affect the community development programme.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9.(a).Explain about the principles of extension education.

(or)

(b).Write in detail about the problems of panchayat raj and community development in India

10.(a).Explain about the PRA technique and its various methods.

(or)

(b).Discuss any two national and international agencies for women and children development.

11.(a).Explain in detail about the three-tiers of Panchayat Raj set-up

(or)

(b).Explain in detail about the different principles of home science extension and qualities of extension education.

12.(a).Explain in detail about current five year plan regarding national and state approaches to women and child welfare programmes in India.

(or)

(b).Explain in detail about the different concepts of extension education and role of home science extension personnel.

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

FIRST SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021-22 onwards)

EMCT-103 a) Dynamics of Rural Society

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.
2.
3.
4.
5.
6.
7.
8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

(b).

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

FIRST SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021-22 onwards)

EMCT-103- b) Dynamics of Groupbehaviour

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.
2.
3.
4.
5.
6.
7.
8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

(b).

EMCT- 104: COMMUNITY NUTRITION

(Common to all the specializations of M. Sc Home Science and MS Food Technology)

Time: 3 hours **Max Marks: 80**

Part- A

Answer any FOUR of the Following

Each question carries 5 marks **(4 x5=20Marks)**

1. Functional food grouping system.
2. Recommended dietary allowances.
3. Indirect methods of Assessment of nutritional status.
4. Clinical symptoms of Vit-A& C deficiencies.
5. Etiology of PEM.
6. Iodine deficiency disorders control programme.
7. Mid day meal programme.
8. Role- of TV in Nutrition education.

Part- B

Answer ALL questions

Each Question carries 15 Marks (4x15=60 Marks)

9. (a)Discuss physiological changes that occur during pregnancy and state the nutritional requirements during pregnancy.

(or)

(b) State the RDA for an adolescent girl. Plan a menu and give justification.

10. (a) Describe briefly the methods of anthropometric measurements in altering nutritional status of the community.

(or)

(b). Explain the advantages and dis-advantages of the Biochemical method of assessment of nutritional status.

11. (a) Write about Iron deficiency and its consequences

(or)

(b).Explain the consequences (or) maternal malnutrition on the growth and development of off- spring.

12. (a).Describe the various programmes and policies implemented by government of India for achieving food security .

(or)

(b). Present a case study of any on governmental nutrition programme that you have studied.

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

First Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22onwards)

EMCT 107-HUMAN VALUES AND PROFESSIONAL ETHICS- I

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.
2.
3.
4.
5.
6.
7.
8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Second Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22 onwards)

EMCT 201 COMMUNITY ORGANIZATION AND LEADERSHIP

- ----------

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any **FOUR** of the Following

Each question carries 5 marks : Marks: 4x5=20

1.Explain the concept of community organization.

2.List out any five important qualities of community organization.

3.Describe the role of farmer's clubs in rural development.

4.Write the deferent tools involved in community organization

5Define leadership and write the role of a leader in community development

6.Describe the techniques of identification of leaders

7.Write the basic needs of young people.

8.Write the decision- making trends of rural women in out state.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9.(a) Enumerate the scope of community organization in solving problems in a rural community

(or)

(b).Write the role of individuals in the community.

10.(a).Write the role of co-operatives and panchayats in rural development.

(or)

(b).Write in detail various skills required for co-ordination and maintaining public relations in a rural set- up by the community organizer.

11.(a).Explain the determinants of effectiveness in leadership function (TenAs)

(or)

(b).Write the use of leaders for upliftment of rural areas.

12.(a).Describe the role of women in Agriculture.

(or)

(b).Write the objectives and organization of a youth club.

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Second Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22 onwards)

EMCT 202-ENTREPRENEURIAL DEVELOPMENT AND EMPOWERMENT OF WOMEN

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks: Marks: 4x5=20

1.Describe the motivating factors of entrepreneurship development

2.Write the problems and concerns of women entrepreneurs.

3. Write a brief note on association women entrepreneurs of Karnataka

4.Write the activities of Entrepreneurial Development Institute (EDI)

5.Write the need and important of project idea in entrepreneurship development

6.Write the factors to be considered for marketing of a product.

7.Write the basic rights of women as an entrepreneur.

8.Explain the concept of women empowerment.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).Write the profile and status of women entrepreneurs in India.

(or)

(b).Enumerate the scheme of Assistance from non-governmental agencies for women entrepreneurs in India.

10.(a).Describe the objectives and functioning of Self-Help Groups (SHG) in the context of entrepreneurial support systems.

(or)

(b).Write the functioning of an enterprise run by women entrepreneurs and regional entrepreneurship support system that is being operated in you area.

(or)

11.(a).Enumerate the factors to be considered for starting the enterprise.

(or)

(b). Write a project proposal for a selected enterprise.

12 (a).Write the strategies for empowering women

(b).Describe the role of women entrepreneur in rural development.

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Second Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22 onwards)

EMCT 203-EDUCATIONAL TECHNOLOGY

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks: Marks: 4x5=20

1.
2.
3.
4.
5.
6.
7.
8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

(b).

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

FIRST SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021-22 onwards)

EMCT-203 b)Technology Transfer and Management

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.
2.
3.
4.
5.
6.
7.
8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

(b).

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

Model Question Paper

M.Sc. (Home Science) Degree Examination- Fourth Semester

Specialization: Extension Management and Communication Technology)

(CBCS for the students admitted from 2021 onwards)

EMCT- 204 :RESEARCH METHODOLOGY AND STATISTICS- (Common to all Branches of

M.Sc. Home Science and MS Food Technology)

Time:3 hrs Max: 80 Marks

SECTION- A

Answer any four questions

Each question carry equal marks Marks: 4x5=20

1. Define research. Enumerate the significance of research?
2. Explain the need and features of a good research design?
3. Write about Quota and snow ball sampling?
4. Describe case study as a research technique?
5. What is meant by frequency distribution?
6. Give an account of histogram.
7. What is level of significance in research?
8. Write about mean as measures of central tendency.

S ECTION- B

Answer all questions. Each question carry equal marks Marks: 4 x 15=60

9. (a). How will you identify a research problem? Write about limitations and delimitations of the problem?

(Or)

(b). Write about probability sampling technique?

10. (a). Describe in detail the methods of collection of data?

(Or)

(b). Define qualitative research and explain the types of qualitative research?

11. (a). What is a *t*-test? Explain about t-test for large sample.

(Or)

(b). In a test given to two groups of students, the marks obtained were as follows: *First Group* 18 20 36 50 49 36 34 49 41 *Second Group* 29 28 26 35 30 44 46 Examine the significance of difference between mean marks obtained by students of the above two groups. Test at five per cent level of significance.

12. (a). What is Chi-square text? Explain its significance in statistical analysis.

(Or)

(b). 200 digits were chosen at random from a set of tables. The frequencies of the digits were: Digit 0 1 2 3 4 5 6 7 8 9, Frequency 18 19 23 21 16 25 22 20 21 15, Calculate $\chi 2$.

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Second Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22 onwards)

EMCT 207- HUMAN VALUES AND PROFESSIONAL ETHICS- II

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.
2.
3.
4.
5.
6.
7.
8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

(b).

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

THIRD SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021-22)

EMCT-301 – MANAGERIAL SKILLS FOR EXTENSION PROFESSIONALS

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.
2.
3.
4.
5.
6.
7.
8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

(b).

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

THIRD SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021 – 2022 onwards)

EMCT- 302 – TRAINING AND DEVELOPMENT

Time: 3hrs Marks: 80

PART - A

Answer any **FOUR** questions

All questions carry equal marks **(4X5=20)**

1. Write the concept of learning and write the factors affecting learning
2. What are the goals of training ?
3. Write about participatory training methodologies
4. What are the roles of a trainer?
5. Write different types of Evaluation, in training Programme?
6. Write notes on system approach to training ?
7. What are different training strategies in the process of training?
8. Explain the competencies of trainer ?

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a).Design a training programme for a particular developmental goal.

(Or)

(b). Enumerate different goals of learning?

10. (a).Write notes on the following

(i) Psychodrama (ii) Case study

(Or)

(b).Write notes on the following

(i) Role Play (b) Buzz group

11. (a). Explain in detail different roles of a trainer

(Or)

(b). Write about different policies and guidelines for a training programme?

12. (a).Give a detailed note about evaluation process in training..

(Or)

(b). Explain about the impact of organizational factors in the process of training.

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

THIRD SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021 – 2022 onwards)

EMCT- 303 a) – RURAL DEVELOPMENT AND ADMINISTRATION

Time: 3hrs **Marks: 80**

PART - A

Answer any **FOUR** questions

All questions carry equal marks **(4X5=20)**

1. Explain the principles of Administration.
2. Discuss the need for human relations in extension administration.
3. What is 'Development of code of ethics?
4. Explain the competencies needed by extension personnel.
5. What is SGSY? Give the salient features.
6. What are the objectives of T&V system?
7. Explain the role of KVK in training rural women.
8. Explain the administrative set-up of IRDP?

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a).What is coordination? Discuss the factors influencing coordination?

(Or)

(b).Write notes on DWCRA.

10. (a).What is training? Explain the need for training extension personnel and mention the agencies offering training

((Or)

(b).Write about the role of ICDS in women and child welfare. Critically analyze its strengths and weakness.

11. (a).What is supervision? Discuss about the importance and principles of supervision in Rural Development programmes.

(Or)

(b). Write briefly about PMRY programme.

12. (a).Discuss briefly the nature and purpose of administration in Rural Development programmes.

(Or)

(b).Write notes on

i) Factors influencing coordination

ii) Delegation of authority and responsibility

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

THIRD SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021 – 2022 onwards)

EMCT- 303. b) – PRINCILES OF GUIDANCE AND COUNSELLING

Time: 3hrs Marks: 80

PART - A

Answer any **Four** questions

All questions carry equal marks **(4X5=20)**

1. Examine the implications of directive counseling.
2. What type of guidance programmes can be given in a school?
3. Briefly explain the elements in facilitating counseling relationship.
4. Compare individual with group counseling
5. Explain why socio-metric devices are necessary in guidance and counseling Programme.
6. What are the basic principles of guidance programme?
7. What are the goals of counseling?
8. Explain the merits and demerits of client-centred approach.

S ECTION- B

Answer ALL questions

Each Question carries 15 Mark 4x15=60 Marks

9. (a).Write in detail the examples on the uses of psychological tests in counseling.

(Or)

(b).Discuss the appraisal and informational services that a guidance programme can offer.

10. (a).How the counselor perform his role?

i)as change agent ii) as generalist iii) as specialist in a special school

(Or)

(b)Critically evaluate any two counseling theories.

10. (a).Family counseling is increasingly recommended. Discuss why?

(Or)

(b) Compare and contrast between -

i. counseling and psychoanalysis ii.counseling and psychiatry

11. (a).What is non-verbal communication? Discuss the role of non-verbal behaviour in counseling.

(Or)

(b). Discuss the nature of career planning at the college level.

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Third Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22onwards)

EMCT- 305: NGO MANAGEMENT (SKILL ORIENTED COURSE)

Time: 3 hours **Max Marks : 40**

SECTION- A

Answer any TWO of the Following

Each question carries 5 marks : Marks: 2x5=10

1.

2.

3.

4.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 2x15=30 Marks

5. (a)

(or)

(b)

6. (a).

.

(or)

(b)

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Third Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22onwards)

EMCT-306 (a)- FUNDAMENTALS OF FOOD, NUTRITION AND HEALTH

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.

2.

3.

4.

5.

6.

7.

8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

THIRD SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021-22 onwards)

EMCT 306b: DYNAMICS IN FOOD PREPARATION

(With effect from academic year 2021-22 onwards)

OPEN ELECTIVE- THEORY

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.
2.
3.
4.
5.
6.
7.
8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

(b)

SRI VENKATESWARA UNIVERSITY: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

FOURTH SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021-22 onwards)

EMCT-401 – COMMUNICATION TECHNOLOGIES IN EXTENSION

Time: 3hrs Marks: 80

PART - A

Answer any **Four** questions

All questions carry equal marks **(4X5=20)**

1. Define Communication systems and their functions .
2. Write characteristics of mass communication.
3. What is the scope of media in society.
4. Write the Historical background of media.
5. What is the role of advertising in modern marketing system ?
6. What are different types of advertisements?
7. Explain the concept of multimedia.
8. Give brief Explanation about graphics?

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a).Explain in detail about visual communication.

(Or)

(b).Give a detailed explanation on mass communication

10. (a). What are the contemporary issues in media ? Explain

(Or)

(b). Explain the role of Government in controlling the media.

11. (a).Enumerate the interrelationship of advertising and mass media systems.

(Or)

(b).What are the different techniques of preparation of effective advertisements for various Media

12. (a). Give a detailed explanation on the following

(i)Animation (b) Scanning (c) Graphics.

(Or)

(b). Explain in detail about international media.

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

FOURTH SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021 – 2022 onwards)

EMCT- 402 – PARTICIPATORY PROGRAMME MANAGEMENT

Time: 3hrs Marks: 80

PART - A

Answer any **Four** questions

All questions carry equal marks **(4X5=20)**

1. Define programme. Enumerate any eight principles of a programme planning.
2. What are needs? How do you convert unfelt needs into felt needs?
3. What are techniques of evaluation? Explain any one of them.
4. Write briefly on Follow-up in extension.
5. What is the purpose of scoring in research studies and explain?
6. Explain the role of non-officials in programme building.
7. Diagramatically write the programme development cycle.
8. Explain the need for reporting in extension work.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9.(a).Discuss the general problems faced in the data collection based on your practical

(Or)

(b).What is the importance of programme planning in extension and what are the techniques of developing a plan of work? Explain.

10.(a).Present a plan of work for a short term project on 'AIDS Awareness.'

(Or)

(b).What is interview schedule and what are the points to be considered while preparing interview schedule.

11.(a).What is monitoring and evaluation? Explain briefly the evaluation in programme planning process.

(Or)

(b)What is the need for 'Plan of work' in programme planning? Mention the techniques of developing a plan of work.

12. (a). Write about the different types and purposes of evaluation with suitable example.

(Or)

(b).Develop an attitude scale to measure attitudes of rural women about 'Girl Child Education.'

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

FOURTH SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021 – 2022 onwards)

EMCT- 403 a) – EXTENSION MANAGEMENT

Time: 3hrs Marks: 80

PART - A

Answer any **Four** questions

All questions carry equal marks **(4x5=20)**

1. Need for Extension Management.
2. Briefly discuss the Models of Management.
3. What is Scalar Principle?
4. Give the line and staff function?
5. What are the barriers of communication?
6. What are the elements of planning?
7. Explain the need for leadership in an organization.
8. What is monitoring and evaluation.

S ECTION- B

Answer ALL questions

Each Question carries 15Marks 4x15 =60 Marks

9. (a).What is Training? Explain the need and methods of training for Human Resource Development?

(Or)

(b). Explain different types of evaluation methods.

10. (a).What is meant by controlling? Discuss modern techniques of Management Controlling

(Or)

(b).Explain about the delegation of authority and responsibility.

11. (a).Discuss about need for Budgeting and Auditing.

(Or)

(b).Define Leadership? Discuss briefly the different theories and styles and leadership.

12. (a).What is meant by extension management? Explain the principles of extension management.

(Or)

(b).What is supervision? Explain how the principles of supervision is essential for efficiency of personnel.

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

FOURTH SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021 – 2022 onwards)

EMCT-403 b)– SCIENCE AND TECHNOLOGY FOR RURAL WOMEN

Time: 3hrs Marks: 80

PART - A

Answer any **Four** questions

All questions carry equal marks **(4X5=20)**

1. Explain the concept of appropriate technology for rural development.
2. Bring out the need for safety education to rural mass.
3. List out the merits and demerits of soak-pit?
4. Explain the working mechanism of smokeless chulahs.
5. How does the solar energy serve as an alternate energy source?
6. Suggest ways to improve the health and hygiene of rural women.
7. Write short note on Janata refrigerator.
8. List out the significance of Hay Box.

S ECTION- B

Answer ALL questions

Each Question carries 15Marks 4x15=60 Marks

9. Write an essay on Appropriate technology Vs. Traditional technology.

(Or)

Give an account on KVK and DST.

10. (a).Discuss the favour rendered by any three agencies in the field of science and Technology for the welfare of rural mass.

(Or)

(b).Explain the role of private organizations in introducing technology for the benefit of rural community.

11. (a).Enumerate the principles of Biogas and the type of plants and their merits.

(Or)

(b). Bring out the alternate use of sources of energy and their use.

12. (a).Discuss the role of agricultural universities in motivating the rural mass to utilize the improvised technology for better living.

(Or)

(b).Explain the role of government agencies in rural development.

SRI VENKATESWARA UNIVERSITY ::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Third Semester

(Specialization 'C' ; Extension Management & Communication Technology)

(CBCS for the students admitted from 2021-22onwards)

EMCT- 305: NGO MANAGEMENT (SKILL ORIENTED COURSE)

Time: 3 hours **Max Marks : 40**

SECTION- A

Answer any TWO of the Following

Each question carries 5 marks : Marks: 2x5=10

1.

2.

3.

4.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 2x15=30 Marks

5. (a)

(or)

(b)

6. (a).

.

(or)

(b)

SRI VENKATESWARA UNIVERSITY:TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

FOURTH SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021-22 onwards)

EMCT-406 (A)- CHILD GROWTH AND DEVELOPMENT

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.

2.

3.

4.

5.

6.

7.

8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

(b).

SRI VENKATESWARA UNIVERSITY: TIRUPATI

MODEL QUESTION PAPER

M.Sc. (HOME SCIENCE) DEGREE EXAMINATION

FOURTH SEMESTER

(Specialization 'C' ; Extension Management & Communication Technology)

(Under CBCS students admitted from 2021-22)

EMCT-406 (B)- Disaster Management

Time: 3Hours. **Max Marks : 80**

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks : Marks: 4x5=20

1.

2.

3.

4.

5.

6.

7.

8.

S ECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9.(a).

(or)

(b).

10.(a)

(or)

(b)

11.(a).

(or)

(b).

12.(a).

(or)

(b).

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF HOME SCIENCE



Course

M.S. FOOD TECHNOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

The Department of Home Science established in the year 1963 as first of its kind in the state of Andhra Pradesh and celebrated golden jubilee in the year 2013. Ms Dorothy M. Pearson, a Canadian Home Scientist was largely instrumental to start the post graduate programmes in Home Science at Sri Venkateswara University, Tirupati. The committed founder stalwarts and the successive faculty members with immense foresight established the pioneering activities of teaching, research and extension in the department. The department from its inception has thrived to offer new insights through academic reforms and outreach activities. The commitment of the faculty has contributed practice-based teaching, action research, technology development and extension outreach activities for the development of students. The department stocks eight patents of which two patents awarded. The Ministry of food processing granted 10 crores for the establishment Food testing laboratory with NABL accreditation.

Vision

To be a premiere centre for excellence in higher education in the areas of specialization fostering nurturing and building careers for students and to be an apex body playing a pivotal role in planning and monitoring community development.

Mission

The Department of Home Science is committed to empower the students in capacity building skills through teaching, research and community oriented extension activities, thereby widening the scope for self development and Employability and preparing them as socially useful and responsible citizens

The academic programmes, research and extension activities are planned and executed meticulously so as to reflect the vision and mission of the Department, focusing on the empowerment of students through quality education by updating syllabus with current trends and providing appropriate knowledge and skills compete at the global level. The Department through motivated staff always strives towards reaching proficiency through teaching and community oriented extension programmes.

Department Objectives

The Department is having the following objectives:

- Enable the students to understand the interrelation of food and health.
- To foster knowledge across the life span in inter connected Human development factors to become efficient counselors and early childhood educators.
- Develop sensitivity towards the community problems and train the students in Extension and out reach activities.
- To focus on training students in application of techniques to process and preserve the food.

The department of Home Science has been adopting the systematic procedure for development, revision and implementation of the curriculum for four different post-graduate programmes offered viz., Food Science Nutrition and Dietetics (FSND), Human Development and Child Welfare (HDCW), Extension Management and Communication Technology (EMCT) and Food Technology (FT) . The learning out comes of each course are framed such that they help students to gain theoretical knowledge as well as skills to meet local, national and global trends. The curriculum of each course has practicals, field visits, visit to institutions and a mandatory internship programme, which focus on imparting essential skills and hands-on experience and experiential learning thereby can excel when they get employment in Government and Non-Government Organizations to work individually as well as in teams. The cross cutting issues namely, technology, gender, child rights, human values and professional ethics are incorporated in core theories and electives to enable the students to lead a purposeful and independent life filled with moral and ethical values . Majority of the courses offered across all programmes do focus on nurturing employability/entrepreneurship/skill development. The outcomes of each programme have the emphasis on commitment to the contribution to the interest of the society as a whole and perform well in their careers.

Program Specific Outcomes (PSOs)

- Identify and select sources of credible information and technologies in Food science and Food technology
- Apply and incorporate the principles of Food science and technology in Food industry, Food research, Food quality and Community.

Programme Objectives:

- To provide the theoretical and practical knowledge with regard to the various aspects of food i.e., science, Technology, microbiology and quality control measures involved in food products as well as their preservation techniques.
- To identify, Understand and analyse the difficulties related to food technology and make the students to take proper decisions for the same.
- To make the students learn about concepts in designing and developing of new food products to meet the current demands of consumers as well as industries.
- To enable the students to get scientific knowledge through different food technology papers so that they can enhance their skills towards research and development.
- To acquire the knowledge through different aspects such as unit operations in food processing, food packaging, preservation methods, dairy processing and bakery, confectionery, meat, poultry and fish processing and preservation methods.
- To strengthen the students skills to work in different groups as well as an individual while they enter into the food industries, institutions, research and quality control laboratories, academic institutions and governmental agencies.
- To provide effective interpersonal skills by conducting seminars and Presentations in each paper.
- To attain the knowledge with regard to government policies and regulations of food quality and safety.
- To facilitate the student to understand the personal and professional ethics towards the role of food technologist in the whole process of food product development.
- To make the students to find the solutions for the problems occurred in industries by applying effective technologies in developing of by products as well as value added foods.
- To assist the students towards entrepreneur through new food product development by conducting market research, shelf life studies and test marketing of food products.
- To gain the knowledge and skills related to Academic, research, employee and entrepreneurial roles in the broad field of food technology for their holistic development.

Programme Outcomes:

- Demonstrate and apply comprehensive knowledge and understanding gained in food Science, food chemistry, microbiology, Technology of various foods and food products, food processing, Food product development quality control and Community nutrition in an integrated manner to the development, processing, and preservation of safe, nutritious, and high-quality foods.
- Identify, Understand and analyze problems related to food technology and make suitable decisions to find an appropriate solution for the same as identify the factors responsible for food spoilage, food contaminants and adulterants and the methods to detect and control the same.
- Design and develop food products by apply the concepts of Food Technology in creative manner to meet the needs and demands of the customers and industry. Formulate and develop tailor made products as per the needs of customers such as specialty foods.
- Students develop a scientific knowledge with a sense of enquiry through various food technology papers. Able to strengthen research skills in order to meet the global challenges associated within all aspects of the food science and technology to develop their capacity to undertake research into the science of foods from farm to fork.
- Demonstrate knowledge in various aspects of food and its application in food industry, concept of unit operations in food processing, conventional and advanced methods of food science, processing, preservation, methods of packing, post-harvest practices bakery and confectionery, meat, poultry and fish processing, food fermentation, dairy processing so as to develop food products. Able to Utilize advanced instruments and technologies to process and analyze food products and to solve food safety and quality related problems.
- Able to work as individual as well as in teams with others from different backgrounds and confident to work in diverse socio-cultural settings with multicultural groups and teams in food industries, institutions, food research and quality control laboratories, academic institutions and governmental agencies as well as an entrepreneur.
- Able to communicate orally and in writing related to discipline-specific, technical and non-technical aspects with effective interpersonal skills. seminars and Presentations in each paper enhances their confidence, ability to express themselves & presentation skills. Can effectively communicate scientific knowledge to meet the needs of industry and the consumer for the production and marketing of safe and quality foods.

- Have knowledge in regulations governing on legal, safety, security and health issues and Able to follow food laws, regulations and safety standards in application of food additives preservatives etc. and apply the principles of Hazard Analysis and Critical Control Points (HACCP) to ensure safe food processing.
- Understand and apply personal and professional ethics and responsibilities of food technologist in product development, quality, documentation and publications.
- Find solutions for industrial and societal problems by effective utilization of byproducts, developing value added foods and transfer of technologies for sustainable development.
- Screen business ideas, conduct market research, acceptability, quality control, shelf life studies and test market of the food products to avoid risks in commercialization of food products.
- Acquire ability to gain knowledge and skills which are necessary throughout their life as professionals seeking to expand their career prospects into a wide range of Academic, research, employee and entrepreneurial roles in the broad field of food technology for their holistic development.

Programme Educational Objectives (PEOs)

To enable students to:

- Understand the methods and techniques of production, processing, preservation, packaging and labeling, safety and quality assurance of different foods.
- Gain knowledge in development of new food products and evaluation in terms of physical, chemical, microbiological, safety attributes, sensory and shelf life.
- Acquire skills in food formulations, processing, preservation and evaluation of foods for their safety with reference to standards nationally and globally.
- Apply of food processing and preservation technologies in research and food industry

SRI VENKATESWARA UNIVERSITY COLLEGE OF SCIENCES

DEPARTMENT OF HOME SCIENCE

CHOICE BASED CREDIT SYSTEM (C.B.C.S) SYLLABUS AND SCHEME OF EXAMINATION

(WITH EFFECT FROM THE ACADEMIC YEAR 2021-22 Onwards)

MS FOOD TECHNOLOGY (FT)

I Semester

S. No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	FT 101	Food Chemistry and Analysis	6	4	20	80	100
2	Core	FT 102	Cereals, Legumes and Oil seed Technology	6	4	20	80	100
3	Compulsory Foundation	FT 103-A	Food Science and Experimental Foods	6	4	20	80	100
		FT 103-B	Baking Technology	6	4	20	80	100
4	Elective Foundation	FT 104-A	Community Nutrition	6	4	20	80	100
		FT 104-B	Nutrition during life span	6	4	20	80	100
5	Practical -I	FT 105	101+103-A/103-B	3+3/3	4	--	--	100
6	Practical -II	FT 106	102+104-A/104-B	3+3/3	4	--	--	100
	Total				24			600
7	FT 107: Human Values and Professional Ethics-I (Audit course*)			0	0	100	0	0

***Audit Course – Zero credits under self- study**

II Semester

S. No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	FT 201	Fruit and Vegetable Technology	6	4	20	80	100
2	Core	FT 202	Dairy Technology	6	4	20	80	100
3	Compulsory Foundation	FT 203-A	Food Microbiology and Safety	6	4	20	80	100
		FT 203-B	Nutrition in Emergencies And Disaster Management	6	4	20	80	100
4	Elective Foundation	FT 204-A	Research Methodology	6	4	20	80	100
		FT 204-B	Statistics and Computer Applications	6	4	20	80	100
5	Practical -I	FT 205	201+203-A/203-B	3+3/3	4	--	--	100
6	Practical - II	FT 206	202+204-A/204-B	3+3/3	4	--	--	100
	Total				24			600
7	FT 207: Human Values and Professional Ethics-II (Audit course*)			0	0	0	100	0

***Audit Course – Zero credits under self-study**

III Semester

S.No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	FT 301	Food Processing and Preservation Technology	6	4	20	80	100
2	Core	FT 302	Live stock and Sea Food Technology	6	4	20	80	100
3	*Generic Elective	FT 303-A	Technology of Spices, Condiments and Plantation crops	6	4	20	80	100
		FT 303-B	Basics of Food Engineering					
4	Practicals	FT 304	301+302	6	4	--	--	100
5	**Skill Oriented Course	FT 305	Food Industry Management (T) + (Practicals)	3+6	4	10	90 (40+50) (T+P)	100
6	***Open Elective	FT 306-A	Fundamentals of Food, Nutrition and Health	6	4	20	80	100
		FT 306-B	Dynamics in Food Preparation					
	Total				24			600

***Generic Elective – Student has to choose any one paper**

****Internship is mandatory**

*****Open Elective – Offered by Department to other Department students**

Note: Interested student may register for MOOCS with the approval of DDC

IV Semester

S.No	Components of the Study	Title of the course	Title of the paper	Credit Hrs/ Week	No. of credit	IA Marks	Sem End Exam Marks	Total
1	Core	FT 401	Food Safety Standards and Quality Control	6	4	20	80	100
2	Core	FT 402	Food Product Development and Marketing	6	4	20	80	100
3	*Generic Elective	FT 403-A	Nutrition for Health and Fitness	6	4	20	80	100
		FT 403-B	Unit Operations in Food Industry					
4	Practicals	FT 404	401+402	6	4	--	--	100
5	Multi Disciplinary Course/Project work	FT 405	Technology of Packaging (T+P)	3+6	4	10	90 (40+50) (T+P)	100
	Project work			--	--	40	60	100
6	**Open Elective	FT 406-A	Child Welfare Programmes	6	4	20	80	100
		FT 406-B	Disaster Management					
	Total				24			600

***Generic Elective- Student has to choose any one.**

****Open elective –Offered by Department to other department Students.**

Note: Interested students may register for MOOCS with the approval of DDC.

DEPARTEMNT OF HOME SCIENCE

M S FOOD TECHNOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS)

(With effect from academic year 2021-22 onwards)

SEMESTER I

FT-101: FOOD CHEMISTRY AND ANALYSIS

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

COURSE OBJECTIVES –

To enable the students to:

1. Acquire knowledge on chemical composition of different foods.
2. Understand the physical, chemical, and functional properties of foods.
3. Know the principles and working applications of different analytical techniques associated with food.
4. Perform skills in qualitative and quantitative estimation of nutrients in different foods.

CORE –THEORY

UNIT-I: Water Chemistry and Dispersed Systems:

- Water chemistry – Structure of Water, Free, Bound and Entrapped Water.
- Water Activity and Relative Vapour pressure– Definition and measurement, factors affecting water activity, Moisture sorption isotherms, Hysteresis and Moisture Determination.
- Dispersions- Food as dispersed systems, Liquid dispersions.
- Colloids- Definition, Characteristics of Colloids, Gels, Emulsions, Foams.

UNIT-II: Carbohydrates and Lipids

- Carbohydrates – Classification, Structure, Physico – Chemical properties ofMonosaccharide's-Pentoses, and Hexoses,Oligosaccharides – Di Saccharides-Maltose, Lactose, Sucrose –Crystallisation of sugars.Polysaccharide's – Starch-

Amylose and Amylopectin- Gelatinisation of starches and Hydrolysis of starch.Cellulose and Pectin- Structure and properties.

- Lipids – Nomenclature, classification – Milk fats, Animal fats, Vegetable fats.
- Physical properties – Crystallization, Plasticity
- Chemical properties – Thermal decomposition, Chemistry of Frying, Hydrogenation, Inter esterification, Rancidity of fats.

UNIT-III: Proteins and Amino Acids

- Proteins and amino acids – Classification, Structure, Physical properties.
- Functional properties-
    - Protein Denaturation, Protein hydration, Solubility.
    - Interfacial properties,
    - Emulsification and foaming, Gelation
    - Dough formation.

UNIT-IV: Food Analysis

- Introduction to food analysis- Methods of sampling,
- Determination of Total ash, Principles and methods of chemical analysis
- Carbohydrates – Qualitative and Quantitative analysis of starch and sugars.
- Proteins – Electrophoresis, Micro-Kjeldahl method.
- Fats – Analysis of solid and liquid fats, Rancidity.
- Determination of Vitamin and Minerals – Vitamin-C, Iron, Phosphorus, Calcium.
- Basic principles and applications of spectroscopy- UV, UV- visible, AAS, AES.
- Chromatography- principles and applications of Chromatography- HPLC, GC/ MS and LC/ MS.

REFERENCES

1. Lillian Hoagland Meyer. (2019).Food Chemistry", First Edition, CBS publishers and Distributors, New Delhi.
2. Fennema R. (2019). Food Chemistry. Marcel Dekker Inc. New York.
3. Ranganna S. (2019). Handbook of analysis and quality control for fruits and vegetables, 2nd edition. Tata McGraw Hill.
4. Nielsen S.S. (2002). Introduction to the chemical analysis of foods, CBS Publishers and Distributers, Pvt. Ltd.

Course Out comes- After completion of this course, students will be able to:

CO 1 Acquire knowledge on the physico chemical properties of compounds in foods.

CO 2 Apply the functional properties of foods in processing and preservation.

CO 3 Perform skills in qualitative and quantitative estimation of nutrients in different foods.

CO 4 Describe the chemical components and their functions in Food applications.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**3**			**2**	**2**							**3**	
CO2	**3**	**3**			**2**	**3**							**3**	
CO3	**3**				**3**	**3**		**1**				**1**	**3**	**3**
CO4	**3**				**2**	**2**		**1**				**1**	**3**	**3**

High-3, Medium-2, Low-1

FT-102: CEREAL GRAINS, LEGUMES AND OILSEED TECHNOLOGY

COURSE OBJECTIVES-

To enable the students to:

1. Know the structure and composition of cereal grains, pulses and oil seeds.
2. Learn Post harvest technology and processing of cereals, pulses and oilseeds
3. Understand the mechanism of the equipment, Machinery and tools required for processing of cereals, pulses and oilseeds
4. Prepare and evaluate Traditional and commercially processed foods with cereals, pulses and oilseeds

CORE-THEORY

UNIT-1: Cereals and Millets

- Structure and Composition of Cereals and Millets.
- Milling Technology - Small scale, large scale, Turbo milling process.
- Parboiling,Popping, flaking, Malting and Fermentationprocess of cereal grains.
- Biproducts, Breakfast cereals and RTE foods, Enrichment, Fortification.
- Physico chemical changes during soaking, germination, heating and malting.
- Value addition and Health benefits of millets.

UNIT- II: Pulses and Legumes

- Structure and Composition of Pulses and Legumes.
- Milling Technology - General Milling of Pulses and Legumes. Soaking and Germination. Products, Biproducts and Value-added products.
- Soya bean – Processing, soya isolates, soya concentrates and soya products.

UNIT-III: Nuts and Oil Seeds

- Structure and Composition of Nuts and Oil seeds.
- Milling Technology – Processing, Extraction, Refining and Hydrogenation of Nuts and oilseeds.
- Biproducts and Value-added products of nuts and oil seeds.

UNIT-IV: Post Harvest Technology

- Post harvest losses, spoilage, causative factors, prevention and control measures.
- Equipment- machinery and tools required for processing of cereals, legumes, nuts and oil seeds.
- Quality control standards for Cereals, Legumes, Nuts and Oil seeds.

REFERENCES

1. Norman N Potter. (2007).*Food Science*, Fifth edition, An Aspen Publication, Mariland.
2. Peter C Morris and James H Bryce.(2004). *Cereal Biotechnology*, First Edition, Wood head publishing limited, Cambridge, England.
3. Subba Lakshmi G, and Shobha A. Udipi.(2001). *Food Processing and preservation*, New Age International (P) Ltd Publishers, New Delhi.
4. VijayaKhader. (2001).*Text Book of Food science and Technology*, Directorate of Information and publications of Agriculture, Indian Council of Agricultural Research, New Delhi.
5. Edwards, W.P.(2007).*The science of Bakery Products*, The Royal Society of Chemistry, Thomas Graham House, Cambridge.
6. Fast R.B. and Caldwell E.F. (1990). *Breakfast cereals and how they are made?*, American Association of Cereal Chemists" St Paul. MN.

COURSE OUTCOMES –

After the completion of the course, the students will able to:

CO1 Gain knowledge about basic composition and structure of cereal grains, pulses and oil Seeds.

CO2 An in-depth understanding of the science and technology associated with Post-harvest technology and processing of cereals, pulses and oilseeds.

CO3 Able to operate and handle the equipment, Machinery and tools required for processingof cereals, pulses and oilseeds.

CO4 Prepare various food products including the by-products of cereal grains, pulses andoil Seeds.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**											**3**	**3**	**3**
CO2	**3**	**3**		**3**	**3**							**3**	**3**	**3**
CO3	**3**				**3**	**2**						**3**	**3**	**3**
CO4	**3**		**3**		**3**				**2**	**3**	**3**	**3**	**3**	**3**

High-1, Medium-2, Low-3

FT-103-A: FOOD SCIENCE AND EXPERIMENTAL FOODS

(COMMON TO MS FOOD TECHNOLOGY AND M.SC. FOOD SCIENCE NUTRITION & DIETETICS COURSE)

COURSE OBJECTIVES –

To enable the students to:

1. Acquiree on Plant and Animal foods composition, processing and preservation of nutritive values.
2. Understand the principles of cookery of different foods and methods of evaluation.
3. Apply knowledge about different processing techniques on nutritive quality of foods.
4. Apply skills in standardisation of foods using different processing techniques.

COMPULSORY FOUNDATION- THEORY

UNIT-I: Foods of Plant Origin

- Cereals and Millets: Structure, Composition and functional properties.
- Pectin and Gums: Functional role in food products and its applications.
- Baking process: Cereal flours, Flour mixes dough and batter, Leavening agents, role of ingredients in baking process.
- Pulses and Legumes: Composition, anti-nutritional factors, Effect of cooking.
- Vegetables and Fruits: Classification, Composition, Pigments and Flavors constituents - Cooking effect, Browning reaction.

UNIT-II: Foods of Animal Origin

- Milk: Composition, Kinds of milk and Functional properties of Milk.
- Egg: Structure, composition and Functional properties of eggs.
- Meat and Poultry: Structure, Muscle composition, Heat-induced changes in meat, Tenderness – Tenderizers.
- Fish and Marine foods: Classification and Composition and cooking.

UNIT-III: Starch, Sugars and Fats

- Starch: Characteristics, Gelatinization, Factors affecting gelatinization, modified food starches-Applications.
- Sugars: Types of sugars and sugar syrups, Crystallization of sugars, Sugar cookery and applications.
- Fats and oils: Sources, Composition, Absorption, Functional properties of fat-Melting point, Smoke point and flash point.

UNIT-IV: Sensory Evaluation

- Sensory Attributes of food quality and its characteristics.
- Requirements to conduct sensory evaluation- Sensory panel, Preparing and Presenting Samples for Testing, Panel booth.
- Sensory Tests – Analytical and Affective Tests.

REFERENCES

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3. Srilakshmi, B. (2003). *Food science*. New Age International.
4. Khader, V. (2019). *Text book of food science and technology*. Indian council of agricultural research.
5. Belle Lowe.(1998).*Experimental Cookery*, John Wiely& Sons, INC, New York.
6. SethiMohini.(2011).*Food Science: Experiments and Application*, second edition, Jain book Agency, New Delhi.
7. N.ShakuntulaManay& M. Shadaksharswamy. (2001).*Foods- Facts and Principles*, second edition, New Age International Publishers, New Delhi.
8. Norman N Potter.(2007).*Food Science*, Fifth edition, An Aspen Publication, Mariland.

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO 1. Acquire knowledge on the functional properties of Plant and Animal foods.

CO 2. Standardize the weights and measures of various food items.

CO 3. Demonstrate the role of ingredients in cookery.

CO 4. Apply different techniques in evaluation of food.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**											**3**	**3**	**3**
CO2	**3**		**3**		**3**		**3**		**3**		**2**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**3**					**2**		**3**	**3**	**3**
CO4	**3**	**2**	**3**	**1**	**3**	**2**	**3**		**3**		**2**	**3**	**3**	**3**

High-3, Medium-2, Low-1

FT 103-B: BAKING TECHNOLOGY

(COMMON TO MS FOOD TECHNOLOGY AND M.SC. FOOD SCIENCE NUTRITION & DIETETICS COURSE)

COURSE OBJECTIVES:

To enable the students to:

1. Understand the concept and technology of baking.
2. Learn the role of different ingredients in baking process
3. Familiarize with processing techniques of various bakery products
4. Develop skills in organizing and maintenance of a baking industry.

GENERIC ELECTIVE - THEORY

UNIT-I: Bakery Industry

- Introduction, current status, growth rate, and economic importance of Bakery Industry in India.
- Baking: Principles, baked foods, Baking temperatures, Knowledge and working of various types of oven, baking equipment; Roasting: Principles of roasting, roasting equipment;
- Formulations, processing (mixing, fermentation, rounding, proofing, sheeting, moulding, baking, depanning etc.), equipments, packaging, storage and quality testing of bakery products

UNIT-II: Baking Technology

- Types and grades of wheat flour, Wheat flour proteins and importance of gluten in manufacture of bakery products.
- Role of ingredients in bakery products- sugars, fats, leavening agents, additives and other ingredients.
- Types of Bakery Products and Technology for their Manufacture – dough and batters; Dough rheology.

UNIT-III: Bakery Products

- Hard wheat Products: bread- Ingredients, various types of bread, equipments and types of mixing methods, preparation of bread, Product quality characteristics, faults and corrective measures of bread.
- Soft wheat Products: cookies, crackers, biscuits– Ingredients, types, equipments, method of preparation, Product quality characteristics, faults and corrective measures.
- Ingredient used in Cake Making, types and varieties, equipments, cake making methods, Product quality characteristics, faults and corrective measures of cakes.
- Other bakery products: using very hard wheat. Pizza, pastry and its types.

UNIT- IV: Modified BakeryProducts

- Modified bakery products: high fiber, low sugar, low fat, gluten free bakery products.
- Decoration of baked foods – Icing and Fillings, its types and applications in bakery. Role of other ingredients used in icing and fillings.
- Staling and Nutrient Losses in Bakery Products.

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3. Hebeda, R. (Ed.). (1996). *Baked goods freshness: Technology, evaluation, and inhibition of staling* (Vol. 75). CRC Press.
4. Manley, D. (Ed.). (2011). *Manley's technology of biscuits, crackers and cookies*. Elsevier.
5. Vaclavik, V. A., Christian, E. W., & Campbell, T. (2008). *Essentials of food science* (Vol. 42). New York: Springer.

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Acquire knowledge on bakery industry and products.

CO2 Comprehend the technology of processing of bakery products.

CO3 Demonstrate the skills in various types of bakery items.

CO4 Comprehend the technology of processing in handling the bakery.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**		**3**		**3**	**3**	**3**		**3**	**3**		**3**	**3**	**3**
CO2	**3**		**3**		**2**		**3**	**2**	**3**		**3**	**3**		**3**
CO3	**3**		**3**		**3**	**3**				**1**	**3**		**3**	**3**
CO4	**2**		**3**			**3**	**3**		**2**		**3**	**3**	**3**	

High-3, Medium-2, Low-1

104-A: COMMUNITY NUTRITION

(COMMON TO ALL SPECIALIZATIONS OF M SCHOME SCIENCEAND MS FOOD TECHNOLOGY COURSE)

COURSE OBJECTIVES-

To enable the students to:

1. Know about nutrients in food and their functions.
2. Understand the consequences of deficiency of taking nutrients.
3. Apply skills for planning diets for nutritional disorders.
4. Apply the techniques to assess the nutritional status of different age groups.

ELECTIVE FOUNDATION – THEORY

UNIT-I: Food Composition - Grouping

- Food Groups **–** Classification – food composition
- Nutritive values of different foods, Functions of foods and nutrients – cereal grains, millets, pulses, nuts and oil seeds fruits and vegetables, milk and milk products, meat, egg, poultry and fish, spices and condiments.
- Menu planning– Definition, Principles, Factors affecting menu planning

UNIT – II: Assessment of Nutritional Status of the Community:

- Need - Methods of Assessment - (a) Direct Methods - (i) Diet Surveys (ii) Anthropometric Assessment - (iii).clinical and (iv). Biochemical Assessment
- (b) Indirect Methods - Vital Statistics - Merits and Demerits of methods -
- Nutrition surveys - longitudinal and cross sectional - Family, individual and institutional surveys - Techniques for assessment of age - use of reference standards for the assessment of nutritional status.

UNIT – III: Major Nutrition Problems of the Community:

- Nutrition Through Life Span – Infancy, Early and late childhood, Adolescence, Adulthood and Ageing – Nutritional requirements and Recommended Dietary Allowances (RDA)– Justification for special needs during periods of growth and development, pregnancy and lactation – significance of breast feeding –

- Malnutrition and under nutrition- PEM/CED, obesity- deficiencies vit-A, iron /iodine - Etiology –Symptoms - Government programmes to eradicate PEM, vitamin-A, Iron and Iodine deficiencies – Principles of planning diets for different conditions of malnutrition

UNIT – IV: Strategies to Combat Malnutrition:

- Food security – Definition – Management of food insecurity - -Food Fortification and enrichment-.
- Food Assistance and Food Supplementation - Policies and Programmes of the Government - Governmental Policies and Programmes - Food Assistance and Food Supplementation Programmes - Public Distribution System (PDS) - Food For Work (FFW), Special Nutrition Programme (SNP), School Lunch Programme (SLP), Mid Day Meal Programme (MMP), Balawadi Nutrition Programme (BNP), Integrated Child Development Services (ICDS) -
- Nutrition Education - Importance - Approaches Media and Methods

REFERENCES

1. Davidson and Passmore R., Brock, J.F., and Truswell, A.S. (1979). *Human Nutrition and Dietetics,* 7th ed. New York. Churchill Living stone.
2. Gopalan, C. (1992). *Basic issues in combating malnutrition*- NFI Publication.
3. Gopalan, C. (1990). *Women nutrition in India*. NFI Publication.
4. Jelliffe, D.B.(1966).*Assessment of nutritional status of the community*, WHO Monograph, Series No. 53. WHO Geneva
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6. Seymour L. HarpenM.D.(1979).*Quick reference to clinical nutrition*
7. Suitor, C.W. and Hunter, M.F. (1980).*Nutrition principles and application in health promotion*, J.B. Lippincot Company, Philadelphia
8. Swaminathan, M. (1990). *Essentials of food and nutrition*, Vol. I and Vol. II Ganesh and co. Madras

COURSE OUT COMES:

After completion of this course, students will be able to

CO 1 Know the nutritional problems of the community.

CO 2 Acquire knowledge about food groups, RDA and steps in planning a diet.

CO 3 Skills in planning and calculating nutritive values for different nutritional disorders.

CO 4 Understand the skills in assessing the nutritional status by different methods for different age groups.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2			2					2		
CO2	3	3	3	2			3					2		
CO3	3	3	3	2					2			2		
CO4	3	3	3	2			3		2			2		

High-1, Medium-2, Low-3

104-B:NUTRITION DURING LIFE SPAN

(COMMON TO ALL SPECIALIZATIONS OF M SC HOME SCIENCE AND MS FOOD TECHNOLOGY COURSE)

COURSE OBJECTIVES

To enable the students to:

1. Gain knowledge on the importance of nutrition during life span
2. To do computation of nutrient allowances during life span.
3. Enlighten the principles and working applications during dietary modifications.
4. Comprehensive knowledge on analysing the nutritional requirements.

COMPULSORTY FOUNDATION THEORY

UNIT-I:Nutrition during Pregnancy& Lactation:

- Nutrient requirement during pregnancy, intake and gaps, prenatal and antenatal nutritional importance, metabolic adjustments in pregnancy.
- Nutrition intervention and pregnancy outcome, Nutritional management, problems and Complications.
- Nutritional requirements during lactation, physiology of milk production, effects of lactation on Nutrition composition of Human-Milk,
- Factors affecting breast milk quality and comparative advantages & disadvantages of breast and formula feeding.

UNIT-II:Nutrition during Infancy &Early Child hood period:

- Nutritional requirements, concerns and overall development during Infancy.
- Need for infant formulae, types of infant formulae, care in Preparation, and importance of preparation of weaning foods.
- Home prepared versus commercial weaning foods, Feeding problems-Lactose and cow's milk protein intolerance.
- Pre-school children: Age, growth & development, nutrient requirements, Intake and gaps. Effects of Macro & Micro nutrient malnutrition on physical and mental development.

UNIT-III: Nutrition For School-going children &Adolescents:

- Dietary patterns and factors to be considered. Implications of childhood obesity and other nutritional concerns. Healthy food choices during childhood.
- Growth during adolescence, nutritional requirements, hormonal influences, age of menarche-factors affecting, physiological problems and nutritional issues in adolescence.
- Nutritional requirements and RDA. Behavioural characteristics and feeding problems.

UNIT-IV: Nutrition during adulthood and old age:

- Nutritional requirements for adult man and woman. Nutritional concerns, RDA, nutritional guidelines and work efficiency. Physiological changes in aging, effects of aging on nutritional health.
- Modification in diet, feeding old people. Nutritional concerns in old age and their management.

REFERENCES

1. Seth V and Singh K. Diet planning through life cycle: Part 1. Elite publishing house pvt ltd, New Delhi. 2006.
2. Mahtab S. Bamji, Kamala Krishna Swamy and G N V Brahmam. Text book of Human Nutrition. Oxford and IBH Publishing, New Delhi. 2009.
3. Michelle McGuire, Kathy A Beer Man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA
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5. Whitney, E.N. and Rolfes, S.R.(1999). Understanding Nutrition, 8th Edition, West/Wadsworth, An International Thomson Publishing Co.

COURSE OUT COMES

After completion of this course, students will be able to:

CO1 Acquire knowledge on nutritional requirements at various stages.

CO2 Apply the knowledge of nutrition during planning and preparation of diet.

CO3 Assess and compare diet and nutritional requirements relative to age, developmental and disease status.

CO4 Evaluate nutrition products for composition, quality, and appropriateness of use and formulate dietary interventions to address nutritional deficiencies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**3**		**2**			**2**					**2**		
CO2	**3**	**3**	**3**	**2**			**3**					**2**		
CO3	**3**	**3**	**3**	**2**					**2**			**2**		
CO4	**3**	**3**	**3**	**2**			**3**		**2**			**2**		

High-1, Medium-2, Low-3

PRACTICAL-1: FT-105: FOOD CHEMISTRY AND ANALYSIS & FOOD SCIENCE AND EXPERIMENTAL FOODS/ BAKING TECHNOLOGY

FT-101: FOOD CHEMISTRY AND ANALYSIS

COURSE OBJECTIVES

1. Know the principles and working applications of different analytical techniques associated with food.
2. Comprehensive knowledge on techniques of analysing the nutrient components in foods.

PRACTICALS:

1. Volumetric analysis of Acids and Bases
2. Determination of Moisture
3. Qualitative analysis of Carbohydrates, Hydrolysis of Starch.
4. Determination of starch and sugars
5. Qualitative analysis of Proteins and Amino acids
6. Estimation of proteins - Micro-Kjeldahl method
7. Qualitative analysis of fats and oils.
8. Determination of fat in solid and liquid foods.
9. Determination of Total ash
10. Estimation of Calcium
11. Estimation of Phosphorus
12. Estimation of Iron
13. Estimation of Vitamin C

COURSE OUT COMES

CO 1 Perform skills in qualitative and quantitative estimation of nutrients in different foods.

CO 2 Describe the chemical components and their functions in Food applications.

FT-103-A: FOOD SCIENCE AND EXPERIMENTAL FOODS

COURSE OBJECTIVES

- Acquire Knowledge on different processing techniques on nutritive quality of foods.
- Knowledge on standardisation of foods for different processing techniques.

PRACTICALS:

1. Standardization of weights and measures of various foods
2. Starch cookery- Structure, gelatinization and factors affecting gelatinization
3. Baking –Determination of gluten content, Preparation of plain cake and evaluation by subjective and objective methods.
4. Pulse cookery – effect of different cooking methods
5. Vegetable and fruit – Effect of time, temperature, media and cooking methods on pigments, Enzymatic Browning- Preventive measures.
6. Sugar cookery- stages of sugar cookery and its application in Indian sweet making, fondant preparation.
7. Fats and oils – Smoke points, oil absorption and mayonnaise preparation.
8. Milk cookery - factors affecting milk cookery- Temperature, pH, acid, base, coagulation factor.
9. Egg and Meat cookery – Egg white foams, methods of cooking egg and Meat, role of tenderizers in meat cooking.
10. Sensory Evaluation of food- preparation of score card, threshold tests, sensory testing.

COURSE OUT COMES

CO 1 Demonstrate the role of ingredients in cookery.

CO 2 Apply different techniques in evaluation of food.

FT 103-B: BAKING TECHNOLOGY

COURSE OBJECTIVES:

1. To understand the concept and role of ingredients in technology of baking.
2. Familiarize with processing techniques of various bakery products.

PRACTICALS:

1. Introduction of tools and equipment's of bakery products.
2. Determining the gluten content.
3. Preparation of Biscuits and Cookies.
4. Preparation of Doughnuts and Muffins.
5. Preparation of Bread and Bun.
6. Preparation of Pizza.
7. Preparation of various Types of Cakes.
8. Preparation of Filling and Icings.

COURSE OUTCOMES -

CO1 Acquire knowledge on bakery industry and handling the bakery products.

CO2 Demonstrate the skills in various types of bakery items.

PRACTICAL-II: FT-106: CEREAL GRAINS, LEGUMES AND OILSEED TECHNOLOGY & COMMUNITY NUTRITION/ NUTRITION DURING LIFE SPAN

FT-102: CEREAL GRAINS, LEGUMES AND OILSEED TECHNOLOGY

COURSE OBJECTIVES

- To gain knowledge on various processing techniques of cereals, legumes and oilseeds
- To acquire knowledge in various food applications and product preparations.

PRACTICALS:

1. Market survey on cereals, legumes, nuts, oil seed grains and their products.
2. Effect of Soaking, germination and malting process of Cereals on Physical and functional properties.
3. Popping and flaking.
4. Fermentation processing of cereals and pulses.
5. Flour Analysis.
6. Baking- Bread and biscuit making and evaluation of physical and chemical attributes.
7. Effect of Soaking, germination and malting process of Pulse and legume on Physical and functional properties.
8. Preparation and evaluation of peanut butter.
9. Preparation and evaluation of ready to eat breakfast foods.
10. Visit to food industry.

COURSE OUTCOMES

CO1 Able to identify and handle various processing techniques.

CO2 Hands on experience in product preparations.

FT-104-A: COMMUNITY NUTRITION

COURSE OBJECTIVES

1. To Understand the consequences of deficiency and menu planning.
2. To gain knowledge about the different methods of nutritional assessment.

PRACTICALS:

1. Assessment of Nutritional Status using Anthropometry,
2. Assessment of Nutritional Status using Dietary method
3. Planning of Diets for Different Nutritional Deficiencies like PEM, Anemia, Vit-A.
4. Planning and Preparation of Programmes for Significant Days like Breast Feeding Week, Nutrition Week, World Food Day.
5. Study of the following through visits
   - Govt School Lunch Programme
   - ICDS Programme
   - Anganwadi Training Centers.
6. School Lunch Programme at Sri Venkateswara University Laboratory Nursery School.
7. Community Nutrition Programme Planning - Introduction, Identification of problem, nutritional assessment, analysis of causes, resources, constraints, selection of interventions, setting a strategy, implementations, evaluation of the programme

COURSE OUT COMES

CO 1 Acquire knowledge about food groups, RDA and steps in planning a diet.

CO 2 Skills in planning and calculating nutritive values for the foods and recipes.

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FT-104-B: NUTRITION DURING LIFE SPAN

COURSE OBJECTIVES -

1. To acquire knowledge on principles and working applications during dietary modifications..
2. To enable the comprehensive knowledge on analyzing the nutritional requirements.

PRACTICALS:

1. Planning and preparation of diet during pregnancy.
2. Planning and preparation of diet during lactation.
3. Planning and preparation of weaning foods.
4. Planning and preparation of diet for pre-school children.
5. Planning and preparation of diet for school going children.
6. Planning and preparation of diet during adolescence.
7. Planning and preparation of diet for adults.
8. Planning and preparation of diet for old age.

COURSE OUT COMES-

CO1 Assess and compare diet and nutritional requirements relative to age, developmental and disease status.

CO2 Evaluate nutrition products for composition, quality, and appropriateness of use and formulate dietary interventions to address nutritional deficiencies.

FT-107: HUMAN VALUES AND PROFESSIONAL ETHICS – I

(REVISED SYLLABUS WITH EFFECT FROM 2021-22 ONWARDS)

AUDIT COURSE

COURSE OBJECTIVES

- This course helps the students to:

1. Define the term 'ethics' , 'good and bad values', crime and punishment and religious tolerance.
2. Understand the importance of good character, conduct and values embedded in various religions.
3. Apply knowledge of professional ethics and correlate the concepts in addressing the ethical issues outside the class room.
4. Demonstrate knowledge of ethical values in non-class room activities, internships and field work and resolve the moral issues.

AUDIT COURSE-THEORY

UNIT-I:

- Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment.
- Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

UNIT-II:

- Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom.
- Good behavior and respect for elders, Character and Conduct.

UNIT-III:

- Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha(Non- stealing).
- Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires). Moksha(Liberation).

UNIT-IV:

- Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths – AryaAstangamarga, (c) Jainism- mahavratas and anuvratas.
- Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.
- Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

REFERENCES

1. John S Mackenjie: A manual of ethics.
2. The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today Maitra, S.K: Hindu Ethics .
6. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
7. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
8. Analyzing Moral.Issues, Judith A. Boss. May Field Publishing Company - 1999.
9. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications
10. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.

COURSE OUTCOMES:

After studying the course, students will able to:

CO1 Define the term ‘ethics’, ‘good and bad values’, crime and punishment and religious tolerance.

CO2 Understand the importance of good character, conduct and values embedded in various religions.

CO3 Apply knowledge of professional ethics and correlate the concepts in addressing the ethical issues outside the class room.

CO4 Demonstrate the ability to face difficult situations in non-class room activities, Internships and field work and resolve them confidently.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**						**1**	**3**	**3**			**3**
CO2						**2**			**3**			**3**
CO3						**3**		**3**	**3**			**3**
CO4						**3**		**3**	**3**			**3**

High-1, Medium-2, Low-1

DEPARTEMNT OF HOME SCIENCE

M S FOOD TECHNOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS)

(WITH EFFECT FROM ACADEMIC YEAR 2021-22 ONWARDS)

SEMESTER II

FT-201: FRUIT AND VEGETABLE TECHNOLOGY

COURSE OBJECTIVES

To enable the students to:

1. Attain an overview on the classification and composition of fruits and vegetables
2. Acquaint with the post-harvest handling technologies of fruits and vegetables to reduce postharvest losses and their value addition.
3. Equip with the knowledge of processing and preservation of fruits and vegetables.
4. Impart the expertise in Production and manufacture of fruits and vegetable based food products and preserves.

CORE –THEORY

UNIT-I: Fruits and Vegetables

- Production and processing scenario of fruits and vegetables in India and world.
- Morphology, Structure, Classification of fruits and vegetables; Composition and Nutritive value of fruits and vegetables: Maturity Indices and standards for fruits and vegetables; Methods of maturity determination.
- Standards and specifications for fresh fruits and vegetables of Indian origin.

UNIT-II: Post Harvest Handling of Fruits and Vegetables

- Importance and scope of post harvest management, Factors affecting post harvest losses.
- Post-harvest physiological and biochemical changes in fruits and vegetables; Ripening of climacteric and non-climacteric fruits.
- Physiological post harvest problems - Chilling injury and disease; Prevention of post harvest diseases and infestation.

UNIT-III: Storage, Transportation and Handling

- Methods and storage practices- Controlled atmosphere storage, Modified atmosphere packaging, Hypobaric storage, Pre cooling and Cold storage, Zero energy cool chamber; Commodity pretreatments - Chemicals, Coatings, Prepackaging, Vapor Heat Treatment.
- Post Harvest Handling operations; Cleaning: Cleaning and washing of fruits and vegetables, types of cleaners, screens, types of screens, rotary screens, vibrating screens, machinery for cleaning of fruits and vegetables (air cleaners, washers). Sorting and grading: Sorting, grading, methods of grading- Size grading, color grading, specific gravity grading.

UNIT-IV: Fruit and Vegetable Products

- **Fruit Products:** Definition-Manufacturing Process-Quality Standards and Specifications of:

  Fruit Beverages, Jams, Jellies, Marmalades, Puree, Concentrates, Preserves, Candied Fruits, Bars, Toffees, Dehydrated Fruits.
- **Vegetable Products:** Definition-Manufacturing Process-Quality Standards and Specifications of: Vegetable Products-Pickles, Chutneys, Sauces, Tomato juice, Tomato puree, Paste, Ketchup, Sauce, Soup, Dehydrated vegetables.

REFERENCES

1. VijayaKhader. (2004). *Preservation of fruits and Vegetables*, 2nd edition, Kalyani publishers, Ludhiana.
2. GirdhariLal, G.S. Siddappa& G.L. Tandon. (1998). Preservation of Fruits and Vegetables. ICAR, New Delhi.
3. Srivastava.P.R. andSanjeev Kumar. Fruit and vegetable preservation - 3rd Edition. International Publishers, Delhi.
4. Shrivastava, A. K. (2004). *Agrirulcture and Food*, 1st edition, APH publishing corporation, New Delhi.

COURSE OUTCOMES

- After the completion of the course, the students will able to:

CO1 Application of Post-Harvest handling technologies to reduce the postharvest losses.

CO2 Learn the processing and preservation methods to prevent the spoilage of Fruit &vegetables.

CO3 Develop various Fruits & vegetables based products and preserves

CO4 Assess the quality of fruit and vegetables and their products.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3		3	3							3	3	3
CO2	3			3	3							3	3	3
CO3	3	3	3	2	3	2			2	3		3	3	3
CO4	3	3		2	3	2		2	2		3	3	3	3

High- 3, Medium- 2, Low- 1

FT- 202: DAIRY TECHNOLOGY

COURSE OBJECTIVES

- To enable the students to:

1. Impart the knowledge of milk grading and their composition.
2. Illustrate the technologies of processing of milk and milk products.
3. Provide in-depth knowledge in various unit operations and developments in dairy processing.
4. Demonstrate the manufacturing of various dairy products and exemplify the quality of dairy products.

CORE-THEORY

UNIT-I: Milk Processing

- Milk - Definition, Structure, Composition, Factors affecting composition of milk.
- Collection and Transportation of milk - Reception, Sampling techniques, grading of milk, clarification, chilling at procurement site, Storage and Transportation.
- Processing - Homogenization, Pasteurization, sterilization, UHT processing of Milk.
- Cleaning and sanitization of equipments - cleaning methods and sanitization methods in dairy processing.

UNIT-II: Milk &Milk Products

- Types of Market Milk - Whole milk, Low fat milk, Toned and Double toned milk, Skimmed milk, Condensed milk, concentrated milk, Fortified and Double fortified milk, flavored milk.
- Fat-Rich Dairy Products - Definition, composition, standards and method of manufacture of Cream, Butter, Ghee, and butter oil.
- Traditional Indian Dairy Products - Standards and method of manufacture of Khova, Khova based sweets, chenna, chenna based sweets, panner, and kheer.
- Evaporated products -Standards, types and method of manufacture of Condensed and Dried Milks.

UNIT-III: Fermented, Frozen and By products of Milk

- Cheese - Definition, standards and classification of cheese, Manufacture of different varieties of cheese.
- Fermented Milk products - Types of starter cultures, Role of starters in the preparation of various fermented milks and Types of fermented products – dahi and yoghurt preparation.
- Ice cream - Definition, classification and composition and standards of ice cream and other frozen desserts, Stabilizers and emulsifiers-their classification.
- By products utilization - Various types of by-products, utilization of dairy by-products, processing and its application.

UNIT-IV: Advanced Technologies in Milk & Whey Processing

- Membrane techniques - classification and characteristics of filtration processes, types of membrane processing,applications of Ultra filteration, Mono filteration, Micro filteration, Reverse osmosis, ion exchange and electrodialysis processes.
- Application of Stabilizers, emulsifiers, immobilized enzymes and developments in dairyBio-technology.

REFERENCES

1. De, S. (1980). Outlines of dairy technology. *Outlines of dairy technology.*
2. Smit G. 2003. Dairy Processing – Improving Quality. CRC-Woodhead Publ.
3. Tamime, A. Y. (Ed.). (2008). *Structure of dairy products*. John Wiley & Sons.
4. Walstra, P. (1999). *Dairy technology: principles of milk properties and processes*. CRC Press.
5. Edgar, S., & Axel, M. (2017). *Milk and dairy product technology*. Routledge.

COURSE OUTCOMES –

After the completion of the course, the students will be able to:

CO1. Gain knowledge of milk composition, types and grades of milk.

CO2. Comprehend the technology of processing of milk and milk products.

CO3. Apprehend the manufacturing and quality analysis of different dairy products.

CO4. Perceive hygiene and sanitation practices in dairy industry.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**											**3**	**3**	**3**
CO2	**3**		**2**	**2**	**3**							**3**	**3**	**3**
CO3	**3**	**2**	**3**		**3**	**1**		**2**	**1**	**1**	**2**	**3**	**3**	**3**
CO4	**3**	**2**						**3**		**3**	**2**	**3**	**3**	**3**

High-3, Medium-2, Low-1

FT-203-A: FOOD MICROBIOLOGY AND SAFETY

(COMMON TO MS FOOD TECHNOLOGY AND M.SC. FOOD SCIENCE NUTRITION & DIETETICS COURSE)

COURSE OBJECTIVES –

To enable the students to:

1. Obtain knowledge about important genera of microorganisms associated with food.
2. Acquaint food contaminants and their sources.
3. Understand the various factors associated with growth, food spoilage and food-borne diseases of different microorganisms.
4. Demonstrate the use of standard methods and procedures for the microbiological analysis of food.

COMPULSORY FOUNDATION- THEORY

UNIT-I: Introduction to Food Microbiology

- Classification and growth of microorganism, factors affecting microbial growth.
- General characteristics, structure, classification, morphological characteristics, cultural characteristics of bacteria, fungi, virus, protozoa, and algae.
- Role of Harmful and beneficial microorganisms in food.
- UNIT-II:Food Contamination and Spoilage
- General principles underlying spoilage: causes of spoilage, classification of foods based on spoilage and changes caused by microorganisms.
- Sources of contamination and types of spoilages among plant origin foods:
  - Cereals, Legumes, nuts and oil seeds
  - Fruits and Vegetable products
  - Spices and condiments

UNIT-III:Food Contamination and Spoilage of Animal origin and Processed Foods

- Sources of contamination and types of spoilages among :
  - Milk and Milk products
  - Eggs, poultry and Meat
  - Fish and Other sea foods
  - Sugars and sugar products
  - Processed foods

UNIT-IV: Food Borne Diseases and Food Safety

- Food borne diseases – Food Infection and Intoxication Sources of infection of food by pathogenic organisms and physiological action, Signs and symptoms of various Bacterial Food-borne poisoning and Non-bacterial food-borne poisoning.
- Food safety: concept, factors affecting food safety, biological hazards.
- Applications of Food Microbiology- probiotics, prebiotics, microbial enzymes, fermentation process.

REFERENCES

1. Jay, J. M., Loessner, M. J., & Golden, D. A. (2008). *Modern food microbiology*. Springer Science & Business Media.
2. Banwart, G. (2012). *Basic food microbiology*. Springer Science & Business Media.
3. Matthews, K. R., Kniel, K. E., & Montville, T. J. (2017). *Food microbiology: an introduction*. John Wiley & Sons.
4. Adams,M.R. and Moss,M.O.(2003). *Food Microbiology*, Second edition, Panima Publishing Corporation, New Delhi.
5. James,M.Jay.(2005). Modern *Food Microbiology*, 4th edition, CBS publishers and Distributors, New Delhi.
6. William.C.Frazier and Denni, S.C. Westhoff. (2004). *Food Microbiology*, 4th edition, Tata MCGraw-Hill publishing company Ltd, New Delhi.

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Identify the important genera and factors associated with food spoilage.

CO2 Elucidate the food contaminants in different types of food commodities.

CO3 Describe the characteristics of food borne diseases, infections and intoxicationsand their identification.

CO4 Demonstrate the use of standard methods and procedures for the microbiological analysis of food.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**3**									**3**	**3**	**3**	**3**
CO2	**3**	**3**		**2**							**2**	**3**	**3**	**3**
CO3	**3**	**3**										**3**	**3**	**3**
CO4	**3**	**3**			**2**			**2**			**3**	**3**	**3**	**3**

High-3, Medium-2, Low-1

FT203-B: NUTRITION IN EMERGENCIES AND DISASTER MANAGEMENT

(COMMON TO M.SC FOOD SCIENCE NUTRITION & DIETETICS AND MS FOOD TECHNOLOGY COURSE)

COURSE OBJECTIVES

- To enables the students to:

1. Understand the emergency situations in natural and manmade disasters.
2. Gain knowledge on nutrition surveillance and treatment in emergencies.
3. Knowledge on planning nutrition relief and rehabilitation in emergencies.
4. Explain concepts on Epidemiology and its application in planning programs during emergencies.

GENERIC ELECTIVE- THEORY

UNIT-I: Disasters

- Natural/Manmade disasters resulting in emergency situations: Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies, Factors giving rise to emergency situation in these disasters.
- Nutritional problems in emergencies in vulnerable groups: Causes of malnutrition in emergency situations, Major deficiency diseases in emergencies, Protein – Energy Malnutrition / Starvation / Under Nutrition, Specific Nutrient deficiencies - Energy, Vitamins, Minerals
- Communicable disease: Surveillance and treatment.Control of communicable diseases in emergencies – Role of immunization and sanitation.

UNIT-II: Assessment

- Assessment and surveillance of Nutritional status in emergency affected populations: Scope of assessment of malnutrition in emergencies, Indicators of malnutrition. Clinical signs for screening acute malnutrition, Anthropometric assessment of nutritional status.
- Indicators and cut-offs indicating seriously abnormal nutrition situation: Weight for height based indices, MUAC, social indicators.
- Organization of nutritional surveillance and individual screening.

UNIT-III: Nutritional Relief and Rehabilitation

- Assessment of food needs in emergency situations, Food distribution strategy – Identifying and reaching the vulnerable group – Targeting Food Aid.
- Mass and Supplementary Feeding, Therapeutic Feeding, Special foods/rations for nutritional relief, Local production of special foods, Local foods in rehabilitation
- Organisation of mass feeding/general food distribution, Feeding centers, Transportation and food storage, Sanitation and hygiene,Evaluation of feeding programmes, Household food security and nutrition in emergencies
- Public nutrition approach to tackle nutritional problems in emergencies

UNIT-IV: Nutritional Epidemiology

- Introduction to Epidemiology – types of epidemiology, collection ofepidemiological data, secondary routine date, Descriptive epidemiology, Cross sectional Analysis, prevalence and incidence, risk factors, risks and odds, relative and attributable risks
- Principles of Nutritional Epidemiology, Measurement issues, Measurement of disease, Occurrence and Measurement of association, Exposure and outcome, Socio demographic and Psycho social variables.
- Design and Planning of Nutritional Epidemiological studies – assessing andsupplyingAndEvaluating Epidemiological studies – Discussion of selected case studies.

REFERENCES

1. World Disasters Report – Focus on Public Health, International Federation of Red Cross and Red Crescent Societies.
2. Disasters – International Public Nutrition and Emergencies: The Potential for improving practice. Special Issue – Vol.23/4, Dec. 1999.
3. Guidelines and Research publications of OXFAM, WFP, Rome. 1999. Nutrient Requirements and Recommended Dietary Allowance for Indians A Reportof the Expert Group of ICMR. 2010.
4. Dr.M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition theBangalore Printing and Publishing Co Ltd Bangalore 560018.
5. ShubhanginiA.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.

COURSE OUT COMES

- After completion of this course, students will be able to:

CO1 Acquire knowledge in nutritional problems in natural and man made disasters.

CO2 Assess the nutritional status in emergency and plan surveillance and treatment to the affected.

CO3 Acquire knowledge on nutrition epidemiology.

CO4 Plan and Execute nutrition rehabilitation in emergencies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**								**3**	**3**		**3**		
CO2	**3**	**2**		**2**					**3**	**3**		**3**	**3**	
CO3	**3**		**2**	**2**			**2**	**2**				**3**		**3**
CO4			**3**			**2**			**3**			**3**		

High-3, Medium-2, Low-1

204-A: RESEARCH METHODOLOGY

(COMMON TO ALL SPECIALIZATIONS OF M SC HOME SCIENCE AND MS FOOD TECHNOLOGY COURSE)

COURSE OBJECTIVES –

To enable the students to:

1. Get awareness about terms like 'variables', 'hypothesis', research 'and recognizethe purpose of doing research.
2. Understand different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research.
3. Critically apply knowledge to select a sample by using different sampling methods like probability and non-probability sampling.
4. Develop a research proposal in the appropriate scientific style.

ELECTIVE FOUNDATION -THEORY

UNIT – I: Research Purpose and Types

- Research – Significance, meaning, objectives, Approaches,
- Research process, Criteria of good research, Variable- types
- Types of Research: Historical, descriptive, experimental, case study, survey research, participatory research, Fundamental, appliedand action, exploratory research.
- Research hypothesis-Characteristics of good hypothesis.
- Research Design – Meaning, Need, Concepts, Principles and Types of research design

UNIT – II: Research Problem and Sample design

- Definition and Identification, Necessity and Selection of Research problem, Technique involved in defining the research problem.
- Population and Sample – Implications, Steps, Criteria and Characteristics of a good design
- Sampling Methods : *Probability sampling***-** Simple random, systematic random sampling, two Stages and multi stage sampling, cluster sampling and *Non-probability sampling* - Purposive, quota and volunteer sampling / Snowball Sampling.

UNIT –III : Methods of Data Collection

- Primary and Secondary Data, Selection of appropriate method for data collection
- Different Methods and techniques of data collection - Interview, Observation, Social mapping, Participatory assessment Techniques, Observation check list, Questionnaire, Interview schedule, Group discussions, Case studies.

UNIT –IV: Measurement Scales

- Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement,Technique of Developing Measurement Tools, Scaling,Meaning of Scaling,Scale Classification Bases,Important Scaling Techniques
- Research Proposal – Preparation.

REFERENCES

1. Kothari, C.R. (2004).:*"Research Methodology (Methods and Techniques)".* New Age International (p) Ltd., New Delhi.
2. Bandarkar, P.L. and Wilkinson T.S. (2000) :*"Methodology and Techniques of Social Research"*, Himalaya Publishing House, Mumbai.
3. Batnagar, G.L. (1990) :*"Research Methods and Measurements in Behavioural and Social Sciences",* Agri. Cole publishing Academy, New Delhi.
4. BajPai S.M. (1987). *"Methods of Social Survey and Research"*KitabGhat, Kanpur-3
5. Black, T.R. (1999).:*"Doing Quantitative Research in the Social Sciences"*, Sage Publications, New Delhi.
6. Dev Doss R.P. and Kulandavel K (1985).*"Hand book of methodology of research"* Oxford Press,
7. Goode J.W. and Hatt P.K. *"Methods in Social Science Research"* Mc. Graw hill-Co. New York.
8. Sharma S.R. (1994). *"Statistical methods in Educational Research"*, Anmol Publications Pvt. Ltd., New Delhi.

COURSE OUTCOMES

- After studying the course, students will able to:

CO1. Define terms like ‘variables’, ‘hypothesis’, research’ and state the purpose of doing research

CO2. Understand different types of search and can compare the advantages and dis-advantages of each type of research

CO3. Critically know the procedures for identifying an ideal sample for scientific research.

CO4. Prepare a research proposal in the appropriate scientific style .

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**			**3**		**3**	**2**		**2**		**2**	**3**	**2**	
CO2				**3**		**3**	**3**				**2**	**3**	**3**	
CO3		**1**		**3**		**3**			**2**		**3**	**3**	**3**	**1**
CO4				**3**		**3**	**3**		**3**			**3**	**3**	**3**

High-1, Medium-2, Low-3

204-B: STATISTICS AND COMPUTER APPLICATIONS

(COMMON TO ALL SPECIALIZATIONS OF M SC HOME SCIENCE AND MS FOOD TECHNOLOGY COURSE)

COURSE OBJECTIVES

To enable the students to:

1. Get awareness about the scope of statistics in research.
2. Understand the concepts of inferential statistics like t-test, chi-square, Correlation and Variance.
3. Critically apply knowledge of application of statistics in data analysis.
4. Know about the application of computers in research process.

ELECTIVE FOUNDATION -THEORY

UNIT- I: Statistics

- Statistics: Meaning, Definition and Scope, limitations – Role of statistics in Research
- Descriptive Statistics: Classification and tabulation of data, Graphic and diagrammatic presentation of data, measurement of central tendency, variation and dispersion, Normal distribution, Frequency distribution, histogram, frequency polygons, curve ogive
- Levels of Significance

UNIT – II: Inferential statistics

- 't' test for large samples (mean and proportions) and small samples
- Chi square test for significance and association
- Analysis of variance-one way, two way
- Correlation, coefficient of correlation, rank correlation

UNIT – III: Computer Applications I

- Introduction to Computer-Block diagram, PC and its components, Memory capacity, Physical storage of data, various devices, Hardware and software operating- DOS commands for file handling.

- MS Office and its component – Word and its applications/ creating documents, editing spell check, auto correct and print preview, creating tables and sorting data in tables, mail merge and its usage.

UNIT – IV: Computer Applications II

- MS Excel for data analysis - Work sheet and its structure, data entry, editing, Sorting filtering and copying.
- Statistical functions in Excel – Data analysis park for performing descriptive statistics, t-test, ANOVA, Correlation and regression.
- Graphs in Excel – Various types of graphs, editing graphs

REFERENCES

1. Kothari, C.R. (2004).:*"Research Methodology (Methods and Techniques)".* New Age International (p) Ltd., New Delhi.
2. Bandarkar, P.L. and Wilkinson T.S. (2000) :*"Methodology and Techniques of Social Research"*, Himalaya Publishing House, Mumbai.
3. Batnagar, G.L. (1990) :*"Research Methods and Measurements in Behavioural and Social Sciences",* Agri. Cole publishing Academy, New Delhi.
4. BajPai S.M. (1987). *"Methods of Social Survey and Research"*KitabGhat, Kanpur-3
5. Black, T.R. (1999).:*"Doing Quantitative Research in the Social Sciences"*, Sage Publications, New Delhi.
6. Dev Doss R.P. and Kulandavel K (1985).*"Hand book of methodology of research"* Oxford Press,
7. Goode J.W. and Hatt P.K. *"Methods in Social Science Research"* Mc. Graw hill-Co. New York.
8. Sharma S.R. (1994). *"Statistical methods in Educational Research"*, Anmol Publications Pvt. Ltd., New Delhi.

COURSE OUTCOMES - After studying the course, students will able to:

CO1. Define terms like 'frequency distribution', 'Variance' , 'Correlation' and its scope in research data

CO2. Understand different types of statistics that are used in research data.

CO3. Critically know the calculations of different statistics of research data.

CO4. Know the use of computer applications in research process.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**			**3**		**3**	**2**		**2**		**2**	**3**
CO2				**3**		**3**	**3**				**2**	**3**
CO3		**1**		**3**		**3**			**2**		**3**	**3**
CO4				**3**		**3**	**3**		**3**			**3**

High-1, Medium-2, Low-3

PRACTICAL-1: FT-205: FRUIT AND VEGETABLE TECHNOLOGY & DAIRY TECHNOLOGY/ FOOD MICROBIOLOGY AND SAFETY

FT-201: FRUIT AND VEGETABLE TECHNOLOGY

COURSE OBJECTIVES:

- To enable the students on various fruit and vegetable processing techniques.
- To attain practical knowledge in production and preparation of products.

PRACTICALS:

1. Physical tests
   - Check for Firmness of fruits and vegetables by Penetrometer.
   - Estimation of Pigments- Chlorophyll.
2. Chemical tests
   - Estimation of total soluble solids (TSS).
   - Estimation of pH and acidity of products.
3. Ripening of fruits and vegetables by using chemicals- Ethylene.
4. Biochemical changes in fruits and vegetables-estimation of catalase, peroxidase enzymes.
5. Preparation and evaluation of pectin products
6. Vegetable and fruit Maturity Indexes at post harvesting stage
7. Fruit Juice/Pulp Extraction, Concentration and Evaluation & RTS preparation.
8. Tomato Ketchup, Sauce, Culinary Paste
9. Visits to ripening and packaging houses.
10. Visits to fruit and vegetable processing industries.

COURSE OUTCOMES:

CO1 Learn the processing and preservation methods to prevent the spoilage of Fruit & vegetables.

CO2 Develop various Fruits & vegetables based products and preserves.

FT-203-A: FOOD MICROBIOLOGY AND SAFETY

COURSE OBJECTIVES

- Acquire knowledge on laboratory techniques to identify microorganisms in food.
- Creating awareness on role and significance of microbial inactivation, adaptation and environmental factors (i.e., aW, pH, temperature) on growth and response of microorganisms in various environments.

PRACTICALS:

1. Laboratory safety rules and precautions
2. Familiarization with Instruments used in Microbiological Lab, their principles and working.
3. Sterilization methods
4. Sampling techniques
5. Isolation techniques
6. Various types of media preparation and Methods of sterilization of media
7. Microbial Staining Techniques
8. Microbial examination of fresh food products: Identification, isolation and confirmation
9. Microbial examination of processed foods: Identification, isolation and confirmation.
10. Detection of E.coli from food sample

COURSE OUT COMES:

CO1 Apply techniques to identify different microorganisms in foods.

CO2 Compare the role and significance of microbial inactivation, adaptation and environmental factors (i.e., aw, pH, temperature) on growth and response of microorganisms in various environments.

FT-203-B: NUTRITION IN EMERGENCIES AND DISASTER MANAGEMENT

COURSE OBJECTIVES -

1. To gain knowledge on nutrition surveillance and treatment in emergencies.
2. To know the concepts on Epidemiology and its application in planning programs during emergencies.

PRACTICALS:

1. Collection of epidemiological data-a hands on experience.
2. Selection and Rapid assessment of nutritional status in a community.
3. Case study approach on causative factors and management of communicable diseases.
4. Planning and formulation of nutrient dense foods.
5. Survey on adherence to immunization schedule and vaccines.

COURSE OUT COMES -

CO1 Acquire knowledge in nutritional problems in natural and man made disasters.

CO2 Assess the nutritional status in emergency and plan and Execute nutrition rehabilitation in emergencies.

PRACTICAL-1: FT-206 : DAIRY TECHNOLOGY & 204-A: RESEARCH METHODOLOGY/204-B: STATISTICS AND COMPUTER APPLICATIONS

FT-202:DAIRY TECHNOLOGY

COURSE OBJECTIVES:

- To acquire knowledge of milk grading and processing of milk and milk products.
- To demonstrate the manufacturing of various dairy products and exemplify the quality of dairy products.

PRACTICALS:

1. Physical test - Organoleptic evaluation of milk.
2. Analysis of milk composition – Fat and SNF.
3. Chemical tests- temperature, pH, acidity, COB, Phosphatase test.
4. Microbiological test – MBRT.
5. Preparation of ghee from cream and butter.
6. Preparation of Khoa from cow, buffalo and concentrated milk.
7. Preparation of Paneer from cow, buffalo and mixed milk.
8. Preparation of fermented milk products.
9. Product development with bi-products of milk.
10. Visit to Dairy plant.

COURSE OUTCOMES -

CO1 Gain knowledge of milk composition, types and grades of milk.

CO2 Apprehend the manufacturing and quality analysis of different dairy products.

FT-204-A: RESEARCH METHODOLOGY

COURSE OBJECTIVES -

1. To understand different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research.
2. To acquire knowledge in developing a research proposal in the appropriate scientific style.

PRACTICALS

1. Identification of different variables in specialization of study.
2. Framing of hypothesis-Null and alternate Hypothesis
3. Preparation of schedule/questionnaire.
4. Preparation of research proposal
5. Study of an article in a journal-Abstract, Methodology, Results and Bibliography

COURSE OUTCOMES -

CO1. Understand different types of search and can compare the advantages and dis-advantages of each type of research

CO2. Critically know the procedures for identifying an ideal sample for scientific research and able to prepare a research proposal in the appropriate scientific style .

FT- 204-B: STATISTICS AND COMPUTER APPLICATIONS

COURSE OBJECTIVES -

1. To understand the concepts of inferential statistics like t-test, chi-square, Correlation and Variance.
2. To gain knowledge of application of statistics in data analysis.

PRACTICALS

1. Graphic and diagrammatic presentation of data.
2. Calculation of Averages- Arithmetic mean, mode and median.
3. Calculation of Standard deviation and 't' test for large and small samples.
4. Calculation of Correlations.
5. Calculation of chi square to find out significance of association.

COURSE OUTCOMES -

CO1. Define terms like 'frequency distribution', 'Variance' , 'Correlation' and its scope in research data

CO2. Critically know the calculations of different statistics of research data.

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FT-207: HUMAN VALUES AND PROFESSIONAL ETHICS - II

(REVISED SYLLABUS WITH EFFECT FROM 2021-22 ONWARDS)

AUDIT COURSE

COURSE OBJECTIVES:

This course helps the students to;

1. Associate the terms 'value education' 'self-introspection' and 'self-esteem' which are the core aspirations of all human beings.
2. Understand the importance of ethics in different fields like medical, business, environment and social ethics and ethics of media.
3. Apply the knowledge to assess issues and problems in each profession and correlate the concepts in addressing the ethical issues while choosing and joining a profession.
4. Develop all round and well balanced personality of the students and shapes them to become morally finer, socially responsible and physically fit persons of the society.

AUDIT COURSE-THEORY

UNIT-I:

- Value Education- Definition - relevance to present day - Concept of Human Values - self introspection – Self-esteem - Family values-Components, structure and responsibilities of family.
- Neutralization of anger - Adjustability - Threats of family life - Status of women in familyand society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-II:

- Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and health care professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients.
- Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT-III:

- Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions.
- Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

UNIT-IV:

- Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste.
- Climate change, Energy and population, Justice and environmental health.

UNIT-V:

- Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics. Surrogacy/pregnancy.
- Ethics of media- Impact of Newspapers, Television, Movies and Internet.

REFERENCES

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3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. Chowkarnba Sanskrit series. VolLlI and Ill, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
6. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
7. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
8. Analyzing Moral.Issues, Judith A. Boss. May Field Publishing Company - 1999.
9. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications
10. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.

Course Outcomes -After studying the course, students will able ;

CO1 Associate the terms 'value education' 'self-introspection' and 'self-esteem' which are the core aspirations of all human beings.

CO2 Understand the importance of ethics in different fields like medical, business , environment and social ethics and ethics of media.

CO3 Apply the knowledge to assess issues and problems in each profession like medical, business , environment and social ethics and ethics of media and correlate the concepts in addressing the ethical issues while choosing and joining a profession.

CO4 Apply skills for anger management, care of elderly, environmental protection and thereby develop well balanced personality and will contribute to society as morally finer, socially responsible and physically fit persons.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**											**3**
CO2									**3**			**3**
CO3	**2**								**3**			**3**
CO4		**2**			**2**			**1**	**3**			**3**

High-3, Medium-2, Low-1

SEMESTER III

FT- 301: FOOD PROCESSING AND PRESERVATION TECHNOLOGY (COMMON TO MS FOOD TECHNOLOGY AND M.SC. FOOD SCIENCE NUTRITION & DIETETICS COURSE)

COURSE OBJECTIVES

- To enable the students to:

1. Understand the principles and scope of food processing and preservation.
2. Get an overview on various techniques/methods in food processing and preservation.
3. Acquire knowledge of emerging technologies and their applications in food processing and preservation.
4. Equip with skills required for process and preserve various food products.

CORE-THEORY

UNIT-I: Food Processing and Preservation – An Introduction

- Need, Purpose, Principles and Methods of food processing and preservation. Definitions
- Traditional Methods of food processing and preservation.
- Preservatives and Additives –Definitions, Classification, applications, permissible limits and safety aspects.

UNIT-II: Methods of Food Processing and Preservation

- Processing and preservation by Heat - Principles of thermal processing, blanching, pasteurization, UHT processing, thermal sterilization, canning, extrusion.
- Processing and preservation by Cold- Refrigeration and freezing, methods of freezing, effect on quality of foods.
- Processing and preservation by Drying and Dehydration -Types, Methods and their suitability for different food products.
- Processing and preservation by Concentration – Types, Methods and their suitability for different food products.

UNIT-III:Processing and Preservation by Fermentation

- Definition, types, Importance, Technology, Benefits and Limitations.
- Processing and preservation of fermented foods – Cereal and pulse products, Fruits and Vegetables, Milk products, meat products and Beverages.

UNIT-IV:Advanced Food Processing Technologies

- Irradiation, High Pressure Processing, Pulse Electric Field, Microwave, Ohmic Heating, Reverse Osmosis, Ultra Filteration and Membrane Processing.
- Minimal Processing, Edible Coatings and Films, Encapsulation, Nano technology Hurdle Technology, Artificial Intelligence (AI) Technologies and Advanced Robotics in Food Industry.

REFERENCES

1. Fellows,P. and Ellis,H. (1990). *Food Processing Technology: Principles andPractice,*New York.
2. ShafiurRahman, (2011), Hand book of food preservation, CRC Press, Newyork.
3. Harry. W. Von Loesecke.(1998). *Drying and dehydration of Foods*, Allied Scientific,NewDelhi.
4. Jelen,P.(1985). *Introduction to Food Processing*, Prentice Hall, Reston Virginia, USA.
5. Lewis, M.J. (1990). *Physical Properties of Food and Food Processing Systems,*Woodhead, UK.
6. Norman, N. Potter, Joseph H. Hotchkiss.(1996). *Food Science*, 5th edition, CBS Publishers &Distributors, New Delhi.
7. Rama swamy,H. and Marcote,M. (2005).*Food processing- principals and applications*,CRC Press, Newyork

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Conceptualize principles of traditional and novel food processing and preservation technology.

CO2 Understand the applications and limitations of food processing and preservation technology.

CO3 Comprehend the functions and applications of food preservatives and additives.

CO4 Apply appropriate technologies to process and preserve the foods to extend their shelf life.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**				**3**						**2**	**3**	**3**	**3**
CO2	**3**	**2**			**3**			**1**			**2**	**3**	**3**	**3**
CO3	**3**			**2**	**3**			**3**	**3**	**2**	**3**	**3**	**3**	**3**
CO4	**3**		**3**	**3**	**3**	**2**		**3**	**3**		**3**	**3**	**3**	**3**

High-3, Medium-2, Low-1

FT-302: LIVE STOCK AND SEA FOOD TECHNOLOGY

COURSE OBJECTIVES-

To enable the students to:

1. Understand the grades, structure, composition and nutritional quality of various livestock and seafood
2. Comprehend the slaughtering, carcass processing, post-mortem changes.
3. Illustrate the processing technology of meat, poultry, fish and eggs.
4. Develop skills in value addition of meat, fish and poultry products.

CORE-THEORY

UNIT-I:Meat and Meat Products Technology:

- Present Status of Meat Industry in India and Abroad.
- Judging &grading oflive meat animals (Buffalo, Sheep, Goat, Pigs).
- Stunning, slaughtering and dressing operations of food animals - Cattle, Buffalo, Sheep, Goat, Pigs, Rabbits and Poultry.
- Structure, Chemical composition and nutritive value of muscle of food animals including poultry – Proportion of muscular tissues in different meat animals- Associative connective tissues- Muscle fiber.

UNIT-II: Meat Processing and preservation

- Conversion of muscle into meat- Post mortem changes in meat -Rigor mortis- Protein denaturation- Proteolysis-Physico-chemical properties of meat - Factors influencing meat quality- PSE and DFD meat- Pre rigor processing.
- Principles of Meat Preservation – Moisture Control – Temperature Control- Direct microbial inhibition.
- Modern processing techniques for Meat Processing- Concept of meat emulsification- Comminution- Restructuring- Retort pouch Processing-Value Added and Processed Meat Products

UNIT-III: Egg and Poultry Products Technology:

- Preservation and maintenance of egg – Egg cleansing – Oil treatment – Cold storage- Thermo stabilization- Immersion in liquids – Value Added Egg Products.
- Candling and Grading of eggs.
- Pre slaughter handling, transportation and primary and secondary processing of poultry.

- Evaluation and grading of dressed carcasses of various food animals including poultry.
- Processing and preservation of poultry meat products.

UNIT-IV: Sea Food Technology

- Present status of Fish, Shrimp and Prawns processing in India.
- Classification of Fish, Commonly cultivated fish, shrimp and prawns.
- Selection, Grading and Procurement of fish, Shrimp and Prawns– Shipboard operations.
- Factors affecting the quality of fish, Shrimp and Prawns.
- Processing and preservation of fish and Other products
- Value Added Sea Food Products.

REFERENCES

1. Aitkeer, A.(1990). *Fish handling and Processing*, 3rd, Aberdeen Ministry of Agriculture, Edinburgh.
2. Hall, G.M. (1992). *Fish Processing Technology*, blackie. New York.
3. Lawrie,R.A.Lawrie's. (1998).*Meat Science*, 5th Ed, Woodhead Publisher, England.
4. Parkhurst&Mountney.(1997). *Poultry Meat and Egg Production*, CBS Publication, New Delhi.
5. Pearson &Gillet. (1997). *Processed Meats*,3 Ed, CBS Publication, New Delhi.
6. Sen,D.P.(2005). *Advances in Fish Processing Technology*, Allied Publishers Pvt. Limited.
7. Shahidi,F. and Botta,J.R. (1994).*Seafoods: Chemistry, Processing, Technology and Quality*, Blackie Academic &Professional,London.
8. ShaiBarbut. (2005). *Poultry Products Processing,* CRC Press.
9. Stadelman,W.J. and Owen, J.C.(2002).*Egg Science and Technology*, 4th Ed. CBS Publication New Delhi.

Course Outcomes- After the completion of the course, the students will able to:

CO1 Acquire knowledge of the structure, composition, nutritional quality of various, livestock and seafood.

CO2 Understand the slaughtering, carcass processing methods used for processingmeat.

CO3 Gain an insight of the concept and methods of processing technology of meat, poultry and fish.

CO4 Prepare various value-added products of egg, meat, poultry and sea foods.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**												**3**	**3**
CO2	**3**										**3**		**3**	**3**
CO3	**3**				**3**				**2**		**1**	**3**	**3**	**3**
CO4	**3**				**3**			**2**			**2**	**3**	**3**	**3**

High-3, Medium-2, Low-1

FT-303-A: TECHNOLOGY OF SPICES, CONDIMENTS AND PLANTATION CROPS

COURSE OBJECTIVES

- To enable the students to:

1. Identify various spices, condiments and plantation crops.
2. Learn post-harvest technologies and processing of spices, condiments and plantation crops.
3. Illustrate various value added products of spices, condiments and plantation crops.
4. Perceive Standards, specifications, packaging and Quality control measures of spices, condiments and plantation crops.

GENERIC ELECTIVE -THEORY

UNIT-I: Introduction

- Commercial value of Spices, Condiments, plantation crops and theirproducts in global market.
- History, definition, classification and composition of spices, condimentsand Plantain crops.
- Classification of Spices and condiments-based on parts used, aromatic origin, family and mixed: major and minor spices
- Post-Harvest Technology of spices, condiments and Plantain crops.
- Quality control measures of spices, condiments and plantation crops.

UNIT-II: Spices and condiments

- Production technologies and processing of Major - Pepper, Cardamom, Ginger, Red and Green Chilli, Turmeric and Minor Spices- Cumin, Coriander, Cinnamon, Fenugreek, Garlic, Nutmeg, Clove, Mint, Vanilla.
- Sources, Processing of Flavoring agents and extracts, Flavoring components and concentrates.
- Value added products of spices and condiments.

UNIT-III: Plantation crops-A

- Coffee:Bean processing – Grading, blending, roasting of seeds, grinding, brewing; Coffee varieties & processing - Decaffeinated Coffee, Instant Coffee, extraction, Dehydration, Aromatization; Plant and machinery for coffee processing.

- Tea**:** Tea processing- leaves gathering, Grading, leaf processing; Types of tea& processing - dust tea, black tea, green tea, Oolong tea, Instant tea; Plant layout and machinery for tea processing.

UNIT-IV: Plantation crops - B

- Cocoa – Production, Composition, Grading, Processing, Cocoa Products (cocoa mass, cocoa powder, cocoa butter, cocoa-based beverages, malted beverages, cocoa liquor)
- Coconut – Production, Composition, Grading, Post-Harvest Technology, Processing and Products (coconut milk, desiccated coconut).
- Cashew nut Harvesting and Processing

REFERENCES

1. Bose, T.K., Mitra, S.K., Farooqui, A.A. and Sadhu, M.K. 1999, Tropical Horticulture-Vol-1, Nayaprakash, Calcutta.
2. Prema Singh Arya, 2000, Spice crops of India, Kalyani Publishers, New Delhi (India).
3. Kumar, N., Abdul Khader, Rangaswami, P. and Irvadappan, 1993, Introduction to spices, plantation crops, Medicinal and Aromatic plants, Rajalakshmi Publication.
4. Singh, V.B. and Kirti Singh, 2000, Spices, New Age International Publisher, New Delhi.
5. Parthasarthy, V.A., Chattopadhyaya, P.K., Bose, T.K. 2006, Plantation crops. Vol 1&2, NayaUdyog, Kolkata, India.
6. Vijayakhader. (2001)."Text Book of Food science and Technology" ICAR, New Delhi.
7. NIIR board of consultants and engineers. The complete book on spices and condiments, Asia pacific business press, New Delhi.

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Gain an in-depth knowledge on spices, condiments and plantation crops.

CO2 Apply post-harvest and processing technologies to improve the quality and safety of spices, condiments and plantation crops.

CO3 Recommend Standards, specifications, packaging and Quality control measures of spices, condiments and plantation crops.

CO4 Able to prepare various value added products of spices, condiments and plantation crops.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**										**1**	**3**	**3**	**3**
CO2	**3**			**1**	**2**							**3**	**3**	**3**
CO3	**3**							**3**	**3**		**2**	**3**	**3**	**3**
CO4	**3**		**3**						**3**	**3**		**3**	**3**	**3**

High-3, Medium-2, Low-1

FT-303-B: BASIC FOOD ENGINEERING

Course Objective

To enable the students to:

1. Understand the basic Principles of food engineering.
2. Describe the types and properties of Refrigeration systems
3. An insight of agro processing equipments like pasteurizer, spray drier and sealing equipments.
4. Enumerate processing equipments and maintenance of processing equipments

GENERIC ELECTIVE- THEORY

UNIT-I: Basic Principles of Food Engineering

- Engineering properties of food materials: physical, thermal, aerodynamic, mechanical, optical and electromagnetic properties.
- Units, Dimensions and Conversions: Unit Operations, design of food process equipments, elements of measuring instruments- machine elements and electrical elements.

UNIT-II: Basics of Vapor Compression Cycle:

- Properties of steam and Moist air- Boilers operation, Pressure vessels.
- Evaporators-Types of Evaporators Boiler house and workshop.

UNIT-III: Refrigeration and Freezing in Food Industry

- Parts and Functions of a Refrigerator. Refrigeration Cycle. Types of Refrigerants. Concept of Refrigerator Load (one ton, etc.).
- Cryogenic Freezing and Individual Quick Freezing (IQF)

UNIT-IV: Plant Designs

- Plant designs process designs development and general design considerations. Process economics: Economic feasibility of projects using order of magnitude cost estimates plant and equipment cost estimations, product cost estimations; batch vs continuous operations.
- Factors to be considered for location and layout of food plants. Regulatory requirements of food industries.

REFERENCES

1. Berk, Z. (2018). Food process engineering and technology. Academic press.
2. Das, H. 2005. Food Processing Operations Analysis.Asian Books.
3. Rao, G.C. 2006.Essentials of Food Process Engineering.BS Publications.
4. Rao, M.A, S.S.H. Rizvi and A.K. Datta. 2005. Engineering Properties of Food, 3rd edn. Taylor and Francis

COURSE OUTCOMES

- After the completion of the course, the students will able to:

CO1 Ability to apply principles of food engineering in industry.

CO2 Able to operate Food processing equipments

CO3 Acquaint with refrigeration system and material handling.

CO4 Gain an insight of agro processing equipments and handling techniques.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**				**3**	**3**						**3**	**3**	**3**
3CO2	**2**				**3**	**3**						**3**	**3**	**3**
CO3	**2**				**3**							**3**	**3**	**3**
CO4	**2**				**3**					**2**		**3**	**3**	**3**

High- 3, Medium- 2, Low- 1

PRACTICALS: FT-304: FOOD PROCESSING AND PRESERVATION TECHNOLOGY + LIVE STOCK AND SEA FOOD TECHNOLOGY

FT- 301: FOOD PROCESSING AND PRESERVATION TECHNOLOGY

COURSE OBJECTIVES:

- To acquire knowledge of emerging technologies and their applications in food processing and preservation.
- To demonstrate various processing techniques and products of various foods.

PRACTICALS:

1. Market survey of processed and preserved foods and to study the methods of processing, preservation, Additives and preservatives used, shelf life, cost and form of availability.
2. Preservation of food by traditional methods using sugar, salt and turmeric powder etc.
3. Preservation by using Chemical preservatives.
4. Preparation of Jams, Jellies, fruit Juices, Squashes, Sauces and bottling – Shelf life study.
5. Pickling with a variety of foods - Shelf life study.
6. Drying and dehydration of foods.
7. Refrigeration, Freezing and freeze drying of foods.
8. Extrusion processing.
9. Processing and preservation of fermented products.
10. Visits to different commercial food processing units and Industries.

COURSE OUTCOMES:

CO1 Understand the applications and limitations of food processing and preservation technology.

CO2 Application of appropriate technologies to process and preserve the foods to extend their shelf life.

FT-302: LIVE STOCK AND SEA FOOD TECHNOLOGY

COURSE OBJECTIVES-

1. To understand the grades, structure, composition and nutritional quality of various livestock and seafood
2. To develop skills in processing and preparation of value addition products of meat, fish and poultry.

PRACTICALS:

1. Tests for determination of physico- chemical quality of meat and meat products:
   a. pH, Extract Release Volume (ERV)
   b. Meat Swelling capacity, Total Volatile Basic Nitrogen (TVBN),
   c. Picric acid turbidity, Dye reduction capacity.
2. Determination of Nitrate in meat
3. Test for presence of poly phosphates
4. Determination of total volatile bases in frozen fish
5. Determination of moisture in dried fish
6. Determination of sodium chloride in dried fish
7. Determination of Ash insoluble in dilute hydrochloric acid.

COURSE OUTCOMES-

CO1 Acquire knowledge of the structure, composition, nutritional quality of various, livestock and seafood.

CO2 Process and Preparation of various value-added products of egg, meat, poultry and sea foods.

FT - 305: FOOD INDUSTRY MANAGEMENT

(SKILL ORIENTED COURSE)

COURSE OBJECTIVES

- To enable the students to:

1. Provide hands on experience with regard to different areas in food industries.
2. Acquaint and gain knowledge related to production, unit operations, quality control and marketing aspects of food industry.
3. Gain knowledge associated with basic process requirements, documentation and maintenance of a food industry.
4. Emphasize the prominence of food plant sanitation, food safety, standards, laws and regulation in food industry.

SKILL ORIENTED COURSE -THEORY

UNIT-I: Food Industry –An overview

- Introduction, Status of Global food industry, Indian food industry.
- Components of Food Industry – Agriculture, Food processing, Food distribution, Regulation, Financial services, research and Development, marketing.
- Scope for Expansion, Future priorities in Food Production, challenges.
- Government initiatives - MOFPI, objectives and functions, schemes for Infrastructure development, technology up-gradation & modernization, human resources development and R&D.

UNIT-II: Food Industry Maintenance

- Maintenance - staff and plant operators; Preventive maintenance; Guidelines for good maintenance & safety precautions; Work place improvement through '5S'.
- Book keeping, Record maintenance, Audit Check List Preparation of HACCP based SOP checklists for Maintenance and sanitation.
- Wastewater and solid waste treatment: - Waste-types-solid and liquid waste characterization, physical, chemical, biological, aerobic, anaerobic, primary, secondary and tertiary (advanced) treatments.
- Handling customer and complains - types of complains, handling customer complains, evaluation and solution of problem, report making, CAPA.

PRACTICALS:

1. Enlist the various components of food industry, their functions and responsibilities.
2. Identification of challenges in raw material procurement in food industry and find out probable solutions.
3. Identification of challenges in food production and find out probable solutions in food industry.
4. Identification of challenges in food safety and quality control and find out probable solutions in food industry.
5. Maintenance of HACCP in Food Industry – GMP, GHP, CIP.
6. Drawing layouts of various food processing units.

INPLANT TRAINING -

Students are required to take up an internship of minimum of 45 days in any food industry, quality control department, quality control laboratories, research and development department, Nutraceutical industry, Marketing department, Production unit. At the end of internship students are required to submit a hard-bound report. A report on the training which is required to submit consists of:

1. A general overview of the plant.
2. The products & raw material sources of the plant.
3. Detail description of different processing.
4. Scheduling of plant operations.
5. Unit operations in the Industry
6. Quality Control
7. Marketing.
8. A certificate of internship issued by the Industry/Institution.

- A viva will be conducted after submission of the report and presentation of a seminar.

REFERENCES

1. Swaminathan, M. (1999). Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
2. Mahtabs. Bamji and N.PralhadRao. (2004). "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi,
3. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian.(2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderbad.
4. M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
5. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of Indian Council Medical Research.2010.
6. Dietary guidelines for Indians- a manual. National institute of nutrition. Hyderabad. 2011.
7. David L. Kartz. (2008). Nutrition in Clinical Practice. Lippincott Williams and Wilkins. USA.

COURSE OUT COMES

-Upon completion of this course, students will be able to:

CO1 Acquire knowledge on food groups and functions of food.

CO2 Gain knowledge on importance of macro and micronutrients in different age groups.

CO3 Identify signs and symptoms of different nutrient deficiencies.

CO4 Illustrate the nutritional problems in community.

FT – 306-B: DYNAMICS IN FOOD PREPARATION

COURSE OBJECTIVES

- To enable the students to:

1. Learn the principles of safe food preparation and food pyramid.
2. Gain knowledge on cooking methods and effect of cooking on nutrients.
3. Apply knowledge about effect of cooking on nutrients.
4. Able to differentiate different cooking equipment and role of different food items in cookery.

OPEN ELECTIVE- THEORY

UNIT-I: Introduction

- Definitions in food science.
- Composition and functions of foods.
- Food pyramid.
- Principles of safe food preparation.

UNIT-II: Cooking Process

- Objectives of Cooking.
- Preliminary preparations.
- Cooking methods- Moist heat methods, Dry heat methods; Fat as medium of cooking, Microwave cooking.
- Effect of cooking on Nutrients.

UNIT-III: Cooking Equipments

- Types of cooking equipments- Grill, Boiler, Oven and Microwave. Mechanical processing equipments- Vegetable Peeler, Chopper, Mixer, Slicing machine and mincing equipment.
- Non cooking equipment: Refrigerator.

UNIT-IV: Role of Foods in Cookery

- Role of cereals, pulses, fats/oils, milk and milk products, flesh foods, sugars, vegetables, fruits and spices in cookery.

REFERENCES

1. Srilakshmi,B.(2001).*Food Science*, 2nd edition New Age International (P) Ltd., Publishers, Bangalore, Chennai & Hyderabad.
2. Swaminathan, M.(1979).*Food science and Experimental foods*. Ganesh & Co., Madras.
3. Dr.M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
4. ShubhanginiA.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.

COURSE OUT COMES

- After completion of the course, students will able to:

CO1 Acquire knowledge on Food Pyramid.

CO2 Identify role of foods on cookery.

CO3 Gain knowledge on methods of Cooking.

CO4 Estimate the effects of cooking on Nutrients.

SEMESTER IV

FT- 401: FOOD SAFETY STANDARDS AND QUALITY CONTROL (COMMON TO MS FOOD TECHNOLOGY AND M.SC FOOD SCIENCE NUTRITION & DIETETICS COURSE)

COURSE OBJECTIVES

- To enable the students to:

1. Understand the current food safety standards rules and regulations.
2. Gain knowledge on desirable and undesirable constituents and contaminants in foods.
3. Critically explains on subjective and objective methods.
4. Develop skills for quality analysis and assurance of food quality.

CORE - THEORY

UNIT-I: **Food Quality, Assessment and evaluation**

- Definition and Physico Chemical attributes.
- Subjective methods; Sensory/ Organoleptic evaluation -Difference, Preference and Scoring tests.
- Objective methods of evaluation.
- Chemical methods of evaluation.
- Microbial methods of evaluation.

UNIT-II: Food quality Standards

- Food Safety Standards Authority of India (FSSAI)- Rules and Regulations- Food products Standards and additive regulations, Prohibition and sales regulations, Packaging and Labelling regulations, Alchoholic beverages Regulations, Fortification food regulations, Food / Health supplements and Nutraceutical regulations and Organic food regulations.
- Food Licensing and Registration system
- International Food Safety Standards- ISO, CODEX, HACCP- Principles.

UNIT-III: Food Contaminants

- Food contaminants- Definition, Classification- Physical, Chemical, Biological Contaminants.
- Unintentional /Undesirable constituents-Naturally occurring contaminants.Heavy metals, pesticide residues,products of microbial growth, Health hazards.
- Intentional/ Desirable constituents-chelating agents,acids,bases,buffer systems and salts; stabilizers,thickners,polyhydrocalcinols,anticaking,firming,clarifyingand bleaching agents; antioxidants, non- nutritional sweeteners, antimicrobial agents, Gases and propellants.

UNIT-IV: Food contaminants and Standards of Quality

- Contaminants and quality standards in Milk and Milk products,
- Contaminants and quality standards Fruit and Vegetable products,
- Contaminants and quality standards Meat, Poultry, Eggs and Fish,
- Contaminants and quality standards Fats and Oils,
- Contaminants and quality standards Spices and Condiments,
- Contaminants and quality standards Water and Beverages,
- Contaminants and quality standards Food grains and Flours,
- Contaminants and quality standards of Sweeteners- Sugar, Jaggery, Honey.

REFERENCES

1. VanishaNambiar. (2004). A Text book on "Food Contamination and Safety " ANMOL Publications Pvt.Ltd. New Delhi .
2. S.N.Mahindru . (2004). Food Safety –Concept and Reality,APH Publishing corporation, Ansari road ,Darya ganj, New Delhi.
3. Rajesh Mehta and J.George . (2005). Food Safety Regulation concerns and Trade –The developing country perspective ,Mac millan India Ltd.
4. Amerine, M.A.,Pangborrn RM, and Roessler BB. (1965). Principles of Sensory evaluation of foods", Academic press New York.
5. The prevention of food adulteration Act, 1954 and Prevention of food adulteration Rules, 1955. (1998). Federation of Indian Industry, New Delhi.
6. Norman N. Potter, Joseph H. Hotchkiss (1996) "Food Science" 5th Edition.CBS Publishers and Distributors, New Delhi.
7. https://www.fssai.gov.in

COURSE OUTCOMES

- After completion of this course, students will be able to:

CO1 Gain knowledge in current rules and regulations of food safety standards and quality assurance.

CO 2 Identify the contaminants and additives in foods.

CO 3 Select the appropriate analytical technique when presented with a problem.

CO 4 Demonstrate practical proficiency in a food quality analysis.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**3**						**3**				**3**	**3**	**3**
CO2	**3**	**3**						**3**				**3**	**3**	**3**
CO3	**3**	**3**		**1**	**3**	**1**		**3**				**3**	**3**	**3**
CO4	**3**	**2**		**1**	**3**	**1**		**3**				**3**	**3**	**3**

High-3, Medium-2, Low-1

FT- 402: FOOD PRODUCT DEVELOPMENT AND MARKETING (COMMON TO MS FOOD TECHNOLOGY AND M.SC. FOOD SCIENCE NUTRITION & DIETETICS COURSE)

COURSE OBJECTIVES - To enable the students to:

1. Illustrate the new product categories in food market and their characteristics.
2. Elucidate the process of new food product development in food industry.
3. Exemplify various speciality food products and their applications.
4. Acquire the skill to design and development of new food product and analyse the quality of the product.

CORE –THEORY

UNIT-I: New Food Products

- New food product: Definition, Characteristics, Need for New food product development.
- Classification of new food products: Line extensions - Repositioning of existing products - New form of existing product - Reformulation - New packaging - Innovative products - Creative products and Value added products.

UNIT-II: New Food product development

In Food Industry

- Ideation/Idea generation, Consumer research, Product design and Formulation.
- Process development: Prototype development and scale up.
- Quality assessment of new developed products: Evaluation-Shelf Life Testing.
- Packaging and labeling.

In Food ingredient and service Industry

- Characteristics, Consumers and Costumers, market places.
- Development of products for food service and ingredient industries.
- Quality and Safety of the products.

UNIT-III: Food Product Commercialization and Marketing

- Costing and Pricing, Test Market, Advertising and promotions, Product launching, Product life cycle.
- Entrepreneurship, concept, Types, qualities and functions of an entrepreneur.
- Ethics and Intellectual property/ Patents in food product development.

UNIT-IV: Food Products with reference to

- Health foods, Medical foods, Therapeutic foods, Herbal foods, Fortified foods.
- Infant foods, Geriatric foods, Sports drink.
- Functional foods, Designer foods and Nutraceuticals.
- Probiotics, Prebiotic and Symbiotics.

REFERENCES

1. Debashri, Ray.(2002). *Nutritional Challenge and Total Quality Management*, 1st edition;Sarup and Sons, New Delhi.
2. Gordon W.Fuller (2011), New Food Product development, 3rd edition, CRC press, Newyork.
3. Graf, E. and Saguy, I.S. (1991).*Food Product Development: From Concept to the Market Place*, Van Nostrand Reinhold New York.
4. Howard R.Moskowitz,(2009), An integrated approach to new product development, CRC press, Newyork.
5. Man, C.M.D. and Jomes, A.A.(1994).*Shelf life Evaluation of Foods*, Blackie Academic and Professional, London.
6. Mike Stringer and Colin Dennis.(2002). *Chilled foods A comprehensive guide*, 2nd edition, Woodhead publishing limited, Cambridge, England, 2000.
7. Oickle, J.G. (1990).*New Product Development and Value Added*, Food Development Division Agriculture, Canada.

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Apply a product development process to generate ideas, develop concept to test market.

CO2 Design food and nutritional label of food products.

CO3 Demonstrate the skills to conduct the organoleptic evaluation of food product.

CO4 Work collaboratively with a team in food product development.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**		**3**		**3**	**3**	**3**		**3**	**3**	**3**	**3**	**3**	**3**
CO2	**3**		**3**		**2**		**3**	**2**	**3**		**3**	**3**	**3**	**3**
CO3	**3**		**3**		**3**	**3**				**1**	**3**	**3**	**3**	**3**
CO4	**2**		**3**			**3**	**3**		**2**		**3**	**3**	**3**	**3**

High-3, Medium-2, Low-1

FT –403-A: NUTRITION FOR HEALTH AND FITNESS

(COMMON TO MS FOOD TECHNOLOGY AND M.SC. FOOD SCIENCE NUTRITION & DIETETICS COURSE)

COURSE OBJECTIVES

- To enable the students to:

1. Define the concepts of Health, Nutrition, physical activity, physical fitness and methods of evaluation.
2. Understand the Energy metabolism pathways during physical activity.
3. Describe the role of macronutrients in physical performance, weight management and obesity.
4. Explains the nutritional needs in different sports and the role of national agencies.

GENERIC ELECTIVE -THEORY

UNIT-I: Physical Fitness and its Evaluation

- Definitions- Nutrition, Health, Physical activity and Physical Fitness.
- Health benefits of Physical activity and Recommendations,
- Components of physical fitness to overall health-Cardiovascular Fitness, Muscular strength, Muscular Endurance, Flexibility, and Body composition.
- Assessment criteria of age specific fitness and health status- Evaluation of physical fitness- FITT Principles-Talk test, Target heart rate, Borg scale.

UNIT-II: Energy Metabolism in Physical Activity and Weight Management.

- Aerobic and Anaerobic metabolic pathways-ATP-Creatine Phosphate pathway (ATP-CP), Creatine Phosphate(CP), Lactic acid cycle, Glycolysis, Krebs cycle(TCA), Gluconeogenesis.
- Energy requirements and assessment of energy expenditure based on physical activity, Carbohydrate Loading.
- Special conditions- Weight management and Obesity-Dietary modifications-Restricted energy and fat diets, Low glycemic diets, Formula diets and meal replacement programs.

UNIT-III: Nutritional and Physical Performance

- Nutritional Requirements during Exercise- Carbohydrate, Fat, Protein-Recommendations- Before, During and After exercise.
- Carbohydrate utilization during exercise, Role of protein and fat in daily training and competitive performance.
- Vitamins and Minerals-Importance and Recommendations.
- Fluid–Recommendations, Importance and Consequences of Fluid balance. Hydration in pre, during and post exercise.

UNIT-IV: Sports Nutrition

- Classification of sports events and RDA for sports person.
- Nutritional requirements and special needs of sports person, pre, during, post sports events, water and electrolyte balance, ergogenic aids.
- Endurance and fatigue in sports performance.
- Assessment-Kinanthropometry**:** Definition; Introduction; Body size and proportion; Somatotyping; Circumferences; Skinfold measurement sites and determining body composition; Applications.
- Role of National agencies towards improvements of sports performance.

REFERENCES

1. Shils, M.E., Olson, J.A., Shike, N. and Ross, A.C.(Ed)(1999). Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
2. Whitney, E.N. and Rolfes, S.R.(1999). Understanding Nutrition, 8th Edition, West/Wadsworth, An International Thomson Publishing Co.
3. McArdle, W.Katch, F. and Katch, V. (1996). Exercise Physiology, Energy, Nutrition and Human Performance, 4th edition, Williams and Wilkins, Philadelphia.
4. Ira Wolinsky(ed) (1998). Nutrition in Exercise and Sports, 3rd Edition, CRC Press.
5. Mahtabs.Bamji and N.PralhadRao. (2004).Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi.
6. Heather Hedrick Fink, Alan E. mike sky. (2012). Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America.
7. Michelle McGuire, Kathy A Beer Man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA

COURSE OUTCOMES

- Upon completion of this course, students will be able to:

CO1 Gain knowledge on concepts of physical activity and physical fitness.

CO2 Describe the energy metabolism pathways in physical activity.

CO3 List the role of macronutrients in physical performance.

CO4 Demonstrate the importance of nutrients in Sports.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**										**2**	**3**	**3**
CO2	**3**	**2**										**1**	**3**	**3**
CO3	**3**		**3**									**1**	**3**	**3**
CO4	**3**			**2**	**2**							**2**	**3**	**3**

High-3, Medium-2, Low-1

FT 403-B: UNIT OPERATIONS IN FOOD INDUSTRY

COURSE OBJECTIVES:

To enable the students to:

1. Understand the principle of Unit operation in food industry.
2. Learn important preliminary operations in food processing industries.
3. Impart knowledge on Safety, sanitation and Effluent Treatment in food industry.
4. Know the different pre and post processing operations as storage and packaging foods etc.

GENERIC ELECTIVE- THEORY

UNIT-I: Food Industry

- Plant and machinery for different types of Food Industries and processing Units of
  1. Cereals, Pulses and legumes, 2. For oil seeds, 3.Sugars and sugar products, 4. Vegetables and Fruits, 5.Milk and Milk products, 6.Eggs, poultry and meat products, 7.Fish and Sea foods, 8.Beverages, 9.Spices and condiments, etc.
- Management Systems In Food Industry at different Stages and for different components like, power supply electricity - water, procurement of raw material - Storage - product production - preservation.

UNIT-II: Mechanical Operations

- Size reduction: Introduction, Grinding and Cutting – Equipments.
- Filtration: Definition –filter media – Principles of cake filtration, Specific cake resistance. Types of membranes.
- Mixing of liquids and solids (powder), mixing equipment, mixing index and mixing time, Agitation and blending, types of agitators, power consumption in mixing.

UNIT-III: Material Handling

- Belt conveyor: Principle of operation, characteristics. Chain conveyor: Principle of operation, advantages, disadvantages. Screw conveyor: Principle of operation, inclined and vertical screw conveyors
- Bucket elevator: Principle, classification, operation, advantages, disadvantages. Pneumatic conveying system: Types, air/product separators. Gravity conveyor design considerations, capacity and power requirement.

UNIT-IV Food Safety & Sanitation

- Safety and Sanitation - Safety and Hygienic practices, Hazards and Risks- Industrial Effluent Treatment.
- ISO 14000: Introduction, various standards among 14000 series, certification and its importance, CIP & COP.

REFFERENCES

1. D. G. Rao, Fundamentals of food engineering, Prentice-Hall of India, New Delhi, 2010
2. R. Paul Singh and Dennis R. Heldman, Introduction to Food Engineering, 4th Edition, Academic Press, 2009.
3. Z. Berk, Food Process Engineering and Technology, Food Science and Technology, 1st Edition, International Series, Elsevier, 2009.
4. J.M. Smith, H.C. Van Ness and M.M. Abbott. 2005. Introduction to Chemical Engineering Thermodynamics, 7th Ed. McGraw-Hill, Inc., NY, USA.

COURSE OUTCOMES

- After the completion of the course, the students will able to:

CO1 Understand and comprehend the principle of unit operations in food industry

CO2 Operate important preliminary operations in food processing industries

CO3 Choose suitable packaging materials for different foods.

CO4 Identify the suitable unit operations for a specific purpose.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**				**3**							**3**	**3**	**3**
CO2	**3**				**3**	**1**						**3**	**3**	**3**
CO3	**3**	**2**						**1**				**3**	**3**	**3**
CO4	**3**				**3**							**3**	**3**	**3**

High- 3, Medium- 2, Low- 1

PRACTICALS: FT-404: FOOD SAFETY STANDARDS AND QUALITY CONTROL

+ FOOD PRODUCT DEVELOPMENT AND MARKETING

FT- 401: FOOD SAFETY STANDARDS AND QUALITY CONTROL

COURSE OBJECTIVES

- Gain knowledge on subjective and objective methods.
- Learn the methods of contaminants in food for quality assurance.

PRACTICALS:

Assessment of quality parameters and adulterants in different foods

1. Survey of label information of foods in market
2. Cereals, Pulses and Flours – Label information, detection of adulterants
3. Fats and oils – Label information, Adulterant tests, Iodine number and FFA Value
4. Fruit and vegetable products – Label information, Acidity , TSS, Sugars
5. Coffee and Tea, Honey – Label information, Detection of Adulterants
6. Milk and milk products- Label information, COB test, Acidity, MBRT, Detection of adulterants.
7. Spices and Condiments- Label information, Detection of adulterants.
8. Determination of different Preservatives
9. Determination of different Colors
10. Document preparation for the approval of FSSAI.

COURSE OUTCOMES

CO1 Select the appropriate analytical technique when presented with a problem.

CO2 Demonstrate practical proficiency in a food quality analysis.

FT- 402: FOOD PRODUCT DEVELOPMENT AND MARKETING

COURSE OBJECTIVES:

- Exemplify various speciality food products and their applications.
- Acquire the skill to design and development of new food product and analyse the quality of the product.

PRACTICALS:

New Food Product Development and Marketing

1. Ideation.
2. Concept Development.
3. Market research.
4. Formulation and Standardization.
5. Acceptability studies.
6. Shelflife Studies.
7. Costing and Pricing.
8. Food and Nutrition labeling and packaging.
9. Development of Product Promotion strategies.
10. Test Marketing.

COURSE OUTCOMES

CO1 Demonstrate the skills to conduct the organoleptic evaluation of food product.

CO2 Work collaboratively with a team in food product development.

FT-405: TECHNOLOGY OF PACKAGING

(COMMON TO MS FOOD TECHNOLOGY AND M.SC., FOOD SCIENCE NUTRITION & DIETETICS COURSE)

COURSE OBJECTIVE

To enable the students to:

1. Provide knowledge on packaging and packaging materials
2. An overview of the scientific and technical aspects of food packaging.
3. Enable the students to understand the regulations of packaging and packaging material testing.
4. Knowledge of the new innovations in food packaging to improve product stability and/or to extend the product shelf-life.

MULTI DISCIPLINARY COURSE

UNIT- I: Introduction and Types of Packaging

- Principles of food packaging, Functions of packaging; Type of packaging materials- Paper and Paperboard, types of paper, Glass, Metal and Plastic- Thermosets and Thermoplastics.
- Selection of packaging material for different foods. Methods of packaging and packaging equipment.
- Packaging-Food Interactions**:** Factors affecting flavor absorption, the role of the food matrix, the role of differing packaging materials, Flavor modification and sensory quality.

UNIT- II: Food Packaging System

- Active and Intelligent Packaging Techniques**:** Active packaging techniques, intelligent packaging techniques, Consumers towards and novel packaging.
- Aseptic Packaging Technology**-**advances, systems and its food applications, packaging for high pressure processing.
- Oxygen, ethylene and other scavengers**:** Oxygen scavenging technology, Selecting the right type of oxygen scavenger, Ethylene scavenging technology, Carbon dioxide and other scavengers.

PRACTICALS:

1. Classification of various packages based on material and rigidity.
2. Measurement of thickness of packaging materials.
3. Measurement of basic weight and grammage of paper and paperboards.
4. Measurement of water absorption of paper and paper boards (Cobb Test).
5. Measurement of grease resistance of papers.
6. Drop test, Box compression test.
7. Measurement of grease resistance of papers.
8. Head space analysis of packaged food.

REFERENCES

1. Robertson GL,(2012) *Food Packaging – Principles and Practice*, CRC Press Taylor and Francis Group

2. Ahvenainen. R. (2003).*Novel Food Packaging Techniques*:CRC Publications.

3. RaijaAhvenainen (2003) *Novel food packaging techniques*, Published by Woodhead Publishing Limited.

4. F. A. Paine and H. Y. Paine (1992) *A Handbook of Food Packaging*, 2nd edn Blackie Academic and Professional, London.

Course Outcomes- After the completion of the course, the students will able to:

CO1 Exposure about packaging, packaging materials and packaging methods.

CO2 Comprehend the overview of the scientific and technical aspects of food packaging

CO3 Acquire knowledge on regulations of packaging and testing.

CO4 Able to utilize some of the new innovations in food packaging to improve product stability and/or to extend the product shelf-life.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**		**1**									**3**	**3**	**3**
CO2	**3**		**1**					**2**			**1**	**3**	**3**	**3**
CO3	**3**		**1**					**3**			**3**	**3**	**3**	**3**
CO4		**3**	**3**		**2**			**2**	**2**	**2**	**3**	**3**	**3**	**3**

High- 3, Medium- 2, Low- 1

FT-406-A: CHILD GROWTH AND DEVELOPMENT

COURSE OBJECTIVES

-To enables the students to:

1. Know the terms growth , development and stages of development across life span
2. Understand the characteristics of children at different stages of childhood
3. Explain the different developments like physical, cognitive, language and social development during childhood.
4. Apply knowledge to understand normal development and developmental delays during childhood.

OPEN ELECTIVE –THEORY

UNIT-I: Foundations of Development

- Understanding the terms Child, Growth, Development, Child Development, Human Development, and Developmental tasks.
- Principles of Child Development and Factors influencing growth and Development of Children.
- Determinants of Development - Role of Heredity and Environment in Development
- Stages of Development across life span and domains of development.

UNIT-II: Infancy

- Infancy – Characteristics
- Sensory- Motor activities
- Language Development
- Socio-emotional development.

UNIT-III: Early Childhood

- Early Childhood Period –Characteristics
- Physical Development
- Cognitive development
- Emotional and Social development.

UNIT-IV: Middle Childhood

- Middle/ Late Childhood Period-Characteristics
- Physical development
- Cognitive development.
- Emotional and Social development

REFERENCES

1. Berk, L. E. (2007). Child Development. Prentice-Hall of India Pvt.Ltd, New Delhi.
2. Feldman, R.S. (2011).Understanding Psychology, Tenth Edition. Tata MCGraw Hill Education Private Limited, McGraw- Hill, New Delhi.
3. Hallahan, D.P. and Kauffman, J.M. (1991). Introduction to exceptional children. 5th ed. Allyn and Bacon, Boston.
4. Hurlock – E.B. (1990) Child Development , Tata McGraw Hill Company Ltd, New York. McGraw- Hill, New Delhi.
5. Rozario, J. and Karanth, P. (2003). Learning disability in India. Sage publication, New Delhi.
6. Santrock, J. W. (2013). Child Development. Tata McGraw Hill Company Ltd, New Delhi.
7. Singh, A. (Ed).(2015). Foundations of Human Development: A life span approach. Tata McGrawHill ,New Delhi.
8. Prasad, J. and Prakash, R. (1996). Education of handicapped children, problems and solution. Kanishka publication distribution. New Delhi.

COURSE OUTCOMES-

After completion of the course, students will able:

CO1 Define the terms growth and development, and stages of development across life span

CO2 Understand the characteristics of children at different stages of childhood

CO3 Critically explain different developments like physical, cognitive , language and social development during childhood

CO4 Apply knowledge to understand normal development and developmental delays during childhood to assess all round development during childhood

FT406-B: DISASTER MANAGEMENT

COURSE OBJECTIVES

- To enable the students to:

1. Know about natural disasters: manmade disasters; chemical hazards; National and International strategies to mitigate disaster management.
2. Understand natural disasters (like floods, drought, cyclone, earthquakes, global warming etc); Nuclear disasters; Biological disasters;.
3. Illustrate the efforts made by the NGOs, Community based organizations and local administration in disaster management.
4. Discriminate disaster responses of Armed forces and Police.

OPEN ELECTIVE- THEORY

UNIT-I: Natural Disasters

- Meaning and nature of natural disasters, their types and effects.
- Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves.
- Climatic Change: Global warming, Sea Level rise, Ozone Depletion.

UNIT-II: Man Made Disasters

- Nuclear disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution.
- Deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT-III: Chemical Hazards

- Release of Toxic chemicals.
- Sedimentation processes.
- Global Sedimentation Problems.
- Regional Sedimentation Problems, Sedimentation and Environmental Problems.

UNIT-IV: Disaster Management

- Efforts to mitigate Natural Disasters at National and Global levels.
- International Strategy for Disaster reduction.
- Concept of disaster management, National Disaster Management framework; financial arrangements

- Role of NGOs, Community-based organizations, and Media. Central, State, District and local Administration; Armed forces in Disaster response
- Disaster response: Police and other organizations.

REFERENCES

1. Gupta, H.K. (2003). *Disaster management*. Indian National Science Academy. Orient Blackswan.
2. Hodgkinson, P.E. & Stewart, M. (1991). *Coping with catastrophe: A handbook of disaster management*.
3. Routledge. and Sharma, V.K. (2001). *Disaster management*. National Centre for Disaster Management, India.

COURSE OUTCOMES

- After the completion of the course, the students will be able to:

CO1 Gain in-depth knowledge about natural disasters; manmade disasters; chemical hazards: disaster management.

CO2 Design and administer a schedule for collection of Information regarding the roles of NGOs, Community based organizations , central state, District and local Administration, Police and armed forces, in Disaster management.

CO3 Illustrate the efforts made by the NGO's, community based organization and local administration in disaster management.

CO4 Discriminate disaster responses of Armed forces and police.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

First Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-I: FT - 101: FOOD CHEMISTRY AND ANALYSIS

(Common paper for MS Food Technology and M.Sc.Food Science Nutrition and Dietetics)

Time: 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Differentiate free, bound and entrapped water.
2. What are emulsions? Explain.
3. What is Pectin and write the properties.
4. Write the principle and application of Electrophoresis.
5. Explain the Chemistry of frying in foods.
6. Explain the hydrogenation of fats.
7. What are Amylose & Amylopectin and draw the structure.
8. Write any two identification tests of amino acids?

SECTION- B

Answer ALL questions

Each Question carries 15 MarksMarks: 4x15 =60

9.(a). Describe the determination of moisture in foods.

(or)

(b).Write the characteristics of colloids.

10. (a).Discuss the physical & chemical properties of lipids?

(or)

(b). Give the classification and discuss the physico- chemical properties of carbohydrates

11.(a).Explain the chemistry of hydration and dough formation of proteins.

(or)

(b). Classify proteins with suitable examples and write about protein denaturation.

12. (a).Explain the principle and estimation of protein by microkjeldahl method ?

(or)

(b). Write the principle and applications of GC/ MS.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

First Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-II: FT- 102: CEREAL GRAINS, LEGUMES AND OIL SEED TECHNOLOGY

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Write the Physico chemical properties of cereal and millets?
2. Explain small scale milling process of cereals?
3. Explain about products, biproducts and value added products of pulses and legumes?
4. Write a short note on germination?
5. Briefly explain about the various extraction methods of oil seeds?
6. Draw the structure of any oil seed and write its composition?
7. Write the causative factors of post harvest losses?
8. Mention the Machinery and its function for processing of legumes.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a).Give an detailed account on turbo milling process of cereals and millets.

(or)

(b). Write the principle of baking and explain the role of ingredients in baking?

10. (a).Explain the physico chemical properties and composition of pulses and legumes?

(or)

(b).Discuss the processing of soya isolates and concentrates??

1. (a).Discuss about refining and hydrogenation of nuts and oil seeds?

(or)

(b). Explain the value added products of nuts and oil seeds?

2. (a).Discuss about post harvest losses at various stages?

(or)

(b).Write in detail about quality control standards of cereals, millets and pulses?

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

First Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-III:FT-103-A: FOOD SCIENCE AND EXPERIMENTAL FOODS

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Time:3 hours Max Marks: 80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks 4x5=20Marks

1. What are leavening agents and write its importance in baking process?
2. Classify fruits and vegetables and write its nutrient composition?
3. Explain the structure of egg?
4. Explain the functional properties of milk?
5. What are modified food starches? Explain.
6. Describe different types of sugars and sugar syrups?
7. Define sensory evaluation and write the requirements for it?
8. Write the factors should be considered in selecting sensory panel for evaluation?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9.(a). Write the composition of pulses and legumes and explain the different methods to decrease the anti-nutritional content present in pulses?

(or)

(b).Discuss in detail about various pigments and flavor constituents present in fruits and vegetables?

10.(a).Write in detail about the composition and kinds of milk ?

(or)

(b).Draw the structure of muscle and explain the post mortem changes occurred in meat?

11.(a). What is gelatinization? Explain about various factors that affect gelatinization process?

(or)

(b).Explain the different functional properties of fats and their applications in food?

12. (a).Explain in detail about analytical tests in food evaluation ?

(or)

(b). Discuss about sensory attributes and explain the affective tests?

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

First Semester

(CBCS for the students admitted from 2021 onwards)

Paper:III- FT: 103-B: BAKING TECHNOLOGY

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time: 3 hours Max Marks: 80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks: Marks: 4x5=20

1. Write the economic importance of bakery industry.
2. Principal of Baking.
3. Write the types of wheat flour.
4. Differentiate dough and batter.
5. Briefly write about cookies preparation procedure.
6. List down the hard and soft wheat bakery products.
7. Write the types of fillings and icings.
8. Short note on gluten free bakery products

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks:4x15 =60

9. (a) Explain the various equipments used in bakery processing and its importance.

(Or)

(b) Discuss the importance of packaging and quality factors of bakery products.

10. (a) Enumerate the importance of various ingredient used in bakery.

(Or)

(b) Explain various rheological properties associated with bakery items.

11. (a) Explain in detail about bread processing and its types.

(Or)

(b) Discuss about common faults and Corrective measures in bread and cakes.

12. (a) Write the common reasons for nutrient losses in bakery products.

(Or)

(b) Explain in detail about various decorative items in bakery and its preparation.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

First Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-IV:104-A: COMMUNITY NUTRITION

(Common to MS Food Technology and all three specializations of Home Science)

Time: 3 hours Max Marks:80

Part- A

Answer any FOUR of the Following.

Each question carries 5 marks (4 x5=20Marks)

1. Describe classification of foods with functions.
2. Write a short note on recommended dietary allowances.
3. Define Vital Statistics
4. Write short note on Nutritional assessment
5. Significance of breast feeding
6. Clinical symptoms of Vitamin A & C deficiencies
7. Describe Mid-Day Meal programme.
8. What is Public distribution system

Part- B

Answer ALL questions

Each Question carries 15 Marks (4x15=60 Marks)

9. (a) Explain about food groups, food composition and nutritive value of different foods.

(or)

(b) Define meal planning, principles and factors affecting meal planning.

10. (a).Describe briefly the methods of anthropometric measurements in altering nutritional

status of the community.

(or)

(b).Explain the advantages and disadvantages of the Biochemical method of assessment of nutritional status.

11. (a) Discuss physiological changes that occur during pregnancy and state the nutritional requirements during pregnancy.

(or)

(b). State the RDA for an adolescent girl. Plan a menu and give justification.

12. (a) Discuss about food security, food fortification and enrichment.

(or)

(b) Write in detail about ICDS.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

(CBCS for the students admitted from 2021-22onwards)

Paper:FT 104-B: NUTRITION DURING LIFE SPAN

(Common to all specializations of M Sc Home Scienceand MS Food Technology course)

Time: 3 Hrs Max: 80 Marks

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1. Write the effects of lactation on nutritional composition of Human milk.
2. What are the factors that affect the breast milk quality?
3. Explain the need for infant formulae.
4. Discuss the importance of nutrition during Pre-school children.
5. Write the nutritional issues in Adolescence.
6. Discuss the Nutritional requirements in School-going children.
7. Write the effects of aging on nutritional health.
8. Explain the nutritional concerns in old age and their management pregnancy outcome.

Part – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

9. (a). Explain about Nutritional intervention and pregnancy outcome & write the advantage and disadvantages of breast and formulae feeding.

(Or)

(b). Discuss about the nutritional requirements during pregnancy and lactation? Write about common complications and problems.

10. (a).What are the effects of macro & micro nutrient malnutrition on physical and mental health?

(Or)

(b). Discuss about various types of Infant formulas and common problems during infancy.

11. (a). Explain the importance of nutritional requirement and RDA and discuss the importance of implications of child obesity.

(Or)

(b). Write in detail about various physiological problems during adolescence.

12. (a).Discuss the modification in diet, feeding old people. Nutritional requirement for adult man and woman.

(Or)

(b). Explain the principles to be considered while planning and preparation of diets of elderly.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Model Question Paper

M.Sc. (Home Science) Degree Examination

First Semester

(Specialization – Food Technology)

(CBCS for the students admitted from 2021-22onwards)

FT - 107 :HUMAN VALUES AND PROFESSIONAL ETHICS - I

Time: 3 Hrs Max: 100 Marks

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

9. a)
   (Or)
   b)
10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

(Specialization: MS Food Technology)

Second Semester

(CBCS for the students admitted from 2021-22 onwards)

Paper-I: FT-201: FRUIT AND VEGETABLE TECHNOLOGY

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Write the classification and composition of Vegetables?
2. Write about methods of maturity determination?
3. What are the factors affecting the Post harvest losses?
4. Differentiate between climacteric and non-climacteric fruits?
5. Describe methods of grading Size grading and specific gravity grading?
6. Explain the Zero energy cool chamber?
7. What are the defects in Fruit Preserve and Candied Fruit?
8. Define blanching and write the different methods of blanching?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9.(a). Production and processing scenario of fruits and vegetables in India.

(or)

(b).Explain the maturity indices and standards of fruits and vegetables?

10.(a). Post-harvest physiological and biochemical changes in fruits and vegetables.

(or)

(b).Write in detail about Prevention of post harvest diseases and infestation?

11.(a).Enumerate the unit operations in fruit and vegetable processing industry.

(or)

(b).Write about Controlled atmosphere storage, Modified atmosphere packaging, Hypobaric storage?

12.(a).Explain the manufacturing process of jam and write the quality standards?

(or)

(b). Explain the manufacturing process of pickles and write the quality standards?

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Second Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-II- FT-202:DAIRY TECHNOLOGY

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Write the definition and composition of milk?
2. Types of pasteurization?
3. What is fortified and double fortified milk?
4. Write the Processing of cream?
5. Briefly discuss about fermented milk products?
6. List down stabilizers and emulsifiers used in ice creams?
7. Discuss the application of immobilized enzymes in dairy processing?
8. Explain the importance of membrane processing in milk industry?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a). Give a detailed account on UHT processing and aseptic packaging of milk?

(Or)

(b).Explain about: milk reception, chilling, homogenization, storage and transport of milk?

10. (a). Enumerate the manufacturing process of Butter, ghee and butter oil?

(or)

(b). Write the definition, standards and method of manufacturing of khova, paneer and chenna?

11. (a). Define cheese? Write the classification and manufacturing process of cheese.

(or)

(b). Write the importance of dairy by product, their process and applications with examples.

12. (a). Enumerate the types of membrane processing and its applications with examples?

(or)

(b).Write in detail about ultra filteration, mono and micro filteration in whey processing.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Second Semester

(CBCS for the students admitted from 2021-22 onwards)

Paper-III: FT- 203-A: FOOD MICROBIOLOGY AND SAFETY

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Time: 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Role of Micro organism in food industry.
2. Write the general Characteristics of bacteria?
3. Describe the different types of food spoilage?
4. How cereals and cereal products are contaminated?
5. Write the contamination sources of milk?
6. Describe the common spoilages in fish?
7. Write a short note on food borne infections?
8. How microbiology and food safety is related?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a) Explain the factors affecting microbial growth?

(or)

(b) Discuss about classification, morphological and cultural characteristics of viruses?

10. (a)Write the principles underlying food spoilage and discuss the common spoilages in fruits and vegetables.

(or)

(b). Describe the common food spoilages and common microbial spoilages in cereals and cereal products.

11. (a). Discuss the sources of contamination and spoilages in flesh foods.

(or)

(b). Enumerates the spoilages and sources of contamination in sugars and processed foods?

12. (a) Discuss in detail about various food borne intoxications with examples?

(or)

(b) Write in detail about applications of food microbiology.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

FT- 203-B: NUTRITION IN EMERGENCIES AND DISASTER MANAGEMENT

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Famine.
2. Immunization.
3. MUAC.
4. Nutritional surveillance.
5. Targeting Food Aid.
6. Special foods/rations for nutritional relief.
7. Epidemiological data.
8. Psycho socio variables.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks: 4x15 =60

9.(a). Discuss the causes of malnutrition in emergency situations and major deficiency diseases in emergencies.

(or)

(b).What are the communicable diseases that occur during emergencies? Discuss in detail about any one disease treatment and control.

10.(a). Discuss in detail about the nutritional assessment and surveillance in emergency affected populations.

(or)

(b). Write about methods of organizational surveillance and individual screening during emergencies.

11.(a). Write in detail about the assessment of food needs in emergency situations.

(or)

(b). Discuss in detail about the food storage and house hold food security in emergencies.

12.(a). What is Nutritional epidemiology? Discuss in detail about design and planning of nutritional epidemiological studies.

(or)

(b). Discuss in detail about types of epidemiology and collection of epidemiological data.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Second Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-IV: 204-A-RESEARCH METHODOLOGY

(Common to all specializations of M Sc Home Scienceand MS Food Technology course)

Time:3 hrs Max: 80 Marks

SECTION- A

Answer any four questions

Each question carry equal marks Marks:4X5=20

1. Define research. Enumerate the significance of research.
2. Explain the need and features of a good research design.
3. Write about Quota and snow ball sampling.
4. Describe case study as a research technique.
5. What is meant by primary and secondary data?
6. Give an account of Nominal scale.
7. What is Social mapping?
8. Write about Observation check list.

SECTION- B

Answer all questions

Each question carry equal marks Marks: 4 X 15=60

9. (a).Write in detail about types of research.

(Or)

(b).Write about the types of research design.

10.(a).Explain in detail about the definition , identification and selection of research problem.

(Or)

(b).Define qualitative research and explain the types of qualitative research.

11.(a). What is data? Explain in detail different methods of data collection.

(Or)

(b). Describe in detail about the Observation and Interview methods of data collection.

12.(a). What is Measurement scales? Explain its significance in statistical analysis?

(Or)

(b). Explain in detail about the steps in preparing a research proposal.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Second Semester

(Specialization 'A': Food Science Nutrition and Dietetics)

(CBCS for the students admitted from 2021-22 onwards)

Paper-IV: 204-B – Statistics and Computer Applications

(Common to all specializations of M Sc Home Scienceand MS Food Technology course)

Time:3 hrs Max: 80 Marks

SECTION- A

Answer any four questions

Each question carry equal marks Marks:4X5=20

1. Frequency distribution.
2. Histogram.
3. Rank correlation.
4. Mean.
5. File handling.
6. Computer software.
7. What is data analysis?
8. Descriptive statistics.

SECTION- B

Answer all questions

Each question carry equal marks Marks: 4 X 15=60

9. (a). What is a *t*-test? When it is used and for what purpose(s)? Explain by means of examples.

(Or)

(b). In a test given to two groups of students, the marks obtained were as follows:*First Group* 18 20 36 50 49 36 34 49 41 *Second Group* 29 28 26 35 30 44 46 Examine the significance of difference between mean marks obtained by students of theabove two groups. Test at five per cent level of significance.

10. (a). 200 digits were chosen at random from a set of tables. The frequencies of the digits were: Digit 012345678Frequency 18 19 23 21 16 25 22 20 21 15Calculate χ^2 .(Or)

(b). What is Chi-square text? Explain its significance in statistical analysis.

11.(a). What is data? Explain in detail the data processing and analysis in computers.

(Or)

(b). Describe in detail about the PC and its components.

12.(a). What is an excel sheet? Explain its significance in statistical analysis?

(Or)

(b). Explain in detail about the steps in preparing different graphs in computers.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

Model Question Paper

M.Sc. (Home Science) Degree Examination

Second Semester

(Specialization – MS Food Technology)

(CBCS for the students admitted from 2021-22onwards)

FT- 207: HUMAN VALUES AND PROFESSIONAL ETHICS - II

Time: 3 Hrs Max: 100 Marks

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

9. a)

   (Or)

   b)

10. a)

    (Or)

    b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Third Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-I: FT- 301: FOOD PROCESSING AND PRESERVATION TECHNOLOGY

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Define food additive and write its classification?
2. Write about the principles of food preservation?
3. Explain the Process of blanching and its types?
4. Write a note on canning process?
5. Explain the fermentation technology and its advantages?
6. Write the fermentation process for cereals and pulse products.
7. Explain the applications of advanced robotics in food processing?
8. Write the advantages and disadvantages of Irradiation process?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a) Enumerate the different methods of food processing and preservation ?

(or)

(b).Explain the applications, permissible limits and safety aspects of food additives?

10.(a). Write the principles of thermal processing and Explain the Pasteurization, UHT processing?

(or)

(b). Discuss the types and methods of food preservation by concentration?

11.(a).Write the role of fermentation in bread making.

(or)

(b). Explain in detail about the process of fermentation of milk and meat products?

12.(a).Explain the following: (A) High Pressure processing (B) Artificial Intelligence

(or)

(b).Give a detailed note on Edible Coatings, Films and its applications in food?

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Third Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-II:FT-302: LIVESTOCK AND SEA FOOD TECHNOLOGY

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Write short notes on present status of meat and fish industry in India?
2. Various stunning methods during slaughtering?
3. What is rigor mortis?
4. Explain the protein denaturation of meat?
5. Write the composition of egg?
6. Write about the process of thermo stabilization in egg preservation?
7. Write the selection criteria of fish for processing?
8. Explain factors affecting the quality of fish and prawns?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15=60 Marks

9. (a).Explain the structure and chemical composition of meat?

(Or)

(b).Explain the evaluation and grading of dressed carcass of meat animals?

10.(a).Explain the factors influencing meat quality and write the principles of meat preservation?

(Or)

(b).Enumerate the modern processing techniques of meat?

11.(a)Describe the storage, processing and preservation of eggs.

(Or)

(b).Write the processing and preservation of poultry meat products.

12.(a).Explain the shipboard operations involved in processing of fish and sea foods.

(Or)

(b).Write in detail about processing and preservation of fish and sea food products.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Third Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-III: FT-303-A:TECHNOLOGY OF SPICES, CONDIMENTS AND PLANTATION CROPS

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Write the classification of spices? Give examples.
2. Write short notes on global market of spices and condiments?
3. A brief note on processing of flavoring components?
4. Value added products of spices and condiments?
5. Give the classification of plantation cops with suitable examples?
6. Write about Aromatization, Dehydration in coffee Processing?
7. Write the composition of Cocoa?
8. Explain the processing of coconut?

SECTION- B

Answer ALL questions

Each Question 15 Mark 4x15=60 Marks

9. (a). Give a detailed classification of Spices and condiments based on parts used, aromatic origin and family.

(or)

(b).Explain the post harvest technologies and quality parameters of spices and condiments?

10.(a).Describe the production and processing techniques of major spices ?

(or)

(b).Explain the extraction methods of flavoring agents?

11. (a).Write in detail about coffee bean Processing?

(or)

(b).Describe the different types of tea and its processing?

12.(a).Explain the post harvest technology of cocoa bean processing and its products.

(or)

(b).Enumerate the cashew nut harvesting and processing?

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Third Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-III:FT-303-B:BASIC FOOD ENGINEERING

Time: 3 hours Max Marks: 80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks: Marks: 4x5=20

1. Enumerate the basic principles of food engineering?
2. Discuss in detail on unit dimension and conversions.
3. What are the properties of steam and moist air?
4. Describe about pressure vessels and evaporators?
5. What are the different types of refrigeration systems?
6. What do you mean by cryogenic freezing?
7. What are the Factors to be considered for designing a plant layout?
8. Explain about Regulatory requirements of food industries?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a). Discuss in detail on unit dimension and conversions?

(or)

(b). Write a note on Engineering properties of food materials?

10.(a).Enumerate the working, operation and maintenance of graders and evaporators?

(or)

(b). Explain the properties and operation of vapor compression cycles?

11.(a).Write in detail about Refrigeration Cycle and types of Refrigerants?

(or)

(b).Explain about boiler house, workshop and its operation?

12.(a). What are the Factors to be considered for location and layout of food plants?

(or)

(b). Design a blue drawing and layout of a food processing industry?

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

Model Question Paper

M.Sc. (Home Science) Degree Examination

Third Semester

Open Elective

(CBCS for the students admitted from 2021-22 onwards)

Paper-VI:FT- 306-A: FUNDAMENTALS OF FOOD NUTRITION AND HEALTH

Time: 3 Hrs Max: 80 Marks

PART – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1.
2.
3.
4.
5.
6.
7.
8.

PART – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

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Model Question Paper

M.Sc. (Home Science) Degree Examination

Third Semester

Open Elective

(CBCS for the students admitted from 2021-22 onwards)

Paper-VI: FT – 306-B: DYNAMICS IN FOOD PREPARATION

Time: 3 Hrs Max: 80 Marks

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

9. a)

   (Or)

   b)

10. a)

    (Or)

    b)

11. a)

    (Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc., (Home Science) Degree Examination

Fourth Semester

(CBCS for the students admitted from 2021-22 onwards)

Paper-I:FT-401:FOOD SAFETY STANDARDS AND QUALITY CONTROL

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Time: 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Differentiate between subjective Evaluation and objective Evaluation
2. Write about triangle test.
3. Define organic foods as per FSSAI.
4. Write arethe powers of Food inspectors.
5. Write about lead toxicity
6. What are stabilizers?
7. What are common adulterants in milk?
8. How adulterants can be detected in Honey.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks 4x15 =60

9.(a). Write an account of methods of objective evaluation to assess the Food quality

(or)

(b). Write the most common microbial tests of food evaluation.

10. (a).Describe about the rules and regulations Packaging and Labelling.

(or)

(b). Discuss about the International Food Standards CODEX and HACCP principles.

11.(a).Write a short notes on desirable constituents of anticaking agents and propellants.

(or)

(b). Classify the food contaminants based on the type in food with examples.

12.(a).Describe the methods of identifying the common contaminants in fats and oils.

(or)

(b).What are the major contaminants in meat, poultry, Eggs and fish ? How can they be eliminated during Preservation and storage.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Fourth Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-II:FT- 402:FOOD PRODUCT DEVELOPMENT AND MARKETING

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Define new food product?Write the characteristics of a new product.
2. Explain the need of developing new products at an industrial level?
3. Howto design a new product development? Explain.
4. What are the specific characteristics should be considered while designing a product for nutritional and health needs?
5. Write a brief note on test marketing and its types?
6. Write the procedure to apply and receive the patent for new product?
7. Differentiate pre and probiotics with suitable examples?
8. Define Health foods?Write the specifications to be followed in designing a health food.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9. (a).Classify the differentnew food products emerging into the food marketing.

(or)

(b).What are the variousfactors affecting new food product development designing.

10.(a).Explain in detail about the different phases in product design and Formulation?

(or)

(b).Enumerate the shelf life testing procedures in new product development.

11.(a).Describe costing and pricing? Explain the process of food product commercialization and marketing.

(or)

(b).Discuss the concept, types and qualities of entrepreneurship?

12.(a).Write about the characteristics and specifications for therapeutic and value added foods?

(or)

(b).Give a detailed note on functional foods and Neutraceuticals?

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc(Home Science) Degree Examination

Fourth Semester

(CBCS for the students admitted from 2021-22 onwards)

Paper-III:FT- 403-A:NUTRITION FOR HEALTH AND FITNESS

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Define the cardiac and muscle endurance.
2. What is BORG Scale?
3. Write briefly glycolysis energy pathway.
4. What is BMI? How do you assess the BMI?
5. How do you calculate protein requirements for different levels of exercise?
6. Write the importance of vitamins in exercise.
7. Write pre fluid requirements for an athlete.
8. Write the importance of Ergogenic foods in sports performance.

SECTION- B

Answer ALL questions

Each Question carries 15 Marks Marks 4x15 =60

9.(a).Explain about the interrelationship between physical fitness and health

(or)

(b). How do you assess fitness using FITT principle.

10.(a). Explain in detail the fat metabolism before, during and after exercise.

(or)

(b). Explain how the anaerobic energy cycles contribute energy during heavy exercise.

11.(a). Write the role of macro nutrients in supporting physical activity.

(or)

(b).What is the adverse health effects of dehydration or hypo hydration?

12. (a).Describe the assessment of nutritional status of sports person.

(or)

(b).What is Kinanthropometry, explain different measurements.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Fourth Semester

(Specialization: MS Food Technology)

(CBCS for the students admitted from 2021-22 onwards)

Paper-III: FT-403-B:UNIT OPERATIONS IN FOOD INDUSTRY

Time : 3 hours Max Marks:80

SECTION- A

Answer any FOUR of the Following

Each question carries 5 marks Marks: 4x5=20

1. Enlist the processing Equipments used in Beverage Industry?
2. Write short note on Procurement and Storage of Raw materials?
3. Differentiate between Grading and Cutting?
4. What are different types of membranes and filtrates?
5. Explain about Screw Conveyors?
6. Write about Pneumatic conveying system?
7. Explain about the safety and hygiene practices followed in food industries?
8. Write about the CIP system?

SECTION- B

Answer ALL questions

Each Question carries 15 Marks 4x15 =60 Marks

9.(a). What are the factors affecting the rate of evaporation?

(or)

(b).What are the common Food Processing operations employed in processing the food?

10.(a).Explain about different equipments used for cutting for sizing of food?

(or)

(b).Explain in detail about gravitational sedimentation of particles in fluids??

11.(a).Write about Principal of Conveying systems in Food Processing Industry?

(or)

(b).Write the principle of drying? Explain about pneumatic drying?

12.(a).Write in detail about effluent treatment?

(or)

(b).How ISO 14000 is used in food industries and different series in ISO 14000?

SRI VENKATESWARA UNIVERSITY::TIRUPATI

Model Question paper

M.Sc (Home Science) Degree Examination

Second Semester

(CBCS for the students admitted from 2021-22 Onwards)

(Common to MS Food Technology and M.Sc., Food Science Nutrition & Dietetics course)

Paper-V:FT-405: TECHNOLOGY OF PACKAGING

Time :1.30 hours Max Marks:40

SECTION- A

Answer any TWO of the Following

Each question carries 5 marks Marks: 2x5=10

1. Write about the Principles and Functions of Food Packaging
2. Enlist different Types of Packaging materials used for Food Packaging?
3. Explain in brief about
   A) Water Vapor Transmission Rate B) Gas Transmission Rate
4. What are the different factors affecting Flavor Absorption ?

SECTION- B

Answer ALL questions

Each Question carries 15 Mark Marks: 4x15 =60

9.(a). Write in detail about Thermosets and Thermoplastics?

(OR)

(b). What are the different Methods used for Food Packaging?

10. (a)What is meant by Barcode? Explain in brief about Barcoding and their Types?

(OR)

(b). Explain in detail about the role of Food Matrix in Packaging- Food Interactions?

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

Model Question Paper

M.Sc. (Home Science) Degree Examination

Fourth Semester

Open Elective

(CBCS for the students admitted from 2021-22 onwards)

Paper-VI:FT-406 -A: CHILD GROWTH AND DEVELOPMENT

OPEN ELECTIVE

Time: 3 Hrs Max: 80 Marks

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

9. a)

   (Or)

   b)

10. a)

    (Or)

    b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

Model Question Paper

M.Sc. (Home Science) Degree Examination

Fourth Semester

Open Elective

(CBCS for the students admitted from 2021-22 onwards)

Paper-VI: FT-406-B:DISASTER MANAGEMENT

Time: 3 Hrs Max: 80 Marks

Part – A

Answer any four questions

Each question carry equal marks (4X5=20 Marks)

1.
2.
3.
4.
5.
6.
7.
8.

Part – B

Answer all questions

Each question carry equal marks (4X15 = 60 Marks)

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF MATHEMATICS



Course

M.Sc. MATHEMATICS

Choice Based Credit System (CBCS)

Academic Year 2023 - 24

Amended as per NEP-2020

PROGRAMME: M.Sc.,(MATHEMATICS & APPLIED MATHEMATICS)
SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF MATHEMATICS

About the Department:

The Department of Mathematics of Sri Venkateswara University was one among the first six departments started in September1954. The department had the good fortune of being lead by the renowned Indian Mathematician Prof. R. Vaidyanatha Swamy followed by Prof. M.V. SubbaRao, Prof D.P. Banerjee, Prof. K. Sitaram and Prof. P. V. Arunachalam. The department has made many studies and established a multi-dimensional growth in the fields of Semi Group theory, Number theory, Geometry, Graph theory, Approximation theory, Forecasting, Fluid Dynamics, Differential Equations and Theoritical Computer Sciences.

Vision of the Mathematics Department:

- Imparting quality mathematical education and inculcating the spirit of research through innovative teaching and Research methodologies.
- To achieve high standards of excellence in generating and propagating knowledge in mathematics
- To provide an environment where students can learn, become competent users of mathematics and understand the use of mathematics in other disciplines.

Mission of the Mathematics Department:

- To emerge as a global centre of learning academic excellence and innovative research.
- To pursue collaborative programs with highly reputed National and International institutions.

Program Specific Outcomes:

- To develop problem – solving skills and apply them independently to problems in pure and applied mathematics.
- To assimilate complex mathematical ideas and argument.
- To develop abstract mathematical thinking.
- To improve own learning and performance.

Programme Objectives:

- Develop the knowledge, skills and attitudes necessary to pursue further studies in mathematics.
- Become confident in using mathematics to analyze and solve problems in real life situations.
- Able to apply knowledge of mathematical methods in solving, interpreting the solutions of problems.
- Formulate & design appropriate mathematical model in a variety of areas of mathematics.
- Able to develop a mathematical tool for solving real world problems.
- Build the capacity to investigate and apply mathematics to find solutions in a variety of contexts related to Science, Technology, Business and Industry.
- Apply the knowledge of mathematics in understanding concepts like weather, forecasting, earthquakes & Tsunami's...etc, and finds the suitable method to solve the problem.
- Understand the values, Professional ethics and responsibilities. Deal any situation in their personal and professional life without fear.
- Function effectively and work meritoriously as a team member and lead multidisciplinary teams in high quality programs by mathematical analysis.
- Develop abilities to communicate, present their reports and design effectively on various issues.
- Acquires skills in drafting & managing projects and in generating funds.
- Recognize the importance of learning process to understand day to day technology changes and developments.

Program Out Comes (PO) :

Students are expected to know or able to do by the time of graduation. At the end of the programme, the students will be to:

- Apply the knowledge of Mathematics in all the fields of learning including higher research and its extensions.
- Equip the student with skills to analyse problems, formulate the hypothesis, evaluate and draw reasonable conclusions.
- Investigate and apply mathematical problems and solutions in a variety of contexts related to science, technology, business and industry.
- Able to design and develop mathematical experiments to solve environment problems like global pollution, aerosol particles weather and virus in atmosphere.
- Utilize Number Theory in the field of Cryptography that helps in hiding information and maintaining secrecy in military information, transmission, computer password and e-commerce. Facilitate the study of groups in crystallography in chemistry and Lie symmetry groups in physics.
- To interpret the data like dosage of medicine, nutritious food to children and effectiveness of new drugs and survival rate of cancer parents under certain treatments etc.
- Illustrate solutions using numeric or graphical or programming methods.
- Imbibe high standards in life by understanding the values and ethics in their life..
- Investigate and solve unfamiliar math problems and allow to think on unsolved mathematical problems.
- Imbibe effective, scientific / technical communications in both oral and write.
- Acquire knowledge in designing Mathematical models .Also generate funds through various research projects..
- Ability to think, acquire knowledge and skills through logical reasoning and develop a habit of self- learning throughout life.

Program Educational Objectivess:

- Apply their knowledge in modern industry or secure acceptance in high quality post graduate program in mathematics
- Development in their chosen profession and / or progress toward an advanced degree.
- The trust and respect to others as effective and ethical team members.
- Graduates will become effective collaborators and innovators, leading or participating in effort to address social, technical and business challenges.

- Promote the culture of interdisciplinary research among all disciplines and applied mathematics.
- Explore the emerging areas of science and engineering like Nonlinear dynamic, computational mathematics and cryptography.
- Plan, analyze and investigate engineering problems using contemporary design and simulation tools.

SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF MATHEMATICS
(Syllabus common for SV University College and affiliated colleges offered P.G. Courses in SVU Area)

(Revised Scheme of Instruction and Examination, Syllabus etc., with effect from the Academic Years 2021-22 for I and II Semesters and 2022-23 for III and IV Semesters)

M.Sc. MATHEMATICS

SCHEME OF INSTRUCTION AND EXAMINATION

Semester-I

Sl. no	Components of study	Code	Title of the course	Hrs/ week	No. of Credits	Uni. Exams (Hour	IA	Seme-ster end exam	Total Marks
1.	Core	MA 101	Algebra	6	4	3	20	80	100
2.	Core	MA 102	Real Analysis	6	4	3	20	80	100
3.	Compulsory Foundation	MA 103	A) Ordinary Differential Equations B) Linear Algebra	6 6	4	3	20	80	100
4.	Elective foundation	MA 104	A) Numerical Methods B) Lattice theory	6 6	4	3	20	80	100
5.	Theory	MA 105	Complex Analysis	6	4	3	20	80	100
6.	Theory	MA 106	Discrete Mathematics	6	4	3	20	80	100
			TOTAL	48	24		120	480	600
7	Audit Course-I			0	0	0	100	0	0

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one Paper**
- **Elective Foundation - Choose one Paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**.

Semester-II

Sl. no	Components of study	Code	Title of the course	Hrs/ week	No. of Credits	Uni. Exams (Hour	IA	Semester end exam	Total Marks
1.	**Core**	MA 201	**Galois Theory**	**6**	**4**	**3**	**20**	**80**	**100**
2.	**Core**	MA 202	**Partial Differential Equations**	**6**	**4**	**3**	**20**	**80**	**100**
3.	**Compulsory Foundation**	MA 203	**A) Topology** **B) Semi group Theory**	**6** **6**	**4**	**3**	**20**	**80**	**100**
4.	**Elective foundation**	MA 204	**A) Advanced Complex Analysis** **B) Nonlinear Analysis**	**6** **6**	**4**	**3**	**20**	**80**	**100**
5.	**Theory**	MA 205	**Measure and Integration**	**6**	**4**	**3**	**20**	**80**	**100**
6.	**Theory**	MA 206	**Mathematical Statistics**	**6**	**4**	**3**	**20**	**80**	**100**
			TOTAL	**48**	**24**		**120**	**480**	**600**
7	**Audit Course-II**			**0**	**0**	**0**	**100**	**0**	**0**

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one Paper**
- **Elective Foundation - Choose one Paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**.

Semester-III

Sl. no	Components of study	Code	Title of the course	Hrs / week	No. of Credits	Uni. Exams (Hour	IA	Semester end exam	Total Marks
1.	**Core**	MA 301	**Commutative Algebra**	**6**	**4**	**3**	**20**	**80**	**100**
2.	**Core**	MA 302	**Functional Analysis**	**6**	**4**	**3**	**20**	**80**	**100**
3.	**Generic Elective**	MA 303	**A) Differential Geometry** **B) Algebraic coding theory**	**6** **6**	**4**	**3**	**20**	**80**	**100**
4.	**Course**	MA 304	**Classical Mechanics**	**6**	**4**	**3**	**20**	**80**	**100**
5.	**Skill Oriented course**	MA 305	**MAT-LAB**	**3T + 18P**	**4**	**3**	**20**	**80 (50T+ 30P)**	**100**
6.	**Open Elective (Other Departments)**	MA 306	**A) Business Mathematics-I** **B) Fundamentals of Mathematical Statistics**	**6** **6**	**4**	**3**	**20**	**80**	**100**
TOTAL				**45 T+ 18P**	**24**		**120**	**480**	**600**

***All CORE Papers are Mandatory**

- **Generic Elective - Choose Two**
- **Core papers and Generic Elective opted Paper held Practical-I**
- **Project Work – Collaboration with various Firms/Companies/Societies.**
- **Multi-disciplinary course is Mandatory. Circle formation with other subjects/Dept. of Arts/Commerce**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**

Semester-IV

Sl. no	Components of study	Code	Title of the course	Hr/ week	No. of Credits	Uni. Exams (Hour	IA	Semester end exam	Total Marks
1.	**Core**	MA 401	**Number Theory**	**6**	**4**	**3**	**20**	**80**	**100**
2.	**Core**	MA 402	**Banach Algebra**	**6**	**4**	**3**	**20**	**80**	**100**
3.	**Generic Elective**	MA 403	**A) Graph Theory** **B) Approximation Theory**	**6** **6**	**4**	**3**	**20**	**80**	**100**
4.	**Practical/ Course**	MA 404	**Operations Research for Industry and Community Development**	**6**	**4**	**3**	**20**	**80**	**100**
5.	**Multi Disciplinary Course /Project Work**	MA 405	**Computer Oriented Numerical Methods**	**3T+18P**	**4**	**3**	**20**	**80 (50T+ 30P)**	**100**
6.	**Open Elective (Other Departments)**	MA 406	**A) Business Mathematics-II** **B) Mathematics for Social Sciences**	**6** **6**	**4**	**3**	**20**	**80**	**100**
TOTAL				**45T+18P**	**24**		**120**	**480**	**600**

***All CORE Papers are Mandatory**

- **Generic Elective - Choose Two**
- **Core papers and Generic Elective opted Paper held Practical-II**
- **Project Work – Collaboration with various Firms/Companies/Societies.**
- **Multi-disciplinary course is Mandatory. Circle formation with other subjects/Dept. of Arts/Commerce**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**

SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF MATHEMATICS
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M.Sc. APPLIED MATHEMATICS
SCHEME OF INSTRUCTION AND EXAMINATION

Semester-I

Sl. no	Components of study	Code	Title of the course	Hrs/ week	No. of Credits	Uni. Exams (Hour	IA	Semester end exam	Total Marks
1.	Core	AMA 101	Methods of Applied Mathematics	6	4	3	20	80	100
2.	Core	AMA 102	Real Analysis	6	4	3	20	80	100
3.	Compulsory Foundation	AMA 103	A) Ordinary Differential Equations B) Viscous Flows	6 6	4	3	20	80	100
4.	Elective foundation	AMA 104	A) Numerical Methods B) Boundary Value Problems	6 6	4	3	20	80	100
5.	Theory	AMA 105	Complex Analysis	6	4	3	20	80	100
6.	Theory	AMA 106	Discrete Mathematics	6	4	3	20	80	100
			TOTAL	48	24		120	480	600
7	Audit Course-I			0	0	0	100	0	0

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one Paper**
- **Elective Foundation - Choose one Paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**.

Semester-II

Sl. no	Components of study	Code	Title of the course	Hrs / week	No. of Credits	Uni. Exams (Hour	IA	Semester end exam	Total Marks
1.	**Core**	AMA 201	**Mathematical Modeling**	**6**	**4**	**3**	**20**	**80**	**100**
2.	**Core**	AMA 202	**Partial Differential Equations**	**6**	**4**	**3**	**20**	**80**	**100**
3.	**Compulsory Foundation**	AMA 203	**A) Topology** **B) Magneto Hydro Dynamics**	**6** **6**	**4**	**3**	**20**	**80**	**100**
4.	**Elective foundation**	AMA 204	**A) Advanced Complex Analysis** **B) Nonlinear Analysis**	**6** **6**	**4**	**3**	**20**	**80**	**100**
5.	**Theory**	AMA 205	**Measure and Integration**	**6**	**4**	**3**	**20**	**80**	**100**
6.	**Theory**	AMA 206	**Mathematical Statistics**	**6**	**4**	**3**	**20**	**80**	**100**
			TOTAL	**48**	**24**		**120**	**480**	**600**
7	**Audit Course-II**			**0**	**0**	**0**	**100**	**0**	**0**

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one Paper**
- **Elective Foundation - Choose one Paper**
- **Audit Course – 100 Marks (Internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**.

Semester-III

Sl. no	Components of study	Code	Title of the course	Hrs / week	No. of Credits	Uni. Exams (Hour	IA	Semester end exam	Total Marks
1.	**Core**	AMA 301	**Continuum Mechanics**	**6**	**4**	**3**	**20**	**80**	**100**
2.	**Core**	AMA 302	**Functional Analysis**	**6**	**4**	**3**	**20**	**80**	**100**
3.	**Generic Elective**	AMA 303	**A) Differential Geometry** **B) Mathematical Methods**	**6** **6**	**4**	**3**	**20**	**80**	**100**
4.	**Course**	AMA 304	**Classical Mechanics**	**6**	**4**	**3**	**20**	**80**	**100**
5.	**Skill Oriented course**	AMA 305	**MAT-LAB**	**3T +18 P**	**4**	**3**	**20**	**80 (50T+ 30P)**	**100**
6.	**Open Elective (Other Departments)**	AMA 306	**A) Business Mathematics-I** **B) Foundation of Mathematical Statistics**	**6** **6**	**4**	**3**	**20**	**80**	**100**
TOTAL				**45 T+ 18P**	**24**		**120**	**480**	**600**

***All CORE Papers are Mandatory**

- **Generic Elective - Choose Two**
- **Core papers and Generic Elective opted Paper held Practical-I**
- **Project Work – Collaboration with various Firms/Companies/Societies.**
- **Multi-disciplinary course is Mandatory. Circle formation with other subjects/Dept. of Arts/Commerce**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**

Semester-IV

Sl. no	Components of study	Code	Title of the course	Hr/ week	No. of Credits	Uni. Exams (Hour	IA	Semester end exam	Total Marks
1.	**Core**	AMA 401	**Number Theory**	**6**	**4**	**3**	**20**	**80**	**100**
2.	**Core**	AMA 402	**Fluid Dynamics**	**6**	**4**	**3**	**20**	**80**	**100**
3.	**Generic Elective**	AMA 403	**A) Graph Theory** **B) Approximation Theory**	**6** **6**	**4**	**3**	**20**	**80**	**100**
4.	**Practical/ Course**	AMA 404	**Operations Research for Industry and Community Development**	**6**	**4**	**3**	**20**	**80**	**100**
5.	**Multi Disciplinary Course /Project Work**	AMA 405	**Computer Oriented Numerical Methods**	**3 T + 18 P**	**4**	**3**	**20**	**80 (50T+ 30P)**	**100**
6.	**Open Elective (Other Departments)**	AMA 406	**A) Business Mathematics-II** **B) Mathematics for Social Sciences**	**6** **6**	**4**	**3**	**20**	**80**	**100**
TOTAL				**45 T + 18 P**	**24**		**120**	**480**	**600**

***All CORE Papers are Mandatory**

- **Generic Elective - Choose Two**
- **Core papers and Generic Elective opted Paper held Practical-II**
- **Project Work – Collaboration with various Firms/Companies/Societies.**
- **Multi-disciplinary course is Mandatory. Circle formation with other subjects/Dept. of Arts/Commerce**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**

PROGRAMME: M.Sc.,(MATHEMATICS & APPLIED MATHEMATICS)
SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF MATHEMATICS

Instructions for evaluation:-Each theory subject is evaluated for 100 Marks out of which 80 Marks through end examination and internal assessment would be for 20 Marks. The minimum marks for qualifying in theory subject shall be 40%.

1. End Examination Question Paper Pattern is as follows:

Section A&B	Questions	Units of the Syllabus	Marks
A	Questions 1 To 8 (four short answer Questions, TWO from each unit)	Form UNIT-I to UNIT-IV	4x5=20
B	Questions 9.(a) & (b) or 10 .(a) &(b)	Form UNIT-I	15
B	Questions 11. (a) &(b) or 12.(a) &(b)	From UNIT-II	15
B	Questions 2. (a) &(b) or 14.(a) &(b)	From UNIT-III	15
B	Questions 15(a) &(b) or 16(a) &(b)	From UNIT-IV	15
Total:			80

Procedure to evaluate internal examinations:

Theory:

Internal Examinations –I &II	20 marks

The pattern for the internal examination: 20 marks will be divided into descriptive (two out of four questions each carries 4 marks and two questions each carries 6 marks for each question with internal choice & 60 minutes duration).

***Note 1: If the final marks are in fraction, it shall be rounded off to the next number**

- If the student is absent for the internal examination, no re-exam shall be conducted If the student failed to attend both the internal examinations, his/her aggregate marks shall be considered zero.

- **Note:** Final internal semester marks shall be awarded as average of two internal examinations.

Example:

Marks obtained in first internal: 20
Marks obtained in second internal: 20
Final internal semester Marks: (20+20) = 40/2=20

Practical/Lab:

*Continuous assessment/ Day to day work	End examination	Total
20 marks	80M (50T+30P)	100M

*Continuous assessment format given below.

Note: For practical courses, there shall be a continuous evaluation during the semester for 20 sessional marks and end examination shall be for
50 T+30P marks. Day-to-day work in the laboratory shall be evaluated for 20 marks by the concerned laboratory teacher based on the regularity/record/viva. Both day to day evaluation and two internal should be finalized by 20 marks. The end examination shall be conducted by the concerned laboratory teacher and external examiner in the subject nominated by the university.

- Internal marks will be awarded by internal examiner only.

Open elective eligibility criterion:

For all branches of B.SC/BA/B.Com without mathematics background

(Submit Degree certificate Xerox).

FIRST SEMESTER

MA 101 ALGEBRA

Algebra is one of the broad areas of Mathematics together with Number theory Geometry and analysis. Algebra is applicable to all mathematical domains.

Course objectives:

1. To introduce action and conjugation of G-sets, the basic structures of Algebra such as groups, cyclic groups
2. To develop working knowledge on Sylow's theorems
3. Provide information on Ideals and homomorphism.
4. Discuss U.F.D, E.D and polynomial Rings.

UNIT –I:
Cyclic groups - Conjugacy and G-Sets, Permutation groups-Cyclic decomposition-Alternating Group A_n -Simplicity of A_n .
(Section 4 of Chapter 4, Sections 4 of Chapter 5, Sections 1, 2 and 3 of chapters 7).

UNIT –II:
Structure Theory of Groups: Direct Products –Finitely generated abelian groups -Invariants of a finite abelian group –Sylow theorems –group of orders p2, pq.
(Section 1,2,3,4 and 5 of Chapter 8).

UNIT – III:
Ideals and Homomorphism's: Ideals – Homomorphism's –Sum and direct sum of ideals – Maximal and prime ideals – Nilpotent and nil ideals –Zorn's Lemma
(Chapter 10)

UNIT – IV:
Unique Factorization domains and Euclidean Domains: Unique factorization domains-Principal ideal domains-Euclidean domains, Polynomial rings over UFD.
(Chapter 11)

Scope and standard in the book **"Basic Abstract Algebra" by P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, Cambridge University Press, Reprint 1997.**

References:

(1) Topics in Algebra, by I.N. Herstein
(2) Commutative algebra, by Zariski and Samuel Affiliated East-West Press.
(3) Abstract Algebra – Ronald. Solomon.
(4) A First course in 'ABSTRACT ALGEBRA' seventh edition by John B. Fraleigh, Pearson Education.
(5) Abstract algebra by David S. Summit, Richard .M.Forte, Wiley publication, 3rd edition.
(6) Introduction to rings and modules by C.Musli, Narosa Publications.
(7) A first course in abstract algebra by John B Fraleigh.
(8) Basic algebra by Jacobson.Nathan , Vol 1, Hindustan Publishing corporation 1991 .

Course outcomes: After completing this course the student will be able to

1. Identify the concept of action and conjugation.
2. Explain the applications of Sylow's theorems
3. Understand homomorphism and ideals in Rings.
4. Understand U.F.D, E.D and Polynomial Rings

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	2	2	1				1	1		
CO2	3	2	2	3	2				1	1		
CO3	1	2	3	3	3				1	1		
CO4	2	3	2	1	2				1	1		

MA 102 Real Analysis

(Common with the paper AMA 102 of Branch 1(B) Applied Mathematics)

This course covers Riemann-Stieltjes Integral, Sequences and Series of Functions, Functions of Several Variables, Improper Integrals, Fourier series, Maxima and Minima.

Course Objectives:

1) Acquire knowledge on Riemann-Stieltjes Integration and Differentiation.
2) Discuss Uniform Convergence, Continuity Integration and Differentiation
3) Learn comparison Tests
4). Understand the concept of functions of several variables.

UNIT –I:

The Riemann –Stieltijes Integral : Definition and Existence of the integral properties of the integral, integration and Differentiation, Integration of vector valued function, Rectifiable curves.

UNIT – II:

Sequence and series of functions : Discussions of main problem, uniform convergence, uniform convergence and continuity, Uniform convergence and Integration, Uniform convergence and Differentiation, Equicontinuous families of functions, The stone – Weistrass theorem .

Scope and standard as in Chapters 6, sections 7.1 to 7.26 of chapter 7 of Walter Rudin" Principles of Mathematical Analysis" 3rd edition 1976, Nc. Graw hill International student edition.

UNIT – III:

Improper Integrals: Introduction, Integration of unbounded functions with finite limit of Integration, comparison tests for convergence at $\propto$, infinite Range of Integration.

Fourier series: Trigonometrically series, some preliminary theorems, the Main theorem, intervals other than -$[-\Pi, \Pi]$

UNIT-IV:

Functions of Several Variables : Explicit and Implicit functions, Continuity, Partial derivations, differentiability, partial derivatives of higher order, differentials of higher order, function of functions, change of variables, Taylor's theorem, Extreme values, Maxima and Minima, functions of several variables.

Scope and standard as in chapters 11, 12 and 15 of **Mathematical Anlaysis by " S.C. Malik 1994" Wiley Eastern limited**

Reference:

(1) Mathematical Analysis- A modern Approach to Advanced Calculus Narosa Book Distributors Pvt LTD- New Delhi
(2) Real Analysis - Golden Math Series By N.P. Bali.
(3) A course of Mathematical Analysis by Shanti Narayan -.K. Mittal , S-Chand & Company LTD-New Delhi

Course Outcomes:

1. Understand the concepts of Riemann Stieltijes integration and Differentiation.
2. Understand Uniform Convergence and continuity.
3. Learn comparision tests at and infinity.
4. Analyze the concept of functions of several variables.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	2	3				1	1		
CO2	3	2	2	3	2				1	1		
CO3	2	2	3	2	1				1	1		
CO4	1	3	3	2	1				1	1		

MA 103 A: ORDINARY DIFFERENTIAL EQUATIONS

(Common with paper AMA 103 of Branch I (B) Applied Mathematics)

This course introduces fundamental knowledge in mathematics that is applicable in the engineering aspects.

Course objectives :

1. To study boundary value problems.
2. To find solutions of power series and second order linear equations.
3. To provide knowledge on Special functions -Legendre polynomials and properties of Bessel functions
4. To know the method of successive approximation and Picard's theorem.

UNIT –I:
Oscillation Theory and boundary value problems: Qualitative properties of solutions –The Sturm comparison theorem-Eigen values, Eigen functions and the vibrating string.

UNIT – II:
Power series solutions: Series solutions of first order equations –Second order linear equations-Ordinary points-Regular singular points- Gauss's hyper geometric equation.

UNIT – III:
Some special functions of Mathematical Physics :Legender polynomials – properties of Legendre polynomials –Bessel functions –The gamma function- Properties of Bessel functions.

UNIT-IV:
The existence and uniqueness of solutions : The method of successive approximations-Picard's theorem-systems. The second order linear equations.

Scope and standard as in sections 22 to 24 of Chapter 4 (excluding Appendix A), Sections 26 to 30 of Chapter 5, Sections 32 to 35 of Chapter 6 (Excluding Appendices) and sections 55 to 57 of Chapter 11 of **" Differential Equations with Applications and Historical notes" by George F. Simmons, (1992) Tata McGraw Hill Publications**

References:

1. Advanced Differential Equations, M.D. Raisinghania , S. Chand Publications
2. Differential Equations" Ross, Shepley L Wieley India Pvt LTD.
3. Engineering Mathematics y Bali NP, SatyanarayanaBhavanari, kelkar, University Science Press, New Delhi 2012.
4. An introduction to O.D.E by Earl.A.Coddington , Prentice Hall of India Private Limited, New Delhi 1991.
5. Theory of ODE by Sam Sundaram, Narosa Publications

Course outcomes: From this course students will be able to

1. Learn boundary value problems, Eigen values and Eigen functions
2. Solve the second order linear questions.
3. Apply knowledge on special functions of Mathematical Physics.
4. Understand the method of successive approximation and solve the problems related to Picard's theorem.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	2	3				1	1		
CO2	1	2	3	1	3				1	1		
CO3	1	1	2	2	3				1	1		
CO4	2	2	3	3	2				1	1		

MA 103 B: Linear Algebra

Course Objective:

1. To study Systems of Linear Equations.
2 .To introduce the notions of abstract vector spaces and linear transformations.
3. To know the Direct-sum decompositions cyclic decomposition, Rational and Jordan forms.
4. To study Bilinear Forms.

UNIT –I:

Linear Equations:

Systems of Linear Equations, Matrices and Elementary Row Operations, Row-Reduced Echelon Matrices.

UNIT –II:

Vector Spaces & linear transformations:

Vector Spaces, Subspaces, Bases and Dimension, Ordered basis and coordinates. Linear transformations, Rank-NullityTheorem, The algebra of linear transformations, Isomorphism, Matrix representation of linear transformations, Linear Functionals, Annihilator, Double dual, Transpose of a linear transformation. Characteristic Values and Characteristic Vectors of linear transformations.

UNIT –III:

Direct-sum decompositions:

Direct-sum decompositions –Invariant Direct sums. The primary decomposition theorem – cyclic subspaces and annihilators –cyclic decomposition, Rational and Jordan forms

UNIT –IV:

Bilinear Forms:

Bilinear Forms –Symmetric Bilinear Forms –Skew-Symmetric Bilinear Forms –Groups Preserving Bilinear Forms.

Text books:

1. K. Hoffman, R. Kunze, Linear Algebra, Prentice Hall of India, (2015).
2. Gilbert Strang, Introduction to Linear Algebra, Wellesley-Cambridge Press, (2009).

Reference(s):

1. I. N. Herstein, Topics in Algebra, Wiley, (2006).
2. S. Axler, Linear Algebra Done Right, Springer, (2004).
3. S. Lang, Linear Algebra, Springer, (2004).
4. S. Kumaresan, Linear Algebra: A Geometric Approach, Prentice Hall India, (2009).
5. M. Artin, Algebra, Pearson Education India, (2010).

Course outcomes: After completing this course the student will be able to

1. Solve the system of linear equations
2. Understand the concept of vector space, basis, dimension and linear Transformation
3. Explain the direct sum decompositions
4. Understand the Bilinear forms.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	2	2				1	1		
CO2	2	3	1	2	3				1	1		
CO3	3	1	2	1	3				1	1		
CO4	2	3	1	2	2				1	1		

MA 104 A: NUMERICAL METHODS
(Common with paper AMA 104 of Branch I (B) Applied Mathematics)

Course objectives:

1. To provide suitable Numerical Methods, for obtaining
   Roots of algebraic and transcendental equations.
2. To study of different methods of Interpolation and approximation.
3. To solve system of equations by suitable methods.
4. To study the various methods of Numerical integration.

UNIT-I:
Solutions of Algebraic and Transcendental Equations: Introduction - Bisection method – Method of False position - Newton Raphson –method solutions of non linear equations – Method of iteration.
[Above topics are from 2.1 to 2.7, 2.12 of Chapter-2 of the Text Book]

UNIT-II:
Interpolation And Approximation: Introduction - Lagrange Interpolation - Newton Divided Differences - Finite Difference Operators - Interpolating Polynomials using finite differences- Gregory- Newton forward difference interpolation- Backward difference interpolation - Stirling and Bessel interpolation - Spline interpolation – cubic splines. Finite differences- newton's formulae for interpolation- central interpolation formulae –gauss central difference formulae- strilling formula- bessels formula – legrange's interpolation formula.
[Above topics are from 3.1, 3.3, 3.6, 3.7, 3.7.3, 3.9.1, 3.10, 3.13 of Chapter-3 of the Text Book]

UNIT-III:
Direct methods – matrix inversion method -Gauss Elimination Method - Gauss – Jordan Method – eigen value problems –Iterative Methods
[Above topics are from 6.3.1 to 6.3.4 , 6.3.7 and 6.4 of Chapter-6 of the Text Book]

UNIT-IV:
Numerical integration: Trapezoidal rule- Simpsons rules – numerical solution of ODEs by Picard – Euler - Modified Euler – Runge-Kutta methods.
[Above topics are from.4.1 to 5.4.3 of Chapter- 5 and 7.1 to 7.5 of Chapter- 7of the Text Book]

Text Book:
Scope and standard as in chapters 2,3,5,6 and 7 of "**Introductory methods for Numerical Analysis by S.S.Sastry fourth edition**".

Reference Book:
1. An Introduction to Numerical Analysis by Kendall E. Atkinson.

2. Information Technology and Numerical methods fot Atul Kahate
3. Theory and problems in Numerical Methods with programs in C and C++.
4. Numerical Methods and computing by Ward Cheney and David Kincaid
5. Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International (p) Limited, Publishers, 5th Edition

Course Learning Outcomes:

From this Course Students are able to

1. Solve Algebraic and Transcendental polynomial equations.
2. Understand Interpolation.
3. Solve system of equations by matrix inversion method and iterative method...etc.
4. Analyze and evaluate the accuracy of area, volume by Numerical methods.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	2	3				1	1		
CO2	2	2	2	2	2				1	1		
CO3	2	3	3	3	1				1	1		
CO4	3	3	2	2	2				1	1		

MA 104 B: LATTICE THEORY

The course mainly designs with the aim of introducing the Lattice theory and Boolean algebra, the portion of lattice theory discuss modular, distributive lattice.

Course Objectives:

1. To study the Partly Ordered Sets.
2. To discuss Lattices.
3. To analyze Complete Lattices.
4. To explain distributive and modular lattices.

UNIT-I

Partly Ordered Sets: Set Theoretical Notations, Relations, Partly Ordered Sets, Diagrams, Special Subsets of a Partly Ordered Set, Length, Lower and Upper Bounds, The Minimum and Maximum Conditions, The Jordan–Dedekind Chain Condition, Dimension Functions.
(Sections 1 to 9 of Chapter 1)

UNIT-II

Lattices in General: Sub Lattices, Ideals, Bound Elements of a Lattice, Atoms and Dual Atoms, Complements, Relative Complements, Semi Complements, Irreducible and Prime Elements of a Lattice, The Homomorphism of a Lattice, Axiom Systems of Lattices.
(Sections 10 to 21 of Chapter 2)

UNIT-III

Complete Lattices: Complete Lattices, Complete Sub Lattices of a Complete Lattice, Conditionally Complete Lattices, Compact Elements and Compactly Generated Lattices, Sub Algebra Lattice of an Algebra, Closure Operations, Galois Connections, Dedekind Cuts, Partly Ordered Sets as Topological Spaces.
(Sections 22 to 29 of Chapter 3)

UNIT-IV

Distributive and Modular Lattices: Distributive Lattices, Infinitely Distributive and Completely Distributive Lattices, Modular Lattices, Characterization of Modular and Distributive Lattices by their Sub lattices, Distributive Sub lattices of Modular Lattices, The Isomorphism Theorem of Modular Lattices, Covering Conditions, Meet Representation in Modular and Distributive Lattices.
(Sections 30 to 36 of Chapter 4)

PRESCRIBED BOOK:

Introduction to Lattice Theory, Gabor Szasz, Academic press.

REFERENCE BOOK:

Lattice Theory, G. Birkhoff, Amer, Math. Soc.

Course Learning Outcome(s): From this course students are able to

1. Know Partly Ordered Sets.
2. Understand Lattices as Algebraic structures
3. Study complete Lattices.
4. Compare the distributive and modular lattices

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	3	3	3				1	1		
CO2	2	2	3	1	2				1	1		
CO3	3	2	3	1	2				1	1		
CO4	1	3	3	2	2				1	1		

MA 105: COMPLEX ANALYSIS
(Common with paper AMA 105 of Branch I (B) Applied Mathematics)

Complex analysis, traditionally known as the theory of functions of a complex variable, is the branch of mathematical analysis that investigates functions of complex numbers.

Course Objectives :

1. To define analytic functions and derivative rules for complex functions.
2. To introduce Mobius transformations and explain its applications.
3. To evaluate definite integrals using Cauchy integral formula.
4. To understand power series and expansion of analytic function**.**

UNIT –I:
Differentiation: Analytic Functions: Derivative Rules for Differentiating Complex Functions- The Cauchy-Riemann Equations –Analytic Functions-Geometrical Interpretation of Arg $f^1(z)$ and $\left|f^1(z)\right|$ - Conformal Mapping –The Mapping w = $\frac{az+b}{cz+d}$ - Conformal Mapping of the Extended Plane.

UNIT – II:
Mobius Transformations: The Group Property of Mobius Transformations – The Circle – Preserving Property of Mobius Transformations-Fixed points of a Mobius Transformation-Invariance of Cross Ratio-Mapping of a circle onto a Circle –Symmetry Transformations.

UNIT – III:
Complex Integrals: Cauchy Integral Theorem: Rectifiable Curves-Complex Integrals-The Case of Smooth Curves-Cauchy's Integral Theorem-The Key Lemma proof of Cauchy's Integral Theorem-Application to the Evaluation of Definite Integrals Cauchy's Integral Theorem for a system of Contours. Cauchy's Integral Formula –Morera's Theorem – Cauchy's Inequalities.

UNIT-IV:
Power Series: The Cauchy-Hadamard Theorem – Taylor Series. The Uniqueness Theorem for Power series-Expansion of an Analytic Function in a power series –Liouvill'es Theorem. The Uniqueness Theorem for Analytic functions-A Points and Zeros-Weirstrass' Double Series Theorem-Substitution of One Power Series into Another- Division of Power series.

Scope and Standard as in Chapters 3,5,7,8 and 10 of **" Introductory Complex Analysis" by Richard A. Silverman Dover Publications, Inc. (1972). New York.**

References: 1 Complex Variables - . Schaum outline series, 2/E by Speigel
2. An Introductions to Complex Analysis, by C.L. Siegel: North Holland,

Course outcomes:

1. Decide when and where a given function is analytic .

2. Understand the Mobius Transformation.
3. Describe basic properties of complex integration and having the ability to compute such integrals.
4. Understand Power series and expansion of analytic function.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	1	2	2				1	1		
CO2	1	2	2	3	2				1	1		
CO3	2	2	3	3	3				1	1		
CO4	1	3	1	2	2				1	1		

MA 106: DISCRETE MATHEMATICS
(Common with paper AMA 106 of Branch I (B) Applied Mathematics)

The aim of the discrete mathematics is the study of mathematical structure that are fundamentally discrete rather than continuous.

Course Objectives:

1. To learn Normal Forms-Disjunctive-Conjunctive Principal Disjunctive, Principal Conjunctive Normal Forms.
2. Understand predicate calculus.
3. To study the Algebraic systems such as Lattices,Boolean Algebra and Boolean functions
4. To introduce basic concepts of graph theory

UNIT –I:
Normal Forms-Disjunctive-Conjunctive Principal Disjunctive, Principal Conjunctive Normal Forms –Ordering and Uniqueness of Normal Forms. The theory of Inference for the statement Calculus-Rules of inferences – Consistency of Premises-Automatic Theorem proving (Sections 1.3 and 1.4 of Chapter 1)

UNIT – II:
The predicate calculus-Inference Theory of the Predicate Calculus(Sections 1.5 and 1.6 of Chapter 1)

UNIT – III:
Lattices and Boolean Functions: Lattices as partially Ordered sets-Lattices as Algebraic Systems –Boolean Algebra-Boolean Functions- Minimization. (Sections 4.1, 4.2, 4.3 and 4.4 of Chapter 4)

UNIT-IV:
Finite – State Machines-Basic Concepts of Graph Theory –Basic Definitions-Paths-Reach ability, and Connectedness-Matrix Representation of Graphs-Trees (Section 4.6 of Chapter 4 and Section 5.1 of Chapter)

Scope and Standard as in the book **" Discrete Mathematical Structures With Applications To Computer Science" by Tremblay, J.P&Manohar, R-Published by McGraw-Hill International Edition -1987 Edition**

References: 1. Discrete Mathematics & Graph Theory by BhavanariSatyanarana& Kuncham Syam Prasad, PHI Publications, New Delhi, Second Edition, 2014.
2. Mathematical Foundation of Computer Science, by Bhavanari Satyanarayana, T.V. Pradeep Kumar, SK. Mohiddin Shaw, BS Publications, Hyderabad.2016.

Course Outcomes:

1. Use standard Normal Forms-Disjunctive-Conjunctive Principal Disjunctive
2. Discuss Inference Theory of the Predicate Calculus
3. Understand Lattices and Boolean Functions.
4. Understand basic concepts of graph theory.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	2	2				1	1		
CO2	1	2	2	3	3				1	1		
CO3	3	1	3	2	3				1	1		
CO4	3	1	2	2	1				1	1		

Audit Course: Human Values and Professional Ethics – I
(Common with paper of Branch I(B) Applied Mathematics)

Course objectives:

The main objectives of promotion of Ethics and Human values are as under:

1. To create awareness, conviction & commitment to values for improving the quality of life through education, and for advancing social and human well being.

Unit – I

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment.Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

Unit- II

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.

Unit- III

Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).

Unit – IV

Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths - Aryaastangamarga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.

Unit – V

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

References :

1. John S Mackenjie: A manual of ethics.
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
3. “Management Ethics - integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
4. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
10. SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. CarakaSamhita :Tr. Dr.Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values , board of Intermediate
16. Education & Telugu Academic Hyderabad
17. I.C Sharma Ethical Philosophy of India. Nagin&coJulundhar.

Course outcomes:

1. Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for others, Living Peacefully, Caring, Sharing, Honesty, Courage, Cooperation, Commitment, Empathy, Self Confidence character, Spirituality, Case study.
2. Human values are the virtues that guide us to take into account the human element when we interact with other human beings.
3. It will be used for respect, acceptance, consideration, appreciation, listening, openness, affection, empathy, and love towards other human beings.

SECOND SEMESTER (EVEN)

MA 201 GALOIS THEORY

Galois Theory plays an important role in the development of modern mathematics and it has large applications in computer science.

Course objectives:

1. Discuss extension fields and algebraic extensions.
2. To study the Normal and Separable Extensions
3. To introduce Galois Theory and understand applications of Galois Theory.
4. To study the roots of polynomials and Ruler & compass constructions.

UNIT –I:
Algebraic Extensions of Fields: Irreducible polynomials and Eisensteins Criterion-Adjunction of roots- Algebraic extensions- Algebraically closed fields.

UNIT – II:
Normal and Separable Extensions: Splitting fields- Normal extensions- Multiple roots-Finite fields- Separable extensions.

UNIT – III:
Galois Theory: Automorphic groups and fixed fields- Fundamental theorem of Galois Theory-Fundamental theorem of Algebra.

UNIT-IV:
Applications: Roots of unity and Cyclotomic polynomials- Polynomials solvable by radicals- Ruler and compass constructions.

Syllabus and Scope and Standard as in **"Basic Abstract Algebra" by P.. Bhattacharya, S.K. Jain and S.R. Nagpaul, Cambridge University Press, Reprint 1997**. Sections15.1, 15.2, 15.3 and 15.4 of chapter 15, Sections 16.1, 16.2, 16.3, 16.4and 16.5of chapter 16,Sections 17.1, 17.2 and 17.3 of chapter 17 and Sections 18.1, 18.3 and 18.5 of Chapter 18.

Reference:

1. Topics in Algebra by I.N. Herstein.
2. Field and Galois Theory-Howie. J.M
3. Galois Theory II Edition-Steven.H. Weintraub
4. Fields and Galois Theory-J.S. Milne.
5. Galois theory by Joseph Rotman, Second Edition 1998 Springer Publisher.
6. Algebra by Artinn, 1991 PHI
7. Abstract Algebra by David S summit and Richard M Forte , Wiley publications, 3rd edition

Course outcomes:

1. Apply the knowledge on polynomials solvable by radicals, Extension field.
2. Understand the normal and separable extensions.
3. Study the roots of polynomials specially quintic polynomials which is the cause to develop Galois theory.
4. Solve the problems on cyclotomic polynomials.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	2	3				1	1		
CO2	2	3	1	3	3				1	1		
CO3	3	1	2	3	2				1	1		
CO4	1	2	3	3	2				1	1		

MA 202: PARTIAL DIFFERENTIAL EQUATIONS

(Common with paper AMA 202 of Branch I (B) Applied Mathematics)

This course is designed to strengthen the fundamental knowledge of P.D.Es which lead to understand the real world problems.

Course Objectives:

1. To provide methods to find solutions of O.D.Es and P.D.Es
2. To find integral surface passing through given surface.
3. To explain methods to solve Linear P.D.Es with constant and Variable coefficients.
4. To discuss the boundary value problems and Laplace's Equation.

UNIT –I:
Differential Equations in more than two variables: Methods of solutions of dx/P =dy/Q = dz/R-Orthogonal trajectories of a system of curves on surface-Pfaffian differential forms and equations in Three variables. (Sections 3, 4, 5 and of Chapter 1)

UNIT – II:
Partial Differential Equations of the First order: Partial Differential equations-Origins of first order partial differential equations-Cauchy's problems for first order equations-Linear equations of first order-Integral surfaces passing through a given curve –Surfaces orthogonal to a given system of surfaces-Charpit's method.(Sections 1,2,3, 4,5,6 and 10 of Chapter 2)

UNIT – III:
Partial Differential Equations of the Second order: The Origin of second order equations – Linear partial differential with constant coefficients-Equations with variable coefficients. (Sections 1, 4 and 5 of Chapter 3)

UNIT-IV:
Laplace's Equations : Elementary solution of Laplace's equation-Families of equipotential surfaces-Boundary value problems – Separation of variables.(Sections 2,3,4 and 5 of Chapter 4)

Scope and Standard as in **"Elements of Partial Differential Equations" by IAN Sneddon** Chapter 1: Section 1 to 6, Chapter 2: Sections 1,2,4,5,6,10 Chapter 3: Sections 1,4,5, chapter 4: Sections 2,3,4,5, Chapter 5: Sec2, Chapter 6: Section 3 and 4.

Reference:

1. Ordinary and Partial Differential Equations by M.D. Raisinghania.
2. Advanced Differential Equations by M.D.Raisinghania, S. Chand Company Limited, New Delhi, 2021.
3. An elementary course to P.D.E by T.Amarnath, Second Edition, Narosa publishing house.

Course outcomes:

Students will be able to

1. solve Pfaffian differenrial equations and find orthogonal trajectories of a curve. Analyze the origin of first order PDEs and Integral surfaces passing through a given curve
2. Identify linear and nonlinear PDE and solve nonlinear PDE by Charpit's method.
3. Apply various methods to solve Partial Differential Equations of the Second order.
4. Obtain equipotential surfaces using Laplace's equation.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	2	1	2				1	1		
CO2	3	3	3	2	2				1	1		
CO3	2	2	3	3	1				1	1		
CO4	2	3	2	3	1				1	1		

MA 203 A: TOPOLOGY
(Common with paper AMA 203 of Branch I (B) Mathematics)

Topological concepts play important role in the development of modern mathematics and it has large applications in theoretical physics.

Course Objectives:

1. To study basic concepts of Metric spaces.
2. Introduce the basic definitions and standard examples of topological spaces.
3. Define and illustrate a variety of topological properties such as compactness, connectedness and separation axioms.
4. To study the Hausdorff space and normal spaces.

UNIT –I:
Metric spaces:-open sets-closed sets- convergence-completeness and Baire's theorem-Continuous mappings – Cauchy's Inequality and MinKowskisInequality- Euclidean and Unitary Spaces

UNIT – II:
Topological Spaces, definition & examples-open bases and open sub bases- compact spaces

UNIT – III:
Product of spaces - Tychonoff's theorem and loally compact spaces-compactness for Metric spaces.

UNIT-IV:
Separation –T_1 space and Hausdorff spaces –completely regular spaces and Normal spaces –Urysohn's lemma- Tietze extension theorem-Urysohn's imbedding theorem –Connected spaces.

Articles 9 to 13,16,17,18,21 to 29 and 31 of Chapters II, III, IV, V and VI of **Introduction to Topology and Modern Analysis" by G.F. Simmons of MC Graw Hill Publishing company, Ltd**.

Reference:

1. 'Topology' by K.ChandraSekharaRao, Narosa Publications.
2. "Topology" by J.P. Chauhan, J.N. Sharma, Krishna Publications.
3. "General Topology" by M.G. Murdeshwar, new age International publications.

Course Outcomes:

Upon completion of this course, the student will be able to:

1. Understand to construct topological spaces from metric spaces and using general properties of neighborhoods, open sets, closed sets, basic and sub-basis.
2. Understand Topological Spaces, definition & examples.
3. Know the concepts connectedness, compactness, and Hausdorff property and their general characteristics.
4. Understand the Countability axioms, the separation axioms and normal spaces. And also the classical theorems such as the Uryshon lemma, the Tietze extension theorem.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	3	2	3				1	1		
CO2	3	2	2	2	2				1	1		
CO3	3	3	1	2	1				1	1		
CO4	2	1	3	2	1				1	1		

MA 203 (B): SEMIGROUP THEORY

Course Objectives:

1. Introduce basic definitions and examples of semi groups and semi Lattices.
2. Discuss free semi groups and lattices of equivalences.
3. Explain Ree's theorem& primitive Idempotents.
4. Analyze O-simple semi groups and free semi groups with Illustrations.

UNIT-I
Basic definitions – Homogenic Semigroups – Ordered sets- Semi lattices and lattices – Binary relations0- Equivalences- Congruences.

UNIT-II
Free Semi groups Ideals and – Rees Congruences. Lattices of equivalences and congruences – Green's equivalences. The structure of D.Classes – regular semigruops.

UNIT-III
Simple and Q-Simple semi groups. Principle factors, Rees's Theorem, Primitive idempotents.

UNIT-IV
Congruences on completely O-Simple semi groups. The Lattice of Congruences on a completely O-Simple semi groups. Finite Congruences, free semi groups.

Text Book :

An Introduction to Semi group Theory by J.M. Howie (1976), Academic Press, (Content of the Syllabus : Chapters-I, II and III).

Course Out comes:

1. Understand semi groups with the properties.
2. Explain the structure of D.Classes – regular semigruops.
3. Obtain proofs of Rees's Theorem.
4. Know the congruences on completely O-Simple semi groups

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	2	3				1	1		
CO2	3	1	3	1	2				1	1		
CO3	3	2	3	2	1				1	1		
CO4	1	2	2	3	1				1	1		

MA 204: (A) ADVANCED COMPLEX ANALYSIS
(Common with paper AMA 204(A) of Branch I (B) Applied Mathematics)

Course Objectives:

1. To explain Laurent Series, poles and singular points.
2. To understand Residue theorem and its applications.
3. To discuss Laplace's equation, Harmonic functions and Dirichlet problem.
4. To analyse infinite product and Partial Fraction Expansions.

UNIT –I:
Laurent Series-Singular Points: Laurent Series-Laurent's Theorem-Poles and Essential Singular points-Behavior at an Essential Singular point. Picard's Theorem-Behavior at infinity.

UNIT – II:
The Residue Theorem and its Applications: The Residue Theorem-Residues at infinity-Jordan's Lemma-Evaluation of Definite Integrals – The Argument principal-The Theorems of Rouche and Hurwitz-Local Behavior of Analytic Mappings-The Maximum Modulus principle and Schwarz's Lemma.

UNIT – III:
Harmonic Functions: Laplace's Equations-Conjugate Harmonic Functions-Poisson's integral. Schwartz's Formula-The Dirichlet problem.
Conformal Mapping: General Principles of Conformal Mapping –Mapping of the Upper Half-Plane onto a Rectangle –The Schwarz-Christoffel Transformation.

UNIT-IV:
Infinite product and Partial Fraction Expansions: Preliminary Results- Infinite Products-Weierstrass' Theorem –Mittage – Leffer's Theorem – The gamma Functions –Cauchy's Theorem on Partial Fraction Expansions.

Scope and Standard as in **"Introductory Complex Anlaysis" by Richard A. Silverman, Dover Publications, Inc. New York (1972)** Chapter 11 to 15.

Reference:

1. Fundamentals of Complex Analysis- Edward B. Saff, Arthur David Snider, Pearson Education
2. Foundations of Complex Analysis by S. Ponnusamy- Narosa Publications.

Course Outcomes:

1. To learn Laurent Series-Singular Points.
2. Explain the basic properties of complex integration and compute such integrals.

3. Learn topics of contemporary Advanced complex analysis in particular spaces of holomorphic functions, entire functions, harmonic functions and conformal mapping functions.
4. Understand the Infinite product and Partial Fraction Expansions.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	2	3				1	1		
CO2	1	3	2	2	3				1	1		
CO3	1	1	2	3	2				1	1		
CO4	2	3	3	1	1				1	1		

MA 204 :(B): NON LINEAR ANALYSIS
(Common with paper AMA 204 (B) of Branch I (B) Mathematics)

Course Objectives:

1. Analyse and describe Fixed point theory, Banach's Contraction Principle, Schavder's theorem, Krasnoselski's theorems and its applications.
2. Define linear operators, normed spaces.
3. Explain Spectoral theorem and properties of bounded linear operators.
4. To study the Compact Linear operators in normed spaces and their Spectrums

UNIT-I

Fixed point theory and Applications: Banach's Contraction principle (Theorem 4.1.1 of text Book 1) – its applications (Theorem 8.1.1 and Theorem 8.2.4 of text book 1. Schavder's fixed point theorem (Theorem 4.3.10 of text book 1)- its application (Theorem 8.1.3 of text book 1). Krasnoselskii's fixed point theorem (Theorem 4.3.16 of text book 1) – its application to integral equations (theorem 8.2.3 of text book 1)

UNIT-II

Approximation Theory: Approximation in Normed spaces- Uniqueness, strict convexity-uniform approximation- chebyshev polyamines- Approximation in Hilbert space-splines. (Chapter 6 of text book 2)

UNIT-III

Spectral Theory of Linear Operators in Normed Spaces : Spectral Theory in Finite Dimensional Normed Spaces- Basic concepts spectral properties of Bounded linear operators-Further properties of Resolvent and spectrum- Use of Complex Analysis in spectral Theory – Banach algebras –Further properties of Banach algebras. (Chapter 7 of text book 2)

UNIT-IV

Compact Linear operators in Normed spaces and their Spectrums : Compact linear operators on Normed Spaces- Further of Compact linear operators –Spectral properties of compact linear operators on normed spaces – Further spectral properties of compact linear operators –Operator equations involving compact linear operators –Further theorems of fredholm type – Fredholm alternative (Chapter 8 of text book 2)

Text Book:

1. **Mohan C. Joshi and Remendar K. Bose – Some topics in Nonlinear functional Analysis, Wiley Eastern Limited 1985, New Delhi.**
2. **2.Ervin Kreyszig:- Introductory Functional Analysis with Applications, John Wiley & sons. Inc., 1978, New York**.

Course Outcomes:

1) Explain fixed point theory and its applications by well known theorems.
2) Analyse the approximations in Normed spaces.
3) Use of complex analysis in spectral theory and Banach algebras.
4) Evaluation of spectral theory in normed spaces.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	3	1	2	3				1	1		
CO2	2	1	2	2	3				1	1		
CO3	3	3	1	3	2				1	1		
CO4	2	2	3	2	1				1	1		

MA 205: MEASURE AND INTEGRATION
(Common with paper AMA 205 of Branch I(B) Applied Mathematics)

Course Objectives

1. To acquire basic knowledge of measure Theory.
2. To understand the Riemann integtal and lebesgue integral of a bounded function.
3. To analyze the differentiation of monotone functions of bounded variation.
4. To study the Classical Banach Spaces.

UNIT –I :
Lebesgue Measure: Introduction, Outer measure, Measurable sets and Lebesgue measure, a non measurable set, Measurable functions, Little wood's three principles

UNIT – II:
The Lebesgue Integral: The Riemann integral, the Lebesgue integral of a bounded function over a set of finite measure, the integral of a non negative function, the general Lebesgue integral , convergence in measure.

UNIT – III:
Differentiation and Integration: Differentiation of Monotone functions –Functions of bounded variations-Differentiation of an integral – Absolute continuity –Convex functions.

UNIT-IV:
The Classical Banach Spaces: The $\boldsymbol{L^P}$Spaces, The MinKowski and Holder inequalities, Convergence and completeness, Approximation in $\boldsymbol{L^P}$,Bounded linear functional on the $\boldsymbol{L^P}$Spaces.

Syllabus and Scope and Standard as in **" Real Analysis" by H.L. Royden, Prentice Hall of India private limited, New Delhi,2001-Third edition**. Chapter 3, Chapter 4, Chapter 5, and Chapter 6.

Reference:

1. Principles of Mathematical Analysis, Third Edition by Walter Rudin.
2. A Real Analysis by H.L.ROYDEN, III ED., Peasion publishers.
3. Measure theory by P.R. HALMOS, 1974. Spingerverlag.
4. Measure theory by V.I.BOGACHVE, 1997, Spingerverlag.

Course Outcomes:

To document insight in modern theory of integration as a tool in advanced analysis and in statistics.

1. Compute Lebesgue measures.

2. Compute Lebesgue integrals of bounded functions over a set of finite measure
3. Solving the Differentiation and Integration of Monotone functions.
4. Understand the L^P Spaces, the MinKowski and Holder inequalities, Convergence and completeness

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	2	3	1				1	1		
CO2	2	2	1	2	2				1	1		
CO3	1	3	2	3	1				1	1		
CO4	3	1	3	3	2				1	1		

206: MATHEMATICAL STATISTICS
(Common with the paper AMA 206 of Branch I(B) Applied Mathematics)

Course objectives:

1. To introduce basic concepts of statistics and the probability set functions.
2. To study the Binomial, Poisson, Gamma, chi-square, normal distribution.
3. Explain stochastic convergence
4. To explain the objective of Point estimation-Measures of quality of estimations.

UNIT –I :

The probability set function –Random variables –The probability density function –The distribution function-Mathematical expectations-Some special mathematical expectations – Chebyshev inequality. Conditional probability –Marginal and conditional distributions-The Correlation coefficient-Stochastic Independence.

UNIT – II: The Binomial, Poisson, Gamma, chi-square normal distribution. Distributions of functions of Random variables –Sampling theory- Transformation of Variables of Discrete type-Transformation of Variables of the continues type.

UNIT – III:

The t and F Distributions – Distribution of order statistics –The moment –generating function Technique-The Distribution of X and Limiting distribution –Stochastic convergence-Limiting moment generating function-The central limit theorem –Some theorems on Limiting Distribution.

UNIT-IV:

Point estimation-Measures of quality of estimations-confidence intervals for means-confidence intervals for difference of Means-confidence intervals for variances.

A Sufficient statistics for a parameters- The Rao –Blackwell theorem-The Rao Cramer's inequality.

Syllabus and Scope as in **" Introduction to Mathematical Statistics" by Robert V. Hogg Allen T. Craig, Macmillan publishing co., Inc., New York -1978,** section 1.4,1.5,1.6,1.7,1.9,1.10,1.11, of chapter 1, chapter 2, sections 3.1 to 3.4 of chapter 3, sections 4.1 to 4.4, 4.6 to 4.8 of chapter 4, chapter 5, sections 6.1 to 6.5 of chapter 6, section 10.1, 10.2 chapter 10, section 11.1 of chapter 11.

References : 1. Mathematical Statistics by J.N. Kapur, H.C. Saxena- S. Chand Publications
2. Introduction to Mathematical Statistics Robert V Hogg, Allencraig, Joseph W Mekean , Pearson Publishers
3. Fundamentals of mathematical Statistics by S.C.Gupta and V.K.Kapoor, 11th edition S.Chand and sons, New Delhi
4. Probability and Statistics for engineers and scientists by Walpole Myers and Keying ye, ninth edition, Pearson Publications

Audit Course –II :HUMAN VALUES AND PROFESSIONAL ETHICS – II

(Common with paper of Branch I(B) Applied Mathematics)

Unit – I

Value Education – Definition – relevance to present day - Concept of Human Values – self introspection – Self esteem, Family values –Components, structure and responsibilities of family- Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Unit – II

Medical ethics – Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and health care professionals, Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit -III.

Business ethics – Ethical standards of business-Immoral and illegal practices and their solutions.Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics

Unit - IV.

Environmental ethics-Ethical theory man and nature-Ecological crisis, Pest control, Pollution and Waste,Climate change, Energy and Population, Justice and Environmental health.

Unit - V.

Social ethics-Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/Pregnancy. Ethics of media-Impact of Newspapers, Television, Movies and Internet.

Books for study:

1. John S Mackenjie: A manual of ethics.
2. “The Ethics of Management” By Larue Tone Hosmer, Richard D. Irwin Inc.
3. “Management Ethics – integrity at work’ by Joseph A. Petrick and John F. Quinn,Response Books: New Delhi.
4. “Ethics in Management: by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haughton.
10. SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. CarakaSamhita: Tr.Dr.Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, TheoryandContemporarty Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar.

THIRD SEMESTER (ODD)

MA 301: COMMUTATIVE ALGEBRA

This course enables the students to acquire knowledge on algebra to analyse real world problems.

Course objectives:

1. To explain the operations on ideals and modules
2. To introduce the concepts of A.C.C and D.C.C in ideals and modules
3. To provide knowledge on Noetherian rings and their properties.
4. To understand decompostion theorem and uniqueness theorem.

UNIT –I:

Ideals and Modules, Operations on submodules, the isomorphism theorems, rings homomorphism and residue class rings. The order of a subset of a module, operations on ideals, prime and maximal ideals and primary ideals.

UNIT – II:

Finite conditions, composition series and direct sums.

UNIT – III:

Noetherian rings: Definitions, the Hillbert basis theorem, Rings with descending chain conditions, Primary rings and alternative method for studying the rings with d.c.c.

UNIT-IV:

The Lasker –Noetherian decomposition theorem-Uniqueness theorems, Applicationas to Zero –divisors and nilpotent elements and applications to the intersection of the powers of an ideal.

Standard and treatment as in section 1 to 12 Chapter III and section 1 to 7s chapter IV of the text book **" COMMUTAVIVE ALGEBRA" By Zariski and Samuel, D. Van NostranedCo.Inc .Princeton**

Reference : 1. Topics in Algebra- I.N. Hierstein
2. Lectures in Abstract Algebra- Nathan Jacobson.
3. Introduction to rings and modules by C Musli, Narosa Publications.
4. Basic algebra by Jacobson nathan volume 1 , Hindustan Publishing Corporation 1991
5. Introduction to commutative Algebra by M.F.Atiyah, Macdonald.
6. Basic algebra by P B Bhattacharya, S K Jain and S R Nagpaul, Cambridge University Press, Reprint 1997.

Course outcomes:

1. To understand the ideals, Modules and operations on them.
2. To learn the structures of composition series with ACC and DCC
3. To study the theoretical properties of Noetherian rings
4. Explain decomposition theorem and applications.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	3	3				1	1		
CO2	2	2	1	1	2				1	1		
CO3	3	3	1	1	2				1	1		
CO4	2	3	2	3	1				1	1		

MA 302: FUNCTIONAL ANALYSIS
(Common with paper AMA 302 of Branch I (A) Applied Mathematics)

Functional analysis is one of the primary branches of mathematics mainly dealing with a variety of metrics' and linear operators.

Course Objectives:

1) Define and illustrate several normed spaces.
2) Introduce linear operators and derive their properties.
3) Elaborate basic theorems like open and closed mapping theorem, implicit function theorem and spectral theorem.

UNIT –I :
The definitions and some examples –continuous –linear transformations-the Hahn-Banach Theorem.

UNIT – II:
Natural imbedding of N in N**-Open mapping theorem –Conjugate of an Operator.

UNIT – III:
Definition and Simple Properties –Orthogonal Complements- Orthonormal sets – Conjugate spaces-Adjoint of an Operator.

UNIT-IV:
Self adjoint operators –Normal and Unitary Operators-Projection –Spectral theorem.

Scope and Standard as in Sections 46 to 51 of Chapter 9, section 52 to 59 of chapter 10, section 62 of chapter 11 of **"Introduction to Topological and Modern analysis by G.F. Simmons McGraw Hill Book Company**.

References:

1. "Foundations of Functional Analysis" by S. Ponnyusamy-Narosa Publications
2. "Text book of Functional Analysis – A Problem oriented Approach" by V.K. Krishnan-Prentice Halls of India Publishers
3. "Functional Analysis" by B.V. Limaye New age International Publishers

Course Outcomes:

1) Work with different distance metrics and normed spaces,understand continuous linear transformations and the Hahn-Banach Theorem.
2) Comprehend the Open mapping theorem and Closed graph theorem.
3) Construct orthonormal sets and conjugate spaces.
4) Understand the relevance of self-adjoint operators, normal, unitary operators and projections.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	2	2				1	1		
CO2	3	3	2	1	2				1	1		
CO3	2	2	1	2	3				1	1		
CO4	2	3	1	3	1				1	1		

Generic Elective

MA 303(A): DIFFERENTIAL GEOMETRY

(Common with paper AMA 303(A) of Branch I (A) Applied Mathematics)

The aim of the course is to provide knowledge of the geometry of curves and surfaces. The course integrates concepts from different parts of mathematics, such as linear algebra, calculus and differential equations. It also provides intuitive examples for many concepts in linear algebra, calculus and differential equations. These examples are fundamental to physics and mechanics: they play a role in our understanding of the movements of particles and the theory of relativity.

Course Objectives:

1. Define surfaces and their properties
2. Explain local intrinsic properties of a surface
3. Study geodesic equations of conformal mapping
4. Discuss lines of curvature and parallel surfaces

UNIT –I :

The Theory Space Curves: Introductory remarks about space curves –Definitions –Arc length-Tangent, normal, and binormal –Curvature and torsion of a curve given as the intersection of two surfaces –Contact between curves and surfaces-Tangent surface, involutes and evolutes.(Sections 1 to 7 of Chapter 1).

UNIT – II:

The Metric: Local Intrinsic Properties of a Surface: Definitions of a Surface- Curves on a surface-Surfaces of revolution –Helicoids- Metric-Direction Coefficients-Families of curves –Isometric correspondence –Intrinsic properties. (Sections 1 to 9 of Chapter 11).

UNIT – III:

Geodesics-Canonical Geodesic Equations-Normal Property of geodesics –Existence theorems-Geodesic parallels-Geodesic curvature-Gauss-Bonnet theorem –Gaussian curvature-Surfaces of constant curvature –Conformal mapping-Geodesic mapping (Sections 10 to 20 of Chapter 11).

UNIT-IV:

The second Fundamental Form: Local non – intrinsic properties of a surface: The second fundamental form-principal curvatures –Lines of curvature -Developables associated with space curves-Developables associated with curves on surfaces –Minimal surfaces-Ruled surfaces-The fundamental equations of surface theory –Parallel surfaces. (Sections 1 to 10 Chapter III).

Scope and Standard as in Sections and chapters as specified above of the book **"An Introduction to Differential Geometry" of T.J Willmore, Oxford University Press, Thirteenth Impression, 1997.**

References: 1. A first course in Differential Geometry- D. Soma sundaram – Narosa Publications.

Course Outcomes: After completing this course, students should be able to

1. Define space curves , curvature and torsion of a curve.
2. Parameterize surfaces and isometric correspondence.
3. Understand geodesic curves and conformal mapping.
4. calculate and analyse curvature of surfaces in different settings.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	3	3				1	1		
CO2	1	2	2	1	2				1	1		
CO3	2	3	3	1	3				1	1		
CO4	1	1	2	3	2				1	1		

MA 303 (B): ALGEBRAIC CODING THEORY

Course Objectives:

1. To develop the knowledge among students about coding and decoding.
2. Explain linear codes and reliability of IMLD.
3. Hamming codes and extended Golay coad of
4. Introduce cylic coads and polynomial Encoding and Decoding.

UNIT –I :

Introduction to Coding Theory: Introduction –Basic Assumptions- Correcting and Detecting Error Patterns-Information Rate-The Effects of Error Corrections and Detection-Finding the Most Likely Codeword Transmitted-Some Basic Algebra-Weight and Distance –Maximum Likelihood Decoding-Reliability of MLD-Error-Detecting Codes-Error-Correcting Codes.

UNIT – II:

Linear Codes: Two Important Subspaces-Independence, Basis, Dimension-Matrices-Bases for C= < S > and C?-Generating Matrices and Encoding-parity –Check Matrices-Equivalent Codes- Distance of a Linear Code-Cosets-MLD for Linear Codes- Reliability of IMLD for Linear Codes.

UNIT – III:

Perfect and Related Codes- Some Bounds for Codes-Perfect Codes-Hamming Codes-Extended Codes-The Extended Golay Code- Decoding the Extended Golay Code- The Golay Code –Reed-Mullar Codes-Fast Decoding for RM (1,m)

UNIT-IV:

Cyclic Linear Codes; Polynomials and Words – Introduction to Cyclic Codes-Polynomial Encoding and Decoding –Finding Cyclic Codes-Dual Cyclic Codes.

Scope and Standard as in Sections 1.1 to 1.12 of Chapter 1, sections 2.1 to 2.12 of Chapter 2, sections 3.1 to 3.9 of chapter 3, sections 4.1 to 4.5 of chapter 4 and sections **"Coding Theory the Essentials: by D.G. Hoffman, D.A Leonard, C.C. Lindner, K.T. Phelps, C.A. Rodger, J.R. Wall**, Monographs and text books in pure and Applied Mathematics.

References: 1. Algebraic coding theory and Applications Longo. G. Hartmenn C.R. Springer publications
2. Introduction to coding theory by J.H. Vanlint, Springer publications.
3. Introduction to Algebraic and combinatorial coding theory, Academi press,INC. Newyork,1977.
4. The Theory of ERROR Correcting codes by N.J.A.Sloane, Vol I&V,North – Holland Amsterdam,1977.

Course Out comes:

1.Analyse Error detecting and error correcting codes.

2. Understand and apply algorithms in applications like sending messages without errors.

3. Use bounds for different types of codes.

4.Understand the polynomial encoding and decoding.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	2	1				1	1		
CO2	2	3	3	3	1				1	1		
CO3	1	3	1	2	3				1	1		
CO4	2	3	2	3	1				1	1		

MA 304: CLASSICAL MECHANICS

(Common with paper AMA 304 of Branch I (B) Applied Mathematics)

Course Objectives:

1) To provide basic knowledge in mechanics to solve a mechanical problem.

2) To understand the concepts of Lagrange's equation and Hamiltonian principle.

3) To discuss Hamilton's equations of motion and principle of least action.
4) To understand canonical transformations.

UNIT –I:

D'Alembert's Principle and Lagrange's Equations: Some Definitions-Classification of Dynamical System-Some Examples of Constraints Virtual Displacement-Principle of Virtual Work –Generalised Force in Holonomic System-Mathematical Expression for the principle of Virtual work-D'Alember's principle-Lagrange's Equations for a Holonomic system-Velocity-dependent potential –Lagrange's Equations of Motion for conservative , Non-holonomic system-physcial Significance of 1 –Harmonic Oscillator.

UNIT – II:

Variational Principle and Lagrange's Equations:Variational Principle-Calculus of Variations-Hamilton Principle-Derivation of Hamilton's Principle from Lagrange's Equations-Derivation of Lagrange's Equations from Hamilton's Principle –Extension of Hamilton's Principle –Hamilton's Principle for Non-conservative, Non-holonomic System –Generlised Force in Dynamic system-Hamilton Principle for Conservative-Non holonomic System -Lagrange's Equations for Non –conservative –Holonomic System – Cyclic or lgnorable Coordinates –Conservation Theorem-Conservation of Linear Momentum in Lagrangian Formulation-Conservation of Angular Momentum in Lagrangian Formulation –Conservation of Angular Momentum –Conservation of Energy in Lagrangian Formulation.

UNIT – III:

Hamilton's Equations of Motion: Derivation of Hamilton's Equations of Motion (using Lagrange's Equations)-Routh's Procedure-Equations of Motion-Derivation of Hamilton's Equations from Hamilton's Principle –Principle of Least Action-Distinction between Hamilton's Principle and Principle of Least Action.

UNIT-IV:

Canonical Transformations: Canonical Coordinates and Canonical Transformations –The necessary and Sufficient Condition for a Transformation to be Canonical –Examples of Canonical Transformations-Properties of Canonical Transformulations- Infinitesimal Contact Transformation-Relation between Infinitesimal Contact Transformation and Poissson's Bracket-Hamilton Jacob Theory –Hamilton-Jacobi equations for Hamilton's Principle Function.

Syllabus and treatment as in the Book **" Classical Mechanics" by C.R. MONDAL Prentice Hall of India Private Limited, New Delhi, 110001,2001**, Chapter 1,2,4 and 5.

References: 1. Classical Mechanics by Goldstein Herbert, Charles P Poole, John safiko- Pearson India

2. Introduction to Classical Mechanics by Takwale R. Puranik P, Mc. GrawHill Education

Course Outcomes:

1) Understand D' Alembert's Principle and simple applications of the Lagrangian Formulation.
2) Derive the Lagrange's Equation from Hamilton's Principle.
3) Study the concept of the Equations of Motion and the Equivalent One-Dimensional Problems.
4) Distinguish the concept of the Hamilton Equations of Motion and the Principle of Least Action.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	1	2	2				1	1		
CO2	3	1	2	3	3				1	1		
CO3	3	1	3	2	1				1	1		
CO4	2	1	2	2	2				1	1		

SKILL DEVELOPMENT COURSE

MA 305: MAT-LAB
(Common with paper AMA 305 of Branch I (B) Mathematics)

Course Objectives:

1. Getting started with MATLAB
2. To create Matrices.
3. To learn 2D and 3D Plotting Techniques.
4. To know how to write programs to solve algebraic & Transcendental Equations

UNIT-I (Basics of MATLAB)

Getting Started with MATLAB- Different windows-Mathematical Operators and Mathematical functions-Creating matrices and arrays- Matrix algebra-Linear algebra concepts-plotting techniques- 2-D plotting-Subplot- 3-D plotting

UNIT-II (MATLAB Programming)

M-files-Script files-Relational operators-conditional statements-Numerical solutions to algebraic and transcendental equations- Solution of Simultaneous Algebraic Equations

Syllabus and treatment as in the Book:

1.Getting Started with MATLAB – A Quick Introduction for Scientists and Engineers, RudraPratap, Oxford University Press.

2. Engineering Problem solving with MATLAB, D.M.Etter, Printice-Hall

References:

1.. MATLAB Programming for Engineers. (4th ed.), Stephen J. Chapman, Cl Engineering.

2. MATLAB: Demystified -Basic Concepts and Applications, K KSarma, Vikas Publishing House Pvt Lt.

Course Outcomes:

1. Understand the mathematical operations & functions.
2. Write a program to addition & multiplication matrices.
3. Understand the 2-D plotting and 3-D plotting techniques.
4. Solve algebraic and transcendental equations.

MATLAB Practicals:

1. Basic 2D-plots

2. Basic 3D-plots

3. Bi-section method

4. False position method

5. Newton Raphson method

6. Creation and operations on Matrices

7. Gauss Elimination method

8. Gauss Jordan method

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	3	1				1	1		
CO2	1	2	1	2	2				1	1		
CO3	3	3	2	3	1				1	1		
CO4	1	3	2	1	2				1	1		

Open Elective (Other Departments)

MA 306 A: BUSINESS MATHEMATICS -1
(Common with paper AMA 306 of Branch I(A) Applied Mathematics)

Course Objectives:

1. To understand the basic concepts of Mathematics.
2. To calculate percentages- profit and loss.
3. To solve Linear equations.
4. To understand Conversion of one Number System to Another.

Unit - I
Number- H.C.F. and L.C.M. of Numbers - Decimal Fractions.

Unit - II
Surds and Indices – Percentage - Profit and loss.

Unit - III
Linear Equations in Two Variables – Ratio and Proportion- Variation.

Unit -IV
Number System: Types of Number Systems – Conversion of Decimal Number to Binary Number and Vice versa -Conversion of Decimal numbers to Octal numbers and Vice versa - Conversion of Hexadecimal number into Decimal number and Vice versa - Binary Arithmetic.

Scope and Standard Treatment as in Chapters 1,2,3,9,10,11,31,12 o**f"OBJECTIVEARITHMETIC" , by R.S.AGGARWAL , S.Chand and Company.**
Scope and Standard Treatment as in Chapter 1 of "**BUSINESS MATHEMATICS**"**, by P.R.VITTAL , MARGHAM PUBLICATIONS.**

Course Outcomes:

1. Apply the knowledge in mathematics (algebra, matrices, calculus) in solving business problems.
2. Analyse and demonstrate mathematical skills required in mathematically intensive areas in Economics and business.
3. Explain the concepts and use equations, formulae and mathematical expressions and relationships in a variety of contexts
4. Understand The Binary Octal , Octal, Decimal and Hexadecimal Systems.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	1	3				1	1		
CO2	2	2	1	3	1				1	1		
CO3	3	3	1	3	2				1	1		
CO4	1	2	2	3	2				1	1		

MA 306 B: Fundamentals of Mathematical Statistics

(Common with paper AMA B 306 of Branch I (A) Applied Mathematics)

Course Objectives

1. To introduce basic concepts of statistics and Correlation
2. To know the significance of regression lines.
3. Importance of test of significance.
4. To enable to solve linear equations by Matrix method etc

Unit - I

Correlation analysis: measuring and significance of correlation –types of correlation; important methods of Studying correlation –scatter diagram methods, Karl Pearson's coefficient of correlation, and Rank correlation Coefficient –Coefficient of Determination.

Unit -II

Regression analysis: Meaning and significance of regression lines, regression equations, Coefficient of regression, standard error of the estimate.

Unit - III

Test of Significance: (small sample sets only) –t, X2 and F tests and their applications

Unit - IV

Elements of matrix algebra: Elementary operations –rank of matrix –inverse of a matrix – solutions of linear equations by matrix method and Cramer's rule.

References:

1. Gupta, S.P.Statistical Methods

2. Hooda R.P Statistical for business Economics, Macmillan,New Delhi.

3. Statistical Methods Concepts, applications and computation by Aggarwal YP Sterling Publications.

Course outcomes:

1. To learn the fundamental concepts of statistics and correlation analysis
2. To analyse regression lines.
3. To explain tests of significance
4. To solve liner equations by matrix methods

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	2	3				1	1		
CO2	3	3	1	3	2				1	1		
CO3	1	2	1	2	3				1	1		
CO4	2	3	2	3	1				1	1		

FOURTH SEMESTER (EVEN)

MA 401: NUMBER THEORY

(Common with the paper AMA 401 of Branch (B) Applied Mathematics)

Identify and apply various properties of and relating to the integers including the Well-Ordering Principle, primes, unique factorization, the division algorithm and greatest common divisors.

Course Objectives:

1. Identify certain Arithmetical Functions and their properties
2 . Explain the averages Arithmetical Functions.
3. Understand the concept of a congruence and use various results related to Congruence including the Chinese Remainder Theorem.
4 Discuss Quadratic Residues and its properties.

UNIT –I :

Arithmetical Functions and Dirichlet Multiplication: Introduction-The Mobius function μ (n)-The Euler totient function $\emptyset$ (n) –A relation connection $\emptyset$ and μ -A product formula for $\emptyset$ (n) - The Dirichlet product of arithmetical functions –Dirichlet inverses and the Mobius inversion formula-The Mangoldt function Λ(n) –Multiplicative functions-Multiplicative functions and Dirichlet multiplication-The inverse of a completely multiplicative function-Liouville's Function λ(n)-the divisor functions $\sigma_{\propto}$(n) – Generalized convolutions –Formal power series –The Bell series of an arithmetical function –Bell series and Dirichlet multiplications –Derivatives of arithmetical functions-The Selberg identity .

UNIT – II:

Averages of Arithmetical Functions : Introduction –The big oh notation Asymptotic equality of functions-Euler's summation formula –Some elementary asymptotic formulas-The average order of d(n)-The average order of the divisor functions $\sigma_{\propto}$(n)-The average order of $\emptyset$ (n) -An application to the distribution of lattice points visible from the origin-The average order of μ (n) and of Λ(n) - Another identity for the partial sums of a Dirichlet product.

UNIT – III:

Congruences: Definition and basic properties of congruences-Residue classes and complete residue systems-Linear congruences –Reduced residue systems and the Euler-Fermat theorem- Polynomial congruences modulo p.Langranage's theorem-Applications of Lagarange's theorem-Simultaneous linear congruences – The Chinese remainder theorem –

Applications of the Chinese remainder theorem –Polynomial congruences with prime power moduli- The Principle of cross-classification- A decomposition property of reduced residue systems.

UNIT-IV:

Quadratic Residues and the Quadratic Reciprocity Law: Quadratic residues-Lengendre's symbol and its properties –Evaluation of (-1|p) and (2|p) –Gauss' lemma-The quadratic reciprocity law –Applications of the reciprocity law –The Jacobi symbol

Primitive Roots: The exponent of a number mod m. Primitive roots –Primitive roots and reduced residue systems –The nonexistence of primitive roots mod 2^{α} for $\propto \geq 3$.

Scope and Standard as in chapter 2, Chapter 3, Chapter 5, Sections 9.1 to 9.7 of Chapter 9 and Sections 10.1 to 10.3 of chapter 10 **by Tom. M. Apostal , " Introduction to Analytical Number Theory" Springer International Student Edition .**

Course outcomes:

1. Understand arithmetical Functions.
2. Use functions $\Phi(n)$, $\amalg(n)$, $\Lambda(n)$.
3. Understand the definitions of congruences, residue classes and least residues
4. Apply legendary polynomial and application of reciprocity law.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	3	3				1	1		
CO2	1	2	3	2	3				1	1		
CO3	2	3	2	1	2				1	1		
CO4	3	1	1	1	1				1	1		

MA 402: BANACH ALGEBRA

Course Objectives:

1. To study Algebraic, Topological fields and the structure of Banach Algebra.
2. To discuss properties of Gelfand mapping.
3. To emphasize on applications of commutative C*-algebras.
4. To study the fixed point theorem and its applications.

UNIT –I :
Definition and some examples –Regular and Singular elements- Topological divisors of zeros. Spectrum –formula for the spectral radius –Radical and Semi-simplicity

UNIT – II:
Gelfand mapping – Applications of the formula r(x) = lim $\|x^n\|^{1/n}$ –Involutions in Bnach algebras –GelfandNeumark Theorem.

UNIT – III:
Ideals in C (X) and Banach stone theorem –Stone $C^{\wedge}$ech compactification- CommutativeC^* algebras.Connectivity –Blocks-Application Construction of Reliable communications Networks.

UNIT-IV:
Fixed points theorems and some applications to analysis –Boolean algebras, Boolean Rings, and Stone's theorem.

Text Book : Scope and Standard as in Sections 64 to 66of Chapter 12, Sections 67 to 69 of chapter 12, sections 70 to 73 of Chapter 13, sections 74 to 76 of chapter 14, one an d three of Appendices of **" Introduction to Topology and Modern analysis" by G.F. Simmons McGraw Hill book Company**

Reference Books:
(1) W. Arveson, introduction to C algebras, springs-Verlay 1976
(2) KehezhuAn introduction to Operator Algebras, CRC Press Inc. 1993
(3) T.W. Padmer, Banch Algebra Vol 1, Cambridge University Press 1994

Course Outcomes:

1. Understand different types of Banach Algebras with examples.
2. Know the essence of Gelfand mapping
3. Understand the Application of Commutative C*- algebras.
4. Derive the applications of Banach Algebra in analysis, Fourier series,Boolean Algebras and other significant areas of mathematics.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	2	1				1	1		
CO2	2	2	3	1	1				1	1		
CO3	3	3	3	3	2				1	1		
CO4	1	2	2	1	3				1	1		

Generic Elective

MA 403(A) GRAPH THEORY
(Common with the paper AMA 403(A) of Branch (B) Applied Mathematics)

Course Objectives:

1. To introduce the fundamental concepts of graph theory
2. To Study the properties of Trees and Connectivity.
3. To explain Eulerian graphs and Hamiltonian graphs
4. To apply Euler Tours and Hamilton cycles in real life .

UNIT –I:
Graphs &Subgraphs: Graphs and simple Graphs-Isomorphism-Incidence and adjacency Matrices-Sub graphs-Vertex Degrees-Paths ad connection –Cyles-Shortest path-Problem-Sperner's Lemma

UNIT – II:
Trees: Trees-Edges and Bonds-Cut vertices, cayley's Formula –Applications-Connected problem

UNIT – III:
Connectivity-Connectivity –Blocks-Application Construction of Reliable communications Networks.

UNIT-IV:
Euler Tours and Hamiltonian Cycles: Euler Tours – Hamilton cycles Application –Chinese Postman Problem –Travelling Salesman Problem .

Scope and standard as in chapters 1 to 4 **" Graph Theory with application" J.A. Bondy and U.S.R. Murthy, M.C. Millan Press**

Rererences : 1. Discrete Mathematics & Graph Theory, by SatyanarayanaBhavanari, K. Syam Prasad, PHI Pvt Ltd, New Delhi Second Edition,2014
2. Mathematical Foundation of Computer Science by SatyanarayanaBhavanari, T. V. Pradeep Kumar, Sk. Mohiddin Shaw, BS Publications, Hyderabad,2016.
3 .Graph Theory with applications to Engineering and Computer Science – NarsinghDeo
4. First look at Graph Theory- John Clark Derek Allaw Holton.
5. Introduction to Graph Theory- Robin . J. Wilson
6. Introduction to Graph Theory- Douglas B. West
7. Graph theory with applications to engineering and computer science by Narsing Deo, PHI
8. Discrete mathematics for computer scientists and Mathematics by J.L.Mott, A.Kandel and T.P.Baker, Prentice Hall of India

Course outcomes:

1. Able to define basic concepts of graphs
2. Utilize the Algorithms to find the shortest path, Optimal tree from a given graph.
3. construct reliable communication network.
4. Understand the concepts of practical problems like Chinese postman problem and travelling salesman problem

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	1	2				1	1		
CO2	3	2	3	2	3				1	1		
CO3	3	2	3	1	3				1	1		
CO4	3	1	1	2	3				1	1		

MA 403 (B) APPROXIMATION THEORY
(Common with the paper AMA 403 (B) of Branch I (B) Applied Mathematics)

Course Objectives:

Main objective to teach students many important results on several useful topics including metric spaces.

1) To learn about metric spaces, normed linear spaces, innerproduct spaces, convexity.
2) Describe the existence and unicity of best approximation, characterization of the solution.
3) Description of Algorithms like Polya's Algorithm and Weierstrass Theorem.
4) Discretization Errors in general and Algebraic Polynomials.

UNIT –I :
Nomenclature-Metric spaces-Normed linear space-Inner product spaces-convexity

UNIT – II:
Existence and Unicity of Best approximation-Convex functions-System of Equations with one unknown –Characterization of the solution –The special case n=n+1.

UNIT – III:
Polya's Algorithm-Ascent Algorithm –Descent Algorithm –Interpolation-Weierstrass Theorem.

UNIT-IV:
General linear Families –The Unicity Problem –Discretization Errors: General and Algebraic Polynomials-Markoff and Bernstein inequalities –Remes Algorithm.

Scope and standard as in sections 1 to 7 of chapter 1, sections 1 to 8 of chapter 2, sections 1 to 8 of chapter 3 of **"Introduction to Approximation Theory, E.W. Cheney, "McGraw Hill Book Company.**

References: 1. Fundamentals of Approximation Theory by H.N. Mhaskar-Narosa Publications
2. Approximation theory and methods, M.j.d. Powell , Cambridge University Press

Course Outcomes:

1) Know the Basic concepts of Metric spaces And Normed Linear space.
2) Knows existence and uniqueness theorems for the best approximations in various Banach spaces.
3) Knows Bernstein's lethargy theorem and its practical and theoretical implications.
4) Be able to use and analyze the basic methods for polynomial approximations.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	1	1				1	1		
CO2	3	1	3	3	2				1	1		
CO3	1	1	2	2	3				1	1		
CO4	2	3	1	3	1				1	1		

MA 404: OPERATIONS RESEARCH FOR INDUSTRY AND COMMUNITY DEVELOPMENT

(Common with the paper AMA 404 of Branch (B) Applied Mathematics)

Course Objectives:

1) To understand Linear Programming Methods
2) To solve Linear programming problem through Dynamic Programming.
3) To introduce game theory.
4) To analyze Critical path method and program Evaluation and Review Technique.

UNIT –I :

Linear programming: Graphical Method-Simplex Method-Big M Method-Two phase method -Transportation Problem-(Sections 2.4 and 2.5.1, 2.5.2, 2.5.4 of chapter 2,sections 3.2, 3.3 and 3.4 of chapter 3).

UNIT – II:

Dynamic programming : Introduction –Capital Budgeting problem –Reliability improvement problem –Stage coach problem –Optimal subdividing problem –Solution Linear programming Problem through Dynamic Programming (Chapter 8)

UNIT-III:

Game Theory: Introduction -Game with Pure Strategies-Game with Mixed Strategies – Dominance property-Graphical Methods for 2xn and mx2 Games –Linear programming approach to Game Theory (Chapter 12)

UNIT-IV:

Project Management: Guidelines for Network Construction –Critical Path Method (CPM) –Program Evaluation and Review Technique (PERT) (Sections 10.3,10.4 and 10.6 of Chapter 10)

Scope and standard as **"OPERATIONS RESEARCH" By pannerselvam, R. published by Prentice Hall of India, New Delhi, 2002Edition,**

References: 1. Introduction to Management Sceicne " Operation Research" by Manmohan . P.K. Gupta, Kantiswarup, Sultan Chand & Sons Publishing house.
2. Operations Research –Theory and Applications by J.K. Sharma- Macmillan Publishers, India.
3. Operations Research –by Gupta, Prem Kumar, Hira S. Chand Publishers

Course Outcomes:

1) Formulate some real life problems into Linear Programming Problems.
2) Understand Dynamic Programming.
3) Solve the problems of Game with pure Strategies and Mixed Strategies.
4) Construct Reliable Networks.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	1	3				1	1		
CO2	3	2	2	1	3				1	1		
CO3	2	3	1	2	2				1	1		
CO4	3	2	1	3	1				1	1		

MULTI DISCIPLINARY COURSE /PROJECT WORK

MA 405: COMPUTER ORIENTED NUMERICAL METHODS
(Common with paper AMA 405 of Branch I (A) Applied Mathematics)

Course objectives:

1. To provide the knowledge of the C-Language.
2. To make use of commands and operations.
3. To familiarize the ways of solving complicated mathematical problems numerically.
4. To learn writing programs in C to solve integral and Differential Equations

UNIT-I:

Fundamentals of C language:

Fundamentals of C language:

Constants, Variables, and Data Types –Operators and Expressions –Decision making and Branching: Introduction – Decision making with if Statement –Simple if Statement –The if Else Statement –Nesting of if Else Statements –The Else if Ladder –The Switch Statement – The Operator –The Go to Statement Decision making and loops: The WHILE Statement – the DO Statement –the FOR Statement –Jumps in LOOPS, Arrays: One dimensional arrays –Two dimensional arrays –Multidimensional arrays.

UNIT –II:

Numerical Integration – Trapezoidal rule – Simpson's rules – Numerical solution by ODEs by Picard – Euler modified method – Range-Kutta Methods.

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1. Scope and Standard Programming in ANSI C" by E. Balaguruswamy(Sixth edition) Mc. Graw Hill Edition, India.

2. Scope and standard books Information Technology and Numerical methods fot Atul Kahate

Reference:

1. Numerical Methods: Problems and solutions, M.K. Jain, R.K. Jain, SRK Iyengar-New age International Publications

2. Let us "C"- Kanetkar BPB Publications

3. The "C" Programming Language- Kerghan, Brian W, Riechie Dennis M PHI Publisher.

Course outcomes:

1. Gain Knowledge in C-Language
2. Able to use commands and operations of C.
3. Solve integration and ODE problems by numerical methods
4. Write the programming to solve problems in numerical methods.

Practicals:

1. Trapezoidal rule

2. Simpson's $1/3^{rd}$ rule

3. Simpson's $3/8^{th}$ rule

4. Picard's Method

5. Euler method

6. Modified Euler method

7. Range-Kutta Method

8. Milne's Simpson's method

.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	1	2	3	3				1	1		
CO2	3	3	1	2	3				1	1		
CO3	3	1	3	1	1				1	1		
CO4	2	1	3	3	2				1	1		

Open Elective (Other Departments)

MA 406: BUSINESS MATHEMATICS-II

(Common with paper AMA 406 of Branch I (B) Applied Mathematics)

Course Objectives:

1. To understand the basic concepts of Mathematics
2. To have a proper understanding of alligations and mixtures.
3. To solve algebraic Quadratic equations.
4. To understand the given data with data interpretation.

UNITI

Time and Work – pipes &cisterns-Time and distance

UNIT-II

Alligation or Mixture- Simple Interest – Compound Interest

UNIT-III

Algebraic Quadratic equations – series-Arithmetic and Geometric Progressions

UNIT-IV

Data Interpretation- Pie chart-Bar Diagram-Line graphs

1.Scope and Standard Treatment as in Chapters 15,16,17,20,21,22,32,33,41,42,43. of**"OBJECTIVEARITHMETIC" , by R.S.AGGARWAL , S.Chand and Company**.
2.Scope and Standard Treatment as in Chapter 1 of "**BUSINESS MATHEMATICS", by P.R.VITTAL , MARGHAM PUBLICATIONS.**
References:
3. Quick Arithmetic by **Ashish Aggarwal S.Chand**
4. **Quantitative Aptitude for competitive Examinations bu Dr. R.S. Aggarwal**

Course Outcomes:

- Able to solve problems on Time and work, Distance
- Understand the mixtures and also learn to calculate the Simple interest and compound interest.
- Find roots of Algebraic equations and sum and terms of given series.
- Analyse the data from charts and graphs..

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	3	2	3				1	1		
CO2	1	2	3	1	2				1	1		
CO3	3	3	2	3	2				1	1		
CO4	1	2	3	3	1				1	1		

MA 406(B): BASIC MATHEMATICS FOR SOCIAL SCIENCES (EE)

(Common with paper AM 406 (B) of Branch I(A) Mathematics)

Course Objectives:

1. Understand the basic concepts of a vector space and linear transformations.
2. Study Taylor and Maclaurin's series.
3. Discuss methods of integration to find length,area and volume of regions.
4. Introduce the Numerical Techniques to find roots of equations and solutions of linear equations.

UNIT –I :

Linear Algebra : Matrices-Rank of a matrix, Elementary transformations of a matrix, Inverse of a Matrix, System of linear equations, Linear transformations, Eigen values and Eigen vectors. Vector Analysis-Definition of a vector, Vector addition, Vector manipulation – Scalar product, Vector ; Orthogonal components manipulation-Scalar product, Vector product; Orthogonal components of a vector, Differentiation of vectors.

UNIT – II:

Differential Calculus : Limits and Continuity, Differentiation of functions, Successive differentiation, Leibnitz's theorem for nth derivative, Taylor's and Maclaurin's series, Applications to maxima and minima of functions, partial differentiation, Euler's theorem.

UNIT – III:

Integral Calculus: Introduction, Integration –by substitution, by parts, by partial fractions: Definite integrals, Applications to areas, length, and volumes.
Differential Equations: Equations of 1 st order and 1st degree.

UNIT-IV:

Numerical Methods –I Computer arithmetic, Representation of numbers, computer errors in representing numbers, Finding roots of equations-Bisection, Newton, and Secant methods; Interpolation and Numerical differentiation- Polynomial interpolation, Newton-Gregory forward interpolation, Backward differences; Numerical integration-Trapezoidal and Simpson's rules Elements of matrix algebra-elementary operations – rank of matrix-inverse of a matrix-solutions of linear equations by matrix method and Cramer's rule .

Text Books :

1. Grewal B.S. Elementary Engineering Mathematics, 10th edition, Khanna publishers
2. Cheney W. and Kincaid D, Numerical Mathematics and Computing, vikas Publications, 2003.

References:

1. Lispschutz S, and Lipson M, Schaum'sOut line of Linear Algebra, McGraw-Hill, 2000.

2. Ayres F, and Mendelson E, Schaum's Outline of Calculus, 4th edition, Mc.Graw-Hill, 1999.
3. Rajaraman V, Computer Oriented Numerical Mehtods, 3rd edition, PHI 1993.
4. Finite Dimensional vector spaces by Paul R.Halmas,2nd edition, Princeton N.J.D Company,1918.
5. Linear algebra by K.Hoffman and R.Kunze 2nd edition,Pearson Education Taiwan ltd.
6. Numerical Methods:Problems and solutions M.K.Jain, R.K.Jain, SRK.Iyengar, Newage International publications

Course Out comes:

1. Understand the concepts of vector spaces with bases, algebra of Transformations and orthogonal components.
2. Understand the concepts of Limit, continuity &differentiation of functions.
3. Apply Integrals to find areas, length & volume of regions.
4. Apply the numerical Techniques to solve differential equations &Algebraic equations.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	3	3	1				1	1		
CO2	3	1	2	2	3				1	1		
CO3	3	1	1	3	3				1	1		
CO4	3	2	1	2	2				1	1		

SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF MATHEMATICS

(Syllabus common for SV University College and affiliated colleges offered P.G. Courses in SVU Area)

(Revised Scheme of Instruction and Examination, Syllabus etc., with effect from the Academic Years 2021-22 for I and II Semesters and 2022-23 for III and IV Semesters)

M.Sc. APPLIED MATHEMATICS

SCHEME OF INSTRUCTION AND EXAMINATION

FIRST SEMESTER (ODD)

AMA101: METHODS OF APPLIED MATHEMATICS

Course Objectives:

1. To study Fourier series and Fourier Transforms
2. To know applications of finite Fourier Transforms .
3. To understand the applications of Sylow's Theorems.
4. To discuss the algebraic structures U.F.D, E.D and polynomial rings.

UNIT I:

Fourier Transforms : Dirichlet conditions – Fourier integral formula –The (Complex) Fourier transform – Fourier sine and cosine transforms-Relationship of Fourier and Laplace transforms –Some useful results for direct applications-Linearity property of Fourier transforms –Change of scale property –Shifting property—Modulation theorem – Convolution or Falting-The convolution or Falting theorem for Fourier transforms – Parseval's identity for Fourier transforms Rayleigh's theorem of Plancherel's theorem – Relation between the Fourier transforms of the derivatives of a function –Multiple Fourier transforms-Applications of Fourier transforms to Boundary value problems. (Chapter 4)

UNIT-II

Finite Fourier Transforms: Fourier Series –The finite Fourier sine transform-The finite Fourier cosine transforms –Relation between the finite Fourier transforms of the derivations of a function –Multiple finite Fourier transforms –Applications of finite Fourier transforms to boundary value problems-Special case of boundary value problem (Chapter 5)

Scope and standard as in **" Integral Transforms" by Raisinghania, published by S. Chand & Co., New Delhi, 1995 Editon.**

ALGEBRA:
UNIT: III
Structure Theory of Groups : Conjugacy and G-Sets, Normal series, Sovable groups, Simplicity of A_n, Sylow theorems.
(Sections 4 of Chapter 5, Sections 1 and 2 of Chapter 6, Section 3 of Chapter 7 and Sections 4 of Chapter 8)

UNIT IV : UNIQUE FACTORIZATION AND EUCLIDEAN DOMAINS:
Unique factorization domains-Principal ideal domains-Euclidean domains-Polynomial rings over UFD(chapter 11)

Scope and standard as in **"Basic Abstract Algebra" by Bhattacharya , P.B. Jain, S.K. and Nagpul S.R, Cambridge University Press, 1997 Reprint**

References: 1. Topics in Algebra – I.N. Herstein

Course outcomes:
1. Expand a function in a Fourier series and able to know under what conditions such an expansion is valid.
2. Aware of the connection between integral transforms (Fourier and Laplace) and be able to use the latter to solve mathematical problems relevant to the physical sciences.
3. Understand the applications of Sylow theorems.
4. Describe Unique Factorization and Euclidean Domains.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	3	2	1	3				1	1		
CO2	3	2	1	2	2				1	1		
CO3	2	1	3	3	3				1	1		
CO4	2	1	2	1	2				1	1		

AMA 102 Real Analysis

(Common with the paper MA 102 of Branch 1(B) Mathematics)

This course covers Riemann-Stieltjes Integral, Sequences and Series of Functions, Functions of Several Variables, Improper Integrals, Fourier series, Maxima and Minima.

Course Objectives:

1) Acquire knowledge on Riemann-Stieltjes Integration and Differentiation.
2) Discuss Uniform Convergence, Continuity Integration and Differentiation
3) Learn comparison Tests
4) Understand the concept of functions of several variables.

UNIT –I :

The Riemann –Stieltijes Integral : Definition and Existence of the integral properties of the integral, integration and Differentiation, Integration of vector valued function, Rectifiable curves.

UNIT – II:

Sequence and series of functions : Discussions of main problem, uniform convergence, uniform convergence and continuity, Uniform convergence and Integration, Uniform convergence and Differentiation, Equicontinuous families of functions, The stone – Weierstrass theorem .

Scope and standard as in Chapters 6, sections 7.1 to 7.26 of chapter 7 of Walter Rudin" Principles of Mathematical Analysis" 3rd edition 1976, Nc. Graw hill International student edition.

UNIT – III:

Improper Integrals: Introduction, Integration of unbounded functions with finite limit of Integration, comparison tests for convergence at a $\propto$, infinite Range of Integration.

Fourier series: Trigonometrically series, some preliminary theorems, the Main theorem intervals other than $-[-\Pi, \Pi]$

UNIT-IV:

Functions of Several Variables : Explicit and Implicit functions, Continuity, Partial derivations, differentiability, partial derivatives of higher order, differentials of higher order, function of functions, change of variables, Taylor's theorem, Extreme values, Maxima and Minima, functions of several variables.

Scope and standard as in chapters 11, 12 and 15 of **Mathematical Anlaysis by " S.C. Malik 1994" Wiley Eastern limited**

Reference :

(1) Mathematical Analysis- A modern Approach to Advanced Calculus Narosa Book Distributors Pvt LTD- New Delhi
(2) Real Analysis - Golden Math Series By N.P. Bali.

(3) A course of Mathematical Analysis by Shanti Narayan -.K. Mittal , S-Chand & Company LTD-New Delhi

Course Outcomes:

1. Understand the concepts of Riemann Stieltijes integration and Differentiation.
2. Understand Uniform Convergence and continuity.
3. Learn comparision tests at a and infinity.
4. Analyze the concept of functions of several variables.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	2	3				1	1		
CO2	3	2	2	3	2				1	1		
CO3	2	2	3	2	1				1	1		
CO4	1	3	3	2	1				1	1		

AMA 103 A: ORDINARY DIFFERENTIAL EQUATIONS

(Common with paper MA 103 of Branch I(B) Mathematics)

This course introduces fundamental knowledge in mathematics that is applicable in the engineering aspects.

Course objectives:

1. To study boundary value problems.
2. To find solutions of power series and second order linear equations.
3. To provide knowledge on Special functions -Legendre polynomials and properties of Bessel functions
4. To know the method of successive approximation and Picard's theorem

UNIT –I :
Oscillation Theory and boundary value problems: Qualitative properties of solutions –The Sturm comparison theorem-Eigen values, Eigen functions and the vibrating string.

UNIT – II:
Power series solutions: Series solutions of first order equations –Second order linear equations-Ordinary points-Regular singular points- Gauss's hyper geometric equation.

UNIT – III:
Some special functions of Mathematical Physics :Legender polynomials – properties of Legender polynomials –Bessel functions –The gamma function- Properties of Bessel functions.

UNIT-IV:
The existence and uniqueness of solutions: The method of successive approximations-Picard's theorem-systems. The second order linear equations.

Scope and standard as in sections 22 to 24 of Chapter 4 (excluding Appendix A), Sections 26 to 30 of Chapter 5, Sections 32 to 35 of Chapter 6 (Excluding Appendices) and sections 55 to 57 of Chapter 11 of **" Differential Equations with Applications and Historical notes" by George F. Simmons, (1992) Tata McGraw Hill Publications**

References:

1. Advanced Differential Equations, M.D. Raisinghania , S. Chand Publications
2. Differential Equations" Ross, Shepley L Wieley India Pvt LTD.
3. Engineering Mathematics y Bali NP, SatyanarayanaBhavanari, kelkar, University Science Press, New Delhi 2012.
4. An introduction to O.D.E by Earl.A.Coddington , Prentice Hall of India Private Limited, New Delhi 1991.

5. Theory of ODE by Sam Sundaram, Narosa Publications

Course outcomes: From this course students will be able to

1. Learn boundary value problems, Eigen values and Eigen functions
2. Solve the second order linear questions.
3. Apply knowledge on special functions of Mathematical Physics.
4. Understand the method of successive approximation and solve the problems related to Picard's theorem.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	2	3				1	1		
CO2	1	2	3	1	3				1	1		
CO3	1	1	2	2	3				1	1		
CO4	2	2	3	3	2				1	1		

AMA 103 B: Viscous Flows

Course objectives:

1. To introduce and explain fundamentals of Fluid Mechanics, which is used in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics etc.

2. To give fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows.

3. To determine the losses in a flow system, flow through pipes, boundary layer flow and flow past immersed bodies.

UNIT – I:
General theory of stress and rate of strain –Nature of stresses –Transformation of stress components –Nature of Strain Transformation of rates of strain –Relation between stress and rate of strain.

UNIT – II:
Fundamental equations of the flow of viscous incompressible fluids –The equation of continuity -conservation of momentum –the energy equation – conservation of energy –the equations of state –perfect gases –the fundamental equations in cylindrical coordinate – equation of continuity –equations of motion –the energy equation.

UNIT –III:
Laminar flow of viscous incompressible fluids –similarity of flows –The Reynold's number –Viscosity from the point of view of the kinetic energy –Flow between parallel flat plates – couttee flow –plane Poiseuille flow –steady flow through a pipe –the Hagen Poiseuille flow –flow between two co-axial cylinders –Flow between two concentric Rotating cylinders – Applications of the parallel flow theory –The measure of viscosity –Hydro dynamics of bearing Lubrication –Steady flow around a sphere –the theory of very slow motion – unsteady motion os a flat plate

UNIT – IV:
The Laminar Boundary layer –properties of Navier-Stokes equations - Boundary layer concepts –The Boundary layer equations in two dimensional flow –The Boundary layer along a Flat plate –Blasius solution – Shearing stress and boundary layer thickness - Boundary layer as a surface with pressure Gradient –Momentum Integral theorems for the boundary layer –The Von Karman Integral relation.

Course Outcomes: From this course students will be able to

1. Employ Bernoulli's equation for real flow and deduce expressions for orifice meter and Venturimeter.

2. Establish Hagen Poisueille's equation for laminar flow through pipe and parallel plates.

3. The course provides the student with knowledge about: - Formulating and solving problems in fluid mechanics where viscosity and heat conductivity are of importance, in particular at high Reynolds numbers where the boundary layer approximation applies. - Primary focus is on the laminar flow regime. Briefly about stability and transition to turbulence. –

4.Quantitative methods for classical cases, such as Stokes problems, stagnation point flow, Blasius and Falkner-Skan problems, and integral methods for other boundary layers with pressure gradient and possible separation

Standard and treatment as in Articles 4.1 to 4.5 of chapter 4, Articles 5.1 to 5.6, Articles 8.1 to 8.8 of Chapter 8 and Articles9.1 to 9.5a of chapter 9 of **"FOUNDATIONS OF FLUID MECHANICS" by S.W.Yuvan, Prentice Hall of India Pvt.ltd. New Delhi,1969**.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	1	3	2			1	1		
CO2	3	1	2	3	1	2			1	1		
CO3	1	2	1	2	3	1			1	1		
CO4	2	3	3	2	3	1			1	1		

AMA 104 A: NUMERICAL METHODS
(Common with paper AMA 104 of Branch I (B) Applied Mathematics)

Course objectives:

1. To provide suitable Numerical Methods, for obtaining Roots of algebraic and transcendental equations.
2. To study of different methods of Interpolation and approximation.
3. To solve system of equations by suitable methods.
4. To study the various methods of Numerical integration.

UNIT-I:
Solutions of Algebraic and Transcendental Equations: Introduction - Bisection method – Method of False position - Newton Raphson –method solutions of non linear equations – Method of iteration.
[Above topics are from 2.1 to 2.7, 2.12 of Chapter-2 of the Text Book]

UNIT-II:
Interpolation And Approximation: Introduction - Lagrange Interpolation - Newton Divided Differences - Finite Difference Operators - Interpolating Polynomials using finite differences- Gregory- Newton forward difference interpolation- Backward difference interpolation - Stirling and Bessel interpolation - Spline interpolation – cubic splines. Finite differences- newton's formulae for interpolation- central interpolation formulae –gauss central difference formulae- strilling formula- bessels formula – legrange's interpolation formula.
[Above topics are from 3.1, 3.3, 3.6 ,3.7, 3.7.3,3.9.1,3.10, 3.13 of Chapter-3 of the Text Book]

UNIT-II:
Direct methods – matrix inversion method -Gauss Elimination Method - Gauss – Jordan Method – eigen value problems –Iterative Methods
[Above topics are from 6.3.1 to 6.3.4 , 6.3.7 and 6.4 of Chapter-6 of the Text Book]

UNIT-IV:
Numerical integration: Trapezoidal rule- Simpsons rules – numerical solution of ODEs by Picard – Euler - Modified Euler – Runge-Kutta methods.
[Above topics are from.4.1 to 5.4.3 of Chapter- 5 and 7.1 to 7.5 of Chapter- 7of the Text Book]

Text Book:
Scope and standard as in chapters 2,3,5,6 and 7 of "**Introductory methods for Numerical Analysis by S.S.Sastry fourth edition**".

Reference Book:

1. An Introduction to Numerical Analysis by Kendall E. Atkinson.
2. Information Technology and Numerical methods fot Atul Kahate
3. Theory and problems in Numerical Methods with programs in C and C++.
4. Numerical Methods and computing by Ward Cheney and David Kincaid
5. Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International (p) Limited, Publishers, 5th Edition

Course Learning Outcomes:

From this Course Students are able to

1. Solve Algebraic and Transcendental polynomial equations.
2. Understand Interpolation.
3. Solve system of equations by matrix inversion method and iterative method...etc.
4. Analyze and evaluate the accuracy of area, volume by Numerical methods.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	2	3				1	1		
CO2	2	2	2	2	2				1	1		
CO3	2	3	3	3	1				1	1		
CO4	3	3	2	2	2				1	1		

AMA 104 B: BOUNDARY VALUE PROBLEMS

Course objectives:

To learn series solution of some wellknown differential equations, Legendre & Chebysheve polynomials, Fourier &Hankel transforms, linear programming problems and basics of probability.

UNIT-I:

Stability of linear and weakly non-linear systems, continuous dependence and stability properties of linear, non-linear and weakly non-linear systems. Two dimensional systems. (chapter III of text book-1)

UNIT-II:

Stability by Liapunov second method, Autonomous systems, quadratic forms, Krasovski'sMethod. Construction of Liapunov functions for linear systems with constant coefficients. Selection of total energy function as a Liapunov Function, Stability based on first approximation (Chapter V of text book-1)

UNIT-III:

Mathematical Models in Population Dynamics: Introduction, single species Models, Two species Lotka volterra Models, Multi species Models. (chapter VI of text book-1)

UNIT-IV:

Analysis and Methods of non-linear differential equations, Existence theorem, extremal solutions, upper and lower solutions. Existence via upper and lower solutions, Monotone iterative Method and Method of quasilinearlization, Bihari's inequality, Application of Bihari's integral inequality. Non-linear variation of parameters formula Alekseev's formula. (Chapter VI of text book-2)

Text Books:

1. M.Rama Mohan Rao, Ordinary Differential equations, Theory methods and applications, Affiliated East-West Press Pvt.Ltd., New Delhi. (1980).

2. V.Lakshmikantam, S.G.Deo and V.Raghavendra, Text book of ordinary differential equations (second edition) Tata Mc Graw Hill, New Delhi. (1997)

Course Outcomes:

After completing this course the students would be able to:

1. Use the knowledge of Legendre and Chebyshev polynomials.
2. Apply Fourier and Hankel transforms in engineering problems.
3. Solve boundary value problems.
4. Understand the probability theory.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	1	3				1	1		
CO2	2	2	2	1	2				1	1		
CO3	2	3	3	3	1				1	1		
CO4	1	2	3	1	1				1	1		

AMA 105: COMPLEX ANALYSIS

(Common with paper MA 105 of Branch I (B) Mathematics)

Complex analysis, traditionally known as the theory of functions of a complex variable, is the branch of mathematical analysis that investigates functions of complex numbers.

Course Objectives:

1. To define analytic functions and derivative rules of complex functions.
2. To introduce Mobius transformations and explain its applications.
3. To evaluate definite integrals using Cauchy integral formula.
4. To understand power series and expansion of analytic function**.**

UNIT –I :

Differentiation: Analytic Functions : Derivative Rules for Differentiating Complex Functions- The Cauchy-Riemann Equations –Analytic Functions-Geometrical Interpretation of Arg $f^1(z)$ and $\left|f^1(z)\right|$ - Conformal Mapping –The Mapping w = $\frac{az+b}{cz+d}$ - Conformal Mapping of the Extended Plane.

UNIT – II:

Mobius Transformations: The Group Property of Mobius Transformations – The Circle – Preserving Property of Mobius Transformations-Fixed points of a Mobius Transformation-Invariance of Cross Ratio-Mapping of a circle onto a Circle –Symmetry Transformations.

UNIT – III:

Complex Integrals: Cauchy Integral Theorem: Rectifiable Curves-Complex Integrals-The Case of Smooth Curves-Cauchy's Integral Theorem-The Key Lemma proof of Cauchy's Integral Theorem-Application to the Evaluation of Definite Integrals Cauchy's Integral Theorem for a system of Contours. Cauchy's Integral Formula –Morera's Theorem – Cauchy's Inequalities.

UNIT-IV:

Power Series: The Cauchy-Hadamard Theorem – Taylor Series. The Uniqueness Theorem for Power series-Expansion of an Analytic Function in a power series –Liouvill'es Theorem. The Uniqueness Theorem for Analytic functions-A Points and Zeros-Weirstrass' Double Series Theorem-Substitution of One Power Series into Another- Division of Power series.

Scope and Standard as in Chapters 3,5,7,8 and 10 of **" Introductory Complex Analysis" by Richard A. Silverman Dover Publications, Inc. (1972). New York**

References : 1 Complex Variables - . Schaum outline series, 2/E by Speigel
2. An Introductions to Complex Analysis, by C.L. Siegel :North Holland.

Course outcomes:

1. Decide when and where a given function is analytic .
2. Understand the Mobius Transformation.
3. Describe basic properties of complex integration and having the ability to compute such integrals.
4. Understand Power series and expansion of analytic function.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	1	2	2				1	1		
CO2	1	2	2	3	2				1	1		
CO3	2	2	3	3	3				1	1		
CO4	1	3	1	2	2				1	1		

AMA 106: DISCRETE MATHEMATICS
(Common with paper MA 106 of Branch I (B) Mathematics)

The aim of the discrete mathematics is the study of mathematical structure that are fundamentally discrete rather than continuous.

Course Objectives:

1. To learn Normal Forms-Disjunctive-Conjunctive Principal Disjunctive, Principal Conjunctive Normal Forms.
2. Understand predicate calculus.
3. To study the Algebraic systems such as Lattices,Boolean Algebra and Boolean functions
4. To introduce basic concepts of graph theory

UNIT –I :
Normal Forms-Disjunctive-Conjunctive Principal Disjunctive, Principal Conjunctive Normal Forms –Ordering and Uniqueness of Normal Forms. The theory of Inference for the statement Calculus-Rules of inferences – Consistency of Premises-Automatic Theorem proving(Sections 1.3 and 1.4 of Chapter 1)

UNIT – II:
The predicate calculus-Inference Theory of the Predicate Calculus(Sections 1.5 and 1.6 of Chapter 1)

UNIT – III:
Lattices and Boolean Functions: Lattices as partially Ordered sets-Lattices as Algebraic Systems –Boolean Algebra-Boolean Functions- Minimization. (Sections 4.1 , 4.2,4.3 and 4.4 of Chapter 4)

UNIT-IV:
Finite – State Machines-Basic Concepts of Graph Theory –Basic Definitions-Paths-Reach ability, and Connectedness-Matrix Representation of Graphs-Trees (Section 4.6 of Chapter 4 and Section 5.1 of Chapter)

Scope and Standard as in the book " **Discrete Mathematical Structures With Applications To Computer Science" by Tremblay, J.P&Manohar, R-Published by McGraw-Hill International Edition -1987 Edition**

References : 1. Discrete Mathematics & Graph Theory by BhavanariSatyanarana& KunchamSyam Prasad, PHI Publications, New Delhi, Second Edition, 2014.

2. Mathematical Foundation of Computer Science, by Bhavanari Satyanarayana, T.V. Pradeep Kumar, SK. Mohiddin Shaw, BS Publications, Hyderabad.2016.

Course Outcomes:

1. Use standard Normal Forms-Disjunctive-Conjunctive Principal Disjunctive
2. Discuss Inference Theory of the Predicate Calculus
3. Understand Lattices and Boolean Functions.
4. Understand basic concepts of graph theory.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	2	2				1	1		
CO2	1	2	2	3	3				1	1		
CO3	3	1	3	2	3				1	1		
CO4	3	1	2	2	1				1	1		

Audit Course: Human Values and Professional Ethics – I
(Common with paper of Branch I(B) Mathematics)

Course objectives:

1.The main objectives of promotion of Ethics and Human values are as under:

2. To create awareness, conviction & commitment to values for improving the quality of life through education, and for advancing social and human well being.

Unit – I

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment.Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

Unit- II

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.

Unit- III

Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).

Unit – IV

Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths - Aryaastangamarga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.

Unit – V

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

References :

1. John S Mackenjie: A manual of ethics.
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
3. “Management Ethics - integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
4. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
10. SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. CarakaSamhita :Tr. Dr.Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.

14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values , board of Intermediate
16. Education & Telugu Academic Hyderabad
17. I.C Sharma Ethical Philosophy of India. Nagin&coJulundhar.

Course outcomes:

1. Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for others, Living Peacefully, Caring, Sharing, Honesty, Courage, Cooperation, Commitment, Empathy, Self Confidence character, Spirituality, Case study.
2. Human values are the virtues that guide us to take into account the human element when we interact with other human beings.
3. It will be used for respect, acceptance, consideration, appreciation, listening, openness, affection, empathy, and love towards other human beings.

SECOND SEMESTER (EVEN)

AMA 201: MATHEMATICAL MODELLING

Course Objectives:

1) Enable students understand how mathematical models for ODE of first order, second order and system of linear differential equations are formulated, solved and interpreted.
2) Make students appreciate the power and limitations of mathematics in solving practical real-life problems.
3) Equip students with the basic mathematical modeling skills.

UNIT –I

Mathematical modeling through ordinary differential equations of first order.

UNIT-II

Mathematical Modeling through system of ordinary differential equations of first order

UNIT: III

Mathematical Modeling through ordinary differential equations of second order

UNIT IV :

Mathematical Modeling through difference equations : Basic Theory of Linear Difference Equations with constant coefficients- Mathematical Modeling through difference equations in Economics and Finance- Mathematical Modeling through difference Equations in Population Dynamics and Genetics.

Mathematical Modeling Through partial Differential Equations : mass-Balance Equations – Momentum Balance Equations.

Scope and standard as in Chapter 2, Chapter 3, Chapter 4, sections 5.2 to 5.4 Chapters 5 and Sections 6.2 and 6.3 of Chapters 6 in **" Mathematical Modelling" by J.N. Kapur, Wiley Eastern Limited(1988)**

References : 1. Mathematical Modeling –Applications, Issues and analysis – by Vimal K Mishra, ANE Book Publishers –New Delhi
2. Mathematical Modeling by Meerscharet M. Elsevier India Pvt Ltd.

Course Outcomes:

1) Understand what a mathematical model is and explain the series of steps involved in a mathematical modeling process.
2) Identify some simple real-life problems that can be solved using mathematical models, model the problem, solve the resulting problem, and interpret the solution.

3) Acquire basic mathematical modeling skills that will enable them carry out simple modeling tasks individually or as a group.
4) State and explain the different classifications of mathematical models stating examples in each class.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1	2	2	1				1	1		
CO2	3	2	2	3	2				1	1		
CO3	1	2	3	3	3				1	1		
CO4	2	3	2	1	2				1	1		

AMA 202: PARTIAL DIFFERENTIAL EQUATIONS

(Common with paper MA 202 of Branch I (B) Mathematics)

This course is designed to strengthen the fundamental knowledge of P.D.Es which lead to understand the real world problems.

Course Objectives:

1. To provide methods to find solutions of O.D.Es and P.D.Es
2. To find integral surface passing through given surface.
3. To explain methods to solve Linear P.D.Es with constant and Variable coefficients.
4. To discuss the boundary value problems and Laplace's Equation.

UNIT –I:
Differential Equations in more than two variables : Methods of solutions of dx/P =dy/Q = dz/R-Orthogonal trajectories of a system of curves on surface-Pfaffian differential forms and equations in Three variables . (Sections 3,4,5 and of Chapter 1)

UNIT – II:
Partial Differential Equations of the First order: Partial Differential equations-Origins of first order partial differential equations-Cauchy's problems for first order equations-Linear equations of first order-Integral surfaces passing through a given curve –Surfaces orthogonal to a given system of surfaces-Charpit's method.(Sections 1,2,3, 4,5,6 and 10 of Chapter 2)

UNIT – III:
Partial Differential Equations of the Second order: The Origin of second order equations – Linear partial differential with constant coefficients-Equations with variable coefficients.(Sections 1,4 and 5 of Chapter 3)

UNIT-IV:
Laplace's Equations : Elementary solution of Laplace's equation-Families of equipotential surfaces-Boundary value problems – Separation of variables.(Sections 2,3,4 and 5 of Chapter 4)

Scope and Standard as in **" Elements of Partial Differential Equations" by IAN Sneddon** Chapter 1: Section 1 to 6, Chapter 2: Sections 1,2,4,5,6,10 Chapter 3: Sections 1,4,5, chapter 4: Sections 2,3,4,5, Chapter 5: Sec2, Chapter 6: Section 3 and 4.

Reference :

1. Ordinary and Partial Differential Equations by M.D. Raisinghania.
2. Advanced Differential Equations by M.D.Raisinghania, S. Chand Company Limited, New Delhi, 2021.

3. An elementary course to P.D.E by T.Amarnath, Second Edition, Narosa publishing house.

Course outcomes:

Students will be able to

1. solve Pfaffian differenrial equations and find orthogonal trajectories of a curve.

. Analyze the origin of first order PDEs and Integral surfaces passing through a given curve

2. Identify linear and nonlinear PDE and solve nonlinear PDE by Charpit's method.
3. Apply various methods to solve Partial Differential Equations of the Second order.
4. Obtain equipotential surfaces using Laplace's equation.

Course outcomes:

Students will be able to

Analyze the origin of first order PDEs and Integral surfaces passing through a given curve

1. Identify linear and nonlinear PDE and solve nonlinear PDE by Charpit's method.
2. Apply Variables separable methods to solve Laplace Equation in cylindrical or spherical coordinates.
3. Obtain equipotential surfaces using Laplace's equation.
4. Understand the importance of partial differential equations in geometry, physics and other subjects.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	2	1	2				1	1		
CO2	3	3	3	2	2				1	1		
CO3	2	2	3	3	1				1	1		
CO4	2	3	2	3	1				1	1		

AMA 203(A): TOPOLOGY
(Common with paper MA 203 A of Branch I(B) Mathematics)

Topological concepts play important role in the development of modern mathematics and it has large applications in theoretical physics.

Course Objectives:

1. To study basic concepts of Metric spaces.
2. Introduce the basic definitions and standard examples of topological spaces.
3. Define and illustrate a variety of topological properties such as compactness, connectedness and separation axioms.
4. To study the Hausdorff space and normal spaces.

UNIT –I :
Metric spaces:-open sets-closed sets- convergence-completeness and Baire's theorem-Continuous mappings – Cauchy's Inequality and MinKowskisInequality- Euclidean and Unitary Spaces

UNIT – II:
Topological Spaces, definition & examples-open bases and open sub bases- compact spaces

UNIT – III:
Product of spaces-Trychonoff's theorem and loally compact spaces-compactness for Metric spaces.

UNIT-IV:
Separation –T^1 space and Hausdorff spaces –completely regular spaces and Normal spaces –Urysohn's lemma- Tietze extension theorem-Urysohn's imbedding theorem –
Connected spaces.

Articles 9 to 13,16,17,18,21 to 29 and 31 of Chapters II,III,IV,V,andVI of **Introduction to Topology and Modern Analysis" by G.F. Simmons of MC Graw Hill Publishing company, ltd**.

Reference:

1. 'Topology' by K.ChandraSekharaRao, Narosa Publications
2. "Topology" by J.P. Chauhan, J.N. Sharma, Krishna Publications
3. "General Topology" by M.G. Murdeshwar, new age International publications

Course Outcomes:

Upon completion of this course, the student will be able to:

1. Understand to construct topological spaces from metric spaces and using general properties of neighborhoods, open sets, closed sets, basic and sub-basis.
2. Understand Topological Spaces, definition & examples.
3. Know the concepts connectedness, compactness, and Hausdorff property and their general characteristics.
4. Understand the Countability axioms, the separation axioms and normal spaces. And also the classical theorems such as the Uryshon lemma, the Tietze extension theorem.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	3	2	3				1	1		
CO2	3	2	2	2	2				1	1		
CO3	3	3	1	2	1				1	1		
CO4	2	1	3	2	1				1	1		

AMA 203 (B) MAGNETO HYDRO DYNAMICS

Course Objectives:

Magneto hydrodynamics has been successfully applied to a number of astrophysical problems (e.g., to problems in Solar and Magnetosphere Physics), as well as to problems related to laboratory physics, especially to fusion devices. This module gives an introduction to classical magneto hydrodynamics. Students will get familiar with the system of magnetohydrodynamic equations and main theorems that follow from this system (e.g., conservation laws, anti-dynamo theorem). They will study the simplest magnetic equilibrium configurations, propagation of linear waves, and magneto hydrodynamic stability.

UNIT-I :

Three dimensional flows – Introduction – Sources, Sinks and Doublet – Images in a rigid infinite plane –Images in solid sphere – axisymmetric flows – Stroke's stream function – some special forms of the stream function for axisymmetric irrotational motion.

UNIT-II:

Two dimensional flows – Meaning of two dimensional flow – Use of Cylindrical polar co-ordinates – The complex potential for two dimensional, Irrotational Incompressible flow – complex velocity potentials for standard two dimensional flows – examples – Two dimensional Image systems – The Milne-Thomson Circle Theorem – The theorem of Blassius.

UNIT-III:

Magneto Hydro Dynamics: Nature of MHD – Maxwell's Electro magnetic field equations – Medium at rest – Medium in motion – The equation of motion of a conducting fluid – Rate of flow of change – Simplification of the Electro magnetic field equations – The magnetic Reynold's number – Alfven's theorem.

UNIT-IV:

The magnetic body force – Ferraro's Law of Isorotation – The magneto hydrodynamic waves – A more detailed Investigation of Alfven Waves – Laminar flow – of a viscous conducting liquid between parallel walls in a transverse field.

Standard and treatment as in Articles 4.1 to 4.5 of Chapter 4, Articles 5.1 to 5.9 of Chapter 5, Articles 9.1 to 9.10,9.12.1 and 9.14 of Chapter 9 of **"TEXT BOOK OF FLUID DYNAMICS" by F. Chorlton, CBS Publications and Distributors, Delhi, 1985**.

Course Outcomes:

1. Understanding the basic concepts and the equations of flow of viscous fluids.
2.Understanding the electromagnetic induction mechanism which has its origin in the movement of fluids that are good electrical conductors
3. Ability to translate a magnetic hydrodynamic problem in an appropriate mathematical form.
4. Ability to interpret the solutions of the equations established in physical terms.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	1	2	2				1	1		
CO2	2	2	1	3	1				1	1		
CO3	3	2	3	2	3				1	1		
CO4	2	3	1	1	3				1	12		

AMA 204: (A) ADVANCED COMPLEX ANALYSIS

(Common with paper MA 204(A) of Branch I(B) Mathematics)

Course Objectives:

1. To explain Laurent Series, poles and singular points.
2. To understand Residue theorem and its applications.
3. To discuss Laplace's equation, Harmonic functions and Dirichlet problem.
4. To analyse infinite product and Partial Fraction Expansions.

UNIT –I:

Laurent Series-Singular Points: Laurent Series-Laurent's Theorem-Poles and Essential Singular points-Behavior at an Essential Singular point. Picard's Theorem-Behavior at infinity.

UNIT – II:

The Residue Theorem and its Applications: The Residue Theorem-Residues at infinity-Jordan's Lemma-Evaluation of Definite Integrals – The Argument principal-The Theorems of Rouche and Hurwitz-Local Behavior of Analytic Mappings-The Maximum Modulus principle and Schwarz's Lemma.

UNIT – III:

Harmonic Functions: Laplace's Equations-Conjugate Harmonic Functions-Poisson's integral. Schwartz's Formula-The Dirichlet problem.

Conformal Mapping: General Principles of Conformal Mapping –Mapping of the Upper Half-Plane onto a Rectangle –The Schwarz-Christoffel Transformation.

UNIT-IV:

Infinite product and Partial Fraction Expansions: Preliminary Results- Infinite Products-Weierstrass' Theorem –Mittage – Leffer's Theorem – The gamma Functions –Cauchy's Theorem on Partial Fraction Expansions.

Scope and Standard as in **" Introductory Complex Anlaysis" by Richard A. Silverman, Dover Publications, Inc. New York (1972)** Chapter 11 to 15.

Reference:

1. Fundamentals of Complex Analysis- Edward B. Saff, Arthur David Snider, Pearson Education
2. Foundations of Complex Analysis by S. Ponnusamy- Narosa Publications.

Course Outcomes:

1. To learn Laurent Series-Singular Points.
2. Explain the basic properties of complex integration and compute such integrals.
3. Learn topics of contemporary Advanced complex analysis in particular spaces of holomorphic functions, entire functions, harmonic functions and conformal mapping functions.
4. Understand the Infinite product and Partial Fraction Expansions.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	2	3				1	1		
CO2	1	3	2	2	3				1	1		
CO3	1	1	2	3	2				1	1		
CO4	2	3	3	1	1				1	1		

AMA 204 :(B): NON LINEAR ANALYSIS

(Common with paper MA 204 (C) of Branch I (B) Mathematics)

Course Objectives:

1. Analyse and describe Fixed point theory, Banach's Contraction Principle, Schavder's theorem, Krasnoselski's theorems and its applications.
2. Define linear operators, normed spaces.
3. Explain Spectoral theorem and properties of bounded linear operators.
4. To study the Compact Linear operators in normed spaces and their Spectrums

UNIT-I

Fixed point theory and Applications :Banach's Contraction principle (Theorem 4.1.1 of text Book 1) – its applications (Theorem 8.1.1 and Theorem 8.2.4 of text book 1. Schavder's fixed point theorem (Theorem 4.3.10 of text book 1)- its application (Theorem 8.1.3 of text book 1). Krasnoselskii's fixed point theorem (Theorem 4.3.16 of text book 1) – its application to integral equations (theorem 8.2.3 of text book 1)

UNIT-II

Approximation Theory: Approximation in Normed spaces- Uniqueness, strict convexity-uniform approximation- chebyshev polyamines- Approximation in Hilbert space-splines. (Chapter 6 of text book 2)

UNIT-III

Spectral Theory of Linear Operators in Normed Spaces : Spectral Theory in Finite Dimensional Normed Spaces- Basic concepts spectral properties of Bounded linear operators-Further properties of Resolvent and spectrum- Use of Complex Analysis in spectral Theory – Banach algebras –Further properties of Banach algebras. (Chapter 7 of text book 2)

UNIT-IV

Compact Linear operators in Normed spaces and their Spectrums : Compact linear operators on Normed Spaces- Further of Compact linear operators –Spectral properties of compact linear operators on normed spaces – Further spectral properties of compact linear operators –Operator equations involving compact linear operators –Further theorems of fredholm type – Fredholm alternative (Chapter 8 of text book 2)

Text Book:

1. **Mohan C. Joshi and Remendar K. Bose – Some topics in Nonlinear functional Analysis, Wiley Eastern Limited 1985, New Delhi.**
2. **Ervin Kreyszig:- Introductory Functional Analysis with Applications, John Wiley & sons. Inc., 1978, New York.**

Course Outcomes:

1) Explain fixed point theory and its applications by well known theorems.
2) Analyse the approximations in Normed spaces.
3) Use of complex analysis in spectral theory and Banach algebras.
4) Evaluation of spectral theory in normed spaces.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	3	1	2	3				1	1		
CO2	2	1	2	2	3				1	1		
CO3	3	3	1	3	2				1	1		
CO4	2	2	3	2	1				1	1		

AMA 205: MEASURE AND INTEGRATION

(Common with paper MA 205 of Branch I(B) Mathematics)

Course Objectives

1. To acquire basic knowledge of measure Theory.
2. To understand the Riemann integtal and lebesgue integral of a bounded function.
3. To analyze the differentiation of monotone functions of bounded variation.
4. To study the Classical Banach Spaces.

UNIT –I :

Lebesgue Measure: Introduction, Outer measure, Measurable sets and Lebesgue measure, a non measurable set, Measurable functions, Little wood's three principles

UNIT – II:

The Lebesgue Integral: The Riemann integral, the Lebesgue integral of a bounded function over a set of finite measure, the integral of a non negative function, the general Lebesgue integral , convergence in measure.

UNIT – III:

Differentiation and Integration: Differentiation of Monotone functions –Functions of bounded variations-Differentiation of an integral – Absolute continuity –Convex functions.

UNIT-IV:

The Classical Banach Spaces: The $\boldsymbol{L^P}$ Spaces, The MinKowski and Holder inequalities, Convergence and completeness, Approximation in $\boldsymbol{L^P}$,Bounded linear functional on the $\boldsymbol{L^P}$ Spaces.

Syllabus and Scope and Standard as in **" Real Analysis" by H.L. Royden, Prentice Hall of India private limited, New Delhi,2001-Third edition**. Chapter 3, Chapter 4, Chapter 5, and Chapter 6.

Reference:

1. Principles of Mathematical Analysis, Third Edition by Walter Rudin.
2. A Real Analysis by H.L.ROYDEN, III ED., Peasion publishers.

3. Measure theory by P.R. HALMOS, 1974. Spingerverlag.
4. Measure theory by V.I.BOGACHVE, 1997, Spingerverlag.

Course Outcomes:

To document insight in modern theory of integration as a tool in advanced analysis and in statistics.

1. Compute Lebesgue measures.
2. Compute Lebesgue integrals of bounded functions over a set of finite measure
3. Solving the Differentiation and Integration of Monotone functions.
4. Understand the L^P Spaces, the MinKowski and Holder inequalities, Convergence and completeness

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	2	3	1				1	1		
CO2	2	2	1	2	2				1	1		
CO3	1	3	2	3	1				1	1		
CO4	3	1	3	3	2				1	1		

AMA 206: MATHEMATICAL STATISTICS
(Common with the paper MA 206 of Branch I(B) Mathematics)

Course objectives:

1. To introduce basic concepts of statistics and the probability set functions.
2. To study the Binomial, Poisson, Gamma, chi-square, normal distribution.
3. Explain stochastic convergence
4. To explain the objective of Point estimation-Measures of quality of estimations.

UNIT –I :

The probability set function –Random variables –The probability density function –The distribution function-Mathematical expectations-Some special mathematical expectations – Chebyshev inequality. Conditional probability –Marginal and conditional distributions-The Correlation coefficient-Stochastic Independence.

UNIT – II: The Binomial, Poisson, Gamma, chi-square normal distribution. Distributions of functions of Random variables –Sampling theory- Transformation of Variables of Discrete type-Transformation of Variables of the continues type.

UNIT – III:
The t and F Distributions – Distribution of order statistics –The moment –generating function Technique-The Distribution of X and Limiting distribution –Stochastic convergence-Limiting moment generating function-The central limit theorem –Some theorems on Limiting Distribution.

UNIT-IV:
Point estimation-Measures of quality of estimations-confidence intervals for means-confidence intervals for difference of Means-confidence intervals for variances.
A Sufficient statistics for a parameters- The Rao –Blackwell theorem-The Rao Cramer's inequality.

Syllabus and Scope as in **" Introduction to Mathematical Statistics" by Robert V. Hogg Allen T. Craig, Macmillan publishing co., Inc., New York -1978,** section 1.4,1.5,1.6,1.7,1.9,1.10,1.11, of chapter 1, chapter 2, sections 3.1 to 3.4 of chapter 3,

sections 4.1 to 4.4, 4.6 to 4.8 of chapter 4, chapter 5, sections 6.1 to 6.5 of chapter 6, section 10.1, 10.2 chapter 10, section 11.1 of chapter 11.

References : 1. Mathematical Statistics by J.N. Kapur, H.C. Saxena- S. Chand Publications

2. Introduction to Mathematical Statistics Robert V Hogg, Allencraig, Joseph W Mekean , Pearson Publishers
3. Fundamentals of mathematical Statistics by S.C.Gupta and V.K.Kapoor, 11th edition S.Chand and sons, New Delhi
4. Probability and Statistics for engineers and scientists by Walpole Myers and Keying ye, ninth edition, Pearson Publications

Course outcomes:

1. To learn the fundamental concepts of statistics and techniques required for data analysis.
2. Apply the knowledge of Binomial, Poisson, Gamma, chi-square, normal distribution in solving various problems,.
3. To explain stochastic convergence
4. To discuss measures of quanlity of estimations

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	1	1				1	1		
CO2	1	2	3	3	3				1	1		
CO3	1	2	2	3	2				1	1		
CO4	2	3	1	3	3				1	1		

Audit Course –II :HUMAN VALUES AND PROFESSIONAL ETHICS – II

(Common with paper of Branch I(B) Applied Mathematics)

Unit – I

Value Education – Definition – relevance to present day - Concept of Human Values – self introspection – Self esteem, Family values –Components, structure and responsibilities of family- Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Unit – II

Medical ethics – Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and health care professionals, Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit -III.

Business ethics – Ethical standards of business-Immoral and illegal practices and their solutions.Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics

Unit - IV.

Environmental ethics-Ethical theory man and nature-Ecological crisis, Pest control, Pollution and Waste,Climate change, Energy and Population, Justice and Environmental health.

Unit - V.

Social ethics-Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/Pregnancy. Ethics of media-Impact of Newspapers, Television, Movies and Internet.

Books for study:

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" By Larue Tone Hosmer, Richard D. Irwin Inc.

3. “Management Ethics – integrity at work’ by Joseph A. Petrick and John F. Quinn,Response Books: New Delhi.
4. “Ethics in Management: by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haughton.
10. SusrutaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. CarakaSamhita: Tr.Dr.Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, TheoryandContemporarty Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar.

THIRD SEMESTER (ODD)

AMA 301 CONTINUUM MECHANICS
Course Objectives:

1) The purpose of the course is to expose the students to the basic elements of continuum mechanics in a sufficiently rigorous manner.
2) To provide advanced treatment of the fundamental, unifying concepts of the mechanics of continua such as mechanics of viscous fluids, two dimensional flows.

UNIT I:
Kinematics of Fluids in motion (Chapter 2).

UNIT-II
Equations of motion of a Fluid (Chapter 3)

UNIT: III
Some Three –Dimensional Flows(Chapter 4)

UNIT IV :
Some two –Dimensional Flows. (Sections 5.1 to 5.9 of Chapter 5) Scope and standard as in the book **" Text Book of Fluid Dynamics" by F. Chorlton, C.B.S Publishers and Distributors , Delhi, 1985**

References : 1. D.S. Chandrasekharaiah and L. Debnatha Continuum Mechanics – Academic Press -1994
2. A.J.M. Speneer : Continuum Mechanics Long Man, 1980
3. Y. C. Feng, A first Course in Continuum Mechanics – Prentice Hall (2nd Edition) 1997

Course Outcomes:

1) Be able to describe motion, deformation and forces in a continuum.
2) Be able to derive equations of motion and conservation laws for a continuum.
3) Understand constitutive models for fluids and viscoelastic solids.
4) Formulate and solve specific technical problems of displacement, strain and stress.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	1	1				1	1		
CO2	3	1	3	3	2				1	1		
CO3	1	1	2	2	3				1	1		
CO4	2	3	1	3	1				1	1		

AMA 302: FUNCTIONAL ANALYSIS

(Common with paper MA 302 of Branch I (A) Mathematics)

Functional analysis is one of the primary branches of mathematics mainly dealing with a variety of metrics' and linear operators.

Course Objectives:

1) Define and illustrate several normed spaces.
2) Introduce linear operators and derive their properties.
3) Elaborate basic theorems like open and closed mapping theorem, implicit function theorem and spectral theorem.

UNIT –I :

The definitions and some examples –continuous –linear transformations-the Hahn-Banach Theorem.

UNIT – II:

Natural imbedding of N in N**-Open mapping theorem –Conjugate of an Operator.

UNIT – III:

Definition and Simple Properties –Orthogonal Complements- Orthonormal sets – Conjugate spaces-Adjoint of an Operator.

UNIT-IV:

Self adjoint operators –Normal and Unitary Operators-Projection –Spectral theorem.
Scope and Standard as in Sections 46 to 51 of Chapter 9, section 52 to 59 of chapter 10, section 62 of chapter 11 of **" Introduction to Topological and Modern analysis by G.F. Simmons McGraw Hill Book Company**.

References:

1. " Foundations of Functional Analysis" by S. Ponnyusamy-Narosa Publications
2. " Text book of Functional Analysis – A Problem oriented Approach" by V.K. Krishnan-Prentice Halls of India Publishers
3. " Functional Analysis" by B.V. Limaye New age International Publishers

Course Outcomes:

1) Work with different distance metrics and normed spaces,understand continuous linear transformations and the Hahn-Banach Theorem.
2) Comprehend the Open mapping theorem and Closed graph theorem.
3) Construct orthonormal sets and conjugate spaces.
4) Understand the relevance of self-adjoint operators, normal, unitary operators and projections.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	2	2				1	1		
CO2	3	3	2	1	2				1	1		
CO3	2	2	1	2	3				1	1		
CO4	2	3	1	3	1				1	1		

Generic Elective
AMA 303(A): DIFFERENTIAL GEOMETRY
(Common with paper MA 303(A) of Branch I (A) Mathematics)

The aim of the course is to provide knowledge of the geometry of curves and surfaces. The course integrates concepts from different parts of mathematics, such as linear algebra, calculus and differential equations. It also provides intuitive examples for many concepts in linear algebra, calculus and differential equations. These examples are fundamental to physics and mechanics: they play a role in our understanding of the movements of particles and the theory of relativity.

Course Objectives:

1. Define surfaces and their properties
2. Explain local intrinsic properties of a surface
3. Study geodesic equations of conformal mapping
4. Discuss lines of curvature and parallel surfaces

UNIT –I :

The Theory Space Curves: Introductory remarks about space curves –Definitions –Arc length-Tangent, normal, and binormal –Curvature and torsion of a curve given as the intersection of two surfaces –Contact between curves and surfaces-Tangent surface, involutes and evolutes.(Sections 1 to 7 of Chapter 1).

UNIT – II:

The Metric: Local Intrinsic Properties of a Surface: Definitions of a Surface- Curves on a surface-Surfaces of revolution –Helicoids- Metric-Direction Coefficients-Families of curves –Isometric correspondence –Intrinsic properties. (Sections 1 to 9 of Chapter 11).

UNIT – III:

Geodesics-Canonical Geodesic Equations-Normal Property of geodesics –Existence theorems-Geodesic parallels-Geodesic curvature-Gauss-Bonnet theorem –Gaussian curvature-Surfaces of constant curvature –Conformal mapping-Geodesic mapping (Sections 10 to 20 of Chapter 11).

UNIT-IV:

The second Fundamental Form: Local non – intrinsic properties of a surface: The second fundamental form-principal curvatures –Lines of curvature -Developables associated with

space curves-Developables associated with curves on surfaces –Minimal surfaces-Ruled surfaces-The fundamental equations of surface theory –Parallel surfaces. (Sections 1 to 10 Chapter III).

Scope and Standard as in Sections and chapters as specified above of the book **" An Introduction to Differential Geometry" of T.J Willmore, Oxford University Press, Thirteenth Impression, 1997.**

References: 1. A first course in Differential Geometry- D. Soma sundaram – Narosa Publications.

Course Outcomes:

After completing this course, students should be able to

1. Define space curves , curvature and torsion of a curve.
2. Parameterize surfaces and isometric correspondence.
3. Understand geodesic curves and conformal mapping.
4. calculate and analyse curvature of surfaces in different settings.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	3	3				1	1		
CO2	1	2	2	1	2				1	1		
CO3	2	3	3	1	3				1	1		
CO4	1	1	2	3	2				1	1		

AMA 303 (B): Mathematical Methods

Course Objectives:

This course develops a student's proficiency in working with mathematical methods, and it investigates some applications to problems in economics, management and related areas. The course also develops the student's understanding of the theoretical concepts behind these methods.

UNIT –I:

Laplace's wave and Heat Conduction equation, Laplace equation, Wave equation, Heat Conduction equation

UNIT –II:

Applications of Laplace equation to boundary value problems –Applications of Electric circuit –Applications to dynamics, applications to beans Applications to heat conduction equation –Applications to wave equations.

UNIT –III:

Integral Equations: introduction –relation between differential and integral equations – The green's function –linear equations in cause and effect –the influence function (chapter-3 section 3.1 to 3.11)

UNIT –IV:

Fredholm equation with separable kernel –illustrative examples –Hilbert schemed theory – iterative methods for solving equations of second kind –The Neumann series – Fredholm.

TEXT BOOKS

1. Stand as an integral equations by Dr.J.K Goyal Gupta 1st edition. Pragathi prakasam part-2 units 2&3

2. Stand as in methods of applied mathematics by franciesB.Hilbrand ,second edition ,prentice hall of india 1960.

Course Outcomes: After completing this course, students should be able to

1. Knows and can use: a) concepts, results and methods from real analysis of single-variable functions related to limits, continuity, differensiation, integration and differential equations. b) concepts, results and methods related to systems of linear

equations. c) numerical methods for solving equations, integrals and differential equations.

2. Knows some engineering applications of mathematics.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	2	2				1	1		
CO2	3	3	2	1	2				1	1		
CO3	2	2	1	2	3				1	1		
CO4	2	3	1	3	1				1	1		

AMA 304: CLASSICAL MECHANICS

(Common with paper MA 304 of Branch I (B) Mathematics)

Course Objectives:

1) To provide basic knowledge in mechanics to solve a mechanical problem.

2) To understand the concepts of Lagrange's equation and Hamiltonian principle.

3) To discuss Hamilton's equations of motion and principle of least action.
4) To understand canonical transformations.

UNIT –I :

D'Alembert's Principle and Lagrange's Equations: Some Definitions-Classification of Dynamical System-Some Examples of Constraints Virtual Displacement-Principle of Virtual Work –Generalised Force in Holonomic System-Mathematical Expression for the principle of Virtual work-D'Alember's principle-Lagrange's Equations for a Holonomic system-Velocity-dependent potential –Lagrange's Equations of Motion for conservative , Non-holonomic system-physcial Significance of 1 –Harmonic Oscillator.

UNIT – II:

Variational Principle and Lagrange's Equations:Variational Principle-Calculus of Variations-Hamilton Principle-Derivation of Hamilton's Principle from Lagrange's Equations-Derivation of Lagrange's Equations from Hamilton's Principle –Extension of Hamilton's Principle –Hamilton's Principle for Non-conservative, Non-holonomic System –Generlised Force in Dynamic system-Hamilton Principle for Conservative-Non holonomic System -Lagrange's Equations for Non –conservative –Holonomic System – Cyclic or lgnorable Coordinates –Conservation Theorem-Conservation of Linear Momentum in Lagrangian Formulation-Conservation of Angular Momentum in Lagrangian Formulation –Conservation of Angular Momentum –Conservation of Energy in Lagrangian Formulation.

UNIT – III:

Hamilton's Equations of Motion: Derivation of Hamilton's Equations of Motion (using Lagrange's Equations)-Routh's Procedure-Equations of Motion-Derivation of Hamilton's Equations from Hamilton's Principle –Principle of Least Action-Distinction between Hamilton's Principle and Principle of Least Action.

UNIT-IV:

Canonical Transformations: Canonical Coordinates and Canonical Transformations –The necessary and Sufficient Condition for a Transformation to be Canonical –Examples of Canonical Transformations-Properties of Canonical Transformulations- Infinitesimal Contact Transformation-Relation between Infinitesimal Contact Transformation and Poissson's Bracket-Hamilton Jacob Theory –Hamilton-Jacobi equations for Hamilton's Principle Function.

Syllabus and treatment as in the Book **" Classical Mechanics" by C.R. MONDAL Prentice Hall of India PrivateLimited, New Delhi, 110001,2001**, Chapter 1,2,4 and 5.

References: 1. Classical Mechanics by Goldstein Herbert, Charles P Poole, John safiko- Pearson India
2. Introduction to Classical Mechanics by Takwale R. Puranik P, Mc. GrawHill Education

Course Outcomes:

1) Understand D' Alembert's Principle and simple applications of the Lagrangian Formulation.
2) Derive the Lagrange's Equation from Hamilton's Principle.
3) Study the concept of the Equations of Motion and the Equivalent One-Dimensional Problems.
4) Distinguish the concept of the Hamilton Equations of Motion and the Principle of Least Action.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	1	2	2				1	1		
CO2	3	1	2	3	3				1	1		
CO3	3	1	3	2	1				1	1		
CO4	2	1	2	2	2				1	1		

SKILL DEVELOPMENT COURSE

AMA305: MAT-LAB
(Common with paper MA 305 of Branch I (B) Mathematics)

Course Objectives:

1. Getting started with MATLAB
2. To create Matrices.
3. To learn 2D and 3D Plotting Techniques.
4. To know how to write programs to solve algebraic & Transcendental Equations

UNIT-I (Basics of MATLAB)

Getting Started with MATLAB- Different windows-Mathematical Operators and Mathematical functions-Creating matrices and arrays- Matrix algebra-Linear algebra concepts-plotting techniques- 2-D plotting-Subplot- 3-D plotting

UNIT-II (MATLAB Programming)

M-files-Script files-Relational operators-conditional statements-Numerical solutions to algebraic and transcendental equations- Solution of Simultaneous Algebraic Equations.

Syllabus and treatment as in the Book:
Getting Started with MATLAB – A Quick Introduction for Scientists and Engineers, Rudra Pratap, Oxford University Press.

References:
1. Engineering Problem solving with MATLAB, D.M.Etter, Printice-Hall
2. MATLAB Programming for Engineers. (4th ed.), Stephen J. Chapman, Cl Engineering.
3. MATLAB: Demystified -Basic Concepts and Applications, K K.Sarma, Vikas Publishing House Pvt Lt.

Course Outcomes:

1. Understand the mathematical operations & functions.
2. Write a program to addition & multiplication matrices.
3. Understand the 2-D plotting and 3-D plotting techniques.
4. Solve algebraic and transcendental equations.

MATLAB Practicals:

1. Basic 2D-plots

2. Basic 3D-plots

3. Bi-section method

4. False position method

5. Newton Raphson method

6. Creation and operations on Matrices

7. Gauss Elimination method

8. Gauss Jordan method

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	3	1				1	1		
CO2	1	2	1	2	2				1	1		
CO3	3	3	2	3	1				1	1		
CO4	1	3	2	1	2				1	1		

Open Elective (Other Departments)

AMA 306 A: BUSINESS MATHEMATICS -1
(Common with paper MA 306 of Branch I(A) Mathematics)

The Business mathematics contains Investments, Interest, Annuities, Mortgages, Cost, Revenue, Profit, supply and demand, Mathematical Modelling, and optimization,etc.

Course Objectives:

1. To understand the basic concepts of Mathematics.
2. To calculate percentages- profit and loss.
3. To solve Linear equations.
4. To understand Conversion of one Number System to Another.

Unit - I
Number- H.C.F. and L.C.M. of Numbers - Decimal Fractions.

Unit - II
Surds and Indices – Percentage - Profit and loss.

Unit - III
Linear Equations in Two Variables – Ratio and Proportion- Variation.

Unit -IV
Number System: Types of Number Systems – Conversion of Decimal Number to Binary Number and Vice versa -Conversion of Decimal numbers to Octal numbers and Vice versa - Conversion of Hexadecimal number into Decimal number and Vice versa - Binary Arithmetic.
Scope and Standard Treatment as in Chapters 1,2,3,9,10,11,31,12 of"**OBJECTIVEARITHMETIC" , by R.S.AGGARWAL , S.Chand and Company**.
Scope and Standard Treatment as in Chapter 1 of "**BUSINESS MATHEMATICS**", **by P.R.VITTAL , MARGHAM PUBLICATIONS.**

Course Outcomes:

1. Apply the knowledge in mathematics (algebra, matrices, calculus) in solving business problems.
2. Analyse and demonstrate mathematical skills required in mathematically intensive areas in Economics and business.
3. Explain the concepts and use equations, formulae and mathematical expressions and relationships in a variety of contexts
4. Understand The Binary Octal , Octal, Decimal and Hexadecimal Systems.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	1	3				1	1		
CO2	2	2	1	3	1				1	1		
CO3	3	3	1	3	2				1	1		
CO4	1	2	2	3	2				1	1		

AMA 306 B: Fundamentals of Mathematical Statistics

(Common with paper MA B: 306 of Branch I (A) Applied Mathematics)

Course Objectives

1. To introduce basic concepts of statistics and Correlation
2. To know the significance of regression lines.
3. Importance of test of significance.
4. To enable to solve linear equations by Matrix method etc

.

UNIT - I

Correlation analysis: measuring and significance of correlation –types of correlation; important methods of Studying correlation –scatter diagram methods, Karl Pearson's coefficient of correlation, and Rank correlation Coefficient –Coefficient of Determination.

UNIT -II

Regression analysis: Meaning and significance of regression lines, regression equations, Coefficient of regression, standard error of the estimate.

UNIT- III

Test of Significance: (small sample sets only) –t, X2 and F tests and their applications

UNIT - IV

Elements of matrix algebra: Elementary operations –rank of matrix –inverse of a matrix – solutions of linear equations by matrix method and Cramer's rule.

References:

1." Gupta, S.P".Statistical Methods.

2. "Hooda R.P" Statistical for business Economics, Macmillan, New Delhi.

3.Statistical Methods Concepts, applications and computation by Aggarwal YP Sterling Publications.

Course outcomes:

1. To learn the fundamental concepts of statistics and correlation analysis
2. To analyse regression lines.
3. To explain tests of significance
4. To solve liner equations by matrix methods

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	2	3				1	1		
CO2	3	3	1	3	2				1	1		
CO3	1	2	1	2	3				1	1		
CO4	2	3	2	3	1				1	1		

FOURTH SEMESTER

AMA 401: NUMBER THEORY

(Common with the paper MA 401 of Branch (B) Mathematics)

Course Objectives:

1. Identify certain number theoretic functions and their properties
2. Explain the Arithmetical Functions.
3. Understand the concept of a congruence and use various results related to Congruence including the Chinese Remainder Theorem.
4. Discuss Quadratic Residues and its Applications.

UNIT –I:

Arithmetical Functions and Dirichlet Multiplication: Introduction-The Mobius function μ (n)-The Euler totient function $\emptyset$ (n) –A relation connection $\emptyset$ and μ -A product formula for $\emptyset$ (n) - The Dirichlet product of arithmetical functions –Dirichlet inverses and the Mobius inversion formula-The Mangoldt function Λ(n) –Multiplicative functions-Multiplicative functions and Dirichlet multiplication-The inverse of a completely multiplicative function-Liouville's Function λ(n)-the divisor functions $\sigma_\propto$(n) – Generalized convolutions –Formal power series –The Bell series of an arithmetical function –Bell series and Dirichlet multiplications –Derivatives of arithmetical functions-The Selberg identity .

UNIT – II:

Averages of Arithmetical Functions : Introduction –The big oh notation Asymptotic equality of functions-Euler's summation formula –Some elementary asymptotic formulas-The average order of d(n)-The average order of the divisor functions $\sigma_\propto$(n)-The average order of $\emptyset$ (n) -An application to the distribution of lattice points visible from the origin-The average order of μ (n) and of Λ(n) - Another identity for the partial sums of a Dirichlet product.

UNIT – III:

Congruences: Definition and basic properties of congruences-Residue classes and complete residue systems-Linear congruences –Reduced residue systems and the Euler-Fermat theorem- Polynomial congruences modulo p.Langranage's theorem-Applications of Lagarange's theorem-Simultaneous linear congruences – The Chinese remainder theorem – Applications of the Chinese remainder theorem –Polynomial congruences with prime power moduli- The Principle of cross-classification- A decomposition property of reduced residue systems.

UNIT-IV:

Quadratic Residues and the Quadratic Reciprocity Law: Quadratic residues-Lengendre's symbol and its properties –Evaluation of (-1|p) and (2|p) –Gauss' lemma-The quadratic reciprocity law –Applications of the reciprocity law –The Jacobi symbol

Primitive Roots: The exponent of a number mod m. Primitive roots –Primitive roots and reduced residue systems –The nonexistence of primitive roots mod 2^{α} for $\propto \geq 3$.

Scope and Standard as in chapter 2, Chapter 3, Chapter 5, Sections 9.1 to 9.7 of Chapter 9 and Sections 10.1 to 10.3 of chapter 10 by **Tom. M. Apostal , " Introduction to Analytical Number Theory" Springer International Student Edition** .

Course outcomes:

1. Understand arithmetical Functions.
2. Use functions $\Phi(n)$, $\amalg(n)$, $\Lambda(n)$.
3. Understand the definitions of congruences, residue classes and least residues
4. Apply legendary polynomial and application of reciprocity law.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	3	3				1	1		
CO2	1	2	3	2	3				1	1		
CO3	2	3	2	1	2				1	1		
CO4	3	1	1	1	1				1	1		

AMA 402: FLUID DYNAMICS

Course Objectives:

1) Prepare a foundation to understand the motion of fluid and develop concept, models and techniques which enables to solve the problems of fluid flow.
2) Explain Navier –Stokes Equations
3) Analyse the Laminar Boundary Layer in incompressible flow.
4) To Analytic solutions of the Boundary layer equations

UNIT –I

Dynamics of Real fluids- Introduction-Equations of motion for viscous flow .

UNIT-II

Some exact solutions of the Navier –Stokes Equations –Very slow motion

UNIT- III

The Laminar Boundary Layer in incompressible flow -Introduction - The Boundary layer equations.

UNIT IV:

Analytic solutions of the Boundary layer equations

Scope and standard as in chapter 5, sections 6.1,6.2, 6.3.1 to 6.3.4 of Chapter 6 of **" Modern Fluid Dynamics" (Volume I, Incompressible Flow) by N. Curle and H.J Davies, D. Van Nostrand Company Ltd., London, 1968.**

References: 1. Foundations of Fluid Mechanics by S.W. Yuan – Prenctice Hall of India PVT Ltd, New Delhi.

2. An Introduction to Fluid Dynamics by Batchelor G.K., Cambridge Mathematical Library.

Course Outcomes:

1) Be familiar with continuum model of fluid flow and classify fluid/flows based on physical properties of a fluid/flow along with Eulerian and Lagrangian descriptions of fluid motion.

2) Derive and solve equation of continuity, equations of motion, vorticity equation, equation of moving boundary surface, pressure equation and equation of impulsive action for a moving inviscid fluid.
3) Understand Boundary layer Equations.
4) Solve Analytic Boundary layer equations .

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	2	3	3				1	1		
CO2	2	2	1	1	2				1	1		
CO3	3	3	1	1	2				1	1		
CO4	2	3	2	3	1				1	1		

Generic Elective

AMA 403(A) GRAPH THEORY

(Common with the paper MA 403(A) of Branch (B) Mathematics)

Course Objectives:

3. To introduce the fundamental concepts of graph theory
4. To Study the properties of Trees and Connectivity.
3. To explain Eulerian graphs and Hamiltonian graphs
4. To apply Euler Tours and Hamilton cycles in real life .

UNIT –I :

Graphs &Subgraphs: Graphs and simple Graphs-Isomorphism-Incidence and adjacency Matrices-Sub graphs-Vertex Degrees-Paths ad connection –Cyles-Shortest path-Problem-Sperner's Lemma

UNIT – II:

Trees: Trees-Edges and Bonds-Cut vertices, cayley's Formula –Applications-Connected problem

UNIT – III:

Connectivity-Connectivity –Blocks-Application Construction of Reliable communications Networks.

UNIT-IV:

Euler Tours and Hamiltonian Cycles: Euler Tours – Hamilton cycles Application –Chinese Postman Problem –Travelling Salesman Problem .

Scope and standard as in chapters 1 to 4 **" Graph Theory with application" J.A. Bondy and U.S.R. Murthy, M.C. Millan Press**

Rererences : 1. Discrete Mathematics & Graph Theory, by SatyanarayanaBhavanari, K. Syam Prasad, PHI Pvt Ltd, New Delhi Second Edition,2014

2. Mathematical Foundation of Computer Science by SatyanarayanaBhavanari, T. V. Pradeep Kumar, Sk. Mohiddin Shaw, BS Publications, Hyderabad,2016.
3. Graph Theory with applications to Engineering and Computer Science – NarsinghDeo
4. First look at Graph Theory- John Clark Derek Allaw Holton.
5. Introduction to Graph Theory- Robin . J. Wilson
6. Introduction to Graph Theory- Douglas B. West
7. Graph theory with applications to engineering and computer science by Narsing Deo, PHI
8.Discrete mathematics for computer scientists and Mathematics by J.L.Mott, A.Kandel and T.P.Baker, Prentice Hall of India

Course outcomes:

1. Able to define basic concepts of graphs
2. Utilize the Algorithms to find the shortest path, Optimal tree from a given graph.
3. construct reliable communication network.
4. Understand the concepts of practical problems like Chinese postman problem and travelling salesman problem

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	1	2				1	1		
CO2	3	2	3	2	3				1	1		
CO3	3	2	3	1	3				1	1		
CO4	3	1	1	2	3				1	1		

AMA 403 (B) APPROXIMATION THEORY
(Common with the paper MA 403 (B) of Branch I (B) Mathematics)

Course Objectives:

Main objective to teach students many important results on several useful topics including metric spaces.

1) To learn about metric spaces, normed linear spaces, innerproduct spaces, convexity.
2) Describe the existence and unicity of best approximation, characterization of the solution.
3) Description of Algorithms like Polya's Algorithm and Weierstrass Theorem.
4) Discretization Errors in general and Algebraic Polynomials.

UNIT –I :
Nomenclature-Metric spaces-Normed linear space-Inner product spaces-convexity

UNIT – II:
Existence and Unicity of Best approximation-Convex functions-System of Equations with one unknown –Characterization of the solution –The special case n=n+1.

UNIT – III:
Polya's Algorithm-Ascent Algorithm –Descent Algorithm –Interpolation-Weierstrass Theorem.

UNIT-IV:
General linear Families –The Unicity Problem –Discretization Errors: General and Algebraic Polynomials-Markoff and Bernstein inequalities –Remes Algorithm.

Scope and standard as in sections 1 to 7 of chapter 1, sections 1 to 8 of chapter 2, sections 1 to 8 of chapter 3 of "**Introduction to Approximation Theory, E.W. Cheney, "McGraw Hill Book Company.**

References : 1. Fundamentals of Approximation Theory by H.N. Mhaskar-Narosa Publications.
2. Approximation theory and methods, M.j.d. Powell , Cambridge University Press.

Course Outcomes:

1) Know the Basic concepts of Metric spaces And Normed Linear space.
2) Knows existence and uniqueness theorems for the best approximations in various Banach spaces.
3) Knows Bernstein's lethargy theorem and its practical and theoretical implications.
4) Be able to use and analyze the basic methods for polynomial approximations.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	3	1	1				1	1		
CO2	3	1	3	3	2				1	1		
CO3	1	1	2	2	3				1	1		
CO4	2	3	1	3	1				1	1		

AMA 404: OPERATIONS RESEARCH FOR INDUSTRY COMMUNITY DEVELOPMENT

(Common with the paper MA 404 of Branch (B) Mathematics)

Course Objectives:

1) To understand Linear Programming Methods
2) To solve Linear programming problem through Dynamic Programming.
3) To introduce game theory.
4) To analyze Critical path method and program Evaluation and Review Technique.

UNIT –I:

Linear programming: Graphical Method-Simplex Method-Big M Method-Two phase method -Transportation Problem-(Sections 2.4 and 2.5.1, 2.5.2, 2.5.4 of chapter 2,sections 3.2, 3.3 and 3.4 of chapter 3).

UNIT – II:

Dynamic programming: Introduction –Capital Budgeting problem –Reliability improvement problem –Stage coach problem –Optimal subdividing problem –Solution Linear programming Problem through Dynamic Programming (Chapter 8)

UNIT-III:

Game Theory: Introduction -Game with Pure Strategies-Game with Mixed Strategies – Dominance property-Graphical Methods for 2xn and mx2 Games –Linear programming approach to Game Theory (Chapter 12)

UNIT-IV:

Project Management: Guidelines for Network Construction –Critical Path Method (CPM) –Program Evaluation and Review Technique (PERT) (Sections 10.3,10.4 and 10.6 of Chapter 10)

Scope and standard as "OPERATIONS RESEARCH" By pannerselvam, R. published by Prentice Hall of India, New Delhi, 2002Edition.

References: 1. Introduction to Management Sceicne " Operation Research" by Manmohan . P.K. Gupta, Kantiswarup, Sultan Chand & Sons Publishing house.
2. Operations Research –Theory and Applications by J.K. Sharma- Macmillan Publishers, India.
3. Operations Research –by Gupta, Prem Kumar, Hira S. Chand Publishers

Course Outcomes:

1) Formulate some real life problems into Linear Programming Problems.
2) Understand Dynamic Programming.
3) Solve the problems of Game with pure Strategies and Mixed Strategies.
4) Construct Reliable Networks.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	1	3				1	1		
CO2	3	2	2	1	3				1	1		
CO3	2	3	1	2	2				1	1		
CO4	3	2	1	3	1				1	1		

MULTI DISCIPLINARY COURSE /PROJECT WORK

MA 405: COMPUTER ORIENTED NUMERICAL METHODS
(Common with paper AMA 405 of Branch I (A) Applied Mathematics)

Course objectives:

1. To provide the knowledge of the C-Language.
2. To make use of commands and operations.
3. To familiarize the ways of solving complicated mathematical problems numerically.
4. To learn writing programs in C to solve integral and Differential Equations

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UNIT-I:

Fundamentals of C language:

UNIT-I:

Fundamentals of C language:

Constants, Variables, and Data Types –Operators and Expressions –Decision making and Branching: Introduction – Decision making with if Statement –Simple if Statement –The if Else Statement –Nesting of if Else Statements –The Else if Ladder –The Switch Statement – The Operator –The Go to Statement

Decision making and loops: The WHILE Statement – the DO Statement –the FOR Statement – Jumps in LOOPS, Arrays: One dimensional arrays –Two dimensional arrays –Multidimensional arrays.

UNIT –II:

Numerical Integration- – Trapezoidal rule – Simpsons rules – Numerical solution by ODEs by Picard – Euler modified method – Range-Kutta Methods.

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1. Scope and Standard Programming in ANSI C" by E. Balaguruswamy(Sixth edition) Mc. Graw Hill Edition, India.

2. Scope and standard books Information Technology and Numerical methods fot Atul Kahate

Reference:

1. Numerical Methods: Problems and solutions, M.K. Jain, R.K. Jain, SRK Iyengar- New age International Publications
2. Let us "C"- Kanetkar BPB Publications
3. The "C" Programming Language- Kerghan, Brian W, Riechie Dennis M PHI Publisher.

Course outcomes:

1. Gain Knowledge in C-Language
2. Able to use commands and operations of C.

3. Solve integration and ODE problems by numerical methods
4. Write the programming to solve problems in numerical methods.

Practicals:

1. Trapezoidal rule

2. Simpson's $1/3^{rd}$ rule

3. Simpson's $3/8^{th}$ rule

4. Picard's Method

5. Euler method

6. Modified Euler method

7. Range-Kutta Method

8. Milne's Simpson's method

.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	1	2	3	3				1	1		
CO2	3	3	1	2	3				1	1		
CO3	3	1	3	1	1				1	1		
CO4	2	1	3	3	2				1	1		

Open Elective (Other Departments)

AMA 406: BUSINESS MATHEMATICS-II
(Common with paper MA 406 of Branch I(B) Mathematics)

Course Objectives:

1. To understand the basic concepts of Mathematics
2. To have a proper understanding of alligations and mixtures.
3. To solve algebraic Quadratic equations.
4. To understand the given data with data interpretation.

UNITI

Time and Work – pipes &cisterns-Time and distance

UNIT-II

Alligation or Mixture- Simple Interest – Compound Interest

UNIT-III

Algebraic Quadratic equations – series-Arithmetic and Geometric Progressions

UNIT-IV

Data Interpretation- Pie chart-Bar Diagram-Line graphs

1.Scope and Standard Treatment as in Chapters 15,16,17,20,21,22,32,33,41,42,43. Of **"OBJECTIVE ARITHMETIC" , by R.S.AGGARWAL , S.Chand and Company.**
2.Scope and Standard Treatment as in Chapter 1 of "**BUSINESS MATHEMATICS**"**, by P.R.VITTAL , MARGHAM PUBLICATIONS.**

References:

1. Quick Arithmetic by Ashish Aggarwal S.Chand
2. Quantitative Aptitude for competitive Examinations bu Dr. R.S. Aggarwal

Course Outcomes:

- Able to solve problems on Time and work, Distance
- Understand the mixtures and also learn to calculate the Simple interest and compound interest.
- Find roots of Algebraic equations and sum and terms of given series.
- Analyse the data from charts and graphs..

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12

CO1	3	3	3	2	3				1	1		
CO2	1	2	3	1	2				1	1		
CO3	3	3	2	3	2				1	1		
CO4	1	2	3	3	1				1	1		

AMA 406(B): BASIC MATHEMATICS FOR SOCIAL SCIENCES (EE)
(Common with paper MA 305 (C) of Branch I (A) Mathematics)

Course Objectives:

1. Understand the basic concepts of a vector space and linear transformations.
2. Study Taylor and Maclaurin's series.
3. Discuss methods of integration to find length,area and volume of regions.
4. Introduce the Numerical Techniques to find roots of equations and solutions of linear equations.

UNIT –I :

Linear Algebra : Matrices-Rank of a matrix, Elementary transformations of a matrix, Inverse of a Matrix, System of linear equations, Linear transformations, Eigen values and Eigen vectors. Vector Analysis-Definition of a vector, Vector addition, Vector manipulation – Scalar product, Vector ; Orthogonal components manipulation-Scalar product, Vector product; Orthogonal components of a vector, Differentiation of vectors.

UNIT – II:

Differential Calculus : Limits and Continuity, Differentiation of functions, Successive differentiation, Leibnitz's theorem for nth derivative, Taylor's and Maclaurin's series, Applications to maxima and minima of functions, partial differentiation, Euler's theorem.

UNIT – III:

Integral Calculus: Introduction, Integration –by substitution, by parts, by partial fractions: Definite integrals, Applications to areas, length, and volumes.
Differential Equations: Equations of 1 st order and 1st degree.

UNIT-IV:

Numerical Methods –I Computer arithmetic, Representation of numbers, computer errors in representing numbers, Finding roots of equations-Bisection, Newton, and Secant methods; Interpolation and Numerical differentiation- Polynomial interpolation, Newton-Gregory forward interpolation, Backward differences; Numerical integration-Trapezoidal and Simpson's rules Elements of matrix algebra-elementary operations – rank of matrix-inverse of a matrix-solutions of linear equations by matrix method and Cramer's rule .

Text Books :

1. Grewal B.S. Elementary Engineering Mathematics, 10th edition, Khanna publishers
2. Cheney W. and Kincaid D, Numerical Mathematics and Computing, vikas Publications, 2003.

References:

1. Lispschutz S, and Lipson M, Schaum'sOut line of Linear Algebra, McGraw-Hill, 2000.
2. Ayres F, and Mendelson E, Schaum's Outline of Calculus, 4th edition, Mc.Graw-Hill, 1999.
3. Rajaraman V, Computer Oriented Numerical Mehtods, 3rd edition, PHI 1993.
4. Finite Dimensional vector spaces by Paul R.Halmas,2nd edition, Princeton N.J.D Company,1918.

5. Linear algebra by K.Hoffman and R.Kunze 2nd edition,Pearson Education Taiwan ltd.
6. Numerical Methods:Problems and solutions M.K.Jain, R.K.Jain, SRK.Iyengar, Newage International publications

Course Outcomes:

1. Understand the concepts of vector spaces with bases, algebra of Transformations and orthogonal components.
2. Understand the concepts of Limit, continuity &differentiation of functions.
3. Apply Integrals to find areas, length & volume of regions.
4. Apply the numerical Techniques to solve differential equations &Algebraic equations.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	3	3	1				1	1		
CO2	3	1	2	2	3				1	1		
CO3	3	1	1	3	3				1	1		
CO4	3	2	1	2	2				1	1		

PROGAMME: M.Sc.,(MATHEMATICS & APPLIED MATHEMATICS)
SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF MATHEMATICS
Question papers for both mathematics &applied mathematics

M.sc. DEGREE, EXAMINATIONS

FIRST SEMESTER

BRANCH:-Mathematics

MA 101: Paper I: ALGEBRA

(Under the CBCS & Non CBCS w.e.f.2017-2018)

(Regular/Supplementary)

Time:3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. All questions carry **equal** marks. 4X5=20

1. State and prove Cayley's theorem

2. Let $\sigma = (1\ 5\ 3)\ (1\ 2)$, $\tau = (1\ 6\ 7\ 9)$. compute $\sigma\ \tau\ \sigma^{-1}$?

3. Let $n=\Pi_{j=1}^{k} P_{fi}\ p_j$ distinct primes. Then find the number of non isomorphic abelian groups of order n is $\Pi_{j=1}^{k} |P(F_j)|$?

4. If the order of a finite group G is divisible by a prime number p, then prove that G has an element of order p.

5. Prove that f:R→S be a homomorphism of a Ring R into a Ring S. Then prove that Ker f ={0} if and only if f is one-one

6. Prove that in a nonzero commutative ring with unity, an ideal M is maximal if and only if R/M is a field.

7. Define Euclidian domain, prove that ring of Gaussian integers in Euclidian domain.

8. If f(x), g(x) ∈ R[x], then prove that C (fg) =C (f).C(g).

SECTION-B

Answer **ALL** questions. All questions carry **equal** marks 4X15=60

UNIT – I

9. Let G be a finite group order of p^n, where p is prime and n>o. Then prove that

a) G has a nontrivial center Z?

b) Z∩N is a nontrivial for any nontrivial normal subgroup N of G?

OR

10 a) If a permutation $\sigma \in S_n$ is a product of r transpositions and also a product of s transpositions. Then prove that r and s are either both even or both odd.

b) Prove that A_n, n>4 , is the only nontrivial normal subgroup of S_n.

UNIT – II

11. State and prove Fundamental theorem of finitely generated abelian groups.

(OR)

12. State and prove first Sylow theorem

UNIT – III

13 a) State and prove fundamental theorem of Homomorphism.

b) If D is a division ring that show that $R \neq D_n$ has no trivial ideals.

(OR)

14. a) Let R be Boolean ring then show that each prime ideal P=R is maximal.

b) Let R be a commutative principal ideal domain with each identity in which each ideal is prime then show that R is a field

UNIT – IV

15. Prove that Every PID is a UFD, but converse need not be true.

(OR)

16. If R is UFD then prove that R[x] is also U.F.D

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B-236-01-02

M.Sc. DEGREE EXAMINATIONS, AUGUST - 2021

FIRST SEMESTER

BRANCH : MATHEMATICS/APPLIED MATHEMATICS

MA - 102 : Paper - II : REAL ANALYSIS

(Under CBCS & Non - CBCS w.e.f. 2016-2017)

(Common to Supplementary candidates also i.e., who appeared in 2015 and earlier

90 marks)

Time : 3 Hours **Max. Marks : 80**

SECTION - A

Answer any **Four** questions. All questions carry **equal** marks. **(4×5=20)**

1. If P* is a refinement of P, then show that $L(P,f,\alpha)\le L(P^*,f,\alpha)$ and $U(P^*,f,\alpha)\le U(P,f,\alpha)$.

2. Let $f\in R$ on [a,b]. For $a\le x\le b$, put $F(x)=\int_a^x f(t)dt$. Then prove that F is continuous on [a, b].

3. Show that there exists a real continuous function on the real line which is nowhere differentiable.

4. If K is a compact metric space, if $f_n\in C(K)$ for n = 1,2,3..... and if $\{f_n\}$ converges uniformly on K then prove that $\{f_n\}$ is equicontinuous on K.

5. For what values of m and n is the integral $\int_0^1 x^{m-1}(1-x)^{n-1}\log x\,dx$ convergent?

6. Test for convergence the integral $\int_0^\infty \frac{x\tan^{-1}x}{\left(1+x^4\right)^{\frac{2}{3}}}dx$.

7. Show that Z = f(x^2y) where f is differentiable, satisfies $x\left(\frac{\partial z}{\partial x}\right)=2y\left(\frac{\partial z}{\partial y}\right)$.

8. Find the maxima and minima of the function $f(x,y)=x^3-y^3-3x-12y-20$.

[Total No. of Pages : 2

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B-236-01-03

M.Sc. DEGREE EXAMINATIONS, AUGUST - 2021

FIRST SEMESTER

BRANCH : MATHEMATICS/APPLIED MATHEMATICS

MA - 103 : Paper - III : ORDINARY DIFFERENTIAL EQUATIONS

(Under CBCS and Non - CBCS w.e.f. 2016-2017)

(Common to Supplementary candidates also i.e., who appeared in 2015 and earlier 90 marks)

Time : 3 Hours **Max. Marks : 80**

SECTION - A

Answer any **Four** questions. All questions carry **equal** marks. **(4×5=20)**

1. Find the normal form of Bessel's equation $x^2y'' + xy' + (x^2 - p^2)y = 0$.
2. Find the eigen values and eigen functions for the equation $y'' + \lambda y = 0$ with boundary condition $y(0) = y(\pi) = 0$.
3. Find a power series solution for the differential equation $y' + y = 1$.
4. Locate and classify the singular points on the x axis for the equations $x^2y'' + (2-x)y' = 0$.
5. Show that $(n+1)P_{n+1}(x) = (2n+1)xp_n(x) - nP_{n-1}(x)$.
6. Show that $\frac{d}{dx}[j_0(x)] = -j_1(x)$.
7. Calculate the first four terms by the successive approximation for the initial problem $y' = x + y, y(0) = 1$.
8. Show that $f(x,y) = xy^2$ satisfies a lipschitz condition on any rectangle $a \le x \le b$ *and* $c \le y \le d$.

SECTION - B

Answer **All** questions. All questions carry **equal** marks. **(4×15=60)**

UNIT - I

9. i) State the prove Sturm separation theorem.

   ii) Let u(x) be any non trivial solution of $u'' + q(x)u = 0$ where q(x) > 0 where q(x) > 0 for all $x > 0$. If $\int_1^\infty q(x)\,dx = \infty$, then show that u(x) has infinitely many zeros on the positive x-axis.

(OR)

10. If $y(x)$ is a non trivial solution of $y'' + q(x)y = 0$, show that $y(x)$ has an infinite number of positive zeros if $q(x) > \frac{k}{x^2}$ for some $k > \frac{1}{4}$ and only a finite number if $q(x) < \frac{1}{4}x^2$.

UNIT - II

11. Find the two independent Frobenius series solutions of the equation $xy'' + 2y' + xy = 0$.

(OR)

12. Find the solution of Gauss hypergeometric equation $x(1-x)y'' + [c-(a+b+1)x]y' - aby = 0$ where a,b,c are constant at the point $x = 0$.

Unit - III

13. Derive the Rodrigue's formula for legendre's polynomials.

(OR)

14. Show that $\int_0^1 x j_n(\lambda_m(x))\, j_n(\lambda_k(x))\, dx = \begin{cases} 0 & \text{if } m \neq n \\ \frac{j_{n+1}(\lambda_k)^2}{2} & \text{if } m = n \end{cases}$

UNIT - IV

15. State and prove Picard's theorem.

(OR)

16. Let f(x,y) be a continuous function that satisfies a lipschitz condition $|f(x_1,y_1) - f(x_1,y_2)| \leq k|y_1 - y_2|$ on a strip defined by $a \leq x \leq b$ and $-\infty < y < \infty$. If (x_0,y_0) is any point of the strip, then prove that the initial value problem $y' = f(x,y), y(x_0) = y_0$ has one and only one solution y = y(x) on the interval $a \leq x \leq b$.

B-236-01-03 A

B-236-01-03 B

M.Sc. DEGREE, EXAMINATIONS

FIRST SEMESTER

BRANCH:-Mathematics/Applied Mathematics

MA/AMA 103 (B): PAPER III—LINEAR ALGEBRA

(Under the CBCS & Non CBCS w.e.f.2021-2022)

(Regular/Supplementary)

Time: 3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. **All** questions carry equal marks. 4X5=20

1. Suppose F is the field of complex numbers and A=$\begin{bmatrix} -1 & i \\ i & 3 \\ 1 & 2 \end{bmatrix}$

2. Consider the system of equations $x_1 - x_2 + 2x_3 = 1$
$2x_1 + 2x_3 = 1$
$x_1 - 3x_2 + 4x_3 = 2.$
Does this system have a solution? If so, describe explicitly all solutions.

3. Define Linearly dependent and Linear Independent. Give examples?

4. Let T be the (unique) linear operator on C^3 for which $T\epsilon_1$, = (1, 0, i), $T\epsilon_2$ = (0, 1, I), $T\epsilon_3$ = (i, 1, 0). Is T invertible?.

5. Find a projection E which projects R^2 onto the subspace spanned by (1, - 1) along the subspace spanned by (1,2).
6. How many possible Jordan forms are there for a 6 X 6 complex matrix with characteristic polynomial $(x + 2)^4 (x - 1)^2$?
7. Let f be the bilinear form on R^2 defined by f $((z_1, y_1), (x_2, y_2) = x_1y_1 + x_2y_2$.
Find the matrix off in each of the following bases: {(l, 0) ,(0,1)} { ((1, -1), (1, 1)}, {(l, 2),(3,4)}
8. Find a matrix in 0(3, C) whose first row is (2i, 2i, 3).

SECTION B

Answer All questions. Each question carries 15 Marks. 4X15=60

UNIT-I

9. a) Suppose F is the field of rational numbers, and A=$\begin{bmatrix} 2 & -1 & 3 & 2 \\ 1 & 4 & 0 & -1 \\ 2 & 6 & -1 & 5 \end{bmatrix}$

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We shall perform a finite sequence of elementary row operations on A.

b) Find row reduced matrix which is row equivalent to A=$\begin{bmatrix} i & -(1+i) & 0 \\ 1 & -2 & 1 \\ 1 & 2i & -1 \end{bmatrix}$.

OR

10. a) Prove that an elementary matrix is invertible.

b) . Let us find the inverse of A=$\begin{bmatrix} 1 & \frac{1}{2} & \frac{1}{3} \\ \frac{1}{2} & \frac{1}{3} & \frac{1}{4} \\ \frac{1}{3} & \frac{1}{4} & \frac{1}{5} \end{bmatrix}$.

UNIT-II

11 .a) Let T be the linear operator on R^2 defined by $T(x_1, x_2) = (x_1, 0)$. We showed that the matrix of T in the standard ordered basis $\mathcal{B}=\{\epsilon_1,\epsilon_2\}$ is $[T]_{\mathcal{B}}=\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$.

b) Let V be a finite-dimensional vector space over the field F, and let W be a subspace of V. Then dim W + dim W^0 = dim V.

OR

12. Prove that S is any subset of a finite-dimensional vector space V, then $(S^O)^O$ is the subspace spanned by S.

UNIT-III

13. State and prove Primary Decomposition Theorem.

OR

14. Let A be the complex matrix A=$\begin{bmatrix} 2 & 0 & 0 & 0 & 0 & 0 \\ 1 & 2 & 0 & 0 & 0 & 0 \\ -1 & 0 & 2 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 2 & 0 \\ 1 & 1 & 1 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 & 1 & -1 \end{bmatrix}$ Find the Jordan form for A.

UNIT-IV

15. Let V be a finite-dimensional vector space over a field of characteristic zero, and let f be a symmetric bilinear form on V. Then there is an ordered basis for V in which f is represented by a diagonal matrix.

OR

16. Let f be a non-degenerate bilinear form on a finite dimensional vector space V. The set of all linear operators on V which preserve f is a group under the operation of composition.

M.Sc. DEGREE, EXAMINATIONS

FIRST SEMESTER

BRANCH:-Mathematics/Applied Mathematics

MA/AMA 104 (A): PAPER IV— NUMERICAL METHODS

(Under the CBCS & Non CBCS w.e.f.2021-2022)

(Regular/Supplementary)

Time: 3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. **All** questions carry equal marks. 4X5=20

1. Find the real root of the equation using Newton's Raphson method.

2. i) Write the first and second approximation formulae of the method of false position.

ii) Define Algebraic and Transcendental functions.

3. Define forward differences.

4. Show that $\Delta^2 = \delta^2 E$

5. Use Gauss elimination
$$2x + y + z = 10,$$
$$3x + 2y + 3z = 18,$$
$$x + 4y + 9z = 16.$$

6. Explain briefly the power function. Write the formula of Trapezoidal rule.

7. Write the formula of Simpson's 3/8 rule.

8. Write the iterative formula of Modified Euler's method.

SECTION B

Answer All questions. Each question carries 15 Marks. **4X15=60**

UNIT-I

9. Find a real root of the equation f(x) = x3 – x – 1 = 0 using Bisection method.

(OR)

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10. Using iteration method, find the real root of the equation

$$1 - x + \frac{x^2}{(2!)^2} - \frac{x^3}{(3!)^2} + \frac{x^4}{(4!)^2} - \cdots = 0.$$

UNIT-II

11. The population of a town in the decimal census was as given below. Estimate the population for the year 1951 using Newton's backward difference interpolation formula.

Year	Population (in thousands)
1921	46
1931	66
1941	81
1951	93
1961	101

(OR)

12) Using Stirling's formula to find U_{32} from the following table:

U_{20} = 14.035, U25 = 13.674, U30 =13.257,

U_{35} = 12.734, U40 = 12.089, U45 = 11.309.

UNIT-III

13. Solve the system

$$5x - 2y + z = 4,$$
$$7x + y - 5z = 8,$$
$$3x + 7y + 4z = 10.$$

Using (i) Gauss elimination and (ii) Gauss – Jordan Methods.

(OR)

14. Use the iterative method to find the largest eigen value and the corresponding eigen vector of the matrix A = $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$.

UNIT-IV

15. Using this rule, evaluate I = $\int_0^1 \frac{1}{1+x}\, dx$. with h = 1/6, (simpson's 1/3 rule).

(OR)

16. Use the Runge-Kutta method to solve $10\frac{dy}{dx} = x^2 + y^2$, y(0) = 1for the interval $0 < x \leq 0.4$ With h = 0.1.

B-236-01-04-B

M.Sc. DEGREE, EXAMINATIONS

FIRST SEMESTER

BRANCH:-Mathematics/Applied Mathematics

MA/AMA 104 (B): PAPER IV (B) — LATTICE THEORY

(Under the CBCS & Non CBCS w.e.f.2021-2022)

(Regular/Supplementary)

Time: 3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. **All** questions carry equal marks. 4X5=20

1. Let K be the set of all circles of a plane. Define a relation $k_1 \leqq k_2$, for $k_1, k_2 \in K$ iff the circle k_1 is contained in the k_2. Show that K is partially orders ordered set with respect to the relation '$\leqq$'

2. Every sub chain of a partly ordered subset satisfying the maximum (minimum) condition has a greatest (least) element.

3. For any elements a, b of a lattice $a \cap b = a \cup b$ if and only if, a = b.

4. Find all lattices of at most six elements and draw their diagrams.

5. Show that the subset lattice of every set is complete.

6. Every order preserving mapping of a complete lattice into itself has a fix element.

7. A group G is called a generalized cyclic group if every finite subset of G generates a cyclic subgroup. We shall prove that the subgroup lattice of every group of this type is distributive.

8. For the elements x, y, z of a distributive lattice $x \cap z = y \cap z$ and $x \cup z = y \cup z$ imply$x = y$.

SECTION B

Answer All questions. Each question carries 15 Marks. **4X15=60**

UNIT-I

9 (a) Show that Every (non-void) finite partly – ordered set can be represented by a diagram.

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(b) State and prove KURATOWSKI – ZORN lemma.

(Or)

10. (a) Let φ be an order isomorphism of the partly ordered set $p_1$onto the partly ordered set p_2. If a subset R_1 of P_1has an infimum in P_2, the set $R_2 = \{\varphi(x)\}_{x\in R1}$ will have an infimum in $P_2, inf_{P_2} R_2 = \varphi\ (inf_{P_1} R_1)$. The corresponding statement for suprema also holds.

(b) A partly ordered set can satisfy both the maximum and minimum conditions

if and only if, every one of its sub chains is finite.

UNIT-II

11. (a) Every lattice has the following property For any elements a, b of the lattice, a ∩ b = b if, and only if, b ∪ a = a?

(b) With respect to the ordering $a \leqq b \Leftrightarrow a \cap b = a\ (a, b \in L)$, every finite subset

{a1, . ., an} of the lattice L has an infimum and a supremum, namely,

$\inf_L \{a_1, \ldots, an\} = \bigcap_{j=1}^{n} a_j$, aj, $\sup L\ \{a_1, \ldots, a_n\} = \bigcup_{j=1}^{n} a_j$

(Or)

12. (a) Every lattice has at most one minimal and one maximal element; these elements are at the same time the least and greatest element of that lattice.

(b) In a lattice satisfying the maximum condition, every one of its elements can be represented as the meet of a finite number of meet-irreducible elements.

UNIT-III

13. (a) I f a lattice satisfies both the maximum and the minimum condition (in particular, if it is of finite length), it is complete.

(b) If we affix bound elements to a conditionally complete lattice, we obtain a complete lattice.

(or)

14. (a) Let φ be a closure operation of a complete lattice L. The set Z_φ of the $\varphi -$ closed elements of L is itself a complete lattice with respect to the ordering in L; that is, for every subset R of Z_φ, $inf_{Z_\varphi} R = \inf_L R,\ sup_{Z_\varphi} R = \varphi\ (sup_L R)$.

(b) I f the pair of mappings σ, τ establishes a Galois connection between the partly ordered sets S, and T, then $\tau\sigma$ is a closure operation of S, and $\tau\sigma$ is a closure operation of T . If S and T are complete lattices, then the set Z_S of the $\sigma\tau$ - closed elements of S as well as

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the set Z_T of the $\sigma\tau$ -closed elements of T are likewise complete lattices, and σ is a dual isomorphism of Z_s onto Z_r, while τ is a dual isomorphism of Z_r onto Z_s.

UNIT-IV

15. (a) The dual, every sub lattice and every homomorphic image of a distributive lattice is likewise a distributive lattice.

(b) A lattice L is modular if and only if, every triplet a, b, c of L satisfies the equation

$$a \cup \big(b \cap (a \cup c)\big) = (a \cup b) \cap (a \cup c)$$

(or)

16. (a) A lattice is modular if and only if, every triplet of elements a, b, c (a $\leqq$ c) has a median. In fact, if a $\leqq$ c, then $(a \cap b) \cup (b \cap c) \cup (c \cap a) = (a \cap b) \cup (b \cap c) \cup a = a \cup (b \cap c)$ and $(a \cup b) \cap (b \cup c) \cup (c \cup a) = (a \cup b) \cap (b \cup c) \cap a = (a \cup b) \cap c$.

(b) A lattice is distributive if and only if, it has no sub lattice isomorphic with either one of the lattices.

SECTION - B

Answer **All** questions. All questions carry **equal** marks. (4×15=60)

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M.Sc. DEGREE EXAMINATIONS, AUGUST -2021

FIRST SEMESTER

BRANCH : MATHEMATICS/APPLIED MATHEMATICS

Paper - V : COMPLEX ANALYSIS

(Under CBCS & Non - CBCS w.e.f. 2017-2018)

Time : 3 Hours **Max. Marks :80**

SECTION - A

Answer any **Four** questions. **All** questions carry **equal** marks. **(4×5=20)**

1. Show that the function $f(z) = e^x(\cos y + i \sin y)$ is analytic in the whole plane and hence find $f'(z)$.
2. Find the entire linear transformation with fixed point $1+2i$ carrying the point i into the point $-i$.
3. Define a Möbius Transformation. Show that the set M of all Möbius Transformations is a group of transformations.
4. Find the *Möbius* transformation which carries the points $-1, i, 1+i$ into the points $0, 2i, 1-i$.
5. Evaluate the integral $\int_L x dz$, where L is the line segment joining the point $z = 0$ to the point $z = 2 + i$.
6. If f(z) is analytic on a domain G and if G contains the circle $\gamma_\rho : |z - z_0| = \rho$ and its interior, then show that $f(z_0) = \frac{1}{2\pi}\int_0^{2\pi} f(z_0 + \rho e^{i\theta}) d\theta$, that is, the value of f(z) at the point z_0 equals the average of its values on the circle γ_ρ with centre z_0.
7. Find the radius of convergence of the power series $\sum_{n=1}^{\infty} \frac{n!}{n^n} Z^n$.
8. Expand the function $f(Z) = \frac{z}{z+2}$ in a Taylor series at the point Z = 1.

B- 236-01-06

M.Sc. DEGREE, EXAMINATIONS
FIRST SEMESTER
BRANCH:-Mathematics/Applied Mathematics
MA/AMA 106: PAPER VI — DISCRETE MATTHEMATICS
(Under the CBCS & Non CBCS w.e.f.2021-2022)

Time : 3 hours Max. Marks :80

SECTION – A

Answer any FOUR questions

All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Obtain conjunctive normal form $(P \to Q) \wedge \neg P) \to \neg Q$.

2. Determine whether the conclusion $C : P$ follows logically from the premises $H_1 : P \to Q$ and $H_2 : \neg Q$.

3. Symbolize the statement "All men are giants".

4. Show that $(x)(P(x) \to Q(x)) \wedge (x)(Q(x) \to R(x)) \Rightarrow (x)(p(x) \to R(x))$.

5. Draw the diagram of lattice (S_{24}, D).

6. Define Sublattice. Prove that every closed interval of a lattice is a sublattice.

7. If $S_i \equiv S_j$ then show that $\delta(S_i, x) \equiv \delta(S_j, x)$ for any input sequence "x".

8. Define adjacency matrix, path matrix of a graph with examples.

[P.T.O.]

SECTION – B

Answer ALL questions.

All questions carry equal marks.

(Marks : $4 \times 15 = 60$)

9. (a) Obtain sum-of-products canonical form of $P \rightarrow ((P \rightarrow Q) \wedge \neg(\neg Q \vee \neg P))$.

   (b) Obtain product of sum canonical form of $(P \wedge Q \wedge R) \vee (P \wedge R \wedge Q) \vee (\neg P \wedge \neg Q \wedge \neg R)$.

Or

10. (a) Show that $R \rightarrow S$ can be derived from the premises $P \rightarrow (Q \rightarrow S)$, $\neg R \vee P$, and Q.

    (b) Show that $S(\neg Q \wedge (P \rightarrow Q)) \rightarrow \neg P$.

11. (a) Indicate free and bound variable in the expression $(x)(p(x) \wedge R(x)) \rightarrow (x)P(x) \wedge Q(x)$.

    (b) Find the truth values of $(x)(p(x) \vee Q(x))$, where $P(x) : x = 1 Q(x) : x = 2$ and the universe of discourse is {1, 2}.

Or

12. (a) Show that $(\exists x)M(x)$ follows logically from the premises $(x)(Hx) \rightarrow M(x)$ and $(\exists x)H(x)$.

    (b) Show that $(x)(P(x) \vee Q(x)) \Rightarrow (x)P(x) \vee (\exists x)Q(x)$.

13. (a) Show that a lattice is distributive if and only if $(a * b) \oplus (b * c) \oplus (c * a) = (a \oplus b) * (c \oplus a)$.

    (b) State and prove Modular inequalities.

Or

14. (a) Use the Karnaugh map representation to find a minimal sum-of-products expression of the function $f(a, b, c, d) = \sum(0, 1, 2, 3, 13, 15)$.

    (b) Obtain the sum-of-products canonical form of the Boolean expression $x_1 x_2' + x_3$.

15. (a) Let S be any state in a finite state machine and x, y be any words. Then show that $\delta(S, xy) = \delta(\delta(S, x), y)$ and $\lambda(s, xy) = \lambda(\delta(S, x)\, y)$.

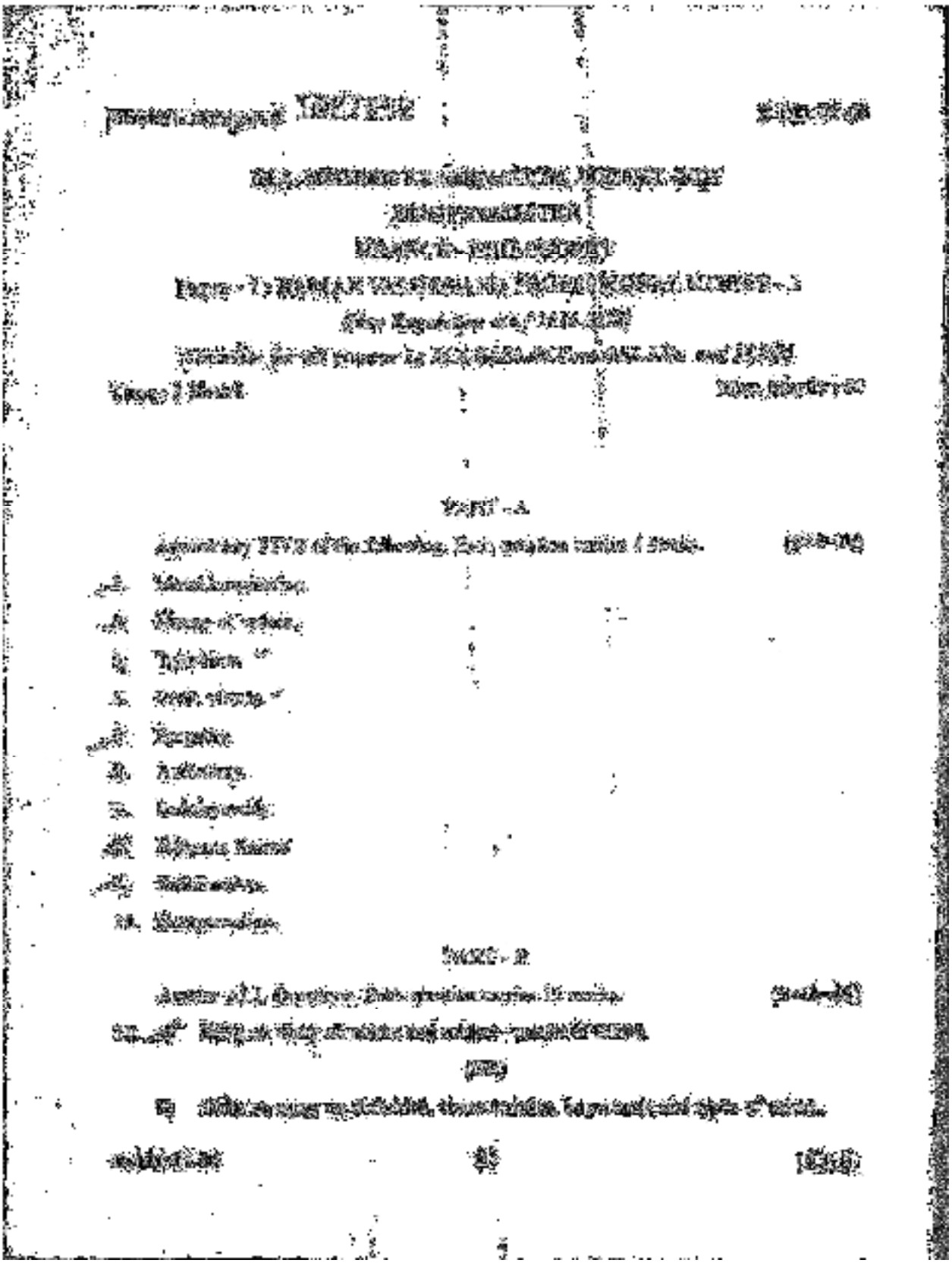
(b) Let $S_i, S_j \in S$ show that $S_j^{k+1} = S_j$ if and only if $S_i^k = S_j$ and for all $a \in T$, $\delta(S_i, a)^k = \delta(S_j, a)$.

Or

16. (a) In a simple digraph $G = \langle V, E \rangle$ prove that every node of the diagraph lies in Exactly one strong component.

(b) Show that a simple diagraph is strongly connected if and only if there is a cycle in G which includes each node at least once and no isolated node.

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12. a) Are Values in nature subjective or objective - discuss.

(OR)

b) Define good and bad and elucidate characteristics of good and bad.

13. a) Write an essay on justice, responsibility and freedom in human values.

(OR)

b) Define and describe Brahmacharya, Aparigraha, and Moksha.

14. a) Write an essay on the Five Great Vows (Mahāvratas) of Jainism.

(OR)

b) Define and describe Aparigraha, Dharma, and Artha.

15. a) Explain the Impact of Religion on Values and Behaviour at work place.

(OR)

b) What is the purpose of Criminal Justice? Write briefly on Reformative and Retributive theories of punishment.

M.Sc. DEGREE EXAMINATIONS, OCTOBER -2021

SECOND SEMESTER

Branch : MATHEMATICS

Paper I MA 201 : GALOIS THEORY

(Under CBCS & Non-CBCS w.e.f. 2016-2017)

Time : 3 Hours **Max. Marks : 80**

SECTION - A

Answer any **FOUR** questions. All questions carry equal marks. (4X5=20)

1. Let $f(x)=a_0+a_1x+.....+a_{n-1}x^{n-1}+x^n \in z[x]$ be a monic polynomial. If f(x) has a root $a \in Q$, then prove that $a \in Z$ and a / a_0

2. Show that $\phi_p(x)=1+x+.....+x^{p-1}$ is irreducible over Q, where P is a prime.

3. Let $f(x) \in F[x]$ be a polynomial of degree ≥ 1 with α as a root. Show that α is a multiple root if, and only if, $f'(\alpha)=0$

4. Let F be a finite field, show that the number of elements of F is P^n for some positive integer n, where P is the characteristic of F.

5. If C and R are respectively the fields of complex numbers and the field of real numbers, show that $[C:R]=2$

6. Let E be a finite separable extension of a field F, and let $H<G(E/F)$ prove that $G(E/E_H)=H$, *and* $[E:E_H]=|G(E/E_H)|$

7. Show that the polynomial $x^7-10x^5+15x+5$ is not solvable by radicals.

8. Show that it is impossible to construct a cube with a volume equal to twice the volume of a given cube by using ruler and compass only.

b) Solve the integral equation $\int_0^\infty f(x)\cos\lambda x dx = e-\lambda$.

(OR)

10. a) Solve $\frac{\int \partial u}{\partial t} = \frac{\partial 2u}{\partial x2}$ 0<x<6, t>0 subject to condtions $u_x(0,t)=u_x(6,t)=0$, $u_x(x,0)=2$

b) Find the steady of tempataure u(x,y) in a long square bar of side Π when one face is kept at constant temparature u_0 and other faces at zero temperature. Assume that u(x,y) is bounded.

11.Let f;R-→S be a homomorphism of a ring into a ring S with Kernel N. Then prove that

R/N ≃ Imf.

(OR)

12. State and prove Gauss lemma.

13. Given the points (0,0) ($\frac{\pi}{2}$, 0) and (π, 0) satisfying the function $Y = Sin\ x$ ($0 \leq x \leq \pi$), determine the value of $Y\left(\frac{\pi}{6}\right)$ using the cubic spline approximation.

(OR)

14. Solve the boundary – value problem $y'' - 64y + 10 = 0$; $Y(0) = Y(1) = 0$ by the Finite- Difference Method. Compute the value of $Y(0.5)$ and compare it with the true value.

15. Explain about Arrays and write the program to the matrix multiplication?

(OR)

16. Write a program (i) To calculate standard deviation.

(ii) To calculate the roots of the quadratic equation.

SECTION - B

Answer **ALL** questions. Each question carries 15 marks. (4×15=60)

9. a) State and prove Eisenstein criterion.

   b) Let $F \subseteq E \subseteq K$ be fields. If $[K : E] < \infty$ and $[E : F] < \infty$, then prove that

      i) $[K:F]<\infty$

      ii) $[K:F]=[K:E][E:F]$

(OR)

10. a) Let E be an extension field of F, and let $u \in E$ be algebraic over F. Let $p(x) \in F[x]$ be a polynomial of the least degree such that $p(u) = 0$. Then prove that.

      i) $p(x)$ is irreducible over F.

      ii) If $g(x) \in F[x]$ is such that g(u)=0, then $p(x) / g(x)$

      iii) There is exactly one monic polynomial $p(x) \in F[x]$ of least degree such that $p(u) = 0$

   b) Let E be an algebraic extension of a field F, and let $\sigma : F \to L$ be an embedding of F into an algebraically closed field L. Then prove that σ can be extended to an embedding $\eta : E \to L$

11. a) Let K be a splitting field of the polynomial $f(x) \in F[x]$ over a field F. If E is another splitting field of f(x) over F, then prove that there exists an isomorphism $\sigma : E \to K$, that is identity as F.

   b) Show that the splitting field of $f(x) = x^4 - 2 \in Q[x]$ over Q is $Q(2^{1/4}, i)$ and its degree of extension is 8.

(OR)

12. Let E be a finite extension of a field F. Then prove the following are equivalent:

      i) $E=F(\alpha)$, for some $\alpha \in E$

      ii) There are only a finite number of intermediate fields between F and E.

13. a) State and prove Dedikind's lemma.

   b) Let H be a finite subgroup of the group of automorphisms of a field E. Then prove that $[E : E_H] = |H|$

(OR)

14. a) Show that the Golois group of $x^4 - 2 \in Q[x]$ is the octic group (=group of symmetries of a square)

b) State and prove fundamental theorem of algebra.

15. Prove that $\phi_n(x) = \prod (x-\omega)$, ω primitive n^{th} root in C, is an irreducible polynomial of degree $\phi(n)$ in $Z[x]$

(OR)

16. Let K be the subset of R consisting of numbers constructible from Q. Then prove that K is a subfield containing square roots of all non-negative numbers in K by proving the necessary lemmas.

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M.Sc. DEGREE EXAMINATIONS, OCTOBER -2021

SECOND SEMESTER

Branch : MATHEMATICS/APPLIED MATHEMATICS

Paper II MA 202 : PARTIAL DIFFERENTIAL EQUATIONS

(Under CBCS & Non-CBCS w.e.f. 2016-2017)

Time : 3 Hours **Max. Marks : 100**

SECTION - A

Answer any **FOUR** questions. All questions carry equal marks. **(4×5=20)**

1. Solve $4y^2z^2dx+16z^2x^2dy+36x^2y^2dz=0$
2. Show that the differential equation $(y^2+yz)dx+(xz+z^2)dy+(y^2-xy)dz=0$ is integrable.
3. Eliminate arbitrary function f from $z=xy+f(x^2+y^2)$
4. Find the general solution of linear partial differential equation $y^2p-xyq=x(z-2y)$
5. Find a particular integral of the equation $(D^2-D')z=2y-x^2$
6. Find the general solution of $\frac{\partial^2 z}{\partial x^2}-4\frac{\partial^2 z}{\partial y^2}=e^{2x+3y}$
7. Define equipotential surface.
8. Write interior Neumann problem.

SECTION - B

Answer **ALL** questions. Each question carries **15** marks. **(4×15 =60)**

9. a) Show that a necessary and sufficient condition that there exists between two functions u(x, y) and V(x,y) a Relation F(u, v)=0, not involving x or y explicitly is that $\frac{\partial(u,v)}{\partial(x,y)}=0$

b) Is the equation $(y^2+xz)dx+(x^2+yz)dy+3y^2dz=0$ integrable? If so, find its solution.

(OR)

10. a) Find the integral curves of the equation $\frac{dx}{x+z}=\frac{dy}{y}=\frac{dz}{y^2+z}$

b) Verify that the equation $yz(y+z)dx+xz(x+z)dy+xy(x+y)dz=0$ is integrable and find its primitive.

11. a) Find the general solution of the differential equation $x^2\frac{\partial z}{\partial x}+y^2\frac{\partial z}{\partial y}=(x+y)z$

b) Find the equation of the integral surface of the differential equation $2y(z-3)p+(2x-z)q=y(2x-3)$ which passes through the circle $z=0,\ x^2+y^2=2x$

(OR)

12. a) Find the surface which intersects the surfaces of the system $z(x+y)=c(3z+1)$ orthogonally & which passes through the circle $x^2+y^2=1;\ z=1$

b) Find the complete integral of $(p^2+q^2)y=qz$

13. a) Find a particular integral of the equation $(D^2-D')z=A\cos(lx+my)$ where A, l, m are constants.

b) Solve the equation $r-s+2q-z=x^2y^2$

(OR)

14. a) Reduce the equation $\frac{\partial^2 z}{\partial x^2}+y^2\frac{\partial^2 z}{\partial y^2}=y$ to canonical form.

b) Reduce the equation $\frac{\partial^2 z}{\partial x^2}+2\frac{\partial^2 z}{\partial x\partial y}+\frac{\partial^2 z}{\partial y^2}=0$ to canonical form.

15. Show that the surfaces $(x^2+y^2)^2-2a^2(x^2-y^2)+a^4=c$ can form a family of equipotential surfaces, and find the general form of the corresponding potential function.

(OR)

16. Find the potential function $\varphi=(x, y, z)$ in the region $0 \le x \le a\ 0 \le y \le b, 0 \le z \le c$ satisfying the conditions:

i) $\varphi=0$ on $x=0, x=a, y=0, y=b, z=0$

ii) $\varphi=f(x, y)$ on $z=c, 0 \le x \le a, 0 \le y \le b$

Total No. of Pages : 2

B-236-02-03 A

M.Sc. DEGREE EXAMINATIONS, OCTOBER -2021

SECOND SEMESTER

Branch : MATHEMATICS/APPLIED MATHEMATICS

Paper III MA 203 : TOPOLOGY

(Under CBCS & Non-CBCS w.e.f. 2016-2017)

Time : 3 Hours **Max. Marks : 80**

SECTION - A

Answer any **FOUR** questions. All questions carry **Equal** marks. **(4×5=20)**

1. Let x be a metric space. Show that a subset F of x is closed if, and only if its compliment F' is open.
2. If a convergent sequence is a metric space has infinitely many distinct points, prove that its limit is a limit point of the set of the points of the sequence.
3. Define a topological space. Let x be any infinite set and let T be the set of all subsets of x together with the empty set ϕ show that $\{x, T\}$ is a topological space.
4. Let x be a second countable space. Prove that any open base for x has a countable subclass which is also an openbase.
5. Prove that any closed subspace of a compact space is compact.
6. Show that a topological space is compact if every basic open cover has a finite subcover.
7. Show that a topological space T_1-space if, and only if, each point is a closed set.
8. Prove that any continuous image of a connected space is connected.

SECTION - B

Answer **ALL** questions. Each question carries 15 marks. **(4×15=60)**

9. a) Show that every non-empty open set on the real line is the union of a countable disjoint class of open intervals.

   b) Show that each closed sphere is a closed set in a metric space.

(OR)

b) Let x and y be metric spaces and let f be a mapping of x into y. Prove that f is continuous if, and only, if $f^{-1}(G)$ is open in x, whenever G is open in y.

11. a) Let x be a topological space. Prove that any closed subset of x is the disjoint union of its set of isolated points and its set of limit points.

b) Let x be a non-empty set, and let there be given a "closure" operation which assigns to each subset A of x a subset $\bar{A}$ of x in such a manner that (i) $\bar{\phi} = \phi$, ii) $A \subset \bar{A}$, iii) $\bar{\bar{A}} = \bar{A}$, and iv) $\overline{A \cup B} = \bar{A} \cup \bar{B}$. If a "closed" set A is defined to be one for which $A = \bar{A}$, then prove that the class of all complements of such sets is topology on x whose closure operation is precisely that intially given.

(OR)

12. a) State and prove Lindelof's theorem.

b) Let x be a non-empty set, and let S be an arbitrary class of subsets of x. Show that S can serve as an open subbase for a topology on x.

13. a) State and prove the Heine-Borel theorem.

b) State and prove Labesgue's covering Lemma.

(OR)

14. a) Prove that any continuous mapping of a compact metric space into a metric space is uniformly continuous.

b) Show that a closed subspace of a complete metric space is compact if, and only if, it is totally bounded.

15. State and prove the Tietze-Extension theorem.

(OR)

16. a) Let x be a topological space. If $\{A_i\}$ is a non-empty class of connected subspaces of x such that $\bigcap_i A_i$ is non-empty, then prove that $A = \bigcup_i A_i$ is also a connected subspace of x.

b) Let x be a Hausdorff space. If x has an open base whose sets are also closed, then prove that x is totally disconnected.

M.Sc. DEGREE, EXAMINATIONS
SECOND SEMESTER
BRANCH:-Mathematics/Applied Mathematics
MA/AMA 203 B: PAPER III — SEMI GROUP THEORY
(Under the CBCS & Non CBCS w.e.f.2021-2022)

Time : 3 Hours **Max. Marks :80**

SECTION - A

Answer any **FOUR** questions. All questions carry equal marks. **(4×5=20)**

1. If S is a Semigroup and X=S' then show that there is a monomorphism $\rho: S \to \Im(X)$
2. If E is an equivalence on a semigroup S then prove that E^k is the largest congruence on S contained in E.
3. If G is a group, then show that $\rho \circ \sigma = \sigma \circ \rho$ for any two congruence ρ, σ on G.
4. Show that the relations Z and R commute.
5. If M is a O-minimal ideal of S, then prove that either $M^2 = \{0\}$, or, M is a O-simple Semigroup.
6. Prove that Se is a O-minimal left ideal.
7. Show that N_ρ is a normal Subgroup of G.
8. Show that the lattice of congruences on a completely O-simple semigroup S is Semimodular.

SECTION - B

Answer **ALL** questions. Each question carries 15 marks. (4×15 = 60)

9. a) Prove that a Semigroup S with zero is a O-group if, and only if, $aS = Sa = S, \forall a \in S / \{0\}$

b) i) Let $(E, \leq)$ be a lower semi lattice. Then prove that $(E, \wedge)$ is a commutative semigroup of idempotents and $a \leq b$ if, and only if $a \wedge b = a, \forall\ a, b \in E$

ii) Let $(E, \bullet)$ be a commutative semigroup of idempotents. Then prove that the relation $\leq$ on E defined by $a \leq b$ if, and only if, ab=a is a partial order on E with respect to which E is a lower semilattice. In $(E, \leq)$, show that the meet of a and b is their product ab.

(OR)

10. a) If R is a relation on a set X, then prove that $R^{\infty} = [R \cup R^{-1} \cup 1_X]^*$

b) If ρ is a congruence on a semigroup S, then show that S/ρ is a semigroup with respect to the operation defined by $(a\rho)(b\rho) = (ab)\rho$ and the mapping $\rho^{\natural} : S \to S/\rho$ defined by $x\rho^{\natural} = x\rho,\ x \in S$ is a homomorphism.

If $\phi : S \to T$ is a homomorphism, where S and T are semigroups, then prove that the relation $\ker\phi = \phi \circ \phi^{-1} = \{(a, b) \in S \times S : a\phi = b\phi\}$ is a congruence on S and there is a monomorphism $\alpha : S / \ker\phi \to T$ such that $ran(\alpha) = ran\,\phi$

11. a) Let G be a group with identity element e.

i) If N is a normal subgroup of G, then show that $\rho_N = \{(a, b) \in G \times G : ab^{-1} \in N\}$ is a congruence on G. For each g in G the ρ_N-class $g\rho_N$ coincides with the coset Ng.

ii) If ρ is a congruence on G, then show that $N = e\rho$ is a normal subgroup of G and $\rho = \rho_N$

iii) If M, N are normal subgroups of G, then show that $\rho_M \wedge \rho_N = \rho_{M \cap N},\ \rho_M \vee \rho_N = \rho_{MN}$

b) Show that a modular lattice is semimodular.

(OR)

12. a) If S is a periodic semigroup, then show that $D = J$

b) State and prove Green's theorem.

13. State and prove Ree's theorem.

(OR)

14. a) If S is Completely O-simple, then prove that S is regular.

b) If S is a regular semigroup with zero in which every non-zero idempotent is primitive, then prove that S is a O-direct union of completely O-simple semigroups.

15. a) Let ρ be a proper congruence on a completely O-simple semigroup $S = \mu^0[G, I, \Omega, P]$ and let i, j, λ, μ be such that $\rho_{i\lambda}, \rho_{j\lambda}, \rho_{i\mu}, \rho_{j\mu}$ are all non-zero. If either $(i, j) \in \rho_1$, or, $(\lambda, \mu) \in \rho_1$, then prove that $q_{\lambda\mu} \in N_\rho$

b) If the elements (a, i, λ) and (b, j, μ) of S are such that $(a, i, \lambda)\rho(b, j, \mu)$ then prove that $(i, j) \in \rho_1$.

(OR)

16. a) If ρ and σ are congruences on $S = \mu^0[G, I, \Omega, P]$ then show that $\rho \cap \sigma = [N_\rho \cap N_\sigma, \rho_1 \cap \sigma_1, \rho_0 \cap \sigma_0]$

$\rho \vee \sigma = [N_\rho N_\sigma, \rho_1 \vee \sigma_1, \rho_0 \wedge \sigma_0]$

b) If S is a finite congruence-free semigroup without O and if $|S| > 2$, then prove that S is a simple group.

B- 236-02-03B

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M.Sc. DEGREE EXAMINATIONS, OCTOBER -2021

SECOND SEMESTER

Branch : MATHEMATICS/APPLIED MATHEMATICS

Paper IV MA 204 (A) : ADVANCED COMPLEX ANALYSIS

(Under CBCS & Non-CBCS w.e.f. 2016-2017)

Time : 3 Hours **Max. Marks : 80**

SECTION - A

Answer any **FOUR** questions. All questions carry equal marks. **(4×5=20)**

1. Expand the function $f(z)=\frac{z^2-2z+5}{(z-2)(z^2+1)}$ on the annulus $|<|Z|<2$.

2. Find the singular points and investigate the behaviour at infinity of the function $f(z)=\frac{1}{z-z^3}$

3. Find the residues of the function $f(z)=\frac{1}{z(1-z^2)}$ at all its isolated singular points and at infinity (if infinity is not a limit point of singular points.)

4. Find the number of zeroes of the polynomial $Z^7-5Z^4+Z^2-2$ inside the unit circle $|Z|=1$

5. Find the conjugate harmonic function $v(x, y)$ corresponding to $u(x, y)=x^2-y^2+x$ on the domain $|z|<\infty$

6. State and prove Uniqueness theorem for conformal mappings.

7. If an entire function f(z) has no zeros, then prove that f(z) is of the form $f(z)=e^{g(z)}$, where g(z) is an entire function

8. Prove that the gamma function satisfies the relation $\sqrt{\pi}\Gamma(2z)=2^{2z-1}\Gamma(z)\Gamma(z+\frac{1}{2})$

SECTION - B

Answer **ALL** questions. Each question carries 15 marks. (4×15=60)

9. a) Show that the coefficients of the Laurent series $f(z)=\sum_{n=-\infty}^{\infty} a_n (z-z_0)^n, r<|z-z_0|<R$ are given by the formula $a_k=\frac{1}{2\pi i}\int_{r_p}\frac{f(z)}{(z-z_0)^{k+1}}dz, k=0,\pm1,\pm2,$ ..... where r_p is any circle $|z-z_0|=p, r<p<R$

b) Expand the function $f(z)=\frac{1}{(z-a)(z-b)}, 0<|a|<|b|$ is a Laurent series on the annulus $|a|<|z|<|b|$

(OR)

10. a) Let f(z) be a single-valued analytic function defined on the domain $D: 0<|z-z_0|<R$. Then prove that z_0 is a regular point of f(z) if, and only if, f(z) is bounded in some deleted neighbourhood of z_0.

b) Find the singular point and investigate the behaviour at infinity of the function $f(z)=\text{Tan}z$

11. State and prove Residue theorem.

(OR)

12. a) Evaluate the integral $I=\int_0^{\infty} e^{-\pi x}\frac{Sinax}{Sin\pi x}dx, a>0$

b) State and prove maximum modulus principle.

13. a) Prove that a necessary and sufficient condition for a function $f(z)=u(x,y)+iv(x,y)$ to be analytic on a domain G is that its real part u(x, y) and imaginary part $v(x,y)$ be conjugate harmonic functions on G.

b) Find the analytic function $f(z)=u(x;y)+iv(x,y)$ given that $u(x,y)=x^2-y^2+2$

(OR)

14. State and prove Dirichlet problem for a disk.

15. Prove that the infinite product $\prod_{n=1}^{\infty}(1+u_n)$ converges if, and only if, the infinite series $\sum_{n=1}^{\infty}|u_n|(1+u_n)$ converges.

(OR)

16. Expand the function Sec Z in partial fractions.

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b) State and prove Green's theorem.

13. State and prove Ree's theorem.

(OR)

14. a) If S is Completely O-simple, then prove that S is regular.

b) If S is a regular semigroup with zero in which every non-zero idempotent is primitive, then prove that S is a O-direct union of completely O-simple semigroups.

15. a) Let ρ be a proper congruence on a completely O-simple semigroup $S = \mu^{\circ}[G, I, \Omega, P]$ and let i, j, λ, μ be such that $\rho_{i\lambda}, \rho_{j\lambda}, \rho_{i\mu}, \rho_{j\mu}$ are all non-zero. If either $(i, j) \in \rho_1$, or, $(\lambda, \mu) \in \rho_\Omega$, then prove that $q_{\lambda\mu j} \in N_\rho$

b) If the elements (a, i, λ) and (b, j, μ) of S are such that $(a, i, \lambda)\rho(b, j, \mu)$ then prove that $(i, j) \in \rho_1$.

(OR)

16. a) If ρ and σ are congruences on $S = \mu^{\circ}[G, I, \Omega, P]$ then show that $\rho \cap \sigma = [N_\rho \cap N_\sigma,\ \rho_1 \cap \sigma_1,\ \rho_\Omega \cap \sigma_\Omega]$

$\rho \vee \sigma = [N_\rho N_\sigma,\ \rho_1 \vee \sigma_1,\ \rho_\Omega \wedge \sigma_\Omega]$

b) If S is a finite congruence-free semigroup without O and if $|S| > 2$, then prove that S is a simple group.

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B-236-02-05

M.Sc. DEGREE EXAMINATIONS, OCTOBER -2021

SECOND SEMESTER

Branch : MATHEMATICS/APPLIED MATHEMATICS

Paper : V MA-205-MEASURE AND INTEGRATION

(Under CBCS & Non CBCS w.e.f. 2016-2017)

Time : 3 Hours **Max. Marks 80**

SECTION - A

Answer any **Four** questions. Each question carry **equal** marks. **(4×5=20)**

1. If E is measurable set then $\overline{E}$ is also measurable.
2. Show that every Borel set is measurable.
3. Let f and g be integrable over E. Show if $f \leq g$ almost every where, that $\int_E f \leq \int_E g$.
4. Show that if f is integrable over E, then so is $|f|$.
5. State monotone convergence theorem.
6. Define a convex function. Let ϕ be a convex function. Let ϕ is bounded from below.
7. Define normal linear space with suitable example.
8. State and prove Holder inequalities.

SECTION - B

Answer **All** questions. Each question carries 15 marks. **(4×15=60)**

9. a) Define a countably additive measure. If M is a contably additive measure defined for all subsets in a σ Algebra, prove that $mA \leq mB$ whenever A and B are subsets in the σ Algebra with $A \subset B$.

   b) Show that if the outer measure of a set E=0 then E is measurable.

(OR)

10. a) For any countable collection $\{A_n\}$ of sets of real numbers, prove that

$$m^*\left(\bigcup_{n=1}^{\infty} A_n\right) \leq \sum_{n=1}^{\infty} m^*(A_n).$$

b) Prove that the collection of measurable sets of real numbers is a σ-algebra and that every set with outer measure zero is measurable.

11. a) Let f be defined on a measurable set E with an E finite. Then show that f is measurable on E if and only if $\inf_{f \leq \psi} \int_E \psi(x)dx = \sup_{f \geq \phi} \int_E \phi(x)dx$ for all simple functions ϕ and ψ.

b) State and prove lebesgue convergence theorem.

(OR)

12. a) Let $\{f_n\}$ be an increasing sequence of non negative measurable functions, and let $f = \lim f_n$ a.e. Then prove that $\int f = \lim \int f_n$.

b) State and prove the Fatou's Lemma and deduce the monotone convergence theorem.

13. a) Let f be an increasing real valued function on an interval [a,b]. Prove that f is differentiable almost everywhere, the derivative f' is measurable and that

$$\int_a^b f'(x)dx \leq f(b) - f(a)$$

b) Let f be integrable on [a,b] such that : $\int_a^x f(t)dt = 0$ for all $x \in [a,b]$. Then prove that $f(t) = 0$ a.e. in [a,b].

(OR)

14. a) If f is bounded and measurable on [a,b] and $F(x) = \int_a^x f(t)dt + F(a)$ then show that $F'(x) = f(x)$ for almost all x in [a,b].

b) State and prove jensen inequality.

15. a) State and prove Minkowski inequality.

b) Let X be a normed linear space. Then every convergent sequence in X is Cauchy. Moreover, a Cauchy sequence in X converges if it has a convergent subsequence.

(OR)

16. a) Let E be a measurable set and $1 < p < \alpha$. Suppose F is a family of functions in $L^p(E)$ that is bounded in $L^p(E)$ in the sense that there is a constant M for which $\| f \|_p \leq M$ for all fin F. Then the family F is uniformly integrable over E.

b) Let E be a measurable set and $1 \leq p \leq \infty$, then the subspace of simple function in $L^p(E)$ is dense in $L^p(E)$.

B- 236-02-06

M.Sc. DEGREE, EXAMINATIONS
SECOND SEMESTER
BRANCH:-Mathematics/Applied Mathematics
MA/AMA 206 PAPER VI — MATHEMATICAL STATISTICS
(Under the CBCS & Non CBCS w.e.f.2021-2022)

Time : 3 hours Max. Marks : 80

SECTION – A

Answer any FOUR questions. All question carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Define a random variable. Let $f(x) = \frac{1}{x^2}$ $1 < X < \infty$

$= 0$ elsewhere

be the probability density function X. If $A_1 = \{X / 1 < X < 2\}$ and $A_2 = \{X / 4 < X < 5\}$ find $P(A_1 \cup A_2)$ and $P(A_1 \cap A_2)$.

2. Define the conditional probability density function of the random variable Y given the random variable X. Let $f(X, Y) = 2$ *for* $0 < X < 1$, *and* $0 < Y < X$

$= 0$ otherwise

Find the conditional density function of X given Y.

3. If $N(x) = \int_{-\infty}^{x} \frac{1}{\sqrt{2\pi}} e^{-\omega^2/2} d\omega$, Show that $N(-x) = 1 - N(x)$.

4. Let X have the p.d.f. given by $f(X) = 1$, $0 < X < 1$

$= 0$, *elsewhere*

Show that the random variable $Y = -2 \ln x$ has a chi-square distribution. Find the degrees of freedom of this distribution.

[P.T.O.]

5. Let X_1, X_2 be a random sample from a distribution having the p.d.f.

$f(x) = e^{-x}, 0 < x < \infty$

$= 0,$ *otherwise*

Show that $Z = X_1/X_2$ has on F distribution.

6. Let $\overline{X}$ be the mean of a random sample of size 5 from a normal distribution with $\mu = 0$ and $\sigma^2 = 125$. Determine C so that $P_r(\overline{X} < c) = 0.90$.

7. Let the observed value of the mean $\overline{X}$ of a random sample of size 20 from a distribution that is $n(\mu, 80)$ be 81.2.

Find a 95 percent confidence internal for μ.

8. Write about confidence intervals with suitable examples.

SECTION – B

Answer FOUR questions. Choosing ONE from each unit. Each question carries 20 marks.

(Marks : $4 \times 15 = 60$)

9. (a) Let X have the p.d.f. $f(x) = 2(1-x), \ 0 < X < 1$

$= 0,$ *elsewhere*

Find $E(6X + 3X^2)$.

(b) In a log of 50 light bulbs, there are a bad bulbs. An inspector examines 5 bulbs which are selected at random and without replacement. Find the probability of atleast 1 defective bulb among the 5.

Or

10. (a) If the correlation coefficient ρ of X and Y exist. Show that $-1 \le \rho \le 1$.

(b) If $f(x_1, x_2) = e^{-x_1 - x_2}; \ 0 < x_1 < \infty, \ 0 < x_2 < \infty$

$= 0$, elsewhere

is the joint probability density function of the random variables X_1 and X_2. Show that X_1 and X_2 are stochastically independent and that $E(e^{t(x_1 + x_2)}) = (1-t)^{-2}, t < 1$.

11. (a) Define the gamma distribution and derive its mean and variance.

(b) Let X have a poisson distribution with parameter m. If m is an experimental value of a random variable having a gamma distribution with $\alpha = 2; \beta = 1$, compute $P_r(X = 0, 1, 2)$.

Or

12. (a) Find the mean and variance of a chi-square distribution.

(b) If X is $\psi(5)$ determine the constants c and d so that $P_r(c < X < d) = 0.95$ and $P_r(X < c) = 0.025$.

13. (a) Obtain the distributions of $\overline{X}$ and ns^2/σ^2 of a random sample of size n.

(b) Define a t-distribution. Derive its p.d.f.

Or

14. (a) State and prove the central limit theorem in the modified form by making suitable assumptions let $\overline{X}$ denote the mean of a random sample of size 75 from the distribution with the p.d.f.

$f(x) = 1, \ 0 < x < 1$

$= 0, elsewhere$

Find $(0.45 < X < 0.55)$

(b) Explain the concept of stochastic convergence. Let S_n^2 denote the variance of a random sample of size n from a distribution that is $n(\mu, \sigma^2)$, prove that $nS_n^2/(n-1)$ converges stochastically to σ^2.

15. (a) Let a random sample of size 17 from the normal distribution $n(\mu, \sigma^2)$ yield $\overline{X} = 4.7$ and $s^2 = 5.76$. Determine 90 percent confidence interval from μ.

(b) State and prove Roo-Cramer inequality.

Or

16. (a) Obtain the confidence interval for the difference $\mu_1 - \mu_2$ between the means of two normal distributions $N(\mu_1, \sigma^2)$ and $N(\mu_2, \sigma^2)$ with σ^2 known.

(b) State and prove Rao – Blackwell theorem.

B-101-02-07

P.G. DEGREE EXAMINATION — APRIL/MAY 2018

SECOND SEMESTER

HUMAN VALUES AND PROFESSIONAL ETHICS - II

(Common paper for M.A./M.Sc./M.Com./M.Ed./M.Lisc etc)

(w.e.f. 2016-2017)

Time : 3 hours Max. Marks : 80

SECTION - A

Answer any FIVE of the following. Each question carries 4 marks.

(Marks : 5 × 4 = 20)

1. Adjustability
2. Caring for needy and elderly
3. Ethical obligation to animals
4. Ethical issues raised by new biological knowledge
5. Ethical theories
6. Causes of unethical behavior
7. Ecological crisis
8. Pest control
9. Organ trade
10. Human trafficking.

SECTION - B

Answer ALL questions. Each question carries 12 marks.

(Marks : 5 × 12 = 60)

11. (a) Describe the relevance of value education to present study.

Or

(b) Explain the status of women in family and society in detail.

[P.T.O.]

12. (a) Describe the views of Charaka, Sushruta and Hippocrates on moral responsibility of medical practitioners.

Or

(b) Explain the ethical issues in relation to health care professionals and patients.

13. (a) Write on ethical standards of Business, immoral and illegal practices and their solutions.

Or

(b) Describe the characteristics of ethical problems in management.

14. (a) Write an essay on pollution and waste.

Or

(b) Explain the causes and consequences of climate change.

15. (a) Explain the human rights violation and social disparities.

Or

(b) Describe the ethics of Media in detail.

B-236-03-01

M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER 2018

THIRD SEMESTER

Mathematics

MA - 301 : Paper 1 — COMMUTATIVE ALGEBRA

(Under CBCS & non-CBCS w.e.f 2017-2018)

Time : 3 hours Max. Marks 80

SECTION - A

Answer any FOUR questions.

All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Define prime and maximal ideals with examples.
2. Let N and U be ideals in a ring R with $N \subset U$. Then prove that U/N is an ideal in R/N and $(R/N)(U/N) \cong R/U$.
3. Let M be a module and N a submodule. Then prove that the ascending (descending) chain condition holds in M if and only if it holds in both N and $M-N$.
4. Prove that an R-module M satisfying the descending chain condition is direct sum of a finite number of indecomposable submodules.
5. In a ring R having only one maxima ideal M. Then prove that every idempotent e is either 0 or 1.
6. Let R be a ring with identity. Prove that the intersection $\mathfrak{T}$ of all the maximal ideals in R is the set of all elements a in R such that $1+xa$ is a unit for every x in R.
7. Prove that in a ring with a.c.c. every irreducible ideal is primary.
8. If R is a noetherian domain and if M is an ideal of R different from R, then prove that $\bigcap_n m^n = (0)$.

SECTION - B

Answer ALL questions. All questions carry equal marks.

(Marks : $4 \times 15 = 60$)

9. If N and L are submodules of an R-module M, then $(L+N)-N \cong L-(L \cap N)$. If L is a subring of a ring R, and N is an ideal in R, then the residue class ring, $L/L \cap N$ is isomorphic with the subring $(L+N)/N$ of the residue class ring R/N.

Or

10. Let U be an ideal different from R. Then prove that is prime if and only if R/U has no zero divisors. If R has an identity, U is maximal if and only if R/U is a field.

[P.T.O.]

11. If a module has a composition series then prove that any two composition series are equivalent.

Or

12. Prove that if M is completely reducible so is every submodule. if L and N are submodules such that $L \subset N$, then every complement of N is contained in a complement of L and if every complement of L contains a complement of N, then M is completely reducible.

13. Prove that a ring with identity R which satisfies the descending chain condition is the direct sum of noetherian primary rings and this decomposition is unique.

Or

14. Prove that in a ring R satisfying the d.c.c every ideal A-all the elements of which are nilpotent is nilpotent.

15. Let R be a ring and let A be an ideal of R admitting an irredundant primary representation $A = U_i Q_i$ prove that for A to be its own radical it is necessary and sufficient that all Q_i be prime ideals.

Or

16. Given a noetherian ring R and two ideals M and A of R prove that the intersection $\bigcap_n (A + M^n)$ is the intersection of those primary components Q_i of a whose radical P_i satisfies the relation $M + P_i \neq R$.

B-236-03-02

M Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER 2018.

THIRD SEMESTER

Branch — Mathematics/Applied Mathematics

MA-302 : Paper II — FUNCTIONAL ANALYSIS

(Under CBCS & Non-CBCS w.e.f. 2017-2018)

Time : 3 hours

Max. Marks : 80

SECTION - A

Answer any FOUR questions. All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Define Normed Linear Space. Prove that norm is continuous function.

2. State and prove Minkowski's inequality.

3. If T is an operator and T^* is its conjugate then prove that $\|T^*\| = \|T\|$.

4. Show that a linear subspace of a normed linear space is closed if it is weekly closed.

5. Define a Hilbert space. If x and y any two vectors in a Hilbert space then show that $|(x, y)| \leq \|x\| \cdot \|y\|$.

6. State and prove Bessel's inequality.

7. If T is an operator on H for which $(Tx, x) = 0$ for all x, then show that $T = 0$.

8. If T is normal then the M_i's are pairwise orthogonal.

SECTION - B

Answer ALL questions. All questions carry equal marks.

(Marks : $4 \times 15 = 60$)

9. Let N and N' be Normed linear space and T a linear transformation of N into N'. Show that the following conditions on T are equivalent to one another :

   (a) T is continuous.

   (b) T is continuous at the origin in the sense that $x_n \to 0 \Rightarrow T(x_n) \to 0$.

   (c) There exists a real number $k \geq 0$ with the property $\|T(x)\| \leq k|x|$ for every $x \in N$.

   (d) If $S = \{x : \|x\| \leq 1\}$ is the closed unit sphere in N, then its image $T(S)$ is a bounded set in N'.

Or

10. State and prove Hahn-Banach theorem.

[P.T.O.]

11. (a) State and prove closed graph theorem.

(b) If P is projection on a Banach space B, and if M and N are its range and null space, then prove that M and N are closed linear subspaces of B such that $B = M \oplus N$.

Or

12. State and prove Uniform Boundedness theorem.

13. (a) If M is a proper closed linear subspace of a Hilbert space H, then prove that there exists a non-zero vector Z_0 in H such that $Z_0 \perp M$

(b) If B is a complex Banach space whose norm satisfies the parallelogram law and if an inner product is defined on B by $4(x, y) = \|x + y\|^2 - \|x - y\|^2 + i\|x + iy\|^2 - i\|x - iy\|^2$ then prove that B is a Hilbert space.

Or

14. (a) If M is a closed subspace of a Hilbert space H, then prove that $H = M \oplus M^{\perp}$.

(b) Explain the Gram-Schmidt's orthogonalization process.

15. (a) If T is an operator on H for which $(Tx, x) = 0$ for all x, then prove that $T = 0$.

(b) Show that $\|T^*\| = \|T\|$ where T^* is an adjoint operator of T.

Or

16. State and prove Spectral theorem.

B-236-03-03 A

M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER 2018.

THIRD SEMESTER

Branch — Mathematics/Applied Mathematics

MA 363 : Paper III (A) : DIFFERENTIAL GEOMETRY (G.E)

(Under C.B.C.S. and Non-CBCS w.e.f. 2017-18)

Time : 3 hours Max. Marks : 80

SECTION – A

Answer any FOUR questions. All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Obtain the equations of the circular helix $r = (a\cos u, a\sin u, bu) - \infty < u < \infty$ where $a > 0$, referred to 's' as parameter and show that the length of one complete turn of the helix is $2\pi c$, where $c = \sqrt{(a^2 + b^2)}$.

2. Show that the length of the common perpendicular d of the tangents at two near points distances apart is approximately given by $d = \frac{k\pi s^3}{12}$.

3. Find the co-efficient of the direction which makes an angles $\frac{1}{2}\pi$ with the direction whose coefficients are (l, m).

4. A helicoid is generated by the screw motion of staright line skew to the axis. Find the curve coplanr with the axis which generates the same helicoid.

5. To Calculate circumference of a geodesic circle of small radius r and to see show it differs from the Euclidean formula $2\pi r$.

6. Prove that very point of a surface has a neighbourhood which is convex and simple.

7. Prove that except for the plane the right helicoid is the only ruled surface which is minimal.

8. Prove that a surface which E, F, G, L, M, N are non zero constants is necessarily a circular cylinder.

SECTION – B

Answer ALL questions. All questions carry equal marks.

(Marks : $4 \times 15 = 60$)

9. Show that the oscillating plane at P has in general three point constant with the curve at P.

Or

11. A helicoid is generated by the screw motion of a straight line which meets the axis at an angle 'α'. Find the orthogonal trajectories of the generators. Find also the metric of the surface referred to genarators and their orthogonal trajectories as parametric curves.

Or

12. Find a surface of revolution which is isometric with a region of the right helicoid.

13. State and prove tissot's theorem.

Or

14. Find the geodesics on a surface of revolution given by $\bar{r} = (g(u)\cos v, g(u)\sin v, f(u))$.

15. Prove that a necessary and sufficient that a curve on a surface be a line of curvature is that the surface normals along the curve form G developable.

Or

16. Prove that a necessary and sufficient condition for a surface to be developable is that its Gaussian curvature shall be zero.

B-236-03-03

B

M.sc. DEGREE, EXAMINATIONS

THIRD SEMESTER

BRANCH:-Mathematics

MA 303 B: Paper III: ALGEBRAIC CODING THEORY

(Under the CBCS & Non CBCS w.e.f.2017-2018)

(Regular/Supplementary)

Time: 3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. All questions carry **equal** marks. 4X5=20

1. Define binary code and Block code. List all words of length 3?

2. Modify C_1={00,01,10,11} by (i) repeating each code word three times

   (ii) by adding a third digit to each code word so that number of each code word is even?

3. Define linear code. Give an example for linear Code and not a linear code?

4. List the cosets of the linear code C= {0000, 1011, 0101, 1110}?

5. If $0 \leq t \leq n$ and if v is a words of length n,then prove that the number of words of length n of distance at most t from v is precisely ?

6. Find an upper bounds for the size or dimension of a linear codes with the values n=8,d=3 & n=23,d=27 ?

7. Represent each code word C with the polynomials a) C={000,001,010,011}

   b)C ={0000,0001,1110}

8. Let $g(x) = 1+x^2+x^3$ let the generator of a linear cyclic code of length 7. Find the message polynomial corresponding to the code words C(x); $x^2+x^4+x^5$, $x+x^2+x^4$, $x^2+x^3+x^4+x^6$.

SECTION-B

Answer **ALL** questions. All questions carry **equal** marks 4X15=60

UNIT – I

9. a) Let C be a code word of length 3. Add a parity check digit to the codewords in the code and use the resulting code C to answer the following questions

i) If 1101 is received can we detect an error?

B-236-03-03 B

ii) If 1101 is received what codewords were most likely to have been transmitted?

iii) Is any word of length 4 that is not in the code, closest to a unique codeword?

b) Let $|M|=2$, $n=3$ and $C=\{000,111\}$. If $v=000$ transmitted, when will IMLD conclude this correctly, and when will IMLD incorrectly conclude that 111 was sent?

OR

10. **a)**Define Hamming weight and Hamming distance. Let $u=01011$, $v=11010$,$w=01100$ compare the following pair of quantities**:**

i) ut(u+w),and wt(v)= wt(w)

ii) d (v. w),and d(v, u)+d(u,w)

b) Suppose $p=.90$, $|M|=3$, $n=4$, and $C= \{0000, 1010, 0111\}$,For each v in C, we compute øp(C, v) ?

UNIT – II

11. **a)** Show that $C= \{0000, 1100, 0011, 1111\}$ is a linear code that its distance is d=2?

b) Explain the following terms with examples i) Linear Independent set

ii) Basis

iii) Dimension

OR

12. **a**) Test for Linear Independence and find Basis

S= {110,011,101,111}.

b) Find a generator matrix for the code $C= \{0000, 1110, 0111\}$ by using the REF.

UNIT – III

13. a) Compute the upper bound for the size or dimension k of a linear code C of length n=6 and distance d=3 ?

b) Let n=23 with t=3 show that it is a linear perfect code?

OR

14. a) Explain the Hamming Code. Find the generator matrix in standard form for a Hamming code of length 15, then encode the message 11111100000?

b) Explain for Algorithm of IMLD for C_{24}? Also decode w=101111101111, 010010010010?

UNIT – IV

15. a) Write out the Hamming code of length 7 generated by the matrix G and then represent this code by polynomials.

$$G = \begin{bmatrix} 1000111 \\ 0100110 \\ 0010101 \\ 0001011 \end{bmatrix}$$

b) Define Cyclic Code. Find the generator polynomial for the smallest linear cyclic code containing that word. 010101.

OR

16. a) Let C be the linear cyclic code of length n=7 with generator polynomial $g(x)= 1+x+x^3$ of degree n–k =3.Find a basis for C ?

b)For n=6, Factor $1+x^6$ into irreducible factors $1+x^6 =(1+x^3)^2=(1+x)^2(1+x+x^2)^2$ then find the generators of proper cyclic codes of length 6?

B-236-03-03

M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER 2018

THIRD SEMESTER

Branch — Mathematics/Applied Mathematics

MA - 304: Paper IV — CLASSICAL MECHANICS

(Under CBCS and Non-CBCS w.e.f. 2

B-236-03-04

Time : 3 hours

SECTION - A

Answer any FOUR questions. All questions carry equal marks.

(Marks : 4 × 5 = 20)

1. A particle of mass m moves in a plane. Find its equations in Cartesian co-ordinates.

2. Derive the equation motion for a simple pendulum of length and mass of bob m by using Lagrange's Equation.

3. Explain the Hamilton's principle for conservative non-holonomic system.

4. Explain conservation of angular Momentum.

5. A particle is sliding down a frictionless inclined plane of angle θ. Use Lagrange's equation for non-Holonomic systems to find the equations of motion.

6. Prove that $\frac{dH}{dt} = \frac{\partial H}{\partial t}$, where H is Hamiltonian function.

7. Prove that Lagrange's bracket is canonical invariant.

8. If u, v are constant of motion $[u,v]$ is also a constant of motion.

SECTION - B

Answer ALL questions. All questions carry equal marks.

(Marks : 4 × 15 = 60)

9. A uniform rod, of mass 3 m and length $2l$ has its middle point fixed and a mass m attached at one Extremity. The rod when in horizontal position is set rotating about a vertical axis through its centre with an angular velocity equal to $\sqrt{(2ng/l)}$. Show that the heavy end of the rod will fall till the inclination of the rod to the vertical is $\cos^{-1}[\sqrt{(n^2+1)} - n]$ and will then rise again.

Or

10. (a) Prove that in a simple dynamic system T + V = Constant.

    (b) Prove that the total kinetic energy of a system of particles about any point 'o' is equal to the kinetic energy of the center mass assuming total mass acting at it plus

11. (a) Derive Lagrange's Equations for non-conservative Holonomic system.

(b) Show that the shortest curve between two points in a plane is straight line.

Or

12. (a) Find the curve for which the surface of revolution is minimum.

(b) A uniform hop is rolling down on an inclined plane with out slipping. Find its motion.

13. (a) Explain Routh's procedure.

(b) Derive Hamilton's Equations from Hamilton's principle.

Or

14. The principle of least action states that $\Delta A = O$ on the actual path as compared with some neighbouring paths provided H, the Hamiltonian is constant through out the actual path. Here Δ denotes a variation in A with time. Prove this theorem.

15. State and prove Poincare theorem.

Or

16. State and prove Jacobi's identity of Poisson's brackets.

B-236-03-04

B-236-

03-05

M.sc. DEGREE, EXAMINATIONS

THIRD SEMESTER

BRANCH:-Mathematics

MA/AMA 305: Paper 5: MATLAB

(Regular)

Time: 2 Hours **Max. Marks: 50**

SECTION-A

Answer any **TWO** questions. All questions carry **equal** marks. 2X5=10

1. Calculate the following quantities

(i) $3\frac{\sqrt{5}-1}{(\sqrt{5}+1))^2}$ -1

(ii) $e^{\pi\sqrt{163}}$

2. Find the valve of (i) $\sin^2\frac{\pi}{6}+\cos^2\frac{\pi}{6}$

3. i) Define algebraic and transcendental equations.

ii) Using bisection method solve the equation $x^3-x-4=0$

4. Solve the following system of linear equations by Gauss-Jordan method.

$2x_1+4x_2-6x_3=-4$

$x_1+5x_2+3x_3=10$

$x_1+3x_2+2x_3=5$

SECTION-B

Answer any **TWO** questions. All questions carry **equal** marks. 2X20=40

5).a) Create upper triangular matrix with following command:

A= diag (1:6) + diag (7:11,1) + diag (12:15,2).

b) Plot the parametric curve x(t) = t,

y(t) = $e^{-t/2}$ sin t for $0 < t < \frac{\pi}{2}$ using ezplot.

OR

6) a) Find the solution of the following set of linear algebraic equations given below:

$$x + 2y + 3z = 1$$
$$3x + 2y + 4z = 1$$
$$2x + 3y + 3z = 2$$

b) Solve the matrix equation in MATLAB

$$-3x + 8y + 4z = 20$$
$$5x + 3y + 2z = 10$$
$$2x + 4y - 9z = 9$$

7) a) (i) How can you create , write and save a script file.

(ii) Write a function file Crossprod to compute the cross product of two vectors u and v.

b) Using the Newton-Raphson method solve the equation. $Sin\ x = 1 - x$.

OR

8) a) Solve the following system of linear equations by Gauss-Jordan method

$$2x_1 + 4x_2 - 4x_3 = 12$$
$$x_1 + 5x_2 - 5x_3 - 3x_4 = 18$$
$$2x_1 + 3x_2 + x_3 + 3x_4 = 8$$
$$x_1 + 4x_2 - 2x_3 + 2x_4 = 8.$$

b) Using Gauss- Seidel method. Solve the following system of linear equations.

$$4x + y - z = 13$$
$$x - 5y - z = -8$$
$$2x - y - 5z = -2.$$

B-236-03-06 A

M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER 2018

THIRD SEMESTER

Branch — Mathematics/Applied Mathematics
Open Electives

Paper VI — BUSINESS MATHEMATICS-I

(Under CBCS and Non-CBCS w.e.f. 2017-2018)

Time : 3 hours Max. Marks : 80.

PART - A

Answer any FOUR questions.

All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. If $47.2506 = 4A + \frac{7}{B} + 2C + \frac{5}{D} + 6E$, then find the value of $5A + 3B + 6C + D + 8E$.

2. What is the unit digit in $(3157)^{754}$?

3. Evaluate 45% of 280 + 28% of 450.

4. If $abc = 1$ then $\frac{1}{1+a+b^{-1}} + \frac{1}{1+b+c^{-1}} + \frac{1}{1+c+a^{-1}} = 1$.

5. If $4a = 5b$ and $8b = 9c$, then find $a : b : c$.

6. Two numbers are in the ratio of 3 : 5. If each number is increased by 10, the ratio becomes 5 : 7, then find the numbers.

7. Convert the decimal number 44_{10} into octal.

8. Conversion 14_{10} of decimal into binary.

PART - B

Answer ALL questions.

Each question carry equal marks.

(Marks : $4 \times 15 = 60$)

UNIT – I

9. (a) Find the H.C.F and L.C.M of 1.5, 3, 0.6.

   (b) Find the L.C.M of 15, 18, 24, 27, 56.

Or

[P.T.O.]

10. Evaluate

(a) $869 \times 738 + 869 \times 262$

(b) What is the unit digit in $3^{61} \times 6^{41} \times 7^{59}$

UNIT – II

11. By selling 100 pens a shopkeeper gains the selling price of 20 pens. Find his gain percent.

Or

12. Rs. 395 are divided among A, B and C in such a manner that B gets 25% more than A and 20% more than C. Find the share of A?

UNIT – III

13. Solve $\frac{3x - y + 1}{3} = \frac{2x + y + 2}{5} = \frac{3x + 2y + 1}{6}$.

Or

14. (a) If a : b = 1 : 3, b : c = 5 : 7 and c : d = 9 : 8. Find a : b : c : d.

(b) On dividing a sum of Rs. 832 between A and B in the ratio $\frac{1}{3} : \frac{1}{5}$, then find their shares.

UNIT – IV

15. (a) Convert $(190)_{11}$ into hexa decimal.

(b) Covert $(B5)_{16}$ into decimal.

Or

16. (a) How to convert of decimal into binary with examples.

(b) Add $111100_2 + 011111_2$.

B-236-03-06 A

B-236-03-06 B

M.Sc. DEGREE, EXAMINATIONS

THIRD SEMESTER

BRANCH:-Mathematics/Applied Mathematics

Open Elective (Other Departments)

MA/AMA 306 (B): PAPER VI-- Fundamentals of Mathematical Statistics

(Under the CBCS & Non CBCS w.e.f.2021-2022)

(Regular/Supplementary)

Time: 3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. **All** questions carry equal marks. 4X5=20

1. If Z = aX+bY and r is the correlation coefficient between X and Y, show that

$\sigma Z^2 = a^2\sigma_x^2+b^2\sigma_y^2+2ab\sigma_x\sigma_Y$

2. The joint probability distribution of X and Y is given below

X / Y	-1	+1
0	1/8	3/8
1		

Find the correlation coefficient between X and Y?

3. Define i) line of regression ii) Regression coefficient?

4. Given $f(x,y)=xe^{-x(y+1)}$; $x\geq 0$, $y\geq 0$ Find the regression curve of y on X.

5. Deduce formula for t-test. Discuss the conditions to use t-test.

6. What are the conditions to apply X^2 –test?

7. Solve the system of equations by the matrix method: $x_1 + x_2 + x_3 = 2$; $4x_1 – x_2 + 2x_3 = -6$;
$3x_1 + x_2 + x_3 = -18$.

8. Solve the equations $2x + y –z = 1$; $x – y + z = 2$; $5x + 5y – 4z = 3$ by Cramer's rule.

SECTION B

Answer All questions. Each question carries 15 Marks. 4X15=60

UNIT-I

9 .Show that the correlation coefficient r is independent of a change of scale and origin the variables.

OR

10. Ten competitors in a musical test were ranked by the three judges x,y and z in the following order :

Rank by x	1	6	5	10	3	2	4	9	7	8
Rank by y	3	5	8	4	7	40	2	1	6	9
Rank by z	6	4	9	8	1	2	3	10	5	7

Using the rank correlation method, discuss which pair of judges has the nearest approach to common likings in music.

UNIT-II

11. a) Obtain the regression equation of Y on X for the following distribution

$$f(x,y) = \frac{y}{(1+x)^4} e^{\left(-\frac{y}{(1+x)^1}\right)} \quad ; x,y \geq 0$$

b) 3. Find the most likely price in Bombay corresponding to the price of Rs.70 at Calcutta from the following:

	Calcutta	Bombay
Average price Standard deviation	65 2.5	67 3.5

Correlation coefficient between the prices of commodities in the two cities is 0.8.

OR

12. Obtain the regression equation of Y on X for the following distribution

a) $f(x,y)=\frac{9}{2}\cdot\frac{1+x+y}{(1+x)^4(1+y)^4}$; $x,y\geq 0$

b) $f(x,y)=\frac{9}{5}(x+3y)e^{-x-2y}$; $x,y\geq 0$ **B-236-03-06**

B

UNIT-III

13 (a). A random sample of 10 boys had the following I.Q's: 70, 120, 110, 101, 88, 83, 95, 98, 107 and 100. Do these data support the assumption of a population mean I.Q of 100 ?

(b). to examine the hypothesis that the husbands are more intelligent than the wives, an investigator took a sample of 10 couples and administered them a test which measures the I.Q. the results as follows:

Husbands	117	105	97	105	123	109	86	78	103	107
Wives	106	98	87	104	116	95	90	69	108	85

Test the hypothesis with a reasonable test at the level of significance of 0.05.

OR

14 (a) Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins, show the sample standard deviations of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test hypothesis that the true variances are equal.

(b) A pair of dice are thrown 360 times and the frequency of each sum is indicated below :

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	8	24	35	37	44	65	51	42	26	14	14

Would you say that the dice are fair on the basis of the chi-square test at 0.05. level of significance ?

UNIT-IV

15. Find the inverse of $A=\begin{matrix}-2 & 1 & 3\\ 0 & -1 & 1\\ 1 & 2 & 0\end{matrix}$ using elementary row operations.

Or

16. Test for consistency the set of equations and solve them if they are consistent.

x+2y+2z = 2; 3x-2y-z = 5; 2x-5y+3z = -4; x+4y+6z = 0

B-236-03-06 B

B-236-04-01

M.Sc. DEGREE EXAMINATION — SEPTEMBER 2020

FOURTH SEMESTER

Mathematics/Applied Mathematics

MA 401 Paper I — NUMBER THEORY

(Under CBCS and Non-CBCS w.e.f. 2017-18)

Time : 3 hours Max. Marks 80

SECTION – A

Answer any FOUR questions. All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Define the Euler function ϕ and Mobius function μ. Prove that $\phi(n) = n \sum_{d|n} \frac{\mu(d)}{d}$.
2. If f and g are multiplicative arithmetic functions, prove that their Dirichlet product $f * g$ is also multiplicative.
3. Prove that $\sum_{n \le x} d(n) = x \log x + (2c-1)x + 0(\sqrt{x})$ where C is Euler's constant.
4. If $x \ge 1$, prove that $\sum_{n \le x} \frac{1}{n^s} = \frac{x^{1-s}}{1-s} + J(s) + 0(x^{-s})$ if $s > 0$, $s \ne 1$.
5. State and prove Fermatt's theorem.
6. State and prove Little Fermatt's theorem.
7. Determine whether 219 is a quadratic residue or non-residue mod 383.
8. If P and Q are odd +ve integers. Then prove that $(m/p)(n/p) = (mn/p)$.

SECTION – B

Answer FOUR questions. Choosing ONE from each Unit.

Each question carries 15 marks.

(Marks : $4 \times 15 = 60$)

9. (a) If 'α' has a Dirichlet inverse 'α^{-1}' then the equation

$$G(x) = \sum_{n \le x} \alpha(n) \cdot F\left(\frac{x}{n}\right)$$ if and only if

$$F(x) = \sum_{n \le x} \alpha^{-1}(n) \cdot G\left(\frac{x}{n}\right).$$

(b) State and prove generalized Mobius inverse formula.

Or

[P.T.O.]

10. (a) If $n \geq 1$, then prove that

$$\log(n) = \sum_{d|n} \Lambda(d)$$

(b) Let f and g are any two arithmetical functions then prove that

(i) $(f+g)' = f' + g'$

(ii) $(f \bullet g)' = f' \bullet g + f \bullet g'$

(iii) $(f^{-1})' = -f' \bullet (f \bullet f)^{-1}$.

11. State and prove Euler's summation formula.

(a) Write Euler's constant (C)

(b) Write Riemann-Zeta function $J(s)$.

Or

12. (a) If $x \geq 2$ then prove that $\log[x]\ ! = x\log x - x + 0(\log x)$ and hence prove that $\sum_{n \leq x} \Lambda(n)\left[\frac{x}{n}\right] = x\log x - x + 0(\log x)$.

(b) If $x \geq 1$ and $\alpha > 0$, $\alpha \neq 1$, show that $\sum_{n \leq x} \sigma_\alpha(x) = \frac{J(\alpha+1)}{\alpha+1} x^{\alpha+1} + 0(x^\beta)$ where $\beta = Max\{1, \alpha\}$.

13. State and prove Legrange's theorem and prove that $(p-1)! \equiv -1 (\text{mod}\, p)$, any prime '$p$'.

Or

14. (a) Prove that the congruence is an equivalence relation.

(b) If $a = b (\text{mod}\, m)$ and $\alpha \equiv \beta (\text{mod}\, m)$, then prove that

(i) $ax + \alpha y \equiv bx + \beta y (\text{mod}\, m)$ $\forall$ integers $x \times y$

(ii) $a\alpha = b\beta (\text{mod}\, m)$

(iii) $\alpha^n = b^n$ $(\text{mod}\, m)$ for every +ve integers 'n'

(iv) $f(a) \equiv f(b) (\text{mod}\, m)$ for every polynomial 'f' with integer co-efficients.

15. (a) State and prove Euler's criterian.

(b) If $m \equiv n (\text{mod}\, p)$ then $(m/p) = (n/p)$.

Or

16. (a) Given $m \geq 1$, $(a, m) = 1$. Let $f = \exp_m(a)$ then β we have

(i) $a^k \equiv a^h \pmod{m}$ if and only if

$k \equiv h \pmod{f}$

(ii) $a^k \equiv 1 \pmod{m}$ if and only if

$k \equiv 0 \pmod{f}$, in particular $f / \phi(m)$

(b) Let 'x' be an odd integer if $\alpha \geq 3$, we have $x^{\phi(2^\alpha)/2} \equiv 1 \pmod{2^\alpha}$, so there are no primitive roots mod 2^α.

B-236-04-02

M.sc. DEGREE, EXAMINATIONS
THIRD SEMESTER
BRANCH:-Mathematics
MA 402: Paper II: BANACH ALGEBRAS
(Regular)

(Under CBCS & Non-CBCS w.e.f 2017-2018)

Time : 3 hours Max. Marks : 80

SECTION – A

Answer any FOUR questions. All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Show that the set G of regular elements of a Banach algebra A is an openset.

2. If O is the only topological divisor of zero in a commutative Banach algebra A, then show that $A = C$.

3. If f_1 and f_2 are multiplicative functionals on A with the same null space M, show that $f_1 = f_2$.

4. If x is a normal element in a B^*-algebra, then show that $\left\|x^2\right\| = \left\|x\right\|^2$.

5. If X is a compact Hausdorff space, then show that every closed ideal in $\mathcal{C}(X)$ is the intersection of the maximal ideals which contain it.

6. Let X be a compact Hausdorff space and A a Banach subalgebra of $\mathcal{C}(X)$. If f is a real function in A which is regular in $\mathcal{C}(X)$, then show that it is also regular in A.

7. State Brouwer's fixed point theorem and Schauder's fixed point theorem. Define contraction mapping.

8. Define the terms :
   (a) Lattice
   (b) Boolean algebra.

[P.T.O.]

SECTION – B

Answer ALL questions. Each question carries 15 marks.

(Marks : $4 \times 15 = 60$)

9. (a) Define a topological divisor of zero in a Banach algebra A. Show that

   (i) The subset Z of topological divisors of zero in A is a subset of S, the set of singular elements in A and

   (ii) The boundary of S is a subset of Z.

   (b) Let A be a Banach algebra. For $x \in A$, define the spectrum $\sigma(x)$ of x and show that $\sigma(x)$ is non empty.

Or

10. (a) Define the spectral radius $r(x)$ of an element x of a Banach algebra and show that

$$r(x) = \lim \left\|x^n\right\|^{\frac{1}{n}}$$

   (b) If I is a proper closed two-sided ideal in A, then show that the quotient algebra A/I is a Banach Algebra.

11. (a) Prove that the maximal ideal space $\mathfrak{M}$ of a commutative Banach algebra is a compact Hausdorff space.

   (b) If A is self-adjoint and if $\left\|x^2\right\| = \left\|x\right\|^2$, for every x in A, prove that the Gelfand mapping $x \to \hat{x}$ is an isometric isomorphism of A onto $\mathcal{C}(\mathfrak{M})$.

Or

12. State and prove Gelfand-Neumark theorem.

13. (a) Let X be a compact Hausdorff space. Show that to each non-empty closed set F in X there corresponds a proper closed ideal $I(F)$ in $\mathcal{C}(X)$, defined by

$$I(F) = \{f : f \in \mathcal{C}(X) \text{ and } f(F) = 0\}$$

   (b) Let A be a commutative C^*-algebra of operators on H, and $\mathfrak{M}$ its space of maximal ideals. Then prove that the Gelfand mapping $T \to \hat{T}$ is an isometric *-isomorphism of A onto $\mathcal{C}(\mathfrak{M})$.

Or

14. (a) Let A be a commutative C^*-algebra of operators on H. If an operator T in A is regular in $B(H)$, then prove that it is also regular in A, and therefore the spectrum of T as an operator on H equals its spectrum as an element of A.

(b) Let N be a normal operator on H, A the commutative C^*-algebra generated by N, and $\mathfrak{M}$ the space of maximal ideals in A. Then prove that the mapping $\hat{N}$ in $\mathfrak{C}(\mathfrak{M})$ which corresponds to N under the Gelfand mapping is a homeomorphism of $\mathfrak{M}$ onto $\sigma(N)$.

15. State and prove Picard's theorem on the existence and uniqueness of solutions of first order differential equations.

Or

16. Define an Boolean ring $(B, +, \cdot)$ and a Boolean algebra $(B, \wedge, \vee)$. If $(B, +, \cdot)$ is a Boolean ring, show that the algebraic structure $(B, \wedge, \vee)$, where $x \wedge y = xy$ and $x \vee y = x + y + xy$ is a Boolean algebra.

B-236-04-03 A

M.Sc. DEGREE EXAMINATION — SEPTEMBER 2020

FOURTH SEMESTER

Mathematics/Applied Mathematics

MA 403(A) Paper III — GRAPH THEORY

(Under CBCS and Non-CBCS w.e.f 2017-18)

Time : 3 hours Max. Marks : 80

SECTION – A

Answer any FOUR questions. All questions carry equal marks.

(Marks : 4 × 5 = 20)

1. Show that if G is simple then $\varepsilon \leq \left(\frac{V}{2}\right)$.
2. Define the terms walk, trial, path and cycle in a graph G.
3. Prove that in a tree, any two vertices are connected by a unique path.
4. Prove that if G is connected, then $\varepsilon \geq V - 1$.
5. Show that if G is simple and $\delta \geq \frac{V}{2}$, then $k' = \delta$.
6. If G is 2-connected, then any two vertices of G lie on a common cycle.
7. Prove that, let G be a simple graph with $V \geq 3$. If $C(G)$ is complete, then G is Hamiltonian.
8. Prove that a connected graph has an eular trial if and only if it has atmost two vertices of odd degree.

SECTION – B

Answer ALL questions. Each question carries 15 marks.

(Marks : 4 × 15 = 60)

9. Explain Dijkstra's algorithm.

Or

10. (a) Prove that a graph is bipartite if and only if no odd cyclee.

    (b) Show that if $\delta \geq 2$, then G contains cycle.

[P.T.O.]

11. Briefly explain Kruskal's algorithm with suitable example.

Or

12. (a) A vertex V of a tree G is a cut vertex of G if and only if $d(V) > 1$.

(b) Prove that $T(K_n) = n^{n-2}$.

13. A graph with $V \geq 3$ is 2-connected if and only if any two vertices of G are connected by atleast two internally-disjoint paths.

Or

14. Prove that the graph $H_{n,s}$ is m-connected.

15. Prove that if G is a simple graph with $V \geq 3$ and $\delta \geq V/2$ then G is Hamiltonian.

Or

16. Let G be a simple graph with degree sequence $(d_1, d_2, \ldots, d_v)$ where $d_1 \leq d_2 \leq \ldots \leq d_v$ and $V \geq 3$. Suppose that there is no value of m less $V/2$ for which $d_m \leq m$ and $d_v - m < V - m$. Then G is Hamiltonian.

B-236-04-04

M.Sc. DEGREE EXAMINATION — SEPTEMBER 2020.

FOURTH SEMESTER

Branch — Mathematics

Generic Elective – IV

MA 404 Paper IV — OPERATIONS RESEARCH FOR INDUSTRY AND COMMUNITY DEVELOPMENT

(Under CBCS and Non-CBCS w.e.f 2017-2018)

Time : 3 hours Max. Marks : 80

SECTION – A

Answer any FOUR questions. All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Solve the L.P. problem graphically:

Max $Z = 6x_1 + 8x_2$

Subject to $x_1 + 2x_2 \leq 12$

$x_1 + x_2 \leq 10;\ x_1, x_2 \geq 0.$

2. Find the initial basic feasible solution by using Least-Cost method of the following transportation problem.

	To			Supply
From	2	7	4	5
	3	3	1	8
	5	4	7	7
	1	6	2	15
Demand	8	9	18	

[P.T.O]

B-236-04-04 D

M.Sc. DEGREE EXAMINATION — SEPTEMBER 2020.

FOURTH SEMESTER

Branch — Mathematics

Generic Elective – IV

MA 404 Paper IV — OPERATIONS RESEARCH FOR INDUSTRY AND COMMUNITY DEVELOPMENT

(Under CBCS and Non-CBCS w.e.f 2017-2018)

Time : 3 hours

Max. Marks : 80

SECTION – A

Answer any FOUR questions. All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Solve the L.P. problem graphically:

Max $Z = 6x_1 + 8x_2$

Subject to $x_1 + 2x_2 \leq 12$

$x_1 + x_2 \leq 10$; $x_1, x_2 \geq 0$.

2. Find the initial basic feasible solution by using Least-Cost method of the following transportation problem.

	To			Supply
From	2	7	4	5
	3	3	1	8
	5	4	7	7
	1	6	2	15
Demand	8	9	18	

[P.T.O]

3) What are the basic features of a dynamic programming problem.

4) Define dynamic programming problem.

5 How do you solve a game when

(a) Saddle point exists and

(b) Saddle point does not exists

6) Given an algorithm to determine mixed strategies in a 2x2 game?

7) Explain various basic steps in PERT/CPM techniques.

8) What are the estimates used in PERT ?

SECTION – B

Answer FOUR questions, choosing ONE for each Unit.

Each question carries 15 marks.

(Marks : $4 \times 15 = 60$)

9. Solve the following L.P.P. by Simplex method:

Max $Z = 10x_1 + 5x_2$

Subject to $4x_1 + 5x_2 \leq 100$;

$5x_1 + 2x_2 \leq 125$; $x_1, x_2 \geq 0$.

10) Use Penalty method to

Maximize $Z = 3x_1 + 2x_2 + 3x_3$

subject to

$2x_1 + x_2 + x_3 \leq 2$;

Or $3x_1 + 4x_2 + 2x_3 \geq 8$,

$x_1, x_2, x_3 \geq 0$ (-)

11) Using dynamic programming solve the reliability problem with following, data.

Mi	$i=1$		$i=2$		$i=3$	
	R	C	R	C	R	C
1	0.6	2	0.8	3	0.7	1
2	0.7	4	0.8	5	0.8	2
3	0.9	5	0.9	6	0.9	3

Or

12) Use Dynamic programming to solve the following L.P.P.

Max $Z=3x_1+7x_2$

Subject to the constraints $x_1+4x_2 \leq 8$;

$x_2 \leq 2$; $x_1, x_2 \geq 0$.

13) For the following two person zero sum game find the strategy of each player and the value of the game :

$$\begin{array}{c} \\ A \end{array} \begin{array}{c} \begin{array}{ccc} B & & \end{array} \\ \begin{pmatrix} 8 & -3 & 7 \\ 6 & -4 & 5 \\ -2 & 2 & -3 \end{pmatrix} \end{array}$$

Or

14) solve the following ~~Or~~ 3X3 game by linear programm

player B

$$\begin{array}{c} \text{player A} \end{array} \begin{bmatrix} 1 & -1 & -1 \\ -1 & -1 & 3 \\ -1 & 2 & -1 \end{bmatrix}$$

B-236-04-04 D

15. The following table gives the activities in a construction project and time duration:

Activity	Preceding activity	Normal time (days)
1–2	–	20
1–3	–	25
2–3	1–2	10
2–4	1–2	12
3–4	1–8, 2–3	5
4–5	2–4, 3–4	10

(a) Draw the activity network of the project.

(b) Find the total float and free float for each activity.

(c) Determine the critical path and project duration.

~~(OR)~~

16) Tasks A, B, C, ..., H, I constitute a project. The notation x<y means that the task x must be finished before y can begin. With this notation. A<D, A<E, B<F, D<F, C<G, C<H, F<I, G<I. Draw the graph to represent the sequence of tasks and find the minimum time of completion of the project, when the time (in days) of completion of each project task is as follows:

Task :	A	B	C	D	E	F	G	H	I
Time :	8	10	8	10	16	17	18	14	9

B-236-04-05

M.sc. DEGREE, EXAMINATIONS

FORTH SEMESTER

BRANCH:-Mathematics

MA/AMA 405: Paper V: COMPUTER ORIENTED NUMERICAL METHODS

(Regular)

Time: 2 Hours **Max. Marks: 50**

SECTION-A

Answer any **TWO** questions. All questions carry **equal** marks. 2X5=10

1. Write the difference between while and do while loops.

2. Explain If else statement with syntax.

3. Evaluate $\int_0^1 \cos\theta \, dx$ using h=0.2.

4. Let $\frac{dy}{dx}$= $3x^2+1$, where y (1) =2

Find y (2) by Euler's method using i)h=0.5 and ii) h=0.25

SECTION-B

Answer any **TWO** questions. All questions carry **equal** marks. 2X20=40

5 a) Explain for loop with syntax and example.

b) Explain switch statement with example.

OR

6. a) write difference string handling functions in C-Language. Explain with an example

b) Explain two dimensional arrays with examples.

7. a) The velocity of a train which starts from rest is given by the following table, the time table being reckoned in minimum from the start and the speed in Km/h

t	0	2	4	6	8	10	12	14	16	18	20
V(t)	0	10	18	25	29	32	20	11	5	2	0

Estimate approximately, the total distance run in 20 min.

b) Using Simpsons 3/8 rule evaluate the definite integral $\int_0^{0.3}(1-8x)^{1/2}$ dx.

OR

8. Write a program to calculate the solution of first order differential equation $y^1=f(x, y)$ by using the fourth order Runge- Kutta method.

B-236-04-06A

M.Sc. DEGREE, EXAMINATIONS

FOURTH SEMESTER

BRANCH:-Mathematics/Applied Mathematics

Open Elective (Other Departments)

MA/AMA 406: PAPER VI A-BUSINESS MATHEMATICS-II

(Under the CBCS & Non CBCS w.e.f.2021-2022)

(Regular/Supplementary)

Time: 3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. **All** questions carry equal marks. 4X5=20

1. Worker A takes 8 hours to do in a job. Worker B takes 10 hours to do same job .how long should it take both A and B working together but independently, to do the same job?

2. Two pipes can fill a tank in 10 hours & 12 hours respectively while a third pipe empties the full tank in 20 hours. If all the three pipes operate simultaneously, in how much time fill the tank do filled?

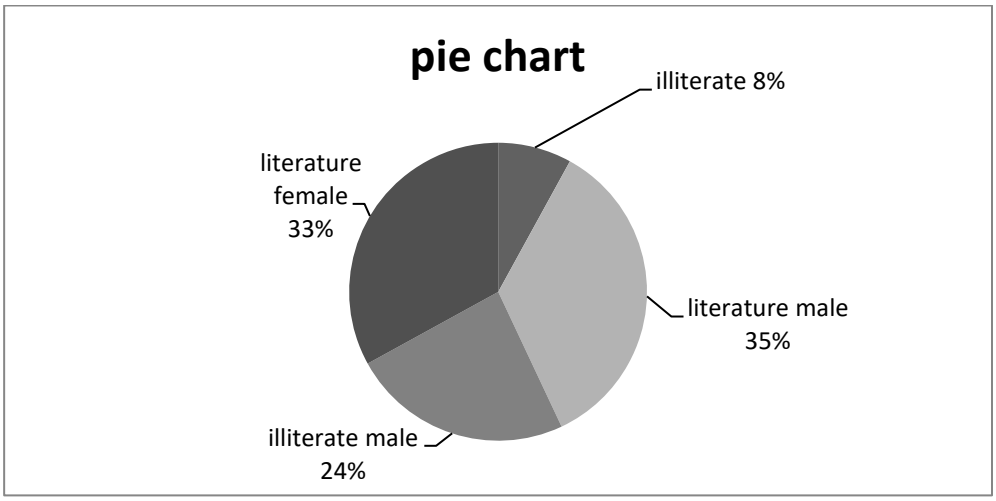
3. In what ratio must rice at Rs 9.30 per kg lie mixed with rice at Rs 10.80 per kg so that the mixture be worth Rs 10 per kg?

4. Find the compound interest on Rs 16000 at 20%per annum for 9 months compounded quarterly?

5. Solve $15x^2-28=x$

6. Find the sum of the series 2+5+8+……+182 ?

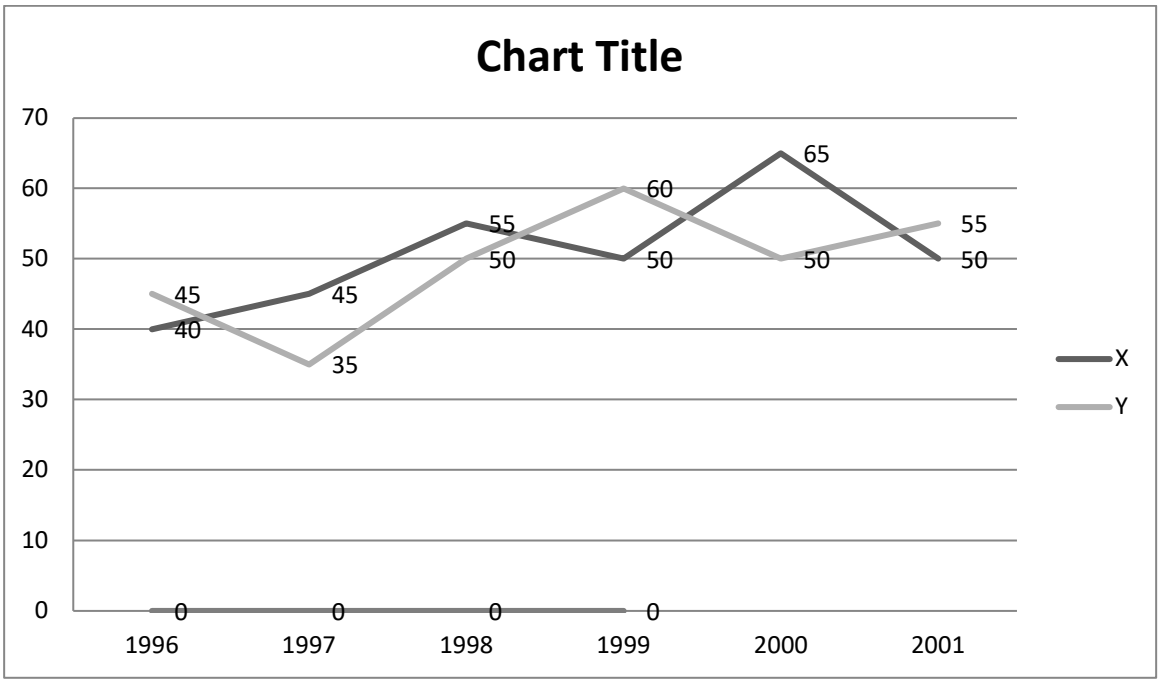
7. The following pie chart shows the percentage of literate and illiterate males and females in a city?



Total number = 2, 50,000

What is the difference between the number of literate males and literate females?

8. If the income of two companies we equal in 1999 then wheat was ratio of expenditure of company X to the company Y in 1999?



SECTION B

Answer All questions. Each question carries 15 Marks. 4X15=60

UNIT-I

9. a)**.** 45 Men can complete a work in 16 days. 6 days after day started working 30 Maximum Men joined then. How many days will they now take two complete the remaining work?

b) 2 Pipe can fill a cistern in 14 hrs & 16 hrs respectively. The pipes are opened simultaneously and it is found that due to leakage in the bottom. At took 32 mins more to fill the cistern. When the cistern is full, in what time will the leak empty it?

(OR)

10 a) While covering a distance of 24 Km, A man noticed that after walking 1 hrs&40 mins, The distance covered by him was 5/7 of the remaining distances. What was his speed in meters per second?

b) A train is leaves Meerut at 5A.M.and reaches Delhi at 9A.M. and that train leaves Delhi at7A.M. and reaches Meerut at 10:30.A.M. at what time do the two trains cross each other?

UNIT-II

11 a).How many Kg of Wheat Costing Rs 8 per Kg must be mixed with 36 kg of rice costing Rs 5.40 per kg. So that 20% gain may be affined by selling the mixture at Rs 7.20 per Kg.?

b) A can contains a mixture of two liquids A and B in the ratio 7:5 .When 9 liters of mixture are drawn off and the can filled with B the ratio of A and B becomes 7:9. How many liters of liquid A was contained by the can initially?

(OR)

12. a) An amount of Rs.1,00,000/- is invested in two types of shares. The first yield an interest of 9% per annum and the second 11% per annum of the total interest at the end of year is 9 ¾ % .Then find the amount of invested in each share ?

b) A person lent out a certain some on simple interest and the same some on compound interest at a certain rate of interest per annum. He noticed that the ratio between the

difference of compound interest and simple interest of 3 years and that of 2 years 25:8. Find the rate of interest per annum?

UNIT-III

13. a) Solve: $\sqrt{25-x^2}=(x-1)$

b) The sum of the roots of the equations $5x^2+ (p+q+r) x+pqr$, is equal to zero. What is the value of $(p^3+q^3+r^3)$?

(OR)

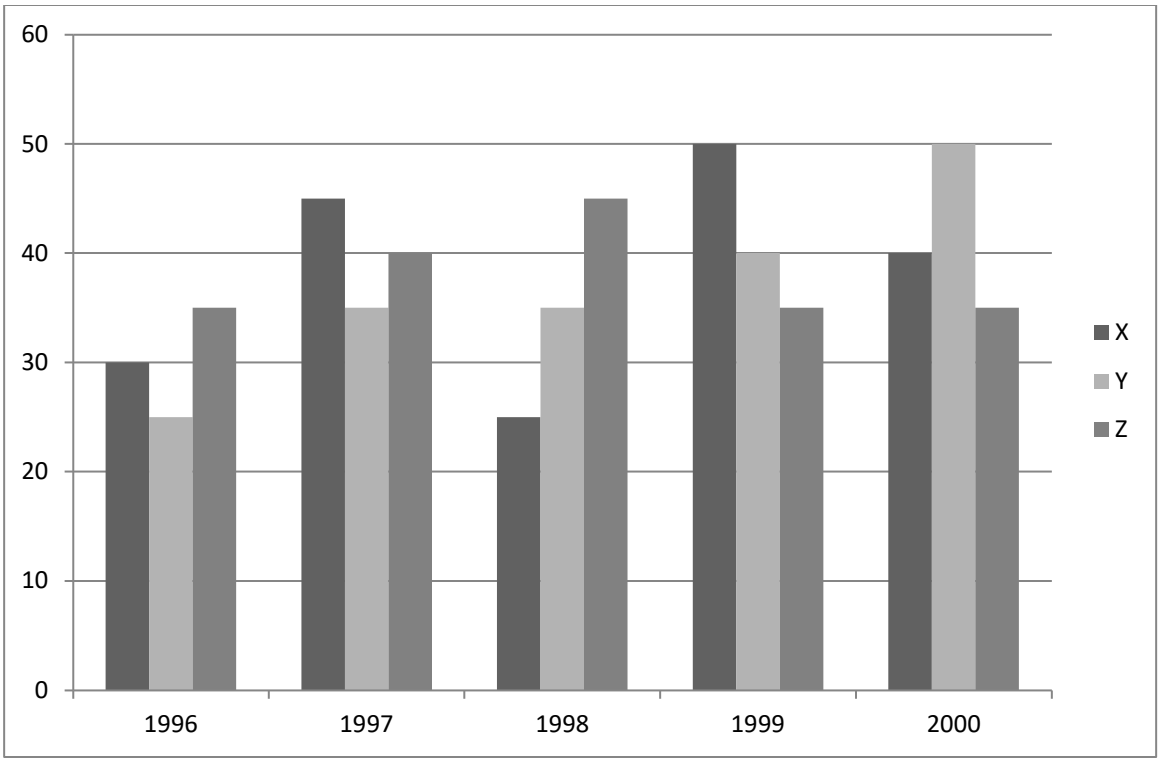
14 a) Find three numbers in A.P. whose sum is 15 and product is 80.

b) If the 4th and 9th terms of a G.P.be 54 and 13122 respectively, find the first term,common ratio and its 6th term.

UNIT-IV

15 . The bar graph provide below gives the data of the production of paper(In Lakhs Tonnes) by three different companies X,Y and Z over the years .

Study the graph and answer the questions that below



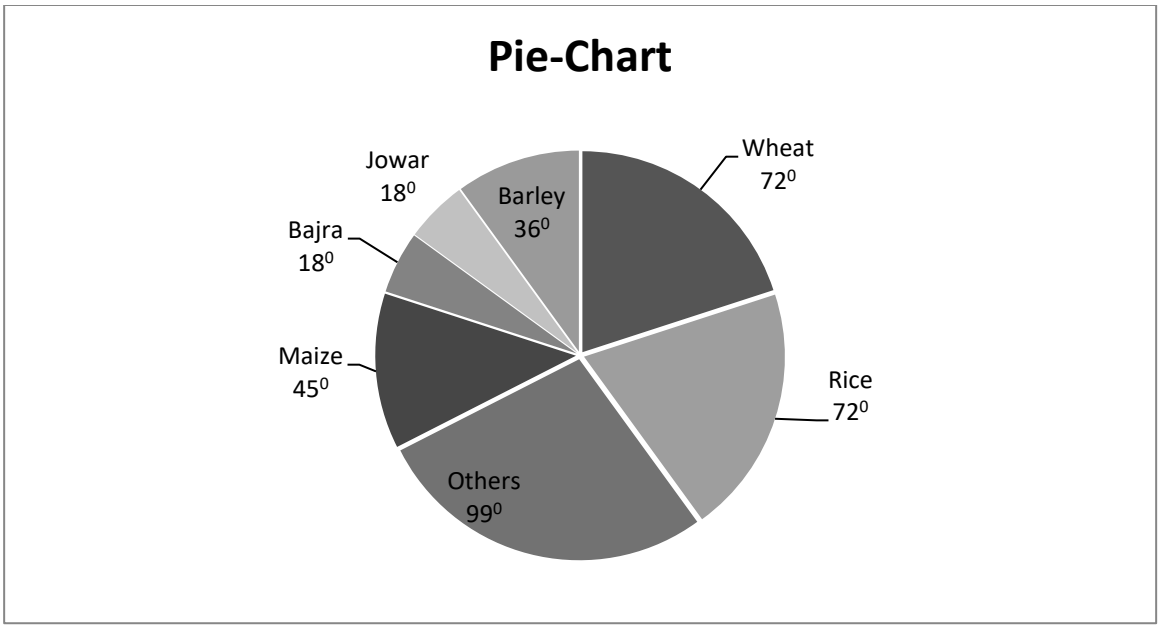
i) What is the ratio of the average production of company X in the period 1998-2000 to the average production of company Y in this same period?

ii) What is the percentage increase in the production of the Company Y from 1996-1999.?

iii) Which company attains the maximum average production for five years?

(OR)

16) The Pie chart provided below gives the distribution of land (in a village) under various food crops. Study the pie chart carefully and answer the given questions that follow. Distribution of areas (in acres) under various food crops?



(i) Which combination of three crops contributes to 50% of the total area under the food crops?

(ii) if the total area under Jowar wan 1.5 million acres then what was area (in million area)

(iii) if the production of wheat in 6 times that of barley, then what is the ratio between the yield per acre of wheat and barley?

B-236-04-06 B

M.Sc. DEGREE, EXAMINATIONS

FOURTH SEMESTER

BRANCH:-Mathematics/Applied Mathematics

Open Elective (Other Departments)

MA/AMA 406: PAPER VI B - BASIC MATHEMATICS FOR SOCIAL SCIENCES (EE)

(Common with paper AM 406 (B) of Branch I(A) Mathematics)

(Under the CBCS & Non CBCS w.e.f.2021-2022)

(Regular/Supplementary)

Time: 3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. **All** questions carry equal marks. 4X5=20

1. If $A = \begin{bmatrix} 3 & 2 & 2 \\ 1 & 3 & 1 \\ 5 & 3 & 4 \end{bmatrix}$, find the matrix B such that $AB = \begin{bmatrix} 3 & 4 & 2 \\ 1 & 6 & 1 \\ 5 & 6 & 4 \end{bmatrix}$.

2. Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

3. Prove that the right- bisectors of the sides of a triangle concur at its circumcentre.

4. Given $R_1 = 5\ I - 2\ J + 4\ K$ and $R_2 = I + 3\ J + 7\ K$, find the magnitude and direction cosines of the vectors $R_1 + R_2$ and $2R_1 - R_2$.

5. Find the nth derivative of $\dfrac{x}{(x-1)(2x+3)}$.

6. Show that $\sin x(1+\cos x)$ is a maximum when $x = \dfrac{\pi}{3}$.

7. Integrate i) $\int \sin^4 x \cos^2 x\, dx$. ii) $\int_0^\infty \dfrac{x^2}{(1+x^2)^{7/2}}\, dx$.

8. Solve the differential equation $(y^2 - 2xy)\, dx = (x^2 - 2xy)\, dy$.

SECTION B

Answer All questions. Each question carries 15 Marks. **4X15=60**

UNIT-I

9. Solve the following system of equation by matrix method

$x_1 + x_2 + x_3 = 1,\ x_1 + 2x_2 + 3x_3 = 6,\ x_1 + 3x_2 + 4x_3 = 6.$

(OR)

10. If A and C are non-singular matrices, then show that $\begin{bmatrix} A & 0 \\ B & C \end{bmatrix}^{-1} = \begin{bmatrix} A^{-1} & 0 \\ -c^{-1}BA^{-1} & c^{-1} \end{bmatrix}$

Hence find inverse of $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 3 & 0 & 4 & 0 \\ 0 & 1 & 0 & 3 \end{bmatrix}$.

UNIT-II

11. A line makes angles $\alpha, \beta, \gamma, \delta$ with Diagonals of a cube, prove that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = 4/3$. (OR)

12. Show that the volume of the tetrahedron ABCD is $\frac{1}{6}\left[\overrightarrow{AB}, \overrightarrow{AC}, \overrightarrow{AD}\right]$.

Hence find the volume of the tetrahedron formed by the points $(1,1,1), (2,1,3), (3,2,2)$ *and* $(3,3,4)$.

UNIT-III

13. Expand $e^{\sin x}$ by Maclaurin's series or otherwise upto the term containing x^4.

(OR)

14. Using Taylor's theorem, prove that $x - \frac{x^3}{6} < \sin x < x - \frac{x^3}{6} + \frac{x^5}{120}$, *for* $x > 0$.

UNIT-IV

15. Evaluate $\int_0^{\pi/2} \log\sin x\, dx.$ (OR)

16. Solve $(y\,dx + x\,dy)\, x\cos(y/x) = (x\,dy - y\,dx)\, y\sin(y/x)$.

B-236-04-06 B

[Total No. of Pages : 2 1003660 B-238-01-01

M.Sc. DEGREE EXAMINATIONS, AUGUST - 2021

FIRST SEMESTER

BRANCH - APPLIED MATHEMATICS

AM - 101 : Paper - I : METHODS OF APPLIED MATHEMATICS

(Under CBCS & Non - CBCS w.e.f. 2016-2017)

(Common to Supplementary candidates also i.e., who appeared in 2015 and earlier 90 marks)

Time : 3 Hours **Max. Marks : 80**

SECTION - A

Answer any **Four** questions. All questions carry **equal** marks. **(4×5=20)**

1. State and prove Change of Scale property.
2. Show that $\int_0^\infty \frac{\sin cox \cos wx}{w} dw = \frac{\pi}{2}, 0 \le x < 1$.
3. Find the finite sine transform of $f(x) = 1 - \frac{\cos n\pi}{n^2\pi^2}$.
4. Find $f(x)$, if $\overline{f_c(p)} = \frac{\cos\left(\frac{2p\pi}{3}\right)}{(2p+1)^2}$ if $0 < x < 1$.
5. State and prove Cayley's theorem.
6. Prove that a group of order P^n is nilpotent.
7. State and Prove Gauss Lemma.
8. Define Euclidean domain and give two examples.

SECTION - B

Answer **All** questions. All questions carry **equal** marks. **(4×15=60)**

UNIT - I

9. a) State and prove the parseval's identity for Fourier series.

   b) Solve the integral equation $\int_0^\infty f(x)\cos \lambda x dx = e^{-\lambda}$.

(OR)

10. a) Find the Fourier cosine transform of e^{-x^2}

b) Express the function $f(x)=\begin{cases}\cos x & \text{if } 0<x<\pi \\ 0 & \text{if } x\le 0 \text{ or } x\ge \pi\end{cases}$ as Fourier integral.

UNIT - II

11. Solve $\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial x^2}, 0<x<6, t>0$, subject to conditions $u_x(0,t)=u_x(6,t)=0, u(x,0)=2x$.

(OR)

12. Find the steady temperature u(x,y) in a long square bar of side π when one face is kept at constant temperature u_0 and the other faces at zero temperature. Assume that u(x,y) is bounded.

UNIT - III

13. i) State and prove Burnside theorem.

ii) Let G be a group. If G is solvable, the prove that every subgroup of G and every homomorphic image of G are solvable. Conversely, if N is normal subgroup of G such that N and G/N are solvable, then prove that G is solvable.

(OR)

14. Prove that the Alternating group A_n is simple if $n > 4$. Consequently, prove that S_n is not solvable if $n > 4$.

UNIT - IV

15. a) Prove that Every Euclidean domain is a UFD.

b) Show that $Z\left[\sqrt{-6}\right]$ is not Euclidean domain.

(OR)

16. Let R be a unique factorization domain. Then the polynomial ring R[x] over R is also unique factorization domain.

B- 238-01-03 B

M.Sc. DEGREE, EXAMINATIONS
FIRST SEMESTER
BRANCH:-Mathematics/Applied Mathematics
MA/AMA 103 B: PAPER III — VISCOUS FLOWS
(Under the CBCS & Non CBCS w.e.f.2021-2022)

Time : 3 Hours *Max. Marks : 80*

Section-A

Answer any FOUR questions (4×5=20 marks)

Each question carries 5 marks.

1. Write about the stress and strain.
2. Verify the following invariant for two dimensional stress components.

$$\left(\sigma_{x'x'}-\sigma_{y'y'}\right)^2+4\sigma_{x'y'}^2=\left(\sigma_{xx}-\sigma_{yy}\right)^2+4\sigma_{xy}^2$$

3. Write about fundamental equations of the flow of viscous incompressible fluids.
4. Derive the equation of continuity in the vector form.
5. Write about plane poiseuille flow.
6. Explain the applications of the parallel flow theory.
7. Write about momentum integral theorems for the boundary layer.
8. Explain about the laminar boundary layer.

Section-B

Answer **all** questions

Each question carries 15 marks (4×15=60 marks)

9. Derive the relation between stress and rate of strain for an incompressible fluid.

OR

10. Let the new coordinate system (x',y') be detained from the original coordinate system (x,y) by a rotation through an angle 45°. Verify the invariants to the rates of strain for a rectilinear flow with a linear velocity profile i.e. $u = ay$, $v = 0$.

11. Derive Navier - stokes equations for viscous incompressible fluid in vector form.

OR

12. Derive the equation of state of perfect gas.

13. Discuss the flow between concentric rotating cylinders.

OR

14. Explain the Hagen - Poiseuille flow through a pipe.

15. Discuss the boundary layer on a surface with pressure gradient.

OR

16. a) Derive Blasius solution of a incompressible fluid past a thin flat plate.

    b) Based on the von karman integral relation determine the local frictional coefficient c_f for flow over a flat plats.

B-238-01-04 B

FIR

M.Sc. DEGREE, EXAMINATIONS
FIRST SEMESTER
BRANCH:-Applied Mathematics
AMA 104: PAPER IV — BOUNDARY VALUE PROBLEMS
(Under the CBCS & Non CBCS w.e.f.2021-2022)

Time: 3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. All questions carry **equal** marks. 4X5=20

(1) Test the Stability of the critical point (0,0) of the System

$x_1' = 2x_1 + 4x_2$

$x_2' = 3x_1 + 4x_2$

(2) Prove that all the Solutions of $x' = A(t)x$ where $A(t)$ is an $n \times n$ continuous matrix on $[0, \infty)$ and x is an n-vector are Stable iff They are bounded

(3) If $x' = A(t)x$ is uniformly Stable, $B(t)$ is an $n \times n$ continuous matrix for $t > t_0$ and $\int_{t_0}^{\infty} \|B(t)\| dt < \infty$ Prove that $x' = (A(t) + B(t))x$ is uniformly Stable

(4) Find the Zero Stability of the First approximation the zero system

$x_1' = 7x_1 + 2\sin x_2 - x_2^5$

$x_2' = e^{x_1} - 3x_2 - 1 + \frac{5}{2}x_1^2$

(5) Show that Lotka-Volterra two Spices mutalism System

$x_1' = x_1(2 - 3x_1 + 2x_2)$

$x_2' = x_2(1 + 4x_1 - 6x_2)$ is Globel Asymptotically Stable

(6) State & prove Bihari's inequality :

(7) Find the normal equation of Bessel's equation $t^2x'' + tx' + (t^2 - p^2)x = 0$ and also Show that if $0 \le p < \frac{1}{2}$ then every interval of the length π contains at least one zero of the Solution $J_p(t)$ of Bessels equation

(8) If $p = \frac{1}{2}$ then every Zero of the $J_p(t)$ is at a distance of π from the Successive Zero

SECTION-B

Answer All questions Each Question carries 15 marks $4 \times 15 = 60$

(9) Test the Stability based on first approximation of the zero solution of the System $x_1' = -2x_1 + 8\sin^2 x_2$
$x_2' = x_1 - 3x_2 + 4x_1^2$

(OR)

(10) Define maximal, minimal, Upper & Lower Solutions of Initial value problem $x' = f(t, x), x(t_0) = x_0$

(11) Prove that the System $x' = A(t)x$ is perpetually Stable if $\|\phi(t)\| \leq M$, $\phi'(t) \leq M$, for some positive constant M and $t \geq t_0$

(OR)

(12) Discuss the nature of the Critical Point (0,0) of the two dimensional System of $u'' + 2ku' + q^2u = 0$ where k & q are positive Constant

(13) Test for Stability based on first approximation of the zero Solution $x_1' = 7x_1 + 2\sin x_2 - x_2^4$
$x_2' = e^{x_1} - 3x_2 - 1 + \frac{5}{2}x_1^2$

(OR)

(14) If the positive numbers a_i, b_{ij} $(i, j = 1, 2)$ Satisfies the Inequalities $\frac{b_{12}}{b_{22}} < \frac{a_1}{a_2} < \frac{b_{11}}{b_{21}}$ holds then prove that the Comprehensive System
$x_1' = x_1(a_1 - b_{11}x_1 - b_{12}x_2)$
$x_2' = x_2(a_2 - b_{21}x_1 - b_{22}x_2)$ where a_i, b_{ij}, are positive Constants.

(15) State & prove Bihari's inequality

(OR)

(16) State & Prove Sturm's Separation theorem.

Total No. of Pages : 2

B-238-02-01

M.Sc. DEGREE EXAMINATIONS, OCTOBER - 2021

SECOND SEMESTER

Branch : APPLIED MATHEMATICS

AM 201 Paper I : MATHEMATICAL MODELING

(Under CBCS & Non-CBCS w.e.f. 2016-2017)

Time : 3 Hours **Max. Marks : 80**

SECTION - A

Answer any **FOUR** questions. All questions carry **Equal** marks. **(4×5=20)**

1. Discuss population growth model.
2. Find the orthogonal trajectories of the family of curves $x^2 + y^2 - 2ax = 0$.
3. Discuss the Domar first debt model.
4. Show that the model represented by

   $\frac{dx}{dt} = x(12 - 4x - 3y), \frac{dy}{dt} = y(30 - 6x - 5y)\ x \geq 0,\ y \geq 0$ has no position of equilibrium and that only the second species will survive.
5. Obtain the curves of pursuit when $k = 1, k > 1$.
6. Give a model for rectilinear motion.
7. Give a brief account on cob web model.
8. Write equation of continuity for heat flow.

SECTION - B

Answer **ALL** questions. Each question carries **20** marks. **(4×15 =60)**

9. a) Discuss the diffusion of glucose in the blood stream.

   b) Explain simple Harmonic Motion.

(OR)

10. a) Formulate a mathematical model for motion of a rocket and explain it.

b) Find the orthogonal trajectories of the families of curve $r = a(1+\cos\theta)$.

11. a) Discuss the modification of the Prey-Predator model when, the predator population is harvested at a constant rate h_1.

b) Formulate and discuss Leontief's open closed dynamical systems for inter-industry relations.

(OR)

12. a) Derive samuelson's investment model.

b) Explain Richardson's model for Arm's race.

13. a) Find the central force F(r) if the orbit of an ellipse with centre of force coinciding with the centre of ellipse.

b) Formulate a mathematical model of circular motion and motion of satellite.

(OR)

14. a) Discuss the motion of a particle on a smooth or rough vertical wire.

b) Solve, $\frac{d^2y}{dt^2}+\frac{dy}{dt}(\alpha L+\beta)+\alpha\beta Ly+\alpha\beta u=\alpha\beta G$ for mixed proportionate derivative stabilization policy and discuss the stability of the solution.

15. a) Solve the difference equation, $x_{t+2}-4x_{t+1}+4x_t=0$ and discuss the behaviour of each solution.

b) Formulate and discuss a mathematical model for Hardy weinberg law.

(OR)

16. a) Derive Euler's equation of motion for inviscid flow.

b) Write diffusion equation in spherical polar and cylindrical polar coordinates.

B-238-02-03 B

M.Sc. DEGREE, EXAMINATIONS
SECOND SEMESTER
BRANCH:-Applied Mathematics
AMA 203 B: PAPER III — MAGNETO HYDRO DYNAMICS
(Under the CBCS & Non CBCS w.e.f.2021-2022)

Time : 3 Hours *Max. Marks : 80*

Section-A

Answer any ~~five~~ questions (5×5=~~25~~ marks)

Each question carries 5 marks.

1. Write about sources and sinks
2. Find the velocity potential at p due to the doublet at 0 and find velocity components at p in spherical polar coordinates.
3. Write about uniform flow past a fixed infinite circular cylinder.
4. Show that the complex potential at p is $w = be^{i\alpha}(z - z_1)^{-1}$ in the case of line doublets.
5. State and explain Maxwell's electromagnetic field equations.
6. Write about Magnetohydrostatics.
7. Write about Fluid in motion.
8. Derive the velocity amplitudes of the reflected and transmitted waves.

Section-B

Answer **one** questions from each unit

Each question carries ~~12½~~ 15 marks (4×~~12½~~ 15 = ~~50~~ 60 marks)

Unit-I

9. a) Write about the image of a doublet in a sphere when the axis of the doublet passes through the centre of the sphere.

   b) Show that the stream function ψ is not a harmonic function.

OR

10. State and prove weiss's sphere theorem.

Unit-II

11. Show that for irrotational incompressible two - dimensional flow, $\phi(x,y), \Psi(x,y)$ are harmonic functions and the families of curves ϕ = constant and ψ = constant intersect orthogonally

OR

12. a) State and prove the Milne - Thomson's circle theorem.

    b) Write about the Magnus effect.

Unit-III

13. State and prove Alfven's theorem.

OR

14. a) Write about the magnetic Reynolds number

    b) Write about Rate of Flow of charge.

Unit-IV

15. State and prove Ferraro's law of iso rotation.

OR

16. Show that the magnetic energy of the pert urbed field is equal to the kinetic energy of the motion.

B–238–03–01

M.Sc., DEGREE EXAMINATION — NOVEMBER/DECEMBER, 2018.

THIRD SEMESTER

Branch — APPLIED MATHEMATICS

AM – 301 : Paper I — CONTINUM MECHANICS

(Under CBCS and Non-CBCS w.e.f. *2017-2018*)

Time : 3 hours Max. Marks : 80

SECTION – A

Answer any FOUR questions. All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Define stream lines. Determine the equation of stream lines if $\overline{q} = x\overline{i} - y\overline{j}$.
2. For an incompressible fluid $q = (ax, y, ax, o)$ Discuss the Nature of the flow.
3. Derive the condition at a boundary of two inviscid immiscible Fluids?
4. Explain pitot tube.
5. Explain Stoke's Stream function.
6. Obtain stream function ψ for a uniform line source along $\overline{oz}$.
7. Discuss the flow due to a uniform line doublet at 'o' of strength μ per unit length its axis being along $\overline{ox}$.
8. Discuss the uniform flow past a fixed infinite circular cylinder.

SECTION – B

Answer ALL questions. All questions carry equal marks.

(Marks : $4 \times 15 = 60$)

9. (a) Derive the equation of Continuity.

   (b) At the point in an incompressible fluid having spherical polar co-ordinates (r, θ, ψ) the velocity components are $(2Mr^{-3}\cos\theta, Mr^{-3}\sin\theta, o)$ where M is a constant show that the velocity is of the potential kind. Find the velocity potential and the equations of the streamlines.

Or

10. (a) Explain the conditions at rigid boundary.

    (b) Discuss general analysis of fluid motions.

[P.T.O.]

11. (a) Prove that the pressure at 'p' in moving inviscid fluid is independent of the orientation of 'δA'.

(b) Discuss Bernoulli's equation.

Or

12. (a) Discuss the case of steady motion under conservation body forces

(b) Explain ventury tube?

13. (a) If $r^n S_n(\theta, \varphi)$ is a Harmonic function, then prove that $r^{-(n+1)} S_n(\theta, \varphi)$ is also Harmonic function.

(b) Discuss doublet is a uniform stream.

Or

14. State and prove Weiss's sphere theorem.

15. (a) Discuss the flow for which $W = z^2$.

(b) State and prove the Milne – Thomson circle theorem.

Or

16. State and prove Blasius theorem.

B-238-03-03 B

M.Sc. DEGREE, EXAMINATIONS
THIRD SEMESTER
BRANCH:-Applied Mathematics
AMA 303 B : PAPER III — MATHEMATICAL METHODS
(Under the CBCS & Non CBCS w.e.f.2021-2022)

Time: 3 Hours **Max. Marks: 80**

SECTION-A

Answer any **FOUR** questions. All questions carry **equal** marks. 4X5=20

1) Find the deflection of a vibrating string of unit length having fixed endpoints with initial velocity zero and initial deflection $f(x) = k(\sin x - \sin 2x)$

2) write about heat conduction equation.

3) Derive the equation of the circuit.

4) show that the sum of the temperatures at any two points equidistant from the centre is always same a constant.

5) Define Green's function and mention some of its important properties

6) classify the integral equations. convert the initial value problem $y'' + y = 0$, $y(0) = 0$, $y'(0) = 1$ into an integral equation.

7) write about a fredholm integral equation of the first kind.

8) write about neumann series

Question No.	Sub No. if any	Section-B 4×15=60	Allotment of Marks for each question
		Answer one question from each unit.	
		Unit-I	
7)		A tightly stretched string with fixed end points x=0 and x=l is initially in a position given by $y = k\sin^3(\pi x/l)$. If it is released from rest from this position, find the displacement $y(x,t)$.	
		(or)	
(b)		A homogeneous rod of conducting material of length 100cm has its ends kept at zero temperature and the temperature initially is $u(x,0) = \begin{cases} x, & 0 \le x \le 50 \\ 100-x, & 50 \le x \le 100 \end{cases}$ Find the temperature $u(x,t)$ at any time.	
		Unit-II	
8)		Solve the following boundary value problem $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$, $0<x<1$, $\frac{\partial u(0,t)}{\partial x} = 0$, $\frac{\partial u(1,t)}{\partial x} = 0$, $u(x,0) = x$.	
		(or)	
(b)		Obtain the solution of the wave equation $\frac{\partial^2 y}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 y}{\partial t^2}$ appropriate to the case when a periodic E.M.F. voltage is applied at the end $x=0$ at the time.	

Sub No if any		Allotment of Marks for each question
	Unit-III	
13)	Solve by the method of successive approximations the integral equation $y(x) = 1 + \lambda \int_0^1 (1 - 3xz) y(z) dz$.	
	or	
14)	Solve the integral equation $y(x) = 1 + \int_0^x y(t) \sin(x-t) dt$	
	Unit-IV	
a)	Find the iterated kernel, for the kernel $k(x,t) = x - t$ in $(0,1)$	
	or	
b)	Determine the resolvent kernel associated with $k(x,z) = x$ in the interval $(0,1)$ & show that it is a power series in λ, obtaining the first three terms.	

B-238-04-02

M.Sc. DEGREE EXAMINATION — SEPTEMBER 2020.

FOURTH SEMESTER

Branch : Applied Mathematics

AM 402 Paper II : FLUID DYNAMICS

(Under CBCS and Non-CBCS w.e.f. 2017-2018)

Time : 3 hours

Max. Marks 80

SECTION – A

Answer any FOUR questions. All questions carry equal marks.

(Marks : $4 \times 5 = 20$)

1. Define viscosity with example.

2. Define viscid and inviscid flow with suitable examples.

3. Obtain with the usual notation the governing equations of motion for a steady incompressible flow through an arbitrary cross section under a constant pressure gradient.

4. Obtain with the usual notation, Helmholtz's equation for the verticity vector $\vec{\omega}$ in a real fluid.

5. State and explains the significance of the boundary layer characteristics.

6. Show with the usual notation that, for the Blasius solution $\int_0^\infty (f' - f'^2)dy = f''(0)$

7. Define and explain the importance of the Van-Mises transformation.

8. Define the displacement thickness and give its physical significance.

SECTION – B

Answer ALL question. Each question carries equal marks.

(Marks : $4 \times 15 = 60$)

9. With the usual notation obtain Navier – Stokes equations for a viscous fluid.

Or

10. Define circulation. Obtain an expression for the rate of circulation in a viscous fluid deduce the corresponding expression for an ideal fluid and state its significance.

11. Discuss completely Hagen – Poiseuille Flow, through a circular pipe.

Or

12. Discuss the steady viscous flow through an arbitrary cylinder under constant press gradient. Using this idea discuss the flow through a tube of elliptic cross-section.

13. With the usual notation obtain Von – Karman's momentum integral equation for steady two dimensional incompressible boundary layers.

Or

14. With the usual notation obtain:
    (a) Momentum integral equation.
    (b) Kinetic – energy integral equation.

15. (a) Write a short note on for the flow near to the stagnation point of a cylinder.
    (b) Show with the usual notation that the rate of energy dissipation ϕ is approximate to $\mu\left(\frac{\partial u}{\partial y}\right)^2$ within the boundary layer.

Or

16. Obtain Blasius equation for the steady flow parallel to a semi-infinite flat plate.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF MICROBIOLOGY



Course

M.Sc. MICROBIOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as

per NEP-2020

About the Department

The Department of Microbiology emerged from the Sri Venkateswara University post graduate Centre, Kavali during 2005. Since 2010, the Department of Microbiology was to transferred College of Sciences, Sri Venkateswara University, Tirupati. The department presently runs Four academic programmes M.Sc. Microbiology (Regular & Self-Supporting), M.Sc. Industrial Microbiology (Self-supporting) and Doctoral Programme. The present intake in each Masters programme is 24. The post graduate programme is under Choice Based Credit Course in four semesters with 16 theory papers, 7 practicals and one project work. The Department has taken special interest in encouraging the students to take up pure, applied and strategic Ph.D research programmes at local and national level to restore the environmental quality and development of indigenous microbial technology. Several students of this department have been gainfully employed and are working in several leading National & International laboratories, Industries, research Institution and colleges.

The research activities of the Department are also well recognized and a number of projects funded by agencies such as UGC, DST, ICMR etc., The thrust areas identified are Molecular Microbial Ecology, Proteomics, DNA Bar-coding, EnvironmentalBiotechnology etc.,The department of Microbiology has developed and transformed itself into a progressive department with upto date laboratory equipments, reference books. The department conducts various activities like Saturday meets, Research Seminars and training programmes for the CSIR-UGC, SLET, NET, GATE examinations. On an average 4 - 6 out of 24 students of each course qualifying these examinations every year.The department has strong rapport with potential employers and the opportunities of employment are routinely displayed.With respect to service the faculty has an exemplary record of participation in National & International Organization and editing professional Journals. The research outcomes of the department are well evidenced by publication of several research papers in peer reviewed national and international Journals with good impact factor. The Department also excels in extra curricular activities too. The department regularly organizes national level seminars, symposia and workshops. It is not only the effect of the faculties for all such success but it is the team spirit and the excellence of the post graduate and Doctoral students too. Students of Microbiology are self sustained and receive individual fellowships including DST inspire Fellowship, Rajiv Gandhi National Fellowship, University Research Fellowship. From all these progresses and growth it is well envisaged that the members of Microbiology Department are well sustained to outrival the competitive scientific World.

Vision

***Upgradation of the Knowledge in theory and research activities in order to keep pace with the* global *scientific progress and to meet the requirements of the society and for the development of the Country*.**

Mission

The mission of the department of microbiology is to educate and train students in the discipline of microbiology and to expand their scientific knowledge through research.

Choice Based Credit System (CBCS):

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill-based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Grading system provides uniformity in the evaluation and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations which enables the student to move across institutions of higher learning. The uniformity in evaluation system also enables the potential employers in assessing the performance of the candidates.

Department Objectives

- To offer courses within National Education Policy (NEP-2020) to enhance the intellectual foundation and preparation of students for life in a complex, dynamic technological world
- To prepare students careers in clinical and Pharma industries and for careers in basic, environmental and biomedical research
- To prepare students (M.Sc. and Ph.D.) with in-depth knowledge and research skills for professional careers in Microbiology
- To enhance opportunities for research and scholarship for faculty members as well as undergraduate and graduate students
- To preserve, add to, evaluate and transmit knowledge in the field of Microbiology
- To serve the society by promoting science

- To promote the sustainable goals of the country

Program Specific Outcomes

PSO-1: Equips capacity to venture into a career in bio based industries as scientists or technologists in the division of production, research and developmental settings.

PSO-2: Demonstrate the concepts and research approach for their higher career in the field of microbiology and develop their scientific interest.

PSO-3: Administer skill sets to understand the rationales behind various regulatory/legal bodies governing the R&D in the industry.

PSO-4: Exhibit in-depth practical oriented knowledge to students in various thrust areas of microbiology, so as to meet the global demands of industry and academia.

PSO-5: Ability to designs aids in developing solutions for complex problems with appropriate consideration to the public health and safety, and the cultural, societal, and environmental considerations.

Programme Objectives

- The broad goal of the teaching of post graduate students in microbiology is to provide an understanding of the natural history of infectious diseases in order to deal with the etiology, pathogenesis, laboratory diagnosis, treatment and control of infections in the community
- Develop core competencies in microbiology: structure and function, information flow, energy transfer and evolution
- Manipulate bacteria genetically to address biological questions
- To offer hands on training on biofertilizers production, and to impart knowledge on various technologies of composting and waste water treatment methods

Program Outcomes

This program will help post graduates to:

PO1: Have Knowledge and technical skills associated with microbiology laboratory for delivering quality clinical investigations.

PO2: Perform safe use of basic laboratory glassware and equipment including the cell counter, microscope, centrifuge, incubator, Hot air oven, autoclave, colorimeter, and laminar air flow.

PO3: Perform advanced molecular microbial methods including Polymerase Chain reaction, site directed mutagenesis, SDS-PAGE, agarose gel electrophoresis, western blotting, southern blotting, transformation ,transduction, conjugation and AMES test etc,

PO4: Conduct routine clinical laboratory procedures within acceptable quality control parameters in bacteriology, virology, mycology, parasitology and immunology.

PO5: Learn Problem solving techniques in identification and correction of pre analytical, post analytical & analytical variables.

PO6: Demonstrate technical skills, social behavior and professional awareness for functioning effectively as a microbiology technician.

PO7: Maintain and operate laboratory equipment utilizing appropriate quality control and safety procedures.

PO8: Identify the impact of laboratory tests in a global and environmental context.

PO9: Perform as a leader/team member in diverse professional and industrial research areas.

PO10: Use the fundamentals of research process to complete and present research studies that enrich the all areas of advanced research.

PO11: Gain practical knowledge through internship at various industries.

PO12: Ability to inculcate an attitude of enquiry towards developing innovative ability and enhancing entrepreneurship skills.

Program Educational Objectives

The Program Educational Objectives (PEOs) for the M.Sc. Microbiology program describes the accomplishments that post graduates are expected to attain within two years after post graduation:

PEO-1: To exhibit ability to pursue careers in the industry, agriculture, and applied research where microbial systems are increasingly employed.

PEO-2: To address the increasing need for skilled scientific manpower, contributing to application, advancement and impartment of knowledge in interdisciplinary areas related to Microbiology and life sciences.

PEO-3: To exhibit excellent professional skills, communication skills and ethical attributes as an effective team member in a competitive global environment

PEO-4: To demonstrate right mixes of innovative ability, equipped with entrepreneurship abilities contributing to self and national development.

PEO-5: The graduates will be cognizant and responsive to the societal needs and will possess the initiative and critical acumen required to continuously improve their knowledge through life long learning.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

COLLEGE OF SCIENCES

M.SC.,MICROBIOLOGY SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS) 2020 – 2021

DEPARTMENT OF MICROBIOLOGY

SEMESTER – I

Sl. No.	Components of Study	Course code	Title of the course	Credit hours/ week	No. of Credits	IA	SEEM	Total Marks
1	Core-Theory	MB-101	Introductory Microbiology	6	04	20	80	100
2	Core-Theory	MB-102	Microbial Physiology	6	04	20	80	100
3	Compulsory Foundation	MB-103	Biochemistry	6	04	20	80	100
4	Elective Foundation	MB-104	Biophysics and Biostatistics	6	04	20	80	100
5	Practical-I	MB-105	Introductory Microbiology & Microbial Physiology	6	04	-	100	100
6	Practical-II	MB-106	Biochemistry & Biophysics and Biostatistics	6	04	-	100	100
Total				36	24	80	520	600
7	Audit Course** (Self-Study)		Human values and Professional Ethics - I	0	-	100	-	-

SEMESTER – II

Sl. No.	Components of Study	Course code	Title of the course	Credit hours/ week	No. of Credits	IA	SEEM	Total Marks
1	Core-Theory	MB-201	Molecular Biology	6	04	20	80	100
2	Core-Theory	MB-202	Recombinant DNA technology	6	04	20	80	100
3	Compulsory Foundation	MB-203	Immunology	6	04	20	80	100
4	Elective Foundation	MB-204	Medical Microbiology	6	04	20	80	100
5	Practical-I	MB-205	Molecular Biology and Recombinant DNA Technology	6	04	-	100	100
6	Practical-II	MB-206	Immunology and Medical Microbiology	6	04	-	100	100
Total				36	24	80	520	600
7	Audit Course** (Self-Study)		Human values and Professional Ethics - II	0	-	100	-	-

SEMESTER – III

Sl. No.	Components of Study	Course code	Title of the course	Credit hours/ week	No. of Credits	IA	SEEM	Total Marks
1	Core-Theory	MB-301	Bacteriology and Virology	6	04	20	80	100
2	Core-Theory	MB-302	Agricultural Microbiology	6	04	20	80	100
3	Generic Elective	MB-303	a) Industrial Microbiology b) Downstream processing Technology	6	04	20	80	100
4	Practical-I	MB-304	Bacteriology and Virology and Agricultural Microbiology and Food& Diary Microbiology& Generic Elective	6	04	-	100	100
5	Skill Oriented Course	MB-305	Food and Diary Microbiology	6	04	20	80	100
6	Open Elective	MB-306	a) Computational biology b) Microbial genomics and proteomics	6	04	-	100	100
Total				36	24	80	520	600
7	Audit Course** (Self-Study)		**Online Courses from MOOS/ NPTEL**	0	-	100	-	-

Downstream Processing Technology

SEMESTER – IV

Sl. No.	Components of Study	Course code	Title of the course	Credit hours/ week	No. of Credits	IA	SEEM	Total Marks
1	Core-Theory	MB-401	Molecular Cell biology and Technology	6	04	20	80	100
2	Core-Theory	MB-402	Environmental Microbiology	6	04	20	80	100
3	Generic Elective	MB-403	a) Pharmaceutical Microbiology b) Industrial based microbial clean Technology	6	04	20	80	100
4	Practical-I	MB-404	Molecular Cell biology and Technology and Environmental Microbiology & Generic elective	6	04	-	100	100
5	Project Work	MB-405	Field Trip/ Industrial Tour Report / Dissertation	6	04	20	80	100
6	Open Elective	MB-406	a) Bioethics, Biosafety and Intellectual property rights b) Microbial Production of Alcoholic beverages.	6	04	-	100	100
Total				36	24	80	520	600
7	Audit Course** (Self-Study)		**Online courses from MOOCs / NPTEL**	0	-	100	-	-

- All CORE Papers are Mandatory
- Generic Elective - Choose any one
- Project Work –In house/Research institutes, National laboratories, Central Universities

- Multi-disciplinary course is Mandatory.
- Skill based course Mandatory
- Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study
- Interested students may register for MOOC with the approval of the concerned DDC

FIRST SEMESTER

MB - 101: INTRODUCTORY MICROBIOLOGY

Course Learning Objective

1. To provide information on microscopy and staining materials that helps to observe microorganism.
2. To provide detailed knowledge on isolation, cultivation and enumeration of microorganisms.
3. To provide in depth knowledge about classification and taxonomy of microorganisms.
4. To provide information on prokaryotic and eukaryotic microorganisms.

UNIT – I

History and Scope of Microbiology - Discovery of microorganisms and development of microbiology - Contributions of pioneers- Prokaryotic and Eukaryotic microorganisms - Origin and evolution of microorganisms. Distinguishing of different microorganisms-Scope and relevance of Microbiology - Future of Microbiology.

Microbial Structure - Microscopy – principles and applications of light microscope-Bright field- Dark-field, Phase – contrast, Fluorescent, Scanning and Transmission electron microscopes, Confocal microscopy, Scanning tunneling microscope. Preparation of microbiological samples for microscopy-simple and differential staining, special and structural staining. Negative contrast staining for virus samples. Preparation of tissues for thin sectioning (fixation, dehydration, infiltration, embedding and sectioning).

Physical and Chemical methods of sterilization and disinfection : Heat, radiation, pH, atmospheric pressure, filters, various chemical agents, safety precautions. The concept of containment facility.

UNIT – II

Microbiological media: Types of media-natural and synthetic; autotrophic, heterotrophic and prototrophic media; basal, defined, complex, enrichment, selective, differential, maintenance and transport media.

Isolation, cultivation and enumeration of microorganisms : Isolation from different natural sources. Approaches for obtaining pure cultures. Cultivation of aerobes and

anaerobes. Continuous, batch, synchronous broth and stock cultures. Enumeration / measurement of growth of microorganisms.

Maintenance and preservation of microbial cultures : Repeated sub-culturing, sterile soil/sand preservation, glycerol-deep freezing, oil overlay, drying methods, freeze-drying.

UNIT-III

Microbial Taxonomy: Classification of microorganisms – introduction – Hackel's three kingdom concept – Whittaker's five kingdom concept – three domain concept of Carl Woese. Basis of microbial classification. Concepts, nomenclature and taxonomic ranks; major characteristics used in Taxonomy – morphological, physiological and metabolic, ecological, numerical taxonomy; genetic and molecular classification systems; the kingdoms of organisms and phylogenetic trees. Characteristics of prokaryotes and eukaryotic cells.

UNIT – IV

Prokaryotic microorganisms:

Brief outlines on discovery, nature, origin, evolution, morphology and structure, composition, reproduction and other characteristics of Bacteria (Eubacteria) Spirochetes, Rickettsias, Chlamydias, Pseudomonads, Acetic acid bacteria, Mycloplasmas, Cyanobacteria, Archaebacteria, Actinomycetes (Actinobacteria).

Eukaryotic microorganisms:

Fungi : Classification, structure, composition, reproduction and other characteristics of fungal divisions – *Zygomycota, Ascomycota, Basidiomycota* and *Deuteromycota* and slime and water molds. General characteristics and importance of fungi – *Saccharomyces, Candida, Pichia, Pencillium, Neurospora, Rhizopus, Aspergillus, Agaricus, Cryptococcus, Fusarium, Trichoderma, Claviceps.*

Algae : Classification, structure, reproduction and other characteristics of algal divisions. Characteristics of *Chlorella, Senedesmus, Gelidiella* and *Gracellaria.* Economic importance of algae, phytoplantanic microalgae.

Protozoan parasites : Classification, morphology and structure, reproduction and other characteristics of pathogenic protozoa like *Entamoeba, Plasmodium, Leishmania, Cryptosporidium, Trichomonas, Taxoplasma, Trypanosoma, Giardia.*

Courses Learning Out Comes

1. Be able to know the microbial structure, sterilization and disinfection techniques
2. Be able to know the maintainence and preservation of microbial culture.
3. Be able to know nomenclature, taxonomic trends and major characteristics used in taxonomy.
4. Be able to know the discovery, classification, structure and importance of prokaryotes, fungi, algae and protozoa.

Suggested Books:

1. Brock Biology of Microorganisms. 2020, 16th ed. Madigan et al., Prentice-Hall International, Inc.
2. Microbiology. 2017. 10th ed. Prescott et al. Wm. C. Brown Publ.
3. Principles of Microbiology. 1996. 2nd ed. R.A. Atlas. Wm.C. Brown. Publ.
4. Foundations in Microbiology. 2017. 10th ed. K. Talaro and A. Talaro. Wm. C. Brown Publ.
5. Microbiology. 2016. 5th ed. Pelczar et al. Tata McGram-Hill Publ. Company Ltd.
6. General Microbiology, 2019.2nd by S.B. Sullia, Oxford and IBH Publishers.
7. General Microbiology, 1999.5thed by Stainer et al., Macmillan Educational Ltd.
8. Instant Notes in Microbiology. 2002. J. Nicklin et al. Viva Books Pvt. Ltd.
9. Microorganisms, Biotechnology and Disease : Students Book. 1997 by Pauline Lourie and Susanwells. Cambridge University Press.
10. Introductory Mycology. 2007. 4th ed. Alexopoulos et al., John Wiley and Sons.
11. Introductory Phychology by H.D. Kumar. 2nd ed. 1999. East West Press.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO1 Knowledge	**PO2** Analysis	**PO3** Design	**PO4** Development	**PO5** Modern Tools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** Programme Management	**PO12** Lifelong Learning
C	3	2	2	2	2	2	2	-	-	-	1	1

O 1												
C O 2	3	2	2	2	2	1	1	-	-	-	1	1
C O 3	3	2	1	2	3	2	2	-	-	-	1	1
C O 4	3	2	2	2	2	2	2	-	-	-	1	1

MB - 102: MICROBIAL PHYSIOLOGY

Course Learning Objective

1. To provide insights in to nutrition and microbial growth.
2. To know the concepts of bioenergetics, photosynthesis and carbon metabolisms.
3. To provide in depth information about aerobic and anaerobic respiration and lipid metabolism.
4. To provide detailed information on protein, nucleic acids and secondary metabolisms.

UNIT – I

Nutrition : Elemental nutrient requirements of microbes; nutritional groups of bacteria; autotrophy-photoautotrophy and bacterial photosynthesis; chemoautotrophy and autotrophic metabolism; heterotrophy – photoheterotrophy and chemoheterotrophy, heterotrophic metabolism in bacteria; nutritional mutants and their use in metabolic studies.

Uptake and Transport of nutrients in microbes – Structural organization of plasma membrane in relation to transport, types and mechanisms of transport (passive, simple, facilitated, active, chemical modification) with reference to sugars, amino acids and ions; methods for studying of transport, coupling of transport of ions and metabolites to ATP/proton gradient.

Microbial Growth: building of macromolecules from elemental nutrients, supramolecules, cell components and cells; cell cycle in microbes and generation times; batch culture phases and importance of each phase, continuous cultures, synchronous culture, factors influencing the microbial growth.

Nature and properties of spores – Physiology and biochemistry of sporulation and germination of spores.

UNIT – II

The concepts of microbial metabolism, primary and secondary metabolism and their significance.

Bioenergetics : Concepts of free energy and thermodynamic principles in biology, energy transformation, ATP cycle, standard free energy of hydrolysis of phosphate compounds, energy transducers, redox potentials, free energy changes in redox reactions.

Photosynthesis : Oxygenic and anoxygenic photosynthesis, photosynthetic pigments, basic photochemistry of PS I and PS II and photosynthetic electron transport; modes of CO_2 fixation, halobacterial photosynthesis, sulphur, nitrogen and iron assimilating bacteria. Chloroplast mediated electron transport; chemolithotrophic electron transport systems. Biolumenescence.

Carbohydrate metabolism : Pathways underlying the utilization of different sugars (EMP, ED, HMP and phosphoketolase) in microorganisms, gluconeogenesis; synthesis of peptidoglycans and glycoproteins.

UNIT – III

Aerobic respiration : TCA cycle – intracellular location and reactions of the cycle, amphibolic nature of the cycle, energetics of the cycle; the glyoxalate cycle. Mechanisms of substrate-level phosphorylation; respiratory electron transport in mitochondria and bacteria along with its components (carriers); mechanism of oxidative phosphorylation, uncouplers, inhibitors;

Anaerobic respiration : nature of fermentation, the relationship of oxygen to growth and fermentation, biochemical mechanisms of lactic acid, ethanol, butanol, citric acid and acetone fermentations, study of fermentations, relationships between fermentation and energy production; nitrate and sulphate respiration.

Lipid metabolism: Biosynthesis of triacyl glycerols, phospholipids and glycolipids; oxidation of saturated and unsaturated fatty acids; microbial metabolism of aromatic and aliphatic hydrocarbons.

UNIT – IV

Protein metabolism: Assimilation of inorganic nitrogen and sulphur, biochemistry of nitrogen fixation; hydrolysis of proteins-exo-and endo-proteinases, outlines of biosynthesis

and catabolism of amino acids in microbes (deamination, decarboxylation and transamination reactions). Urea cycle.

Nucleotide metabolism : biosynthesis of bases, nucleosides and nucleotides including deoxyribonucleotides, regulation of nucleotide synthesis; break down of nucleic acids – exo- and endo-nucleases (RNases and DNases) and phosphodiesterases, salvage pathways; catabolism of purines and pyrimidines.

Secondary metabolism : Utilization of secondary metabolites for production of vitamins, toxins (aflotoxin and corynebacterial), hormones (GA), and antibiotics (penicillin and streptomycin).

Microbial toxins and extra cellular enzymes : Exo-and endotoxins: physiology of toxin production; mode of action of toxins and extra cellular enzymes and their importance in pathogen virulence and pathogenesis.

Course Learning Out Comes

1. Be able to know about the nutrition and microbial growth.
2. Be able to know about photosynthesis and carbon fixation.
3. Be able to know in depth details about aerobic and anaerobic respiration.
4. Be able to know in depth about various pathways in protein and nucleotide metabolisms.

Suggested Books:

1. Microbial Physiology and Metabolism. 1999, by D.R. Caldwell. Wm.C. Brown Publ.
2. Microbial Physiology. 2011, 4th ed. by A.G. Moat & J.W. Foster. Wiley-Liss.
3. Principles of Biochemistry. Lehinger. 2021.8th edition
4. Foundations in Microbiology. 2021. by K. Talaro & A. Talaro, Wm. C. Brown Publ.11th edition
5. Microbiology. 2017. By Prescott et al. Wm. C. Brown Publ.
6. Molecular Cell Biology. 2016 – by Lodish et al.8th edition
7. General Microbiology, 1999 by Stainer et al., Macmillan Educational Ltd.

CO-PO Mapping Matrix/Programme Articulation Matrix

ow ge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management
	2	2	2	2	2	2	-	-	-	1
	2	2	1	2	1	1	-	-	-	1
	1	1	2	3	2	2	-	-	-	1
	2	2	2	2	2	2	-	-	-	1

MB – 103: BIOCHEMISTRY

Course Learning Objective

1. To provide basic concepts of chemistry in life.
2. To provide in depth information on lipids and amino acids.
3. To provide in depth information on proteins and catalytic proteins.
4. To provide in depth information in nucleic acids, hormones and vitamins.

UNIT – I

Basic concepts of Chemistry of life : The major elements of life and their primary characteristics; atomic bonds and molecules – bonding properties of carbon, covalent and non-covalent bonds, Vander waals forces; polarity, hydrophilic and hydrophobic interactions; asymmetry of carbon compounds and cis-trans isomerism; electron transfer and oxidation/reduction; functional groups of organic compounds; hydrogen ion concentration of biological systems; Brownsted – Lowry acids and bases; ionization and titration of acids; dissociable biological compounds and physiological buffer systems.

Carbohydrates : Classification of carbohydrates; outline structure and properties of important mono-, di-and oligosaccharides and their identification and analysis; structure, occurrence and biological importance of structural polysaccharides (cellulose, chitin, agar, alginic acids, pectins, proteoglycans, sialic acids, blood group polysaccharides, bacterial cell wall polysaccharides).

UNIT – II

Lipids: Building blocks of lipids. Classification of lipids. Fatty acids-physico-chemical properties, separation, distribution in nature characterization and saponification and iodine number. Nomenclature, outline structures, properties and functions of glycerides, neutral lipids (waxes, fats, oils, phospholipids, sphingolipids and glycolipids. Steroids – plant sterol, ergosterol, stigmasterol, cholesterol. Lipoproteins-classification, composition and importance. Salient features of bacterial lipids.

Amino acids : Classification, structure, physico-chemical properties, acid-base behaviour of amino acids.

Peptides : Characteristics of peptide bond, peptides of non-protein origin, properties and functions of peptides, determination of amino acid composition and sequence in peptides, chemical synthesis of peptides, peptides profiling.

UNIT – III

Proteins : Classification, properties and biological functions of proteins; structural organization of proteins – primary, secondary, tertiary and quaternary; Ramachandran's plot; proteins denaturation and renaturation (ribonuclease); structure-function relationships of certain proteins – myoglobin, hemoglobin, collagen; chaperones.

Catalytic proteins(enzymes) : Classification, nomenclature, composition and structure, enzymes as biocatalysts, outlines of purification and assay of enzymes, kinetics of enzyme catalyzed reactions, factors influencing enzyme catalyzed reactions, regulation of enzyme activity – activators and inhibitors and mechanism of action of enzymes (chymotrypsin). Regulatory enzymes – allosteric enzymes. Isoenzymes, conzymes, ribozymes, abzymes.

UNIT – IV

Nucleic acids : Types and their composition, structures of purines, pyrimidines, modified bases, nucleosides, nucleotides and polynucleotides; properties of bases and functions of nucleotides; types and structural polymorphism of DNA and RNA; denaturation and renaturation of nucleic acids, factors influencing hybridization, cot values.

Hormones and Growth regulators : Classification, outline structures and functions of major animal and plant hormones.

Vitamins : Discovery and outline chemistry of fat soluble (A,D,E and K) and water soluble (riboflavin, pantothenic acid, niacin, pyridoxine, biotin, cobalamine folic acids and ascorbic acid) vitamins and their role in body functions.

Porphyrins and other pigments : Classification, structures and biological functions of porphyrins, brief account of haemoglobin and chlorphylls, cytochromes, xanthophylls and carotenoids of microorganisms.

Course Learning Out Comes

1. Be able to identify and analyze carbohydrates and lipids.
2. Be familiar with behavior of amino acids and structure functional relationships of proteins and their profiling.

3. Be able to know the separation methods such as centrifugation and Electrophoresis.

Suggested Books :

1. Principles of Biochemistry, Lehninger, 8th edition, 2021 by Nelson and Cox (Worth).
2. Biochemistry, Stryer 9th edition, W.H. Freeman, 2019.
3. Microbial Physiology and Metabolism. 1995, by D.R. Caldwell. Wm.C. Brown Publ.
4. Microbial Physiology. 1999, 3rd ed. By A.G. Moat & J.W. Foster. Wiley-Liss.
5. Foundations in Microbiology. 1996. By K. Talaro & A. Talaro, Wm. C. Brown Publ.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	2	1	2	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	1	-	-	-	1	1

MB – 104: BIOPHYSICS & BIOSTATISTICS

Course Learning Objective

1. Gives insights on electrochemical and spectroscopy concepts.
2. Provides indepth knowledge on separation techniques such as centrifugation, electrophoresis and chromatography.
3. Give detailed information on interval date, proportion data and count data.
4. Provide knowledge on statistical basis of biological assays and design of experiments.

UNIT – I

Electrochemcial techniques (Principles and applications): Redox reactions; pH and Clarke oxygen electrodes; biosensors.

Cell sorting and Flow cytometry (Principles and applications):

Radioisotope techniques - Nature and types of radioactivity, half-life of isotopes; detection and measurement of radioactivity-GM counter, liquid scintillation counter, gama-ray counter, Cerenkov counting and autoradiography; quenching and quench correction; laboratory safety measures in handling isotopes; biological uses of radioisotopes.

Spectroscopy : Electromagnetic spectrum of light; simple theory of light absorption by biomolecules; Beer's – Lambert law; transmittance; extinction co-efficient; light sources; monochromators; types of detectors; working principle and applications of visible, UV-visible, IR, Raman, ESR, mass, plasma emission, atomic absorption, and NMR spectrophotometry; fluorimetry and flame photometry; ORD and CD; X-ray diffraction and X-ray crystallography.

Amino acid and nucleotide sequencers: Basic principle, functioning and applications of amino acid and nucleotide sequencers.

UNIT – II

Centrifugation: Simple theory of preparative and analytical centrifuges and rotors; sedimentation analysis; differential, rate-zonal and equilibrium density gradient centrifugations. Applications – isolation of cells, subcellular organelles, viruses and macromolecules.

Electrophoresis (Principles and applications) : Types of electrophoresis – paper, gel (starch, acrylamide and agarose) disc, vertical, horizontal submarine, gradient, 2-dimentional, pulse-field and capillary; isoelectrofocussing; isolation and analysis of gel separated molecules – recovery of molecules from paper/gels; Southern, Northern and Western blottings.

Chromatography: Principle/simple theory and applications of partition, adsorption, ion-exchange, gel permeation and affinity chromatography based techniques – paper, thin-layer, column, GLC, HPLC, FPLC.

UNIT – III

Introduction: Definition of statistics: population and universe, the sample and population, statistical inference; parameter and statistics.

Interval Data: Mean, mode, median and standard deviation. Concept of probability – classical and frequency definitions; axiones of probability; addition and multiplication theorems (statements only); conditional probability-Baye's theorem (statement only); simple applications. Binomial, Poisson and Normal distributions (definitions and uses only).

Uncertainties in estimation of mean, comparison of means and variances – t, F, and Z tests.

Proportion data: examples of proportion data; (MPN, sterility testing of medicines, animal toxicity, therapeutic trial of drugs and vaccines, animal toxicity, infection and immunization studies) statistical treatment to proportion data. Chi-square test, goodness of fit.

Count data: examples of count data (bacterial cell count, radioactivity count, colony and plaque counts) statistical treatment to count data: Poisson distribution, standard error, confidence limits of counts.

UNIT – IV

Analysis of variance: Analysis of variance: Introduction, procedure and tests for one-way and two-way classified data. Multiple comparisons. Analysis of CRD, RBD and LSD. Factorial experiments- main effects and interaction in a 2^2 design, Duncan's Multiple Range Test.

Correlation and regression, formulae and application. Fitting straight line through a series of points. Fitting of exponential curves. Standard curve and interpolation of unknown Y-values. Multiple linear regression, logistic regression.

Statistical basis of biological assays: Response-Dose metameter. Delusion Assays, Direct and indirect assays. Quantal Responses, Probit, logit, LD_{50}, ED_{50}, PD_{50} – Standard line interpolation assay, parallel assay (4 point, 6 point assays), slope ratio assay.

Design of Experiments – Multiple comparison tests, Dunken's, Tukey's, Scheffic's, Dunnelt's etc.

Probit Analysis

Multiple Regression, Logistic regression

Discriminate Analysis

Clinical trails – Phase I, Phase II etc.

Clinical trails (meaning and importance only).

Course Learning Out Comes

1. Be able to know the principal, instrumentation and applications of spectroscopy, amino acid ,nucleotide sequencers.
2. Be able to know principle, methods and applications of separation techniques.
3. Be able to gain knowledge on basic concepts in statistics.
4. Be able to design the experimental and statistical basics of biological assays.

Suggested Books :

1. Practical Biochemistry: Principles and Techniques 1995, 4th ed. by K. Wilson and J. Walker, Cambridge University Press.
2. Modern Experimental Biochemistry. 1993. 2nd ed. by R.F. Boyer. The Benjamin Cummings Publ. Company.
3. Physical Biochemistry: Applications to Biochemistry and Molecular Biology, 1982, 2nd ed. by David Freifelder. W.H. Freeman and company.
4. Introduction to Practical Biochemistry. 2000. by S.K. Sawhney and Randhir Singh (eds). Narosa Publ. House.
5. Biochemical Methods for Agricultural Sciences. 1992 by S. Sadasivam and A. Manikam. Wiley Eastern Ltd.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	2	2	2	2	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

PRACTICAL:

MB – 105: INTRODUCTORY MICROBIOLOGY & MICROBIAL PHYSIOLOGY:

1. Microbiological laboratory safety measures
2. Sterilization methods - Wet method, Dry method, Filters. Evaluation of alcohol effectiveness, Phenol coefficient method
3. Preparation of different media for cultivation of bacteria & fungi
4. Plating techniques – streak plate, spread plate methods
5. Enumeration of Bacteria by serial dilution, viable count
6. Qualitative tests for identification of Carbohydrates, amino acids, nucleic acids
7. Quantitative tests for Protein, glucose, glycine, bilirubin, cholesterol, Inorganic phosphorous
8. Determination of activity of – Peroxidase and Polyphenol oxidase in plant tissues.
9. Purification and study of Acid Phosphatase from potato tubers: Extraction of enzyme; effect of substrate concentration; enzyme concentration; temperature; pH on enzyme activity.
10. Determination of Bacterial growth curve
11. Determination of effect of temperature on bacterial growth
12. Determination of effect of pH on bacterial growth
13. Determination of effect of salt on bacterial growth
14. Determination of growth of fungi
15. Determination of concentration of cyanobacterial pigments
16. Determination of concentration of oligodynamic action
17. Determination of activity of microbial hydrolytic enzymes like amylases, lipases and proteases.
18. Demonstration of aerobic and anaerobic respiration in microbes.
19. Demonstration of Microbial fermentation
20. Demonstration of microbial toxins

PRACTICAL: MB – 106: BIOCHEMISTRY & BIOPHYSICS AND BIOSTATISTCS:

1. Calculating Mean, Mode Median
2. Problems related to T test & F test & Z test
3. Problems related ANOVA
4. Measurement of pH
5. Micrometry for cell size determination
6. Cell counting by Haemocytometer
7. Beer's Law
8. Determination of λ max for coloured solutions
9. Determination of DNA & RNA by UV spectrophotometry
10. Determination of nucleic acid Bases by UV spectrometry
11. Paper chromatography for separation of amino acids / pigments
12. TLC for separation of lipids / amino acids
13. Dialysis
14. Separation of proteins by SDS-PAGE
15. Separation of DNA by Agarose gel electrophoresis
16. Isolation of chloroplasts by sucrose density gradient centrifugation
17. Determination of concentration of green/yellow pigments by spectrophotometry

SECOND SEMESTER

MB - 201: MOLECULAR BIOLOGY

Course Learning Objective

1. Gives basic concepts in genetics of bacteria and fungi
2. Provides in depth knowledge on genetic recombination
3. Gives overall picture about DNA replication and transcription
4 .Provides in depth information about RNA biosynthesis and gene regulation

UNIT – I

Genetic notations, conventions and terminology

Nucleic acids as genetic information carriers – experimental evidences.

Modern concept of gene – Gene structure, co-linearity and polypeptide, one gene – one enzyme, protein polypeptide or product concepts; types of genes.

Genetics of Bacteria and Fungi : *E. coli, Bacillus, Streptomyces, Sacchromyces,* Filamentous fungi *(Neurospora).*

Gene transfer mechanisms in bacteria : Transformation, conjugation, sexduction and transduction (generalized, abortive, contrasduction, specialized,) and gene mapping. Role of Rec gene products.

Genome diversity : Viruses – linear, circular and dividend genomes of RNA and DNA viruses. Prokaryotes – nucleoid and chromosome organization, genome evolution in microbes, phylogenetic trees. Eukaryotes – chromosome organization / structure, histones, nucleosomes, genome complexity, chromosomal banding. Organelle genomes. Genetic mapping of genomes.

Plasmids : bacterial and yeast plasmids, purification, properties, detection, transfer, replication an curing, significance / importance.

Transposal / mobile genetic elements : Prokaryotes – (IS elements, composite and complex transposons), mechanisms of transposition and importance – Eukaryotes (Yeast, Drosophila and Maize) – retrotransposons, retroelements. Exploitation of transposable elements in genetics.

UNIT – II

Mutations : Types, mutagens and molecular mechanisms of mutation, isolation and analysis of mutants, significance of mutants.

Genetic recombination : General of homologous recombination, site specific recombination, transposition; illegitimate recombination and artificial recombination.

Genetics of viruses : Prokaryotic virus (phages) – Benzer's studies on r-II region of T4 and complementation, recombination in bacteriophages (T2), uses of phages in microbial genetics, Eukaryotic viruses-recombination and reassortment, cross-and multiplicity reactivation, complementation, phenotypic mixing, ploidy, DI particles, transduction of genes by retroviruses, evolution of viruses (influenza, HIV, herpesviruses).

UNIT-III

DNA replication : general principles, various modes of replication. Continuous and discontinuous synthesis, relation between cell cycle and DNA synthesis, replication fork and enzymology of DNA replication in prokaryotes and eukaryotes, replication of ssDNA, retroviruses and their unique mode of DNA synthesis, inhibitors of DNA replication.

DNA damage and repair : types of DNA damage-deamination, oxidative damage, alkylation and pyrimidine dimers; repair pathways – mismatch, short patch repair, nucleotide/base, excition repair, recombination repair and SOS system.

Transcription (RNA biosynthesis) : Types of RNA and their role, organization of protein and RNA (rRNA, tRNA, 5 sRNA) encoding transcription units (promoters and regulatory

elements) and their transcription in prokaryotes and eukaryotes, polycistronic and monocistronic mRNAs. Types of RNA polymerases. Promoters and other regulatory elements and transcription factors, events of transcription. Maturation and processing of different RNAs : methylation, processing of rRNA; capping, polyadenylation, splicing and editing of mRNA; processing and modification of tRNA. Catalytic RNAs (ribozymes). Inhibitors of transcription. *Invitro* transcription systems.

UNIT – IV

Translation (Protein biosynthesis) : Central dogma theory and flow of genetic information, genetic code and its elucidation, structure and composition of prokaryotic and eukaryotic ribosomes, structural features of rRNA, mRNA and tRNA in relation to function, steps of protein biosynthesis (activation of amino acids, initiation, elongation, termination) in prokaryotes and eukaryotes; post-translational modification of proteins and their sorting and targeting; regulation of translation; inhibitors of protein biosynthesis; invitro translation systems.

Regulation of gene expression : An overview on levels of regulation, terminology and operon concepts, enzyme induction and repression; positive and negative regulation in *E. coli*- lac and ara operons; regulation by attenuation – his and trp operons; antitermination – N protein and nut sites in Lambda phage. Organization and regulation of nif and nod gene expression in bacteria; gal operon in yeast. Global regulatory responses-heat shock response, stringent response and regulation by small molecules such as cAMP and PPGPP.

DNA binding proteins : Enhancer sequences and control of transcription. Identification of protein – binding sites on DNA, control of transcription by interaction between RNA polymerases and promoter region, use of alternate sigma factors, controlled termination attenuation and anti termination.

Course Learning Out Comes

1. Be able to gain knowledge on genome diversity and gene transfer mechanisms,.
2. Be able to gain information on mutations and gene transfer mechanisms
3. Be able to gain in depth-knowledge on DNA and biosynthesis

4. Be able to understand about positive and negative gene regulation

Suggested Books:

1. Microbial Genetics by S.R. Maloy et al. 1994
2. Molecular Genetics of Bacteria, 5th ed. 2010. J.W. Dale. Wiley Publ.
3. Bacterial and Bacteriophage Genetics. 4th ed. 2000. By E.A. Birge. Springer.
4. Principles of Molecular Virology. 6th ed. 2015. By A. Cann. Academic Press.
5. Modern Genetic Analysis by Griffith.1999
6. Genetics by Gardner. Principles of Genetics, Goudner,2006,12th
7. Molecular Cell Biology.2021, 9rd ed. by Lodish et al. Scientific American books, W.H. Freeman and Company.
8. Molecular Biology. 1983.3rd, by David Freifelder, Narosa Publ. House.
9. Text Book of Molecular Biology. 2009, by Sivarama Sastry et al, Macmillan India Ltd.
10. Advanced Molecular Biology : A Concise Reference. 2018.3rd, by R.M. Twyman. Viva Books Pvt. Ltd.
11. Instant notes in Molecular Biology, 2000.2nd. by P.C. Turner et al. Viva Books Pvt. Ltd.
12. Genes VIII. 1997. by B. Lewin. Oxford University Press. The Biochemistry of nucleic acids. 1992, 11th ed. by Adams et al, Chapman and Hall. Gene IX Benjamin Lewin 9th 2007
13. Biochemistry. 1995 by L. Stryer. W.H. Freeman and Co.Biochemistry,2021, 9th ed. by G.L. Zubay. W.C.B. Publ.
14. Microbial Genetics. 1983. 3rd, by David Freifelder. Narosa Publ. House.
15. Biochemistry and Molecular Biology. 2009.4th, by W.H. Elliott & D.C. Elliott. Oxford University Press.
16. Molecular biology of the Gene. 2018, 5th ed. Watson et al, Addison Wesley Longman.
17. Schaums Outlines – Molecular and Cell Biology. 2011 (revised). W.D. Stansfield et al., McGraw-Hill

Publ.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO$_1$ Knowledge	**PO$_2$** Analysis	**PO$_3$** Design	**PO$_4$** Development	**PO$_5$** Modern Tools	**PO$_6$** Society	**PO$_7$** Environment	**PO$_8$** Ethics	**PO$_9$** Teamwork	**PO$_{10}$** Communication	**PO$_{11}$** Programme Management	**PO$_{12}$** Lifelong Learning
CO$_1$	3	2	2	2	2	2	2	-	-	-	1	1
CO$_2$	3	2	2	2	2	2	1	-	-	-	1	1
CO$_3$	3	2	2	2	3	2	2	-	-	-	1	1
CO$_4$	3	2	2	2	2	2	2	-	-	-	1	1

MB - 202: RECOMBINANT DNA TECHNOLOGY

Course Learning Objective

1. Gives basic concepts in genetic engineering tools
2. Provides in depth knowledge on molecular tools
3. Gives overall picture about transgnics
4 .Provides in depth information about proteome and genomes microbiology

UNIT – I

Scope and importance of recombinant DNA technology / genetic engineering.

Genetic Engineering tools : Vectors- types, plasmids, transposons, bacterial and animal virus based vectors, bacterial and yeast artificial chromosomes; **enzymes-**restriction endonucleases, different DNA and RNA polymerases ligases, nucleases, kinases, nucleotidyl transferases, alkaline phosphatase; **oligonucleotides-** linkers, homopolymer tails, primers, promoters; **cloning and expression hosts –** *E.coli Bacillus, Agrobacterium,* yeast and plant and animal cell cultures.

Cloning strategies : Generation of DNA molecules, attachment to vectors, delivery of recombinant molecules into host cells, screening and identification of positives clones – antibiotic, nucleic acid and protein based approaches. Construction and screening of cDNA and genomic DNA libraries.

UNIT – II

DNA sequencing : Chemical method of Maxum and Gilbert, Sanger's dideoxy chain termination and primer walking methods. Automated sequencing. Sequence assembly. Genome sequencing and physical mapping of genomes.

Site-directed mutagenesis : Different approaches and its potential in changing genes.

Molecular diagnostics : Preparation of DNA and RNA probes, nucleic acid hybridization, factors influencing hybridization and their applications; PCR-principles, factors affecting PCR, different types of PCR and their applications and limitations; profiling of nucleic acids by DNA fingerprinting, RFLP, RAPD and AFLP.

UNIT – III

Transgenic plants : Construction of plant cell expression vector with desired genes, biological and physical approaches for delivering genes into plant tissues, identification and regeneration of transformed tissues to transgenics. Transgenic plants as bioreactors.

Transgenic animals : Construction of animal cell expression vectors and delivering of genes into cultured animal cells. Production and use of transgenic animals (mice, sheep/goat, cow).

UNIT – IV

Microbial genomics and proteomics : DNA microarray – printing of oligonucleotides and PCR products on glass slides. Whole genome analysis for global pattern of gene expression using fluorescent labeled cDNA or end labeled RNA. Analysis of single nucleotide polymorphisms using DNA chips. **Proteome analysis-**two-dimentional analysis of total cellular proteins, isolation and sequence analysis of individual protein spots by mass spectroscopy. Protein microarray, advantages and disadvantages of DNA and protein microarray.

Applications and implications of genetic engineering in biology, agriculture, medicine and industry.

Course Learning Out Comes

1. Be able to gain knowledge on genetic engineering tools,.
2. Be able to gain details on molecular tools
3. Be able to gain in depth-knowledge on transgenic plants
4. Be able to understand about ‘omics”

Suggested Books:

1. Principles of Gene Manipulation : An introduction to genetic engineering. 1994. 5th ed. Old and Primrose. Blackwell Scientific Publ.7th 2006.

2. Molecular Biotechnology. 1994. Glick and Pasternak. Panima Publ.
3. Recombinant DNA. 1992. 2nd ed. J.D. Watson et al. Freeman and Co.
4. Protein expression : A Practical Approach by S.J. Higgins and B.D. Hames (eds). Oxford University Press.
5. Functional Genomics : A Practical Approach. 2000, by S.P. Hunt and R. Liveey (eds.). Oxford University Press.
6. DNA Microarrays : A Practical Approach by M. Schena (ed.). Oxford University Press.
7. Molecular biology and Biotechnology. 2002. 4th ed. by J.M. Walker and R. Rapley, Panima.
8. Manual of Industrial Microbiology and Biotechnology, second edition., ed. by Demain, A.L., Editor in Chief, 1999, ASM Press.
9. Recombinant DNA and Biotechnology : A guide for Teachers : 2nd ed. H. Kreuzer and A. Massey. ASM Press.
10. Recombinant DNA and Biotechnology : A guide to students : 2nd ed. H. Kreuzer and A. Massey. ASM Press.
11. Basic Biotechnology, 2001. 2nd ed. by C. Ratledge & B. Kristiansen. Cambridge University Press.
12. Molecular Cloning, 2001. Vol. I-III by Sambrook and Russel, CSH Press.
13. Current Protocols in Molecular Biology, 2000. Ausbel et al.
14. Genome analysis. 2000. 4 Vols. CSH Press.

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CO1	3	2	2	2	2	1	2	-	-	-	1	1
CO2	3	2	2	1	2	2	1	-	-	-	1	1

CO3	3	1	2	2	3	2	2	-	-	-	1	1
CO4	3	2	2	2	2	1	2	-	-	-	1	1

MB - 203: IMMUNOLOGY

Course Learning Objective

1. Gives a detailed information on cells and organs of the immune system.
2. Gives in depth knowledge about Antigen-antibody interaction.
3. Provides the details on immuno pathology.
4. Gives central concepts in transplantation and transfusion immunology.

UNIT – I

History : Historical perspective of Immunology, milestones in immunology.

Cells and Organs of the Immune system : Hematopoiesis, Lymphoid cells, stem cells, Mononuclear cells, Granulocytes, Mast cells, Dendritic cells. Lymphoid organs – Primary and Secondary lymphoid organs.

Types of immunity : Innate immunity and adaptive immunity, comparative immunity, Immune dysfunction and its consequences.

Immune responses to infectious diseases : Viral, bacterial, protozoan and other parasitic diseases.

UNIT – II

Antigens : types, properties, study of antigenicity, immunogenicity versus antigenicity, factors influencing immunogenicity. Epitopes, haptens, mitogens, superantigens. Viral and bacterial antigens.

Antibodies : Basic and fine structure of Immunoglobulins, classes and biological activities of Immunoglobulins, Antigenic determinants – Iso, allo and idiotypes. Immunoglobulin super family, antibody diversity, organization and expression of immunoglobulin genes. Production of polyclonal antibodies-animals, additives, adjuvants, routes, dose, collection and preservation of antisera, purification of immunoglobulins, quantitative and qualitative analysis of immunoglobulins.

Monoclonal antibodies : Hybridoma technology – principle and production of monoclonal antibodies, advantages and disadvantages over polyclonal antibodies, application of monoclonal antibodies.

Recombinant antibodies : Production and their advantages over conventional antibodies.

Antigen and Antibody interactions : Affinity, Avidity, Cross reactivity.

***In vivo* serological reactions :** Phagocytosis, Opsonization, Neutralization, Protection tests.

***In vitro* serological tests :** Precipitation tests in liquid and semisolid media, single and double immuno diffusion tests. Immuno electrophoresis tests (Rocket, counter current). Agglutinations tests-HA and HI, latex agglutination. Complement fixation tests, Labeled antibody based tests – Enzyme linked immunosorbent assays (ELISA), Western blotting, Radio immuno assay (RIA), Immunoflurescent and Immuno specific electron microscopy. Infectivity neutralization test. The relative advantages and disadvantages and their applications in Microbiology.

UNIT – III

Humoral immune response : Primary and secondary immune responses, induction, regulation of the immune effector response.

Cell mediated immune response : Induction and mechanism, antibody-dependent cell mediates cytotoxicity (ADCC).

Immune effector mechanisms : Cytokines, Lymphokines, Chemokines and their classification, properties and functions.

Complement cascade system : Complements nomenclature, classification, complement components, functions, activation, regulation, biological consequences, complement deficiencies.

Hypersensitive and Allergic reactions : Classification, types I, II, III and IV.

Immunopathology : Immunodefficiencies – Primary immunodeficiency (genetic) diseases due to B cell, T-cell and combined defects (Hypogamma globulinemia, SCID, ADA) phagocyute and complement defects. Autoimmune diseases – Autoimmunity, induction, mechaniss of tissue damage in autoimmunity. Autoimmune diseases – Organ specific (Autoimmune anemias, Autoimmune thyroid diseases, Diabetes mellitus, Multiple sclerosis), Systemic autoimmune diseases (Rheumatoid arthritis, Systemic lupus erythematousus) and their therapy.

UNIT-IV

Major histocompatability complex (MHC) : Organization and Inheritance of HMC, cellular distribution of HMC molecules, regulations of HMC expression, MHC-immune responsiveness, disease susceptibility, MHC restriction, HLA antigens-Class I, II, III and their functions, Murine antigens and its functions.

Transfusion Immunology : Blood cell components, blood group systems in human and in animals, Rh typing, transfusion reactions, diseases associated with blood transfusion – Hemolytic anemias, Erythroblastosis featalis.

Transplantation Immunology : Transplantation antigens, types of transplants, Graft versus host reactions – immunological basis of graft rejection mechanism, prevention of graft rejection, clinical manifestations of graft rejection, Immunosuppressive therapy of allograft response, clinical transplantation.

Tumor immunology : Cancer and the Immune system, tumor specific antigens, tumors of the immune system, immune response to tumors, cancer immunotherapy.

Vaccinology : Type of immunization procedures, active and passive immunization, designing of vaccines, classical and novel/modern approaches for the production of vaccines, purified macromolecules as vaccines, Recombinant – vector vaccines, DNA vaccines, Synthetic peptide vaccines, Multivalent sub-unit vaccines, uses of vaccines, benefits of vaccination, mass immunization programmes.

Course Learning Out Comes

1. Be able to describe immunology basics.
2. Be able to understand the theoretical principles of *in vitro* selogical tests.
3. Be able to explain allergic reactions.
4. Be able to explain immunization procedure and immunization programmes.

Suggested Books:

1. Immunology. 2000. 4th edition. J. Kuby. W.H. Freeman and Company.
2. Immunology. 1996. 4th edition. I. Roitt, J. Brostoff and David Male. Mosby publications.
3. Fundamental Immunology. 1992. 2nd edition. R.M. Coleman, M.F. Lombard and R.E. Sicard. Wm. C. Brown Publishers.
4. Immunology. 1997. 3rd edition. R.M. Hyde. B.I. Waverly Pvt. Ltd.
5. Immunology. 1995. 4th edition. I.R. Tizard. Saunders College Publishing.
6. Immunology – The Science of self and non-self discrimination. 1982. Jon Klein. John Wiley and Sons.
7. Immunology – An illustrated outline. 1986. David Male. Churchill Living Stone.
8. Viruses that affect immune system. 1991. H.Y. Fan, I.S.Y. chen, N. Rosenberg and W. Sugden. American Society for Microbiology.
9. Immunobiology : The immune system in health and disease, 1994. C.A. Janeway, Jr., P. Travers. Current biology Ltd.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO1 Knowledge	**PO2** Analysis	**PO3** Design	**PO4** Development	**PO5** Modern Tools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** Programme Management	**PO12** Lifelong Learning
CO1	3	2	2	2	2	1	2	-	-	-	1	1
C	3	2	2	2	2	2	1	-	-	-	1	1

O 2												
C O 3	3	2	1	2	3	2	2	-	-	-	1	1
C O 4	3	1	2	2	2	2	2	-	-	-	1	1

MB - 204: MEDICAL MICROBIOLOGY

Course Learning Objective

1. Provides information on infections and pathogenesis.
2. Helps to learn chemotherapy principle.
3. Be able to explain the symptoms of bacterial infections.
4. Be able to explain the symptoms of viral, fungal and parasitic diseases.

UNIT – I

Principles of Medical Microbiology: Historical developments Classification of medically important microorganisms. Normal microbial flora of human body: Origin of normal flora; Infectious diseases.

Infection: Sources of infection for man; vehicles or reservoirs of infection. Exogenous infection: 1) Patients 2) carriers – (Healthy; convalescent; contact; paradoxical and chronic) 3) Infected animals (zoonosis) 4) Soil endogenous infection. Mode of spread of infection: 1) Respiratory 2) skin 3) Wound and burn infection 4) Venereal infections 5) Alimentary tract infection 6) Arthorpod-borne blood infections 7) Laboratory infections. Nosocomial infections: common types of hospital infections, their diagnosis and control.

Pathogenesis: Adhesion in various hosts, cell damage, release of pathogens, Transmissibility, infectivity and Virulence. Opportunistic pathogens and True pathogens. Toxigenicity: Invasiveness, other aggressins (Hyaluronidase), coagulase, fibrinolysins or kinase, depolymerizing enzymes, (mucinase, lipases, proteases, nucleases, collagenase, neuraminidase). Organotropism, variation and virulence.

UNIT – II

Microbial Toxins: Types of microbial toxins, Endotoxins, Exotoxins, LC_{50} of toxins, Effective dose of toxins, Assay of toxins, Mechanism of action of Diphtheria, Cholera, Staphylococcal toxin and Clostridial neurotoxins. Virulence and virulence factors of microbial toxins. Signs and symptoms of microbial intoxication.

Diagnostic methods: Collection, transport and preliminary processing of clinical samples. Clinical, microbiological, immunological and molecular diagnosis of microbial diseases.

Principle of Chemotherapy: Chemotherapeutic agents, Mechanism of action of antimicrobial agents, Synthetic compounds and antibiotics and their assay in body fluids, drug resistance, Mechanisms of drug resistance, MDR. Various methods of drug susceptibility testing. Brief account on available vaccines and schedules, passive prophylactic measures.

UNIT – III

Bacterial diseases: Symptoms, diagnosis , treatment and prevention of the diseases caused by *Staphylococcus, Streptococcus, Pneumococcus, Neisseria, Corynebacterium, Bacillus, Clostridium, Actinomycete, Rickettsiae, Chlamydiae, Mycoplasma, Enterobacteriacea*, *Vibrios*, *Yersinia; Haemophilus; Bordetella, Brucella; Mycobacteria, Spirochetes; Salmonella* species.

UNIT – IV

Viral diseases: Virus-host interactions at cellular and organism levels. Common diseases caused by Poxviruses; Herpes virus; Adeno viruses; Picorna viruses; Orthomyxo viruses; Paramyxo viruses; Arbo viruses, Rhabdo viruses, Hepatitis viruses; Oncogenic viruses; Human Immuno deficiency viruses (HIV/AIDS). Prion diseases – Kuru, CJD disease and GSS syndrome.

Fungal diseases: Diseases caused by dermatophytes, dimorphic fungi and opportunistic fungal pathogens. Description and classification of pathogenic fungi and their laboratory diagnosis.

Parasitic diseases: Disease caused by parasites like *Entamoeba, Plasmodium, Trichomonas, Leishmania* and *Toxoplasma, Giardia, Wuchereria, Dracunculus.*

Course Learning Outcomes

1. Be able to explain about various infections.
2. Be able to understand the diagnostic methods.
3. Be able to explain the symptoms of bacterial infections.
4. Be able to explain the symptoms of viral, fungal and parasitic diseases.

Suggested Books:

1. Ananthanarayan R, Panikar CKJ (2000). Textbook of Microbiology. 2013. 9th Edition. Orient Longman Ltd.
2. Warren Levinson (2014).Review of Medical Microbiology and Immunology. Mc Graw Hill education
3. Bailey & Scott's (2013). Diagnostic Microbiology (13th Edition), Published by: Mosby.
4. Color atlas and Text book of Diagnostic microbiology (6th Edition), 2005, edited by: Eimer W Koneman, published by: Lippinctt.
5. Subash CP (2000). Text Book of Medical Parasitology, by published by : All India Publishers & Distributors. 1st edition.
6. Jayaran Paniker C.K, Text Book of Medical Parasitology (7th Edition), 2013, by Published by: Jaypee Brothers.
7. Cruichshank *et al.,*(2012). Manual of Clinical Microbiology, 7th ed. by E.H. Lennette et al. ASM Publications.
8. Patrick R. Murray, Ken S. Rosenthal, Michael A. Pfaller (2012), 7th edition. Medical Microbiology. Elsevier saunders.
9. Koen Venema and Ana Paula do Carmo (2015). Probiotics and Prebiotics: Current Research and Future Trends. Caister Academic Press.
10. Sergio Sánchez and Arnold L. Demain (2015). Antibiotics: Current Innovations and Future Trends. Caister Academic Press.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO1 Knowledge	**PO2** Analysis	**PO3** Design	**PO4** Development	**PO5** Modern Tools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** Programme Management	**PO12** Lifelong Learning
CO1	3	2	2	2	2	2	2	-	-	-	1	1
C	3	1	2	2	1	2	1	-	-	-	1	1

O 2												
C O 3	3	2	2	2	3	2	2	-	-	-	1	1
C O 4	3	2	2	2	2	2	1	-	-	-	1	1

PRACTICALS:

MB: 205 - Molecular Biology and Recombinant DNA Technology

Course Learning Objective

1. Gives hands on experience in important molecular methods.
2. Provides hands on experience on PCR and Recombinant DNA techniques .
3. Will gain knowledge in bio informatics and molecular biology information

1. Isolation of Genomic DNA from microbes, plant/animal tissues.
2. Isolation of plasmids from Bacteria.
3. Curing of plasmids.
4. Competent cell preparation.
5. Bacterial transformation.
6. Bacterial transduction.
7. Bacterial Conjugation.
8. Mapping of bacterial genes by conjugation / transformation (problems).
9. Side directed mutagenesis
10. AMES test.
11. Screening and isolation of streptomycin mutant resistant bacteria by gradient plate technique.
12. Lethality curve construction.
13. Study of DNA methylation
14. Study of DNA repair
15. Invitro transcription assay
16. Setting of Genetic Engineering laboratory
17. Restriction enzyme analysis of plasmids
18. Recovery of DNA from gels – Electroelution and extraction of DNA from low melting agarose gels.
19. Southern blotting.
20. Western blotting for heterologous gene expression
21. Polymerase chain reaction
22. Induction of enzyme (Beta galactosidase) in Bacteria

23. Calculation of proportion of bases in nucleic acids, number of turns in DNA, length and Mol. Wts. of DNA, Tm values and buoyant densities of DNAs and DNA replication times

Course Learning Outcomes

1. Able perform DNA and plasmid isolations.
2. Be able to amplify the given gene.
3. Be able to gain practical knowledge about molecular tools.
4. Be able to create a chimeric molecule.
5. Be able to perform bioinformatics tools in genomics.

MB: 206 - Immunology and Medical Microbiology

Course Learning Objective

1. Gives hands on experience in Immuno precipitation test.
2. Provides hands on experience on various ELISA methods.
3. Will gain knowledge in immune globulins.
4. Gives hands on experience on blood related tests.
5. Given knowledge on virus cultivation.
6. Provides hands on experience on various diagnostic tests.

1. Purification of immune globulins
2. Electrophoretic separation of normal and immune serum.
3. Ouchterlony double Immuno diffusion
4. Single radial Immuno diffusion
5. Immuno precipitation test
6. Rocket Immuno electrophoresis
7. Counter current Immuno electrophoresis
8. Isolation & Identification of Rosettee cells.
9. Dot ELISA
10. Sandwich ELISA
11. Antigen Capture ELISA
12. Antibody Capture ELISA
13. ASO titre.
14. Complement fixation test
15. Widal Test
16. VDRL Test
17. Total counting of RBC & WBC
18. Differential count of WBC
19. Hemoglobin estimation
20. Latex agglutination test
21. Blood typing and Rh determination
22. Identification of pathogenic organisms based on HIV& DOT-BLOT test

Course Learning Outcomes

1. Able performs various immune precipitations tests.
2. Be able to perform various types of ELISA methods.
3. Be able to gain practical knowledge about immunoglobulin's and their separation.
4. Be able to perform widal, VDRL and types.
5. Be able to perform various staining procedures.
6. Be able to identify blood cell types.

THIRD SEMESTER

MB – 301: BACTERIOLOGY AND VIROLOGY

Course Learning Objective

1. Gives basics concepts on animal & plant virus cultivation.
2. Provides in depth knowledge on properties and purification of Viruses
3. Gives outlines on nomenclature and classification of viruses.
4. Give in-depth understanding on viral genomes and their replication.

UNIT – I

Domain Eubacteria – morphological types – cell walls, Gram positive – Gram negative eubacteria – L-forms, cell wall synthesis, antigenic properties – capsule – types, composition and function, cell membranes – structure – composition – properties.

Domain Archaea : The unique characteristics, habitats, cell wall structure, membrane structure, pigments, genome, unique enzymes, evolutionary significance.

UNIT – II

Structure and function of flagella – flagella – pili – gas vesicles – chromosomes, carboxysomes, magnetosomes and phycobolisomes – nucleoid – cell division – endospores structure, formation and germination.

Reserve food materials – polyhydroxybutyrate – polyphosphate granules – oil droplets – cyanophycin granules and sulphur inclusions.

UNIT – III

Taxonomy : Classification of bacteria according to the Bergey's manual of systematic bacteriology. Domain Archaea, Domain Eubacteria-kingdoms, classes, orders/groups. Phylogenetic relationships among different bacteria.

UNIT-IV

Plant pathogenic bacteria – Characteristics of *Xanthomonas, Pseudomonas, Agrobacterium, Corynebacterium, Erwinia, Xylella.*

Characteristics of nonpathogenic / beneficial bacteria : *Rhizobium, Azospirillum, Azotobacter, Cyanobacteria (Nostoc, Anabaena, Spirulina), Nitrosomonas, Nitrobacter, Frankid, Klebsiella, Zymomonas, Nocardia, Streptomyces, Acetobacter, Lactobacillus, Streptococcus, Leuconostoc, Serratia, pseudomonas, Alcaligenes, Bacillus, Thiobacillus, Desulfovibrio Methylophilus, Methylococcus.*

UNIT – V

History of Virology : Discovery of viruses and development of Virology (contribution of pioneers). Nature, origin and evolution of viruses. New emerging viruses.

Isolation and cultivation of viruses : Animal viruses - experimental animals, embryonated eggs, animal cell cultures-primary and secondary cell cultures. Plant viruses - experimental plants and tissue cultures. Infectivity assay methods of viruses- physical, serological and chemical approaches. Assay and maintenance of viruses, qualitative and quantitative analysis of viruses.

UNIT – VI

Purification of viruses : Extraction of viruses from tissues, clarification, concentration of viruses in clarified extracts by physical and chemical methods, further purification of viruses by rate zonal / equilibrium density gradient centrifugation, approaches and criteria of virus purity, quantification and preservation of purified virus preparations.

Properties of viruses : Biological characteristics of viruses, host-range, transmission (vector and non-vector), virus stability. Physical-morphology and structure, sedimentation, electrophoretic mobility, buoyant density. Biochemical – chemical composition, nucleic acids, proteins, enzymes, lipids, carbohydrates, polyamines, cations. Antigenic nature of viruses.

Architecture of viruses : Morphology, structure and composition of viruses-Principles of virus structure- Icosahedral, helical and binal symmetry.

UNIT-VII

Nomenclature and classification of viruses : Criteria used for naming and classification of viruses. Current ICTV classification of viruses of bacteria, plants, animals, humans, algae, fungi and protozoans. Major characteristics of the virus families / genera / groups.

Sub-viral agents : Characteristics of sub-viral agents – Viroids, Satellite viruses, Satellite nucleic acids and Prions.

UNIT – VIII

Viral genomes : Diversity of viral genomes – DNA genome – linear and circular, single stranded and double stranded. RNA genomes – positive and negative, linear and circular, single and double stranded, partite of viral genomes – mono, bi, tri and multipartite genomes.

Replication of viruses : Outlines of replication of viruses – approaches to study replication of viruses, replication strategies of viruses – Baltimore strategies of viral genome replication and expression. Replication of viruses like MS_2, T_4, Lambda, Phi X-174, M_{13}, TMV, cauliflower mosaic virus, geminivirus, parvovirus, polio, HIV, Influenza, reovirus, SV-40 and poxviruses.

Prevention and Control of viruses : The infection control policyaseptic techniques, cleaning and disinfection, protective clothing, isolation; Prevention – sanitation, vector control, vaccines and immunization; Control- chemoprophylaxis, chemotherapy (antiviral drugs, Interferon therapy), efficacy of infection control.

Course Learning Outcomes

1. Be able to explain about bacteria and viruses cultivation method.
2. Be able to describe properties of viruses and bacteria
3. Be able to classify the viruses according to ICTV and Bergey's manual
4. Be able to conversant with viral genome diversity and control of viruses.

Suggested Books:

1. Virology: 1994. 3rd ed. Frankel-Conrat et al, Prentice-Hall.
2. Fundamental Virology, 1996. 3rd ed. B.N. Fields et al. Lippincott-Raven.
3. Principles of Virology : 2000. by S.J. Flint et al., ASM Press.
4. Introduction to Modern Virology. 1994. 4th ed. Primrose and Dimmock. Blackwell Scientific Publ.
5. Principles of Molecular Virology. 2005. 4th ed. A. Cann. Academic Press.
6. Basic Virology, 1999. By Waginer and M. Hewlett, Blackwell Science Publ.
7. Plant Virology, 4th ed. 2001 by R. Hull (R.E.F. Matthews). Academic Press.
8. Applied Plant Virology. 1985. D.G.A. Walkey. Heinemann Publications.
9. Bergey's Manual of Systamatic Bacteriology, Vol. 1-4, 1st Edition.
10. Bergey's Manual of Determinative Bacteriology, 2000. 9th ed. by J.G. Holt et al. Lippincott Williams and Wilkins.
11. Fundamental Principles of Bacteriology by A.J. Salle.
12. Biology of Microorganisms by T.D. Brock, and M.T. Madigan, Prentice Hall Int., Inc.

13. General Microbiology by Stainer et al., 1999. Macmillan Educational Ltd.
14. Microbiology. 1999. 3rd ed. Prescott et al. Wm. Co. Brown Publ.
15. Principles of Microbiology. 1997. 2nd ed. R.M. Atlas. Wm. C. Brown. Publ.
16. Foundations in Microbiology. 1996. 2nd ed. K. Talaro and A. Talaro. Wm. C. Brown Publ.
17. Biology of the prokaryotes. 1998. By J.L. Lengeler et al., Blackwell Science Publ.
18. General Microbiology, 1999 by S.B. Sullia, Oxford and IBH Publishers.
19. Fields Virology. 1996. B.N. Fields, D.M. Knipe and P.M. Howley. Lippincott-Raven Publishers.
20. Encyclopedia of Virology. 1994. R.G. Webster and Allan Granoff (Eds). Vol I,II,III. Academic
Press.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	1	2	-	-	-	1	1
CO_2	3	2	2	2	2	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	1	2	1	2	2	2	-	-	-	1	1

MB – 302: AGRICULTURAL MICROBIOLOGY

Course Learning Objective

1. To provide in-depth information about plant –microbe interactions
2. To give information on principles of plant pathology
3. To give knowledge on symptoms, epidemiology / disease cycle of various plant diseases
4. To provide in-depth knowledge about various organisms for practical applications.

UNIT – I

Microbes and Plant interactions : Rhizosphere-microbial flora, rhizosphere influence on plant growth, plant pathogens and rhizophere; ectotrophic and endotrophic microrrhizal associations and importance; phyllosphere- ecology of phyllosphere flora and importance. Spermosphere

Nitrogen fixation : Ecology and biology of non-symbiotic and symbiotic nitrogen fixers, infection and nodulation, associative symbiosis, mechanism of nitrogen fixation, role of nitrogenase and hydrogenase, methods for evaluation of biological nitrogen fixation, significance of nitrogen fixation.

Biofertilizers : Cultivation and mass production of *Rhizobium* and *Azotobacter*, phosphate solubilizing bacteria, blue-green algae, carrier based inoculants. Methods of application.

UNIT – II

Decomposition of waste agricultural products : Microbiology and biochemistry of decomposition of cellulose, hemi-cellulose, starch, pectin, lignin, chitin. Factors governing the decomposition.

Microbial pesticides for biocontrol of pests and pathogens : Introduction, useful microbes (bacteria, fungi and viruses), production, formulation, economics, safety, advantages and disadvantages.

Principles of Plant Pathology : Brief history and development of plant pathology (contributions of pioneers). Types of plant diseases and their significance. Symptoms of plant diseases. Basic procedures in the diagnosis of plant diseases. Host-pathogen interactions-virulence factors of pathogens and defense mechanisms of plants against pathogens.

Environmental effects on disease development and disease epidemiology. Control of plant diseases by various approaches.

UNIT – III

Plant diseases : Symptoms, etiology, epidemiology / disease cycle and control measures with reference to the following : **Fungal :** damping of seedlings, *Phytopthora* root and stem rots, downy mildew of grapes, powdery mildew of cucurbits, rust of groundnut, *Fusarium* wilts, red rot of sugarcane, tikka disease of groundnut, blast disease of rice. **Bacterial :** Citrus canker, blight of rice, angular leaf spot of cotton. **Viral and viroid –** rice tungro, sugarcane mosaic/ streak, potato leaf roll and spindle tuber viroid diseases, tomato/tobacco leaf curl, okra yellow vein mosaic, yellow mosaic of grain legumes, pigeon pea sterility mosaic, peanut bud and stem necrosis, citrus tristeza and yellow mosaic, papaya ringspot, banana bunchy top. **Phytoplasmal :** Little leaf of brinjal.

UNIT – IV

Diseases of animals (symptoms, etiology, pathogenesis, epidemiology and prevention and control) : Poultry : Viral-New castle, infectious bursal, Marek's, egg drop syndrome, avian influenza, infectious laryngotrachites; Bacterial – Avian pasteurellosis, salmonellosis; Fungal – Aspergillosis, Aflotoxicosis.

Fish : Viral – infectious pancreatic necrosis, viral haemorrhagic septicemia, infectious haemorrhagic necrosis, Bacterial-*Pseudomonas, Chondrococcus, Vibrio,* Nocardial infections.

Prawn : Viral-Monodon baculovirus, yellow head, white spot diseases; Bacterial – *vibrio* sp. and *Pseudomonas* sp. caused diseases; Fungus- Larval mycosis caused by *Fusarium* sp., Red disease caused by mycotoxins; Protozoa – *Microsporidia, Zoothamnium* caused diseases.

Mulberry and Silkworm diseases : Mulberry: Fungal – Leaf spot, powdery mildew, rust; bacterial blight. **Silkworm:** Viral-Nuclear polyhedrosis, cytoplasmic polyhedrosis; Bacterial – Septicemia, Sotto; Fungal- White and green muscardine, aspergillosis; protozoan- pebrine.

Course Learning Outcomes

1. Be able to acquaint themselves plant –microbe interaction
2. Be able to understand the microbial -.plant pathogens
3. Be able to gain knowledge on various viral,bacterial and fungal .diseases on plants

4. Be able to know about diseases of poultry, fish ,prawn and silkworm .

Suggested Books:

1. Agricultural Microbiology. 2001. By G. Rangasamy and Bagyaraj. Printice Hall.
2. Biofertilizers in Agriculture and Forestry. 1995. By N.S. Subba Rao.
3. Plant Pathology, 1996 by G.N.Agrios. A.P.
4. Diseases of Crop Plants by Rangasami and A. Mahadevan. Printice-Hall.
5. Soil Microbiology and Plant Growth. 1995. By N.S. Subba Rao.
6. Diseases of Poultry,1995 by Calneck et al.
7. Hand book of Sericulture Technologies, 2001, 2nd edition by S.B. Dandin et al., Central Silk Board, Mysore.

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	PO1 Knowledge	**PO2** Analysis	**PO3** Design	**PO4** Development	**PO5** Modern Tools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** Programme Management	**PO12** Lifelong Learning
CO1	3	2	1	2	2	1	2	-	-	-	1	1
CO2	3	1	2	2	2	2	1	-	-	-	1	1
CO3	3	2	2	2	3	2	2	-	-	-	1	1
CO4	3	2	2	1	2	2	2	-	-	-	1	1

MB – 303: a) INDUSTRIAL MICROBIOLOGY

Course Learning Objectives

1. To give information on industrial applications of microorganisms
2. To know about industrial production of various value added products
3. To provide information on microbial transformations
4. To provide in depth information on microbial production of recombinant molecules

UNIT – I

Industrial application of microorganisms : Bacteria, fungi, their characteristics and industrial products.

Screening of microbes for products : Primary and secondary screening, detection and assay of products by physico-chemical and biological assays.

Industrial strains : strategies for selection and improvement, maintenance, preservation and containment of recombinant organisms.

Bioreactors : Types and their designs and working principles, agitation, aeration, antifoam, pH and temperature controls, cleaning and sterilization, variations in fermenter design – Batch and continuous (Flow-through) fermenters, Feed-back fermenters, Tubular fermenters, membrane fermenters. Fluidized bed, packed bed bioreactor, solid state fermentations.

Inoculum and media : Inoculum preparation, substrates for fermentation media; solid state, surface and submerged fermentations. Batch and continuous fermentations, direct, dual or multiple fermentations, scale-up of fermentations and fermentation economics. Fermentation kinetics, fermentation type reactions. Computer control of fermentation processes.

Immobilization of cells and enzymes techniques : Techniques and supports – Adsorption, covalent linkage, entrapment and cross-linkage, their advantages and disadvantages, applications-microbial fermentations with immobilized cells/enzymes.

UNIT – II

Downstream processing : a multistage operation, solid-liquid separation, release of intracellular components, concentration of biological products, purification by chromatography, product formulation, monitoring of downstream processing, process integration.

Process economics : The starting point, cost estimates, process design, design exercise, capital cost estimates, the operating cost estimates.

Industrial production of ethanol, citric acid, lactic acid, acetic acid, glutamic acid, lysine, acetone, butanol, fructose syrup, vitamins C and B12, biocatalysis (microbial enzymes), antibiotics like pencillins, tetracyclines, aminoglycosides, steroids and hormones, biosurfactants, microbial lipids, xanthan gums.

Biofuels (ethanol, methane, hydrogen) : Microbial groups involved in biogas production and interaction among them, factors affecting biogas production, design of digester, feed stocks, uses of spent slurry.

UNIT - III

Commercial production of useful products (ethanol) from starch, cellulose and lignin.

Production of bacterial, yeast and mold cultures for food fermentation and their applications.

Microbial transformations : Types of bioconversion reactions, biotransformation of steroids, Application of microbial systems / processes in plastic, petroleum, mining and mineral processing industries. Microbial leaching of minerals (copper, uranium), factors affecting leaching and leaching processes, microbial mining and metal recovery.

Patenting : concept and its composition and protection of right and their limitation and intellectual property rights (IPR); patenting biotechnology inventions.

UNIT – IV

Microbial production of recombinant molecules: Requirement of recombinant molecules in pharmaceutical, health, agricultural and industrial sectors and in research / diagnostic labs. Rationale for the design of vectors for oven expression of recombinant proteins; selection of suitable promoter sequences, ribosome binding sites, transcription terminator, fusion protein tags, purification tags, protease cleavage sites and enzymes, reporter/marker genes, plasmid copy number, inducible expression systems. Over expression conditions, production of inclusion bodies, solubulisation of insoluble proteins. Purification protocols and up-scaling. Determination of purity and activity of over expressed proteins. Experiments using model systems : *E. coli*, Yeast, Baculovirus and *Agrobacterium.*

Course Learning Outcomes

1. Be able to know about microbes and bioreactors
2. Be able to understand the process economics and down stream processing
3. Be able to understand about patenting
4. Be able to gain in depth idea about recombinant therapeutic molecules

Suggested Books:

1. Principles of Fermentation Technology. 1997 by P.F. Stanbury et al. Aditya Books Ltd.
2. Basic Biotechnology, 2001. 2nd ed. ed by C. Ratiedge & B. Kristiansen, Cambridge University Press.
3. Manual of Industrial Microbiology and Biotechnology, Second edition. 1999. A.L. Demain, Editor in Chief, ASM Press.
4. Biotechnology : A test Book of Industrial Microbiology. Second edition, 2000. Ed. W.Crueger & A.Crueger.Panima Publishing corporation.
5. Industrial Microbiology : An Introduction by M.J. Waites et al. Blackwell Science. 2001.
6. Prescott & Dunn's Industrial Microbiology.Fourth edition, 1999.Edited by Gerald Reed. CBS Publishers and distributors.
7. Microbial Technology by J.H. Peppler and D. Perlman.
8. Microbial Enzymes & Biotechnology by W.M. Fogarty and C.T. Kelly.
9. Industrial Microbiology, 1999 by L.E. Casida, Jr. New Age International Publ.
10. Industrial Microbiology. 1984. A.H. Patel. Macmilan India Limited.
11. Industrial Microbiology by B.M. Miller and W. Litsky.
12. Microbial Biotechnology – Fundamentals of Applied Microbiology. 1995. by Alexander N.
13. Fermentation : A Practical Approach. 1990. B.McNiel and L.M.Harvey. IRL Press.
14. Computer Applications in Fermentation Technology : modeling and control of biotechnological processes. 1989. N.M. Fish, R.I. Fox, and N.F. Thomhill. Elsevier.
15. Biogas systems : Principles and Applications. 1996. K.M. Mital, New Age International (P) Ltd. Publ.
16. Molecular Biotechnology : Principles and Applications of recombinant DNA. 1994. by B.R. Glick and J.J. Pastermak. Panima Publ. Corporation.

17. Microbial Biotechnology; Fundamentals of Applied Microbiology. 1995. A.N. Glazer and H. Nikaido. W.H. Freeman and Company.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	1	2	2	2	-	-	-	1	1
CO_2	3	1	2	2	2	1	1	-	-	-	1	1
CO_3	3	2	1	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

MB – 303: b) DOWN STREAM PROCESSING TECHNOLOGY

Course Learning Objective

1.To give detailed knowledge about upstream and down stream processing

2.To give information on various separation processes

3.To give information on membrane separation and enrichment operations

4.To understand the various technologies such as dialysis,crystallization etc.,

UNIT-I

Processing: Industrial fermentations: Importance of upstream processing (USP) and downstream processing (DSP). Role of downstream processing in industrial fermentation process.

Downstream processing during fermentation:

1) Growth and product formation during fermentation.
2) Concept of primary (growth associated) and secondary (growth non-associated) metabolites and their control, kinetics of growth and product fermentation (growth rate, yield coefficient, efficiency etc.).
3) Production, Recovery, Assay and Applications of (a) Vitamin C (b) Antibiotics (cycloheximide, tetracyclins) (c) Microbial enzymes (Penicillin acylase, Chitinasa, Lipase) (d) Recombinant and synthetic vaccines.

Distillation and various finishing steps: crystallization, drying. Inclusion bodies and the role of genetic engineering in DSP. Economics of downstream processing.

UNIT-II

Physico- chemical basis of bio-separation processes: Recent development in product isolation, one step purification, reverses microcellular extraction, on line membrane separation. Primary separation and recovery process – cell disruption methods for intracellular products, removable of insoluble biomass separation techniques, flocculation and sedimentation and filtration methods.

UNIT-III

Membrane separation: Membrane based separation – micro and ultrafiltration theory, design and configuration of membrane separation and applications of equipment used.

Enrichment operation: Precipitation methods – salts, organic solvents, polymers, extractive separations, aqueous two-phase extraction, supercritical extraction, *in situ* product removal and integrated bioprocessing.

UNIT-IV

Separation and product resolution: Fractionation of downstream processed products by using different technologies – electrophoresis (1D and 2D gels), chromatography – (Paper, TLC, absorption, Ion exchange, Gel filtration, Affinity chromatographic separation, GC, HPLC, FPLC and Chromato focusing electrophoretic separations). Dialysis, crystallization, super liquid extraction, foam based separation.

Suggested Books:

1) Ratiedge C and Kristiansen B (2001) Basic biotechnology 2nd ed. Ed by Cambridge University press.
2) Demain AL (1999) Manual of industrial microbiology and biotechnology, Second edition. Editor in Chief, ASM Press.
3) Crueger W and Crueger A (2000) Biotechnology: A textbook of industrial microbiology. Second edition, Ed. Panima Publishing corporation.
4) M. J. Waites (2001) Industrial microbiology: An introduction by Blackwell Science.
5) Prescott and Dunn's industrial microbiology (1999) Fourth edition, Edition by Gerald Reed. CBS Publishers and distributors.
6) Colin Ratledg and Jorn Kristiansen (2001) Basic biotechnology editor (second edition). By Cambridge university press.
7) Laurence R. Weatherley (2013) Engineering Processes for Bioseparations. By Elsevier.
8) Ronald W. Rousseau (2009) Handbook of Separation Process Technology. wiley.
9) Michael C. Flickinger. (2013) Downstream Industrial Biotechnology: Recovery and Purification. By wiley.
10) Harker JH, Backhurst JR, Richardson JF (2013) Chemical Engineering, Volume 2.By Butterworth HeinemannRatiedge C and Kristiansen B (2001) Basic biotechnology 2nd ed. Ed. by Cambridge University press.

Course Learning Outcomes

1. Be able to produce and assay the various industrial products
2. Be familiar with various physic-chemical methods involved in bio separation process
3. Be acquint themselves with enrichment operations and membrane separations
4. Be able to carry out separation and product resolution

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	1	2	1	2	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	1	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

MB – 304: PRACTICALS: Bacteriology and Virology and Agricultural Microbiology

Course Learning Objective

1. To provide in depth knowledge on plant –microbe interaction
2. To acquaint microbial -.plant pathogens
3. To provide information on various viral, bacterial and fungal diseases on plants
4. To provide information about diseases of poultry, fish ,prawn and silkworm

1.Hanging drop experiment for bacterial motility.

2. Microbiological staining techniques – Simple, Gram negative, spore, capsular, acid fast and Lactophenol-cotton blue staining.

3. Isolation of bacteriophages from sewage water.

4. Cultivation of viruses in embryonated Chicken eggs: different routes of virus inoculation – Yolk sac, Allontoic and Chorio Allontoic Membrane (CAM)

5.Isolation and enumeration of bacteria,actinomycetes and fungi from agricultural soil

6.Isolation of nitrogen fixing bacteria from legume root nodule

7.Enumeration of rhizospheric and non rhizospheric population bacteria

8.Isolation of antagonistic fluorescent pseudomads from soil

9.Microscopic observation by root colonization by VAM fungi

10.Isolation of Azospillum from grass roots

11.Isolation of Azatobacter from rice fields

12.Isolation of Anabena from azolla plants

13.Isolation and enumeration of Phosphate solubilizers

14.Field Visit and Herbarium preparation of Local Plant-disease specimens

15. Demonstration of different bioferlizers and biopesticides types,formulation and application methods.

Course Learning Outcomes

1. Be able to acquaint themselves plant –microbe interaction
2. Be able to understand the microbial -.plant pathogens
3. Be able to gain knowledge on various viral, bacterial and fungal .diseases on plants
4. Be able to know about diseases of poultry, fish , prawn and silkworm

MB – 305: FOOD MICROBIOLOGY

Course Learning Objective

1. To provide knowledge on quality control of food products.
2. To provide in depth knowledge about food poisoning and fermentation product.
3. To understand the about fermentation technology concepts.
4. To given concentrate knowledge on microbials application modern technology.

UNIT – I

Food as substrate for microorganisms : Microorganisms important in food microbiology – Molds, Yeasts and Bacteria- General characteristics-classification and importance. Principles of food preservation. Asepsis-Removal of microorganisms, (anaerobic conditions, high temperatures, low temperatures, drying). Factors influencing microbial growth in food-Extrinsic and intrinsic factors; Chemical preservatives and Food additives. Canning, processing for Heat treatment-D, Z, and F values and working out treatment parameters.

UNIT – II

Contamination and spoilage : Cereals, sugar products, vegetables, fruits, meat and meat products, Milk and Milk products- Fish and sea foods- poultry- spoilage of canned foods. Detection of spoilage and characterization.

Food-borne infections and intoxications : Bacterial and nonbacterial- with examples of infective and toxic types- *Brucella, Bacillus, Clostridium, Escherichia, Salmonella, Staphylococcus, Vibrio, Yersinia;* Nematodes, protozoa, algae, fungi and viruses. Food borne outbreaks-laboratory testing procedures; Prevention Measures- Food sanitation in manufacture and retail trade, Food control agencies and its regulations, Plant sanitation-Employee's Health standards- waste treatment – disposal – quality control.

UNIT – III

Food fermentations : bread, cheese, vinegar, fermented vegetables, fermented dairy products; Experimental and Industrial production methods. Spoilage and defects of fermented dairy products – oriental Fermented foods, their quality standards and control.

UNIT – IV

Food produced by Microbes : Microbial cells as food (single cell proteins)- mushroom cultivation. Bioconversions- production of alcohol-fermented beverages- beer and wine. Genetically modified foods.

Steroid conversion : Industrial Enzymes production- amylases, proteinases, cellulases, aminoacid production- glutamic acid and lysine productions. Hazard analysis and critical control points (HACCP).

Course Learning Outcomes

1. Be able to understand presentation methods.
2. Be able to understand the food infections and microbial sancer.
3. To gain knowledge on Fermentation process.
4. Be able to know the advantages and biofuels and microbial frerapeulic compounds.

Suggested Books:

1. Food Microbiology: Fundamentals and Frontiers. 4th ed. 2012. ed by M.P. Doyle et al., ASM Press..
2. Food Microbiology: 3rd ed. 2007. Adams, M.R. and Moss M.O. Royal Society of Chemistry Publication, Cambridge.
3. Food Microbiology: 4th ed., 1988. Frazier WC and Westhoff Dc. Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Principles of Fermentation Technology. 2nd Edition : 1999. Stanbury, PF., Whitekar, A and Hall, S.J. Pergamon Press.
5. Basic Food Microbiology: 2nd ed.1989. Banwart, GJ. CBS Publishers and Distributors, Delhi.

6. Food poisoning and Food Hygiene: 7th ed. 2007. Hobbs BC and Roberts D. Edward Arnold (A division of Hodder and Stoughton) London.
7. Dairy Microbiology: 3rd ed. 2002. Robinson RK., Elsevier Applied Sciences, London.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO1 Knowledge	**PO2** Analysis	**PO3** Design	**PO4** Development	**PO5** Modern Tools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** Programme Management	**PO12** Lifelong Learning
CO1	3	2	2	2	2	1	2	-	-	-	1	1
CO2	3	2	2	1	2	2	1	-	-	-	1	1
CO3	3	1	2	2	3	2	2	-	-	-	1	1
CO4	3	2	2	2	2	2	2	-	-	-	1	1

MB – 306: a) BIOINFORMATICS AND COMPUTERS

Course Learning Objective

1.To give information on Networking of computers

2.To provide indepth knowledge on databases and tools

3.To provide knowledge on operating systems

4.To give detailed knowledge on MS-office techniques

UNIT – I

Internet and Biologist : Internet basics, getting onto the internet, e-mail, file transfer protocols, gopher, the world-wide web, browsing and down loading from sites.

Networking of computers, need and advantages, an overview of International and Indian networks – Virtual Library-I: Searching MEDLINE; Pubmed. Virtual Library II: Science Citation Index and current awareness services; Virtual Library III: Electronic Journal; International and Indian Networks- NICNET, INFLIBNET, AGRIS.

Information Networks: WWW, HTTP, HTML, URLs, EMB net, NCBI net, Virtual tourism.

UNIT-II

Databases and Tools: Primary information resources- Protein and genomic information resources-Biological databases; primary, secondary and composite protein sequence databases, structure classification databases, DNA sequence databases, specialized genomic resources; DDBJ, Gen Bank and EMBL public DNA sequence databases; SWISSPROT Database, information retrieval from biological databases; the NCBI data model. Submitting DNA sequences to the Database and updating.

Sequence analysis : Wisconsin GCG, DNASIS, DNASTAR, CLONE MANAGER packages for nucleotide sequence analysis; sequence alignment and database searching; practical aspects of multiple sequence alignment.

Phylogenetic analysis: Phylogenetic models; multiple alignment procedures (CLUSTAL, ALIGN, PHYLIP); tree building methods and trees evaluation; rooting trees, phylogenetics software.

Predictive methods using nucleotide and protein sequences : Detection regulatory elements in the DNA; physical properties of proteins based on sequences, different protein

structural motifs RNA binding domains and folding classes; Transcription factors and their DNA binding.

UNIT – III

Basics of personal computer and its components. Concept of programming Languages. Hardware and Software. The idea of operating systems.

Disk Operating Systems (DOS)- Simple commands to create directories and handle files. DOS based software for creating biological databases-dBASE,

Windows-98 operating system – Starting Windows, Desk Top items, folders and files, explorer, notepad and word pad and their applications. Features of Windows 2000

Microsoft Office - 2000 : Introduction and facilities available. Shortcut Bar; customizing toolbars; using common office techniques-starting an office application.

UNIT – IV

Microsoft Word : Starting a new document, opening existing documents, saving, closing, and printing documents, moving and copying text, proofing the documents, working with multiple documents. Creating and editing work documents; formatting documents; working the tabs, tables and columns; working with long documents; working with graphics; formatting shortcuts; streamlining repetitive work.

Microsoft Excel : Introducing Excel Worksheet, formatting and printing worksheets, workbooks, functions and formulae, excel graphics, creating databases. Solving simple statistical problems and curve fitting using Excel.

Microsoft Power point : Creating presentations, working with slides, showing slide shows, creating an organization charts and graphs, printing a presentation.

Course Learning Outcomes

1.Be able to give familiarize with various networking tools

2.Be able to acquaint themselves with construction of phylogenetic trees

3. Be able to learn basics of computers

4.Be able to create excel worksheets and slide shows

Suggested Books:

1. Biostatistics by Daniel.
2. Campbell R.C. 1974 : Statistics for Biologists, Cambridge University Press, Cambridge.

3. Statistics made simple – Do it yourself on PC. 2001. By K.V.S. Sarma. Printice Hall of India Publ.
4. An introduction to Biostatistics. 1997. Third Edition. P.S.S. Sundar Rao and J. Richard, Prentice-Hall of India Pvt. Ltd., New Delhi.
5. Fundamentals of Biostatistics. 1994. First Edition. Irfan A. Khan and Atiya Khanum, Ukaaz Publications.
6. Biostatistics. 1996. First Edition. P.N. Arora and P.K. Malhan, Himalaya Publishing House.
7. Statistics for Biologists. 1980. D.J. Finney.
8. Statistics and Experimental design : An Introduction for Biologists and Biochemists. 1994. 3rd edition. G.M. Clarke. Edward Arnald Publications.
9. Statistical methods. 1967. 6th edition. Snedecor and Cochran, Oxford Press. 1967.
10. Elements of Computer Science, 1998. S.K. Sarkar, A.K. Gupta. S. Chand & Company (Chapters – 1,2,9,12,14).
11. Microsoft Office. 1997. Stultz. Office 2000 – The Basics and beyond, 2000. A Lan Neibauer. Tata Mc Graw-Hill Publishing Comp. Part I, II, III, IV, V.
12. Windows-98, 2000, Vickram Crishra. Tata Mc Graw-Hill Publishing.
13. The Internet : Complete Reference, Harley Hahn. 1996. Second Edition. Tata Mc Graw-Hill Publication.
14. Introduction to Bioinformatics, 2001 by T.A. Attwood & D.J. Parry-Smith, Pearson Education Asia Publ.
15. Bioinformatics : Methods and Protocols, Edited by Stephem Misener and Stephen A. Krawetz. 2000. Methods in Molecular Biology Series. Humana press.
16. Bioinformatics : A Practical guide to the analysis of genes and proteins. 1998. Edited by A.D. Baxevanis and B.F.
17. Francis Ouellette. Wiley – Interscience. Computational Methods in Molecular Biology by S.L. Saizberg.
18. Computer Applications in Biotechnology. 1998. by T. Yosida. Introduction to Bioinformatics by Atwood.
19. Bioinformatics – From Nucleic Acids and Proteins to Cell Metabolism. 1995, by Schomburg and Label VCH Publ.
20. Bioinformatics : Sequence and Genome Analysis. By D.W. Mount. CSHL Press.

21. Bioinformatics : Methods and Protocols,. Ed by S. Misener and S.A. Krawetz. Humana Press, 2000.
22. Principles of Biostatistics, 2000. Marcello Pagano; Kimberlee Gauvreau, Published by Duxbury,
Thomson Learning, USA.
24. Biostatistical Analysis, 1999. Jorrold H. Zar Published by Pearson Education, Inc., Delhi.
25. Statistical methods for survival data analysis, 1992. Elisa T. Lee. Published by Wiley Series in probability and mathematical statistics; John Wiley & Sons, Inc. New York.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	1	2	-	-	-	1	1
CO_2	3	2	2	1	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

MB – 306: b) Microbial genomics and proteomics

Course Learning Objective

1. To give information on biological sequences
2. To provide in depth knowledge on functional and structural genomics
3. To provide knowledge on functional proteomics
4. To give detailed knowledge on microarray

Unit-I

Introduction to microbial genomics - sequencing genomes – first generation DNA sequencing – shot gun sequencing – second generation DNA sequencing – third and fourth generation DNA sequencing

Biological sequences as information – DNA, RNA and protein as informative molecules – general characteristics of microbial genomes – genome assembly – genome annotation – identification of an open reading frame in a genome.

Microbial genomes size and content – small genomes and large genomes – genomes of organelles – symbionts and organelles – eukaryotic microbial genomes an introduction: genomes of microbial parasites – the yeast genome.

Unit-II

Functional genomics: microarrays and transcriptomes – gene chips and gene expression and its applications – RNA sequence analysis – methods in proteomics – comparative genomics and proteomics – the interactome.

Culture independent studies of microorganisms – metagenomics: principles and applications – steps in construction of a metagenomes – examples of metagenomic studies – metagenomics as a tool to reveal the vast microbial diversity.

Unit III

Functional proteomics :Molecular analysis of gene expression (RTPCR)., CRISPR (CRISPR/Cas9)- Mechanism and applications.: Gene functions through protein interactions: Identification of Protein–Ligand Interactions. Combining yeast two-hybrid and phage display

data, Detecting Interactions with Protein Fragment Complementation Assays. Mass Spectrometry for Protein–Protein Interaction Mapping: Overview, Identification of substrates for E. coli GroEL, Studying the transcriptome and proteome of Escherichia coli and Saccharomyces cerevisiae.

Unit IV

Protein microarrays: overview, principle, limitations; Protein microarray Manufacturing technology, solid supports, different formats, experimental approach and detection, peptidomics; Microarray for protein-carbohydrate interaction (phage display technology); protein domain microarray; protein biochips; Antibody microarray; protein microarray for drug discovery

Course Learning Outcomes

1. Be able to give familiarize with microbial genomes
2. Be able to acquaint themselves with metagenomics
3. Be able to learn basics of protein identification method
4. Be able to gain knowledge on drug discovery

Suggested readings:

1. Madigan M.T., Bender K.S., Buckley D.H., Sattley W.M. and Stahl D.A. (2017) Brock Biology of Microorganisms, 15th Edn. (Global Edn.) Pearson Education.

2. Sanders E.R. and Miller J.H. (2010) I Microbiologist: A discovery based course in Microbial Ecology and Molecular Evolution, ASM press.

3. Fraser C.M., Read T. and Nelson K.E. (2004) Microbial Genomes, Springer.

4. Highlander S.K., Rodriguez-Valera F. and White B.A. (2015) Encyclopedia of Metagenomics: Environmental Metagenomics, Springer Science.

5. Dale J.W. and von Schantz M. (2007) From Genes to Genomes: Concepts and Applications of DNA Technology, 2nd Edn. Wiley publishers.

6.Protein Microarrays, edited by Mark schena, Jones and Bartlet pblisher, 2005.

7.Microbial Functional Genomics, Jizhong Zhou, Dorothea K. Thompson, Ying Xu, James M. Tiedje, A John Wiley & Sons, Inc., Publication, 2004.

8.Microarrays for an Integratiul J. But. Kho and Atte, Published in India by Ane Books, 2003.

9.Gene Cloning and DNA analysis An Introduction, Sixth Edition, T. A. Brown, Wiley Blackwell publications, A John Wiley & Sons, Inc., Publication, 2010.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	2	2	1	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	1	2	-	-	-	1	1

FOURTH SEMESTER:

MB - 401: MOLECULAR CELL BIOLOGY AND TECHNOLOGY

Course Learning Objective

1. To provide information on signaling mechanisms.
2. To gives detailed information on cancer biology.
3. To provide in depth information about culture media.
4. To gives information on transgenic technology.

UNIT – I

Cell cycles : Bacterial and eukaryotic cell cycles, molecular basis of cell cycle regulation, progress through the cell cycle. Prokaryotic and eukaryotic cell signaling mechanisms : eukaryotic cell-to-cell signaling, endocrine signaling, cyclins. Prokaryotic signaling : Quorum sensing and bacterial pheromones. Intracellular signaling. Signaling pathways. Cell cycle and growth regulation.

UNIT – II

Molecular Biology of tissue transformation and tumerogenesis in plants and animals : Terminology, experimental approaches to study transformation and tumerogenesis. **Plants :** induction of crown gall by *Agrobacterium.* **Animals :** types of tumors, physical, chemical and biological carcinogens, chromosomal changes induced by carcinogens, oncogenes (v-onc, c-onc), antioncogenes and their products, induction of tumors by DNA and RNA viruses, regulation of gene expression by oncogene products; role of oncogene products in signal transduction.

Cancer : Biology of human cancer, Growth of cells, Cell transformation. Oncogenes and Chromosome , Translocation, Amplification of Oncogenes in Tumors, Tumor Suppressor Genes, Role of Oncogenes and Tumor Suppressor Genes in the Pathogenesis of Neoplasms. Oncogene and proto-oncogene functions

UNIT – III

Cell culture media – Components of the medium, physical, chemical and metabolic functions of media. Role of serum and supplements, serum-free media, features and

specifications of MEM, DHEM, RPMI and Ham's medium. Role of antibiotics in media. Cell viability and cytotoxicity. Dye exclusion and inclusion tests, colonigenic assay, macromolecular estimation, MTT based assay. **Primary culture** – Mechanical and enzymatic mode of disaggregation. Cell lines – Definite and continuous cell lines, characterization, authentication, maintenance and preservation of cell lines.

UNIT- III

In vitro fertilization – Concept of superovulation, collection, maintenance, and maturation of oocytes, fertilization of oocytes. Cloning – Concept of nuclear transfer, nuclear reprogramming and creation of Dolly. **Transgenic animals** – Retroviral, microinjection, and engineered embryonic stem cell method of transgenesis. Application of transgenic animals – Biopharming, disease models, functional knockouts. **Gene therapy** – *Ex vivo* and *in vivo* gene therapy methods, and their applications. Application of animal cell culture - Vaccine production, specialized cell types. Concepts of tissue engineering – Skin, liver, kidney, blader and heart.

Course Learning Outcomes

1. Able to understand the cell cycle and quorum sensing
2. Able to acquire with carcinogens and oncogenes.
3. Be able to acquaint with cell cultures media and cell lines.
4. Be able to acquaint themselves with transgenic animal production technology.

Suggested Books:

1. Molecular Cell Biology. 6th ed. 2007 by Lodish et al. Scientific American books, W.H. Freeman and Company.
2. Molecular Biology. 4th ed. 2008, by David Freifelder, Narosa Publ. House.
3. Text Book of Molecular Biology. 1994, by Sivarama Sastry et al, Macmillan India Ltd.
4. Advanced Molecular Biology : A Concise Reference. 1998, by R.M. Twyman. Viva Books Pvt. Ltd.
5. Instant notes in Molecular Biology,2nd ed. 2000. by P.C. Turner et al. Viva Books Pvt. Ltd.
6. Schaums Outlines – Molecular and Cell Biology. 1997. W.D. Stansfield et al., McGraw-Hill Publ.

7. Oncogenes. 1990. G.M. Cooper. Jones and Bartlett Publishers, Boston.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	1	2	2	-	-	-	1	1
CO_2	3	2	2	1	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

MB - 402: ENVIRONMENTAL MICROBIOLOGY

Course Learning Objective

1. To provide overview of microbial ecology.
2. To give in-depth information about soil microbiology.
3. To give knowledge about aquatic microbiology.
4. To provide information about waste treatment methods.

UNIT – I

Brief account of the habitat for microorganisms : soil, water and atmosphere. General description of soil, water, air. Physical and chemical factors influencing the distribution of microbial flora.

Populations and communities interactions : Population interactions (commensalisms, synergism, mutalism, competition, ammensalism, predation, parasitism), microbial population and community dynamics, microbial growth in open and closed environments, the kinetic principles of competition between microbial populations.

Extremophiles – acidophilic, alkalophilic, thermophilic, barophilic and osmophilic microbes – mechanisms and adoption. Halophiles – membrane variation – electron transport – application of thermophiles and extremophiles.

Methods in microbial ecology : Enrichment and isolation methods, microbial activity measurements.

UNIT – II

Soil Microbiology : Diversity of microorganisms (bacteria, fungi, algae, viruses), their distribution and abundance, methods of isolation and estimation, beneficial and antagonistic interactions among microorganisms. Survival of soil-borne pathogens.

Organic matter in soil : Nature, synthesis and decomposition. Humus formation in the soil.

Microbiology and ecological significance of ammonification, nitrification and denitrification : microbes involved, biochemistry of the above processes, factors influencing the processes.

Bio-geo-chemical cycles : Carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur and iron. Microbiological transformation of phosphorus, sulfur and iron.

UNIT – III

Aerobiology : Microbes and microbial propagules in air. Methods for microbial analysis of air. Brief account of air-borne transmission of microbes – viruses, bacteria and fungi, their diseases forcasting and preventive measures.

Aquatic Microbiology : Water ecosystems – types – fresh water (ponds, lakes, streams) – marine habitats (esturies, mangroves, deepsea, hydrothermal vents, saltpans, coral reefs). Zonations of water ecosystems- upwelling – eutrophication – food chain. Potability of water. Sampling and microbial assessment of water quality. Water purifications – sanitary quality of water. Municipal water treatment, filtration. Disinfection of water by heat, solar energy, UV and gamma radiation, ultra sound, ozone and chlorine. Brief account of major water-borne diseases and their control measures.

UNIT – IV

Waste treatment : Wastes – Solids and liquids and their characterization : Liquid wastes : microbial diversity and treatments- physical, chemical, biological – aerobic – anaerobic-primary-secondary tertiary. Solid waste treatment: saccharification-gassification – composting, utilization of solid wastes – food (SCP, mushroom, yeast) fuel (ethanol, methanol), fertilizers (composting). Liquid waste treatment – trickling – activated sludge-oxidation pond – oxidation ditch. Subterranean microbes and bioremediation. Treatment of industrial fermentation unit effluents.

Positive and negative roles of microbes in environment : Bioremediation, biodegradation of recalcitrant compounds – lignin – pesticides; bioaccumulation of metals and detoxification – biodeterioration – of paper – leather, wood, textiles – metal corrosion – mode of deterioration – organisms involved – its disadvantages – mode of prevention. GMO and their impact.

Course Learning Outcomes

1. Be able to acquaint with microbial communities and their interaction.
2. Be able to know about bio geochemical cycle.
3. Be able to understand the water borne diseases and their control measure.
4. Be able to understand the solid waste management.

Suggested Books :

1. Extremophiles, by B.N. Johri, 2000. Springer Verlag., New York.
2. Microbial Diversity, by D. Colwd, 1999. Academic Press.
3. Manual of Environmental Microbiology, second edition, by C.J. Hurst, Editor in Chief, 2002. ASM Press.
4. Microbial ecology: Fundamentals and Applications. 1998. Atlas, RM & Barta, R.
5. Aerobiology. 1997. By Tilak.
6. Environmental Microbiology by Ralph Mitechell.
7. Bioremediation Principles by Eweis.
8. Techniques in Microbial Ecology by Buruage.
9. Soil Microbiology and Plant Growth, 1995 by N.S. Subba Rao.
10. Soil Microbiology by Alexander. 2nd ed. 2011.
11. Environmental Microbiology. 1981 by W.P. Grant and P.E. Long.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	1	2	2	2	1	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	1	2	2	2	-	-	-	1	1

MB - 403: a) PHARMACEUTICAL MICROBIOLOGY

Course Learning Objective

1. To provide overview antimicrobial agents.
2. To give in-depth information about antibiotic action with the celll.
3. To give knowledge about production of pharmaceuticals.
4. To provide information about GLPs .

UNIT-I

Antibiotics and synthetic antimicrobial agents: Antibiotics and synthetic antimicrobial agents(Aminoglycosides, lactams, tetracyclines, ansamycins, macrolid antibiotics) Antifungal antibiotics, antitumor substances. Peptide antibiotics, Chloramphenicol, Sulphonamides and Quinolinone antimicrobial agents. Chemical disinfectants, antiseptics and preservatives.

Mechanism of action of antibiotics: Mechanism of action of antibiotics (inhibitors of cell wall synthesis, nucleic acid and protein synthesis)Molecular principles of drug targeting.

Drug delivery system in gene therapy, Bacterial resistance to antibiotics, Mode of action of bacterial killing by quinolinones, Bacterial resistance to quionolinones, Mode of action of non – antibiotic antimicrobial agents. Penetrating defenses – How the antimicrobial agents reach the targets (cellular permeability barrier, cellular transport system and drug diffusion).

UNIT-II

Microbial production and Spoilage of pharmaceutical Products

Microbial contamination and spoilage of pharmaceutical products (sterile injectibles, non injectibles, ophthalmic preparations and implants) and their sterilization. Manufacturing procedures and in process control of pharmaceuticals. Other pharmaceuticals produced by microbial fermentations (Streptokinase, Streptodornase).New vaccine technology, DNA vaccines, synthetic peptide vaccines, multivalent subunit vaccines. Vaccine clinical trials.

UNIT-III

Regulatory practices, biosensors and applications in Pharmaceuticals

Financing R&D capital and market outlook. IP, BP, USP. Government regulatory practices and policies, FDA perspective. Reimbursement of drugs and biologicals, legislative perspective. Rational drug design. Immobilization procedures for pharmaceutical applications (liposomes). Macromolecular, cellular and synthetic drug carriers. Biosensors in Pharmaceuticals. Application of microbial enzymes in pharmaceuticals.

UNIT-IV

Quality Assurance and Validation

Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) in

pharmaceutical industry.Regulatory aspects of quality control.Quality assurance and quality management in pharmaceuticals ISO, WHO and US certification.Sterilization control and sterility testing (heat sterilization, D value, z value, survival curve, Radiation, gaseous and filter sterilization).Chemical and biological indicators.Design and layout of sterile product manufacturing unit.Designing of Microbiology laboratory,Safety in microbiology laboratory.

Course Learning Outcomes

1. Be able to acquaint with antibiotics
2. Be able to know antimicrobials action.
3. Be able to understand the production of pharmaceuticals
4. Be able to understand the quality assurance.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	1	2	2	2	2	-	-	-	1	1
CO_2	3	2	2	2	2	1	1	-	-	-	1	1
CO	3	2	2	2	3	2	2	-	-	-	1	1

3												
CO 4	3	1	2	2	2	2	1	-	-	-	1	1

MB - 403: b) INDUSTRIAL BASED MICROBIAL CELAN TECHNOLOGY

Course Learning Objective

1. To provide overview of organic wastes.
2. To give in-depth information biomining
3. To give knowledge biopesticides.
4. To provide information bioremediation

UNIT – I

Scope of microbial agents in industry - regarding clean environment – waste water and effluent treatment – aerobic biological treatment, carbon oxidizers, filamentous carbon oxidizers, nitrifiers, dinitrifiers. Anaerobic waste-water treatment – hydrolytic bacteria, acetogenic bacteria, methanogenic bacteria.

Compositing of solid organic wastes – *Agaicus bisporus, Bacillus stearothermophilus, Thermus sp., Fungi – Rhizomucor Pusillus.* Ensiling – to preserve the material with a minimum loss of nutritional value, commercial, microbial inoculants, *Pediococcus sp.,Sstreptococcus sp.,* some *Lactobacillus sp*. Biodegradation of Xenobiotics, Bioremediation – basic principle, biodegrade or detoxify contaminating compounds in situ, metal sequester – *Geobacter metallireducens,* radiation resistance bacteria – *Deinococcus radiodurans.*

UNIT – II

Biomining (mineral leaching) – conventional mineral mining – metal ores, *Thiobacillus ferroxidans, Leptosirillum ferroxidans,* Microbial desulphurization of coal – S*ulfolobus acidocaldarium.*

Bioinsecticides – control of insects by use of microbial pathogens - bacteria, fungi, protozoa and viruses – *Bacillus thuringiensis, Pythium, Oligandrum, Ampelomyces quiqualis,* Baculo viruses.

UNIT – III

Biopesticides – Introduction and importance of biopesticides, types of biopesticides, bioinsecticides – biofungicides – biobactericides – bionematicides – bioherbicides. Important bioinsecticides- Bt, NPV, fungal bioinsecticides (Beauveria, Metarhizium, Verticillium, Paecilomyces, Nomuraea. Mass production – formulation – application for the control of insect pests. Important biofungicides – Trichoderma, Gliocladium, *Pseudomonas fluorescens*, mass production – formulation – use in agriculture for the control of crop diseases. Biobactericide - *Agrobacterium radiobacter*, use in control of crown gall disease. Bionematicides- Verticillium, Trichoderma, control of root knot nematodes. Bioherbicides - Phytophthora , Colletotricum, advantage for the use of biopesticides – Problems in commercialization and efficacy – commercial products of biopesticides.

UNIT – IV

Bioremediation – Bioremediation definition, concept – rationale – kinds of pollution – organic, inorganic in soil, water and air – remediation by bacteria, fungi and green plants. Processes of bioaccumulation and biomagnification – microbial remediation by natural attenuation – biostimulation – bioaugmentation – application of immobilized microbes in soil decontamination.Use of genetically engineered microorganisms and bioremediation – Biodegradation of organic compounds – humification and polymerization reaction – biotransformation of metal and metal compounds – phyto-remediation use of green plants to remove pollutants – Phyto-extraction – induced phyto-extraction and continuous phyto-extraction – phyto-degradation – rhizofiltration – phyto-stabilisation – phytovolatisation of metals – phyto-remediation of organic – bioavailability and uptake – biotransformation and compartmentalization.

Course Learning Outcomes

1. Be able to acquaint various bacteria involved in composting
2. Be able to know about mineral leaching.
3. Be able to understand the production of bioinsecticides and bio fungicides
4. Be able to understand the biomagnification.

Suggested Books :

1. Microbial Technology by J.H. Peppler and D. Perlman.
2. Microbial Enzymes & Biotechnology by W.M. Fogarty and C.T. Kelly.
3. Industrial Microbiology, 1999 by L.E. Casida, Jr. New Age International Publ.
4. Industrial Microbiology. 1984. A.H. Patel. Macmilan India Limited.
5. Industrial Microbiology by B.M. Miller and W. Litsky.
6. Microbial Biotechnology – Fundamentals of Applied Microbiology. 1995. by Alexander N.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	1	2	1	2	-	-	-	1	1
CO_2	3	2	2	2	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

MB – 404: PRACTICAL: MOLECULAR CELL BIOLOGY & CELL TECHNOLOGY AND ENVIRONMENTAL MICROBIOLOGY.

Course Learning Objective

1. To provide hands on experience with the techniques used in molecular cell biology.
2. To give hands on experiments techniques used in Environmental Microbiology.

1. MTT assay
2. Trypan blue dye exclusion test
3. Agrobacterium mediated transformation
4. Culturing of HeLaS3 cells insuspension.
5. Humus estimation in the soil
6. Determination of organic matter of soil
7. Contact slide technique
8. Ammonification in soil
9. Nitrification in soil
10. Denitrification in soil
11. Isolation of antibiotic producing microorganisms from soil
12. Most Probable Number Test for coliforms
13. Quantitative analysis of water for microbial numbers (SPC)
14. Membrane filter method for detection of coliforms in water
15. Effect of heavy metals on the growth of bacteria
16. Microbial interrelationships (Synergism and Antagonism)

Course Learning Outcomes

1. Be able to perform techniques in molecular cell biology independently.
2. Be able to perform techniques in environmental microbiology.

MB - 405: Project

Course Learning Objective

1. To acquatic themselves to identify and collect scientific Research Problem formula in microbiology.

Practical experience in locating, collecting and interpreting the scientific information for the purpose of M.Sc., Microbiology project work. Students work individually under faculty / scientist supervision in Laboratories, Research labs, National Institutions to perform the procedures and record the results and present the project work at the end of the fourth semester. The project work of the student will be evaluated by seeing the performance of presentation and interpretation of the results.

Course Learning Outcomes

1. Be able to design and a research problem analyzes the results.

MB-406: a) BIOETHICS, BIOSAFETY AND INTELLECTUAL PROPERTY RIGHTS

Course Learning Objective

1. To give information on ethics.
2. To give in-depth information about containment.
3. To give knowledge about regulatory affairs of pharmaceuticals.
4. To provide information about Intellectual rights .

UNIT – I

Bioethics – Introduction to Bioethics, solid and ethical issues related industrial genetically manipulated microorganisms (GMM).

UNIT – II

Biosafety – Definition, biosafety consideration, types of containments, personal practices, primary and secondary containment barriers (biosafety levels 1, 2, 3, 4), containment for production activities, practical consideration, possible hazards from industrial production and use of pathogens.

UNIT – III

Biosafety for human health and environment - Use of genetically modified microorganisms and their release in to the environment, special procedures for recombinant DNA based products. Regulatory affairs – regulatory requirements for drugs and biologics.

UNIT – IV

Intellectual property rights – Importance of Intellectual property, history of patent concept, composition of a patent, general patent information – patent laws, patentable subject matter, apply for patent, requirements for patentability, issuance of a patent, infringement of a patent. Obtain patent protection – applying for patent protection, patent prosecution, appeals and interference proceedings, applying for foreign patent protection. Patent laws in US, India and other countries.

Course Learning Outcomes

1. Be able to acquaint various ethical issues related to recombinant bacteria
2. Be able to know about various biosafety levels
3. Be able to understand the production of GMO is use
4. Be able to understand about patenting

Suggested Books :

1. Intellectual property rights on Biotechnology. K. Singh BCII, New Delhi.
2. Biotechnologies in developing countries present and future. 1993. A. Sasson. UNESCO Publishers.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowled	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwo	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Lear

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CO1	3	2	2	2	2	2	2	-	-	-	1	1
CO2	3	1	2	1	2	2	1	-	-	-	1	1
CO3	3	2	2	2	3	1	2	-	-	-	1	1
CO4	3	2	2	2	2	2	2	-	-	-	1	1

MB-406: b) MICROBIAL PRODUCTION OF ALCOHOLIC BEVERAGES

Course Learning Objective

1. To give information on role of microorganisms in brewing
2. To give in-depth information about fermentation process
3. To give knowledge about various types of whiskies.
4. To provide information about vinegar production process

UNIT – I

History, scope and Industrial important of Beverages. Types of Beverages and their significance in the society. Brewing microbiology – Microorganisms related to Beverages, their isolation, identification and small scale culturing, pure culture techniques, Microbial metabolism and nutrition, genetics of Microbial organisms, magnitude of the brewing industry.

UNIT – II

Elements of the Brewing process – Ingredients – Malt, Adjuncts, water, Hops, yeast, miscellaneous additives. Different process of Bear Brewing – Malting, Brewing, Mashing, Hop addition. Fermentation – Primary, continuous fermentation, aging and finishing. Pure culture of yeast – quality, source, maintenance of pure culture, pure culture propagation, evaluation of yeast produced, microscopic and serological tests, test fermentations, recycled yeast, separation, collection and storage. Microbial contamination. Fermentation requirements – Carbohydrates, nitrogen compounds, inorganic ions, vitamins, polyphenols, Hop compounds, lipids oxygen, yeast.

UNIT – III

Distilled Beverage Alcohol – commercial Important of alcohol, whiskey – Raw materials, mashing and conversion, fermentation, distillation, types of whiskey – Bourbon whiskey, Rye whiskey, corn whiskey, Light whiskey, Tennessee whiskey. Canadian whiskey, scotch whiskey, Irish whiskey, Vodka, Gin, By-product recovery in whiskey synthesis, Rum, Tequila, Cordials and Liqueurs, Congeners.

Wine production – production of grape must, wine fermentation, traditional spontaneous wine fermentation, use of starter cultures, continuous wine fermentation, secondary wine fermentation, post – fermentation treatments.

UNIT – IV

Cider production – apple juice extraction, composition of apple juice, cider fermentation, cider maturation. Vinegar production – Vinegar fermentation, alcohol fermentation, acetic acid fermentation, methods of acetification in vinegar manufacture, traditional surface method trickle generators, submerged methods, finishing processes, process developments.

Course Learning Outcomes

1. Be able to acquaint with various bevarges
2. Be able to know about various beverage production process
3. Be able to understand the production of bevarages
4. Be able to understand about cidar productions

Suggested Books:

1. Molecular Biotechnology : Principles and Applications of recombinant DNA. 1994. by B.R. Glick and J.J. Pastermak. Panima Publ. Corporation.
2. Microbial Biotechnology; Fundamentals of Applied Microbiology. 1995. A.N. Glazer and H. Nikaido. W.H. Freeman and Company.
3. Biotechnology : A test Book of Industrial Microbiology. Second edition, 2000. Ed. W.Crueger & A.Crueger.Panima Publishing corporation.
4. Industrial Microbiology : An Introduction by M.J. Waites et al. Blackwell Science. 2001.
5. Microbial Technology by J.H. Peppler and D. Perlman.
6. Manual of Industrial Microbiology and Biotechnology, Second edition. 1999. A.L. Demain, Editor in Chief, ASM Press

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowled	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Teamwo	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Lear

	ge								rk			ning
CO1	3	2	2	2	2	2	2	-	-	-	1	1
CO2	3	2	2	2	2	2	1	-	-	-	1	1
CO3	3	2	1	2	1	2	2	-	-	-	1	1
CO4	3	2	2	2	2	2	1	-	-	-	1	1

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF MICROBIOLOGY



Course

M.Sc. INDUSTRIAL MICROBIOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

The Department of Microbiology emerged from the Sri Venkateswara University post graduate Centre, Kavali during 2005. Since 2010, the Department of Microbiology was to transferred College of Sciences, Sri Venkateswara University, Tirupati. The department presently runs Four academic programmes M.Sc. Microbiology (Regular & Self-Supporting), M.Sc. Industrial Microbiology (Self-supporting) and Doctoral Programme. The present intake in each Masters programme is 24. The post graduate programme is under Choice Based Credit Course in four semesters with 16 theory papers, 7 practicals and one project work. The Department has taken special interest in encouraging the students to take up pure, applied and strategic Ph.D research programmes at local and national level to restore the environmental quality and development of indigenous microbial technology. Several students of this department have been gainfully employed and are working in several leading National & International laboratories, Industries, research Institution and colleges.

The research activities of the Department are also well recognized and a number of projects funded by agencies such as UGC, DST, ICMR etc., The thrust areas identified are Molecular Microbial Ecology, Proteomics, DNA Bar-coding, EnvironmentalBiotechnology etc.,The department of Microbiology has developed and transformed itself into a progressive department with upto date laboratory equipments, reference books. The department conducts various activities like Saturday meets, Research Seminars and training programmes for the CSIR-UGC, SLET, NET, GATE examinations. On an average 4 - 6 out of 24 students of each course qualifying these examinations every year.The department has strong rapport with potential employers and the opportunities of employment are routinely displayed.With respect to service the faculty has an exemplary record of participation in National & International Organization and editing professional Journals. The research outcomes of the department are well evidenced by publication of several research papers in peer reviewed national and international Journals with good impact factor. The Department also excels in extra curricular activities too. The department regularly organizes national level seminars, symposia and workshops. It is not only the effect of the faculties for all such success but it is the team spirit and the excellence of the post graduate and Doctoral students too. Students of Microbiology are self sustained and receive individual fellowships including DST inspire Fellowship, Rajiv Gandhi National Fellowship, University

Research Fellowship. From all these progresses and growth it is well envisaged that the members of Microbiology Department are well sustained to outrival the competitive scientific World.

Vision: To build a global standard in microbiology research and teaching, and to be a guiding light worthy of emulating.

Mission: To provide wholesome experience and knowledge to students to develop into exemplary leaders of the future in academic and outside arena.

- To pursue and promote world-class research and training at the frontiers of microbiology
- To move up through International & national alliances and collaborative initiatives to excel globally in Microbiology and Biotechnology research and education.

CHOICE BASED CREDIT SYSTEM (CBCS):

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill-based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Grading system provides uniformity in the evaluation and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations which enables the student to move across institutions of higher learning. The uniformity in evaluation system also enables the potential employers in assessing the performance of the candidates

Program Specific Outcomes

PSO-1: Equips capacity to venture into a career in bio based industries as scientists or technologists in the division of production, research and developmental settings.

PSO-2: Demonstrate the concepts and research approach for their higher career in the field of microbiology and develop their scientific interest.

PSO-3: Administer skill sets to understand the rationales behind various regulatory/legal bodies governing the R&D in the pharmaceutical industry.

PSO-4: Exhibit in-depth practical oriented knowledge to students in various thrust areas of industrial microbiology, so as to meet the global demands of industry and academia.

PSO-5: Ability to designs aids in developing solutions for complex problems with appropriate consideration to the public health and safety, and the cultural, societal, and environmental considerations.

Programme Objectives

- To produce competent microbiologists who can employ and implement their knowledge gained from this programme in applications which will profoundly influence different fields viz. pharmaceutical, biotech, food, wine and beverages industries.
- The programme will provide students with the knowledge and skill base that would enable them to undertake further studies in microbiology/industrial microbiology and related areas or in multidisciplinary areas that involve microbiology, biochemistry, biotechnology and molecular biology and help develop a range of generic skills that are relevant in enhancing entrepreneurship skills among students
- The Master's Programme in Microbiology will address the increasing need for skilled scientific manpower with an understanding of research ethics involving microorganisms

to contribute to application, advancement and impartment of knowledge in the field of microbiology

- To impart basic understanding on molecular and cellular mechanism of all living organisms including industrially important microorganisms.

Programme Outcomes

PO-1: Grasp of basic and advanced knowledge on various domains of Microbiology.

PO-2: Ability to integrate technologies through an inter-disciplinary learning habit.

PO-3: Demonstrate an independent thinking ability.

PO-4: Ability to communicate effectively.

PO-5: Equipped with laboratory skills in microbiology.

PO-6: Awareness of the impact of biosolutions in a global, economic, environmental, and societal context.

PO-7: Understanding of professional and ethical responsibility.

PO-8: Ability to design and conduct experiments, as well as to analyze and interpret scientific data.

PO-9: Awareness of contemporary issues that can be mitigated or supported through life science know how and industrial microbiology skills.

PO-10: Recognition of the need for, and an ability to engage in life-long learning.

Program Educational Objectives

The Program Educational Objectives (PEOs) for the M.Sc. Industrial Microbiology program describe accomplishments that post graduates are expected to attain within two years after post graduation:

PEO-1: To exhibit ability to pursue careers in the industry, agriculture, and applied research where microbial systems are increasingly employed.

PEO-2: To address the increasing need for skilled scientific manpower, contributing to application, advancement and impartment of knowledge in interdisciplinary areas related to industrial Microbiology.

PEO-3: To exhibit excellent professional skills, communication skills and ethical attributes as an effective team member. in a competitive global environment

PEO-4: To demonstrate right mixes of innovative ability, equipped with entrepreneurship abilities contributing to self and national development.

PEO-5: The post graduates will be cognizant and responsive to the societal needs and will possess the initiative and critical acumen required to continuously improve their knowledge through life long learning.

SRI VENKATESWARA UNIVERSITY::TIRUPATI

DEPARTMENT OF MICROBIOLOGY

M.Sc. INDUSTRIAL MICROBIOLOGY PROGRAMME

SEMESTER – I

Sl. No.	Components of Study	Course code	Title of the course	Credit hours/ week	No. of Credits	IA	SEEM	Total Marks
1	Core-Theory	IMB-101	Introductory Microbiology	6	04	20	80	100
2	Core-Theory	IMB-102	Microbial Physiology	6	04	20	80	100
3	Compulsory Foundation	IMB-103	Biochemistry	6	04	20	80	100
4	Elective Foundation	IMB-104	Biophysics and Biostatistics	6	04	20	80	100
5	Practical-I	IMB-105	Introductory Microbiology & Microbial Physiology	6	04	-	100	100
6	Practical-II	IMB-106	Biochemistry & Biophysics and Biostatistics	6	04	-	100	100
Total				36	24	80	520	600
7	Audit Course** (Self-Study)		**Human and Professional Ethics - I**	0	-	100	-	-

SEMESTER – II

Sl. No.	Components of Study	Course code	Title of the course	Credit hours/ week	No. of Credits	IA	SEEM	Total Marks
1	Core-Theory	IMB-201	Molecular Biology	6	04	20	80	100
2	Core-Theory	IMB-202	Recombinant DNA technology	6	04	20	80	100
3	Compulsory Foundation	IMB-203	Immunology	6	04	20	80	100
4	Elective Foundation	IMB-204	Medical Microbiology	6	04	20	80	100
5	Practical-I	IMB-205	Molecular Biology and Recombinant DNA Technology	6	04	-	100	100
6	Practical-II	IMB-206	Immunology and Medical Microbiology	6	04	-	100	100
Total				36	24	80	520	600
7	Audit Course** (Self-Study)		**Online Courses from MOOS/ NPTEL**	0	-	100	-	-

SEMESTER – III

Sl. No.	Components of Study	Course code	Title of the course	Credit hours/ week	No. of Credits	IA	SEEM	Total Marks
1	Core-Theory	IMB-301	Basics of Industrial Microbiology	6	04	20	80	100
2	Core-Theory	IMB-302	Bioprocessing of Industrial Microorganisms	6	04	20	80	100
3	Generic Elective	IMB-303	a) Pharmaceutical Microbiology b) Downstream Processing	6	04	20	80	100
3	Practical	IMB-304	Basics of Industrial Microbiology and Bioprocessing of Industrial Microbiology	6	04	-	100	100
4	Skill Oriented Course	IMB-305	Industrial Food Microbiology	6	04	20	80	100
5	Open Elective	IMB-306	a) Computational Biology b) Industrial Biotechnology	6	04		100	100
Total				36	24	80	520	600
7	Audit Course** (Self-Study)		**Online Courses from MOOS/ NPTEL**	0	-	100	-	-

SEMESTER – IV

Sl. No.	Components of Study	Course code	Title of the course	Credit hours/ week	No. of Credits	IA	SEEM	Total Marks
1	Core-Theory	IMB-401	Animal and plant cell culture	6	04	20	80	100
2	Core-Theory	IMB-402	Industrial based Microbial clean technology	6	04	20	80	100
3	Generic Elective	IMB-403	a) Industrial production of Microbial product b) Industrial Microbial Technology	6	04	20	80	100
3	Practical	IMB-404	Animal and plant cell culture and Industrial based Microbial clean technology	6	04	-	100	100
4	Project Work	IMB-405	Field Trip/ Industrial Tour Report / Dissertation	6	04	20	80	100
5	Open Elective	IMB-406	a) Bioethics, Biosafety and Intellectual property rights b) Microbial Production of Alcoholic beverages.	6	04		100	100
Total				36	24	80	520	600
7	Audit Course** (Self-Study)		**Online courses from MOOCs / NPTEL**	0	-	100	-	-

- All CORE Papers are Mandatory
- Generic Elective - Choose any one
- Project Work –In house/Research institutes, National laboratories, Central Universities
- Multi-disciplinary course is Mandatory.
- Skill based course Mandatory
- Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study
- Interested students may register for MOOC with the approval of the concerned DDC

FIRST SEMESTER

IMB - 101: INTRODUCTORY MICROBIOLOGY

Course Learning Objective

1. To provide information on Microscopy and staining materials that helps to observe microorganism.
2. To provide detailed knowledge on Isolation, cultivation and enumeration of microorganisms.
3. To provide in that knowledge about classification and taxonomy of microorganisms.
4. To information on prokaryotic eukaryotic microorganisms.

UNIT – I

History and Scope of Microbiol–gy - Discovery of microorganisms and development of microbiol–gy - Contributions of pioneers- Prokaryotic and Eukaryotic microorgani–ms - Origin and evolution of microorganisms. Distinguishing of different microorganisms-Scope and relevance of Microbiol–g dentture of Microbiology.

Microbial Struct–re - Microscopy – principles and applications of light microscope-Bright field- Dark-field, Phase – contrast, Fluorescent, Scanning and Transmission electron microscopes, Confocal microscopy, Scanning tunneling microscope. Preparation of microbiological samples for microscopy-simple and differential staining, special and structural staining. Negative contrast staining for virus samples. Preparation of tissues for thin sectioning (fixation, dehydration, infiltration, embedding and sectioning).

Physical and Chemical methods of sterilization and disinfection : Heat, radiation, pH, atmospheric pressure, filters, various chemical agents, safety precautions. The concept of containment facility.

UNIT – II

Microbiological media: Types of media-natural and synthetic; autotrophic, heterotrophic and prototrophic media; basal, defined, complex, enrichment, selective, differential, maintenance dentify port media.

Isolation, cultivation and enumeration of microorganisms : Isolation from different natural sources. Approaches for obtaining pure cultures. Cultivation of aerobes and anaerobes. Continuous, batch, synchronous broth and stock cultures. Enumeration / measurement of growth of microorganisms.

Maintenance and preservation of microbial cultures : Repeated sub-culturing, sterile soil/sand preservation, glycerol-deep freezing, oil overlay, drying methods, freeze-drying.

UNIT-III

Microbial Taxonomy: Classification of microorganisms – introduction – Hackel's three kingdom concept – Whittaker's five kingdom concept – three domain concept of Carl Woese. Basis of microbial classification. Concepts, nomenclature and taxonomic ranks; major characteristics used in Taxonom dentify tryical, physiological and metabolic, ecological, numerical taxonomy; genetic and molecular classification systems; the kingdoms of organisms and phylogenetic trees. Characteristics of prokaryotes and eukaryotic cells.

UNIT – IV

Prokaryotic microorganisms:

Brief outlines on discovery, nature, origin, evolution, morphology and structure, composition, reproduction and other characteristics of Bacteria (Eubacteria) Spirochetes, Rickettsias, Chlamydias, Pseudomonads, Acetic acid bacteria, Mycloplasmas, Cyanobacteria, Archaebacteria, Actinomycetes (Actinobacteria).

Eukaryotic microorganisms:

Fungi : Classification, structure, composition, reproduction and other characteristics of fungal divisions – *Zygomycota, Ascomycota, Basidiomycota* and *Deuteromycota* and slime and water molds. General characteristics and importance of fungi – *Saccharomyces, Candida, Pichia, Pencillium, Neurospo dentify opus, Aspergillus, Agaricus, Cryptococcus, Fusarium, Trichoderma, Claviceps.*

Algae : Classification, structure, reproduction and other characteristics of algal divisions. Characteristics of *Chlorella, Senedesmus, Gelidiella* and *Gracellaria.* Economic importance of algae, phytoplantanic microalgae.

Protozoan parasites : Classification, morphology and structure, reproduction and other characteristics of pathogenic protozoa like *Entamoeba, Plasmodium, Leishmania, Cryptosporidium, Trichomonas, Taxoplasma, Trypanosoma, Giardia.*

Courses Learning Out Comes

1. Be able to know the microbial structure, sterilization disinfection techniques.
2. Be able to know they maintain and preservation of microbial culture.
3. Be able to know nomenclature taxonomic read and major characteristics uses in taxonomy.
4. Be able to know the discovery, classification, structure and importance of Prokaryotic, fungi, algae and protozoa.

Suggested Books:

1. Brock Biology of Microorganisms. 199^{7,} 8th ed. Madigan et al., Prentice-Hall International, Inc.
2. Microbiology. 199$^{9.}$ 3rd ed. Prescott et al. Wm. C. Brown Publ.
3. Principles of Microbiology. 199$^{7.}$ 2nd ed. R.A. Atlas. Wm.C. Brown. Publ.
4. Foundations in Microbiology. 199$^{6.}$ 2nd ed. K. Talaro and A. Talaro. Wm. C. Brown Publ.
5. Microbiology. 199$^{6.}$ 5th ed. Pelczar et al. Tata McGram-Hill Publ. Company Ltd.
6. General Microbiology, 1999 by S.B. Sullia, Oxford and IBH Publishers.
7. General Microbiology, 1999 by Stainer et al., Macmillan Educational Ltd.
8. Instant Notes in Microbiology. 1999. J. Nicklin et al. Viva Books Pvt. Ltd.
9. Microorganisms, Biotechnology and Disease : Students Book. 1997 by Pauline Lourie and Susanwells. Cambridge University Press.
10. Introductory Mycology. 199$^{6.}$ 4th ed. Alexopoulos et al., John Wiley and Sons.
11. Introductory Psychology by H.D. Kuma$^{r.}$ 2nd ed. 1999. East West Press.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	2	2	2	2	1	1	-	-	-	1	1
CO_3	3	2	1	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB - 102: MICROBIAL PHYSIOLOGY

Course Learning Objective

1. To provide insights in to nutrition, microbial growth.
2. To know concepts of biogenetics, photosynthesis and carbon metabolisms.
3. To provide in depth information about aerobic and anaerobic respiration and lipid metabolism.
4. To provide detailed information on protein, nucleic acid, secondary metabolisms.

UNIT – I

Nutrition : Elemental nutrient requirements of microbes; nutritional groups of bacteria; autotrophy-photoautotrophy and bacterial photosynthesis; chemoautotrophy and autotrophic metabolism; heterotrophy – photoheterotrophy and chemoheterotrophy, heterotrophic metabolism in bacter dentify tonal mutants and their use in metabolic studies.

Uptake and Transport of nutrients in microbes – Structural organization of plasma membrane in relation to transport, types and mechanisms of transport (passive, simple, facilitated, active, chemical modification) with reference to sugars, amino acids and ions; methods for studying of transport, coupling of transport of ions and metabolites to ATP/proton gradient.

Microbial Growth: building of macromolecules from elemental nutrients, supramolecules, cell components and cells; cell cycle in microbes and generation times; batch culture phases and importance of each phase, continuous cultures, synchronous culture, factors influencing the microbial growth.

Nature and properties of spores – Physiology and biochemistry dentify tion and germination of spores.

UNIT – II

The concepts of microbial metabolism, primary and secondary metabolism and their significance.

Bioenergetics: Concepts of free energy and thermodynamic principles in biology, energy transformation, ATP cycle, standard free energy of hydrolysis of phosphate compounds, energy transducers, redox potentials, free energy changes in redox reactions.

Photosynthesis: Oxygenic and anoxygenic photosynthesis, photosynthetic pigments, basic photochemistry of PS I and PS II and photosynthetic electron transport; modes of CO_2 fixati dentify tryrial photosynthesis, sulphur, nitrogen and iron assimilating bacteria. Chloroplast mediated electron transport; chemolithotrophic electron transport systems. Biolumenescence.

Carbohydrate metabolism : Pathways underlying the utilization of different sugars (EMP, ED, HMP and phosphoketolase) in microorganisms, gluconeogenesis; synthesis of peptidoglycans and glycoproteins.

UNIT – III

Aerobic respiration : TCA cycle – intracellular location and reactions of the cycle, amphibolic nature of the cyc dentify tics of the cycle; the glyoxalate cycle. Mechanisms of substrate-level phosphorylation; respiratory electron transport in mitochondria and bacteria along with its components (carriers); mechanism of oxidative phosphorylation, uncouplers, inhibitors;

Anaerobic respiration : nature of fermentation, the relationship of oxygen to growth and fermentation, biochemical mechanisms of lactic acid, ethanol, butanol, citric acid and acetone fermentations, study of fermentations, relationships between fermentation and energy production; nitrate and sulphate respiration.

Lipid metabolism: Biosynthesis of triacyl glycerols, phospholipids and glycolipids; oxidation of saturated and unsaturated fatty acids; microbial metabolism of aromatic and aliphatic hydrocarbons.

UNIT – IV

Protein metabolism: Assimilation of inorganic nitrogen and sulphur, biochemistry of nitrogen fixation; hydrolysis of proteins-exo-and endo-proteinases, outlines of biosynthesis and catabolism of amino acids in microbes (deamination, decarboxylation and transamination reactions). Urea cycle.

Nucleotide metabolism : biosynthesis of bases, nucleosides and nucleotides including deoxyribonucleotides, regulation of nucleotide synthesis; break down of nucleic acids – exo-and endo-nucleases (RNases and DNases) and phosphodiesterases, salvage pathways; catabolism of purines and pyrimidines.

Secondary metabolism: Utilization of secondary metabolites for production of vitamins, toxins (aflotoxin and corynebacterial), hormones (GA), and antibiotics (penicillin and streptomycin).

Microbial toxins and extra cellular enzymes: Exo-and endotoxins: physiology of toxin production; mode of action of toxins and extra cellular enzymes and their importance in pathogen virulence and pathogenesis.

Course Learning Out Comes

1. Be able to know about the nutrition and microbial growth.
2. Be able to know about photosynthesis and carbon.
3. Be able to know in depth details about aerobic and anaerobic respiration.
4. Be able to know in depth about various pathways in protein and nucleotide metabolisms.

Suggested Books:

1. Microbial Physiology and Metabolism. 1995, by D.R. Caldwell. Wm.C. Brown Publ.
2. Microbial Physiology. 199[9,] 3rd Ed. by A.G. Moat & J.W. Foster. Wiley-Liss.
3. Principles of Biochemistry. Lehinger. 2000.
4. Foundations in Microbiology. 1996. by K. Talaro & A. Talaro, Wm. C. Brown Publ.
5. Microbiology. 2000. By Prescott et al. Wm. C. Brown Publ.
6. Molecular Cell Biology. 2000 – by Lodish et al.
7. General Microbiology, 1999 by Stainer et al., Macmillan Educational Ltd.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	2	2	1	2	1	1	-	-	-	1	1
CO_3	3	1	1	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB – 103: BIOCHEMISTRY

Course Learning Objective

1. To provide basic concepts of chemistry in life.
2. To provide in depth information lipids and amino acids.
3. To provide in depth information on proteins and catalytic proteins.
4. To provide in depth information in nucleic acids, hormones and vitamins.

UNIT – I

Basic concepts of Chemistry of life : The major elements of life and their primary characteristics; atomic bonds and molecules – bonding properties of carbon, covalent and non-covalent bonds, Vander waals forces; polarity, hydrophilic and hydrophobic interactions; asymmetry of carbon compounds and cis-trans isomerism; electron transfer and oxidation/reduction; functional groups of organic compounds; hydrogen ion concentration of biological systems; Brownsted – Lowry acids and bases; ionization and titration of acids; dissociable biological compounds and physiological buffer systems.

Carbohydrates : Classification of carbohydrates; outline structure and properties of important mono-, di- and oligosaccharides and their identification and analysis; structure, occurrence and biological importance of structural polysaccharides (cellulose, chitin, agar, alginic acids, pectins, proteoglycans, sialic acids, blood group polysaccharides, bacterial cell wall polysaccharides).

UNIT – II

Lipids: Building blocks of lipids. Classification of lipids. Fatty acids-physico-chemical properties, separation, distribution in nature characterization and saponification and iodine number. Nomenclatu dentifyline structures, properties and functions of glycerides, neutral lipids (waxes, fats,

oils, phospholipids, sphingolipids and glycolipids. Steroids – plant sterol, ergosterol, stigmasterol, cholesterol. Lipoproteins-classification, composition and importance. Salient features of bacterial lipids.

Amino acids : Classification, structu dentisico-chemical properties, acid-b dentifyiour of amino acids.

Peptides : Characteristics of peptide bond, peptides of non-protein origin, properties and functions of peptides, determination of amino acid composition and sequence in peptides, chemical synthesis of peptides, peptides profiling.

UNIT – III

Proteins : Classification, properties and biological functions of proteins; structural organization of proteins – primary, secondary, tertiary and quaternary; Ramachandran's plot; proteins denaturation and renaturation (ribonuclease); structure-function relationships of certain proteins – myoglobin, hemoglobin, collagen; chaperones.

Catalytic proteins(enzymes) : Classification, nomenclature, composition and structure, enzymes as biocatalysts, outlines of purification and assay of enzymes, kinetics of enzyme catalyzed reactions, factors influencing enzyme catalyzed reactions, regulation of enzyme activity – activators and inhibitors dentify nism of action of enzymes (chymotrypsin). Regulatory enzymes – allosteric enzymes. Isoenzymes, conzymes, ribozymes, abzymes.

UNIT – IV

Nucleic acids : Types and their composition, structures of purines, pyrimidines, modified bases, nucleosides, nucleotides and polynucleotides; properties of bases and functions of nucleotides; types and structural polymorphism of DNA and RNA; denaturation and renaturation of nucleic acids, factors influencing hybridization, cot values.

Hormones and Growth regulators : Classification, outline structures and functions of major animal and plant hormones.

Vitamins : Discovery and outline chemistry of fat soluble (A,D,E and K) and water soluble (riboflavin, pantothenic acid, niacin, pyridoxine, biotin, cobalamine folic acids and ascorbic acid) vitamins and their role in body functions.

Porphyrins and other pigments : Classification, structures and biological functions of porphyrins, brief account of haemoglobin and chlorphylls, cytochromes, xanthophylls and carotenoids of microorganisms.

Course Learning Out Comes

1. Be able to identify and analyze carbohydrates and lipids.

2. Be familiar with behavior of amino acids and structure functional relationships of proteins and their profiling.
3. Be able to Isolation centrifugation, Electrophoresis.

Suggested Books:

1. Principles of Biochemistry, Lehninge[r,] 3rd edition, 2000 by Nelson and Cox (Worth).
2. Biochemistry, Stry[er] 5th edition, W.H. Freeman, 2001.
3. Microbial Physiology and Metabolism. 1995, by D.R. Caldwell. Wm.C. Brown Publ.
4. Microbial Physiology. 199[9,] 3rd ed. By A.G. Moat & J.W. Foster. Wiley-Liss.
5. Foundations in Microbiology. 1996. By K. Talaro & A. Talaro, Wm. C. Brown Publ.

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	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
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CO_2	3	2	1	2	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	1	-	-	-	1	1

IMB – 104: BIOPHYSICS & BIOSTATISTICS TECHNIQUES

Course Learning Objective

1. Gives in sights on electrochemical and spectroscopy concepts.
2. Provide in depth knowledge on separation techniques such as centrifugation, electrophoresis and chromatography.
3. Give detailed information on interval date, proportion data and count data.
4. Provide knowledge on statistical basis of biological assays and design of experiments.

UNIT – I

Electrochemcial techniques (Principles and applications): Redox reactions; pH and Clarke oxygen electrodes; biosensors.

Cell sorting and Flow cytometry (Principles and applications):

Radioisotope techniq–es - Nature and types of radioactivity, half-life of isotopes; detection and measurement of radioactivity-GM counter, liquid scintillation counter, gama-ray counter, Cerenkov counting and autoradiography; quenching and quench correction; laboratory safety measures in handling isotopes; biological uses of radioisotopes.

Spectroscopy : Electromagnetic spectrum of light; simple theory of light absorption by biomolecules; Beer's – Lambert law; transmittance; extinction co-efficient; light sources; monochromators; types of detectors; working principle and applications of visible, UV-visible, IR, Raman, ESR, mass, plasma emission, atomic absorption, and NMR spectrophotometry; fluorimetry and flame photometry; ORD and CD; X-ray diffraction and X-ray crystallography.

Amino acid and nucleotide sequencers: Basic principle, functioning and applications of amino acid and nucleotide sequencers.

UNIT – II

Centrifugation: Simple theory of preparative and analytical centrifuges and rotors; sedimentation analysis; differential, rate-zonal and equilibrium density gradient centrifugations. Applications – isolation of cells, subcellular organelles, viruses and macromolecules.

Electrophoresis (Principles and applications) : Types of electrophoresis – paper, gel (star dentify mide and agarose) disc, vertical, horizontal submarine, gradient, 2-dimentional, pulse-field and capilla dentifsing; isolation and analysis of gel separated molecules – recovery of molecules from paper/gels; Southern, Northern and West dentifyings.

Chromatography: Principle/simple theory and applications of partition, adsorption, ion-exchange, gel permeation and affinity chromatography based techniques – paper, thin-layer, column, GLC, HPLC, FPLC.

UNIT – III

Introduction: Definition of statistics: population and universe, the sample and population, statistical inference; parameter and statistics.

Interval Data: Mean, mode, median and standard deviation. Concept of probability – classical and frequency definitions; axiones of probability; addition and multiplication theorems (statements only); conditional probability-Baye's theorem (statement only); simple applications. Binomial, Poisson and Normal distributions (definitions and uses only).

Uncertainties in estimation of mean, comparison of means and variances – t, F, and Z tests.

Proportion data: examples of proportion data; (MPN, sterility testing of medicines, animal toxicity, therapeutic trial of drugs and vaccines, animal toxicity, infection and immunization studies) statistical treatment to proportion data. Chi-square test, goodness of fit.

Count data: examples of count data (bacterial cell count, radioactivity count, colony and plaque counts) statistical treatment to count data: Poisson distribution, standard error, confidence limits of counts.

UNIT – IV

Analysis of variance: Analysis of variance: Introduction, procedure and tests for one-way and two-way classified data. Multiple comparisons. Analysis of CRD, RBD and LSD. Factorial experiments- main effects and interaction in a 2^2 design, Duncan's Multiple Range Test.

Correlation and regression, formulae and application. Fitting straight line through a series of points. Fitting of exponential curves. Standard curve and interpolation of unknown Y-values. Multiple linear regression, logistic regression.

Statistical basis of biological assays: Response-Dose metameter. Delusion Assays, Direct and indirect assays. Quantal Responses, Probit, logit, LD_{50}, ED_{50}, PD_{50} – Standard line interpolation assay, parallel assay (4 point, 6 point assays), slope ratio assay.

Design of Experiments – Multiple comparison tests, Dunken's, Tukey's, Scheffic's, Dunnelt's etc.

Probit Analysis

Multiple Regression, Logistic regression

Discriminate Analysis

Clinical trails – Phase I, Phase II etc.

Clinical trails (meaning and importance only).

Course Learning Out Comes

1. Be able to know the principal function and applications of spectroscopy, amino acid nucleotide sequences.
2. Be able to know principle, function and applications of separation techniques.
3. Be able to gain knowledge on basic concepts in statistics.
4. Be able to design the experimental and statistical basics of biological assays.

Suggested Books :

1. Practical biochemistry : Principles and Techniques 199^{5,} 4th Ed. by K. Wilson and J. Walker, Cambridge University Press.
2. Modern Experimental Biochemistry. 199$^{3.}$ 2nd Ed. by R.F. Boyer. The Benjamin Cummings Publ. Company.
3. Physical Biochemistry : Applications to Biochemistry and Molecular Biology, 198^{2,} 2nd Ed. by David Freifelder. W.H. Freeman and company.
4. Introduction to Practical Biochemistry. 2000. by S.K. Sawhney and Randhir Singh (eds). Narosa Publ. House.
5. Biochemical Methods for Agricultural Sciences. 1992 by S. Sadasivam and A. Manikam. Wiley Eastern Ltd.

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CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	2	2	2	2	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

PRACTICAL:

IMB – 105: INTRODUCTORY MICROBIOLOGY & MICROBIAL PHYSIOLOGY:

1. Microbiological laboratory safety measures
2. Sterilization methods - Wet method, Dry method, Filters. Evaluation of alcohol effectiveness, Phenol coefficient method
3. Preparation of different media for cultivation of bacteria & fungi
4. Plating techniques – streak plate, spread plate methods
5. Enumeration of Bacteria by serial dilution, viable count
6. Qualitative tests for identification of Carbohydrates, amino acids, nucleic acids
7. Quantitative tests for Protein, gluco dentifcine, bilirubin, cholesterol, Inorganic phosphorous
8. Determination of activity of – Peroxidase and Polyphenol oxidase in plant tissues.
9. Purification and study of Acid Phosphatase from potato tubers: Extraction of enzyme; effect of substrate concentration; enzyme concentration; temperature; pH on enzyme activity.
10. Determination of Bacterial growth curve
11. Determination of effect of temperature on bacterial growth
12. Determination of effect of pH on bacterial growth
13. Determination of effect of salt on bacterial growth
14. Determination of growth of fungi
15. Determination of concentration of cyanobacterial pigments
16. Determination of concentration of oligodynamic action
17. Determination of activity of microbial hydrolytic enzymes like amylases, lipases and proteases.
18. Demonstration of aerobic and anaerobic respiration in microbes.
19. Demonstration of Microbial fermentation
20. Demonstration of microbial toxins

PRACTICAL:

IMB – 106: BIOCHEMISTRY & BIOPHYSICS AND BIOSTATISTCS:

1. calculating Mean, Mode Median
2. Problems related to T test & F test & Z test
3. Problems related ANOVA
4. Measurement of pH
5. Micrometry for cell size determination
6. Cell counting by Haemocytometer
7. Beer's Law
8. Determination of λ max for coloured solutions
9. Determination of DNA & RNA by UV spectrophotometry
10. Determination of nucleic acid Bases by UV spectrometry
11. Paper chromatography for separation of amino acids / pigments
12. TLC for separation of lipids / amino acids
13. Dialysis
14. Separation of proteins by SDS-PAGE
15. Separation of DNA by Agarose gel electrophoresis
16. Isolation of chloroplasts by sucrose density gradient centrifugation
17. Determination of concentration of green/yellow pigments by spectrophotometry

SECOND SEMESTER

IMB - 201: MOLECULAR BIOLOGY

Course Learning Objective

1. Gives basic concepts in genetics of bacteria and fungi
2. Provides in depth knowledge on genetic recombination
3. Gives overall picture about DNA replication and transcription
4 .Provides in depth information about RNA biosynthesis and gene regulation

UNIT – I

Genetic notations, conventions and terminology

Nucleic acids as genetic information carriers – experimental evidences.

Modern concept of gene – Gene structure, co-linearity and polypeptide, one gene – one enzyme, protein polypeptide or product concepts; types of genes.

Genetics of Bacteria and Fungi : *E. coli, Bacillus, Streptomyces, Sacchromyces,* Filamentous fungi *(Neurospora).*

Gene transfer mechanisms in bacteria : Transformation, conjugation, sexduction and transduction (generalized, abortive, contrasduction, specialized,) and gene mapping. Role of Rec gene products.

Genome diversity : Viruses – linear, circular and dividend genomes of RNA and DNA viruses. Prokaryotes – nucleoid and chromosome organization, genome evolution in microbes, phylogenetic trees. Eukaryotes – chromosome organization / structure, histones, nucleosomes, genome complexity, chromosomal banding. Organelle genomes. Genetic mapping of genomes.

Plasmids : bacterial and yeast plasmids, purification, properties, detection, transfer, replication an curing, significance / importance.

Transposal / mobile genetic elements : Prokaryotes – (IS elements, composite and complex transposons), mechanisms of transposition and importance – Eukaryotes (Yeast, Drosophila and Maize) – retrotransposons, retroelements. Exploitation of transposable elements in genetics.

UNIT – II

Mutations : Types, mutagens and molecular mechanisms of mutation, isolation and analysis of mutants, significance of mutants.

Genetic recombination: General of homologous recombination, site specific recombination, transposition; illegitimate recombination and artificial recombination.

Genetics of viruses : Prokaryotic virus (phages) – Benzer's studies on r-II region of T4 and complementation, recombination in bacteriophages (T2), uses of phages in microbial genetics, Eukaryotic viruses-recombination and reassortment, cross-and multiplicity reactivation, complementation, phenotypic mixing, ploidy, DI particles, transduction of genes by retroviruses, evolution of viruses (influenza, HIV, herpesviruses).

UNIT-III

DNA replication : general principles, various modes of replication. Continuous and discontinuous synthesis, relation between cell cycle and DNA synthesis, replication fork and enzymology of DNA replication in prokaryotes and eukaryotes, replication of ssDNA, retroviruses and their unique mode of DNA synthesis, inhibitors of DNA replication.

DNA damage and repair : types of DNA damage-deamination, oxidative damage, alkylation and pyrimid dentifmers; repair pathways – mismatch, short patch repair, nucleotide/base, excition repair, recombination repair and SOS system.

Transcription (RNA biosynthesis) : Types of RNA and their role, organization of protein and RNA (rRNA, tRNA, 5 sRNA) encoding transcription units (promoters and regulatory elements) and their transcription in prokaryotes and eukaryotes, polycistronic and monocistronic mRNAs. Types of RNA

polymerases. Promoters and other regulatory elements and transcription factors, events of transcription. Maturation and processing of different RNAs : methylation, processing of rRNA; capping, polyadenylation, splicing and editing of mRNA; processing and modification of tRNA. Catalytic RNAs (ribozymes). Inhibitors of transcription. Invitro transcription systems.

UNIT – IV

Translation (Protein biosynthesis) : Central dogma theory and flow of genetic information, genetic code and its elucidation, structure and composition of prokaryotic and eukaryotic ribosomes, structural features of rRNA, mRNA and tRNA in relation to function, steps of protein biosynthesis (activation of amino acids, initiation, elongation, termination) in prokaryotes and eukaryotes; post-translational modification of proteins and their sorting and targeting; regulation of translation; inhibitors of protein biosynthesis; invitro translation systems.

Regulation of gene expression : An overview on levels of regulation, terminology and operon concepts, enzyme induction and repression; positive and negative regulation in *E. coli*- lac and ara operons; regulation by attenuation – his and trp operons; antitermination – N protein and nut sites in Lambda phage. Organization and regulation of nif and nod gene expression in bacteria; gal operon in yeast. Global regulatory responses-heat shock response, stringent response and regulation by small molecules such as cAMP and PPGPP.

DNA binding proteins : Enhancer sequences and control of transcription. Identification of protein – binding sites on DNA, control of transcription by interaction between RNA polymerases and promoter region, use of alternate sigma factors, controlled termination attenuation and antitermination.

Course Learning Out Comes

1. Be able to gain knowledge on genome diversity and gene transfer mechanisms,.
2. Be able to gain information on mutations and gene transfer mechanisms
3. Be able to gain in depth-knowledge on DNA and biosynthesis
4. Be able to understand about positive and negative gene regulation

Suggested Books:

1. microbial Genetics by S.R. Maloy et al. 1994
2. Molecular Genetics of Bacteri[a,] 3rd ed. 1998. J.W. Dale. Wiley Publ.

3. Bacterial and Bacteriophage Genetics. 4th ed. 2000. By E.A. Birge. Springer.
4. Principles of Molecular Virology. 4th ed. 2004. By A. Cann. Academic Press.
5. Modern Genetic Analysis by Griffith.
6. Genetics by Gardner.
7. Molecular Cell Biology. 1995, 3rd Ed. by Lodish et al. Scientific American books, W.H. Freeman and Company.
8. Molecular Biology. 1995, by David Freifelder, Narosa Publ. House.
9. Text Book of Molecular Biology. 1994, by Sivarama Sastry et al, Macmillan India Ltd.
10. Advanced Molecular Biology : A Concise Reference. 1998, by R.M. Twyman. Viva Books Pvt. Ltd.
11. Instant notes in Molecular Biology, 1998. by P.C. Turner et al. Viva Books Pvt. Ltd.
12. Genes VIII. 1997. by B. Lewin. Oxford University Press. The Biochemistry of nucleic acids. 1992, 11th Ed. by Adams et al, Chapman and Hall.
13. Biochemistry. 1995 by L. Stryer. W.H. Freeman and Co.Biochemistry, 1998, 4th Ed. by G.L. Zubay. W.C.B. Publ.
14. Microbial Genetics. 1995, by David Freifelder. Narosa Publ. House.
15. Biochemistry and Molecular Biology. 1997, by W.H. Elliott & D.C. Elliott. Oxford University Press.
16. Molecular biology of the Gene. 1998, 5th ed. Watson et al, Addison Wesley Longman.
17. Schaums Outlines – Molecular and Cell Biology. 1996. W.D. Stansfield et al., McGraw-Hill Publ.

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CO_2	3	2	2	2	2	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB - 202: RECOMBINANT DNA TECHNOLOGY

Course Learning Objective

1. Gives basic concepts in genetic engineering tools
2. Provides in depth knowledge on molecular tools
3. Gives overall picture about transgenics
4. Provides in depth information about proteome and genomes microbiology

UNIT – I

Scope and importance of recombinant DNA technology / genetic engineering.

Genetic Engineering tools : Vectors- types, plasmids, transposons, bacterial and animal virus based vectors, bacterial and yeast artificial chromosomes; **enzymes-**restriction endonucleases, different DNA and RNA polymerases ligases, nucleases, kinases, nucleotidyl transferases, alkaline phosphatase; **oligonucleotides-** linkers, homopolymer tails, primers, promoters; **cloning and expression hosts –** *E.coli Bacillus, Agrobacterium,* yeast and plant and animal cell cultures.

Cloning strategies : Generation of DNA molecules, attachment to vectors, delivery of recombinant molecules into host cells, screening and identification of positives clones – antibiotic, nucleic acid and protein based approaches. Construction and screening of cDNA and genomic DNA libraries.

UNIT – II

DNA sequencing : Chemical method of Maxum and Gilbert, Sanger's dideoxy chain termination and primer walking methods. Automated sequencing. Sequence assembly. Genome sequencing and physical mapping of genomes.

Site-directed mutagenesis : Different approaches and its potential in changing genes.

Molecular diagnostics : Preparation of DNA and RNA probes, nucleic acid hybridization, factors influencing hybridization and their applications; PCR-principles, factors affecting PCR, different types of

PCR and their applications and limitations; profiling of nucleic acids by DNA fingerprinting, RFLP, RAPD and AFLP.

UNIT – III

Transgenic plants : Construction of plant cell expression vector with desired genes, biological and physical approaches for delivering genes into plant tissues, identification and regeneration of transformed tissues to transgenics. Transgenic plants as bioreactors.

Transgenic animals : Construction of animal cell expression vectors and delivering of genes into cultured animal cells. Production and use of transgenic animals (mice, sheep/goat, cow).

UNIT – IV

Microbial genomics and proteomics : DNA microarray – printing of oligonucleotides and PCR products on glass slides. Whole genome analysis for global pattern of gene expression using fluorescent labeled cDNA or end labeled RNA. Analysis of single nucleotide polymorphisms using DNA chips. **Proteome analysis-**two-dimentional analysis of total cellular proteins, isolation and sequence analysis of individual protein spots by mass spectroscopy. Protein microarray, advantages and disadvantages of DNA and protein microarray.

Applications and implications of genetic engineering in biology, agriculture, medicine and industry.

Course Learning Out Comes

1. Be able to gain knowledge on genetic engineering tools,.
2. Be able to gain details on molecular tools
3. Be able to gain in depth-knowledge on transgenic plants
4. Be able to understand about 'omics"

Suggested Books:

1. Principles of Gene Manipulation: An introduction to genetic engineering. 199$^{4.}$ 5th ed. Old and Primrose. Blackwell Scientific Publ.
2. Molecular Biotechnology. 1994. Glick and Pasternak. Panima Publ.
3. Recombinant DNA. 199$^{2.}$ 2nd ed. J.D. Watson et al. Freeman and Co.

4. Protein expression: A Practical Approach by S.J. Higgins and B.D. Hames (eds). Oxford University Press.
5. Functional Genomics: A Practical Approach. 2000, by S.P. Hunt and R. Liveey (eds.). Oxford University Press.
6. DNA Microarrays: A Practical Approach by M. Schena (ed.). Oxford University Press.
7. Molecular biology and Biotechnology. 200$^{2.}$ 4th Ed. by J.M. Walker and R. Rapley, Panima.
8. Manual of Industrial Microbiology and Biotechnology, second edition., Ed. by Demain, A.L., Editor in Chief, 1999, ASM Press.
9. Recombinant DNA and Biotechnology: A guide for Teachers : 2nd ed. H. Kreuzer and A. Massey. ASM Press.
10. Recombinant DNA and Biotechnology: A guide to students : 2nd ed. H. Kreuzer and A. Massey. ASM Press.
11. Basic Biotechnology, 200$^{1.}$ 2nd Ed. by C. Ratledge & B. Kristiansen. Cambridge University Press.
12. Molecular Cloning, 2001. Vol. I-III by Sambrook and Russel, CSH Press.
13. Current Protocols in Molecular Biology, 2000. Ausbel et al.
14. Genome analysis. 2000. 4 Vols. CSH Press.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO$_1$ Knowledge	**PO$_2$** Analysis	**PO$_3$** Design	**PO$_4$** Development	**PO$_5$** Modern Tools	**PO$_6$** Society	**PO$_7$** Environment	**PO$_8$** Ethics	**PO$_9$** Team work	**PO$_{10}$** Communication	**PO$_{11}$** Programme Management	**PO$_{12}$** Lifelong Learning
CO$_1$	3	2	2	2	2	1	2	-	-	-	1	1
CO$_2$	3	2	2	1	2	2	1	-	-	-	1	1
CO$_3$	3	1	2	2	3	2	2	-	-	-	1	1
CO$_4$	3	2	2	2	2	1	2	-	-	-	1	1

IMB - 203: IMMUNOLOGY

Course Learning Objective

1. Give detailed information on cells and organs of the immune system.
2. Give in depth knowledge about Antigen-antibody interaction.
3. Provides the details on immune pathology.
4. Gives central concepts in transplantation and transfusion immunology.

UNIT – I

History: Historical perspective of Immunology, milestones in immunology.

Cells and Organs of the Immune system: Hematopoiesis, Lymphoid cells, stem cells, Mononuclear cells, Granulocytes, Mast cells, Dendritic cells. Lymphoid organs – Primary and Secondary lymphoid organs.

Types of immunity: Innate immunity and adaptive immunity, comparative immunity, Immune dysfunction and its consequences.

Immune responses to infectious diseases: Viral, bacterial, protozoan and other parasitic diseases.

UNIT – II

Antigens: types, properties, study of antigenicity, immunogenicity versus antigenicity, factors influencing immunogenicity. Epitopes, haptens, mitogens, superantigens. Viral and bacterial antigens.

Antibodies: Basic and fine structure of Immunoglobulins, classes and biological activities of Immunoglobulins, Antigenic determinants – Iso, allo and idiotypes. Immunoglobulin super family, antibody diversity, organization and expression of immunoglobulin genes. Production of polyclonal antibodies-animals, additives, adjuvants, routes, dose, collection and preservation of antisera, purification of immunoglobulins, quantitative and qualitative analysis of immunoglobulins.

Monoclonal antibodies: Hybridoma technology – principle and production of monoclonal antibodies, advantages and disadvantages over polyclonal antibodies, application of monoclonal antibodies.

Recombinant antibodies: Production and their advantages over conventional antibodies.

Antigen and Antibody interactions: Affinity, Avidity, Cross reactivity.

***In vivo* serological reactions:** Phagocytosis, Opsonization, Neutralization, Protection tests.

***In vitro* serological tests:** Precipitation tests in liquid and semisolid media, single and dou dentimuno diffusion tests. Immuno electrophoresis tests (Rocket, counter current). Agglutinations tests-HA and HI, latex agglutination. Complement fixation tests, Labeled antibody based tests – Enzyme linked immunosorbent assays (ELISA), Western blotting, Ra dentimuno assay (RIA), Immunoflurescent dentimuno specific electron microscopy. Infectivity neutralization test. The relative advantages and disadvantages and their applications in Microbiology.

UNIT – III

Humoral immune response: Primary and secondary immune responses, induction, regulation of the immune effector response.

Cell mediated immune response: Induction and mechanism, antibody-dependent cell mediates cytotoxicity (ADCC).

Immune effector mechanisms: Cytokines, Lymphokines, Chemokines and their classification, properties and functions.

Complement cascade system: Complements nomenclature, classification, complement components, functions, activation, regulation, biological consequences, complement deficiencies.

Hypersensitive and Allergic reactions: Classification, types I, II, III and IV.

Immunopathology : Immunodefficiencies – Primary immunodeficiency (genetic) diseases due to B cell, T-cell and combined defects (Hypogamma globulinemia, SCID, ADA) phagocyute and complement defects. Autoimmune diseases – Autoimmunity, induction, mechaniss of tissue damage in autoimmunity. Autoimmune diseases – Organ specific (Autoimmune anemias, Autoimmune thyroid diseases, Diabetes mellitus, Multiple sclerosis), Systemic autoimmune diseases (Rheumatoid arthritis, Systemic lupus erythematousus) and their therapy.

UNIT-IV

Major histocompatability complex (MHC) : Organization and Inheritance of HMC, cellular distribution of HMC molecules, regulations of HMC expression, MHC-immune responsiveness, disease susceptibility, MHC restriction, HLA antigens-Class I, II, III and their functions, Murine antigens and its functions.

Transfusion Immunology : Blood cell components, blood group systems in human and in animals, Rh typing, transfusion reactions, diseases associated with blood transfusion – Hemolytic anemi dentify osis featalis.

Transplantation Immunology : Transplantation antigens, types of transplants, Graft versus host reactions – immunological basis of graft rejection mechanism, prevention of graft rejection, clinical manifestations of graft rejection, Immunosuppressive therapy of allograft response, clinical transplantation.

Tumor immunology : Cancer and the Immune system, tumor specific antigens, tumors of the immune system, immune response to tumors, cancer immunotherapy.

Vaccinology : Type of immunization procedures, active and passive immunization, designing of vaccines, classical and novel/modern approaches for the production of vaccines, purified macromolecules as vaccines, Recombinant – vector vaccines, DNA vaccines, Synthetic peptide vaccines, Multivalent sub-unit vaccines, uses of vaccines, benefits of vaccination, mass immunization programmes.

Course Learning Out Comes

1. Able to describe immunology basics.
2. Able to theoretical principles of invitro selogical tests.

3. Able to explain allergic reactions.
4. Able to explain immunization procedure and immunization programmes.

Suggested Books:

1. Immunology. 200$^{0.}$ 4th edition. J. Kuby. W.H. Freeman and Company.
2. Immunology. 199$^{6.}$ 4th edition. I. Roitt, J. Brostoff and David Male. Mosby publications.
3. Fundamental Immunology. 199$^{2.}$ 2nd edition. R.M. Coleman, M.F. Lombard and R.E. Sicard. Wm. C. Brown Publishers.
4. Immunology. 199$^{7.}$ 3rd edition. R.M. Hyde. B.I. Waverly Pvt. Ltd.
5. Immunology. 199$^{5.}$ 4th edition. I.R. Tizard. Saunders College Publishing.
6. Immunology – The Science of self and non-self discrimination. 1982. Jon Klein. John Wiley and Sons.
7. Immunology – An illustrated outline. 1986. David Male. Churchill Living Stone.
8. Viruses that affect immune system. 1991. H.Y. Fan, I.S.Y. chen, N. Rosenberg and W. Sugden. American Society for Microbiology.
9. Immunobiology : The immune system in health and disease, 1994. C.A. Janeway, Jr., P. Travers. Current biology Ltd.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO$_1$ Know ledge	**PO$_2$** Analysis	**PO$_3$** Design	**PO$_4$** Development	**PO$_5$** Modern Tools	**PO$_6$** Society	**PO$_7$** Environment	**PO$_8$** Ethics	**PO$_9$** Team work	**PO$_{10}$** Communication	**PO$_{11}$** Programme Management	**PO$_{12}$** Lifelong Learning
CO$_1$	3	2	2	2	2	1	2	-	-	-	1	1
CO$_2$	3	2	2	2	2	2	1	-	-	-	1	1
CO$_3$	3	2	1	2	3	2	2	-	-	-	1	1
CO$_4$	3	1	2	2	2	2	2	-	-	-	1	1

IMB - 204: MEDICAL MICROBIOLOGY

Course Learning Objective

1. Provides information on infections and pathogenesis.
2. Helps to clean chemotherapy principle.
3. Be able to explain the symptoms of bacterial infections.
4. Be able to explain the symptoms of viral, fungal and parasitic diseases.

UNIT – I

Principles of Medical Microbiology: Historical developments Classification of medically important microorganisms. Normal microbial flora of human body: Origin of normal flora; Infectious diseases.

Infection: Sources of infection for man; vehicles or reservoirs of infection. Exogenous infection: 1) Patients 2) carriers – (Healthy; convalescent; contact; paradoxical and chronic) 3) Infected animals (zoonosis) 4) Soil endogenous infection. Mode of spread of infection: 1) Respiratory 2) skin 3) Wound and burn infection 4) Venereal infections 5) Alimentary tract infection 6) Arthorpod-borne blood infections 7) Laboratory infections. Nosocomial infections: common types of hospital infections, their diagnosis and control.

Pathogenesis: Adhesion in various hosts, cell damage, release of pathogens, Transmissibility, infectivity and Virulence. Opportunistic pathogens and True pathogens. Toxigenicity: Invasiveness, other aggressins (Hyaluronidase), coagulase, fibrinolysins or kinase, depolymerizing enzymes, (mucinase, lipases, proteases, nucleases, collagenase, neuraminidase). Organotropism, variation and virulence.

UNIT – II

Microbial Toxins: Types of microbial toxins, Endotoxins, Exotoxins, LC_{50} of toxins, Effective dose of toxins, Assay of toxins, Mechanism of action of Diphtheria, Cholera, Staphylococcal toxin and Clostridial neurotoxins. Virulence and virulence factors of microbial toxins. Signs and symptoms of microbial intoxication.

Diagnostic methods: Collection, transport and preliminary processing of clinical samples. Clinical, microbiological, immunological and molecular diagnosis of microbial diseases.

Principle of Chemotherapy: Chemotherapeutic agents, Mechanism of action of antimicrobial agents, Synthetic compounds and antibiotics and their assay in body fluids, drug resistance, Mechanisms of drug resistance, MDR. Various methods of drug susceptibility testing. Brief account on available vaccines and schedules, passive prophylactic measures.

UNIT – III

Bacterial diseases: Symptoms, diagnosis , treatment and prevention of the diseases caused by *Staphylococcus, Streptococcus, Pneumococcus, Neisseria, Corynebacterium, Bacillus, Clostridium, Actinomycete, Rickettsiae, Chlamydiae, Mycoplasma, Enterobacteriacea*, *Vibrios*, *Yersinia; Haemophilus; Bordetella, Brucella; Mycobacteria, Spirochetes; Salmonella* species.

UNIT – IV

Viral diseases: Virus-host interactions at cellular and organism levels. Common diseases caused by Poxviruses; Herpes virus; Adeno viruses; Picorna viruses; Orthomyxo viruses; Paramyxo viruses; Arbo viruses, Rhabdo viruses, Hepatitis viruses; Oncogenic viruses; Human Immuno deficiency viruses (HIV/AIDS). Prion diseases – Kuru, CJD disease and GSS syndrome.

Fungal diseases: Diseases caused by dermatophytes, dimorphic fungi and opportunistic fungal pathogens. Description and classification of pathogenic fungi and their laboratory diagnosis.

Parasitic diseases: Disease caused by parasites like *Entamoeba, Plasmodium, Trichomonas, Leishmania* and *Toxoplasma, Giardia, Wuchereria, Dracunculus.*

Course Learning Out Comes

1. Be able to explain about various infections.
2. Be able to understand the diagnostic methods.
3. Be able to explain the symptoms of bacterial infections.
4. Be able to explain the symptoms of viral, fungal and parasitic diseases.

Suggested Books :

1. Ananthanarayan R, Panikar CKJ (2000). Textbook of Microbiology. 201[3.] 9th Edition. Orient Longman Ltd.

2. Warren Levinson (2014).Review of Medical Microbiology and Immunology. Mc Graw Hill education
3. bailey & Scott's (2013). Diagnostic Microbiology (13th Edition), Published by: Mosby.
4. Color atlas and Text book of Diagnostic microbiology (6th Edition), 2005, edited by: Eimer W Koneman, published by: Lippinctt.
5. Subash CP (2000). Text Book of Medical Parasitology, by published by : All India Publishers & Distributors. 1st edition.
6. Jayaran Paniker C.K, Text Book of Medical Parasitology (7th Edition), 2013, by Published by: Jaypee Brothers.
7. Cruichshank *et al.,*(2012). Manual of Clinical Microbiology, 7th Ed. by E.H. Lennette et al. ASM Publications.
8. Patrick R. Murray, Ken S. Rosenthal, Michael A. Pfaller (2012), 7th edition. Medical Microbiology. Elsevier saunders.
9. koen Venema and Ana Paula do Carmo (2015). Probiotics and Prebiotics: Current Research and Future Trends. Caister Academic Press.
10. Sergio Sánchez and Arnold L. Demain (2015). Antibiotics: Current Innovations and Future Trends. Caister Academic Press.

CO-PO Mapping Matrix/Programme Articulation Matrix

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CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	1	2	2	1	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	1	-	-	-	1	1

PRACTICALS:

IMB: –205 - Molecular Biology and Recombinant DNA Technology

Course Learning Objective

1. Gives hands on experience in important molecular methods.
2. Provides hands on experience on PCR and Recombinant DNA techniques .
3. Will gain knowledge in biosinformatics and molecular biology information

1. Isolation of Genomic DNA from microbes, plant/animal tissues.
2. Isolation of plasmids from Bacteria.
3. Curing of plasmids.
4. Competent cell preparation.
5. Bacterial transformation.
6. Bacterial transduction.
7. Bacterial Conjugation.
8. Mapping of bacterial genes by conjugation / transformation (problems).
9. Side directed mutagenesis
10. AMES test.
11. Screening and isolation of streptomycin mutant resistant bacteria by gradient plate technique.
12. Lethality curve construction.
13. Study of DNA methylation
14. Study of DNA repair
15. Invitro transcription assay
16. Setting of Genetic Engineering laboratory
17. Restriction enzyme analysis of plasmids
18. Recovery of DNA from gels – Electroelution and extraction of DNA from low melting agarose gels.
19. Southern blotting.
20. Western blotting for heterologous gene expression
21. Polymerase chain reaction
22. Induction of enzyme (Beta galactosidase) in Bacteria
23. Calculation of proportion of bases in nucleic acids, number of turns in DNA, length and Mol. Wts. of DNA, Tm values and buoyant densities of DNAs and DNA replication times

Course Learning Outcomes

1. Able perform DNA and plsmid isolations.
2. Be able to amplify the given gene.
3. Be able to gain practical knowledge about molecular tools.
4. Be able to create a chimeric molecule.
5. Be able to perform bioinformaticstools in genomics.

IMB: –206 - Immunology and Medical Microbiology

Course Learning Objective

1. Gives hands on experience in Immuno precipitation test.
2. Provides hands on experience on various ELISA methods.
3. Will gain knowledge in immunoglobulins.
4. Gives hands on experience on blood related tests.
5. Given knowledge on virus cultivation.
6. Provides hands on experience on various diagnostic tests.

1. Purification of immunoglobulins
2. Electrophoretic separation of normal and immunoserum.
3. Ouchterlony double Immuno diffusion
4. Single radial Immuno diffusion
5. Immuno precipitation test
6. Rocket Immuno electrophoresis
7. Counter current Immuno electrophoresis
8. Isolation & Identification of Rosettee cells.
9. Dot ELISA
10. Sandwich ELISA
11. Antigen Capture ELISA
12. Antibody Capture ELISA
13. ASO titre.
14. Complement fixation test
15. Widal Test
16. VDRL Test
17. Total counting of RBC & WBC
18. Differential count of WBC
19. Hemoglobin estimation
20. Latex agglutination test
21. Blood typing and Rh determination
22. Identification of pathogenic organisms based on HIV& DOT-BLOT test

23. Hanging drop experiment for bacterial motility.
24. Microbiological staining techniques – Simple, Gram negative, spore, capsular, acid fast and Lactophenol-cotton blue staining.
25. Isolation of bacteriophages from sewage water.
26. Cultivation of viruses in embryonated Chicken eggs: different routes of virus inoculation – Yolk sac, Allontoic and Chorio Allontoic Membrane (CAM).

Course Learning Outcomes

1. Able performs various immune precipitations tests.
2. Be able to perform various types of ELISA methods.
3. Be able to gain practical knowledge about immunoglobulin's and there separation.
4. Be able to perform widal, VDRL and types.
5. Be able to perform various staining procedures.
6. Be able to identify blood cell types.

THIRD SEMESTER

IMB - 301: BASICS OF INDUSTRIAL MICROBIOLOGY

Course Learning Objective

1. To give indepth information about industrially important microorganisms.
2. To prove information about recombinant molecular in pharmaceutical, health, agricultural and industrial sectors.
3. To helps to understand the role of microorganisms in various industries.
4. To gain concepts in Bioremediation.

UNIT – I

Definition and scope of Industrial Microbiology – Historical development – chronological order of outstanding scientific achievements, concepts and practices of microbiology proceeded to Industrial Microbiology.

UNIT – II

Industrially important microorganisms – Introduction to industrially important microorganisms – Bacteria, fungi, actinomycetes, microalgae, viruses – culture techniques, collection isolation, identification, maintenance of microorganisms. Generally regarded as safe (GRAS) microorganism dentifyeria, Yeasts, Filamentous fungi, Industrial strains, improvement of strains and study of strain stability.

UNIT – III

Industrial fermenters – types of fermenters, designing, operation uses and their auxiliary equipments, limitations imposed by the fermenters on the ways which microorganisms can be cultivated on an Industrial scale.

Fermentation – simple and complex media, media formulation, carbon sources, nitrogen sources, water, minerals, vitamins and growth factors, precursors, inducers and elicitors, inhibitors, cell permeability modifiers, oxygen, antifoams, animal and plant cell culture media, maintenance cell culture media.

UNIT-IV

Role of microorganisms in various industries – Food – yeast, mushroom, microalgae and food spoilage organisms. Pharmaceuticals – production of aminoacids, antibiotics, diagnostic proteins, enzymes, hormones, vaccines, vitamins and role of transformed microorganisms in pharmaceuticals. Agriculture –

Biofertilizers, biopesticides, biocontrol of microbial pathogens. Industrial enzymes-microbial enzymes, application in food, leather, textile, paper, detergent industries, role of transformed microorganisms in enzymes production. Bioremediation-pesticides, fungicides, preservatives, waste recycling, industrial effluent treatment. Dairy – important microbes in dairy and dairy products. Conventional and recombinants microorganisms involved in the production of ethanol, aminoacids, organic acids – Methanogens and methylotrops.

Course Learning Out Comes

1. Be able to assess "GRAS"
2. Be able to have clear cut about the production of recombinant molecules.
3. Be conversant with Biofertilizer, Biopesticides and microbial enzymes.
4. Be able to gain the concepts in waste recycling and industrial efficient.

Suggested Books:

1. Industrial Microbiology. 2001. M.J. Waites et al., Blackwell Science.
2. Industrial Microbiology. 1999. L.E. Casida, Jr. New Age International Publ.
3. Industrial Microbiology. B.M. Miller and W. Litsky.
4. Industrial Microbiology. 1984. A.H. Patel. Macmilan India Limited.

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CO_1	3	2	2	2	2	1	2	-	-	-	1	1
CO_2	3	2	2	2	2	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	1	2	1	2	2	2	-	-	-	1	1

IMB – 302: BIOPROCESSING OF INDUSTRIAL MICROORGANISMS

Course Learning Objective

1. Give elaborate knowledge on Health care products.
2. Provide in depth knowledge about microbial antibodies and recombinant products.
3. Provide detailed knowledge about organic acids and enzymes.
4. Gives in depth knowledge on oxidative transformation.

UNIT – I

Introduction to Bioprocesses – Historical development and scope of bioprocessing technology, traditional and modern applications of bioprocessing, intergrated bioprocess and various unit operations involved in bioprocessing (upstream and down stream), generalized process flow sheets.

UNIT – II

Fermentation processes – Aerobic and anaerobic fermentation processes and their application in the microbial industry, solid-substrate fermentation slurry fermentation and their applications, whole cell immobilization, behaviour of microbes in different reactors – air lift, fluidized, batch, continuous fed batch condition.

Fermentation media design – Design and usage of various commercial fermentation media – Thermal death kinetics of microorganisms, batch and continuous heat sterilization of liquid media – filter and air. Control of chemical and physical conditions – agitation, heat transfer, mass transfer. Fermenter control and monitoring, operating modes.

UNIT – III

Screening – Primary and secondary screening of microorganisms used in fermentation, detection and assay of fermentation products – physical and clinical assays – titration and gravimetric analysis, turbidity analysis and cell-yield determinations, spectrophotometric assays, chromatographic partition assays, GC

assays, Biological assays, diffusion assays, turbidimetric and growth assays, End-point determination assays, metabolic assays, enzymatic assays, stock cultures – working and primary stocks.

UNIT – IV

Scale-up of fermentation, increasing product yields, Dual or multiple fermentation, continuous fermentation and late nutrient additions.

Kinetics of microbial growth and product formation – Kintetic models for microbial growth, phases of cell growth in batch cultures, Microbial growth and non growth associated product formation kinetics – (Primary and secondary). Substrate and product inhibition on cell growth and product formation. Fermentation Economics-Market potential, fermentation and product recovery costs, process appraisal.

Course Learning Out Comes

1. Be able to understand the sources of microbes for the production of health care products.
2. Be able to understand Microbial products.
3. Be able to have detailed idea about organic acids and enzymes.
4. Be able to have clear idea about dairy products and fermented products.

Suggested Books:

1. Biotechnology: A text book of Industrial. Ed. W. Cruger & A. Cruger. Second Edition 2000.
2. Principles of Fermentation Technology. 1997. P.E. Stanbury et al., Pergamon Press.
3. Microbial Biotechnology: Fundamentals of Applied Microbiology. 1995. A.N. Glazer et al., Freeman and Company.
4. Fermentation: A Practical approach. 1990. B. McNiel and L.M. Harvey. IRL Press.

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CO_1	3	2	1	2	2	1	2	-	-	-	1	1
CO_2	3	1	2	2	2	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	1	2	2	2	-	-	-	1	1

IMB – 303: a) PHARMACEUTICAL MICROBIOLOGY

Course Learning Objective

1. To give information on Pharmaceutical of microorganisms
2. To know about Pharmaceutical production of various value added products
3. To provide information on Pharmaceutical Microbiology transformations
4. To provide in depth information on microbial production of recombinant molecules

UNIT – I

Animal Cell Culture: Scope of animal cell culture, principles and methodology of animal cell cultures, physical chemical and metabolic function of the constituents of culture media and reagents, primary, secondary and continuous cell lines, stem cell and embryonic cell isolation and culture, organ culture. Sub culturing, maintenance and preservation of cell cultures.

Transgenesis for improvement of traits and use of animals as bioreactors for production of proteins of pharmaceuticals value, marker assisted selection and genetic improvement of livestock, Germplasm, maintenance and Biodiversity.

Industrial importance of animal cell culture products – viral vaccines for human and animal use, production of interferon, interleukins, retroviruses and adenoviruses and produced for use in gene therapy, large scale production of Bio-Insecticides – Baculoviruses, NPV, GV, cell cultures used for diagnostic assay system, therapeutics.

UNIT – II

Plant cell culture – Embryo culture, meristem culture, callus culure, anther culture, protoplast culture, cell suspension, spore culture, protoplast isolation culture and fusion regeneration and somatic hybridization and regeneration of plants.

Scope of plant cell culture – Major sources of pharmaceuticals, dyes, food colours and flavours, enzymes, polysaccharides, fragrances, insecticides, herbicides, products of secondary metabolites. Production of Shikonim and culturing of Microalgae. Industrial advantages and disadvantages of plant tissue culture – Cell and organ differentiation – Clonal propagation or micropropagation. Application of cell culture for mutant selection, production of secondary

metabolites, transformations, production of transgenic plants for herbicide resistance, insect resistance and disease resistance, nutritional quality improvement, as bioreactors for vaccines.

UNIT – III

Historical review of the involvement of microbiology with pharmaceutical practice, the impact of microorganisms in pharmaceutical device manufacture, microbial contamination control in pharmaceutical manufacturing, implementation of Rapid Microbiological Methods(RMM) for pharmaceutical laboratories, the broader picture of microorganisms and pharmaceutical manufacturing: Challenges, Solutions and Pharmacopoeial guidance.

UNIT – IV

Drug targeting principles: Targeting, Principles and its importance in therapeutics, Methods in drug targeting, advantages and disadvantages in targeting, protein and peptide based drug delivery systems.

The drug development process: Drug Discovery the impact of genomics and related technologies upon drug discovery. Delivery of Biopharmaceuticals-Oral delivery systems – Pulmonary delivery – Nasal, transmucosal and transdermal delivery systems.

Immunopharmacology: The interferon family, cytokines as Biopharmaceuticals. TNF – therapeutic aspects. Haemopoietic growth factors, Growth factors, Hormones of therapeutic interest, Blood products, therapeutic enzymes and Nucleic acid therapeutics.

Course Learning Out Comes

1. Be able to know about microbes and bioreactors
2. Be able to understand the process economics and down stream processing
3. Be able to understand about patenting
4. Be able to gain in depth idea about recombinant therapeutic molecules

Suggested Books:

1. Tim Sandle, (2011)Selection of Microbiological Culture Media and Testing Regimes
2. Sandy Rubio,(2011) Validation of Microbiological Methods by Business Horizons;
3. Masakazu Tsuchiya,(2010)Bacterial Endotoxins Test by bioprocess awards
4. Michael J. Miller,(2013)The Implementation of Rapid Microbiological Methods by European Pharmaceutical company
5. Matts Ramstorp,(2012) Microbiology and Sterility Assurance in Pharmaceuticals and Medical Devices by Madhu Raju Saghee, Tim Sandle and Edward C. Tidswell,UK

6. Sandle, T. (2012). The CDC Handbook: A Guide to Cleaning and Disinfecting Cleanrooms, Grosvenor House Publishing: Surrey, UK
7. Sandle, T. and Saghee, M.R. (2013). Cleanroom Management in Pharmaceuticals and Healthcare, Euromed Communications: Passfield, UK
8. Wulf Crueger and annelies Crueger (2000) Biotechnology : A Text book of Industrial Microbiology (2ed) Panima publishing Mc Graw Hill book
9. Peppler (2003) Microbial techonology. by CRC Press, Canada.
10. Jogdand (2001) Medical Biotechnology, by New Age Publishers, New Delhi
11. Gary Walsh (2013) Pharmaceutical Biotechnology: Concepts and Applications. By wiley.
12. Fowler MW, Warren GS, Murray Moo-Young (2013) Plant Biotechnology: Comprehensive Biotechnology Second Supplement. Elsevier.
13. John M. Davis (2011) Animal Cell Culture: Essential Methods. By Wiley.

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CO_2	3	1	2	2	2	1	1	-	-	-	1	1
CO_3	3	2	1	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB – 303: b) DOWNSTREAM PROCESSING

Course Learning Objective

1. To gives detailed knowledge about upstream and downstream processing during vitamins, Antibodies, Microbial enzymes and Recombinant and synthetic vaccines.
2. To gives information on various separation processes.
3. To gives information on membrane separation & enrichment operations.
4. To understands the various technologies (such as chromatography, chromate focusing, electrophored C, Dialysis and crystallization methods) used for tradition of downstream processed production.

UNIT – I

Processing – Industrial fermentation – Importance of upstream processing (USP) and Downstream processing (DSP). Role of Downstream processing in industrial fermentation processes, problems and requirements of bioproduct purification. Cell harvesting – broth conditioning, sedimentation, centrifugation, filtration. Cell disruption – mechanical and non-mechanical. Product recovery – Chromatography and dialysis. Distillation and various finishing steps-crystallization, drying. Inclusion bodies and the role of genetic engineering in DSP. Economics of downstream processing.

UNIT – II

Physico – chemical basis of bio-separation processes. Recent development in product isolation – one step purification, reverse microcellular extraction on line membrane separation. Primary separation and recover process – cell disruption methods for intracellular products, removable of insoluble, biomass separation techniques, products flocculation and sedimentation, centrifugation and filtration methods.

UNIT – III

Membrane separations – membrane based separation – micro and ultrafiltration, theory, design and configuration of membrane separation and applications of equipments used.

Enrichment operations – Precipitation methods – salts, organic solvents, polymers, extractive separations, aqueous two-phase extraction, supercritical extraction in situ product removal, integrated bioprocessing.

UNIT – IV

Separation, product resolution, fractionation of downstream processed products by using different technologies – electrophoresis (1D, 2D, gels), chromatography – (Paper, TLC, Absorption, Iox exchange, Gel filtration, Affinity chromatographic separation, GC, HPLC, FPLC, Chromato focusing

electrophoretic separations). Dialysis, crystallization, super liquid extraction foam based separation. Study the above process with suitable industrial products.

Course Learning Out Comes

1. Be able to produce and assay the various Industrial products.
2. Be familiar with various physics-chemical methods involved in bio-seperation process.
3. Be acquint themselves with enrichment operations and membrane seperations.
4. Be able to carry out separation and product resolution.

Suggested Books:

1. Basic Biotechnology, 2001. 2nd ed. ed by C. Ratiedge & B. Kristiansen, Cambridge University Press.
2. Manual of Industrial Microbiology and Biotechnology, Second edition. 1999. A.L. Demain, Editor in Chief, ASM Press.
3. Biotechnology : A test Book of Industrial Microbiology. Second edition, 2000. Ed. W.Crueger & A.Crueger.Panima Publishing corporation.
4. Industrial Microbiology : An Introduction by M.J. Waites et al. Blackwell Science. 2001.
   Prescott & Dunn's Industrial Microbiology. Fourth edition, 1999.Edited by Gerald Reed. CBS Publishers and distributors.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	1	2	1	2	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	1	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB- 304: PRACTICALS: Basics of Industrial Microbiology and Bioprocessing of Industrial Microbiology

Course Learning Objective

1. Gives knowledge on various isolation procesures.
2. Give knowledge about staining methods.

1. Isolation, identification and culturing of industrially important microbes – Bacteria, yeast, filamentous fungi from different natural sources.
2. Formulation different simple and complex fermentation media.
3. Production of organic acid from different microbial organism.
4. Production of microbial enzymes and confirmation tests.
5. Estimation of biomass.
6. Estimation of substrate product analysis.
7. Study of growth substrate utilization and product formation – Flask cultures.

Course Learning Out Comes

1. Be isolation, identification and culturing of industrially important microbes.
2. Be formulation different simple and complex fermentation media.
3. Be growth substrate utilization and product formation – flask cultures.

IMB – 305: INDUSTRIAL FOOD MICROBIOLOGY

Course Learning Objective

1. To provide knowledge on quality control of food products.
2. To provide indepth knowledge about food poisoning and fermentation product.
3. To understand the about fermentation technology concepts.
4. To given concentrate knowledge on microbials application modern technology.

UNIT – I

Food infected by microbes – Types of foods, microorganisms infects various foods. Molds, yeast and bacteria and their important in food microbiology. Extrinsic and Intrinsic factors influencing microbial growth in food. Removal of microorganism from food – Asepsis – Anaerobic conditions, high and low

temperatures, drying. Principles of food preservation – chemical preservatives and food additives. Canning, processing for heat treatment and working out treatment parameters.

UNIT – II

Microbial Food contamination and spoilage of - cereals vegetables, fruits; meat, milk, sugar and their products. Fish, sea foods, poultry, canned foods. Detection of spoilage and their characterization. Food-borne infections – Bacterial infective and toxic types, *Brucella*, *Bacillus*, *Clostridium*, *Escherichia*, *Salmonella*, *Staphylococcus*, *Vibrio*, *Yersinia*. Non-bacterial – Protozoa, algae, nematodes, fungi and viruses. Food borne outbreaks – laboratory testing procedures, prevention and control measures.

UNIT – III

Food made by microbes – Cheese, bread, Vinegar, fermented Vegetables and dairy products, experimental and industrial production methods, spoilage and defects of fermented dairy products. Fermented foods, their quality and standards. Microbial cells as food – single cell proteins, yeast mushroom, algae, bacterial insecticides, legume inoculants.

UNIT – IV

Microbial enzymes as fermented products – Industrial enzymes production – Amylases – Fungal and bacterial analyses; proteolytic enzymes – Fungal and bacterial proteases; Pectinases, Invertage, other enzymes. Bioconversions – Production of alcohol, fermented beverages – bear and wine, genetically modified foods – Hazard analysis and critical control points (HACCP).

Course Learning Out Comes

1. Be able to understand presentation methods.
2. Be able to understand the food infections and microbial sancer.
3. To gain knowledge on Fermentation process.
4. Be able to know the advantages and biofuels and microbial frerapeulic compounds.

Suggested Books:

1. Food Microbiology: Fundamentals and frontiers. 2001. 2nd Ed. M.P. Doyle et al., ASM Press.
2. Food Microbiology. 1995. M.R. Adams and M.O. Moss. Royal Society of Chemistry Publication, Cambridge.
3. Food Microbiology. 1988. Frazier WC and Westhoff Dc. Tata Mc Graw Hill Publishing Company.
4. Dairy Microbiology. 1990. Robinson R.K. Elsevier Applied Sciences London.

5. Microbial enzymes & Biotechnology. W.M. Fogarty and C.T. Kelly.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	1	2	-	-	-	1	1
CO_2	3	2	2	1	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB – 306: a) COMPUTATIONAL BIOLOGY

Course Learning Objective

1. Gives knowledge on Design and application of biotechnology.
2. Give deep understanding about product recovery.
3. Gives knowledge of industrial products.
4. Provides detailed information on microbial teaching.

UNIT – I

Introduction : Definition of statistics : population and universe, the sample and population, statistical inference; parameter and statistics.

Interval Data : Mean, mode, median and standard deviation. Concept of probability – classical and frequency definitions; axiones of probability; addition and multiplication theorems (statements only); conditional probability-Baye's theorem (statement only); simple applications. Binomial, Poisson and Normal distributions (definitions and uses only).

Uncertainties in estimation of mean, comparison of means and variances – t, F, and Z tests.

Proportion data : examples of proportion data; (MPN, sterility testing of medicines, animal toxicity, therapeutic trial of drugs and vaccines, animal toxicity, infection and immunization studies) statistical treatment to proportion data. Chi-square test, goodness of fit.

Count data : examples of count data (bacterial cell count, radioactivity count, colony and plaque counts) statistical treatment to count data: Poisson distribution, standard error, confidence limits of counts.

Analysis of variance : Analysis of variance : Introduction, procedure and tests for one-way and two-way classified data. Multiple comparisons. Analysis of CRD, RBD and LSD. Factorial experiments- main effects and interaction in a 2^2 design, Duncan's Multiple Range Test.

UNIT – II

Correlation and regression, formulae and application. Fitting straight line through a series of points. Fitting of exponential curves. Standard curve and interpolation of unknown Y-values. Multiple linear regression, logistic regression.

Statistical basis of biological assays : Response-Dose metameter. Delusion Assays, Direct and indirect assays. Quantal Responses, Probit, logit, LD_{50}, ED_{50}, PD_{50} – Standard line interpolation assay, parallel assay (4 point, 6 point assays), slope ratio assay.

Design of Experiments – Multiple comparison tests, Dunken's, Tukey's, Scheffic's, Dunnelt's etc.
Probit Analysis
Multiple Regression, Logistic regression
Discriminate Analysis
Clinical trails – Phase I, Phase II etc.
Clinical trails (meaning and importance only).

UNIT – III
Basics of personal computer and its components. Concept of programming Languages. Hardware and Software. The idea of operating systems.

Disk Operating Systems (DOS)- Simple commands to create directories and handle files. DOS based software for creating biological databases-dBASE,

Windows-98 operating system – Starting Windows, Desk Top items, folders and files, explorer, notepad and word pad and their applications. Features of Windows 2000

Microsoft Office - 2000: Introduction and facilities available. Shortcut Bar; customizing toolbars; using common office techniques-starting an office application.

Microsoft Word: Starting a new document, opening existing documents, saving, closing, and printing documents, moving and copying text, proofing the documents, working with multiple documents. Creating and editing work documents; formatting documents; working the tabs, tables and columns; working with long documents; working with graphics; formatting shortcuts; streamlining repetitive work.

Microsoft Excel: Introducing Excel Worksheet, formatting and printing worksheets, workbooks, functions and formulae, excel graphics, creating databases. Solving simple statistical problems and curve fitting using Excel.

Microsoft Power point: Creating presentations, working with slides, showing slide shows, creating an organization charts and graphs, printing a presentation.

UNIT – IV

Internet and Biologist : Internet basics, getting onto the internet, e-mail, file transfer protocols, gopher, the world-wide web, browsing and down loading from sites.

Networking of computers, need and advantages, an overview of International and Indian networks – Virtual Library-I: Searching MEDLINE; Pubmed. Virtual Library II: Science Citation Index and current awareness services; Virtual Library III: Electronic Journal; International and Indian Networks- NICNET, INFLIBNET, AGRIS.

Information Networks: WWW, HTTP, HTML, URLs, EMB net, NCBI net, Virtual tourism.

Databases and Tools: Primary information resources- Protein and genomic information resources- Biological databases; primary, secondary and composite protein sequence databases, structure classification databases, DNA sequence databases, specialized genomic resources; DDBJ, Gen Bank and EMBL public DNA sequence databases; SWISSPROT Database, information retrieval from biological databases; the NCBI data model. Submitting DNA sequences to the Database and updating.

Sequence analysis : Wisconsin GCG, DNASIS, DNASTAR, CLONE MANAGER packages for nucleotide sequence analysis; sequence alignment and database searching; practical aspects of multiple sequence alignment.

Phylogenetic analysis: Phylogenetic models; multiple alignment procedures (CLUSTAL, ALIGN, PHYLIP); tree building methods and trees evaluation; rooting trees, phylogenetics software.

Predictive methods using nucleotide and protein sequences : Detection regulatory elements in the DNA; physical properties of proteins based on sequences, different protein structural motifs RNA binding domains and folding classes; Transcription factors and their DNA binding.

Course Learning Out Comes

1. Be able to gain knowledge on strain improvement.
2. Be able understand the whole broth processing.
3. Gain knowledge on production of industrial products.
4. Be able to understand on efficient trident process.

Suggested Books:

1. Biostatistics a foundation for analysis in the field of health sciences by Daniel.2013, 10th edition.
2. Campbell R.C. 1989: Statistics for Biologists, 3rd edition. Cambridge University Press, Cambridge.
3. Statistics made simple – Do it yourself on PC. 2001. By K.V.S. Sarma. Printice Hall of India Publ.
4. An introduction to Biostatistics. 2012. 5th Edition. P.S.S. Sundar Rao and J. Richard, Prentice-Hall of India Pvt. Ltd., New Delhi.
5. Fundamentals of Biostatistics. 1994. First Edition. Irfan A. Khan and Atiya Khanum, Ukaaz Publications.
6. Biostatistics. 2012. First Edition. P.N. Arora and P.K. Malhan, Himalaya Publishing House.
7. Statistics for Biologists. 1980. D.J. Finney.
8. Statistics and Experimental design : An Introduction for Biologists and Biochemists. 1994. 3rd edition. G.M. Clarke. Edward Arnald Publications.
9. Statistical methods. 1989. 8th edition. Snedecor and Cochran, Oxford Press.
10. Elements of Computer Science, 2010. S.K. Sarkar, A.K. Gupta. S. Chand & Company (Chapters – 1,2,9,12,14).
11. Microsoft Office. 1997. Stultz. Office 2000 – The Basics and beyond, 2000. A Lan Neibauer. Tata Mc Graw-Hill Publishing Comp. Part I, II, III, IV, V.
12. Windows-98, 2000, Vickram Crishra. Tata Mc Graw-Hill Publishing.
13. The Internet: Complete Reference, Harley Hahn. 1996. Second Edition. Tata Mc Graw-Hill Publication.
14. Introduction to Bioinformatics, 2001 by T.A. Attwood & D.J. Parry-Smith, Pearson Education Asia Publ.
15. Bioinformatics: A Practical guide to the analysis of genes and proteins. 2004, 3rd edition. Edited by A.D. Baxevanis and B.F.

16. Francis Ouellette. Wiley – Interscience. Computational Methods in Molecular Biology by S.L. Saizberg. 1999.
17. Computer Applications in Biotechnology. 1998. by T. Yosida. Introduction to Bioinformatics by Atwood.
18. Bioinformatics – From Nucleic Acids and Proteins to Cell Metabolism. 1995, by Schomburg and Label VCH Publ.
19. Bioinformatics: Sequence and Genome Analysis. 2004, 2nd edition. By D.W. Mount. CSHL Press.
20. Bioinformatics: Methods and Protocols,. Ed by S. Misener and S.A. Krawetz. Humana Press, 2000.

References:

1. Principles of Biostatistics, 2000. Marcello Pagano; Kimberlee Gauvreau, Published by Duxbury, Thomson Learning, USA.
2. Biostatistical Analysis, 2009, 5th edition. Jorrold H. Zar Published by Pearson Education, Inc., Delhi.
3. Statistical methods for survival data analysis, 2003, 3rd edition. Elisa T. Lee. Published by Wiley Series in probability and mathematical statistics; John Wiley & Sons, Inc. New York.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	1	2	-	-	-	1	1
CO_2	3	2	2	1	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB – 306: b) INDUSTRIAL BIOTECHNOLOGY

Course Learning Objective

1. Gives knowledge on Design and application of biotechnology.
2. Give deep understanding about product recovery.
3. Gives knowledge of industrial products.
4. Provides detailed information on microbial teaching.

UNIT - I

Raw materials used as media for industrial fermentations. Development of inocula for industrial fermentations. Isolation, preservation and strain improvement of industrially-important microorganisms. Bioreactor - Designing and appliaction of a biofermentor. Aerobic and anaerobic reactors. Aeration, agitation and sterilization of fermentors. Surface, submerged, batch and continuous fermentations. Scale-up of fermentations.

UNIT - II

Bioprocessing - Recovery of particulates, product isolation, extraction, precipitation, chromatography, centrifugation, membrane separation, electrophoresis, distillation, use of resins super-critical fluid extraction, whole broth processing, online processing integrated product separation, and purification.
Single cell protein (SCP) - production from cellulose and sewage. Food from microorganisms – edible mushrooms and cultivation of mushrooms (button).

Commercial production of cheese, yogurt, production of flavoring components.

Biofuels – Methane, hydrogen, alcohol (gasohol).

UNIT - III

Industrial production of (1) antibiotics - streptomycin, penicillin, cephalosporin, and tetracyclin, (2) biomass of *Bacillus megaterium*, *Acinetobacter cerificans*, *Candida utilis* using hydrocarbons, (3) organic acids - citric acid, lactic acid, (4) amino acids - L-lysine, (5) enzymes - amylases, proteases and laccases, stabilization of enzymes, (6) vaccines - rabies, FMD vaccine, hepatitis B, (7) alcohol - ethanol and butanol. Esterification of biofuels, Steroid transformations.

UNIT - IV

Microbial leaching - Organisms of leaching, chemistry of microbial leaching, commercial process. immobilization of cells - methods, applications, advantages and disadvantages. Recombinant DNA products - interferon.

Fermentation economics - Market potential, some effects of legislation on production of antibiotics and recombinant proteins, plant and equipment, continuous culture, recovery costs, water usage and recycling, effluent treatment.

Course Learning Out Comes

1. Be able to gain knowledge on strain improvement.
2. Be able understand the whole broth processing.
3. Gain knowledge on production of industrial products

Suggested Books:

1. Principles of fermentation technology (2nd edition) by STANBURY, WHITAKER & HALL.
2. Biotechnology: A Text Book of Industrial microbiology 2nd edition by CRUEGER. & CRUEGER
3. Microbial Technology Vol I by PEPPLER & PEARLMAN (Editors).
4. Microbial Technology Vol II by PEPPLER & PEARLMAN (Editors).
5. Microbial enzymes and bioconversions by ROSE.
6. Microbial Biotechnology: Fundamentals of Applied Microbiology (2nd edition) by GLAZER & NIKAIDO.
7. Prescott & Dunn's Industrial Microbiology 4th edition Editor REED.
8. Biotechnology Vol III. DELLWEG (Editor).
9. Concepts in Biotechnology by BALASUBRAMANIAN, BRYCE, DHARMALINGAM, GREEN & JAYARAMAN.
10. Immobilized cells: Principles and Application by TAMPION & TAMPION.
11. Industrial Microbiology by THOMA.
12. Methods in Food and Dairy Microbiology by DILIELLO.
13. Industrial Microbiology by CASIDA.
14. Industrial Microbiology by MILLER & LITSKY.
15. Microbiology: A Laboratory Manual by CAPPUCCINO & SHERMAN.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team	**PO_{10}** Communication	**PO_{11}** Programme	**PO_{12}** Lifelong

	ledge				Tools				work		Management	Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	2	2	1	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	1	2	-	-	-	1	1

FOURTH SEMESTER:

IMB - 401: ANIMAL AND PLANT CELL CULTURE

Course Learning Objective

1. To provide hands on experience with the techniques used in plant cells.
2. To give hands on experiments techniques used in Animal cells.

UNIT – I

Animal cell culture – scope of animal cell culture – Industrial importance of animal cell culture products – viral vaccines for human and animal use, production of interferon, interleukins, retroviruses and adenoviruses are produced for use in gene therapy, large scale production of Bio-Insecticides – Baculoviruses, NPV, GV, cell cultures used for diagnostic assay system, therapeutics.

UNIT – II

Production of animal cell culture – primary and secondary cell cultures of different tissues – kidney, embryo, fibroblasts. Cell lines – types of cell lines – Human, Animal insect cell lines. Principles and methodology of animal cell cultures, subculturing, maintenance and preservation of cell cultures, Biology of the cultured cell, culture environment – preparation of media, Tissue and Primary culture – isolation of the tissue, primary culture, cell lines and cell types, cloning and selection of specific cell types, physical and chemical methods of cell separation , induction of differentiation and study of transformed phenotype, other specialized techniques.

UNIT – III

Plant cell culture – scope of plant cell culture – major sources of pharmaceuticals, dyes, food colours and flavours, enzymes, polysaccharides, fragrances, insecticides, herbicides, products of secondary metabolites. Production of Shikonin and culturing of Microalgae. Industrial advantages and disadvantages of plant tissue culture – Cell and organ differentiation – Clonal propagation or micropropagation – production Artificial seeds and Virus free seeds – Somaclonal variation – cross barriers – other uses of tissue culture such as endosperm and nucellus cultures, germplasm storage including cryopreservation – Application of cell culture for mutant selection, production of secondary metabolites, transformations – Plant tissue culture technology – equipment requirements for plant tissue culture – cleaning procedures, laboratory working procedures – Aseptic techniques and use of antibiotics – Environmental factors for tissue growth and development-different type of tissue culture media and their constituents – different cell culture plating techniques .

UNIT-IV

Plant tissue culture types – embryo culture, meristem culture, callus culture, anther culture, protoplast culture, cell suspension, spore culture, protoplast culture, regeneration and somatic hybridization – Protoplasts isolation, culture, purification, viability and regeneration of plants, protoplast fusion and somatic hybridization, cytoplasmic hybrids or cybrids, genetic modification of protoplasts. Gene transfer methods in plants – target cell for transformation, vectors for gene transfer, gene transfer techniques for *Agrobacterium,* selectable and scoreable markers, agroinfection and gene transfer, physical delivery methods or DNA mediated gene transfer methods- PEG stimulated, microinjection, microinjection, micro projectile or particle gun, electroporation. Production of Transgenic plants – transgenic plants for crop improvement, molecular farming, transgenic to study regulated gene and their expression- production of edible vaccines, viral CP mediated and insect resistance transgenic plants.

Course Learning Out Comes

1. Be able to perform techniques in animals and plants.
2. Be able to perform techniques in animals and plants microbiology

Suggested Books :

1. Culture of Animal cells – A manual of Basic technique. Third edition. 1995. R.I. Freshney. A.R. Liss. Inc., New York.
2. Animal cell culture – Practical approach Ed. John R.W. Master. Oxford.
3. Methods in Biology. Vol. 57. Animal cell culture methods. Ed. Jenni. P. Cell Mather and David Barnes. Academic Press.
4. An Introduction to Plant tissue culture. 2000. M.K. Razdan. Oxford & IBH Publishing House.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	1	2	2	-	-	-	1	1

CO_2	3	2	2	1	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB - 402: INDUSTRIAL BASED MICROBIAL CLEAN TECHNOLOGY

Course Learning Objective

UNIT – I

Scope of microbial agents in industry - regarding clean environment – waste water and effluent treatment – aerobic biological treatment, carbon oxidizers, filamentous carbon oxidizers, nitrifiers, dinitrifiers. Anaerobic waste-water treatment – hydrolytic bacteria, acetogenic bacteria, methanogenic bacteria.

Compositing of solid organic wastes – *Agaicus bisporus, Bacillus stearothermophilus, Thermus sp., Fungi – Rhizomucor Pusillus.* Ensiling – to preserve the material with a minimum loss of nutritional value, commercial, microbial inoculants, *Pediococcus sp.,Sstreptococcus sp.,* some *Lactobacillus sp*. Biodegradation of Xenobiotics, Bioremediation – basic principle, biodegrade or detoxify contaminating compounds in situ, metal sequester – *Geobacter metallireducens,* radiation resistance bacteria – *Deinococcus radiodurans.*

UNIT – II

Biomining (mineral leaching) – conventional mineral mining – metal ores, *Thiobacillus ferroxidans, Leptosirillum ferroxidans,* Microbial desulphurization of coal – S*ulfolobus acidocaldarium.*

Bioinsecticides – control of insects by use of microbial pathogens - bacteria, fungi, protozoa and viruses – *Bacillus thuringiensis, Pythium, Oligandrum, Ampelomyces quiqualis,* Baculo viruses.

UNIT – III

Biopesticides – Introduction and importance of biopesticides, types of biopesticides, bioinsecticides – biofungicides – biobactericides – bionematicides – bioherbicides. Important bioinsecticides- Bt, NPV, fungal bioinsecticides (Beauveria, Metarhizium, Verticillium, Paecilomyces, Nomuraea. Mass production – formulation – application for the control of insect pests. Important biofungicides – Trichoderma, Gliocladium, *Pseudomonas fluorescens*, mass production – formulation – use in agriculture for the control of crop diseases. Biobactericide - *Agrobacterium radiobacter*, use in control of crown gall disease. Bionematicides- Verticillium, Trichoderma, control of root knot nematodes. Bioherbicides - Phytophthora , Colletotricum, advantage for the use of biopesticides – Problems in commercialization and efficacy – commercial products of biopesticides.

UNIT – IV

Bioremediation – Bioremediation definition, concept – rationale – kinds of pollution – organic, inorganic in soil, water and air – remediation by bacteria, fungi and green plants. Processes of bioaccumulation and biomagnification – microbial remediation by natural attenuation – biostimulation – bioaugmentation – application of immobilized microbes in soil decontamination.Use of genetically engineered microorganisms and bioremediation – Biodegradation of organic compounds – humification and polymerization reaction – biotransformation of metal and metal compounds – phyto-remediation use of green plants to remove pollutants – Phyto-extraction – induced phyto-extraction and continuous phyto-extraction – phyto-degradation – rhizofiltration – phyto-stabilisation – phytovolatisation of metals – phyto-remediation of organic – bioavailability and uptake – biotransformation and compartmentalization.

Course Learning Out Comes

Suggested Books:

1. Microbial Technology by J.H. Peppler and D. Perlman.
2. Microbial Enzymes & Biotechnology by W.M. Fogarty and C.T. Kelly.
3. Industrial Microbiology, 1999 by L.E. Casida, Jr. New Age International Publ.
4. Industrial Microbiology. 1984. A.H. Patel. Macmilan India Limited.
5. Industrial Microbiology by B.M. Miller and W. Litsky.
6. Microbial Biotechnology – Fundamentals of Applied Microbiology. 1995. by Alexander N.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	1	2	2	2	1	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	1	2	2	2	-	-	-	1	1

IMB - 403: a) INDUSTRIAL PRODUCTION OF MICROBIAL PRODUCTS

Course Learning Objective

UNIT – I

Health care products – Pharmaceuticals-sources of drugs-Microbial based-antibiotics, vitamins, steroids, ergot alkaloids, vaccines, Recombinant therapeutic proteins, DNase, Erythropoietin, Hormones – Cytokines – Interferons, Interleukins I, II, Tissue plasminogen activator (tPA) – Human growth hormone (somatotrophin), Insulin, Tumor necrosis factor (TNF), collagen, Bacteriophages as therapeutic agents.

UNIT – II

Production of Antibiotics from - Penicillin, Cephalosporin, Streptomycin – Vitamins from *Streptomycin sp*., *Bacillus sp*., *Priopionibacterium sp.*- Steroids from *Rhizopus sp.*, *Cunning hamella sp*. – Vaccines, BCG, Anthrax, conventional and recombinant vaccines of viral, bacterial – Insulin, *E.coli*. through Recombinant DNA technology.

UNIT – III

Production of organic acids – Lactic acid – *Lactobacillus sp. ,* Citric acid – *Aspergillus niger* and Alpha ketoglutaric acid, Gluconi acid – *Aspertillus niger*, *Acetobacter sp*., *Pseudomonas sp*., Fumaric acid – *Rhizopus nigricans,* Itaconic acid – *Aspergillus terreus,* Kojc acid – *Aspergillus sp*., Gibberllic acid – *Gibberella sp.*, *Agaricus sp*., *Phallus sp*., *Boletus sp*., *Grifola sp*. Amino acids – Production of L-Lysine, Glutamic acid.

Production of enzyme – Proteases, Amylases pectic enzymes; Production of solvents – Acetone, Butyl alcohol, glycerol; Production of fuels –Methane, Ethanol, Hydrogen, Hydrocarbons; Recovery of minerals – golden microorganism, Recovery of oil.

UNIT – IV

Microbial oxidative transformationof substrate – Vinegar, *Acetabactor sp., Saccharomyces sp.* Dairy products – production of buffer – *Lactococcus sp.,* Yoghurt – *Streptococcus sp., Lactobacillus sp.,* Cheese – *Lactococcus sp., Streptococcus sp.* Probiotics – *Lactobacillus sp., Bifidobacterium bifidum Saccharomyces boulardii, Salmonella enteritidis, Lactobacillus salivarius.* Microbial fermented products of meat, fish, plant (Bread sauer kraut, soyabean coffee, cocoa, tea).

Course Learning Out Comes

Suggested Books:

1. Microbial Biotechnology – Fundamentals of Applied Microbiology. 1995. by Alexander N.
2. Microbial Biotechnology; Fundamentals of Applied Microbiology. 1995. A.N. Glazer and H. Nikaido. W.H. Freeman and Company
3. Basic Biotechnology, 2001. 2nd ed. ed by C. Ratiedge & B. Kristiansen, Cambridge University Press.
4. Manual of Industrial Microbiology and Biotechnology, Second edition. 1999. A.L. Demain, Editor in Chief, ASM Press.
5. Biotechnology : A test Book of Industrial Microbiology. Second edition, 2000. Ed. W.Crueger & A.Crueger.Panima Publishing corporation.
6. Industrial Microbiology : An Introduction by M.J. Waites et al. Blackwell Science. 2001.
7. Prescott & Dunn's Industrial Microbiology. Fourth edition, 1999.Edited by Gerald Reed. CBS Publishers and distributors.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Knowledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	1	2	2	2	2	-	-	-	1	1
CO_2	3	2	2	2	2	1	1	-	-	-	1	1
CO_3	3	2	2	2	3	2	2	-	-	-	1	1
CO_4	3	1	2	2	2	2	1	-	-	-	1	1

IMB - 403: b) INDUSTRIAL MICROBIAL TECHNOLOGY

Course Learning Objective

UNIT – I

Industrial important microorganisms – isolation of cultures, screening of cultures for their activity, microbial cultures preservation and inoculum development. Fermentation – small-scale liquid fermentations, small-scale solid fermentations, Anaerobic fermentation, continuous culture. Improvement of fermentations, cell and enzyme immobilization, microbial strain improvement by nonrecombinant and recombinant methods, selection of raw materials and development of various media for industrial fermentation processes, small-scale bioreactors, scale-up of Microbial processes.

UNIT – II

Downstream process – Isolation and identification of small molecules, purification and characterization of proteins, Bioprocess simulation, Industrially used microorganisms, molecular biology and genetics – Genetics of *Bacillus sp., Clostridia sp.,* Filamentous fungi, C*orynebacteria sp.,* Streptomyces and non-streptomyces. Actinomycetes, *Saccharomy cervisiae.*

Microbial organisms used in - Recombinant DNA technology for industrial application – Recombinant application of Streptomyces, Thermophiles, Zygosaccharomyces, *E.coli* – Expression of G-protein-couples receptors, over expression of proteins, enzymes, aromatic compounds, biodegradable polymer (polyhydroxy alkanoates).

UNIT – III

Microbial organisms in Environmental clean technology – Bioprospecting, Bioremidiation, Biopesticides, Biomarkers, Bioreporters, Biofilms, Biocorrosion, Microbial biodiversity, release of recombinant microorganisms.

UNIT – IV

Biosynthesis of Microbial secondary metabolites – Antibiotic biosynthesis, streptomycete secondary metabolite biosynthesis, Bacteriocins production. Biosafety, Bioethics and Intellectual property rights, Quality assurance and quality control, Economics of Industrial Microbial technology, future of Industrial microbial technology.

Course Learning Out Comes

Suggested Books:

1. Industrial Microbiology, 1999 by L.E. Casida, Jr. New Age International Publ.
2. Industrial Microbiology. 1984. A.H. Patel. Macmilan India Limited.
3. Industrial Microbiology by B.M. Miller and W. Litsky.
4. Microbial Biotechnology – Fundamentals of Applied Microbiology. 1995. by Alexander N.
5. Manual of Industrial Microbiology and Biotechnology, Second edition. 1999. A.L. Demain, Editor in Chief, ASM Press.
6. Biotechnology : A test Book of Industrial Microbiology. Second edition, 2000. Ed. W.Crueger & A.Crueger.Panima Publishing corporation.
7. Industrial Microbiology : An Introduction by M.J. Waites et al. Blackwell Science. 2001.
8. Prescott & Dunn's Industrial Microbiology. Fourth edition, 1999.Edited by Gerald Reed. CBS Publishers and distributors.
9. Microbial Technology by J.H. Peppler and D. Perlman

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	1	2	1	2	-	-	-	1	1
CO_2	3	2	2	2	2	2	1	-	-	-	1	1
CO_3	3	1	2	2	3	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB- 404: PRACTICALS: ANIMAL AND PLANT CELL CULTURES AND INDUSTRIAL BASED MICROBIAL CLEAN TECHNOLOGY

1. Antibiotics and study of their role in microbial inhibition.
2. Collection and study of antibiotics sensitivity by invitro.
3. Isolation of Bacteriophages from sewage and soil.
4. Biodegradation of human hairs and animal fur by using the actinomycetes.
5. Set up and demonstrate the ethanol production in the lab.
6. Isolation and identification of polymeric material degrading organisms.
7. Preparation of bread in the lab.
8. Plant tissue culture techniques- meristem, embryo, protoplast
9. Secondary metabolites production from plant cell cultures.
10. Assessment of immune diagnostic kits.
11. Immuno flurocence technique.
12. Immuno blot Analysis of antigens and allergens.
13. *In vitro* analysis for antibacterial properties
14. Antibiotic assay preservative test
15. Bioburden Testing
16. Interferon, interleukin assay.
17. Microbial Limit test (MLT)
18. Bacterial Endotoxins Test

IMB – 405 : Practical : Field Trip / Industriel Tour Report / Project :

Course Learning Objective

1. Give practical experience in locating, collecting and interpretent the scientific, information.

Practical experience in locating, collecting and interpreting the scientific information for the purpose of MSc., Industrial Microbiology field trip/industrial tour report. The student works individually, under faculty/Scientist supervision in laboratories, Research labs, Industries, National Institutes to perform the procedures, record the results and present the project work at the end of the Fourth Semester. The project work of the student will be evaluated by seeing the performance of presentation and interpretation of the results.

Course Learning Out Comes

1. Able to design procedures, record research methodology and interpret the research.

IMB- 406: a) BIOETHICS, BIOSAFETY, INTELLECTUAL PROPERTY RIGHTS

Course Learning Objective

UNIT – I

Bioethics – Introduction to Bioethics, solid and ethical issues related industrial genetically manipulated microorganisms (GMM).

UNIT – II

Biosafety – Definition, biosafety consideration, types of containments, personal practices, primary and secondary containment barriers (biosafety levels 1, 2, 3, 4), containment for production activities, practical consideration, possible hazards from industrial production and use of pathogens.

UNIT – III

Biosafety for human health and environment - Use of genetically modified microorganisms and their release in to the environment, special procedures for recombinant DNA based products. Regulatory affairs – regulatory requirements for drugs and biologics.

UNIT – IV

Intellectual property rights – Importance of Intellectual property, history of patent concept, composition of a patent, general patent information – patent laws, patentable subject matter, apply for patent, requirements for patentability, issuance of a patent, infringement of a patent. Obtain patent protection – applying for patent protection, patent prosecution, appeals and interference proceedings, applying for foreign patent protection. Patent laws in US, India and other countries.

Course Learning Out Comes

Suggested Books:

1. Intellectual property rights on Biotechnology. K. Singh BCII, New Delhi.
2. Biotechnologies in developing countries present and future. 1993. A. Sasson. UNESCO Publishers.

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	1	2	1	2	2	1	-	-	-	1	1
CO_3	3	2	2	2	3	1	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	2	-	-	-	1	1

IMB- 406: b) MICROBIAL PRODUCTION OF ALCOHOLIC BEVERAGES.

Course Learning Objective

UNIT – I

History, scope and Industrial important of Beverages. Types of Beverages and their significance in the society. Brewing microbiology – Microorganisms related to Beverages, their isolation, identification and small scale culturing, pure culture techniques, Microbial metabolism and nutrition, genetics of Microbial organisms, magnitude of the brewing industry.

UNIT – II

Elements of the Brewing process – Ingredients – Malt, Adjuncts, water, Hops, yeast, miscellaneous additives. Different process of Bear Brewing – Malting, Brewing, Mashing, Hop addition. Fermentation – Primary, continuous fermentation, aging and finishing. Pure culture of yeast – quality, source, maintenance of pure culture, pure culture propagation, evaluation of yeast produced, microscopic and serological tests, test fermentations, recycled yeast, separation, collection and storage. Microbial contamination. Fermentation requirements – Carbohydrates, nitrogen compounds, inorganic ions, vitamins, polyphenols, Hop compounds, lipids oxygen, yeast.

UNIT – III

Distilled Beverage Alcohol – commercial Important of alcohol, whiskey – Raw materials, mashing and conversion, fermentation, distillation, types of whiskey – Bourbon whiskey, Rye whiskey, corn whiskey, Light whiskey, Tennessee whiskey. Canadian whiskey, scotch whiskey, Irish whiskey, Vodka, Gin, By-product recovery in whiskey synthesis, Rum, Tequila, Cordials and Liqueurs, Congeners.

Wine production – production of grape must, wine fermentation, traditional spontaneous wine fermentation, use of starter cultures, continuous wine fermentation, secondary wine fermentation, post – fermentation treatments.

UNIT – IV

Cider production – apple juice extraction, composition of apple juice, cider fermentation, cider maturation. Vinegar production – Vinegar fermentation, alcohol fermentation, acetic acid fermentation, methods of acetification in vinegar manufacture, traditional surface method trickle generators, submerged methods, finishing processes, process developments.

Course Learning Outcomes

Suggested Books:

1. Molecular Biotechnology: Principles and Applications of recombinant DNA. 1994. by B.R. Glick and J.J. Pastermak. Panima Publ. Corporation.
2. Microbial Biotechnology; Fundamentals of Applied Microbiology. 1995. A.N. Glazer and H. Nikaido. W.H. Freeman and Company.
3. Biotechnology: A test Book of Industrial Microbiology. Second edition, 2000. Ed. W.Crueger & A.Crueger.Panima Publishing corporation.
4. Industrial Microbiology: An Introduction by M.J. Waites et al. Blackwell Science. 2001.
5. Microbial Technology by J.H. Peppler and D. Perlman.
6. Manual of Industrial Microbiology and Biotechnology, Second edition. 1999. A.L. Demain, Editor in Chief, ASM Press

CO-PO Mapping Matrix/Programme Articulation Matrix

	PO_1 Know ledge	**PO_2** Analysis	**PO_3** Design	**PO_4** Development	**PO_5** Modern Tools	**PO_6** Society	**PO_7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO_{11}** Programme Management	**PO_{12}** Lifelong Learning
CO_1	3	2	2	2	2	2	2	-	-	-	1	1
CO_2	3	2	2	2	2	2	1	-	-	-	1	1
CO_3	3	2	1	2	1	2	2	-	-	-	1	1
CO_4	3	2	2	2	2	2	1	-	-	-	1	1

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

SVU COLLEGE OF SCIENCES

DEPARTMENT OF PHYSICS



Syllabus for M.Sc. PHYSICS Choice Based

Credit System (CBCS)

Amended as per NEP-2020

(Academic Year 2023-2024)

About the Department

The Department of Physics, Sri Venkateswara University, was established in 1954 with B.Sc. and B.Sc. (Hons) degree courses. Two year M.Sc. degree course was started in 1959. To meet the growing demands of the society and to keep pace with reputed institutions in the country and abroad, the Department has innovative specializations in M.Sc. Physics such as Applied Spectroscopy, Condensed Matter Physics, Electronics, Photonics, Solar Energy Physics and Vacuum and Thin film Physics. The department has also started M.Sc. Electronics course in 1998. At Present the department has 7 Professors, 1 Associate Professor and 1 Assistant Professor.The research work in the Department of Physics was initiated in 1957 and since then, there has been significant progress in the areas of Atmospheric Science, Condensed Matter Physics, Microelectronics, Solar Energy, Solid State Spectroscopy, Photonics and Thin Films. In recognition of these efforts, the department has received research funding from UGC, CSIR, DST, ISRO, DNES, DoE, DRDO and DAE-BRNS. The Department was selected for UGC - CAS and DST- FIST programmes and was able to procure several sophisticated instruments like XRD, ATR-FTIR, UV-Vis-NIR spectrophotometer, FLS-980-Florescence spectrometer, SEM with EDS, Micro-Raman, Vibrating Sample Magnetometer (VSM), Liquid Nitrogen Plant,etc., for student training and advanced research activities. The UGC has set up UGC-SVU Center for MST Radar applications to promote research activities on Atmospheric research. This was further supported by the ISRO in the form of an Advanced Center for Atmospheric Sciences (ACAS). The advances made so far in basic and applied research are well recognized both in the country and abroad. The Department organizes National and International Conferences/Seminars/Workshops on regular basis. The faculty members of the Department have several collaborative research programmes with national and International institutions. Many of the faculty members of the Department are regularly invited as visiting Professors and visiting researchers by overseas Universities/ Institutes in India and abroad.

Vision

To inculcate certain specific enabling skill sets to prepare the students to take up challenges in any one or more functional domains viz. (i) Academics; (ii) Basic and Applied Research; (iii) Research & Development; (iv) Engineering & Technology and (v) Industry.

Mission

To bring out professionals having knowledge of basic laws of nature together with strong fundamentals in the core area of physics viz. Classical Mechanics, Quantum Mechanics, Condensed Matter Physics, Electromagnetism, Computational Physics, Statistical Physics, Spectroscopy, Photonics, Thin film Technology and Solar Energy Physics, Electronics, Atomic and Nuclear Physics and advanced level topics such as High Energy Physics, Nanotechnology, Nonlinear Optics, etc.

Program Specific Out comes: At the end of the program, the student will be able to:

PSO1	Understand the basic and advance concepts of different branches of physics.
PSO2	Perform and design experiments in the areas of electronics, atomic, nuclear, Condensed matter, and computational physics.
PSO3	Apply the concepts of physics in specialized areas of condensed, nuclear, renewable energies, particle physics, etc. in industry, academia, research and day to day life.

Program Objectives :

- P1. To impart quality education in physics through well designed courses in theoretical and experimental physics
- P2. to enable the students in acquiring knowledge in the specialized thrust areas such as Applied spectroscopy, Condensed Matter Physics , Electronics, Photonics, Solar energy Physics and Vacuum and thin film physics
- P3.To develop abilities and skills that encourage research and development activities
- P4. to inculcate scientific bent of mind and attitude relevant to science such as concern for efficiency, accuracy and precision, objectivity and integrity.

Program Out comes:

At the end of the program, the student will be able to:

PO1	Apply the scientific knowledge to solve the complex physics problems.
PO2	Identify, formulate, and analyze advanced scientific problems reaching substantiated Conclusions using first principles of mathematics, physical, and natural sciences.
PO3	Design solutions for advanced scientific problems and design system components or processes that meet the specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal consideration.
PO4	Use research-based knowledge and methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern scientific Tools to complex physics problems with an understanding of the limitations.
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the Professional scientific practice.
PO7	Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to the norms of scientific practice.

PO9	Function effectively as an individual, and as a member or leader in diverse teams, And in multidisciplinary settings.
PO10	Communicate effectively on scientific activities with the Scientific/Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective representations, and give And receive clear instructions.
PO11	Demonstrate knowledge and understanding of the scientific principles and apply These to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent And life-long learning in the broadest context of scientific cand technological change.

Program Educational Objectives: At the end of the program, the student will be able to:

PEO1	Apply principles of basic scientific concepts in understanding, analysis, and prediction of physical systems.
PEO2	Develop human resource with specialization in theoretical and experimental Techniques required for career in academic, research and industry.
PEO3	Engage in lifelong learning and adapt to changing professional and societal needs.

SRI VENKATESWARA UNIVERSITY:: TIRUPATI

DEPARTMENT OF PHYSICS

TWO YEAR M.Sc. COURSE IN PHYSICS (2021-2022)

SCHEME

Semester -I

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs /Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	PHY101	1.ClassicalMechanicsandTheoryof Relativity	6	4	20	80	100
2.		PHY102	2.Solid State Physics	6	4	20	80	100
3.	**Compulsory Foundation**	PHY103(a)	1.Analogand Digital Electronics	6	4	20	80	100
		PHY103(b)	2.ComputationalMethods & C Language					
		PHY103(c)	3.Sensors and Transducers					
4.	**Elective Foundation**	PHY104(a)	1.Atomic and Molecular Physics	6	4	20	80	100
		PHY104(b)	2.Optical, Micro wave and Satellite Communications					
		PHY104(c)	3.Computer Architecture and Networking					
5.	**Practical-I**	PHY105	Paper1&3 (General Lab)	6	4	--	100	100
6.	**Practical-II**	PHY106	Paper3 &4 (Electronics Lab)	6	4	--	100	100
	Total			36	24	80	520	600
7.	Audit Course (Human values & Ethics I)			0	0	100	0	0

*All core papers are Mandatory

- Compulsory Foundation choose one paper.

- Elective Foundation–Choose one paper.
- Auditcourse-100Marks (Internals) Zero Credits under self-study.
- Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.

Semester -II

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	PHY201	1. Statistical Mechanics	6	4	20	80	100
2.		PHY202	2.EM Theory, Lasers & Modern Optics	6	4	20	80	100
3.	**Compulsory Foundation**	PHY203(a)	1.NuclearPhysics	6	4	20	80	100
		PHY203(b)	2.ICfabrication Techniques					
		PHY203(c)	3.AdvancedMicroprocessors and its Applications					
4.	**Elective Foundation**	PHY204(a)	1.Mathematical Physics	6	4	20	80	100
		PHY204(b)	2.Introductionto VLSI design					
		PHY204(c)	3.MaterialScience For Industrial Applications					
5.	**Practical-I**	PHY205	Paper1&3 (General Lab)	6	4	--	100	100
6.	**Practical-II**	PHY206	Paper3&4 (Electronics Lab)	6	4	--	100	100
	Total			36	24	80	520	600
7.	Audit Course (Human values & Ethics II)			0	0	100	0	0

*All core papers are Mandatory

- Compulsory Foundation choose one paper.
- Elective Foundation–Choose one paper.
- Auditcourse-100Marks (Internals)Zero Credits under self-study.
- Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.

Semester -III

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs/Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**MandatoryCore**	PHY301	1.IntroductoryQuantumMechanics	6	4	20	80	100
2.		PHY302	2.Physics of Semiconductor Devices	6	4	20	80	100
3.	**Generic Elective**	PHY303(a)	1.Applied Spectroscopy	6	4	20	80	100
		PHY303(b)	2.Condensed Matter Physics					
		PHY303(c)	3.Embedded Systems					
4.	**Practicals**	PHY304	Elective Lab	6	4	--	100	100
5.	**Skill Oriented Course**	PHY305	Advances in Physics	6	4	10	90(T40+P50)	100
6.	**Open Elective**	PHY306(a)	1.Basic Spectroscopic Techniques	6	4	20	80	100
		PHY306(b)	1. Nano materials and Devices					
	Total			36	24	90	510	600

*All core papers are Mandatory

- Generic Elective– Choose two
- Core papers and Generic Electives opted paper held Practical-I
- Skill Oriented Course is Mandatory. Relevant society along with practical (10marksinternal40 final theory& 50 for practical's).
- Open Electives are for the students of other Departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study.
- Interested students may register for MOOC with the approval of the concerned DDC.

Semester -IV

S.No	Components of study	Title of the Course	Title of the Paper	Credit Hrs/Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	PHY401	1.AdvancedQuantumMechanics	6	4	20	80	100
2.		PHY402	2.PhysicsofAdvanced Materials	6	4	20	80	100
3.	**Generic Elective**	PHY403(a)	1.Photonics	6	4	20	80	100
		PHY403(b)	2.SolarEnergy-Thermal and Photovoltaic Properties					
		PHY403(c)	3.VacuumandThinFilm Technology					
4.	**Practicals**	PHY404	Elective Lab	6	4	--	100	100
5.	**Multi Disciplinary Course/ Project Work**	PHY405	Advanced Characterization Techniques	6	4	10	90(T40 +P 50)	100
6.	**Open Elective**	PHY406(a)	1.Wireless Communications	6	4	20	80	100
		PHY406 (b)	2. Vacuum Technology & Applications					
	Total			36	24	90	510	600

*All core papers are Mandatory

- Generic Elective –Choose two
- Core papers and Generic Electives opted paper held Practical-II.
- Project Work-Collaboration with various firms/companies/societies.
- Multi-Disciplinary Course is Mandatory. Circle formation with other subjects/ Dept. of Arts / Commerce.
- Open Electives are for the students of other Departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study.
- Interested students may register for MOOC with the approval of the concerned DDC.

(Mandatory Core)

PHY-101	CLASSICALMECHANICS AND THEORY OF RELATIVITY	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level physics

Course Objectives: The aim and objective of the course on **Classical Mechanics and theory of relativity** is to train the students of M.Sc. in the Lagrangian and Hamiltonian formalisms and relativity theory so that they can use these in the modern branches of physics such as Quantum Mechanics, Quantum Field Theory, Condensed Matter Physics, Astrophysics, etc.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand the necessity of Action, Lagrangian, and Hamiltonian formalism.
CO2	Used' DAlambertprincipleandcalculusofvariationstoderivetheLagrangeequationsof motion.
CO3	Describe the motion of a mechanical system using Lagrange-Hamilton formalism.
CO4	Apply essential features of a relativity problem (like motion under central force, periodic motions) to set up and solve the appropriate physics problems.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	1	1	-	2	2	2	2
CO2	3	2	2	2	2	1	1	-	2	2	2	2
CO3	3	2	2	2	2	1	1	-	2	2	2	2
CO4	3	2	2	2	1	1	1	-	2	2	2	2

PHY101:Classical Mechanics and Theory of Relativity

UNIT–I: Lagrangian Mechanics and Hamiltonian Mechanics

Newtonian mechanics of one and many particle systems: Conservation laws: Constraints and their classification: Degrees of freedom: Generalized coordinates: Principle of virtual work, D' Alemberts principle: Lagrange's equations of motion.

Applications: Inclined plane, Linear harmonic oscillator and simple pendulum: Hamiltonian principle: Lagrange's equation from Hamilton's principle: Hamilton's equation of motion: Applications: Simple pendulum, Compound pendulum.

UNIT–II: Canonical Transformations and Hamilton – Jacobi Theory

Canonical Transformations; generating function; properties: Condition for transformation to be canonical; Illustration of canonical transformation: Poisson - Brackets; Canonical equations in terms of Poisson -Bracket notation. Lagrange-Brackets and their properties.

The Hamiltonian - Jacobi equation; one dimensional harmonic oscillator; Action Angle variables: Kepler problem in action angle variables

UNIT–III: Motion in a Central Force Field

Reduction to the equivalent one body problem; Motion in a central force field: Conditions for closed orbits: Inverse square law of forces: Kepler’s laws of planetary motion; Rutherford scattering.

Rotations – Space and body fixed axes: Angular momentum and Torque; Eulerian angles– Euler’s equations of a rigid body: Motion of symmetrical top; Expression for slow and fast precessions; Larmour precision; Examples of Gyroscope.

UNIT–IV: Special Theory of Relativity

Introduction – Postulates of Special Theory of Relativity – The principle of constancy of light – The Lorentz transformations. Relativistic Kinematics: The velocity transformations–The transformations for the acceleration of a particle. Relativity Optics: The aberration of the of the light from stars – The Doppler effect.

Relativistic Mechanics: The mass of a moving particle – The relativistic dynamics of a single particle –Applications of relativistic dynamics of a single particle: Motion in electric field – Motion in a magneticfield–Experimentalverificationofthevariationofmasswithvelocity–

Bucherer'sexperiment-Transformation of momentum and force.

Books for Study

1. Classical Mechanics by N.C. Rana and P.S. Joag Tata Mc- graw Hill(1991).
2. Classical Mechanics by H.Goldstein, AddiWesely,(1980).
3. Classical Mechanics by J.C.Upadyaya, Himalaya Publishing House(2014).
4. Classical Mechanics by Gupta, Kumar and Sharma, Pragati Edition,(2019).
5. Classical dynamics of particles and systems by J.B.Marion, Thomson Books/ cole,(2004).
6. Introduction to Classical Mechanics by R.G. Takwale and P.S.Puranik, Tata Mc-grawHill,(2008).
7. Theory of Relativity by W.Pauli, Dover Publications,(2013).
8. Introduction to the theory of relativity by P.G.Bergmann, Dover Publications(1977).
9. Introductory Relativity by W.G.V. Rosser, London Butterworths,(1967).

(Mandatory Core)

PHY-102	Solid State Physics	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level solid state physics

Course Objectives: The aim and objective of the course on **Solid State Physics** is to expose the students of M.Sc. class to the topics like elastic constants, lattice vibrations, dielectric properties, energy band theory and transport theory so that they are equipped with the techniques used in investigating the sea aspects of the matter in condensed phase.

Course Outcomes: At the end of the course, the student will be able to

CO1	Gain in-depth knowledge about the formation of various crystal structure vaper forming calculations on their elemental parameters.
CO2	Differentiate between various lattice types based on their lattice dynamics and then explain thermal properties of crystalline solids.
CO3	Understand the electron motion in periodic solids and origin of energy bands in semiconductors.
CO4	To explain the basic transport theory for understanding the transport phenomenon in solids

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	1	2	2	2	1	2
CO2	2	2	2	2	2	2	2	2	2	2	2	2
CO3	2	2	1	2	1	2	2	2	1	2	1	2
CO4	2	2	1	2	2	2	1	2	1	2	2	2

PHY102:Solid State Physics

UNIT–I: Crystallography, Lattice Energies and Lattice Vibrations

Bravais lattices–Reciprocal lattice –X-ray diffraction –structural factor.

Origin of chemical binding in ionic and van der Waals crystals – Elastic properties – Stress and strain –Elastic moduli - Lattice energy calculations for ionic and van der Waals crystals – Lattice vibrations: Mono and diatomic one dimensional infinitely long lattices–Quantization of lattice vibrations–Phonons

–Properties.

UNIT– II: Transport Phenomena and Band Theory

Concept of electrical and thermal resistivity – Expression for thermal and electrical conductivities for metals – Lorenz number - Different scattering mechanisms – Matheissens rule- Distribution function -Formulation of Boltzmann transport equation– Relaxation time approximation.

Sommerfeld model – its consequences – electron-lattice interaction (Quantitative only) – Bloch function -Motion of electron in periodic potential –Kronig - Penny model – Formation of energy bands in solids –Brillouin zones–Concept of effective mass –Distinction between metals, insulators and semiconductors.

UNIT–III: Semi conduct or Physics

Intrinsic and extrinsic semiconductors–Expression for position of Fermi levels and carrier concentrations – Variation of Fermi level with temperature – np product – Carrier mobility, conductivity and their variation with temperature – Direct and indirect band gap semiconductors – Differences and examples –Hall effect - Continuity equation – Drift and Diffusion – Einstein relation – Generation, Recombination and life time of non-equilibrium carriers – Heyness- Schockley experiment – Determination of life time, diffusion length of minority charge carriers.

UNIT–IV: Super conductivity

Concept of zero resistance–Magnetic behavior–Distinction between a perfect conductor and superconductor–Meissnereffect–Isotopeeffect–Specificheatbehavior–Two-fluidmodel–

Expression for entropy difference between normal and superconducting states – London's equations –Penetration depth – BCS theory –Josephson junctions – SQUIDS and its applications - Applications ofsuperconductors –High TCsuperconductors–Preparation– Properties.

Books for Study

1. Solid State Physics, C.Kittel, Edition:8th 2012, John Wiley & Sons.
2. Solid State Physics, A.J.Dekkar, Edition: 1st,2000.Macmillan India Ltd.
3. Solid State Electronic Devices, B.G.Streetman. Edition 7th,2018,Pearson Education India
4. Elementary Solid State Physics, M.Ali Omar,1993,Addison-Wesley.
5. Solid State Physics, M.A.Wahab, Edition:3rd, 2020,NarosaPublishingHouse.
6. HighT_C Super conductivity, C.N.R.Rao and S.V.Subramanyam, world scientific publishing company,1989
7. Solid State Physics, S.O.Pillai.Edition:6th,2009, New Academic Science Ltd
8. Solid State Physics, S.L.Kakani and C.Hemarajan, Edition: 4th,2005,Sultan Chand andSons
9. Electrons in Solids, Richard H.Bube,Edition 3rd,1992 Elsevier,
10. Solid State Physics by R.K. Puri V.K. Babbar Edition: 1st 2017. S.Chand.

(Compulsory Foundation)

PHY-103(a)	Analog and Digital Electronics	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about electronics

Course Objectives: The aim and objective of the course on **Analog and Digital Electronics** is to introduce the students of M.Sc. class to the formal structure of the subject and to equip them with the knowledge of semiconductor physics, basic circuit analysis, first-order non linear circuits, OPAMP based analog circuits and introduction to digital electronics so that they can use these in various branches of physics as per their requirement.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand working of Different Semiconductor devices (Construction, Working Principles and V-I characteristics) and their applications.
CO2	Explain the construction and working of Operational amplifiers and applications
CO3	Design Digital circuits and their applications.
CO4	Understand the working of various analog communication techniques

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	2	2	1	2	1	2	2	2
CO2	3	3	2	1	2	2	1	2	1	2	2	2
CO3	2	2	3	2	2	2	1	2	1	2	2	2
CO4	3	3	2	1	2	2	1	2	1	2	2	2

(Compulsory Foundation)

PHY103(a): Analog and Digital Electronics

UNIT–I: Introduction to Electronic Devices:

Field Effect Transistor (FET): Structure and working of JFET, Characteristics, and parameters of JFET. Advantages of FET over BJT. FET as switch and Amplifier-Application of FET as voltage variable resistor. Structure of MOSFET, depletion type and enhancement type, MOSFET Characteristics, MOSFET as variable resistor, Concept of CMOS. Structure, working and Characteristics of UJT. Application of UJT as a Relaxation oscillator.

UNIT–II: Operational Amplifiers:

Block diagram of a typical Op-Amp, differential Amplifier, Comparator open loop configuration, inverting and non-inverting amplifiers. Op-amp with negative feedback, voltages hunt feedback, effect of feedback on closed loop gain, input resistance, output resistance, CMRR, frequency response, slewrate.

Instrumentation Amplifier, integrator and differentiator. Wave form generators (Square and triangle). Filters (Low pass, high pass and Band pass). Analog to Digital data converters (ADC)and Digital to Analog conversion (DAC).

UNIT–III: Digital Electronics

Combinational Logic: Multiplexers, Decoder, Demultiplexer, Data selector, Multiplexer, Encoder. Sequential Logic: Flip–Flops, A1-bit memory, The RS Flip-Flop, JK Flip – Flop, JK Master Slave Flip–Flops, T Flip-Flop, D Flip-Flop, Shift Registers, Serial-in Serial-out, Serial-in Parallel-out, Parallel-in Serial-out, Parallel-in Parallel-out Registers. Asynchronous and Synchronous Counters.

UNIT–IV: Communication Electronics

Introduction to Modulation (AM & FM), Sampling Theorem, Low pass and Band pass signals, PAM, Channel BW for a PAM signal. Natural sampling, Flat-top sampling. Signal recovery through holding. Quantization of signals, PCM transmission, Quantization of noise, Differential PCM, Delta Modulation, Adaptive Delta modulation CVSD. Signal to noise ratio in PCM and Delta Modulations.

Books for Study

1. Micro Electronics by Milliman and Halkias.TMH Publications
2. OP-Amps & Linear Integrated Circuits, by Ramakanth A.Gayakwad,PHI,2ndEdition,1991.
3. Digital Systems by Ronald J. Tocci, 6th Edition, PHI, 1999.
4. Digital Principles and Applications by A.P. Malvino and Donald P.Leach, Tata McGraw-Hill, New Delhi, 1993.
5. Principles of Communications by Taub and Schilling, Mc-GrawHill Publication.
6. Electronic Devices and Circuit Theory by Robert Boylested and Louis Nashdsky–Jose Kanedy & Division. PHI, New Delhi, 1991
7. Electronic Principles by Malvino, 6th Ed.TMH, 2017
8. Linear Integrated circuits by Roy Choudhry, Pearson,2018
9. Op-Amps – D.K. Mahesh, PHI

(Compulsory Foundation)

PHY-103(b)	Computational Methods and C language	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level physics

Course Objectives: The aim and objective of the course on **Computational Methods and C language** is to familiarize the students of M.Sc. students with the numerical methods used in computation and programming using any high level language such as C,etc., so that they can use these in solving simple physics problems.

Course Outcomes: At the end of the course, the student will be able to

CO1	Apply basics knowledge of computational physics in solving the physics problems.
CO2	Programme with the C or any other high-level language.
CO3	Use various numerical methods in solving physics problems.
CO4	Analyze the outcome of the algorithm/program graphically.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	2	3	2	3	2
CO2	3	3	3	1	2	1	1	1	3	2	3	2
C O3	3	3	3	2	2	1	1	2	1	2	2	2
CO4	3	3	3	3	2	2	2	2	2	2	2	2

(Compulsory Foundation)

PHY103(b):Computational Methods & C Language

UNIT–I:(a) Fundamentals of C language

C character set–Identifiers and keywords–Constants–Variables–Datatypes–Declarations of variables–Declaration of storage class–Defining symbolic constants–Assignment statement. Operators: Arithmetic operators–Relational operators–Logic operators–Assignme nt operators–Increment and decrement operators–Conditional operators.

(b) Expressions and I/O statements: Arithmetic expressions–Precedence of arithmetic operators–Type converters in expressions–Mathematical(library) functions–Data input and output -Get char and put char functions– Scan f– Print f–Simple programs.

(c) Control statements: If-Else statement – Switch statement – The? operator – GO TO – While, Do-while, FOR statements – BREAK and CONTINUE statements.

UNIT–II:(a) Arrays

One dimensional and two-dimensional arrays – Initialization – Type declaration – Inputting and outputting of data for arrays– Programs of matrices addition, subtraction and multiplication.

(b) User Define functions: The form of C functions – Return values and their types – Calling a function – Category of functions. Nesting of functions. Recursion. ANSI C functions –Function declaration. Scope and lifetime of variables in functions.

(c) Pointers: Accessing the address of variable. Declaration and Initialization of pointer variables. Accessing the value of the variable through its pointer. Pointer Expressions- Pointers and Arrays – Pointers and structures.

UNIT– III: Linear and non-linear equations

(a) Solution of Algebraic and transcendental equations – Bisection, Falsi position and Newton-Rhapson methods– Basic principles– Formulae–Algorithms.

(b) Simultaneous equations: Solutions of simultaneous linear equations – Gauss elimination and Gauss-Seidel iterative methods -Basic principles –Formulae–Algorithms

UNIT–IV:(a) Interpolations

Concept of linear interpolation – Finite differences – Newton's and Lagrange's interpolation formulae –Principles and Algorithms Curve fitting – regression – Least square fitting – Linear and quadratic**.**

(b) Numerical differentiation and integration: Numerical differentiation –algorithm for

evaluation of first order derivatives using formulae based on Taylor's series – Numerical integration– Trape zooidal and Simpson's1/3 rule – Formulae–Algorithms.

(c) Numerical solution of ordinary differential equations: Euler, method, Fourth order Runga-Kutta Method.

Books for Study

1. Programming with 'C'–Byron Gottfried, 4th Edition, Tata Mc Graw Hill, 2010.
2. Programming in 'C' –Balaguruswamy,8th Edition, Tata Mc Graw-Hill,1990.
3. Numerical Methods, E. Balaguru swamy, Tata Mc GrawHill,1999.
4. Computer oriented numerical methods–Raja Raman,4th Edition, PHILearning,2018.
5. Let Us C, Yeswanth Kanetkar,17th Edition, Infinity Science Press, 2008.

(Compulsory Foundation)

PHY-103©	Sensors and Transducers	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level physics

Course Objectives: The aim and objective of the course on Sensors and Transducers is to familiarize the students of M.Sc. students with the various electronic sensors used in the industry and to understand the working principles of the sensors so that they can design and use them in industry or in real time applications.

Course Outcomes: At the end of the course, the student will be able to

CO1	Apply basics knowledge of sensors and transducers in understanding the measurement systems.
CO2	Study and understanding of various types of sensors
CO3	Study and understanding of various types of Transducers
CO4	Analyze the outcome of the signal conditioners like filters, detectors and amplifiers

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	2	3	2	3	2
CO2	3	3	3	1	2	1	1	1	3	2	3	2
CO3	3	3	3	2	2	1	1	2	1	2	2	2
CO4	3	3	3	3	2	2	2	2	2	2	2	2

(Compulsory Foundation)

PHY103(c):Sensors and Transducers

UNIT–I: General Introduction to sensors/transducers

Definition of a transducer/sensor. Role of a transducer in a generalized measurement system. Classification of transducers. Classification of transducers. Significant parameters of transducer. Temperature scales. Mechanical temperature sensors. Platinum resistance thermometer. Thermistors. Thermocouples.

UNIT–II: Displacement and strain transducers

Displacement transducers- Variable resistance, inductance and capacitance. Linear voltage differential Transformer (LVDT) Strain- Definition, Principal of working of strain gauges. Gauge factor. Types of strain gauges. Materials for strain gauges. Temperature compensation. Application

UNIT–III: Opto-electronic transducers

Photoemission tube. Photomultiplier cell. Photo conductive cell. Photo voltaic cell (solar cell). Photodiode, Photo–transistor, Photo FET, Light emitting diode. Liquid crystal display. Opto electronic couplers. Laser diode.

UNIT–IV: Single conditioners (Filters, Detectors & Amplifiers)

Filters – Integrators, Differentiators and active filters. Detectors Peak Detectors sample and _hold circuits. Phase sensitive detector and precision rectifiers, Amplifiers– chopper stabilized DC amplifiers. Instrumentation amplifiers. Logarithmic and anti-logarithmic amplifiers Isolation amplifiers, Lock in amplifiers.

Books for Study

1. Instrumentation Measurement Analysis, NakraandChaudary,4th Edition, TataMcGraw-Hill,1985.
2. Instrumentation- Devices and Systems, Rangan, Mani and Sharma,2nd Edition, Tata Mc GrawHill,1983.
3. A course in Electrical and Electronic Measurements and Instrumentation, AK Sawhney, 4th Edition, Dhanpat Rai & Company, 2016.
4. Instrumental Methods of Analysis, Willard, Meritt, Dean and Seattle,7th Edition, Van Nostr and,1981.
5. Hand Book of Biomedical Instrumentation, RS Khandpur,3rd Edition, Tata Mc Graw-Hill,1987.
6. Fundamentals of Electronic Devices, David A. Bell, 5th Edition, Oxford University Press,2008.
7. An introduction to Operational amplifiers, SV Subramanyam,2nd Edition, Macmillan India,1980.

(ElectiveFoundation)

PHY-104(a)	Atomic and Molecular Physics	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level spectroscopy

Course Objectives: The aim and objective of the course on **Atomic and Molecular Physics** for the students of M.Sc. Physics is to equip them with the knowledge of Atomic, Rotational, Vibrational, Raman, and Electronic spectra.

Course Outcomes: At the end of the course, the student will be able to

CO1	Have the basic knowledge of different atomic models, quantum nos and atomic spectra.
CO2	Understand the classical/quantum description of effect of magnetic field and Electric field on spectral lines.
CO3	Know the different types of rotation of the molecules and rotational constants and intern structure of the molecules.
CO4	Study the vibrational spectra of molecules and applications of vibrational spectra of molecules and applications of vibrational spectra

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	1	1	2	2	3	1	2
CO2	2	2	3	3	2	1	2	2	2	3	1	1
CO3	2	2	3	3	2	1	2	2	2	3	1	3
CO4	2	2	3	3	2	1	2	2	2	3	1	3

(ElectiveFoundation)

PHY104(a): Atomic and Molecular Physics

UNIT-I: Atomic Spectra

Introduction: Hydrogen atom (one electron atom) - quantum numbers- Spectra of hydrogen atom- Spectra of alkali elements- Fine structure-Elements with more than one valence electron-Forbidden transitions and selection rules- Vector atom model– Spin-orbit interaction energy-Stern-Gerlach experiment-Experimental setup to demonstrate S-G **-** Coupling schemes- Spectral terms and term symbols based on electron configuration - LS coupling - JJ coupling- Interaction energies in LS and JJ couplings - Hund's rule of multiplicity- Pauli's exclusion principle-Equivalent and non-equivalent electronic systems.

UNIT-II: Zeeman and Stark Effects

Introduction: Zeeman effect- Normal and anomalous Zeeman effects - Experimental details – Magnetic moment of atom and Lande's 'g'-factor - Zeeman effect in sodium atom - Lande g-formula for LS and JJcouplings-Paschen-Backeffect-Splittingofsodiumlinesandselectionrules-Starkeffect-Experimental details - Weak and strong field effects – linear and quadratic Stark effects-Width of spectral lines.

UNIT-III: Diatomic Molecular Spectroscopy–Rotational Energies

Introduction–Rotational, vibrational, electronic spectra of diatomic molecules–types of molecules–Linear, symmetric top, asymmetric top and spherical top molecules –Rotational spectra of a diatomic molecule as rigid rotator– Energy levels and spectra of non-rigid rotor –Intensity of rotational lines-Rotational spectra of polyatomicmolecule–Rotationalanalysisofelectronicspectra-Evaluation of rotational constants-Effect of iso topic substitution on rotational levels–Stark splitting of rotational lines–Stark modulated microwave spectrometer – Applications of rotational spectroscopy

UNIT-IV: Diatomic Molecular Spectroscopy –Vibrational Spectra

Introduction–Vibrational spectra of diatomic molecule–Diatomic molecule as simple harmonic oscillator–An harmonic oscillator–Energy levels and spectrum– Molecule as vibrating rotator – PQR branches – progressions and sequences –Vibrational analysis of electronic spectra-Deslander's table–Evaluation of vibrational constants–Morse potential energy curve
– Frank-Condon principle – Intensity distribution in absorption and emission spectra -Effect of isotopic substitution on vibrational bands–IR spectrometer–FTIR spectroscopy–Principle–Interferometer arrangement–advantages- Applications of vibrational spectroscopy

(ElectiveFoundation)

Books for Study

1. Introduction to Atomic Spectra, H.E. White, McGraw-Hill Kogakusha. Ltd., New Delhi (1934).
2. Elements of Spectroscopy by Gupta, Kumar, Sarma, Pragati Prakasan,(2012).
3. Fundamentals of Molecular Spectroscopy, C.N. Banwell and E.M. Mc Cash, Tata McGraw-Hill Publishing Company Ltd., New Delhi.(1994).
4. Spectroscopy, Volume I and III, B.P. Straughan and S. Walker, John Wiley & Sons Inc., New York. (1976).
5. Introduction to Molecular Spectroscopy, G.M.Barrow, Mc Graw-Hill Book company, Inc., New York. (1962).
6. Spectra of Diatomic Molecules, G. Herzberg, D. Van Nostr and Company Inc, New York,(1950).
7. Molecular Spectroscopy, J.M.Brown, Oxford Science Publications, Oxford.(1998).
8. Molecular Structure and Spectroscopy, G. Aruldhas, Prentice- Hall of India, Pvt., New Delhi,(2005).

(ElectiveFoundation)

PHY-104(b))	Optical, Microwave and Satellite Communications	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Basic Electronics

Course Objectives: The aim and objective of the course on Optical, Microwave and Satellite Communications for the students of M.Sc. Physics is to equip them with the knowledge of Optical, microwave and satellite Communications.

Course Outcomes: At the end of the course, the student will be able to

CO1	understand microwave communication system
CO2	Understand functioning of Radar systems
CO3	Study different digital modulation techniques
CO4	Differentiate losses in optical fiber link and state transmission characteristics of optical fiber

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	1	1	2	2	3	1	2
CO2	2	2	3	3	2	1	2	2	2	3	1	1
CO3	2	2	3	3	2	1	2	2	2	3	1	3
CO4	2	2	3	3	2	1	2	2	2	3	1	3

(ElectiveFoundation)

PHY104(b): Optical, Microwave and Satellite Communications

UNIT– I: Microwave Communications

Advantages and Disadvantages of microwave transmission, loss in free space, propagation of microwaves, atmospheric effects on propagation, Fresnelz one problem, ground reflection, fading Sources, Detectors, components, antennae used in MW communication systems.

UNIT–II: **Radar Systems**

Radar block diagram and operation, radar frequencies, pulse considerations. Radar range equation, derivation of the radar range equation, minimum detectable signal, receiver noise, Signal to noise ratio, Integration of radar pulses, Radar cross section, Pulse repetition frequency, Antenna parameters, System Losses and propagation losses, Radar transmitters, receivers, Antennas, Displays.

UNIT-III: Digital Communications

Digital Communications: Principles of digital communications, digital radio, frequency shift keying, phase shift keying, quadrature amplitude modulation.

UNIT–IV: **Optical and Satellite Communications**

Optical Communications: Optical transmitter and receiver for analog and digital communications, coherent and non-coherent detection, signal to noise ratio, error rate, coding, synchronization and equalization in optical data transmission.

Satellite Communications: Orbital satellites, geo stationary satellites, orbital patters, look angles, orbital spacing, satellite systems, Link modules.

Books for Study

1. Microelectronics by Jacob Millman, 2nd Edition, Mc Graw-Hill International Book Co., New Delhi, 1990.
2. Optoelectronics: Theory and Practice, edited by Allen Chappel, 11th Edition, Mc Graw Hill, International Book Co., New York,1978.
3. Microwaves" by K.C. Gupta,2nd Edition, Wiley Eastern Limited, New Delhi,1979.
4. Advanced Electronics Communications Systems by Wayne Tomasi, 6th Edition, Prentice Hall,1998.

(Elective Foundation)

PHY-104(C)	Computer Architecture and Networking	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Basic Physics and Electronics

Course Objectives: The aim and objective of the course on Computer Architecture and Networking for the students of M.Sc. Physics is to equip them with the knowledge of Computer architecture and working and also various networking protocols.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand basics of logic circuits and computer functional blocks
CO2	Know machine instructions and assembly languages
CO3	Comprehend I/O organization
CO4	Appreciate differences between different memory devices

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	1	1	2	2	3	1	2
CO2	2	2	3	3	2	1	2	2	2	3	1	1
CO3	2	2	3	3	2	1	2	2	2	3	1	3
CO4	2	2	3	3	2	1	2	2	2	3	1	3

PHY104(c):Computer Architecture and Networking

UNIT– I: Logic Circuits

Logic functions – synthesis of logic functions – Minimization of logic - Synthesis with NAND and NOR gates – Implementation of Logic gates – Flip-Flops – Registers and shift registers – counters – decoders – multiplexers – PLDs – sequential circuits. Basic structure of computers: Functional units – Basic operational concepts – Bus structures performance – Multi processors and multi computers.

UNIT–II: Machine Instructions and programs

Numbers, arithmetic operations and characters – memory locations and address, operations – Instructions and instruction sequencing–addressing modes–assembly language–basic input/output operations–subroutines–encoding of machine instruction. Instructions–assembly languages–O/I operations-registers and addressing–instructions–assembly language –instructionsof68000andIntelPentium.

UNIT–III: Input/output organization

Accessing I/O devices – interrupts – direct memory access – buses 240 interface circuits – standard I/O interface.

UNIT– IV: Memory System

Concepts semiconductor RAM memories – Randomly memories - cache memories performance considerations – virtual memories – memory management requirements – secondary storage arithmetic: addition and subtraction of signed numbers – design of fast adders – multiplication of positive numbers–signed oper and multiplication–fast multiplication–integer division –floating point numbers and operations.

Books for Study

1. Hamacher CV ranesic Z and Zaky S. Computer Organization, 5th Edition, Mc Graw Hill 2002.
2. Stallings W. Computer Organization and Architecture 6th Edition, Pearson Education 2003
3. Mano MM, Computer System Architecture 3rd Edition Phi 1993
4. Yarbrough J.M. Digital Logic Applications and Design, Thomas Learning 1997
5. Heuring VP and Jordan HF Computer Systems Design and Architecture, Pearson Education 1977

(Mandatory Core)

PHY201	**Statistical Mechanics**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Understanding of graduate level statistical mechanics

Course Objectives: The aim and objective of the course on **Statistical Mechanics** is to equip the M.Sc. student with the techniques of statistical ensemble theory so that he/she can use these to understand the macroscopic properties of the matter in bulk in terms of its microscopic constituents.

Course Outcomes: At the end of the course, the student will be able to

CO1	Use ensemble theory to explain the behavior of Physical systems
CO2	Understanding
CO3	Explain the statistical behavior of Bose-Einstein and their applications.
CO4	Fermi –Dirac Statistics & Fluctuations

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	-	-	-	-	-	1	1	-	-	-
CO2	3	3	3	1	3	2	1	2	2	1	1	1
CO3	3	3	3	1	2	2	1	2	2	1	1	1
CO4	3	3	3	1	2	2	1	2	2	1	1	1

PHY201: Statistical Mechanics

UNIT-I: Ensembles

Phase space – Concept of ensembles – Types of ensembles - Ensemble average -Liouville's Theorem – Microcanonical ensemble: ideal gas – Gibb's paradox and its resolution – Entropy and probability – Canonical ensemble – Ideal gas in canonical ensemble –Grand canonical ensemble–Ideal gas in grand canonical ensemble– Comparison of various ensembles.

UNIT–II: Partition Functions

Canonical partition function – Molecular partition function – Transnational partition function – Rotational partition function – Vibrational partition function – Electronic and Nuclear partition functions – Applications of Rotational partition function – Applications of vibrational partition function to solids

UNIT–III: Maxwell –Boltzmann and Bose –Einstein Statistics

Maxwell-Boltzmann distribution- Distribution of velocities–Experimental verification-Calculation of mean values–Equipartition energy- Bose–Einstein distribution, Bose–Einstein condensation, Black body radiation and the Planck's radiation law - Dulong and Petit's law - Einstein and Debye's theories of heat capacities - Liquid helium – Two fluid model of liquid helium II– Super fluid phase of ^{3}He.

UNIT–IV: Fermi –Dirac Statistics & Fluctuations

Fermi - Dirac distribution – Electrons in metals – Thermionic emission – Magnetic susceptibility of free electrons – White dwarfs – Fluctuations in ensembles, On sagar's one dimensional and reciprocal rotations and their applications to thermos electric phenomena, Kelvin's first and second equations: One dimensional random walk–Random walk and Brownian motion.

Books for Study

1. Statistical Mechanics by B.K. Agarwal, Melvin Eisner- Publisher John Wiley & Sons,1988
2. Statistical Mechanics and properties of Matter by ESR Gopal–Publishers Ellis Horwood, 1974
3. Statistical and Thermal Physics by F. Reif-Publisher WavelandPress,2009
4. Elementary Statistical Mechanics by C.Kittel-Dover Publications, 2012
5. Statistical Physics by Bhattacharjee, Allied Publishers Limited,2000
6. Thermal Physics by Kittel and Kremer –W.H. Freeman and Company, 1980

(Mandatory Core)

PHY- 202	Electromagnetic Theory, Lasers and Modern Optics	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level optics and Lasers

Course Objectives: Course Objectives: The aim and objective of the course on Electromagnetic Theory, Lasers and Modern Optics is to expose the M.Sc. students to the basics of the challenging research field of optical fibres and their use in nonlinear optics.

Course Outcomes : At the end of the course, the student will Analyze the propagation of light in optical fiblbe able to

CO1	Understand the electro statistics and magneto statistics and also the properties of propagation of electromagnetic radiation in different media
CO2	Know about the properties of laser beam and the working of different lasers and applications
CO3	Describe the fourier analysis in optics problems and to understand the concept of holography
CO4	Analyze the propagation of light in optical fibers and to know the various applications of optical fibers

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	1	-	1	-	1	-	3	-	1
CO2	3	2	1	1	1	1	-	1	-	3	-	1
CO3	2	2	-	1	-	1	-	1	-	3	-	1
CO4	3	2	1	1	1	-	-	1	-	3	-	1

PHY202: Electromagnetic Theory, Lasers and Modern Optics

UNIT– I: Electromagnetic Theory

Electromagnetic radiation; Introduction to electrostatics and magnetostatics–Electro dynamics: emf – electromagnetic induction – Maxwell's equations in differential and integral forms- Retarded potentials – Radiation from moving point charge and oscillating dipoles –Linear antenna–Radiation resistance –electric quadrupole radiation - Lienard –Wiechert potentials.

General wave equation – Propagation of light in isotropic dielectric medium – Dispersion – Propagation of light in conducting medium- skin depth–Reflection and refraction at the boundary of a dielectric interface– Fresnel's equations– Propagation of light in crystals-Double refraction.

UNIT–II: Lasers and Non-Linear Optics

Introduction to lasers – Spontaneous and stimulated emission – Laser beam properties – Einstein coefficients – Population inversion – Pumping schemes – Losses in laser radiation – Threshold condition for laser oscillation – Laser cavity - Q factor– different experimental methods – Rubylaser- Ga Aslaser -He-Nelaser–Argon ionlaser– CO_2laser–Laser applications.

Basic Principles – Origin of optical nonlinearity - Harmonic generation – Second harmonic generation–Phase matching condition–Third harmonic generation–Optical mixing–Parametric generation of light – Parametric light oscillator – Frequency up conversion – Self focusing of light -Guided wave optics-Pulse compression -Optical solutions.

UNIT–III: Holography and Fourier Optics

Introduction to Holography – Basic theory of Holography – Recording and reconstruction of Hologram–Diffuse object illumination– Speckle pattern–Frene land Fourier transform Holography– Applications of Holography.

Introduction to Fourier optics – Two dimensional Fourier transforms – Transforms of Dirac-delta function – The convolution integral – convolution theorem- Spectra and correlation – Parsevel's formula–Apodization–Array theorem– Fourier methods in diffraction- Fraunhouffer diffraction of single slit, double slit and transmission grating using Fourier method.

UNIT–IV: Fiber Optics

Total internal reflection - Optical fiber modes and configuration – Single mode fibers – Graded index fiber structure – Fiber materials and fabrication – Mechanical properties of fibers – Fiberoptic cables – Attenuation – Signal distortion on optical wave guides - Erbium doped fiber amplifiers – Solitons in optical fibers - Block diagram of fiber optic communication system - Applications of optical fibers in communication and medicine.

Books for Study

1. Introduction to Electro dynamics, D.J. Griffiths, Prentice-Hall, India, 2015
2. Electromagnetics, B.B. Laud, Wiley-Eastern, New Delhi, 2011
3. Introduction to Modern Optics, G.R. Fowels,2012
4. Lasers and their Applications, M.J. Beesly, Taylor andFrancis,1976
5. Lasers and Non-Linear Optics, B.B. Laud, Wiley Eastern Ltd.,1983
6. Optics, E.Hecht, Addison Wiley,1974
7. Optical Fiber Communications, G. Keiser, Mc Graw HillBook, 2000

(Compulsory Foundation)

PHY-203(a)	Nuclear Physics	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level physics

Course Objectives: The aim and objective of the course on **Nuclear Physics** is to familiarize the students of M.Sc. class to the basic aspects of Nuclear Physics like static properties of nuclei, radioactive decays, nuclear forces, nuclear models, and nuclear reactions so that they are equipped with the techniques used in studying these things.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand the basics of nuclear forces and their characteristics and also about various nuclear models
CO2	Know the various types of nuclear reactions and nuclear decay system
CO3	Understand the basic principles in nuclear accelerators and rectors and also their applications
CO4	Describe the various elementary particles and their conservation layers.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	2	1	1	2	1	2	2	2
CO2	3	3	1	1	2	1	1	2	1	2	2	2
CO3	3	3	1	1	2	1	1	2	1	2	2	2
CO4	3	3	1	1	2	1	1	2	1	2	2	2

PHY203 (a): Nuclear Physics

UNIT– I: Nuclear Forces and Models

Nuclear Forces: Characteristics of nuclear forces –Ground state of Deuteron–Proton–Proton scattering– Neutron – Proton scattering–Meson theory of nuclear forces.
Nuclear Models: Introduction–The liquid drop model–Bethe-Weizacker semi-empirical binding energy equation and its applications – Nuclear shell model – Energy levels and calculation of angular momentum– Collective model.

UNIT–II: Nuclear Reactions and Decays

Nuclear Reactions: Types of nuclear reactions–Compound nuclear reactions–Nuclear cross section–Resonance theory– Briet Wigner formula.
Nuclear Decays: Nuclear transformations–Radioactivedecay–Alphadecay–Gamow'stheory–Betadecay–Fermi theory–Selection rules – Interaction of gamma radiation with matter–Photo electric effect
–Compton scattering–Pair production.

UNIT–III: Nuclear Accelerators and Reactors

Nuclear Accelerators: Introduction – Linear accelerators – Drift tube and Wave guide accelerators –Low energy circular accelerators–Cyclotron and Betatron–High energy circular accelerators–Synchrotron and Microtron.
Nuclear Reactors: Nuclear fission and fusion reactions – Nuclear chain reactions – Four factor formula –The critical size of a reactor – General aspects of reactor design – Classification of reactors – Power reactors (elementary aspects only).

UNIT–IV: Elementary Particles

Discovery and classification of elementary particles–Types of interactions –Conservation laws–Iso-spin, parity, charge conjugation – Time reversal – CPT theorem – Properties of leptons, mesons and baryons – Elementary particle symmetries (SU_2 and SU_3 symmetries) – Quark model – Search for Higg's particle –elementary ideas.

Book for Study

1. Nuclear Physics, Irving Kaplan, Narosa Pub. (1998).
2. Nuclear Physics, Theory and experiment–P.R. Roy and B.P. Nigam, New Age Int.1997.
3. Atomic and Nuclear Physics (Vol.2), S.N. Ghoshal, S. Chand & Co.(1994).
4. Nuclear Physics, D.C. Tayal, Himalaya Pub.(1997).
5. Atomic and Nuclear Physics, R.C. Sharma, K. Nath & Co., Meerut(2007).
6. Nuclei and Particles, E.Segre, WA Benjamin. Inc., (1965).
7. Introduction to Nuclear Physics, H.A. Enge, Addison Wesley(1975).
8. Introduction to Nuclear Physics, K.S. Krane, John Wiley & Sons(1988).

(Compulsory Foundation)

PHY-203(b)	IC fabrication Techniques	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level physics

Course Objectives: The aim and objective of the course on **IC fabrication Techniques** is to familiarize the students of M.Sc. class to the basic aspects of IC fabrication, different techniques in preparing and processing of IC technology and deposition techniques.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand and compare crystal growth and Epitaxial deposition techniques
CO2	Understand structure and process of oxidation
CO3	Study the diffusion processes
CO4	Understand vacuum deposition techniques

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	2	1	1	2	1	2	2	2
CO2	3	3	1	1	2	1	1	2	1	2	2	2
CO3	3	3	1	1	2	1	1	2	1	2	2	2
CO4	3	3	1	1	2	1	1	2	1	2	2	2

PHY 203 (b): IC Fabrication Techniques

UNIT– I: IC Fabrication Technology

Wafer preparation: Silicon crystal growth, Wafer orientation, Sawing and polishing, Crystal orientation, Doping of crystals during growth.

Epitaxial deposition: Introduction theory, Growth of an Epitaxial layer, evaluation of Epitaxial layers.

UNIT– II: Oxidation

Introduction, equipment for thermal oxidation, oxidation process, oxide evaluation, recent advances in oxidation technology, oxide thickness determination, oxidation function, redistribution of dopant atoms during thermal oxidation, anodic oxidation.

UNIT-III: Impurity

Introduction and redistribution, the idea of diffusion, diffusion process, diffusion analysis, ion implementation,

UNIT–IV: Photomasking

Introduction – generation of photomask. Metallization: Metallization of requirements, vacuum deposition, deposition techniques, vacuum deposition cycle.

Books for Study

1. Instrumentation Measurement and Analysis by Nakra and Choudary, 4th Edition, Tata Mc Graw-Hill, 1985.
2. Instrumentation–Devices and Systems by Rangan, Sarma and Mani, 2nd Edition, Tata Mc Graw-Hill, 1997.
3. Measurement of Systems Applications and Design by Earnest O.Doeblin, 7th Edition, Mc Graw-Hill,1990.
4. A course in Electrical; and Electronic Measurements and Instrumentation by A.K. Sawhney, 3rd Edition, Dhanpat Rai &Company, 2016.
5. Electronic Instrumentation and Measurements Techniques, Cooperand Albert D.Helfriek, 3rd Edition, Pearson India Education, 2016.
6. Applied Electronics by G.K. Mithal, 20th Edition, Khanna Publishers, 1997.
7. Principles of Industrial Instrumentation by D.Patranabis,Tata Mc Graw-Hill,1976.

(CompulsoryFoundation)

PHY-203(c)	Advanced Microprocessors and Its Applications	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level physics

Course Objectives: **The aim and objective of the course on Advanced Microprocessors and Its Applications** is to familiarize the students of M.Sc. class to the basic aspects of micro processors and different programming and interfacing techniques.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understanding of microprocessor architecture and evaluation
CO2	Develop skill of writing programs in ALP for various applications of 8085 & 8051
CO3	Interface various peripherals with 8085 & 8051.
CO4	Understanding interrupts and direct memory access

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	2	1	1	2	1	2	2	2
CO2	3	3	1	1	2	1	1	2	1	2	2	2
CO3	3	3	1	1	2	1	1	2	1	2	2	2
CO4	3	3	1	1	2	1	1	2	1	2	2	2

(CompulsoryFoundation)

PHY203(c): Advanced Micro processors and Its Applications

UNIT–I: Microprocessors and its Architecture

Internal microprocessor architecture, Real mode and protected modes of memory addressing, Memory paging.

Addressing modes-Data addressing modes, program memory – addressing modes, Stack - memory addressing modes.

Instruction Set - Data movement instruction, Arithmetic and logic Instruction, Program control instructions, Assembler details.

UNIT–II: Programming the Micro processor

Modular programming, using the keyboard and video display, Data conversions.

Hardware Specifications - Pin - outs and the pin functions, clock - generator (8284A), Bus buffering and latching, Bus timing, Ready and Wait state, Minimum mode versus maximum mode.

UNIT–III: Memory Interface

Memory devices, Address decoding,8088and80188 (8-bit) memory interface, 8086,80186, 80286and 80386 (16-bit) memory interface.

Basic I/O Interface - Introducing to I/interface, I/O port address decoding, 8255,8279, 8254, ADC and DAC (excluding multiplexed display& keyboard displayusing8255).

UNIT–IV: Interrupts

Basic interrupt processing, Hardware interrupts, expanding the interrupt structure,8259APIC.

Direct Memory Access-Basic DMA operation, 8237DMAcontroller.

Bus Interface -PCI bus.

Book for Study

1. B.B. Brey, “The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium pro processor architecture, programming and interfacing”, 4/e, PHI,1999.
2. K.J. Ayala, “The 8086 Microprocessor: Programming & Interfacing the PC” Penram International Publishing (India) Pvt. Ltd., 1995.
3. Douglas V.Hall, “Microprocessors and Interfacing, Programming and Hardware”,2/e, Mc Graw Hill, International Edition, 1992.
4. Muhammad Ali Mazidi and Janice Gillispie Mazidi, “The 80x86 IBMPC and Compatible Computers, (VolumesI &II)”. 2/e, Printice– Hall, Inc., 1998.
5. Walter A.Triebe land Avatar Singh, “Software, Hardware and Applications”PHI,1995.
6. Yu Cheng Lin and Glenn A. Gibson, “Micro computer systems: The 8086/8088 Family Architecture, Programming and Design”, PHI,1992.

(ElectiveFoundation)

PHY204(a)	**Mathematical Physics**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Understanding of graduate level mathematics

Course Objectives: The aim and objective of the course on **Mathematical Physics** is to equip the M.Sc. Students with the mathematical techniques that he/she needs for understanding theoretical treatment in different courses taught in this class and for developing a strong background if he/she chooses to pursue research in physics as a career.

Course Outcomes: At the end of the course, the student will able to

CO1	Understand the basics and applications of special functions in all the branches of Physics.
CO2	Use Fourier series and transformations as an aid for analyzing physical problems.
CO3	Apply integral transform to solve mathematical problems of Physics interest.
CO4	Formulate and express a physical law in terms of complex variables and simplify it by use of coordinate transforms.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	1	1	2
CO2	3	3	2	2	-	1	1	-	2	1	1	2
CO3	3	3	2	2	-	1	1	-	2	1	1	2
CO4	3	3	2	2	-	1	1	-	2	1	1	2

(ElectiveFoundation)

PHY204(a): Mathematical Physics

UNIT-I: Special Functions

Beta and Gamma Functions – Definitions and properties – Evaluation of integrals, Legendre, Bessel and Hermite differential equations– Solutions– Generating functions– Orthogonal properties of Legendre, Bessel and Hermite Functions (Proof not necessary)–Recurrence relations– (Proof for Legendre polynomials only).

UNIT-II: Integral Transforms

Fourier Transforms: Properties of Fourier transforms – Fourier sine and cosine transforms-Power in Fourier series **–** Modulation theorem, Fourier transform of impulse function, Constants, Unit step function and Periodic functions.

Laplace Transforms: Definition and notation – Properties of Laplace transforms – Laplace transforms of Dirac delta function and periodic functions (Square wave, sawtooth wave and triangular wave) –Inverse Laplace transforms– properties– Solution of linear differential equations with constant coefficients - Applications to LCR circuits and resonance of simple pendulum.

UNIT-III: Numerical Techniques

Solution of an equation – Bisection method, Regular False method, Newton – Rhapson method Solutions of simultaneous– Gauss elimination method and Gauss-Seidel method–Interpolations - Newton's interpolation and Lagrange's interpolation, Curve fitting – Method of Least squares. Numerical differentiation and integration – Trapezoidal rule and Simpson's 1/3 rule – Solutions of differential equations– Euler's method and Runga-kutta Methods.

UNIT–IV: Complex Variables

Functions– Complex differentiation- Analytic function-Cauchy–Riemann equations –Derivatives of elementary functions – Singular points and classification. Complex integration - Cauchy's theorem – Integrals of special functions – Cauchy's integral formula – Taylor's and Lorentz theorem (statements only) – Residues, calculations of residues - Residue theorem – evaluation of definite integrals.

(ElectiveFoundation)

Books for Study

1. Mathematical physics, B.D. Gupta,4th edition, Vikas publishing house,2010
2. Mathematical physics, B.S. Rajput, Pragati Prakashan Meerut, 2017
3. Special Functions for Scientists and Engineers, W.W. Bell, DoverPublications,2013
4. Laplace Transforms, Murray Spiegle, Schaum's outlineseries, Mc Graw Hill, International Book Company, NY, 2005
5. Applied Mathematics for Engineers, Louis A. Pipes, Lawrence R. Harvill, Courier Corporation, 2014
6. Theory and Properties of Complex Variables, Schaum's outlineseries, Murray R. Spiegel, Seymour Lipschutz, John J. Schiller, Dennis Spellman, Mc Graw-Hill, 1976
7. Complex Variables and Applications, Brown and Churchill, Mc Graw–Hill,2013
8. Applied Fourier analysis, Hweipiao Hsu, UnitechDivision,1984
9. An Introduction to Mathematical Physics, Suresh Chandra, Mohit Kumar Sarma Alpha Science International, 2013.

(Elective Foundation)

PHY204(b)	**Introduction to VLSI design**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Understanding of graduate level mathematics

Course Objectives: The aim and objective of the course on is to equip the M.Sc. Students with the **Introduction to VLSI design** that he/she needs for understanding theoretical treatment in different courses taught in this class and for developing a strong background if he/she chooses to pursue research in physics as a career.

Course Outcomes: At the end of the course, the student will able to

CO1	Demonstrate a clear understanding of CMOS fabrication flow and technology scaling.
CO2	Analyze CMOS based logic circuit
CO3	Realize logic circuits with different design styles
CO4	Understand Front & Back end design aspects of simple VLSI Digital circuits

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	1	1	2
CO2	3	3	2	2	-	1	1	-	2	1	1	2
CO3	3	3	2	2	-	1	1	-	2	1	1	2
CO4	3	3	2	2	-	1	1	-	2	1	1	2

PHY 204 (b): Introduction to VLSI Design

UNIT-I: **An Overview of VLSI and Logic Design with MOSFET**

Complexity and Design, Basic concepts, Ideal switches and Boolean operations, MOSFETs as switches, Basic logics gates in CMOS, Complex logic gates in CMOS, Transmission Gate circuits, Clocking and data flow control.

UNIT-II: Physical Structure and Fabrication of CMOS ICs

Integrated Circuit layers, MOSFETs, CMOS layers, Designing FET arrays, Overview of silicon processing, Material growth and deposition, Lithography, The CMOS process flow, Design rules.

UNIT-III: **Elements of Physical Design and Electrical Characteristics of MOSFETs**

Basic concepts, Layout of basic structures, Cell concepts, FET sizing and the unit transistor, Physical design of logic gates, Design hierarchies, MOS physics, nFET current-voltage equations, FET RC model, pFET characteristics, Modeling of small MOSFETs.

UNIT-IV: **Electronic analysis of CMOS logic gates**

DC characteristics of the CMOS inverter, Inverter switching characteristics, Power dissipation, DC characteristics: NAND and NOR gates, NAND and NOR transient response, Analysis of complex logic gates, Gate design for transient performance, Transmission gates and pass transistors.**Designing High-speed CMOS Logic Networks**- Gate delays, Driving Large capacitive loads, Logical effort, Bi CMOS drivers.

Book for Study

1. John P. Uyemura, “Introduction to VLSI circuits and Systems”, John Wiley & Sons Asia)Pet Ltd., 2003.
2. S.K. Ghandhi,“VLSI Fabrication principles”,2/e, John Wiley & Sons(Asia)Pte. Ltd., 2003.
3. S.M. Sze, “VLSI Technology”,2/e, Mc Graw-Hill, 1988.
4. N.H.E. Weste and K. Eshraghian, “Principles of CMOSVLSI design”, Pearson Education, Inc., 1999.
5. Yuan Taur and T.H. Ning, “Fundamentals of Modern VLSI devices”, Cambridge University, Press, 1998.
6. R.L. Geiger, P.E.Allen and N.R.Strader,“VLSI design Techniques for Analog and Digital Circuits”, Mc Graw-Hill, 1990.

(Elective Foundation)

PHY -204 (c)	Materials Science for Industrial Applications	L-5,T-1,P-0	4Credits

Pre-requisite: Course on Particle Physics

Course Objectives: The aim and objective of the course on Materials Science for Industrial Applications is to expose the students of M.Sc. students to experimental aspects of different equipment and methods used in the fields of Industrial applications

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand various experimental techniques for describing interaction of organic materials
CO2	Use error analysis for experimental data.
CO3	Knowledge about the different types of the Liquid crystals
CO4	Apply the knowledge of phase transformations for various applications

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	2	-	1	-	-	1	-	1	1	1
CO2	-	-	-	3	-	-	-	3	1	1	1	1
CO3	-	-	1	2	3	-	1	3	2	2	2	2
CO4	-	-	1	3	3	1	1	2	2	2	2	2

PHY 204 (c): Materials Science for Industrial Applications

UNIT– I: Organic materials and their properties

Introduction - polymerization mechanism. Structure and properties of polymers. Strengthening of polymers. Behavior of polymers. Deformation of polymers and their industrial use. Ceramic Materials: Introduction– Classification of ceramic. Structure of ceramics. Polymorphism. Properties of ceramic and their applications.

UNIT–II: Liquid Crystals

Introduction–classification, oriental order, Elasticity, magnetic effects, optical properties – applications.

Ferroelectrics: General properties of ferro electric materials. Theories of ferroelectricity. Thermo dynamic of Ferro electric transitions. Magnetic Materials: Classification. The domain structure. Soft and hard magnetic materials, Ferrites, ceramic magnets.

UNIT–III: Phase diagrams and phase transformation

The Phase rules. Unary and binary phase diagrams. Typical phase diagrams- coper-zinc systems. Iron-carbon system. Other applications of phase diagrams. Phase transformation. Nucleation and growth. Nucleation kinetics. Martensic transformation.

UNIT–IV: Thin films

Theories of thin film nucleation and growth. Thin film preparation – Rf sputtering. Chemical vapor deposition. Thickens measurements. Electrical and optical properties of thin films Applications.

Super conductivity: Messier Effect. The critical field. Theories of super conductivity. Tunneling and Josephson effect. High Tc super conductors. Application of super conductors.

Books for Study

1. Introduction to Solid State Physics, Charles Kittel VII edition, John Wiley & Sons.
2. Solid State Physics, A.J. Dekker, Mc Millan Publications.
3. Solid State Physics, M.A. Wahab, Narosa Publishing House.
4. Fundamentals of Solid State Physics, Saxena, Gupta, Saxena, Pragathi Publications, Meerut.
5. Solid State Physics, R.L. Singhal, Kedar Nath Ram Nath & Co.Pub.
6. Science of Engineering Materials, C.M. Srivastsava and C.Srinivasan, New Age Inter. Pub.
7. Crystal Growth, B.R. Pamplin, Pergmon Press.
8. Crystal Growth from High Temperature Solutions, D. Elwell and H.J. Scheel, Academic Press.

(MandatoryCore)

PHY-301	Introductory Quantum Mechanics	L-5,T-1,P-0	4Credits

Pre-requisite: Basic knowledge of wave mechanical quantum Mechanics

Course Objectives: The aim and objective of the course on **Introductory Quantum Mechanics** is to introduce the students of M.Sc. class to the formal structure of the subject and to equip them with the techniques of vector spaces, angular momentum, perturbation theory, and scattering theory so that they can use these in various branches of physics as per their requirement.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand the need for quantum mechanical formalism and its basic principles.
CO2	Appreciate the importance and implication of vector spaces, Dirac Ket Bra notations, eigen value problem.
CO3	Understand the need of approximate methods in solving problems
CO4	Understanding scattering theory and its importance.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	2	1	1	2	3	2	2
CO2	3	2	2	2	2	2	1	1	2	2	2	2
CO3	3	2	2	2	2	2	1	2	1	3	2	2
CO4	3	2	2	2	2	2	2	2	2	2	2	2

(MandatoryCore)

PHY 301: Introductory Quantum Mechanics

UNIT-I: Formulation and Simple Problems

Wave particle duality – Wave functions in coordinate and momentum representation- Postulates of quantum mechanics -Linear vector space: Hilbert space - Dirac's Bra and Ket notations-Hermitian operators and their properties-Matrix representation of an operator-Unitary operators-Unitary transformation - The Kronicker Delta and Dirac delta functions- Eigen values and Eigen functions for finite potential well and step barrier–Quantum mechanical tunneling.

UNIT-II: Quantum Dynamics and Simple Problems

Equations of motion - Schrodinger Picture- Heisenberg Picture- Interaction Picture-EquivalenceofvariousPictures-PoissonandCommutationbrackets-TheirProperties-EigenvaluesandEigenfunctionsforSimpleharmonicoscillator-Polynomial method and abstract operator method in one dimension- Eigen values and Eigen functions for a free particle and particle in a box in three dimensions.

UNIT-III: Approximate Methods

Time independent perturbation theory for non-degenerate levels: Perturbed harmonic oscillator, Normal Helium atom, Stark effect of the plane rotator. First order perturbation theory for degenerate levels: First order Stark effecting in hydrogen atom; Time dependent perturbation theory: Transition to continuum (Fermi Golden rule).

WKB approximation – Turning points and connecting formulae: Application to potential barrier. Variational methods.

UNIT-IV: Scattering Theory

Introduction: classical theory of scattering - Quantum theory of scattering - Method of partial wave analysis- Scattering by a perfectly rigid sphere- Greens function in scattering theory -Born approximation-Validity of Born approximation-optical theorem.

(MandatoryCore)

Books for Study

1. Quantum Mechanics: Concepts and Applications by Nouredine Zettili, Wiley, Ed.,2021
2. Introduction to Quantum Mechanics by David J.Griffiths and Darrell F.Schoeter, Third Ed., Cambridge University Press India PvtLtd.,2018.
3. Quantum Mechanics: G. Arul das PHI learning private limited Second edition, 2018
4. Quantum Mechanics: S.L. Kakani and H.M. Chandalia Sultan Chand and, Sons First Edition, 2004
5. Advanced Quantum Mechanics: B.S. Rajput, Pragati prakasan,2019
6. Quantum Mechanics: V.K. Thankappan, New Age International(P)Ltd., Publishers,1993
7. A Textbook of Quantum Mechanics: P.M. Mathews and K.Venkatesan, Tata Mc Graw Hill Publishing Company, 2008
8. Quantum Mechanics: S.L. Gupta, V. Kumar, H.V. Sharma and R.C. Sharma, Jai Prakash Nath and Company, 2007
9. An Introduction to Quantum Mechanics, P.T. Mathews Mc Graw Hill Publishing Company, 1974

(MandatoryCore)

PHY -302	Physics of Semiconductor devices	L-5,T-1,P-0	4Credits

Pre-requisite: Course on general Physics

Course Objectives: The aim and objective of the course on **Physics of Semiconductor devices** is to expose the students of M.Sc. students to experimental aspects of different semiconductor devise technologies, characterization and fabrication.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand various experimental techniques for semiconductor junctions and interfaces
CO2	Use I-V characteristics to understand the function of devices
CO3	Apply the knowledge of Junction transistors for various applications
CO4	To get familiarization with Power Devices and Semi conductor Technology

Mapping of course out comes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	2	-	1	-	-	1	-	1	1	1
CO2	-	-	-	3	-	-	-	3	1	1	1	1
CO3	-	-	1	2	3	-	1	3	2	2	2	2
CO4	-	-	1	3	3	1	1	2	2	2	2	2

(MandatoryCore)

PHY302: Physics of Semi conductor Devices

UNIT-I: Junctions and Interfaces

p-n Junctions: Descriptionofp-nJunctionaction–Junctioninequilibrium-applicationofbias–energy band diagrams. Abrupt junction – calculation of the built-in Voltage- electric field and potential distributions – Expression for Depletion layer capacitance, Static I-V characteristics of p-n junction diodes: Ideal diode model- Derivation of ideal diode equation. Real diodes – Carrier generation – recombination in the junction depletion region, I-V characteristics of Real Diodes.

Electrical breakdown inp-njunctions: Zener and Avalanche breakdown inp-njunctions, Distinction between the Zener and Avalanche breakdown.

UNIT-II: Junction Diodes

Majority carrier diodes: Tunnel diode- I-V characteristics, equivalent circuits as an oscillator and amplifier. Backward diode, Schottky barrier diode-operation and applications.

Microwave devices: Varactor diode- basic principle, equivalent circuit, Figure of merit and applications.p-i-ndiodeoperationanditsapplications.Transferred-electrondevices-Gunneffect devices- domain formation- modes of operation. Avalanche Transit devices: IMPATT diode, TRAPATT diode, BARITT diode.

UNIT-III: Junction Transistors

Bipolar junction transistors: Principle of operation- Analysis of the ideal diffusion transistor – Calculation of terminal currents, DC parameters. Ebers- Moll Equations–Four regions of operation of a bipolar transistor. Real transistors -- carrier recombination in the Emitter-Base junction depletion region – Effect of collector bias variation, avalanche multiplication in the collector – base junction and base resistance. Basic Structures and the operating principle of MOSFET, I-V characteristics of an ideal MOSFET, Charge Coupled Devices (CCD)-principle of operation.

UNIT–IV: Power Devices and Semi conductor Technology

Power rectifiers and Thyristors: Power rectifiers, Thyristors, Some special thyristor structures, Bidirectional thyristors, Field-controlled thyristor. Technology of Semiconductor Devices: Crystal growth and Wafer preparation, Methods of p-njunction formation, Growth and deposition of dielectric layers, Planar technology, Masking and lithography, Pattern definition, Metal deposition techniques.

(MandatoryCore)

Books for Study

1. Introduction to Semi conductor Materials and Devices by M.S. Tyagi, John Wiley & Sons (Asia) Pte. Ltd., Singapore, 2000.
2. Microwave Devices and circuits by SAMUELY. LIAO, Prentice-Hall of India,1999.
3. Microwave and Radar Engineering by M. Kulkarni, UMESH publications, New Delhi,1999.
4. Physics of Semiconductor Devices by S.M.Sze, 3rdEdition, Oct.2006,JohnWiley
5. Solid State Electronic Devices by B.G. Streetman, PHI, New Delhi, 2006

(GenericElective)

PHY-303 (a)	Applied Spectroscopy	L-3,T-1,P-2	4 Credits

Pre-requisite: Understanding of graduate level spectroscopy

Course Objectives: The aim and objective of the course on Applied Spectroscopy
For the students of M.Sc. Physics is to equip them with the knowledge of Atomic, Rotational, Vibrational, Raman, and Electronic spectra.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand the rotational and vibrational spectra of di molecules and their applications in structure determinations.
CO2	Know the Raman effect and its use in the structural analysis of various molecules.
CO3	Have the knowledge about various spectrophotometer and the functioning of various parts in SPECTRO PHOTOMETER.
CO4	Understand the basic concepts of fluorescence and phosphorescence their applications in different fields

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	1	1	2	2	3	1	2
CO2	2	2	3	3	2	1	2	2	2	3	1	1
CO3	2	2	3	3	2	1	2	2	2	3	1	3
CO4	2	2	3	3	2	1	2	2	2	3	1	3

(GenericElective)

PHY303(a): Applied Spectroscopy

UNIT-I: Molecular Spectroscopy

Introduction – Rotational and vibrational structure of electronic bands of diatomic molecules – Fortrat diagram – General relations – Combination relations for $^1\square$- $^1\square$ and $^1\square$ – $^1\square$ bands – Evaluation of rotational constants with reference to above transitions. Isotope effect in electronic spectra of diatomic molecules – Vibrational effect and rotational effect. Potential energy curves - Dissociation energy and pre-dissociation energy - Vibrations of polyatomic molecules: CO_2 and H_2O.

UNIT-II: Raman Spectroscopy

Introduction – Theory of Raman Scattering – Rotational Raman Spectra – Vibrational Raman Spectra–Mutual Exclusion Principle Laser Raman Spectroscopy Sample Handling Techniques – Polarization of Raman Scattered Light – Single Crystal Raman Spectra – Raman Investigation of Phase Transitions – Resonance Raman Scattering – Structure Determination using FTIR and Raman Spectroscopy. Fourier Transform (FT) Raman Spectroscopy and its additional advantages over the conventional Raman Spectroscopy - Surface enhanced Raman Scattering-Coherent Anti-Stokes Raman Spectroscopy.

UNIT–III: Spectro photometry

Introduction – Beer's law – Absorptivity – UV and visible absorption –Instrumentation – Essential parts of spectrophotometer – Gratings and prisms – Radiant energy sources – Filters – Photosensitive detectors – Barrier layer cells – Photo emissive cells – Photomultiplier tubes – Relationship between absorption in the visible and UV region and molecular structure – IR Spectrophotometry – Fourier Transform Infrared (FTIR) Spectrometer – Molecular structure – Qualitative and Quantitative analysis–Importance of photography in the spectro chemical analysis.

UNIT-IV: Fluorescence and Phosphorescence Spectroscopy

Introduction – Normal and Resonance Fluorescence – Intensities of Transitions – Non-radiative decay of fluorescent molecules – Phosphorescence and the nature of the triplet state – Population of the tripletstate–DelayedFluorescence–Excitationspectra–Experimentalmethods–Emission life time measurements–Time resolved emission spectroscopy –Applications of Fluorescence and Phosphorescence.

Books for Study

1. Molecular spectra and Molecular Structure Vol. I, G. Herzberg,2nd Ed, Van. Nostr and (1950).
2. Fundamentals of Molecular Spectroscopy, C.N. Banwell, Tata McGraw-Hill,(1983).
3. Spectroscopy Straughan and Walker(Vol.2 &3),John Wiley & Sons, (1976).
4. Molecular Structure and Spectroscopy G. Aruldhas, Printice -Hall Pvt. Ltd.(2001).
5. Instrumental Methods of Analysis Willard, Merritt, Dean & Settle, CBS Pub,(2001).
6. Spectro chemical Analysis, L.H. Ahrens and S.R.Taylor, Addison–Wesley,London,Pergamon,1961.
7. Elements of Spectroscopy, Gupta, Kumar and Sharma Pragati Prakasan, NewDelhi (2012).
8. Elements of Diatomic Molecular Spectra, H.Dunford, Addison Wesly Publishing company,1965.
9. Problems in Spectroscopy, S.V.J.Lakshman,ICSU,Costed,1988.
10. Basic Principles of Spectroscopy by R. Chang, Mic Graw Hill,1971.
11. Principles of Fluorescence Spectroscopy, Joseph R. Lakowicz- Plenum Press, (1983).

(GenericElective)

PHY-303(b)	Condensed Matter Physics	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level solid state physics

Course Objectives: The aim and objective of the course on **Condensed Matter Physics** is to expose the students of M.Sc. class to the topics like elastic properties, thermal properties, Fermi surface studies and photoluminescence so that they are equipped with the knowledge on the matter in condensed phase.

Course Outcomes: At the end of the course, the student will be able to

CO1	They gain knowledge on elastic properties of solids and its importance.
CO2	Differentiate they gain knowledge on specific heat and Thermal importance.
CO3	Understand the importance of Fermi surface in electrical properties of Solids.
CO4	Gain knowledge on photoconductivity and its origin

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	1	2	2	2	1	2
CO2	2	2	2	2	2	2	2	2	2	2	2	2
CO3	2	2	1	2	1	2	2	2	1	2	1	2
CO4	2	2	1	2	2	2	1	2	1	2	2	2

(GenericElective)

PHY303(b): Condensed Matter Physics

UNIT-I: Elastic Properties of Solids

Lattice as a homogeneous and continuous medium - Analysis of stress and strain tensors – Hooke's law - Elastic compliances and stiffness constants– Elastic energy density – Reduction in the number independent elastic constants in cubic crystals–Cauchy's relations–Bulk modulus and compressibility – Elastic waves in cubic crystals – Formulation and solution of wave equations along [100], [110] and [111] directions – Experimental determination of elastic constants – Pulse-echo technique.

UNIT-II: Thermal Properties of Solids

Quantum theory of lattice vibrations – Properties of phonons – Lattice specific heat at low temperatures – Einstein and Debye models – Born cut-off procedure – Inelastic scattering of neutrons by phonons–Experimental study of dispersion curves–Inadequacy of harmonic model – Anharmonicity – Thermal expansion – Gruneisen parameter- Lattice thermal conductivity – Elementary kinetic theory– Role of U and N processes.

UNIT-III: Energy bands and Fermi Surfaces

Energy band calculations: Plane Wave method and Augmented Plane Wave (APW) method. Importance of Fermi surface – Characteristics of Fermi surface – Construction of Fermi surface - Quantization of electron orbits - Experimental study of Fermi surface: Anomalousskin effect – Cyclotron resonance – de Haas van Alphen effect.

UNIT-IV: Photo conductivity and Luminescence

Excitons: Weakly bound and tightly bound – Photoconductivity – Simple model – Influence of traps – Space charge effects – Determination of photoconductivity. Luminescence – Various types–Thermo luminescence, Electroluminescence, Photoluminescence, Cathodoluminescence and Chemiluminescence-Excitation and emission–Decay mechanisms –Applications

Books for Study

1. Solid State Physics, C. Kittel, Edition:8 th 2012, John Wiley & Sons.
2. Solid State Physics, A.J.Dekkar,Edition:1st,2000. Macmillan India Ltd.
3. Solid State Physics, M.A. Wahab, Edition:3rd, 2020, Narosa Publishing House.
4. Fundamentals of Solid State Physics, Saxena, Gupta, Saxena, Edition: 31st, 2019, Pragathi
5. Solid State Physics, R.L. Singhal, Kedar Nath, Ram Nath & Co. Publications, Meerut,2018.

(GenericElective)

PHY-303 (c)	Embedded Systems	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level spectroscopy

Course Objectives: The aim and objective of the course on Embedded Systems for the students of M.Sc. Physics is to equip them with the knowledge of microcontrollers and other processors used in the industry.

Course Outcomes: At the end of the course, the student will be able to

CO1	understand about the basic functions and structure of embedded systems
CO2	Get familiarized with Embedded system Design Tools and Hardware
CO3	understand about the basic programming concepts of embedded systems
CO4	know about the applications of PIC microcontrollers

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	1	1	2	2	3	1	2
CO2	2	2	3	3	2	1	2	2	2	3	1	1
CO3	2	2	3	3	2	1	2	2	2	3	1	3
CO4	2	2	3	3	2	1	2	2	2	3	1	3

(GenericElective)

PHY303(c): Embedded Systems

UNIT-I: Introduction to Embedded Systems

Embedded systems in today's world – examples of Embedded systems – Microprocessors and Micro controllers – Microchip and PIC microcontroller – Introduction to PIC micro controllers using the 12 series.

Architecture of 16F84A – Memory organization – in 16F84A – Timing generation – Power-up and Reset functions in 16F84A.

UNIT-II: Hardware Details of 16F84A

Parallel ports: Basic idea – Technical challenge – connecting to the parallel port – Parallel ports of PIC16F84A – Clock oscillator – Power supply – Interrupts – Timers and counters – watch dog timer– Sleep mode.

UNIT-III: Assembler and Assembler Programs

Basic idea – PIC 16 series instruction set and ALU – Assemblers and Assembler format – creating simple programs– Adopting a development environment– Building structured programs – Flow control: Branching and Subroutines – Generating time delays and intervals –Logical instruction– Arithmetic instructions.

UNIT-IV: PIC Microcontroller PIC16F873A

Block diagram and CPU– Memory and memory maps–Interrupts–Oscillator, Reset and Power supply– Parallel ports.PIC16F87XATimer0andTimer1–16F87XATimer2, Comparator and PR2 register–capture/Compare/PWM(CCP) Module–Pulse width modulation–ADC module.

Interface: LED displays– Liquid crystal displays–Sensors–Actuators.

Books for Study

1. Designing Embedded Systems with PIC Micro controllers: Principles and Applications by Tim Wilmshurst, First Edition, 2007, Newnes– Elsevier– Publishers.
2. Micro controllers: Theory and Applications by Ajay V. Deshmukh, Tata McGraw-Hill, New Delhi, 2005.
3. Designing with PIC Microcontrollers by JohnB. Peatman, Pearson Education,Inc.,1998.
4. The 8051 Micro controller and Embedded systems, by Mahammad Ali Mazidi and Janice Gillispie Mazidi, Pearson Education Asia, Pvt.Ltd.,2000.

(Skill Oriented Course)

PHY – 305	**Advances in Physics**	**L-3,T-1,P-2**	**4Credits**

Pre-requisite: Understanding of graduate level physics

Course Objectives: The aim and objective of the course on **Advances Physics** for the students of M.Sc. Physics is to equip them with the knowledge of Nano technology, MEMS and remote sensing.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand the concepts of nanotechnology
CO2	Physical and chemical techniques of nanomaterial synthesis
CO3	Concepts of Nano materials and Nano devices
CO4	Basics of remote sensing and understanding the concepts of Geographical Information system

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	1	1	2	2	3	1	2
CO2	2	2	3	3	2	1	2	2	2	3	1	1
CO3	2	2	3	3	2	1	2	2	2	3	1	3
CO4	2	2	3	3	2	1	2	2	2	3	1	3

PHY305: Advances in Physics

UNIT–I: Nano Technology

Introduction to Nanomaterials– Zero, One- and Two-Dimensional Nanostructures-Quantum confinement-Density of states and Dependence of dimensionality–Properties of Nanomaterials –Carbon Nanotubes, Fullerenes, Graphene.

Synthesis of Nanomaterials–Physical Techniques: Ball Milling–Plasma Arc Deposition–Inert Gas Condensation –Pulsed Laser Deposition– Molecular Beam Epitaxy.

Chemical Techniques: Hydro thermal synthesis– Sol-Gel Process–Chemical Vapor Deposition.

Applications: Single Electron Transistor – Solar Cells–Light Emitting Diodes.

UNIT–II: Micro and Nano devices

Micro electro mechanical systems (MEMS): Introduction to MEMS, Basic MEM structure.

Applications of MEMS: Pressure sensors, Accelerometers Mass flow sensors.

Nanodevices: Quantum well and quantum dot devices: Infrared Detectors-Quantum Dot Lasers.

Carbon nano tube emitters-Photoelectrical cells - Plasmons propagation in wave guides.

UNIT–III: 8051 Micro controllers

Introduction of Microprocessors and Micro controllers, Micro controller: 8051 Internal Architecture, Register Structure, I/O pins, Memory Organization, 8051 Addressing modes. 8051 Assembly Language Programming Tools. 8051 Instruction set: Data Transfer Instructions, Arithmetic instructions, Logical instructions, Boolean Variable Manipulation Instructions-Bit Addressability, Single-Bit instructions, Program Branching Instructions-Jump, Loop, and Call instructions, Rotate Instructions, Stack Pointer.

UNIT -IV: Remote Sensing

Definition of remote sensing; introduction to concepts and systems; Electromagnetic radiation; electromagnetic spectrum; image characteristics; remote sensing systems; remote sensing platform; Sources of remote sensing information; Advantages of remote sensing. Application of Remote sensing in Environmental Management, Natural resource management–forest resources, water resources, land resources and mineral resources.

Books for Study

1. Nano structures and Nanomaterials: Synthesis, Properties and Application by Guozliong Cao, Imperial College Press (2004).
2. Introduction to Nano technology, By Charles P. Poole, Jr and Frank J. Owens, Willey India(2006).
3. An Introduction to Micro electro mechanical Systems Engineering by Nadim Maluf, Artech House Publishers, 2004
4. Nanomaterials Synthesis Properties and Applications, by Alen. S. Edelstein and Robert C. Cammarata, 1998.
5. The 8051 Micro controller and Embedded systems, by Mahammad Ali Mazidi and Janice Gillispie Mazidi, Pearson Education Asia, Pvt.Ltd.,2000.
6. Floyd F. Sabins Jr., Remote Sensing Principles and interpretation, by W.H. Free man and Company, 2nd Ed., New York, 1987.
7. T.M. Lilles and &R .W. Kiefer, Remote Sensing and Image Interpretation', by John Wiley & Sons, New York, 1994.
8. An Introduction to GIS by Ian Heywoodetal., Addision Wesley, Longmont Limited, England, 2011.

(Open Elective)

PHY – 306 (a)	Basic Spectroscopic Techniques	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level spectroscopy

Course Objectives: The aim and objective of the course on **Basic Spectroscopic Techniques** for the students of M.Sc. Physics is to equip them with the knowledge of Atomic, Rotational, Vibrational, Raman, and Electronic spectra.

Course Outcomes: At the end of the course, the student will be able to

CO1	Have the basic knowledge of Bohr's-Sommer feld Quantum theory of hydrogen like atom
CO2	Understand classical/quantum description of electronic spectra of atom and molecules
CO3	Use microwave and Raman Spectroscopy for analysis of known molecules
CO4	Correlate infrared spectroscopic information of known molecules with their physical description

Mapping of course out comes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	1	1	2	2	3	1	2
CO2	2	2	3	3	2	1	2	2	2	3	1	1
CO3	2	2	3	3	2	1	2	2	2	3	1	3
CO4	2	2	3	3	2	1	2	2	2	3	1	3

PHY 306 (a): Basic Spectroscopic Techniques

UNIT I: Fundamentals of Spectroscopy

Introduction - Interaction of Electromagnetic radiation with matter - Spectra of Hydrogen atom-quantum numbers -Forbidden transitions and selection rules- Spectroscopic transition between two stationary states - Absorption and emission of a photon - Einstein A and B coefficients - Line shape functions -Spectral broadening mechanisms-Spin or bit interaction energy-Stern-Gerlach experiment-L Scoupling– JJ coupling – Hund's rule of multiplicity - Pauli's exclusion principle - Rotational and vibrational spectra of different molecules-Energy expressions**.**

UNIT– II: Spectro photometry

Introduction – Beer's law – Absorptivity – UV and visible absorption –Instrumentation – Essential partsofspectrophotometer–Gratingsandprisms–Radiantenergysources–Filters–Photosensitivedetectors
– Barrier layer cells – Photo emissive cells – Photomultiplier tubes – Relationship between absorption in the visible and UV region and molecular structure – IR Spectrophotometry – Fourier Transform Infrared (FTIR)Spectrometer–Molecularstructure–QualitativeandQuantitativeanalysis–Importance of photography in the spectrochemical analysis.

UNIT–III: Colorimeters, spectrophotometers and microscopes

Colorimeter – Principle - Applications of colorimeters in analytical and biomedical purposes Spectrophotometer-Principle and working with block diagram–Salient features of individual blocks–Specifications and operation of spectrophotometers– Applications of spectrophotometers to chemical analysis Electron microscope – Transmission electron microscope - Principle and working with block diagram –Salient features of individual blocks – Scanning electron microscope - Principle and working with block diagram– Description of individual blocks–Applications of electron microscopes.

UNIT–IV: Resonance spectrometers and Mass Spectrometer

Electron spin resonance–theory–ESR spectrometer–Principle and working with block diagram–Experimental

techniques–Salient features of individual blocks– Applications of ESR.

Nuclear magnetic resonance–theory–NMR spectrometer-Principle and working with block diagram– Experimental techniques–Description of individual blocks– Applications of NMR.

Mossbauereffect–theory–Mossbauerspectrometer–PrincipleandworkingofMossbauerspectrometer -Experimental methods–Explanation of block diagram– Applications of Mossbauer studies.

Books for Study

1. Introduction to Atomic Spectra, H.E. White, Mc Graw- Hill Kogakusha. Ltd., New Delhi (1934).
2. Elements of Spectroscopy by Gupta, Kumar, Sarma, Pragati Prakasan,2012.
3. Spectrochemical Analysis, L. H. Ahrens and S.R. Tayler, Addison-Wesley, London, 1961.
4. Instrumental methods of Chemical analysis by Chatwal and Anand, Himalaya Publisher,2003
5. Spectroscopy by B.K. Sarma, Goel publishing House, Meerut,1993.
6. Spectroscopy VolI by Straughan and Walker, John Wileyand Sons,1976
7. Basic principles of Spectroscopy by Raymond Chang,Mic Graw Hill,1971
8. Molecular Structure and Spectroscopy by G. Aruldas, Prentice Hall of India,2001

(Open Elective)

PHY-306(a)	Nanomaterials and Devices	L-5,T-1,P-0	4Credits

Pre-requisite: Condensed matter physics

Course Objectives: The aim and objective of the course on **Physics of Nano-materials** is to familiarize the students of M.Sc. to the various aspects related to preparation, characterization and study of different properties of nanomaterials so that they can pursue this emerging research field as career.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understanding the basics of nanomaterials
CO2	Acquire knowledge of basic approaches to synthesize the nanaomaterials
CO3	Understand the physical and chemical properties of carbon nano tubes and nano structured materials.
CO4	Introduction to nanodevices

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	-	1	2	1	1	2	2	3
CO2	1	2	2	2	-	2	2	1	1	2	2	3
CO3	1	2	2	2	-	2	2	1	1	2	2	3
CO4	1	2	2	2	-	2	2	1	1	2	2	3

PHY 306 (b): Nanomaterials and DevicesUNIT-1: Introduction to Nanomaterials

Introduction to Nanomaterials-Zero, One and Two Dimensional Nanomaterials Quantum confinement, Density of states, Dependence of dimensionality–Physical and chemical properties.

UNIT–II: Synthesis of Nanomaterials

Introduction to Bottom –up and Top-down approaches

Ball milling –Inert Gas condensation – Physical vapor deposition -, Molecular Beam Epitaxy – Sputtering – Pulsed laser Deposition –Chemical vapor deposition - Sol Gel – Hydrothermal Synthesis

UNIT-III: Nano –Carbon

Carbon molecules: Nature of the carbon bond –New Carbon structure –carbon clusters – Smallcarbon clusters –Discovery of C_{60}–Structure of $C_{60}$and its properties –Synthesis of buckyballs and Applications.

Carbon Nanotubes: Fabrication –Structure -Electrical Properties – Mechanical properties – Applications of carbon Nanotubes

Graphene: Fabrication–Structure–ElectricalProperties–Mechanicalproperties–Applications.

UNIT–IV: Nano Devices

Introduction–Nanofabrication–Photo-Lithography–Patterntransfer–Introduction to MEMS –Single Electron Transistor–Solar Cells–Light Emitting diodes–Gas Sensors-Micro batteries –Field emission display devices –Fuel Cells.

Books for Study

1. Nano materials: Synthesis, operties and Applications–Edited by A.S. Edelstein and R.C. Cammarata, Institute of Physics Publishing, 2002.
2. Introudction to Nano technology–Charles P.Poole Jrand Frant J. Owens, Wiley Inter science, 2003.
3. Nano practices from Theroy to Applications edited by Gunter Schmid, Wiley VCH, 2004.
4. Nano electronics and Nano systems by K. Glosekotter and J. Dienstuthi (Springer), 2004.

(MandatoryCore)

PHY401:AdvancedQuantumMechanics

PHY- 401	**Advanced Quantum Mechanics**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Preliminary course of Quantum Mechanics

Course Objectives: The aim and objective of the course on **Advanced Quantum Mechanics** is to introduce the M.Sc. students to the formal structure of the subject and to equip him/her with the concept of identical particles, angular momentum. Relativistic quantum mechanics and Quantum field theory so that he/she can use these in various branches of physics as per his/her requirement.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand the concept of identifiable particles
CO2	Understand the Orbital Angular momentum spin angular momentum and general angular momentum and their importance in spectroscopy
CO3	Give the significance of Klein Gordon and Dirac equation and explain the existence of antiparticles.
CO4	Apply the symmetries principles in calculating the conserved currents and charges.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	1	1	1	2	2	1	2	2
CO2	2	2	3	1	1	1	-	1	2	1	2	2
CO3	2	2	2	2	1	1	1	1	2	1	2	2
CO4	2	2	2	2	1	1	1	2	2	1	2	2

UNIT-I: Identical Particles and Molecules

Identical particles- Indistinguishability of Identical particles- Construction of Symmetric and Anti-symmetric wave functions for two and three particle systems - Pauli's Exclusion Principle-Hydrogen molecule-Spin-orbit interaction-Ortho and Parahydrogen-Spin statistics connection.

UNIT-II: Angular Momentum

(MandatoryCore)

PHY401:AdvancedQuantumMechanics

Introduction: Motion in Central Potential, Orbital Angular momentum –L_x, L_y,L_z,L^2,L^+ and L^- Operators -Commutation rules for angular momentum - Eigen values and Eigen functions of $L_z$and L^2 - Angular momentum in general - Allowed values of angular momentum J - Eigen valuesof J+and J-angular momentum matrices - Addition of angular momenta and Clebsh-Gorden co-efficients: Clebsh–Gorden co-efficient for J_1=J_2=1/2andJ_1=1,J_2=1/2-spinangular momentum and Pauli's spin matrices.

UNIT-III: Relativistic Quantum Theory

Klein – Gorden Equation – KG equation in Co-variant form- Probability Density and Probability Current Density – Inadequacies of K.G. Equation – Dirac's Relativistic Equation for a Free Particle -Dirac`s Matrices – Dirac`s Equation in Co-variant form –Plane wave solution – Negative Energy States–Spin Angular Momentum-Existence.

UNIT-IV: Quantization of Wave Fields

Concept of Field-Method of Canonical Quantization: Lagrangian Formulation of Field, Hamilton Formulation of Field -Second Quantization –Field equation – Quantization of Non-relativistic Schrodinger equation – Commutation and Anti-Commutation Relations, The N-representation-System of Fermions and Bosons– Creation and Annihilation.

(MandatoryCore)

PHY401:AdvancedQuantumMechanics

Books for Study

1. Quantum Mechanics: Concepts and Applications by Nouredine Zettili ,Wiley, Ed.,2021
2. Introduction to Quantum Mechanics by David J. Griffith sand Darrel lF.Schoeter, Third Ed., Cambridge University Press India PvtLtd.,2018.
3. Quantum Mechanics: G. Aruldas PHI learning private limited Second edition, 2018
4. Quantum Mechanics: S.L. Kakani and H.M. Chand alia Sultan Chand and, Sons First Edition, 2004
5. Advanced Quantum Mechanics: B.S. Rajput, Pragati prakasan,2019
6. Quantum Mechanics: V.K. Thankappan, New Age International(P)Ltd., Publishers,1993
7. A Text book of Quantum Mechanics :P.M. Mathews and K.Venkatesan, Tata Mc Graw Hill Publishing Company, 2008
8. Quantum Mechanics :S.L. Gupta, V. Kumar, H.V.Sharma and R.C.Sharma, Jai Prakash Nath and Company, 2007
9. An Introduction to Quantum Mechanics, P.T. Mathews Mc Graw Hill Publishing Company, 1974

(MandatoryCore)

PHY402:Physicsof AdvancedMaterials

PHY - 402	Physics of Advanced materials	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level solid state physics

Course Objectives: The aim and objective of the course on Physics of Advanced materials is to expose the students of M.Sc. class to the topics like crystal growth, dielectric properties, ferromagnetic properties and functional materials, concepts and applications, so that they are equipped with the investigating the matter in the condensed phase.

Course Outcomes: At the end of the course, the student will be able to

CO1	Gain in-depth knowledge about the formation of various crystal Growth techniques
CO2	Understand the properties dielectric and ferroelectric materials
CO3	Understand different on Ferro and Anti ferro and ferro magnetism and their applications
CO4	Study functional materials

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	1	2	2	2	1	2
CO2	2	2	2	2	2	2	2	2	2	2	2	2
CO3	2	2	1	2	1	2	2	2	1	2	1	2
CO4	2	2	1	2	2	2	1	2	1	2	2	2

UNIT-I: Crystal Growth and Imperfections in Crystals

Crystal growth: Nucleation and growth – Homogeneous and heterogeneous nucleation – Classification of crystal growth techniques–Melt growth: Bridgman, Czochralski techniques.

Imperfections: Classification of imperfections–Point defects–Schottky and Frenkel defects-Expressions for equilibrium defect concentrations – Colour centres –Production of colour centres – Line defects – Dislocations – Edge and Screw dislocations – Burger vector –Estimation of dislocation densities –Ordered phases of matter-Translational and orientational order

(MandatoryCore)

PHY402:Physicsof AdvancedMaterials

UNIT-II: Dielectrics and Ferroelectrics

Dielectrics: Introduction–Di polemoment– various types of polarization–Electronic, ionic and orientational polarization**–**Langevin's theory–Lorentz field–Clausius-Mosotti equation– Measurement of dielectric constant– Applications of dielectrics.

Ferroelectrics: Piezo-, Pyro- and ferroelectric crystals– Spontaneous polarization – Classification and properties of ferroelectrics - Ferroelectric domains – Oxygen ion displacement theory –Applications of ferroelectrics.

UNIT- III: Ferromagnetism and Anti-ferromagnetism

Ferromagnetism: Introduction – Weiss molecular field theory – Temperature dependence of spontaneousmagnetization–Heisenbergmodel–Exchangeinteraction–Ferromagneticdomains– Magneticbubbles–Blochwall –Thickness and energy–Ferromagnetic spin waves–Magnons– Dispersion relations.

Anti-ferro magnetism: Introduction–Twosublatticemodelofanti-ferromagnetism– Ferrimagnetism-Ferrites – Structure– Applications– Multiferroics

UNIT- IV: Functional Materials

Amorphous semiconductors: Band structure – Electronic conduction – Optical absorption – Applications. Liquid crystals: Classification– Orientational order and inter molecular forces– Magnetic effect– Optical properties– Applications.

Polymers: Classification–Structuralpropertycorrelation–Molecularweight–Crystallineinpolymers– Applications.

(MandatoryCore)

PHY402:Physicsof AdvancedMaterials

Books for Study

1. Solid State Physics, C. Kittel, Edition:8th 2012, John Wiley & Sons.
2. Solid State Physics, A.J. Dekkar, Edition: 1st, 2000.Macmillan India Ltd.
3. Solid State Physics, M.A. Wahab, Edition:3rd, 2020, Narosa Publishing House.
4. Fundamentals of Solid State Physics, Saxena, Gupta, Saxena, Edition: 31st,2019, Pragathi
5. Solid State Physics, R.L. Singhal, 2018, Kedar Nath,Ram Nath & Co. Publications, Meerut.
6. Science of Engineering Materials and carbon nanotubes, C.M. Srivastsava and C.Srinivasan, Edition:3rd,2010 New Age Inter. Pub.
7. Crystal Growth, B.R. Pamplin,1977, Pergmon Press.
8. Crystal Growth from High Temperature Solutions, D.Elwell and H.J .Scheel, 1975, Academic Press.

(GenericElective)

PHY403(a):Photonics

PHY -403 (a)	**Photonics**	**L-3,T-1,P-2**	**4Credits**

Pre-requisite: Understanding of graduate level optics and Lasers

Course Objectives: Course Objectives: The aim and objective of the course on **Photonics** is to expose the M.Sc. students to the basics of the challenging research field of optical fibers and their use in integrated optics and photonic crystals.

Course Outcomes: At the end of the course, the student will be able to

CO1	In depth knowledge on different lasers and their application
CO2	Importance of Fiber optics and their components in communication and sensors
CO3	Significance and role of wage guides and optics in integrated optics
CO4	Advances in photonic crystals, circuits and applications with respect to conventional devices.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7e	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	1	-	1	-	1	-	3	-	1
CO2	3	2	1	1	1	1	-	1	-	3	-	1
CO3	2	2	-	1	-	1	-	1	-	3	-	1
CO4	3	2	1	1	1	-	-	1	-	3	-	1

UNIT–I: Laser systems, Properties and Applications

General description, structure, excitation mechanism and working of CO_2, Argonion, Free-electron, Dye, Nd: YAG, Optical parametric oscillator, semiconductor and erbium doped fiber lasers.

Laser beam line width, frequency stabilization, divergence and coherence. Q-Switching and Methods of Q-switching. Mode locking and methods of mode locking. Frequency doubling and phase conjugation.

Laser applications in isotopic separation, velocity measurements, interferometry and speckle metrology.

(GenericElective)

PHY403(a):Photonics

UNIT- II: Fiber Optic Components and Sensors

Connector principles, Fiber end preparation, Splices, Connectors, Source coupling, Distribution networks, Directional couplers, Star couplers, Switches, Fiber optical isolator, Wavelength division multiplexing, Time division multiplexing, Fiber Bragg gratings. Advantage of fiber optic sensors, Intensity modulated sensors,

Mach-Zehnder interferometer sensors, Current sensors, Chemical sensors –Fiber optic rotation sensors. Optical biosensors: Fluorescence and energy transfer sensing, molecular beacons and optical geometries of bio-sensing, Bio-imaging, Biosensing.

UNIT- III: Integrated Optics

Introduction – Planar wave guide – Channel wave guide – Y-junction beam splitters and couplers – FTIR beam splitters–Prism andgratingcouplers–Lenswaveguide–Fabricationofintegratedopticaldevices

- Integrated photodiodes – Edge and surface emitting laser – Distributed Bragg reflection and Distributed feed back lasers -Wave guide array laser.

UNIT-IV: Photonic Crystals

Basics concepts, Theoretical modeling of photonic crystals, Features of photonic crystals, Methods of fabrication, Photonic crystal optical circuitry, Nonlinear photonic crystals, Photonic crystal fibers, Photonic crystals and optical communications, Photonic crystal sensors.

(GenericElective)

PHY403(a):Photonics

Books for Study

1. Lasers: Principles and applications by J.Wilson and J.F.B. Hawkes, Prentice, Hall of India, New Delhi,1996.
2. Laser fundamentals, W.T. Silf vast, Foundation books, New Delhi,1999.
3. Fiber Optic Communication, Joseph C.Palais, Pearson Education Asia, India,2001
4. Introduction To Fibre Optics, A.Ghatak And K.Thyagarajan, Cambridge University Press , NewDelhi,1999
5. Optical Guided Wave Signal Devices, R. Syms And J. Cozens.Mc graw Hill,1993.
6. Optical Electronics, AGhatak and K. Thyagarajan, Cambridge University Press, New Delhi,1991
7. Fundamentals of Photonics, B.E.A. Sale hand M.C.Teich, John Willy and Sons,1991
8. Nanophotonics, P.N.Prasad, Wiley Interscience,2003.

(GenericElective)

PHY- 403 (b)	Solar Energy–Thermal and Photo voltaic Properties	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level semiconductor physics

Course Objectives: The aim and objective of the course on Solar Energy–Thermal and Photovoltaic

Properties is to expose the M.Sc. students to the basics of solar energy.

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand the thermal and light components of solar energy, basic concepts and measurement of solar radiation.
CO2	Learn the theoretical aspects of solar collectors, performance evaluation and application.
CO3	Know the concepts of solar cells, types and fabrication procedures of source solar cells.
CO4	Provide knowledge on cell efficiency measurements.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	1	-	1	2	1	2	3	2	2
CO2	2	2	1	2	1	1	1	1	1	3	1	1
CO3	3	2	-	2	1	1	2	1	1	3	1	1
CO4	2	2	-	2	1	1	2	1	1	3	1	1

(GenericElective)

PHY403(b): Solar Energy–Thermal and Photo voltaic Properties

UNIT-I: Basic Concepts of Solar Energy

Introduction - Distribution of solar radiation – Solar Constant, Zenith Angle, Air Mass, Standard Time, Local Apparent Time, Equation of Time, Declination, Hour Angle, Azimuth Angles (all definitions only). Radiation Measurement using Pyranometer and Pyrheliometer–Principle and working.

Kirchoff's law – Solar transmittance, absorptance, emittance and reflectance – Their relation. Selective coatings - Methods of Preparation of coatings - Measurement of solar absorptance and emittance of a selective surface.

UNIT- II: Solar Thermal Collectors

Introduction, Collector types - Flat plate collector (FPC), Evacuated tube collector – Energy balance equation and efficiency, Definitions of collector overall heat loss coefficient, collector efficiency factor, collector heat-removal factor and collector flow factor, Temperature distribution in FPC - Testing of FPC, solar water heating - natural and forced circulation type; Concentrating collectors, types, single axis and two-axis tracking – Performance of Linear parabolic trough concentrator, Applications - Space heating, Air heater - Configurations - Drier - Principle and working; Energy storage - Sensible heat storage- liquid and pebble-bed storage, Thermo chemical storage.

UNIT–III: Solar Cells

Photovoltaic effect – Equivalent circuit of solar cell - Definitions of cell parameters, Type of cells, Crystalline silicon (c-Si), Float zone and Czochrolski methods - Wafer to cell formation steps**,** Poly-Siwafer growth methods – EFG, Web, Heat exchange method, Amorphous Si cells. Thin film cells –Advantages and limitations – CdTe/ CdS, CuInGaSe2/CdS and Ga Ascells – Configurations and structures

– Fabrication of these cells - I-V characteristics and spectral response - Multijunction cells - Quantum dot, Dyesensitized and Perovskite cells.

UNIT–IV: Solar Photo voltaic Systems

Photovoltaic (PV) Module assembly - Description of steps involved in the fabrication of solar module -Performance of module – I-V Characteristics, Modules design for different current and

voltages – Module protection - Use of bypass and blocking diodes, Solar PV system - Components – PV Array, battery, invertor and load. Bifacial solar modules – Advantages over mono-facial cells; Applications of solar PV systems–Stand-alone system–Design methodologies, Hybrid system–Types and issues, Grid connected systems.

Books for Study

1. Solar Energy Utilization, G.D. Rai, KhannaPublishers,1987.
2. Solar Energy-Fundamentals, Design, Modelling and Applications, G.N.Tiwari, Narosa Publications, 2005.
3. Solar Energy-Principles of Thermal Energy Collection & Storage, S.P. Sukhatme, Tata Mc-Graw Hill Publishers, 1999.
4. Science and Technology of Photo voltaics, P.Jayarama Reddy , CRC Press(Taylor & Francis Group, Leiden, Netherlands) & BS Publications,2009.
5. Solar Photovoltaics-Fundamentals, Technologies and Applications, Chetan Singh Solanki, PHIL earning Pvt. Ltd.,2015.

(GenericElective)

PHY-403 (c)	Vacuum and Thin Film Technology	L-3,T-1,P-2	4Credits

Pre-requisite: course in Condensed Matter Physics

Course Objectives: The main objective of the course on vacuum and thin film technology is to introduce the basic and advanced concepts in the field of vacuum and thin films. The students are not only exposed to theoretical concepts but also have hands-on training in the preparation of thin films. The students also are exposed to various industrial applications of vacuum and thin films

Course Outcomes: At the end of the course, the student will be able to

CO1	Basic theoretical concepts of the kinetic theory of gases applicable to vacuum technology and also the principles and construction of various vacuum pumps and gages.
CO2	Design and construction of various techniques for the preparation of thin films
CO3	Theoretical aspects to understand the growth and properties of thin films
CO4	Various industrial applications of thin films

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	**2**	2	3	1	2	1	3	2	3	3
CO3	2	3	3	3	3	1	2	1	3	2	3	3
CO3	2	2	2	2	2	1	1	1	1	2	1	2
CO4	3	3	3	3	3	1	1	1	3	3	3	3

(GenericElective)

PHY403(c): Vacuum and Thin Film Technology

UNIT-I: Basics of Vacuum

Fundamentals of kinetic theory applicable to vacuum technology -Vacuum pumps: Rotary pump - Roots pump – Sorption pump – Diffusion pump -Turbo molecular pump – Cryogenic pump - Vacuum Gauges: Pirani gauge - Penning gauge - Hot cathode ionization gauge – Bayard –Alpert gauge –Quadruple mass spectrometer - Pump combinations – Design of vacuum systems – Leaks and Leak detection-Applications of vacuum.

UNIT- II: Preparation of Thin Films

Physical Methods: Vacuum evaporation -Resistive heating- Electron beam evaporation-Co-evaporation-Epitaxial deposition: Pulsed laserablation- Molecular beam epitaxy. Sputtering-Glow discharge-DC and RF sputtering-Reactive sputtering-Magnetron sputtering
- Chemical methods: Electroplating – Spray pyrolysis – Chemical vapor deposition (CVD) -Sol-gel– Spin coating.
Measurement of film thickness -Multiple beam interferometer (MBI) methods – Quartz crystal thickness monitor -Stylus profiler.

UNIT-III: Properties of Thin Films

Transport Properties of Thin Films**:** Metallic Films: Sources of resistivity in metallic conductors – sheet resistance and temperature coefficient of resistance of thin films – Influence of thickness on the resistivity of structurally perfect thin films – Fuchs Sondhemier theory – Annealing and agglomeration - Optical Properties -Reflection and transmission by single film and multi layer films -Optical absorption– Determination of optical constants by Ellipsometry.

UNIT-IV : Applications of Thin Films

Photolithography-PatternGeneration-Thinfilmresistors–Thinfilmcapacitors–Thinfilmdiodes and transistors – Thin film solar cells - Thin film micro batteries – Thin film Gas sensors –Reflection and antireflection coatings - Optical filters - Transparent conducting oxide coatings -Hard coatings -Tribological coatings.

Books for Study

1. Vacuum Technology, A. Roth, North-Holland,1986.
2. Vacuum Science and Technology, V.Vasudeva Rao, T.B. Ghosh and K.L.Chopra, Allied Publications,1998.
3. Handbook of Thin Film Technology, L.I. Maissel and R.L.Glang, Mc Graw HillBookCo.,1970.
4. Thin Film Phenomena, K.L. Chopra, Mc Graw Hill Book Co., New York,1969.
5. Vacuum Deposition on to Webs, Films and Foils, Charles A. Bishop, Elsevier, London,2011.
6. The Materials Science of Thin Films, M.Ohring, Academic Press, New York,1992.
7. The User's Guide to Vacuum Technology, J.F. O'Henlon, John Wiley & Sons, 2003.

(Multidisciplinary Course)

PHY-405	Advanced characterization techniques	L-3,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level chemistry and physics

Course Objectives: The aim and objective of the course on Advanced characterization Techniques is to familiarize the M.Sc. students with the basics of the recently emerging research field of dynamics of Structures, Spectra and properties of various instruments

Course Outcomes: At the end of the course, the student will be able to

CO1	Describe various Instrumentation – Essential parts of spectrophotometer.
CO2	Understand theoretical techniques Resonance Spectrometers and Mass Spectrometer
CO3	Understand use of various spectroscopic techniques and their application to the various fields of physics.
CO4	Understand the Advanced Spectroscopic and Microscopic Techniques

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2	2	1	2	1	2	2	1	2
CO2	2	2	1	2	2	2	2	-	2	2	1	2
CO3	2	2	1	2	1	2	2	-	2	2	1	2
CO4	2	2	1	2	2	2	2	-	2	2	1	2

PHY405: Advanced Characterization Techniques

UNIT–I: Spectrophotometry

Introduction – Beer's law – Absorptivity – UV and visible absorption –Instrumentation – Essential parts of spectrophotometer–IR Spectrophotometry–Fourier Transform Infrared(FTIR) Spectrometer–Molecular structure – Qualitative and Quantitative analysis–Raman Spectroscopy – Qualitative and Quantitative analysis. Fourier Transform (FT) Raman Spectroscopy and its additional advantages over the conventional Raman Spectroscopy,

UNIT–II: Resonance Spectrometers and Mass Spectrometer

Electron Spin Resonance (ESR)–Principle–ESR spectrometer–Working Principle with block diagram – Applications of ESR. Nuclear Magnetic Resonance (NMR) – Principle – NMR spectrometer – Working Principle with block diagram – Experimental techniques –. Basic concepts of NQR spectra: Half integral and integral spins, Instrumentation, Super regenerative oscillator, applications of NQR. Mossbauer effect
– theory – Mossbauer spectrometer – Principle and working of Mossbauer spectrometer – Experimental methods with block diagram– Applications of Mossbauer studies.

UNIT–III: Advanced Spectroscopic and Microscopic Techniques

Spectroscopic Techniques: Energy Dispersive Spectroscopy, X-ray Photo Electron Spectroscopy, X ray Fluorescence Spectroscopy and Auger Electron Spectroscopy, Secondary Ion Mass Spectrometry.
Imaging Techniques: Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy,
Diffraction Techniques: X-Ray diffraction –Laue method–Powder method.

Books for Study

1. Elements of X-ray Diffraction, B.D. Cullity,3rdEd., Pearson Education Ltd.,2014.
2. Methods of Surface Analysis, Techniques and Applications, J.M. Walls Cambridge
3. University Press, 1990.
4. X-ray Structure Determination, H.Stout and LH.Jenson, Macmillan, London,1968.
5. Instrumental Methods of Analysis, Willard Merritt, Dean Settle, CBS publishers,
6. New Delhi,1986
7. Spectroscopy, B.P. Straughan and S.Walker, John Wiley & Sons Inc.,NewYork,1976.
8. Spectroscopy, G.Chatwal and S.Anand, Himalaya Pub.,2002.
9. Spectroscopy, B.K. Sharma, Goel Publishers House, Meerut,1975.
10. Basic principles of Spectroscopy by Raymond Chang, Mic Graw Hill,1971
11. Molecular Structure and Spectroscopy by G.Aruldas, Prentice Hall of India,2001

(OpenElective)

PHY-406 (a)	Wireless Communications	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level chemistry and physics

Course Objectives: The aim and objective of the course on Wireless Communications is to familiarize the M.Sc. students with the basics of the recently emerging mobile technologies.

Course Outcomes: At the end of the course, the student will be able to

CO1	understand the basics of digital modulation techniques
CO2	Understand various coding and error correction techniques
CO3	Know GSM mobile communication standards, its architecture, logical channels, advantages and limitations.
CO4	Familiarize with optical and satellite communication techniques

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2	2	1	2	1	2	2	1	2
CO2	2	2	1	2	2	2	2	-	2	2	1	2
CO3	2	2	1	2	1	2	2	-	2	2	1	2
CO4	2	2	1	2	2	2	2	-	2	2	1	2

(OpenElective)

PHY 406 (a): Wireless Communications

UNIT– I: Base Band Data Transmission

Digital Modulation techniques: BPSK, QPSK, DPSK, QASK, BFSK, MSK, M-ary techniques. Base band binary data transmission system – Inter symbol interference – Nyquist pulse shapingcriteria–linecoding,pulseshaping,andscramblingtechniques,Detectionoferrorprobability.

UNIT–II: Codes for Error Detection and Correction

Linear block codes, Convolutional codes. Encoding, Decoding of convolutional codes, State, Tree and Trellis diagrams. Maximum likelihood – Viter by algorithm, Burst error correction - Inter leaving techniques–Block and convolutional inter leaving, Types of ARQ.

UNIT–III: Introduction to Wireless Communication Systems

Global system for mobile (GSM): cellular concept, system design. Transmission system, receiving system; frequency re-use; Spread spectrum modulation; Multiple access techniques as applied to wireless communications; 1G,2G, 3G wireless networks.

UNIT–IV: Satellite and Optical Communications

Introduction Satellite systems: Orbiting satellites, satellite frequency bands, communication satellite system-modulation and multiple access format-satellite systems in India, Satellite receiving systems, G/T ratio, satellite uplink and down link analysis. Applications to communications and remote sensing. Introduction to Optical communications systems: Optical fibers, sources and detectors, analog and digital systems.

Books for Study

1. Modern Digital and Analog communication system by B.P. Lathi: .Oxford 3rd ed.,2011
2. Digital Communications Fundamentals and Applications by Bernard Sklar, Sklar Person Education, 2008
3. Principles of Communication Systems: Taub & Schilling, Tata Mc Graw-Hill,1991
4. Principles of Communication, R.E.Ziemer, WH Tranter Fifth Edition John Wiley (fifth module)
5. Wayne Tomoasi: Morden Electronic Communication Systems. Person Education/PHI,2014
6. John G Proakis: Digital Communication. MGH
7. Digital Communication Techniques Simon, Hindey Lindsey PHI
8. Communication Systems :Simon Haykin, John Wiley & Sons. Pvt. Ltd.
9. Digital and Analog Communication System : KSam Shanmugam. John Wiley
10. Communication Systems Engineering: Proakis, Pearson Education
11. Digital & Analog Communication System– Leon W Couch, Pearson Education/PHI.
12. Introduction to statistical Signal Processing with Applications MD Srinath, P.K. Rajasekaran, RE. Viswnathan PHI
13. Analog and Digital Communication MS Roden PHI
14. Digital modulation and coding. Wilson, Pearson Education
15. Applied coding and information Theory forengineers, Wells, Pearson education.

(OpenElective)

PHY-406 (b)	Vacuum Technology and applications	L-3,T-1,P-2	4Credits

Pre-requisite: course in Condensed Matter Physics

Course Objectives: The main objective of the course on vacuum technology and applications is to introduce the basic and advanced concepts in the field of vacuum technology. The students are not only exposed to theoretical concepts but also have hands-on training in the construction of various vacuum pumps, vacuum measuring gauges, and thin film preparation techniques. The students also are exposed to various industrial applications of vacuum and thin films

Course Outcomes: At the end of the course, the student will be able to

CO1	Basic theoretical concepts of the kinetic theory of gases applicable to vacuum technology and also the principles and construction of various vacuum pumps and gages for the production and measurement of vacuum
CO2	Design and construction of various components for the construction of vacuum systems for the preparation of thin films
CO3	Various techniques used for the growth of thin films
CO4	Various industrial applications of vacuum technology and thin films

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	3	1	2	1	3	2	3	3
CO3	2	3	3	3	3	1	2	1	3	2	3	3
CO3	2	2	2	2	2	1	1	1	1	2	1	2
CO4	3	3	3	3	3	1	1	1	3	3	3	3

(OpenElective)

406 (b) Vacuum Technology and Applications

UNIT-I: **Basics of Vacuum**

Vacuum – definition – Units of Vacuum – Vacuum ranges - Kinetic theory of gases related to vacuum -Physical parameters at low pressures–Vacuum components- Applications of vacuum – Vacuum metallurgy – Freeze drying – Vacuum in electrical applications – Space simulators– Leaks and detection of leaks– Pressure test– Halogen leak detector– Mass spectrometric leak detection.

UNIT-II: **Production and Measurement of Vacuum**

Classification of vacuum pumps – Rotary pump – Roots pump – Sorption pump – Diffusion pump– Turbo-molecular pump–Ion pump – Cryogenic pump.
Classification of vacuum gauges – McLeod gauge – Pirani gauge – Ionization gauges – Penning gauge – Bayard Alpert gauge – Measurement of partial pressure –Residual gas analyzer – Pump combinations– Construction of high vacuum coating system.

UNIT-III : **Preparation of Thin Films**

Physical Methods- Vacuum evaporation - Resistive heating - Electron beam evaporation -Co-evaporation.
Epitaxial deposition-Pulsed laserablation- Molecular beamepitaxy.
Sputtering - Glow discharge - DC and RF sputtering - Reactive sputtering - Magnetron sputtering
Chemical methods: Electroplating – Spray pyrolysis – Chemical vapour deposition (CVD) -Sol-gel– Spin coating.

UNIT-IV : **Applications of Thin Films**

Photolithography-Pattern generation- Thin film resistors – Thin film capacitors – Thin film diodes and transistors – Thin film solar cells - Thin film micro batteries – Thin film gas sensors – Reflection and antireflection coatings - Optical filters - Transparent conducting oxide coatings - Hard coatings-Tribological coatings.

Books for Study

1. Vacuum Technology, A.Roth, 3rd Edition, North-Holland Publications,2012.
2. Vacuum Science and Technology, V.V. Rao, T.B. Ghosh and K.L.Chopra, 3rdEditions, Allied Publications, 2008.
3. Handbook of Thin Film Technology, L.I. Maissel and R.L. Glang, Mc Graw Hill Book Co., 1970.
4. Thin Film Phenomena, K.L. Chopra, Mc Graw Hill Book Co., New York,1969.
5. Vacuum Deposition on to Webs, Films and Foils, Charles A. Bishop, Elsevier, London, 2015
6. The Materials Science of Thin Films, M.Ohring, Academic Press, New York,1992.
7. The User's Guide to Vacuum Technology, J.F.O'Henlon, John Wiley & Sons, 2003.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF PHYSICS



Course

M.Sc. INSTRUMENTATION

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per

NEP-2020

About the Department

The Department of Physics, Sri Venkateswara University, was established in 1954 with B.Sc. and B.Sc. (Hons) degree courses. Two year M.Sc. degree course was started in 1959. To meet the growing demands of the society and to keep pace with reputed institutions in the country and abroad, the Department has innovative specializations in M.Sc. Physics such as Applied Spectroscopy, Condensed Matter Physics, Electronics, Photonics, Solar Energy Physics and Vacuum and Thin film Physics. The department has also started M.Sc. Electronics course in 1998. At Present the department has 7 Professors, 1 Associate Professor and 1 Assistant Professor.The research work in the Department of Physics was initiated in 1957 and since then, there has been significant progress in the areas of Atmospheric Science, Condensed Matter Physics, Microelectronics, Solar Energy, Solid State Spectroscopy, Photonics and Thin Films. In recognition of these efforts, the department has received research funding from UGC, CSIR, DST, ISRO, DNES, DoE, DRDO and DAE-BRNS. The Department was selected for UGC - CAS and DST- FIST programmes and was able to procure several sophisticated instruments like XRD, ATR-FTIR, UV-Vis-NIR spectrophotometer, FLS-980-Florescence spectrometer, SEM with EDS, Micro-Raman, Vibrating Sample Magnetometer (VSM), Liquid Nitrogen Plant,etc., for student training and advanced research activities. The UGC has set up UGC-SVU Center for MST Radar applications to promote research activities on Atmospheric research. This was further supported by the ISRO in the form of an Advanced Center for Atmospheric Sciences (ACAS). The advances made so far in basic and applied research are well recognized both in the country and abroad. The Department organizes National and International Conferences/Seminars/Workshops on regular basis. The faculty members of the Department have several collaborative research programmes with national and International institutions. Many of the faculty members of the Department are regularly invited as visiting Professors and visiting researchers by overseas Universities/ Institutes in India and abroad.

Vision:

To achieve excellence in analytical and electronic instruments through quality education and training and to logically translate the proven research ideas into a reliable and effective, simple, elegant and handy instruments and gadgets

Mission

To enhance the teaching-learning process by implementing innovative practices to create globally competent researchers

To strengthen research culture providing sustainable solutions in the domain of analytical instruments, electronic instruments for the benefit of research and industry.

To inculcate professional ethics and entrepreneurial attitude for addressing needs of industry and society.

Program Specific Outcomes: At the end of the program, the student will be able to:

PSO1	Understand the basic and advance concepts of different branches of Instrumentation, Industrial and Electronics.
PSO2	Perform and design experiments in the areas of Instrumentation, electronics, atomic and Controlling Circuits
PSO3	Apply the concepts of Instrumentation in specialized areas of Sugar Industries, Irrigation methods in Agriculture, renewable energies, Controlling Circuits etc. in industry, academia, research and day to day life.

Program Objectives:

- P1.To develop analytical skills covering both scientific and technical domains.
- P2. To develop in depth understanding of the instrumentation technologies.
- P3. To gain practical, hands-on experience in different sensors and instrumentation
- P4. To logically translate the proven research ideas into a reliable and effective but simple, elegant and handy instruments and gadgets.

Program Outcomes: At the end of the program, the student will be able to:

PO1	Apply principles of basic engineering concepts in understanding and analysis of instruments
PO2	Identify, formulate, and analyze advanced engineering problems reaching substantiated conclusions using first principles of mathematics and basics of engineering.
PO3	Design solutions for advanced engineering problems and design system components to meet the specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal consideration.
PO4	Use research based knowledge and methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO5	Create, select, and apply appropriate techniques, resources, and modern scientific Tools to complex physics problems with an understanding of the limitations
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional scientific practice.
PO7	Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	Apply ethical principles and commit to the norms of scientific practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams,

	And in multidisciplinary settings
PO10	Communicate effectively on scientific activities with the scientific/Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective representations, and give and receive clear instructions
PO11	Demonstrate knowledge and understanding of the scientific principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO12	Recognize the need for, and have the preparation and ability to engage in independent And life-long learning in the broadest context of scientific and technological change

Program Educational Objectives: At the end of the program, the student will be able to:

PEO1	Apply principles of basic scientific concepts in understanding, analysis, and prediction of Instrumentation and Electronic systems.
PEO2	Develop human resource with specialization in theoretical and experimental Techniques required for career in academic, research and industry.
PEO3	Engage in lifelong learning and adapt to changing professional and societal needs.

SRI VENKATESWARAUNIVERSITY::TIRUPATI

DEPARTMENT OF INSTRUMENTATION

TWO YEAR M.Sc. COURSE IN INSTRUMENTATION (2021-2022)

COURSE STRUCTURE AND EXAMINATION

SCHEME

Semester -I : OVERVIEW

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	INS – 101	1.Introduction to Instrumentation and Control System	6	4	20	80	100
2.		INS – 102	2. Analog Devices and Industrial Electronics	6	4	20	80	100
3.	**Compulsory Foundation**	INS - 103(a)	1. Digital Techniques and Principles of Communications	6	4	20	80	100
		INS - 103(b)	2. Power Electronics					
		INS - 103(c)	3. Industrial Product Instrumentation					
4.	**Elective Foundation**	INS - 104 (a)	1. Programming in "C"	6	4	20	80	100
		INS - 104 (b)	2. Renewable Sources of Energy					
		INS -104 (c)	3. Opto Electronics					
5.	**Practical –I**	INS - 105	Paper 1& 3 (Analog and Digital Electronics Lab)	6	4	--	100	100
6.	**Practical-II**	INS – 106	Paper 3 &4 (" C " Programs Lab)	6	4	--	100	100
	Total			36	24	80	520	600
7.	Audit Course			0	0	100	0	0

*All core papers are Mandatory

- Compulsory Foundation choose one paper.
- Elective Foundation – Choose one paper.
- Audit course-100 Marks (Internals) Zero Credits under self-study.
- Interested students may register for MOOC with the approval of the concerned DDC butit will be considered for the award of the grade as open elective only giving extra credits.

Semester – II: OVERVIEW

S.No	Components of Study	Title of theCourse	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	INS – 201	1.Industrial Instrumentation	6	4	20	80	100
2.		INS – 202	2. Electronic Instrumentation	6	4	20	80	100
3.	**Compulsory Foundation**	INS - 203(a)	1. Sensors and Signal Conditioners	6	4	20	80	100
		INS - 203(b)	2.Network Analysis					
		INS - 203(c)	3. Spectroscopic Instrumentation					
4.	**Elective Foundation**	INS - 204(a)	1.Microprocessors and Interfacing	6	4	20	80	100
		INS - 204(b)	2. Robotics					
		INS - 204(c)	3. Electronic Measurement Instruments					
5.	**Practical -I**	INS – 205	Paper 1& 3 (Transducers Lab)	6	4	--	100	100
6.	**Practical-II**	INS – 206	Paper 3 & 4 (Microprocessors Lab)	6	4	--	100	100
	Total			36	24	80	520	600
7.	Audit Course			0	0	100	0	0

*All core papers are Mandatory

- Compulsory Foundation choose one paper.
- Elective Foundation – Choose one paper.
- Audit course-100 Marks (Internals) Zero Credits under self-study.
- Interested students may register for MOOC with the approval of the concerned DDC butit will be considered for the award of the grade as open elective only giving extra credits.

Semester – III: OVERVIEW

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	INS – 301	1.Analytical Instrumentation	6	4	20	80	100
2.		INS – 302	2.Digital Signal Processing	6	4	20	80	100
3.	**Generic Elective**	INS - 303(a)	1. Biomedical Instrumentation	6	4	20	80	100
		INS - 303(b)	2. Micro Electro Mechanical Systems					
		INS - 303(c)	3. Instrumentation for Environmental Science					
4.	**Practicals**	INS – 304	Analytical Instrumentation Lab	6	4	--	100	100
5.	**Skill Oriented Course**	INS – 305	Microcontrollers and Interfacing	6	4	10	90 (T40 +P50)	100
6.	**Open Elective**	INS - 306(a)	1. Computer Architecture and Organization	6	4	20	80	100
		INS - 306(b)	1. Industrial Organization and Management					
	Total			36	24	90	510	600

*All core papers are Mandatory

- Generic Elective – Choose two
- Core papers and Generic Electives opted paper held Practical-I
- Skill Oriented Course is Mandatory. Relevant society along with practical (10marksinternal 40 final theory & 50 for practical's).
- Open Electives are for the students of other Departments. Minimum one paper should beopted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study.
- Interested students may register for MOOC with the approval of the concerned DDC.

Semester – IV: OVERVIEW

S.No	Components of study	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	INS - 401	1.Introduction to VLSI Circuits	6	4	20	80	100
2.		INS – 402	2.Embedded Systems and Real time Operating Systems	6	4	20	80	100
3.	**Generic Elective**	INS - 403(a)	1. Programmable Logic Controllers	6	4	20	80	100
		INS - 403(b)	2.Computational Mathematics					
		INS - 403(c)	3. Electrical Engineering Materials					
4.	**Practicals**	INS – 404	VLSI Lab	6	4	--	100	100
5.	**Multi Disciplinary Course/ Project Work**	INS – 405	Project Work	6	4	--	--	100
6.	**Open Elective**	INS - 406(a)	1. Agro Based Instrumentation	6	4	20	80	100
		INS - 406(b)	2.Industrial Automation					
	Total			36	24	90	510	600

*All core papers are Mandatory

- Generic Elective – Choose two
- Core papers and Generic Electives opted paper held Practical-II.
- Project Work- Collaboration with various firms/companies/societies.
- Multi-Disciplinary Course is Mandatory. Circle formation with other subjects/Dept. ofArts/Commerce.
- Open Electives are for the students of other Departments. Minimum one paper should be opted.Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study.
- Interested students may register for MOOC with the approval of the concerned DDC.

(MandatoryCore)

INS-101	INTRODUCTION TO INSTRUMENTATION AND CONTROL SYSTEM	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Instrumentation

Course Objectives:

- To study the basic principles of Instrumentation System
- To study the basic concepts of Control System
- To study the time response analysis
- Root Locus, Frequency Response Analysis, Routh stability

Course Outcomes: At the end of the course, the student will be able to

CO1	• Understand fundamentals of Instrumentation system
CO2	• Understand and design open loop and closed loop control system
CO3	• Understand time response analysis
CO4	• Design and Analysis of Root Locus ,Frequency Response Systems

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	1	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	1	2	-	1	1	-	2	2	1	-

(MandatoryCore)

Core – 1: INS-101	Introduction to Instrumentation and Control System

UNIT:I: INSTRUMENTS AND THEIR CLASSIFICATION

Typical applications of instrument systems, Functional elements of instrumentationand measuring Systems. Input elements (Transducers and Electrodes), Intermediateelements (Signal conditioning) and Output elements (Data display and storage)

(a) Order of Instruments: Zero, First, Second and nth order Instruments.

(b)Null &Deflection, Manual & Automatic, Self-generating & Power operated. Proximity &Non proximity types.

(c) Analogue and Digital Types.

ERRORS AND UNCERTAINTIES

Introduction to errors and uncertainties in the measurement Performance parameters of instruments.Propagation of uncertainties in measurement.

STATIC PERFORMANCE PARAMETERS (CHARACTERISTICS)

Accuracy,Precision,Resolution,Threshold, Sensitivity, Linearity, Hysterises, Dead band.Backlash, Drift, Span. Impedance loading and Matching.Specifications of an Instrument.

UNIT –II: INTRODUCTRION TO CONTROL SYSTEMS

(a).Basic components of a control system, Open-loop and closed-loop control system and their differences.

(b).Classifications of control systems. Linear & non-linear time –invariant & time varying continuous & sampled data and digital.

(c).Effects of feedback on overallgain, stability, sensitivity, bandwidth and noise

UNIT – III: T IME RESPONSE ANALASIS AND STABILITY CRITERIA

(a). Standard test signals.Time response of first and second order systems Transient and steady state response. Time domain specifications. Steady state errors and error coefficients.

(b). Concept of stability. Necessary condition for stability. Hurwitz stability Criterion.Routh stability criterion. Relative stability analysis.

UNIT – IV

FREQUENCY RESPONSE ANALYSIS AND STABILITY CRITERIA

Frequency domain specifications. Bode diagrams. Phase margin and gain margains.

Polar plots Nyquist plot. Applications of Nyquist criterion to find the stability.

Books For Study:

1. A course in Electrical and Electronic Measurements and Instrumentation ByA.K. Sawhney
2. Electronic Instrumentation and Measurement Techniques, Cooper and Albert D.Helfriek
3. Principles of Industrial Instrumentation by D. Patranabis
4 Modern control systems engineering by Ogata
5. Instrumentation measurement and Analysis – Nakra&Chaudhry
6. Instrumentation – Devices and systems – Rangan,Sarma& Mani
7. Control Systems Engineering – Nagrath and Gopal
8. Automatic Control Systems – Benjamin C.Kuo
9. Control systems –Nagoorkani.

(MandatoryCore)

INS-102	Analog Devices and Industrial Electronics	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Analog Devices and Industrial Electronics

Course Objectives:

- To study basic electronic circuits.
- To study the basics of operational amplifiers
- To understand the concepts of transistors, UJT,SCR and thyristers
- The main objective of this course is to introduce and expose the students to various electronic circuits and design operational amplifiers for various applications.

Course Outcomes: At the end of the course, the student will be able to

CO1	• Understand and describe specifications, features and capabilities of electronic devices.
CO2	• Understand the basics of operational amplifiers and their applications
CO3	• Understand fundamental of semiconductors and power devices
CO4	• Select appropriate device for circuit operation.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	2	1	-	2	-	1	-
CO2	3	3	2	1	2	2	2	-	-	-	1	-
CO3	3	3	2	2	1	2	2	-	1	-	1	-
CO4	3	3	2	1	2	2	1	-	-	-	1	-

(MandatoryCore)

Core – 2: INS-102	Analog Devices and Industrial Electronics

UNIT-I

a. Electronic Devices:

Introduction to semiconductors. General semiconductor devices -Diodes, Transistor, Field Effect Transistor (FET), MOSFET, Zener diodes Special semi conductor devices - Tunnel diode, Varactor diodes,

b. Power supplies and Regulation (DC and AC)

Rectifiers - Half wave, Full wave, Bridge, Voltage Multipliers, Filters -inductance. LC. Pi, and T sections. Basic DC voltage regulation- Two terminal and three terminal voltage regulators,. Switch mode regulated Power supplies (SMPS)- AC voltage regulation- Step voltage regulation and Servo voltage regulation, Constant voltage transformer, UPS.

UNIT-II

a. Operational amplifiers:

Introduction to operational amplifiers,. Characteristics of ideal and real operational amplifiers, Op amp configurations - Inverting, Non-inverting, current and voltage- followers, Differential amplifiers and comparators,.Virtual ground and Miller effect.

b. Applications of Operational amplifiers:

Addition, Subtraction, Scale changing (Multiplication and Division) Integration and Differentiation. Waveform generators: Wein Bridge Oscillator and Multi vibrators, Precision Rectifiers, Instrumentation Amplifiers, Active filters.

UNIT-III

Thyristors and Related Power Devices

Thyristor turn and off methods, Thyristor ratings, SCR half wave rectifier, SCR full wave rectifier, Light activated silicon controlled rectifier (LASCR), Shockley diodes, TRIAC power control circuit, UJT Full wave phase control circuit, Programmable UJT, Silicon controlled switch (SCS), Gate turn off thyristors (GTO), Gate drive Circuits.

UNIT-IV

Industrial Applications

Relays, Reed relay, Solid state relay, UJT/SCR time delay relay, AC time delay relay , Precision long time

delay relay, Integrated circuit timers (.555 timers), Electronic resistance welding types of resistance welding, AC welder circuits, Industrial heating, skin effect, High frequency power source for induction heating, Dielectric heating, applications, comparison between dielectric and induction heating, Resistance heating.

Books For Study:

1. Fundamentals of Electronic Devices by David A. Bell
2. Operational Amplifiers and Linear Integrated Circuits by RamakanthGaekwad
3. Electronic devices and Circuits by G.K. Mithal
4. Thyristors and applications - M. Rammurthy, East-West Press, 1977.
5. Electronic Measurements and Instrumentation – Dr. Rajendra Prasad
6. Operational Amplifiers and Linear Integrated Circuits by Robert F. Coughlin and Frederick F. Driscoll
7. Operational Amplifier characteristics and applications by Robert G. Irvine
8. Semiconductor circuits : Linear and Digital by Marlin, Restenbalt
9. An introduction to Operational Amplifiers by SV Subramanyam
10. Industrial electronics by S.Biswas, DhanpatRai, India
11. Industrial and Power Electronics - G.K. Mithal and Maneesha Gupta, Khanna, 2003.
12. Integrated Electronics - J. Millman and C.C Halkias, McGraw Hill, 1972.
13. Electronic Devices and circuits - Theodore. H.Bogart, Pearson Education, 2003.

INS-103(a)	Digital Techniques and Principles of Communications	L-5,T-1,P-6	4Credits

Pre-requisite: Basic knowledge about Digital Techniques

Course Objectives:

- To teach theory and working of FET and MOSFET
- To teach Op-amp basics
- To teach flip-flops, registers, counters, interfacing with analog devices
- To teach communication electronics

Course Outcomes: At the end of the course, the student will be able to

CO1	• Learn working and applications of FET and MOSFET.
CO2	• Learn the basics of op-amps.
CO3	• Learn the importance of digital electronics.
CO4	• Learn the process of communication and its importance.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	1	-	1	-	1	-
CO2	3	3	2	1	2	-	1	-	-	2	1	-
CO3	2	2	3	2	2	-	1	-	1	-	1	-
CO4	3	3	2	2	2	-	1	-		2	1	-

(Compulsory Foundation)

Compulsory Foundation: INS-103(a)	Digital Techniques and Principles of Communications

UNIT–I: Introduction to ElectronicDevices:

Field Effect Transistor (FET): Structure and working of JFET, Characteristics, and parameters of JFET.AdvantagesofFETоverBJT.FETasswitchandAmplifier-ApplicationofFETasvoltage variable resistor. Structure of MOSFET, depletion type and enhancement type, MOSFETCharacteristics,MOSFET as variable resistor,Conceptof CMOS.Structure,working and Characteristics of UJT. Application of UJT as a Relaxation oscillator.

UNIT–II: Operational Amplifiers:

Block diagram of a typical Op-Amp, differential Amplifier, Comparator open loop configuration,invertingandnon-invertingamplifiers.Op-ampwithnegativefeedback,voltageshuntfeedback, effect of feedback on closed loop gain, input resistance, output resistance, CMRR, frequency response, slew rate. InstrumentationAmplifier,integratoranddifferentiator.Waveformgenerators(Squareandtriangle). Filters (Low pass, high pass and Band pass). Analog to Digital data converters (ADC)andDigital to Analog conversion (DAC).

UNIT–III: Digital Electronics

Combinational Logic: Multiplexers, Decoder,Demultiplexer,Dataselector,Multiplexer,Encoder. Sequential Logic: Flip–Flops, A1-bit memory, The RS Flip-Flop, JK Flip – Flop, JKMaster Slave Flip–Flops, T Flip-Flop, D Flip-Flop, Shift Registers, Serial-in Serial-out, Serial-inParallel-out,Parallel-inSerial-out,Parallel-inParallel-outRegisters.AsynchronousandSynchronousCounters.

UNIT–IV: Communication Electronics

Introduction to Modulation (AM & FM), Sampling Theorem, Low pass and Band pass signals, PAM, Channel BW for a PAM signal. Natural sampling, Flat-top sampling. Signal recovery through holding. Quantization of signals, PCM transmission, Quantization of noise, Differential PCM, Delta Modulation, Adaptive Delta modulation CVSD. Signal to noise ratio in PCM and Delta Modulations.

Books for Study

1. Micro Electronics by Milliman and Halkias.TMH Publications
2. OP-Amps&LinearIntegratedCircuits,byRamakanthA.Gayakwad,PHI,2ndEdition,1991.
3. DigitalSystems byRonald J. Tocci,6th Edition,PHI, 1999.
4. DigitalPrinciplesandApplicationsbyA.P.MalvinoandDonaldP.Leach,TataMcGraw-Hill, New Delhi, 1993.
5. PrinciplesofCommunications byTaub andSchilling,Mc-GrawHillPublication.
6. ElectronicDevicesandCircuitTheorybyRobertBoylestedandLouisNashdsky–JoseKanedy&Division.PHI,New Delhi, 1991
7. ElectronicPrinciples byMalvino, 6th Ed.TMH, 2017
8. Linear Integrated circuitsbyRoyChoudhry, Pearson,2018
9. Op-Amps – D.K. Mahesh, PHI

NS-103(b)	Power Electronics	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Power Electronics

Course Objectives:

□□□□□□□□□□□□□□□□□To understand the operation, characteristics and performance parameters of

- Single phase and three phase controlled rectifiers.
- To study the operation, switching techniques and basic topologies of DC-DC
- Switching regulators.
- To learn the different inverter to understand the harmonic reduction methods.

Course Outcomes: At the end of the course, the student will be able to

CO1	• Students will be able to understand the working of FET, JFET, MOSFET.
CO2	□□□□□Understand working of Controlled Rectifiers, Inverters and DC to DC converters.
CO3	□□□□Understand the inverters
CO4	• Understand the Working of AC/DC Drives.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	-	-	2	-	1
CO2	3	3	3	1	2	1	-	-	-	2	-	1
CO3	3	3	3	2	2	1	1	-	-	2	-	1
CO4	3	3	3	-	-	2	-	-	-	2	-	1

Compulsory Foundation: INS-103(b)	Power Electronics

UNIT I

Study of switching devices: Frame, Driver and snubber circuit of SCR, TRIAC, BJT, IGBT, MOSFET, Commutation circuits for SCR. Step-down and step-up chopper, Time ratio control and current limit control Buck, boost, buck- boost converter, concept of Resonant switching - SMPS.

UNIT II

Converters: Half controlled and fully controlled converters, single phase dual converters – power factor Improvements.

Three Phase Converters – Half controlled and fully controlled converters. Design of SCR based DC power circuits including UJT as triggering device AC power control using SCR-UJT & TRIAC-DIAC like universal speed controller fan regulator. Design of SCR/TRIAC based AC power control circuits including UJT/DIAC as a triggering device.

UNIT III

AC to AC Controllers: On Off controller, Single phase AC voltage controllers–single and three phase cycloconverters.

Inverters: Single phase and three phase (both 1200 mode and 1800 mode) inverters – Series resonant inverter - Current source inverter. UPS

UNIT IV

Motors: Working principle, Types of AC motors and Characteristics of AC motors. DC motors working principle, types and characteristics. Stepper motors.

AC Motor Drives: Concept & requirement of drives, Current fed & Voltage fed drives, rotor resistance control & v/f control of AC motors.

DC Motor Drives: DC Drives for brushed/brushless motors

Industrial Applications: Induction & dielectric heating process block diagram, merits/demerits and applications of power electronics in traction.

Books For Study:

1. M.H. Rashid, ‗Power Electronics: Circuits, Devices and Applications‘, Pearson Education, 4th Edition, 2013.
2. P.S. bimbhra, ―Power Electronics‖, Khanna publishers, 13th reprint, 2004.
3. Alok Jain, ―Power Electronics & its applications‖, PENRAM International Publishing (India) Pvt. Ltd, 2nd Edition, 2008.

INS-103©	Industrial Product Instrumentation	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Industrial Product Instrumentation

Course Objectives:

- Learn the basics of instrumentation design
- Lear the hardware design
- Learn the digital design
- Learn the PCB design

Course Outcomes: At the end of the course, the Student will be able to

CO1	Design the instruments
CO2	Learn the hardware design
CO3	Learn the digital design
CO4	Learn the PCB design

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	1	1
CO2	3	3	3	1	2			-	-	-	1	1
CO3	3	3	3	2	2			-	-	-	1	1
CO4	3	3	3					-	2	-	1	1

Compulsory Foundation: INS-103(c)	Industrial Product Instrumentation

Unit - I:

Introduction: Stages in product design - Market survey, Product Specifications (Electrical, Mechanical, Environmental), R&D and Engineering Prototypes, Pilot Production Batch, Environmental testing, Documentation, Manufacturing. Electronic Products Classification- Consumer, Industrial and Military. Their peculiarities in terms of Cost/performance ratio and Reliability. Reliability- Bath tub curve, Measures taken (at Component and Product level and various soldering techniques including Surface Mount Technology) to improve reliability. Fundamentals of Communication System Design, criteria for selection of frequency bands, requirements of Voice and Multimedia Applications

Unit - II

Hardware designs- Analog

Analog Signal Conditioning- Factors affecting choice of OPAMPs in signal conditioning applications. Need for Instrumentation Amplifiers- Case study. Error budget analysis with Case study. ADCs- Interpretation of ADC specifications from design view point. Considerations in selecting References (Vref for ADC).DACs- Interpretation of DAC specifications from design view point.

Unit – III

Hardware design- Digital

Interface examples for- LED, HB LED, LCD, Keyboard, Touch Screen. Microcontrollers - Comparative study of different Microcontroller Architectures, Factors affecting choice of Microcontroller for particular application with Case study of one application. Introduction to buses and protocols used in Electronic Products- I2C, SPI.

UNIT - IV

PCB design and EMI/EMC

PCB Design practices for Analog and Mixed signal circuits- Ground Loops, Precision circuits, shielding and guarding. PCB Design Practices for High Speed Digital Circuits, Signal integrity and EMC. EMI/EMC testing standards and compliance.

Text Books

1. Bernhard E. Bürdek, ―History,Theory, Practice of Product Design‖, Springer Science, 1st edition, 2005.
2. Paul Horowitz, ―Art of Electronics‖, Cambridge University Press, 3rd edition, 2015.
3. Howard Johnson, Martin Graham, ―High-speed Digital design- A Handbook of Black Magic‖, Prentice Hall Publication, 1st edition, 1993.
4. Proakis and Salehi, ―Contemporary Communication Systems Using Matlab‖, Wadsworth Publishing Co Inc, 3rd edition, 2011.
5. G. PahlandW.Beitz J. Feldhusen and K.-H. Grote, ―Engineering Design - A Systematic Approach‖, Springer, 3rd edition, 2007.
6. Tim Williams, ―EMC for Product Designers‖, Elsevier, 4th edition, 2007.

Books For Study

1. David Bailey, ―Practical Radio Engineering and Telemetry for Industry‖, Elsevier, 1st Edition 2003.
2. Bernard Sklar , ―Digital Communication‖ , Pearson Education, 2nd Edition, 2001.
3. Pressman , ―Software Engineering - A Practitioner's Approach‖ McGraw-Hill Higher Education, 8th Edition, 2014.
4. DomineLeenaerts ,Johan van der Tang , Cicero S. Vaucher , ―Circuit Design for RF Transceivers ‖ Springer, 2001 Edition, 2011.

INS-104(a)	Programming in "C"	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Programming in "C"

Course Objectives:

- To teach basic principles of 'C' language.
- To teach basic Programs in 'C' Language.
- To teach simple Array Programs in 'C' Language.
- To teach file management using 'C' language

Course Outcomes: At the end of the course, the student will be able to

CO1	• Understand the basic principles of C language.
CO2	• Understand To teach basic Programs in C Language.
CO3	• Understand the simple Array Programs in C Language.
CO4	• Understand the File management and Linked List Programs.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	2	-	-	2	1	-	1
CO2	3	2	3	3	-		2	-	2	1	-	1
CO3	3	2	3	3	2		-	-	2	-	-	1
CO4	3	2	3	3	-	2		-	2	-	-	1

Elective Foundation: INS-104(a)	Programming in "C"

UNIT-1

a. Overview of computers: Overview of computer system, people, procedures, data, information, hardware-operations of computing, hardware categories, software application software and system software, developments in computer technology, types of programming languages, algorithms, flow charts.

B. Overview of C: History of C, importance of C, basic structure of C programs, programming style.

UNIT-II

a. Constants, Variables and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, declaration storage classes, assigning values to variables, defining symbolic constants, declaring a variable as Constant and volatile, Overflow and underflow of data.

b. Operators and Expressions: Introduction to operators, arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, special operators, arithmetic expressions, reading and writing a character, formatted input and output.

c. Decision Making and Looping: IF and Else IF statements, SWITCH statements, WHILE, DO-WHILE and FOR statements. C programs covering all the above aspects.

UNIT-III

a. Arrays and Strings: Introduction to arrays, initialization of One dimensional array and two dimensional arrays, declaring and initializing string variables, reading and writing strings, string handling functions.

b. User Defined Functions: need for user-defined functions, definition of functions, return values and their types, function calls and declarations, arguments but no return values, no arguments no return values, nesting of functions, passing arrays to functions, passing strings to functions.

UNIT- IV

a. Structures and Pointers: Defining a structure, declaring structure variables, structure initialization, copying and comparing structure variables, arrays of structures, understanding pointers, declaring pointer variables, initialization of pointer variables, pointer expressions.

b. File Management and Linked Lists: Defining and opening a file, closing a file, input/output operations on files, and concepts of Single Linked Lists.

Books For Study

1. Programming with C" by K.R. Venugopalprasad, Tata McGraw Hill
2. Programming in C by E. Balaguruswamy, Tata McGraw Hill
3. "Data structures through C" by YeshwanthKanitkar, BPB Publications (2003)
4. Programming in ANSI C - E. Balaguruswamy.
5. Let us C - YeshwanthKanitkar.
6. Data Structures using C - A.M. Tanenbaum and others.
7. "C programming "by Dennis Ritche, PHI Publishers.

INS - 104(b))	Renewable Sources of Energy	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Renewable Sources of Energy

Course Objectives:

- To teach the different energy sources
- To teach the importance of Solar energy
- To teach the usage of wind energy
- To teach the importance of bio-mass energy

Course Outcomes: At the end of the course, the student will be able to

CO1	• Understand about different energy sources
CO2	• Learn the importance of Solar energy
CO3	• Learn the usage of wind energy
CO4	• Learn the importance of bio-mass energy

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	-	2	-	-	-
CO2	3	3	3	3	-	1	2	-	1	2	-	-
CO3	3	3	3	3	-	1	2	-	1	-	-	-
CO4	3	3	3	3	-	1	2	-	2	2	-	-

Elective Foundation: INS-104(b)	Renewable Sources of Energy

Unit - 1:

INTRODUCTION TO ENERGY STUDIES

Introduction, Energy science and Technology, Forms of Energy, Importance of Energy Consumption as Measure of Prosperity, Per Capita Energy Consumption, Roles and responsibility of Ministry of New and Renewable Energy Sources, Needs of renewable energy, Classification of Energy Resources, Conventional Energy Resources , Non-Conventional Energy Resources, World Energy Scenario, Indian Energy Scenario.

SOLAR ENERGY

Introduction, Solar Radiation, Sun path diagram, Basic Sun-Earth Angles, Solar Radiation Geometry and its relation, Measurement of Solar Radiation on horizontal and tilted surfaces, Principle of Conversion of Solar Radiation into Heat, Collectors, Collector efficiency, Selective surfaces, Solar Water Heating system , Solar Cookers , Solar driers, Solar Still, Solar Furnaces, Solar Greenhouse. Solar Photovoltaic, Solar Cell fundamentals, Characteristics, Classification, Construction of module, panel and array. Solar PV Systems (stand-alone and grid connected), Solar PV Applications. Government schemes and policies.

Unit - 2:

WIND ENERGY

Introduction, History of Wind Energy, Wind Energy Scenario of World and India. Basic principles of Wind Energy Conversion Systems (WECS), Types and Classification of WECS, Parts of WECS, Power, torque and speed characteristics, Electrical Power Output and Capacity Factor of WECS, Stand alone, grid connected and hybrid applications of WECS, Economics of wind energy utilization, Site selection criteria, Wind farm, Wind rose diagram.

Unit - 3:

BIOMASS ENERGY

Introduction, Biomass energy, Photosynthesis process, Biomass fuels, Biomass energy conversion technologies and applications, Urban waste to Energy Conversion, Biomass Gasification, Types and application of gasifier, Biomass to Ethanol Production, Biogas production from waste biomass, Types of biogas plants, Factors affecting biogas generation, Energy plantation, Environmental impacts and benefits, Future role of biomass , Biomass programs in India.

Unit - 4:

HYDRO POWER AND OTHER RENEWABLE ENERGY SOURCES

Hydropower: Introduction, Capacity and Potential, Small hydro, Environmental and social impacts. Tidal Energy: Introduction, Capacity and Potential, Principle of Tidal Power, Components of Tidal Power Plant,

Classification of Tidal Power Plants. Ocean Thermal Energy: Introduction, Ocean Thermal Energy Conversion (OTEC), Principle of OTEC **5** system, Methods of OTEC power generation. Geothermal Energy: Introduction, Capacity and Potential, Resources of geothermal energy.

Books For Study

1. Sukhatme. S.P., Solar Energy, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.

2. B. H. Khan, Non-Conventional Energy Resources, , The McGraw Hill

3. Twidell, J.W. & Weir, A. Renewable Energy Sources, EFN Spon Ltd., UK, 2006.

4. S. P. Sukhatme and J.K. Nayak, Solar Energy – Principles of Thermal Collection and Storage, Tata McGraw-

Hill, New Delhi.

5. Garg, Prakash, Solar Energy, Fundamentals and Applications, Tata McGraw Hill.

INS-104(C)	Opto Electronics	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Basic Opto Electronics

Course Objectives:

- To teach the fundamentals of laser and their applications
- To teach the different optical sources and detectors
- To teach the oprtical components and instruments
- To teach the basics of optical fibres and its applications

Course Outcomes: At the end of the course, the student will be able to

CO1	• Learn fundamentals of laser and their applications
CO2	• Know the different optical sources and detectors
CO3	• Understand the oprtical components and instruments
CO4	• Learn the basics of optical fibres and its applications

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	2	1	1	-	2	1	-	-
CO2	3	2	-	3	2	1	2	-	2	1	-	-
CO3	3	2	-	3	2	1	2	-	2	1	-	-
CO4	3	2	-	3	2	1	2	-	2	1	-	-

(Elective Foundation)

Elective Foundation: INS-104(c)	Opto Electronics

Unit I:

Laser Fundamentals: Properties of laser, Laser modes- axial and transverse, single mode operation. Frequency stabilization.Mode locking, Mode hopping, Q-switching techniques.

Laser Types: Doped insulator lasers, Semiconductor lasers, Gas lasers, Liquid Dye lasers.

Laser safety: Biological effects, safety standards, risk of exposure, laser hazard classification and assessment, laser safety system, safe industrial laser laboratory, laser eye protection, laser accidents.

Applications of Laser: Biomedical, process, etc

Unit II:

Optical sources: Electromagnetic spectrum, types of spectra- line, band and continuous light sources, radiometry and photometry, natural sources, incandescent lamp, gas discharge lamp. Light-emitting diodes electroluminescent process, choice of LED materials, LED structures, infrared sources, semiconductor laser.

Optical detectors: Thermal detectors and Quantum detectors, bolometer, Photodiodes- PIN and avalanche photodiodes, phototransistors, photo multipliers, photovoltaic, IR detectors, Solar cells, CCD devices.

Unit III:

Optical components Filters: absorption filters and interference filter, gratings- equation of diffraction grating, resolving power, concave grating, volume diffraction grating, holographic grating. Lenses, Polarizer and Beam splitters, Monochromator

Optical instruments: Eye, telescopes, microscopes, optical projection systems, cameras, basic principles of Holography, OTDR, polarimeter.

Unit IV:

Optical Fiber and Their properties: Ray theory, wave guiding principles, Theory of optical wave propagation, Types and classification of optical fibers, optical fiber mode, single mode fiber, special fiber, fiber materials, fiber fabrication, transmission characteristics of fiber, absorption losses, scattering losses, dispersion, polarization, nonlinear
phenomena

Optical Fiber Measurements: Measurement of attenuation, dispersion, refractive index profile of fiber and cut off wavelength, numerical aperture, OTDR, Measurement of flow, pressure, Temperature, displacement, acceleration and fluid level vibration measurement.

Books For Study

1. J. Wilson, ―Optoelectronics‖, Prentice-Hall of India.3rd Edition, 1988.
2. ―Electro-Optical Instrumentation: Sensing and Measuring with Lasers‖, Pearson Education, Inc., 1st Edition, 2004.
3. Opto Electronic Devices – Li, Xun-Hardback-374.
4. Optical Electronics – Ajoy Ghatak, K.Thyagarajan.

(MandatoryCore)

INS-201	**Industrial Instrumentation**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Understanding of graduate level Industrial Instrumentation

Course Objectives:

- To teach the introduction in Process Instrumentation .
- To teach the Instrumentation in Iron and Steel Industries.
- To teach the Instrumentation in Petrochemical, Pharmacy
- To teach Thermal Power Stations.

Course Outcomes: At the end of the course, the student will be able to

CO1	• learn the introduction in Process Instrumentation .
CO2	• learn To teach the Instrumentation in Iron and Steel Industries.
CO3	• learn the Instrumentation in Petrochemical.
CO4	• know the Instrumentation in Pharmacy and Thermal Power Stations.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	3	2	1	1	1	-	1	-
CO2	3	3	3	1	3	-	1	1	-	1	-	-
CO3	3	3	3	-	2	-	1	-	-	-	-	-
CO4	3	3	3	-	2	2	1	1	-	-	1	-

(Mandatory Core)

Core – 1: INS-201	Industrial Instrumentation

UNIT – I

Introduction to Process Instrumentation: Elements of Process Instrumentation - Switches, Valves, Gauges, Converters, transmitters, actuators, relays. Process Instrumentation Diagrams - Familiarization.

Instrumentation in Iron & Steel Industries: Description of the process, Measurement hardware, Valves, Controllers and displays, Computer Applications and Typical control systems as applied to the iron and steel industries.

UNIT – II

Instrumentation in Petrochemical Industries: Control of Distillation Towers, Refrigeration units, Steam boilers, Furnaces, Centrifuges, Crystallizers, Heat exchangers, Pumps, Compressors, and Evaporators as applied to the petrochemical industry.

UNIT – III

Instrumentation in Pharmaceutical Industries : Description of the process, Measurement hardware, Valves, Controllers and displays, Computer Applications and Typical control systems as applied to the Pharmaceutical industries.

UNIT – IV

Instrumentation in Thermal Power Stations : Description of the process, Measurement hardware, Valves, Controllers and displays, Computer Applications and Typical control systems as applied to the Thermal Power Stations.

Books For Study

1. Industrial Instrumentation – K. Krishnaswamy.
2. Industrial Instrumentation – Donald P. Eckman.
3. Industrial Instrumentation – Umesh Rathore.
4. Industrial Instrumentation – K. Krishnaswamy, S. Vijaychitra.
6. Process Instrumentation — Liptak
7. Process Instrumentation & control Handbook - Mithal
8. Instrumentation in Industries - H.E. Soison
9. Programmable Logic Controllers – John Webb – Maxwell Macmillan International

(MandatoryCore)

INS- 202	Electronic Instrumentation	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Electronic Instrumentation

Course Objectives:

- To teach Analogue Measuring Instruments
- To teach. Principle, operation and construction and details of analog and digital measuring instrumentation
- To teach designof function generator, square wave generator and digital multi meter
- To teach Spectrum Analyzers, Frequency Synthesizers, Digital tachometer, Digital watt meter

  Digital Capacitance meter

Course Outcomes: At the end of the course, the student will be able to

CO1	• Learn about analogue Measuring Instruments
CO2	• Learn • Principle, operation and construction and details of analog and digital measuring instrumentation.
CO3	• analyze and design function generator, square wave generator and digital multi meter.
CO4	• Learn Spectrum Analyzers, Frequency Synthesizers, Digital tachometer, Digital watt meter Digital Capacitance meter

Mapping of course outcomes with the program outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	2	1	1	-	**1**	1	**-**	-
CO2	3	2	2	1	2	1	-	-	**1**	1	**-**	-
CO3	3	3	3	-	2	1	2	-	**1**	1	-	-
CO4	3	2	3	2	3	-	2	-	**1**	1	-	-

(Mandatory Core)

Core – 2: INS-202	Electronic Instrumentation

UNIT-I: Analogue Measuring Instruments

(a). Principle, Operation and constructional details of moving coil moving iron - induction type dynamometer type of DC meters Thermal type and rectifier type of meters. Errors and their compensation - extension of ranges of DC and AC meters -Ohmmeters - series type - shunt type meters – Meggers.

(b). Cathod Ray Oscilloscopes, D.C. and A.C. Millie/Micro voltmeters Precision rectifier types. Nano ammeter (usingop.amp). Analogue frequency meter. Analogue phase meter, impedance, L, C, R Bridges, Q meters and Distortion factor meters

UNIT-II: Digital Measuring Instruments: (Basic principle, design and working with suitable block/circuit diagrams)

a) Digital frequency meter.

b) Digital volt meter.

c) Digital multimeters.

d) Digital phase meter.

e) Digitizing Oscilloscopes, Storage oscilloscope and Sampling Oscilloscopes.

UNIT-III: Waveform Generators: (Basic principle, design and working with suitable block/circuit diagrams)

(a) A.F. Sine/Square wave Generator.

(b) R.F. Signal Generator.

(c) Standard signal Generator.

(d) Function Generator.

UNIT – IV: Special Instruments: (Basic principle, design and working with suitable block/circuit diagrams)

(a) Spectrum Analyzers

(b) Frequency Synthesizers

(c) Digital tachometer

(d) Digital watt meter

(e) Digital Capacitance meter

Books For Study:

1. Principle of Electronic Instrumentation – De Sa, Elsevier Science
2. Electronic Instrumentation and Measurements – H. S. Kalsi
3. Electrical and Electronic Measurements and Instrumentation – J. K. Gupta.
4. Electronic Instruments and Instrumentation Technology – M.M.S. Anand.
5. Electronic Instrumentation and Measuring Techniques. — Cooper
6. Electronic Instrumentation — Kalsi
7. Electronic Measurements and Instrumentation. — Oliver & Cage
8. Instrumentation Devices and Systems. — Rangan, Sarma and Mani
9. A Course in Electrical and Electronic Measurements and Instrumentation. by AK Sawhney

(CompulsoryFoundation)

INS-203(a)	Sensors and Signal Conditioners	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level in Sensors and Signal Conditioners

Course Objectives:

- To study the basic principles sensors and transducers
- To study the basic concepts of Signal Conditioners and Recorders
- To study Temperature transducer , flow transducer and level sensors
- To teach Pressure Transducers,d Manometers and Elastic transducers

Course Outcomes: At the end of the course, the student will be able to

CO1	• Understand fundamentals of sensor/Transducers
CO2	• Understand the concept of Signal Conditioners.
CO3	• Understand the concepts Temperature transducer , flow transducer and level sensors
CO4	• Learn Pressure Transducers, Manometers and Elastic transducers

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	2	1	2	-	-	2	2	-
CO2	3	3	2	1	2	1	1	-	1	-	2	-
CO3	3	3	2	1	2	1	2	-	-	-	2	-
CO4	3	3	2	1	2	1	1	-	-	2	2	-

(Compulsory Foundation)

Compulsory Foundation: INS-203(a)	Sensors and Signal Conditioners

UNIT-I: INTRODUCTION TO SENSORS \ TRANSDUCERS.

Definition of a transducers\sensor.Role of transducers.Characteristics of transducers.Significant parameters of a transducer.Selection of a transducer.Classification of transducers.Linearization of transducers.

UNIT-II: SIGNAL CONDITIONERS: Precision Rectifier, Logarithmic Amplifier, Anti Logarithmic Amplifier, Active filters, DC to DC converters, Chopper Stabilized Amplifier, Phase Sensitive detector.

OPTO-ELECTRONIC TRANSDUCERS

Photoelectric effect.Photo emissive tube and photomultiplier tubes.Photoconductive and photovoltaic cells.Photo diodes and photo transistor. Light Dependent Resistors.

UNIT – III:

(a) TEMPERATURE TRANSDUCERS

Mechanical Temperature sensors.Resistance type temperature sensors.Platinum resistance thermometer.Thermocouples.Solid state sensors.Radiation type sensors – optical pyrometers.Calibration of thermometers.

(b) FLOW TRANSDUCERS

Flow characteristics. Obstruction meters-Venturi meter and orifice meters.Turbine flow measuring devices.

(c) LEVEL SENSORS

Diaphragm level sensor.Differential pressure level sensor.Laser level sensor. Level gauges.

UNIT-IV: DISPLACEMENT, STRAIN AND PREESSURE TRANSDUCERS

Displacement transducers-Variable resistance, inductance and capacitance.Linear Voltage Differential Transformer (LVDT).Strain-definition. Principle of working of strain gauges. Gauge factor. Types of strain gauges.Materials for strain gauges. Temperature compensation.Applications.

Manometers.Elastic transducers - Diaphragms, Bellows, Bourdon or helical tubes.Electrical pressure transducers – variable resistance, inductance and capacitance.Piezoelectric pressure transducer.Pressure calibration.

Books For Study:

1. Sensors and Transducers – D.Patranabis
2. Inteligent Sensor Systems 1996 Edition by John Bringnell, Neil White, Taylor & Francis.
3. Sensors and Transducers – Principle and Applications – R. Y. Borse
4. Modern Sensors Handbook 2007 Edition by Pavel Ripka, Aloisk Tipek, ISTE LTD.
5. Instrumentation Measurement Analysis – Nakra and Chaudhry
6. Instrumentation – Devices and Systems – Rangan, Mani and Sharma
7. A Course in Electrical and Electronic Measurements and Instrumentation A.K.Sahany
8. Hand Book of Bio-Medical Instrumentation – R.S. Khandpur (TMH)
9. 9.Process Measurement and Analysis – B.G. Liptak

(CompulsoryFoundation)

INS-203(b)	Network Analysis	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level

Course Objectives:

- To teach different Network theorems
- To teach Laplace Transform in the Network Analysis
- To teach The concept of complex frequency
- To teach Resonance in series and parallel circuits

CourseOutcomes: At the end of the course, the student will be able to

CO1	• Under stand different Network theorems
CO2	• Lear the use of Laplace Transform in the Network Analysis
CO3	• Under stand the concept of complex frequency
CO4	• Learn the concepts in Resonance in series and parallel circuits

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	2	1	1	-	-	2	2	-
CO2	3	3	2	1	2	1	1	-	1	2	2	1
CO3	3	3	2	-	-	1	1	-	-	2	2	-
CO4	3	3	2	1	2	1	1	-	1	2	2	1

(Compulsory Foundation)

Compulsory Foundation: INS-203(b)	Network Analysis

UNIT-I

Network theorems: Thevenin‘s theorem, Norton‘s theorem, Super position theorem, Reciprocity theorem, Millman theorem, Maximum Power Transfer theorem.

Signal representation - Impulse, step, pulse and ramp function, waveform synthesis.

UNIT-II

Laplace Transform in the Network Analysis: Initial and Final conditions, Transformed impedance and circuits, Transform of signal waveform. Transient analysis of RL, RC, and RLC networks with impulse, step, exponential, pulse and sinusoidal inputs, use of initial and final value theorems. Networks with transformed impedance and dependent sources.

UNIT-III

The concept of complex frequency - Network functions for the one port and two port - driving point and transfer functions - Poles and Zeros of network functions and their locations and effects on the time and frequency domain. Restriction of poles and zeros in the driving point and transfer function. Time domain behavior from the pole - zero plot.Frequency response plots - Magnitude and phase plots, Plots from s-plane phasors, Bode plots - phase margin and gain margin.Parameters of two-port network – impedance, admittance, transmission and hybrid - Conversion formulae.Attenuators – propagation constant, types of attenuators – T, π and Balanced.

UNIT-IV

Resonance in series and parallel circuits- resonant frequency- bandwidth - Q factor, Selectivity. Coupled circuits, single tuned and double tuned circuits, coefficient of coupling, Image Impedance, Characteristic impedance and propagation constant.Introduction to filters- Filter approximations - poles of the Butterworth, Chebyshev and inverse Chebyshev functions, expression for transfer function of Butterworth Low pass filter, design for 2nd order and 3rd order low pass Butterworth filters, Bessel-Thomson response.

Books For Study:

1. Circuits and Network Analysis,3/e, TMH: Sudhakar and S. P. Shyam Mohan
2. Network Analysis – M.E.Van Valkenburg, T.S.Rathore
3. Network Analysis And Synthesis – B.Somanathan Nair, S.R.Deepa.
4. Network Analysis and Synthesis – Ravish R. Singh.

INS-203(c)	Spectroscopic Instrumentation	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Spectroscopy

Course Objectives:

- To study the basics of Molecular Spectroscopy
- To study the basics of RAMAN Spectroscopy
- To study the basics of Spectrophotometry
- To study the basics of Fluorescence and Phosphorescence Spectroscopy

Course Outcomes: At the end of the course, the student will be able to

CO1	• Understand the basics of Molecular Spectroscopy
CO2	• Understand the basics of RAMAN Spectroscopy
CO3	• Understand the basics of Spectrophotometry
CO4	• Understand the basics of Fluorescence and Phosphorescence Spectroscopy

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	-	-
CO2	3	3	-	2	2	1	1	-	-	2	2	-
CO3	3	3	2	1	2	1	1	-	-	2	-	-
CO4	3	3	1	-	2	1	1	-	1	2	2	-

(Compulsory Foundation)

Compulsory Foundation: INS-203(c)	Spectroscopic Instrumentation

UNIT-I

Molecular Spectroscopy:

Introduction, Rotational structure of electronic bands of diatomic molecules, Fortrat diagram, General relations, Combination relations for $^1\Sigma$ - 1Σ and $^1\Sigma - ^1\pi$ bands Evaluation of rotational constants with reference to above transition.SSIsotope effect in electronic spectra of diatomic molecules.Potential energy curves and dissociation energy and pre-dissociation energy.

UNIT-II

Raman Spectroscopy:

Introduction, Theory of Raman Scattering, Rotational Raman Spectra, Vibrational Raman Spectra, Mutual Exclusion Principle, Laser Raman Spectroscopy, Schematic diagram of Laser Raman Spectrometer, description, Applications, Sample Handling Techniques, Polarization of Raman Scattered Light, Single Crystal Raman Spectra Raman Investigation of Phase Transitions, Resonance Raman Scattering, Structure Determination.

UNIT-III

Spectrophotometry :

Introduction – Beer's law, Absorptivity, UV and visible absorption, Instrumentation, Essential parts of spectrophotometer, Gratings and prisms, Radiant energy sources, Filters, Photosensitive detectors, Barrier layer cells, Photo emissive cells Photomultiplier tubes, Relationship between absorption in the visible and UV region and molecular structure, IR spectrophotometry, Fourier Transform Infrared (FTIR) Spectrometer, Principle, description of the Spectrophotometer, Advantages of FTIR over convention IR spectrophotometer, Applications.

UNIT - IV

Fluorescence and Phosphorescence Spectroscopy:

Introduction – Normal and Resonance Fluorescence, Intensities of Transitions, Non-radiative decay of fluorescent molecules, Phosphorescence and the nature of the triplet state, Population of the triplet state, Delayed Fluorescence, Excitation spectra Schematic diagram of Fluorescence Spectrometer description, Applications of Fluorescence and Phosphorescence.

Text books:

1. Principles of Fluorescence Spectroscopy, Joseph R.Lakowicz - Plenum Press, 1983
2. Molecular Spectroscopy, N.C.Crabb and P.W.B.King
3. Light Scattering in Solids, M Cardona, G Guntherodt - 1975 - Springer-Verlag
4. Noble Lecture of SirC.V.Raman

Books For Study:

1. Elements of Spectroscopy, Gupta, Kumar and Sharma
2. Elements of Diatomic Molecular Spectra, H. Dunford
3. Problems in Spectroscopy, S.V.J. Lakshman
4. Basic Principles of Spectroscopy, R. Chang

INS-204(a)	**Microprocessors and Interfacing**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Understanding of graduate level Microprocessors

Course Objectives:

- To teach principles of Microprocessor.
- To teach topics including internal architecture of microprocessor 8085 and 8086, their memory organization.
- Interfacing of data converts, memory and I/O Devices
- Programmable peripheral Interfacing Device

Course Outcomes: At the end of the course, the student will able to

CO1	• learn assembly programming language
CO2	• demonstrate the knowledge of addressing modes, instruction sets.
CO3	• able to analyze and design assembly level programmes and timing diagrams.
CO4	• able to analyze programmable peripheral devices, 8255, 8257/8237, 8259.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9		PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	1	1
CO2	3	3	2	2	-1	-	1	-	2	-	1	-
CO3	3	3	2	-	1	1	1-	-	2	-	1	-
CO4	3	3	2	2	2	1	1	-	2	-	1	2

(Elective Foundation)

Elective Foundation: INS-204(a)	Microprocessors and Interfacing

UNIT-I

Introduction to Microprocessor: Overview of a basic microcomputer structure and operation, Ideal microprocessor, Microprocessor technology-Bipolar and MOS, Microprocessor evolution and types

UNIT-II

8086 / 8088 Microprocessor Family: Overview of 8086 Microprocessor family.

Architecture of 8086/8088 Microprocessor - Architecture of Intel 8086/8088, Addressing modes. Detailed instruction set of Intel 8086/8088. Interrupts, Assembler Directives.

UNIT- III

Interfacing of data converts, memory and I/O Devices: Interfacing 8-bit D/A converter and A/D converts, Software controlled successive approximation A/D converter using ADC, Memory interfacing, DMA data transfer, serial data transfer, interfacing to Alphanumeric display.

UNIT-IV

Programmable peripheral Interfacing Device: programmable Keyboard/display interface(8279), Programmable Peripheral Interface(8255), Programmable Interval Timer(8253), Programmable Interrupt Controller(8259), Synchronous Data Communication Device(8251).

Books For Study:

1. Microprocessors and Interfacing Programming and Hardware --- Douglas V Hall
2. The Intel Microprocessors 8086/8088. 80186/80187. 80286. 80386. 80486. Pentium Processors - Architecture. Programming and interfacing. PHI, B.B. Brey
3. Advanced Microprocessors and Interfacing – Badri Ram.
4. Microprocessors and Interfacing Devices - Rupender Singh, Sarika Jain.
5. Introduction to Microprocessor/Microcontrollers-B.RAM.
6. The 8086/8088 Microprocessors : Programming. Interfacing Software. Hardware and Applications - Walter A. Triebel. Avatar Singh. PHI Edition.
7. Microprocessors, PC Hardware and Interfacing – N.Mathivannan, PHI
8. Advanced Microprocessor & Peripherals – Architecture, Programming & Interfacing – A.K.Ray&K.M.Bhurchandi , TMH.

INS-204(b)	**Robotics**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Understanding of graduate level in Robotics

Course Objectives:

The goal of the Robotics course is to familiarize the students with the concepts and techniques in robot manipulator control, enough to evaluate, chose, and incorporate robots in engineering systems

Course Outcomes: At the end of the course, the student will able to

CO1	To develop the student's knowledge in various robot structures and their workspace.
CO2	• To develop student's skills in performing spatial transformations associated with rigid body motions.
CO3	To develop student's skills in perform kinematics analysis of robot systems.
CO4	• To provide the student with knowledge of the singularity issues associated with the operation

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	2	1	-	-
CO2	3	3	2	2	2	1	1	-	2	1	-	-
CO3	3	3	2	2	2	1	1	-	2	1	-	-
CO4	3	3	2	2	2	1	1	-	2	1	-	-

(Elective Foundation)

Elective Foundation: INS-204(b)	Robotics

UNIT-I

Brief History, Types of robots, Overview of robot subsystems, resolution, repeatability and accuracy, Degrees of freedom of robots, Robot configurations and concept of workspace, Mechanisms and transmission, End effectors and Different types of grippers, vacuum and other methods of gripping. Pneumatic, hydraulic and electrical actuators, applications of robots, specifications of different industrial robots.

UNIT-II

Rotation matrices, Euler angle and RPY representation, Homogeneous transformation matrices, Denavit-Hartenbergnotation,representation of absolute position and orientation in terms of joint parameters, direct kinematics.

Inverse Kinematics, inverse orientation, inverse locations, Singularities, Jacobian, Trajectory Planning: joint interpolation, task space interpolation, executing user specified tasks.

UNIT-III

Static force analysis of RP type and RR type planar robots, Dynamic analysis using Lagrangian and Newton-Euler formulations of RR and RP type planar robots, , Independent joint control, PD and PID feedback, actuator models, nonlinearity of manipulator models, Computed torque control, force control, hybrid control.

UNIT-IV

Sensors and controllers: Internal and external sensors, position, velocity and acceleration sensors, proximity sensors, force sensors, laser range finder. Robot vision: image processing fundamentals for robotic applications, image acquisition and preprocessing. Segmentation and region characterization object recognition by image matching and based on features

Books For Study:

1. Introduction to Robotics – Analysis, Control, Applications – Saeed B. Niku.
2. Introduction to Robotics – Mechanics and Control - John J. Craig.
3. Robotics and Control – R.K. Mittal, I.J.Nagrath.
4. Robotics for Engineers – Kailash Chandra Mahajan, Prashant Kumar Pattnaik, Raghvendra Kumar.

(Elective Foundation)

INS -204 (c)	Electronic Measurement Instrumentation	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level Electronic Measurement Instrumentation

Course Objectives:

- To teach Static and Dynamic characteristics of instruments,
- To teach Signal Converters: I To P / P To I Converter
- To teach Electronic Instruments for Measuring Basic Parameters
- To teach Instrument for Generation and Analysis of Waveforms

CourseOutcomes: At the end of the course, the student will be able to

CO1	• Learn the static and Dynamic characteristics of instruments,
CO2	• Learn the signal Converters: I To P / P To I Converter
CO3	• Understand the electronic Instruments for Measuring Basic Parameters
CO4	• Understand the Instrument for Generation and Analysis of Waveforms

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	-	-	-	-	1	1	-
CO2	3	2	2	3	2	-	-	-	1	-	1	-
CO3	3	2	1	2	3	-	1	-	2	2	-	-
CO4	3	2	1	3	3	1	1	-	2	-	2	-

(Elective Foundation)

Elective Foundation: INS-204(c)	Electronic Measurement Instruments

Unit I:

Static and Dynamic characteristics of instruments, dead zone, hysteresis, threshold, resolution, input & output impedance, loading effects, fundamentals of measurements, Types of Error, Statistical Analysis, Probability of Errors, Limiting Errors, calibration of instruments, traceability, calibration report & certification.

DC bridges: Wheatstone bridge and Kelvin bridge design, bridge sensitivity, errors in bridge circuits, null type and deflection type bridges, current sensitive and voltage sensitive bridges, applications of DC bridges

Unit II:

Signal Converters: I To P / P To I Converter, Temperature to Voltage Converter, Conversion To Frequency, Period, or Time Duration, Measurement of Phase Difference Using X-OR and SR Flip-Flop Method, Measurement of Active And

Reactive Power of Supply Line, Lock-in Amplifiers, Variable Oscillators, Direct Sensor Microcontroller Interfacing.

Isolation Techniques: Transformer Isolation, Optical Isolation, Digital Techniques For Optical Isolation, Hall-Effect Principle and Measurement of Displacement, Current And Power Using Hall Sensors, Amplifications of Low Level Signals, Guarding, Shielding.

Unit III:

Electronic Instruments for Measuring Basic Parameters: Amplified DC meter, AC Voltmeter, True-RMS responding Voltmeter, Electronic multi-meter, Digital voltmeter, Vector Voltmeter.

Digital Instruments: Block diagram, principle of operation, Accuracy of Measurement Digital Multimeter, Kilo Watt Hour meter, Phase meter, Digital Tachometer, Ultrasonic Distance meter, Digital Thermometer, DSO, Frequency meter.

Unit IV:

Instrument for Generation and Analysis of Waveforms: Introduction, The Sine Wave Generator, Frequency Synthesized Signal Generator, Frequency Divider Generator, Signal Generator Modulation, Sweep Frequency Generator, Pulse and Square Wave Generator, Function Generator, Wave Analyzers, Harmonic Distortion Analyzer, Spectrum Analyzer.

Books For Study:

1. Helfrick Albert D., Cooper W. D., "Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall India, 2nd Edition, 2008.

2. Sawhney A. K., "A Course in Electrical and Electronics Measurements and Instrumentation", DhanpatRai& Sons, 11th Edition, 2005.

3. Kalsi H. S., "Electronic Instrumentation", Tata McGraw-Hill Education, 3rd Edition, 2010.

4. Bell David A., "Electronic Instrumentation and Measurements", Pearson Education, 3rd Edition, 2013.

INS-301	Analytical Instrumentation	L-5,T-1,P-0	4Credits

Pre-requisite: Basic knowledge of Analytical Instrumentation

Course Objectives:

- To introduce the basic concept of qualitative and quantitative analysis of given sample.
- To study various spectroscopic techniques and its instrumentation.
- To study the concept of separation science and its applications.
- To study the concept of industrial analyzers and its application.

Course Outcomes: At the end of the course, the student will be able to

CO1	• The Students get will be versed with the principles, construction and working of various analytical instruments..
CO2	• Students get details information about the applications of analytical techniques in medicine, industry etc.
CO3	• Understand the Polarographs
CO4	• Understand the NMR and ESR Spectrometers

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	2	1	-	2	1	-	-
CO2	3	2	2	2	2	2	1	-	-	2	2	-
CO3	3	2	2	2	2	2	1	-	-	-	-	-
CO4	3	2	2	2	2	2	2	-	2	2	-	1

(Mandatory Core)

Core – 1: INS-301	Analytical Instrumentation

UNIT –I:

COLORIMETERS AND SPECTROPHOTOMETERS

(a) Colorimeter – Principle and working with a block diagram. Salient features of individual blocks. Specifications of a colorimeter. Applications of colorimeters to analytical and biomedical purposes.

(b) Spectrophotometer – Principle and working with a block diagram. Salient features of individual blocks. Specifications and operation of spectrophotometer. Types of Spectrophotometers - Ultraviolet, Visible and Infrared. Applications of spectrophotometers.

ATOMIC ABSORPTION AND RAMAN SPECTROMETERS

a) Atomic absorption spectrometer – Principle and working with a block diagram. Salient features of individual blocks. Applications.

b) Raman Spectrometer – Principle and working with a block diagram. Salient features of individual blocks. Applications of Raman spectrometer.

UNIT –II

CONDUCTIVITY BRIDGES, PH METERS AND POLAROGRAPHS

a) Conductivity bridge – Principle and working of a conductivity bridge with a block diagram. Salient features of individual blocks. Applications of conductivity bridges.

b) pH Meters – Principle and working with a block diagram. Salient features of individual blocks. Types of pH meters. Applications of pH meters in chemical and industrial fields.

c) Polarograph – Principle and working with a block diagram. Salient features of individual blocks. Characteristics of dropping mercury electrode. Polarogram. Pulse polarograph. Application of Polographs in chemical and Industrial fields.

UNIT – III

RESONANCE AND MASS SPECTROMETERS

a) Nuclear magnetic resonance spectrometer – Principle and working with suitable schematic/block diagrams. Experimental arrangement. Salient features of individual blocks. NMR spectrum. Applications of NMR spectrometer.

b) Electron spins resonance spectrometer – Principle and working with a block diagram. Experimental arrangement. Salient features of individual blocks. Applications of ESR spectrometer.

c) Mossbauer Spectrometer – Experimental arrangement. Salient features of individual blocks. Sources, absorbers and detectors. Mossbauer spectrum. Applications of Mossbauer spectrometer.

d) Mass spectrometer – Principle and working. Description of individual blocks of experimental arrangement. Applications of Mass spectrometer.

UNIT – IV

ELECTRON MICROSCOPES

a) Transmission electron microscope – Principle and working with a block diagram. Salient features of individual blocks.

b) Scanning electron microscope – Principle and working with a block diagram. Description of individual blocks. Applications of electron microscopes.

THERMAL ANALYSERS

Thermo gravimetric and Differential Thermal analyzers – Principle and working with schematic diagram.Description of individual blocks.Applications.

CHROMATOGRAPHS

Chromatographs – Gas and liquid chromatographs: Principle and working with a block diagram. Applications.

Books For Study:

1. Hand Book of Analytical Instruments – R.S.Khandpur
2. Instrumental Methods of - Dr.S.Ravi Sankar
3. Advanced Instrumentation Techniques – Dr.S.Ravichandran, Dr.Naredndra Mulchand Gowekar
4. A Hand Book of Instrumental Methods of Analysis – Dr.Gokul S. Talele, Prof. Hitesh V. Shahare.
5. .Instrumental Methods of Analysis – Willard, Merrit& Dean
6. .Instrumental Methods of Analysis – Chatwal & Anand
7. .Principles of Instrumental Analysis – Skoog
8. .Industrial Instrumentation – Soisson

INS -302	Digital Signal Processing	L-5,T-1,P-0	4Credits

Pre-requisite: Basic knowledge of Digital Signal Processing

Course Objectives:

- To teach the basic elements of Digital Signal Processing
- To teach the analysis of discrete-time systems
- To teach discrete Fourier Transform
- To teach design of digital IIR filters:

Course Outcomes: At the end of the course, the student will be able to

CO1	• Gain knowledge on the basic elements of Digital Signal Processing
CO2	• Learn the analysis of discrete-time systems
CO3	• Understand the discrete Fourier Transform
CO4	• Learn design of digital IIR filters:

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	2	-	1	1	1	-
CO2	3	2	1	3	2	1	-	-	1	1	-	1
CO3	3	2	1	2	3	2	1	-	2	2	-	-
CO4	3	2	1	3	3	1	1	-	-	2	2	2

(Mandatory Core)

Core – 2: INS-302	Digital Signal Processing

Unit I:

Introduction, signals and systems

Basic elements of Digital Signal Processing (DSP), analog to digital conversion (ADC), comparison between DSP and Analog Signal Processing (ASP) with applications of DSP. Discrete-time signals and systems. Classification of signals, sampling process/theorem, aliasing effect and reconstruction, classification of systems, input-output description of systems, Block-digram representation of discrete-time systems.

Unit II:

Analysis of discrete-time systems

Linear convolution, causality and stability of discrete time systems, autocorrelation, crosscorrelation, z-transform and its properties, solving difference equations and analysis of discrete-time systems in zdomain, transfer function, pole-zero plot. Implementation of discrete-time systems: Structures for the realization, Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) structures.

Unit III:

Discrete Fourier Transform (DFT)

Discrete Fourier transform (DFT), properties of DFT, symmetry properties, circular convolution, linear filtering methods based on DFT, Frequency analysis of signals using DFT, Efficient computation of DFT, Fast Fourier Transform (FFT) algorithms: radix-2 decimation-in-time (DIT) and decimation-infrequency (DIF)FFT algorithms.

Unit IV:

Design of digital IIR filters:

IIR filter design by Approximation of Derivatives, IIR filter design by impulse invariance, IIR filter design by bilinear transformation, Characteristics of commonly used analog filters (Butter worth and Chebyshev), Frequency transformations, comparison of IIR & FIR filters.

Design of dital FIR filters:

Symmetric and antisymmeric FIR filters, Design of linear phase FIR Digital Filters using Windows, Design of linear phase FIR Digital Filters by Frequency Sampling method.

Books For Study:

1. A. V. Oppenheim and R. W. Schafer, “Discrete Time Signal Processing”, Pearson Education.
2. J. G. Proakis and D. J. Manolakis, “Digital Signal Processing: Principles, Algorithms and Applications”, PHI, 2000.
3. P. Ramesh Babu, “Digital Signal Processing”, Sci- Tech Publications.
4. A. Nagoor Kani, “ Digital Signal Processing”, Mc Graw Hill Publications, 2nd Edition.
5. B. Porat, “A Course in Digital Signal Processing”, J. Wiley and Sons.
6. J. R. Johnson, “Introduction to Digital Signal Processing”, PHI.
7. Rabiner, Gold, “Theory and Applications of Digital Signal Processing”, TMH.
8. S. K. Mitra, “Digital Signal Processing-A Computer Based Approach”, MGH

INS-303 (a)	Biomedical Instrumentation	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Biomedical Instrumentation

Course Objectives:

- To make student understand the identification, classification, and working principle of various Biomedical Instruments used for Bio-potential measurement and application.
- To make students understand these instruments in diagnosis, therapeutic treatment and imaging fields.

Course Outcomes: At the end of the course, the student will be able to

CO1	• Identify various Bio-potential and their specification in terms of amplitude and frequency.
CO2	• Decide the applications of therapeutic instruments for treatment purpose.
CO3	• Decide the applications of therapeutic instruments for treatment purpose.
CO4	• Understand applications of imaging instruments and the modalities involved in each technique.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	1	-	2	1	-	-
CO2	3	2	3	3	-	1	2	-	2	1	-	-
CO3	3	2	3	3	2	-	2	-	2	1	-	-
CO4	3	2	3	3	-	-	2	-	2	1	-	-

(Generic Elective)

Generic Elective : INS-303(a)	Biomedical Instrumentation

UNIT-I

a. Human Physiological Systems, Bio Potentials and Electrodes:

Introductions, Cells And their Structure, Transport of ions Through Cell Membrane, Resting and Action Potentials, Bioelectric Potentials, Physiological Systems of Human Body, Electrodes Biomedical Instrumentation System.

b. Bio Signal Acquisition and Recording:

Physiological Signal Amplifiers, Isolation Amplifiers, Pre Amplifiers, Line Driving Amplifiers, Characteristics of Recording System, Electrocardiography (ECG), Electroencephalography (EEG), Electromyography (EMG), Electro- Retinography (ERG), Electro Oculography (EOG), Accuracy in Recording

UNIT - II

a. Physiological Assist Devices:

Introduction, Pacemakers, Defibrillators, Nerve and Muscle Stimulators, Heart Lung Machine, Kidney Machine

b. Special Equipment:

Blood Cell Counter, Audiometer, Digital Thermometer, X Ray. Machine, Radiography and Fluoroscopy, Image Intensifies, Angiography

UNIT - III

a. Bio Telemetry:

Elements of Biotelemetry Systems, Design of aBiotelemetry System Radio telemetry System, Uses Of Biotelemetry

b. Operation Theatre Equipment:

Introduction, Surgical Diathermy Ventillators, Anaesthesia Machine, Cardiac Output Measurement, Pulmonary Function Analyzer, Oxymeters.

UNIT-IV

a. Safety Instrumentation:

Radiation Safety Instrumentation: Dosimeters, Radiation Alarm, Physiological Effects due to 50 Hz Frequency, Micro Shock and Macro Shock, Hospital Architecture.

b. Advanced Biomedical Instrumentation:

Lasers iln Biomedical Instrumentation, Endoscopes, Cryogenic Surgery, Computer Tomography Scanner (CT), Applications, Thermography, Applications, Ultrasonic Image Forming Systems, Applications, Magnetic Resonance Imaging (MRI), Positron
Emission Tomography.

Books For Study:

1. Biomedical Instrumentation and Measurement by Harry E. Thomas
2. Hand book of Biomedical Instrumentation by R.S. Khandpur
3. Biomedical Instrumentation & Measurements by Leslie Cromwell, Fred J. Waibell, Erich A.Pfeiffer.
4. Hand Book of Bio medical Engineering by Jacob Klime
5. Bio Medical Electronics by Joseph Duboy
6. Transducers for Bio medical Measurements by Richards SC Cobbold
7. Bio medical Instrumentation by M. Arumugam
8. Biomedical Instruments, Theory and Practice by Welkowitz and Dentsch
9. Biological Engineering by Schwan
10 . Biomedical Engineering systems by Clines and Mulism

INS-303(b)	Micro Electro Mechanical Systems	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Micro Electro Mechanical Systems

Course Objectives:

- To teach the fundamentals of MEMS
- To teach Scaling laws in miniaturization
- To teach topics including Micro system Fabrication and design
- To teach Microsystem Design - Design considerations

CourseOutcomes: At the end of the course, the student will be able to

CO1	• Basic structure of MEMS and design
CO2	• Learn Scaling laws in miniaturization
CO3	• Analyze applications of MEMS and their importance as sensors
CO4	• Understand the Microsystem Design and its considerations

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	1	-	-	2	-	-
CO2	3	2	2	2	2	2	2	-	2	-	2	-
CO3	3	2	2	2	1	2	2	-	-	2	-	-
CO4	3	2	2	2	2	2	1	-	1	-	2	-

(Generic Elective)

Generic Elective : INS-303(b)	Micro Electro Mechanical Systems

UNIT-I

MEMS and Microsystems – Applications – Multidisciplinary nature of MEMS – principles and examples of Micro sensors and micro actuators – micro accelerometer - meters Micro grippers – micro motors - micro valves – micro pumps – Shape Memory Alloys.

UNIT-II

Scaling laws in miniaturization - scaling in geometry, scaling in rigid body dynamics, the trimmer force scaling vector, scaling in electrostatic and electromagnetic forces, scaling in electricity and fluidic dynamics, scaling in heat conducting and heat convection.

UNIT-III

Micro System fabrication – photo lithography – Ion implantation- Diffusion – Oxidation – Chemical vapour deposition – Etching- Overview of Micro manufacturing – Bulk micro manufacturing – Surface micro machining – LIGA process – Materials for MEMS – silicon – silicon compounds – silicon piezo resistors – GaAs – polymers.

UNIT-IV

Microsystem Design - Design considerations – Selection of signal transduction – Process design – Design of a silicon die for a micro pressure sensor – Microsystem packaging - three levels of micro system packaging – interfaces in micro system packaging.

Books For Study:

1. Micro Electro Mechanical System Design – James J. Allen
2. MICRO ELECTRO MECHANICAL SYSTEMS – DR.P.ELAMURUGAN.
3. Micro Electro Mechanical Systems – Dr. T. Kamatchi, Dr. G. Veera Senthil Kumar, K. Meenakshi Sundar, R. Karthick.
4. Micro Electronic and Mechanical Systems – Zheng Yun Man

INS-303 (c)	Instrumentation for Environmental Science	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Instrumentation in Environmental Science

Course Objectives:

- To teach the necessity of instrumentation and control for environment
- To teach Ground water monitoring
- To teach Air pollution
- To teach Air monitoring. Flow monitoring Rain water harvesting

Course Outcomes: At the end of the course, the student will be able to

CO1	• Learn necessity of instrumentation & control for environment
CO2	• Gain knowledge in Ground water monitoring and waste water monitoring
CO3	• Learn the effects of air pollution
CO4	• Understand air monitoring. Flow monitoring and Rain water harvesting

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	-	-	2	1	1	-
CO2	3	2	3	3	2	1	2	-	2	-	1	-
CO3	3	2	3	3	2	-	-	-	2	1	1	-
CO4	3	2	3	3	2	1	2	-	2	1	1	-

(Generic Elective)

Generic Elective: INS-303(c)	Instrumentation for Environmental Science

UNIT I

a.Introduction: Necessity of instrumentation & control for environment, sensor requirement for environment. Instrumentation methodologies: Ultraviolet analyzers, total hydrocarbon analyzers using flame ionization detector, Gas chromatography in environmental analysis, photo ionization, portable & stationary analytical instruments.

b.Quality of water: Standards of raw & treated water, sources of water & their natural quality, effects of water quality. Water quality parameters: Thermal conductivity, detectors, Opacity monitors, pH analyzers & their application, conductivity analyzers & their application. Water treatment: Requirement of water treatment facilities, process design.

UNIT II

a.Ground water monitoring: Level measurement in ground water monitoring wells, laboratory analysis of ground water samples, instrumentation in ground water monitoring, instrumentation in assessment of soil & ground water pollution.

b.Waste water monitoring: Automatic waste water sampling, optimum waste water sampling locations, and waste water measurement techniques. Instrumentation set up for waste water treatment plant. Latest methods of waste water treatment plants.

UNIT III

Air pollution: definitions, energy environment relationship, importance of air pollution,air pollution from thermal power plant, their characteristics & control. Air sampling methods &equipments, analytical methods for air pollution studies. Control of air pollution.

UNIT IV

a. Air monitoring: measurement of ambient air quality.

b. Flow monitoring: Air flow measurement, gas flow, non-open channel flow measurement,open channel waste water flow measurement.

c. Rain water harvesting: necessity, methods, rate of NGOs municipal corporation, Govt.,limitations. Quality assurance of storage water.

Books For Study:

1. Walter J. Weber (Jr.), ―Physicochemical Processes: For Water Quality Control John Wiley & Sons, 1st Edition, 1972.
2. M. N. Rao& H. V. N. Rao, ―Air pollution engineering‖ McGraw Hill Higher Education, 1st Edition, 1989.
3. Wark& Warner, "Air pollution control technology‖, Pearson, 3rd Edition, 1997.
4. Randy D. Down, ―Environmental Instrumentation & Analysis Handbook‖,Wiley, 1st Edition, 2004.

(SkillOrientedCourse)

INS – 305	Microcontrollers and Interfacing	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Microcontrollers

Course Objectives:

- To make the student to understand the fundamentals of microcontroller.
- To teach addressing modes, Instructions and programming in 8051
- To teach 8051 Memory and I/O device Interfacing
- To teach Interfacing DAC / ADC with 8051 Microcontroller

CourseOutcomes: At the end of the course, the student will be able to

CO1	• .Uunderstand the fundamentals of microcontroller.
CO2	• Understand . **a**ddressing modes, Instructions and programming in 8051
CO3	• Understand 8051 Memory and I/O device Interfacing. Interrupts and Timer/counters, .
CO4	• Learn8051 Memory and I/O device Interfacing

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	-	1	-	-	2	2	-	-
CO2	3	2	3	3	2	1	2	-	2	2	-	-
CO3	3	2	3	3	-	1	-	-	2	2	-	-
CO4	3	2	3	-	2	1	2	-	2	2	-	-

(Skill Oriented Course)

Skill Oriented: INS-305	Microcontrollers and Interfacing

UNIT-I

a. Introduction to Microcontrollers

Introduction, Microcontrollers and Microprocessors Embedded versus external Memory devices, 8 bit and!6 bit micro controllers,CISC and RISC processors, Harvard and Von Newmann Architectures, commercial microcontroller devices

b.8051 Microcontroller

Introduction, MCS-51 architecture, Registers in MCS 51 , Pin description, connections, I/O ports and Memory Organization

UNIT –II

a. Addressing modes, Instructions and programming in 8051

Addressing modes, Instruction set, Instructions and simple programs, Assembly language programming, Development systems and tools

b. Interrupts, Timer/counters, . Serial communication and Parallel Communication

Interrupts - Interrupts in MCS-51 -Timers and counters – Communications – Serial and Parallel.

UNIT III

a. 8051 Memory and I/O device Interfacing:

Memory Interfacing – Program and data memory, I/O Interfacing – LED, relays, Keyboard, LCD, Seven Segment Display, Stepper Motor.

b. Interfacing DAC / ADC with 8051 Microcontroller:

Interfacing DAC – 0808 with 8051 and its simple programming.

Interfacing ADC – 0809 with 8051 and its simple Programming.

BOOKS FOR REFERENCE

1. Microcontrollers Architecture, Programming, Interfacing and System Design- Raj
2. The 8051 Microcontroller and Embedded Systems – Mazidi and Mazidi, PHI,2000.
3. The 8 051 Microcontroller, Kenneth Ayala
4. Microcontrollers (Theory & Applications)-A. V. Deshmuk, WTMH, 2005.
5. Design with PIC Microcontrollers - John B. Peatman, Pearson Education, 2005.
6. Programming and Customizing the PIC Microcontroller – Myke Predko.
7. The 8051 Microcontroller and Embedded Systems – Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. Mokinlay.
8. Microcontroller(ARM) and Embedded Systems – Raghunandan G. H.
9. MicroProcessors and Microcontrollers – Sunil Mathur, Jeebananda Panda.

(OpenElective)

INS – 306 (a)	Computer Architecture and Organization	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Computer Architecture and Organization

Course Objectives:

- To teach basics of Computer Architecture and block diagram
- To teach the Micro Programmed Control
- To teach the The Memory System and Input-Output Organization
- To teach thePipeline And Vector Processing

Course Outcomes: At the end of the course, the student will be able to

CO1	Understand internal block diagram of computer
CO2	know the Micro Programmed Control and organization of computer
CO3	Know The Memory System and Input-Output Organization
CO4	Know thePipeline And Vector Processing

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	1	-	2	1	-	
CO2	3	2	3	3	2	1	2	-	2	1	1	-
CO3	3	2	3	3	2	1	2	-	2	1	-	-
CO4	3	2	-	3	2	1	2	-	2	1	-	-

(Open Elective)

Open Elective: INS – 306 (a)	Computer Architecture and Organization

UNIT I

a. Basic structure of Computers: Computer Types, Functional unit, Basic Operational concepts, Bus structures, Performance, multiprocessors and multi computers.

b. Register Transfer Language And Micro operations: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro-operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes.Computer Registers Computer instructions - Instruction cycle.Memory -Reference Instructions.Input - Output and Interrupt. STACK organization. Instruction formats. Addressing modes

UNIT II

a. Micro Programmed Control: Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Micro programmed control

b. Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations. Decimal Arithmetic unit Decimal Arithmetic operations.

UNIT III

a. The Memory System: Basic concepts semiconductor RAM memories. Read only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.

b. Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input -Output Processor (IOP) Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, and IEEE1394.

UNIT IV

a. Pipeline And Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

b. Multi Processors: Characteristics or Multiprocessors, Interconnection Structures, Inter processor Arbitration. Inter Processor Communication and Synchronization Cache Coherence. Shared Memory Multiprocessors.

Books For Study:

1. Computer Systems Architecture -'M.Moris Mano, Illrd Edition, PHI/Pearson.
2. Computer Organization - Car Hamacher, ZvonksVranesic, SafeaZaky, McGraw Hill.
3. Computer Organization and Architecture - William Stallings Sixth Edition, Pearson.
4. Structured Computer Organization - Andrew S. Tanenbaum, 4th Edition Pearson.
5. Fundamentals or Computer Organization and Design, -SivaraamaDandamudi
6. Computer Organization and Architecture (Designing for Performance) – William Stallings.
7. Computer Organization and Architecture – A.P.Godse, Dr.D.A.Godse.
8. Computer Organization and Architecture – R. Senthilnathan, A.Pagalavan, R.Vijayabaskar.
9. computer architecture and organization – Nicholas p carter

(OpenElective)

INS-306(b)	Industrial Organization and Management	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level in Industrial Organization and Management

Course Objectives:.

- To give the basics Industrial Management and Business organization
- To teach the Quality, Inspection and Environment Management :
- To teach the Production Planning, Inventory Control and Supply Chain Management:
- To teach Human Resources Management

Course Outcomes: At the end of the course, the student will be able to

CO1	Learn the basics Industrial Management and Business organization
CO2	Learn the Quality, Inspection and Environment Management
CO3	Learn the Production Planning, Inventory Control and Supply Chain Management
CO4	Learn the Human Resources Management

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	1	2	-	1	2	1	-
CO2	3	2	2	2	3	2	2	-	1	2	-	-
CO3	3	3	-	2	3	2	2	-	1	2	1	-
CO4	3	2	3	2	3	2	2	-	1	2	-	-

(Open Elective)

Open Elective: INS – 306(b)	**Industrial Organization and Management**

Unit I:

Industrial Management and Business organization:

Definition of business, characteristics and classifications, objectives, types of business organizationscharacteristics, levels of management, characteristics and objectives. Hierarchical structure and organization of group, Functions of management- *forecasting, organizing, directing, motivating planning, co-ordinating, controlling, communication, leadership etc.*

Developing Business environment: SWOT analysis, BCG Matrix, Porter's 5 forces of competition. Management techniques for developing strategy viz., Balanced score card, Performance Management and analysis techniques viz. Ishikawa diagrams, Business process Re-engineering

Unit II:

Quality, Inspection and Environment Management :

Quality Circles/ Forums, Quality Objectives, use of Statistical Process Control, Introduction to ISO 9000 Inspection: objectives, Principles, standards, Qualities of inspector, Role of R & D, Innovation, Business expansion, Diversion, Mergers and Takeovers Environmental pollution:- ecology, factors causing pollution, effect of pollution on human health, Air pollution control, sources of pollution water pollution and control, solid waste management

Environmental norms: ISO 14000

Unit III:

Production Planning, Inventory Control and Supply Chain Management:

Manufacturing Excellence, Outsourcing, Production planning techniques, Purchase and Inventory Management, inventory control using Economic Order Quantity, Minimum Order Quantity, Ordering T. E. Instrumentation Syllabus 2015 Course (Credit Base) Level, store keeping, Finished goods, semi finished goods, raw material handling and storage, Value

Addition, Supply Chain concepts and management for leveraging profit

Unit IV:

Human Resources Management:

Manpower planning, Human Resources: exploiting true potential, Staff training and development, Motivation, Selection and training of manpower, Appraisal and increments management, Leadership skills, Delegation and development for growth. Objectives and Job Descriptions/ Role Summary

Books For Study:

1. Business Poly – Azar Kazmi
2. Resisting Intellectual property – Halbert, Taylor & Francis – 2007 – PHI
3. Management in Engineering- Gail Freeman- Bell and James Balkwill (PHI).
4. The New Era of Management – R. L. Daft, THOMSON (India Edition)
6. Modern Economic Theory- Dewett K. K.
7. Elementary Economic Theory- Dr. R. D. Gupta.
8. Business organization and Management- M.C. Shukla.T.E.

INS- 401	Introduction to VLSI Circuits	L-5,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level in Introduction to VLSI Circuits

Course Objectives:

- To make the student familiar with VLSI system design aspects
- To teach the physical Structure and Fabrication of CMOS ICs.
- To teach the elements of Physical Design and Electrical Characteristics of MOSFETs
- To teach the electronic analysis of CMOS logic gates

Course Outcomes: At the end of the course, the student will be able to

CO1	• Understand the fundamentals of VLSI systems
CO2	• Learn the physical Structure and Fabrication of CMOS ICs.
CO3	• Understand the elements of Physical Design and Electrical Characteristics of MOSFETs
CO4	• Understand the electronic analysis of CMOS logic gates

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	1	1	1	-	2	1	2	-
CO2	3	2	3	-	1	1	1	-	2	1	2	-
CO3	3	2	2	2	1	1	1	-	2	1	2	-
CO4	3	3	2	2	1	1	1	-	2	1	2	-

(Mandatory Core)

Core – 1: INS-401	INTRODUCTION TO VLSI CIRCUITS

UNIT-I

An Overview of VLSI and logic and Design with MOSFETs: Complexity and Design, Basic concepts, Ideal switches and Boolean operations, MOSFETs as switches, Basic logic gates in CMOS, Complex logic gates in CMOS.

UNIT-II

Physical Structure and Fabrication of CMOS ICs: Integrated circuit layers, MOSFETs, CMOS layers, Designing FET arrays, Overview of silicon processing, Material growth and deposition, Lithography.

UNIT-III

Elements of Physical Design and Electrical Characteristics of MOSFETs: Basic Concepts, Layout of basic structures, cell concepts, FET sizing and the unit transistor, Physical design of logic gates, Design hierarchies, MOS physics, nFET current-voltage equations, pFET characteristics.

UNIT-IV:

Electronic analysis of CMOS logic gates: DC characteristics of the CMOS inverts, inverter switching characteristics, power dissipation, DC characteristics: NAND and NOR gates, NAND and NOR transient response, Transmission gates and pass transistor.

Books For Study:

1. John P. Uyemura, “Introduction to VLSI circuits and Systems”,Johnwiley and sons.
2. VLSI - W. Wolf.
3. VLSI Fabrication Principles (Sillicon and Gallium Arsenide) – Sorab K Ghandhi
4. VLSI Design – K.Lal Kishore, V.S.V.Prabhakar
5. S.K.Ghandhi,”VLSI Fabriction principles”, 2/e, John Wiley and sons.
6. S.M.Sze,”VLSI Technology”,2/e mcGraW-Hill,1988.
7. VLSI Physical Design Automation – Sadiq M Sait, Habib Youssef.
8. VLSI Technology & Design – V.S.Bagad.

INS - 402	Embedded Systems and Real Time Operating Systems	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Embedded Systems

Course Objectives:

- To teach the basics of o embedded systems and pic microcontroller
- To teach the concepts of ARM processors and architecture of ARM 7
- To teach the real time operating systems and concepts
- To teach the RTOS application domains

Course Outcomes: At the end of the course, the student will be able to

CO1	Learn the basics of o embedded systems and pic microcontroller
CO2	Understand the concepts of ARM processors and architecture of ARM 7
CO3	Learn the real time operating systems and concepts
CO4	Understand the RTOS application domains

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	1	-	2	2	1	-
CO2	3	2	2	2	2	2	2	-	2	2	2	-
CO3	3	2	-	2	1	2	2	-	1	2	1	-
CO4	3	2	-	2	2	2	1	-	1	2	2	-

(Mandatory Core)

Core – 2: INS-402	Embedded Systems and Real time Operating Systems

UNIT-I: Introduction to Embedded systems: Introduction, Application areas, Categories of embedded systems, Overview of embedded systems architecture, Specialities of embedded systems, Recent trends, Hardware architecture, Software architecture, Application software, Communication software, core platform development, development tools.

The PIC Microcontroller : Introduction: PIC microcontroller features, PIC Architecture, Program memory, Addressing Modes, Instruction set, Instruction Format, Byte-Oriented Instructions, Bit-Oriented Instructions, Literal Instructions,Control Instructions (CALL and GOTO),Destination Designator

UNIT-II: Introduction to ARM processors, architecture of ARM 7, registers, current program status register, pipeline, exceptions, interrupts and vector table. Instruction set: Data processing instructions, arithmetic, Logic, branch, load-store instructions, software interrupt instructions, PSR instructions, loading constants.

Applications: Programming the flash memory using JTAG, working with audio codec (AC97), JPEG encoder, MP3 decoder, ADC, DAC, LCD, Stepper motor, seven segment displays, Relays and Opto- isolators..

UNIT-III: Real Time Operating Systems and Concepts: Introduction,Types of operating systems, Typical real time applications, Hard Vs Soft real-time systems, Real time operating systems(RTOS),Architecture of the kernel, Task and task scheduler, Interrupt service routines, Management Function calls of Semaphores, Mutex, , Message Queues, Event registers, Pipes, Signals, Timers. Memory management, Priority inversion problem. Embedded Operating Systems: Real time operating systems, hand held operating systems.

UNIT-IV: RTOS APPLICATION DOMAINS

RTOS for Image Processing - Embedded RTOS for voice over IP - RTOS for fault Tolerant Applications - RTOS for Control Systems.

RFID systems:RFID system, RFID applications RFID Tag, RFID Reader, applications development using RFID

Books For Study:

1. Real Time systems-black book, Dr.K.V.K.K. Prasad, Dreamtech Publishers
2. ARM system Developer's Guide-Andrew N.SLOSS, Domic Symes and Chris Wright, Morgan Kaufman Pubs.
3. J B Peatman, Design with PIC Microcontrollers, Prentice Hall.
4. RTOS Designing embedded systems-J.Ganssle, Newnes, 1999
5.Real Time Systems, C.M. Krishna, Kang, G.Shin, McGraw Hill, 1997
6. PIC Microcontroller by H.W Huang, Delmar CENGAGE Learning, 2007.

INS -403 (a)	Programmable Logic Controllers	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level Programmable Logic Controllers

Course Objectives:

- To teach Process Dynamics and Process Control Action
- To teach Process Controllers and Tuning
- To teach Analysis of Control Loop
- To teach Multivariable Control and Intelligent Controllers

Course Outcomes : At the end of the course, the student will be able to

CO1	Learn Process Dynamics and Process Control Action
CO2	Learn Process Controllers and Tuning
CO3	Learn Analysis of Control Loop
CO4	Learn Multivariable Control and Intelligent Controllers

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	1	1	-	-	3	-	1
CO2	3	2	1	1	1	1	-	-	-	3	-	1
CO3	3	2	2	1	2	1	-	-	-	3	-	1
CO4	3	2	1	1	1	2	-	-	-	3	-	1

(Generic Elective)

Generic Elective: INS-403(a)	Programmable Logic Controllers

Unit I

a.Process Dynamics: Dynamic elements in a control loop, Dead time processes and smith predictor compensator. Inverse response behavior of processes and compensator. Dynamic behavior of first and second order systems. Interacting and non-interacting systems.

b.Process Control Action: Elements of process control, Controller Principle, Process Characteristics, Control system parameters, discontinuous, continuous and composite controller modes/actions (P,I,D,PI,PD and PID).

Unit II

a.Process Controllers and Tuning: General features, construction and working of Pneumatic, Hydraulic and Electronic controller. Process reaction curve method, Zigler- Nichols method, Cohencoon correction for quarter amplitude, Frequency response method, Relay based tuning.

b.Control Schemes: Feedback, feedforward, cascade, ratio, split range, selective control, adaptive control, and model based control.

Unit III

a.Analysis of Control Loop: Steady state gain, Process gain, Valve gain, Process time constant, Variable time Constant, Transmitter gain, Linearisinga equal percentage valve, Variable pressure drop. Analysis of Flow Control, Pressure Control, Liquid level Control, Temperature control, SLPC-features, faceplate, functions, MLPC- features, faceplate,

functions, SLPC and MLPC comparison.

b.Scaling: Types of scaling, examples of Scaling.

Unit IV

a.Multivariable Control: Block diagram analysis of multivariable systems, Interaction, Tuning of Multivariable controllers, relative gain analysis, Decoupler design.

b.Intelligent Controllers:

Step analysis method for finding first, second and multiple time constants and deadtime. Model Based controllers: Internal Model control, Smith predictor, optimal controller, Model Predictive controller, Dynamic matrix controller (DMC).Self Tunning Controller. Basic concept Fuzzy logic systems – Artificial

Neural networks

Books For Study:

1. Donald Eckman, ―Automatic Process Control‖, Wiley Eastern Limited, 1st Edition, 1966
2. Thomas E Marlin, ―Process Control- Designing processes and Control Systems for Dynamic Performance, McGraw-Hill International Editions, 1st Edition , 1995.
3. F.G.Shinskey, ―Process control Systems‖, TATA MCGRAW HILL, 3rd Edition, 1988.
4. Krishna Kant, ―Computer Based Industrial Control‖, Prentice hall of India, 2nd Edition, 2010.
5. B Liptek, ―Instrument engineers handbook‖, Chilton book Co, 1st Edition, 1969.
6. P.W.Murrill, ―Fundamentals of Process Control‖, International Society of Automation, 1st Edition, 2000.

7. Considine, ―Process/Industrial Instruments and Controls Handbook‖, McGraw-Hill Professional, 5th Edition, 1999.
8. T.J.Ross, Fuzzy Logic with Engineering Applications, Wiley, 3rd Edition, 2011.
9. P.W.Murrill, ―Applications concepts of Process control‖, International Society of Automation, 3rd edition, 2012.
10. B.Waynebequette, ―Process Control:Modeling, Design and Simulation‖, Prentice hall of India, 1st Edition, 2002.
11. Stephanopoulos George, ―Chemical Process Control‖, Prentice hall of India, United States Edition, 1983.

NS- 403 (b)	Computational Mathematics	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Computational Mathematics

Course Objectives:

- To teach the basics of Special Functions and their importance in different fields
- To teach the fundamentals of Integral Transforms and its applications in communications
- To teach the different numerical techniques and their applications
- To teach the complex Variables and their importance

Course Outcomes: At the end of the course, the student will be able to

CO1	Learn the basics of Special Functions and their importance in different fields
CO2	Learn the fundamentals of Integral Transforms and its applications in communications
CO3	Understand the different numerical techniques and their applications
CO4	Understand the complex Variables and their importance

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	1	-	1	2	-	2	3	-	-
CO2	2	2	1	2	1	1	1	-	1	-	-	-
CO3	3	2	-	2	1	1	2	-	1	3	-	-
CO4	2	2	-	2	1	1	2	-	1	-	-	-

(Generic Elective)

Generic Elective: INS-403(b)	Computational Mathematics

UNIT - I: Special Functions

Beta and Gamma Functions – Definitions and properties – Evaluation of integrals, Legendre, Bessel and Hermite differential equations – Solutions – Generating functions – Orthogonal properties of Legendre, Bessel and Hermite Functions (Proof not necessary) – Recurrence relations – (Proof for Legendre polynomials only).

UNIT - II: Integral Transforms

Fouriers Transforms: Properties of Fourier transforms – Fourier sine and cosine transforms- Power in Fourier series – Modulation theorem, Fourier transform of impulse function, Constants, Unit step function and Periodic functions.

Laplace Transforms: Definition and notation – Properties of Laplace transforms – Laplace transforms of Dirac delta function and periodic functions (Square wave, sawtooth wave and triangular wave) – Inverse Laplace transforms – properties – Solution of linear differential equations with constant coefficients - Applications to LCR circuits and resonance of simple pendulum.

UNIT - III: Numerical techniques

Solution of an equation – Bisection method, Regular False method, Newton - Rhapson method - Solutions of simultaneous – Gauss elimination method and Gauss-Seidel method - Interpolations - Newton's interpolation and Lagrange's interpolation, Curve fitting – Method of Least squares. Numerical differentiation and integration – Trapezoidal rule and Simpson's 1/3 rule – Solutions of differential equations - Euler's method and Runga-Kutta Methods.

UNIT – IV: Complex Variables

Functions – Complex differentiation - Analytic function - Cauchy – Reimann equations –Derivatives of elementary functions – Singular points and classification. Complex integration - Cauchy's theorem – Integrals of special functions – Cauchy's integral formula – Taylor's and Lorentz theorem (statements only) – Residues, calculations of residues - Residue theorem – evaluation of definite integrals.

Books For Study:

1. Functions for Scientists and Engineers, W.W. Bell, D.Van Nostrand Company, London (1968)
2. Fourier Analysis, Hsu P Jewi, Unitech Division
3. Laplace Transforms by Murray Spiegle, Schaum's outline series, McGraw Hill, International Book Company, New York.
4. Applied Mathematics for Engineers, Pipes and Harval, Third Edition, McGraw Hill Books Co.

INS-403 (c)	Electrical Engineering Materials	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Electrical Engineering Materials

Course Objectives:

- To teach the concepts of bonding and different crystal systems
- To teach different polarizations and importance of dielectrics
- To teach the basics of semiconductors and their importance in devices
- To teach the shape memory alloys and its importance

Course Outcomes: At the end of the course, the student will be able to

CO1	Learn the concepts of bonding and different crystal systems
CO2	Understand the concepts different polarizations and importance of dielectrics
CO3	Learn the basics of semiconductors and their importance in devices
CO4	Learn the basics of shape memory alloys and its importance

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	**3**	2	3	1	2	-	3	2	3	-
CO3	3	3	3	-	3	1	-	-	3	-	3	-
CO3	3	2	-	2	2	1	1	-	1	2	1	-
CO4	3	3	-	3	-	1	1	-	3	-	3	-

(Generic Elective)

Generic Elective: INS-403(c)	**Electrical Engineering Materials**

UNIT I:

Atomic bonding, crystallinity, Miller Indices, X-ray crystallorgraphy, structural imperfections, crystal growth.Free electron theory of metals, factors affecting electric conductivity of metals, thermal conductivity of metals, heat developed in current Carrying conductors, thermoelectric effect, super conductivity.

UNIT II:

Polarization mechanism and dielectric constant, behavior of polarization under impulse and frequency switching, dielectric loss, spontaneous polarization, piezoelectric effect. Origin of permanent magnetic dipoles in materials, classifications of magnetism.

UNIT III:

Energy band theory, classification of materials using energy band theory, Hall effect, drift and diffusion currents, continuity equation, P-N diode, volt-amp equation and its temperature dependence.

UNIT IV:

Special purpose materials, Nickel iron alloys, high frequency materials, permanent magnet materials, Feebly magnetic materials, Ageing of a permanent magnet, Effect of impurities.

Books For Study:

1. Ian P. Hones, 'Material Science for Electrical & Electronics Engineers', Oxford University Press

2. K. M. Gupta – Electrical Engineering Materials, Umesh Publication, 2nd edition 2003

(MultidisciplinaryCourse)

INS-405	Project Work	L-3,T-1,P-0	4Credits

Pre-requisite: Understanding of graduate level

Course Objectives: .

- To train the students for independent thinking, planning and execution of any selected problem.
- To take-up a simple problem with an aim, plan the experiment, take the measurements, discuss the results and give the conclusion.
- To motivate the students towards the research
- To motivate them towards new innovations

Course Outcomes: At the end of the course, the student will be able to

CO1	• Get the experience of working on a problem independently with planning and execution.
CO2	• Develop skills related to presentation of data, analysis discussion of the results and draw conclusions
CO3	• Learn the importance of research for development and self sustaining
CO4	• Understand the need of the society

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	1	2	-	2	-	-	3
CO2	3	2	1	2	2	2	2	-	2	-	1	3
CO3	3	2	1	2	1	2	2	-	2	-	-	3
CO4	3	3	1	2	2	2	2	-	2	-	1	2

INS405: Project Work

INS-406 (a)	Agro Based Instrumentation	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Agro Based Instrumentation

Course Objectives:

- To create awareness of Properties of Soil.
- To study the concept of flow diagram of Sugar Plant.
- To study the role of Irrigation System .
- To study about SCADA and DMA

Course Outcomes: At the end of he course, the student will be able to

CO1	• Understand the Properties of Soil.
CO2	• Understand the concept of flow diagram of Sugar Plant.
CO3	• Understand the role of Irrigation System .
CO4	• Understand the working of SCADA and DMA in agriculture.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	-	2	-	2	2	-	1
CO2	3	2	1	2	2	2	-	-	2	2	-	-
CO3	3	2	1	2	1	2	2	-	2	2	-	1
CO4	3	2	1	2	2	-	-	-	2	2	-1	-

(Open Elective)

Open Elective: INS-406(a)	Agro Based Instrumentation

Unit I:

Necessity of instrumentation & control for agriculture, engineering properties of soil:

fundamental definitions & relationships, index properties of soil, permeability & seepage analysis, shear strength, Mohr's circle of stress, active & passive earth pressures, stability & slopes, Sensors: introduction to sonic anemometers, hygrometers, fine wire thermocouples, open & close path gas analyzers, brief introduction to various bio-sensors.

Unit – II

Flow Diagrams: Flow diagram of sugar plant & instrumentation set up for it, flow diagram of fermenter & control (batch process),flow diagram of dairy industry & instrumentation set up for it, juice extraction-control process - instrumentation set up.

Unit – III

Irrigation systems: necessity, irrigation methods: overhead, centre pivot, lateral move, micro irrigation systems & it's performance, comparison of different irrigation systems, soil moisture measurement methods: resistance based method, voltage based method, thermal based method, details of gypsum block soil moisture sensor, irrigation scheduling, irrigation efficiencies, design considerations in irrigation channels.

Unit IV:

Application of SCADA for DMA

Application of SCADA for DAM parameters & control, irrigation control management upstream & down - stream control systems, green houses & instrumentation: ventilation, cooling & heating, wind speed, temperature & humidity, rain gauge carbon dioxide enrichment measurement & control.

Automation in earth moving equipments & farm equipments

Application of SCADA & PLC in packing industry and cold storage systems, implementation of hydraulic, pneumatic & electronics control circuits in harvesters cotton pickers, tractor etc. classification of

Books For Study:

1. Patranabis, ―Principles of Industrial Instrumentation‖, Tata McGraw-Hill, 2nd Edition 2005.
2. Bella Liptek, ―Instrument engineers handbook‖, Chilton book Co., NY, 1st Edition, 1969.
3. C. D. Johnson, ―Process Control Instrumentation Technology‖, Prentice hall of India, 8th Edition, 2009.
4. B.A.Wills, **"**Wills' Mineral Processing Technology‖, Butterworth-Heinemann, 8th Edition, 2015.
5. Microprocessor – Based Agri Instrumentation – Krishna Kant.
6. Advanced Agricultural Instrumentation – William G. Gensler

INS-406 (b)	Industrial Automation	L-3,T-1,P-2	4Credits

Pre-requisite: Understanding of graduate level in Agro Based Instrumentation

Course Objectives:

- To make the students understand the fundamentals of automation and various automation systems used in industry such as PLC, DCS, and SCADA.
- Students should understand the working of these systems and should be able to determine hardware and software requirements of SIS and SIL.
- They should further understand how to design any application based on these systems.
- To make the students understand the fundamentals of Open loop and Closed loop controls

Course Outcomes: At the end of the course, the student will be able to

CO1	• Define automation, it's importance, expectations from automation and applications in industry.
CO2	• Uderstand the working of these systems and should be able to determine hardware and software requirements of SIS and SIL.
CO3	• Understand evolution and architecture of DCS, hierarchical control in DCS, programming DCS
CO4	• Understand the fundamentals of Open loop and Closed loop controls

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	3	-	2	-	3	1	-	-
CO3	2	3	3	3	3	1	-	-	3	2	-	-
CO3	2	2	2	2	2	-	1	-	1	1	-	-
CO4	3	3	3	3	3	-	-	-	3	3	-	-

(Open Elective)

Open Elective: INS-406(b)	Industrial Automation

Unit I:

Introduction: Overview, OSI reference model, Transmission media : Copper cable, Coaxial cables, Twisted-pair cable, Connector standards, Earthing/grounding, Fiber-opticcable components, Fiber-optic cable parameters

Open control network: RS-232 overview, RS-232 interface standard, RS-232 troubleshooting, Typical RS-232 problems, RS-485 overview, The RS-485 interface standard, RS-485 troubleshooting Current loop and RS-485 converters overview, TCP/IP overview, Internet layer protocols (packet transport), Modbus overview, Modbus protocol structure, Modbus troubleshooting

Unit II:

Network at different level: AS-I, CAN, Devicenet, Industrial Ethernet overview, Profibus PA/DP/FMS overview, Foundation Fieldbus overview, The physical layer and wiring rules, HART overview, Introduction to HART and smart instrumentation.

Safety Instrumented System (SIS): Need for safety instrumentation- risk and risk reduction methods, hazards analysis. Process control systems and SIS. Safety Integrity Levels (SIL) and availability. Introduction to the international functional safety standard IEC61508

Unit III:

Automation Fundamentals: Automation and its importance, automation applications, expectations of automation. Process and factory automation. Types of plant and control – categories in industry, open loop and close loop control functions, continuous processes, discrete processes, and mixed processes. Automation hierarchy – large control system hierarchy, data quantity & quality and hierarchical control. Control system architecture – evolution and current trends, comparison of different architectures.

Unit IV:

Distributed Control System (DCS): Introduction to DCS. Evolution of DCS, DCS flow sheet symbols, architecture of DCS. Controller, Input and output modules, Communication module, data highway, local I/O bus, Workstations, Specifications of DCS. Introduction of Hierarchical control of memory: Task listing, Higher and Lower computer level task. Supervisory computer tasks DCS configuration. Supervisory

computer functions, Control techniques, Supervisory Control Algorithm. DCS & Supervisory computer displays, advanced control Strategies, computer interface with DCS. DCS. System integration with PLCs computer: HMI, Man machine interface sequencing, Supervisory control, and
integration with PLC, personal computers and direct I/O, serial linkages, network linkages, link between networks. Introduction to DCS Programming, Function Block Diagram method for DCS programming.

Books For Study:

1 Samuel M. Herb, ―Understanding Distributed Processor Systems for Control‖, International Society of Automation Publication, 1st Edition, 1999.

2. Thomas Hughes, ―Programmable Logic Controller‖, International Society of Automation Publication, 4th Edition, 2004

3. Stuart A. Boyer, ―SCADA supervisory control and data acquisition‖, International Society of Automation Publication, 4th Edtion, 2009.

4.Gruhn and Cheddie, ―Safety Shutdown Systems‖, International Society of Automation,

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION FIRST SEMESTER

Paper : I: INS -101:Introduction to Instrumentation and Control System

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Explain the typical applications of Instrument systems?

2.Write a brief note on the performance parameters of instruments i.e.

i) Accuracy ii) Precision

3. Explain the basic components of a control system?

4. Explain the classification of control systems

5. Discuss in detail transient response

6.What is meant by stability explain about relative and absolute stability of a control system.

7. Write a brief note on Bode plot?.

8.Discuss about Polar plot?

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

9.a) Explain the Functional elements of Instrumentation and Measuring Systems with neat block diagram.

(OR)

b) Discuss about errors and uncertainties in the measurement of performance parameter of instruments.

10. a) Write about open loop and closed loop systems with neat diagram and explain it with suitable

Examples?

(**OR)**

b) Write briefly about effect of feed back on Overall gain, Stability, Sensitivity, Bandwidth and noise.

11. a) Discuss about Time response of first order systems with neat block diagram?

(OR)

b) Explain about concept of stability and necessary condition for stability?

12. a) Explain about Phase margin and Gain margin with neat sketch?

(OR)

b) Write about Nyquist criterion to find stability with suitable example?

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION FIRST SEMESTER

Paper : I: INS -102:Analog Devices and Industrial Electronics

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Write a brief note on Semi conductor materials.

2. Explain the working of a two pin and a three pin voltage regulators.

3. Write about differential amplifier and a comparator with circuits?

4. Describe the constructional features of a Wein Bridge Oscillator with neat sketch.

5. Explain the working of Gate Turn Off Thyristors (GTO) and its salient features.

6. Write a short note on Shockley diodes.

7. State and explain the AC time delay relay and solid state relays with neat circuit diagram.

8**.** State and explain the Sink effect?

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

9. a) Discuss the inversion layer formation in MOSFET and explain its characteristics

. **(OR)**

b) Explain the working principle of SMPS unit using relevant sketches. Write down some of its salient features.

10. a) Write down the characteristics idal and real amplifier. Discuss about the working of voltage and current follower with neat sketeches.

(**OR)**

b) Explain the various mathematical operations that can be performed using operational amplifier with the help of relevant sketches.

11. a) Draw the circuit diagram of SCR full wave rectifier. Explain the operation with wave forms.

(OR)

b) Describe the construnction of programmable UJT and explain its operational Mechanism with neat diagrams.

12. a) Draw the characteristics and explain the operations of UJT / SCR time delay relays.

(OR)

b) Explain the working of a 555 timer with block diagram and also mention some of its applications with relevant sketeches.

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION FIRST SEMESTER

Paper : I: INS -103(a):Digital Techniques and Principles of Communications

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Give various number systems used in Digital Electronics?
2. What is a Logic Gate? Give a brief account of AND, OR and NOT logic gates?
3. Draw a circuit diagram of a 4 bit Ripple Counter?
4. Explain programme array logic
5. How can frequency modulation be generated from phase modulation?
6. What is quantization? Write PCM system?
7. What is a Satellite? Write the differences between Active and Passive Satellites?
8. Write a note on transponders

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

9. (a). State De Morgan's Theorems of Boolean Algebra and prove them?

(OR)

(b). Illustrate and describe the working of J-K Master/Slave Flip Flop Circuit? Give its Truth Table?

10. (a). Discuss the applications of shift registers

(OR)

(b). Draw the circuit diagram of a Programmable Logic Array and explain its operation?

11. (a). Write the comparison between amplitude modulation, frequency modulation and phase modulation

(OR)

(b). Write in detail sampling theorem

12. (a). Write the advantages of Geostationary satellite

(OR)

(b). Explain the classification of satellites

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION FIRST SEMESTER

Paper : I: INS -104(a):Programming in "C"

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Discuss about the significance of flow charts in Computer Programming?
2. Explain briefly about constants and varaibles and write a C program for finding the Sum of the Squares of the natural numbers using for statement?
3. What is the difference between Over flow and Under flow of Data?
4. Write about bitwise and conditional operators in "C" with examples?
5. Write a brief note on string handling functions?
6. Explain the importance of user – defined functions?
7. What is structure in C? Explain the structure initialization?
8. Write about the concepts of single linked lists

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

9. (a). Explain the organization of a computer system with relevant examples?

(OR)

(b). Discuss about the basic structure of "C" program with examples and also its key words?

10. (a). What is an operator? Explain briefly about the different type of operators with examples and also mention the their hierarchy in "C" program.

(OR)

(b).Example briefly about the different type of Decision making and looping statements with examples?

11. (a). What is an array? How to initialize 1 D and 2 D arrays? Write a C program for computing two given (3×3) matrix multiplication?

(OR)

(b). What is pointer? Explain about user defined functions and how they are different from library functions?

12. (a). Write a program in C for declaration of pointers and structures in “C”

(OR)

(b). Discuss about the file management and I/O operation on files in “C” language with examples.

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION SECOND SEMESTER

Paper : I: INS -201:INDUSTRIAL INSTRUMENTATION

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Write a brief note on Elements of Transmitters in Process Instrumentation ?

2. Discuss about the valves and controllers in Iron and Steel Industry?

3. Write a brief note Steam Boilers in Petrochemical Industry?

4. Give a detailed note Heat Exchangers in Petrochemical Industry?

5. Briefly discuss about Measurement Heard ware in Pharmaceutical Industry?

6. Give a detailed note on Controllers and Displays in Pharmaceutical Industry?

7. Write a short note on Valves and Controllers in Thermal Power Stations?

8. Explain Computer Applications in Thermal Power Stations?

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

9. a)Write in detail about the Valves, Guages, Converters, actuators and relays

(OR)

b) Explain the Instrumentation process in Iron and Steel Industry?

10. a) Explain the Instrumentation process in Petrochemical Industry ?

(**OR)**

b) Explain in detailed about the Furnaces in and Centrifuges in Petrochemical Industry with neat

sketch.

11. a) Explain the Instrumentation process in Pharmaceutical Industry?

(OR)

b) Explain briefly about the Measurement Heard ware and Valves in Pharmaceutical Industry with neat sketch?

12. a) Explain in detailed about Instrumentation in Thermal Power Station?

(OR)

b) Explain briefly about controller and Displays in Thermal Power Station with neat sketch?

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION SECOND SEMESTER

Paper :II: INS -202:ELECTRONIC INSTRUMENTATION

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Discuss the extension of ranges in DC meter

2. Write the working of analog phase meter

3. What are the types of digital measuring instruments? Describe them briefly?

4. Discuss the principle and working of Digital voltmeter?

5. Write theworking of square wave generator

6. Write the various elements and their working in function generator

7.Explain the functioning of digital watt meter

8.Explain briefly Digital Capacitance meter with a diagram?

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

9. a) What are Analog and Digital Measuring Instruments? Explain the principle and construction and operation of dynamometer type of DC meter?

(OR)

b) What are the types of Cathode Ray Oscilloscope (CRO)? Explain the working principle of dual beam CRO with a neat block diagram?

10. a) Illustrate Digital Phase Meter with a neat diagram and write its applications.

(OR)

b) Draw a neat sketch of digital storage Oscilloscope (DSO) and explain its working in

details.

11. a) Design a RF signal generator and explain its principle and working.

(OR)

b) Explain signal generator with neat diagram and write its working principle. What are the applications of signal generator?

12.a) Illustrate the principle and working of a spectrum analyzer. Discuss two important applications.

(OR)

b) Explain the working principle and functioning of Digital tachometer with a neat circuit diagram.

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION SECOND SEMESTER

Paper :III: INS -203(a):Sensors and Signal Conditioners

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Define "Passive" and "Active" Transducer and give an example of each?
2. Write the importance of transducer
3. Discuss the functioning of logarithmic transducer
4. Write the difference between photo conductive and photo voltaic cell.
5. What is Thermocouple? How Thermocouple can be used to measure temperature?
6. Write the working of differential pressure level sensor
7. Describe the functioning of variable resistance transducer
8. Write the various elements and their working in electrical transducer

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

9. a). What is a Transducer? Classify the transducers according to their characteristics and applications?

(OR)

b). Discuss the linearization of transducers

10. (a). Describe in detail the working of phase sensitive detector

(OR)

(b).Discuss the principle and working of photomultiplier tube

11. a) Write a working and importance of Platinum Resistance Thermometer.

(OR)

b) Write the differences between the Venturi meter and Orifice meter?

12. a) With neat diagram explain the principle and working of linear voltage differential transformer

(LVDT).

(OR)

b) Discuss the functioning of various elements in Strain Gauge with neat diagram and explain its uses.

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION SECOND SEMESTER

Paper : IV: INS -204(a):MICROPROCESSORS AND INTERFACING

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Discuss briefly about Overview of a basic microcomputer structure?

2.Write the microprocessor technology in bipolar junction trnsistor

3.Discuss about Addressing Modes in 8086 Microprocessor?

4. Write about Instruction Sets in 8086 Microprocessor?

5. Explain about Successive approximation A/D Converter?

6. Discuss about Serial Data Transfer?

7. Write about Programmable Peripheral Interface (8255)?

8. Discuss about Programmable Interrupt Controller (8259)?

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

09. (a) Give a detailed account on the Microprocessor technology in MOS

(OR)

(b) Describe about detailed Microprocessor Evolution and types?

10. (a) Explain about the Architecture of 8086 Microprocessor?

(**OR)**

(b) Explain in detailed about the Interrupts in 8086 Microprocessor?

11. (a) Describe in detail about Interfacing 8 bit D/A converter?

(OR)

(b) Write about DMA data transfer with suitable example?

12. (a) Give a detailed account on Programmable Keyboard/ Display Interface (8279) with neat sketch?

(OR)

(b) Describe about Programmable Interval Timer (8253) with neat sketch?

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION THIRD SEMESTER

Paper : I: INS -301:Analytical Instrumentation

TIME: 3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Discuss the principle of calorimeter
2. Write the applications of atomic absorption spectrometer
3. Write a brief note on applications of Conductivity bridges?
4. Write some applications of Polarographs in chemical and industrial fields?
5. Write the principle of NMR and its importance .
6. Write the salient features of individual blocks in electron spin resonance spectrometer
7. Sketch the block diagram of transmission electron microscope and name the various elements
8. Discuss the applications of gas chromatography

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

9. (a). Explain the working of UV – Visible Spectrophotometer with a neat block diagram and also mention its applications?

(OR)

(b).Write the principle and working of Raman spectrometer and discuss its applications

10. (a). Explain the principle and working of Conductivity bridge with block diagram?

(OR)

(b). Discuss the salient features of various blocks in a polarograph and write the working of polorograph with diagram?

11. (a). Draw the block diagram of nuclear magnetic resonance spectrometer and explain its

working?

(OR)

(b). Explain the principle and working of Mass Spectrometer with relevant block diagrams and write its applications

12. (a). with neat diagram write the principle and working of scanning electron microscope and discuss its applications

(OR)

(b). Describe the working principle of Thermo Gravimetric Analyzers with the help of relevant diagrams?

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION THIRD SEMESTER

Paper : II: INS -302:Digital Signal Processing

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. What are the differences between DSP and ASP?

2. write and prove the sampling process theorem?

3. Give a short note on causality and stability of the discrete time signals?

4. Explain the Z – transfer function and its properties?

5. Explain circular convolution and its properties?

6. What is decimation in frequency. Explain it?

7. Comparison of IIR and FIR filters?

8. Difference between symmetric and Anti - symmetric FIR filters?

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

09. (a) Draw the block diagram of a typical DSP system. Explain the function of each block?

(OR)

(b) Describe the advantages and disadvantages of DSP? Write the applications of DSP?

10. (a) Construct the block diagram of discreate time system and Explain it in detailed?

(OR)

(b) Determine the Z transform of unit step sequence?

11. (a) Find the 4 – point DFT of the sequence $x(n) = \cos(n\pi) / 4$?

(OR)

(b) Derive the relation between DFT and Z transform?

12.(a) Describe the matched Z transform technique for IIR filter design?

(OR)

(b) Design the linear phase FIR digital filter by frequency sampling method?

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION THIRD SEMESTER

Paper :III: INS -303(a):BIOMEDICAL INSTRUMENTATION

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. What are the basic bioelectrical signals/parameters and mention each of its frequency range?
2. Write a note on electroencephalography
3. What is a pacemaker? What are the different modes of operation of Cardiac Pacemakers?
4. Write the working of blood cell counter
5. Discuss the working of anaesthesiamechine
6. Write the operation of oxymeter
7. Write about dosimeter
8. Discuss the advantages of ultrasonic image forming systems

SECTION – B

Answer ALL questions. Each Question carries 15 marks (4x15 = 60)

9.(a) With neat sketch explain the Physiological Systems of Human Body?

(OR)

(b) What are the Characteristics of EMG signal? Compare the signal characteristics of ECG and EMG with neat sketches?

10.(a) Explain the Nerve and Muscle Stimulators with the help of a neat sketch?

(OR)

(b) Explain the working of X- Ray Machine with the help of a neat diagram?

11.(a).Write the design of biotelemetry system and radio telemetry system

(OR)

(b) Write the working of pulmonary analyzer

12. (a) With neat sketch explain the Computer Tomography Scanner (CT)

(OR)

(b) Explain the working of Magnetic Resonance Imaging (MRI) with the help of a neat diagram?

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION THIRD SEMESTER

Paper : V: INS -305:MICROCONTROLLERS AND INTERFACING

TIME:2 Hours **Max.Marks:40**

SECTION - A

Answer any four of the following. Each Question carries 4 marks. **(4x4=16)**

1. Write the differences between embedded versus external memory devices
2. Explain 8 bit and 6 bit micro controllers
3. Discuss the addressing modes in 8051 micro controller
4. Write about interrupts in MCS-51 timers
5. Discuss memory interfacing in 8051
6. Write the interfacing of 0809 with 8051

SECTION – B

Answer **ALL** questions. Each Question carries 8 marks **(3x8 =24)**

7**.** (a) Write about Harvard and Von Newmann architectures in microcontroller devices

(OR)

(b) Explain the pin structure and memory organization in 8051 Microcontroller?

8**. (**a) Write the instructions and programming in 8051 microcontroller

(OR)

(b) Explain in detail serial and parallel communication

9 (a) What is stepper motor in Microcontroller? Discuss the interfacing of stepper motor to 8051 Microcontroller with neat diagram?

(**OR)**

(b) Draw circuit diagram and explain the interfacing of 8 bit ADC to 8051 Microcontroller?

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION THIRD SEMESTER

Paper :VI: INS -306:COMPUTER ARCHITECTURE AND ORGANIZATION

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Briefly explain the processor function with block diagram?

2. Define Micro-Operation with example and Give the Micro instruction format?

3. What are the differences between the hardwired control organization and micro programmed control organization?

4. Briefly explain about Algorithms and Flowcharts with exaples?

5.Write a short note on I / O control method?

6. What is meant by Virtual memory and explain it with diagram?

7. Describe the concept of pipelining and give the basic structure of the pipeline processor?

8. Write the importance of shared memory multiprocessors

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

09**.** (a)Discuss in detail multiprocessors and multi computers

(OR)

(b) Write in detail with examples logic micro operations and shift micro operations

10 **.**(a)What is micro programming? What are the advantages and disadvantages of micro programming?

(OR)

(b) Briefly explain about Arithmetic operations with suitable example?

11. (a) Discuss in detail read only memories and cache memories performances in computers

(OR)

(b) Write the input and output organization in computer

12. (a)Discuss with suitable examples: RISC pipe line Vector processing and Array processing?

(OR)

(b) Discuss in detail aboutmulti processor with block diagram and write it's characteristics?

MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FOURTH SEMESTER

Branch - Instrumentation

Paper 1 –INS -401: INTRODUCTION TO VLSI CIRCUITS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Explain the overview of design steps involved in the fabrication of VLSI circuits.
2. Explain the design and applications logic gates in circuits.
3. What is a MOSFET? Explain the working of MOSFET?
4. Explain the concept of Lithography.
5. Write a note on FET sizing and unit Transistors.
6. Explain in detail the FET RC model.
7. Write a brief note on power dissipation.
8. Give the working of pass transistor

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Explain MOSFETs as switches with a neat diagram.

(Or)

(b) Draw a neat sketch and explain basic logic gates in CMOS.

10. (a) Discuss briefly the concept of CMOS layers in detail.

(Or)

(b) Explain the overview of materials growth and their deposition in VLSI Technology.

11. (a) Write briefly on layout basic structured sequences.

(Or)

(b) Explain briefly the n – FET current and voltage equation with a neat diagram.

12. (a) Draw a neat diagram and explain briefly the DC characteristics of the CMOS inverter.

(Or)

(b) Discuss briefly the Designing of High Speed CMOS logic Networks.

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION FOURTH SEMESTER

Paper : II: INS -402:EMBEDDED SYSTEMS AND REAL TIME OPERATING SYSTEMS

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. What is general purpose system and embedded system. Explain it with block diagram?

2. What are the differences between microprocessor and PIC microcontroller?

3. Write the evaluation of ARM processors?

4. Explain the applications of relays with ARM processor?

5. Explain about hard and soft real time systems?

6. What is the need of Task communication?

7. What are the differences between GPOS and RTOS?

8. What is image processing. Explain it with the help of a neat sketch ?

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

09. (a) Explain the difference between Embedded Systems and General Computing Systems with the help of a neat block diagram?

(OR)

(b) Explain the PIC microcontroller architecture with neat block diagram

10. (a) Explain the instruction set of ARM 7 with suitable block diagram?

(OR)

(b) What is meant by Flash memory and write its applications?

11. (a) What is kernel and describe it's architecture with neat block diagram?

(OR)

(b) Write a detailed note on interrupt service routines in RTOS with suitable block diagram?

12. (a) Write the role of RTOS for fault tolerant applications

(OR)

(b) Discuss in detail RFID systems and their applications development using these systems

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION FOURTH SEMESTER

Paper :III: INS -403(a):PROGRAMMABLE LOGIC CONTROLLERS

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. Write the functioning of dynamic elements in control loop

2. Briefly explain composite controller modes

3. Write the general features of process contoller

4. Give a brief account of model based control

5.Write about steady state gain

6.Discuss in detail Liquid level control

7.Write the design of decoupler

8.Write in brief about artificial neural networks

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

9. (a) Write the working of interacting and non- interacting systems

(OR)

(b) Write the characteristics of process control

10. (a) Discuss in detail Zingler and Nichols method

(OR)

(b) Write the overview of control schemes

11. **(**a) Write in detail the analysis of flow control and pressure control

(OR)

(b) Explain the comparison of SLPC and MLPC

12. (a) Give the overview of multivariable systems

(OR)

(b) Write about model based controller and optimal controller

MODEL QUESTION PAPER

M.Sc., DEGREE EXAMINATIONS- 2022

Branch: INSTRUMENTATION FOURTH SEMESTER

Paper : VI: INS -406(a):AGRO BASED INSTRUMENTATION

TIME:3 Hours **Max.Marks:80**

SECTION - A

Answer any **FOUR** of the following. Each Question carries 5 marks. **(4x5=20)**

1. List the properties of soil and explain any two properties of soil in detail?

2. Write in brief about bio sensor

3. List out any 4 equipment's used in sugar industry/ Explain in detail about any one of it?

4. Explain the working of fermenter in sugar industry

5. Explain soil moisture measurement method?

6. What are the factors affecting the selection of irrigation system?

7. List out the different sensors & instruments used for monitoring green house environment?

8. Write a short notes on ventilation systems used in green house environment?

SECTION – B

Answer **ALL** questions. Each Question carries 15 marks **(4x15 = 60)**

09. (a) Write in detail the working of sonic anemometer and hygrometer and its usage in agriculture

(OR)

(b) Discuss in detail, Open and Close path gas analyzers with a neat sketch?

10. (a) Draw the flow diagram of a diary industry and instrumentation set up and Explain it?

(OR)

(b) Write in detail juice extraction process and instrumentation

11. (a) Compare surface and micro methods of irrigation based on their advantages and disadvantages?

(OR)

(b) Discuss in detail soil moisture methods

12.(a) Explain the application of SCADA for DAM control?

(OR)

(b) Explain the application of PLC and SCADA in packing industry with neat sketch?

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF PHYSICS



Course

M.Sc. ELECTRONICS

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-

2020

About the Department

The Department of Physics, Sri Venkateswara University, was established in 1954 with B.Sc. and B.Sc. (Hons) degree courses. Two year M.Sc. degree course was started in 1959. To meet the growing demands of the society and to keep pace with reputed institutions in the country and abroad, the Department has innovative specializations in M.Sc. Physics such as Applied Spectroscopy, Condensed Matter Physics, Electronics, Photonics, Solar Energy Physics and Vacuum and Thin film Physics. The department has also started M.Sc. Electronics course in 1998. At Present the department has 7 Professors, 1 Associate Professor and 1 Assistant Professor.The research work in the Department of Physics was initiated in 1957 and since then, there has been significant progress in the areas of Atmospheric Science, Condensed Matter Physics, Microelectronics, Solar Energy, Solid State Spectroscopy, Photonics and Thin Films. In recognition of these efforts, the department has received research funding from UGC, CSIR, DST, ISRO, DNES, DoE, DRDO and DAE-BRNS. The Department was selected for UGC - CAS and DST- FIST programmes and was able to procure several sophisticated instruments like XRD, ATR-FTIR, UV-Vis-NIR spectrophotometer, FLS-980-Florescence spectrometer, SEM with EDS, Micro-Raman, Vibrating Sample Magnetometer (VSM), Liquid Nitrogen Plant,etc., for student training and advanced research activities. The UGC has set up UGC-SVU Center for MST Radar applications to promote research activities on Atmospheric research. This was further supported by the ISRO in the form of an Advanced Center for Atmospheric Sciences (ACAS). The advances made so far in basic and applied research are well recognized both in the country and abroad. The Department organizes National and International Conferences/Seminars/Workshops on regular basis. The faculty members of the Department have several collaborative research programmes with national and International institutions. Many of the faculty members of the Department are regularly invited as visiting Professors and visiting researchers by overseas Universities/ Institutes in India and abroad.

Vision

To inculcate certain specific enabling skill sets to prepare the students to take up challenges in any one or more functional domains viz. (i) Academics; (ii) Basic and Applied Research; (iii) Research & Development; (iv) Engineering & Technology and (v) Industry.

Mission

To bring out professionals having knowledge of basic laws of nature together with strong fundamentals in the core area of Electronic viz. Analog Integrated Circuits, Digital Integrated Circuits, Programming in C, Python, Matlab, Mathematical methods of Signal and System Analysis, Optical, wireless and satellite communications, Advanced Microprocessors and Microcomputers, Embedded controllers, Semiconductor Materials and Devices, Signal and Image Processing, VHDL, VLSI circuits, Industrial Electronics, Control Systems, Data Communications and Networking, Microwaves, etc.

Program Specific Outcomes: Attheend oftheprogram,thestudent willbeableto:

PSO1	Understandthebasicandadvancedconceptsofdifferentbranchesof Electronics.
PSO2	Performanddesignexperimentsintheareasofelectronics,Microcontrollers, Communications, Semiconductors Devices, and Programming.
PSO3	Applythe conceptsof electronics in specialized areasof VLSI technology, VHDL, Communications,etc.in industry,academia, research anddaytodaylife.

Program Objectives:

- P1. To develop analytical skills covering both scientific and technical domains.
- P2. To develop in depth understanding of the advanced technologies in Electronics.
- P3. To gain practical, hands-on experience in different integrated circuits and Controllers
- P4. To translate the proven research ideas logically into a reliable and effective but simple, elegant and advanced electronic systems.

Program Outcomes: At the end of the program, the student will be able to:

PO1	Apply the scientific knowledge to solve the complex physics problems.
PO2	Identify,formulate,andanalyzeadvancedscientificproblemsreachingsubstantiated Conclusions using first principles of mathematics, physical, and natural sciences.
PO3	Design solutions for advanced scientific problems and design system components or processes that meet the specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal consideration.
PO4	Use research-based knowledge and methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid Conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern scientific Tools to complex physics problems with an understanding of the limitations.
PO6	Applyreasoninginformedbythecontextualknowledgetoassesssocietal,health,safety,legalandculturalissues,andtheconsequentresponsibilitiesrelevant tothe Professional scientific practice.
PO7	Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to the norms of scientific practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, And in multidisciplinary settings.

PO10	Communicate effectively on scientific activities with the Scientific/Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective representations, and give And receive clear instructions.
PO11	Demonstrate knowledge and understanding of the scientific principles and apply These to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent And life-long learning in the broadest context of scientific and technological change.

Program Educational Objectives: At the end of the program, the students will beable to:

PEO1	Apply principles of basic scientific concepts in understanding, analysis, and prediction of physical systems.
PEO2	Develop human resource with specialization in theoretical and experimental Techniques required for career in academic, research and industry.
PEO3	Engage in lifelong learning and adapt to changing professional and societal needs.

SRIVENKATESWARAUNIVERSITY : TIRUPATI

DEPARTMENTOFPHYSICS

TWO YEAR M.Sc. COURSE IN ELECTRONICS (2021-2022) SCHEME

Semester – I

Sl. No	Components of Study	Course code	Title of the Paper	Instruction hours per week	Credits	Internal Assess-ment Marks	End Semester Exams Marks	Total Marks
1.	Core-Theory	ELE-101	Analog Integrated Circuits and Applications	6	4	20	80	100
2.	Core-Theory	ELE-102	Digital Integrated Circuits and Applications	6	4	20	80	100
3.	Compulsory Foundation	ELE-103 (a)	Programming in C with data structures	6	4	20	80	100
		ELE-103 (b)	Python Programming					
		ELE-103 (c)	Programming in Matlab					
4.	Elective Foundation	ELE-104 (a)	Mathematical Methods of Signal & System analysis	6	4	20	80	100
		ELE-104 (b)	Optical Communications					
		ELE-104 (c)	Wireless communications					
5.	Core-Practical	ELEP-105	Analog and Digital IC's (Lab)	6	4	20	80	100
6.	Core-Practical	ELEP-106	Programming in C (Lab)	6	4	20	80	100
			Total:	36	24	120	480	600

All Core papers are Mandatory

Compulsory Foundation – Choose one paper

Elective Foundation – Choose one paper

Semester – II

Sl. No	Components of Study	Course code	Title of the Paper	Instruction hours per week	Credits	Internal Assess-ment Marks	End Semester Exams Marks	Total Marks
1.	Core-Theory	ELE-201	Advanced Microprocessors and Microcomputers	6	4	20	80	100
2.	Core-Theory	ELE-202	Digital Communications	6	4	20	80	100
3.	Compulsory Foundation	ELE-203(a)	Semiconductor Materialsand Devices	6	4	20	80	100
		ELE-203(b)	Sensors and Transducers					
		ELE-203(c)	Atmospheric and Space Instrumentation Techniques					
4.	Elective Foundation	ELE-204 (a)	Control Systems	6	4	20	80	100
		ELE-204 (b)	Medical Instrumentation					
		ELE-204 (c)	Data Mining and Information Security					
5.	Core-Practical	ELEP-205	8086 Microprocessor (Lab)	6	4	20	80	100
6.	Core-Practical	ELEP-206	Digital Communications (Lab)	6	4	20	80	100
			Total:	36	24			600

All Core papers are Mandatory

Compulsory Foundation – Choose one paper

Elective Foundation – Choose one paper

Semester – III

Sl. No	Core/Elective	Course code	Title of the Paper	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exams Marks	Total Marks
1.	Core-Theory	ELE-301	Digital Signal Processing	6	4	20	80	100
2.	Core-Theory	ELE-302	Digital system Design-VHDL	6	4	20	80	100
3.	Generic Elective	ELE-303(a)	Microcontrollers and Applications	6	4	20	80	100
		ELE-303(b)	Computer organization					
		ELE-303(c)	Digital Image Processing					
4.	Core-Practical	ELEP-304	Digital Signal Processing (Lab)	6	4	20	80	100
5.	Skill Oriented Course	ELE-305	Peripheral interface controllers VHDL &Microcontrollers (Lab) (Hands on training)	6	4	10	90 (40+50)	100
6.	Open Elective	ELE-306 (a)	Microprocessors, PC Hardware and Interfacing	6	4	20	80	100
		ELE-306 (b)	Satellite Communications					
			Total:	36	24	110	490	600

All Core papers are Mandatory

Generic Elective - Choose one paper

Skill Oriented Course is Mandatory (10 marks for Internal, 40 marks for final theory, & 50 marks for Practicals)

Semester – IV

Sl. No	Core/Elective	Course code	Title of the Paper	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exams Marks	Total Marks
1.	Core-Theory	ELE-401	Advanced CommunicationSystems	6	4	20	80	100
2.	Core-Theory	ELE-402	Introduction to VLSI circuits	6	4	20	80	100
3.	Generic Elective	ELE-403(a)	Data Communications and Networking	6	4	20	80	100
		ELE-403(b)	Industrial Electronics					
		ELE-403 (c)	EMI and EMC					
4.	Core-Practical	ELEP-404P	Communication (Lab)	6	4	---	100	100
5.	**Multi Disciplinary Course/ Project work**	ELE-405	Internet of Things/ Project Work	6	4	20	80	100
6.	**Open Elective**	ELE-406 (a)	Embedded systems with PIC Microcontrollers	6	4	20	80	100
		ELE-406 (b)	Microwaves					
			Total:	36	24	80	520	600

All Core papers are Mandatory

Generic Elective - Choose one paper

MultiDisciplinary Course/Project is Mandatory

(MandatoryCore)

ELE-101	ANALOG INTEGRATED AND APPLICATIONS	L-5,T-1,P-0	4Credits

Pre-requisite: Understandingofgraduatelevel Electronics

Course Objectives: The aim and objective of the course on Analog Integrated Circuits and Applications is to train thestudents of M.Sc. in the Voltage Regulators and Signal generators, Nonlinear Circuits, Amplifiers, and Phase-Locked Loops, A-D and D-A Converters, Op. Amp. Applications used in the Industry.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	UnderstandthenecessityofAction, Voltage regulators and Signal generators.
CO2	Used' Nonlinear Circuits, Amplifiers, and Phase-Locked Loops in various applications.
CO3	DescribetheA-D and D-A Convertersin different applications.
CO4	ApplyessentialfeaturesofOp. Amp. Applications used in the Industry.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-

ELE-101 ANALOG INTEGRATED CIRCUITS AND APPLICATIONS

UNIT-1 : Voltage Regulators and Signal generators

Linear regulators, Linear regulator applications, Switching regulators, Monolithic Switching Regulators, Sine, Triangular, Sawtooth wave form generators, Multivibrators, Monolithic timers, Monolithic waveform generators, V-F and F-V converters.

UNIT-II: Nonlinear Circuits, Amplifiers, and Phase-Locked Loops

Voltage comparators, Comparator applications, Schmitt Triggers, Precision Rectifiers, Analog Switches, Peak detectors, Sample- and Hold Amplifiers, Log/Antilog Amplifiers, Analog multipliers, Phase-Locked Loops, Monolithic PLLs.

UNIT-III : A-D and D-A Converters

Performance Specifications, D-A conversion Techniques – Weighted Resistor DACs, Voltage mode R-2R ladder DAC, Bipolar DACs, Multiplying DAC applications.

A-D conversion Techniques– DAC based A-D conversion, Successive-Approximation ADC, Flash Converters, Integrating Type Converters.

UNIT – IV: Op Amp Applications

Summing Amplifier, Voltage to current converter, Current to Voltage converter, Integrator, Differentiator, Instrumentation Amplifier. Active Filters- First order filters, Second order Filters, Higher Order Filters, Switched Capacitor Filters.Oscillators: Principles and types of Oscillators.

Books for study:

1. Sergio Franco, “Design with Operational Amplifiers and Analog Integrated Circuits”, 3/e, TMH, 2002 (UNIT-I to UNIT-III)

2. Ramakanth A. Gayakwad, OP-Amps & Linear Integrated Circuits, PHI, 2nd Edition, 1991.

3. J. Michael Jacob, “Application and Design with Analog Integrated Circuits” 2/e, PHI, 1996.

4. D. Roy Choudhury and Shail Jain, “Linear Integrated Circuits”, New Age International (P) Limited, 1991.

5. R.F. Coughlin and F.F. Driscoll, “Operational Amplifiers and Linear Integrated Circuits”, PHI, 1992.

6. D.K. Anvekar and B.S. Sonde, “Electronic Data Converters: Fundamentals & Applications”, TMH, 1994.

7. A.D. Helfric and W.D. Cooper, “Modern Electronic Instrumentation and Measurement Techniques”, PHI, 1996.

(MandatoryCore)

ELE-102	Digital Integrated Circuits and Applications	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingofgraduatelevel Digital Electronics

Course Objectives: The aim and objective of the course on Digital Integrated Circuits and Applications is toexpose the students of M.Sc.class to the topics like Flip-Flops, Counters and Registers, IC Logic families, Semiconductor Memories, Digital Instruments so that they are equipped with the digital integrated circuits and applications in the present days.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Gainin-depthknowledge abouttheFlip-Flops, Counters and Registers and their symbolsused in digital integrated circuits and their function.
CO2	Differentiatevarious IC Logic families usedDigital circuits.
CO3	Understand the various semiconductor memories such as RAMs and ROMs, Programmable Logic devices and development software.
CO4	To explain the basic function of various digital instruments such as DVMs, MP based Ramp type DVM, Digital multimeters, Frequency meter, Phase meter, capacitance meter and their Automation.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	2	1	-	2	-	1	-
CO2	2	3	2	2	2	2	2	-	-	-	1	2
CO3	3	3	2	2	1	2	2	-	1	-	1	-
CO4	3	3	2	2	2	2	1	-	-	-	1	2

ELE-102 DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS

UNIT – I :Flip-Flops, Counters and Registers

NAND and NOR gate latches, Clocked signals and Clocked flip-flops, Clocked S-C, J-K, and D-FFs, D-latches, asynchronous inputs, timing considerations, one shot.

Ripple counters, Counters with MOD numbers$<2^N$, Changing the MOD number, IC asynchronous counters, Asynchronous down counter, Propagation delay in ripple counters, Synchronous counters, Presettable counters, 74193 counter, Synchronous counter design, Shift register counter. IEEE/ANSI Symbols.

UNIT – II : IC Logic families

Digital IC terminology, TTL logic family, TTL series characteristics, Improved TTL series, TTL loading and fan-out, other TTL characteristics, Connecting TTL outputs together, tristate TTL, ECL family, MOS digital ICs & Characteristics, CMOS logic & characteristics, Bilateral switch, TTL driving CMOS and vice-versa, Low voltage technology.

UNIT – III : Semiconductor Memories

RAM architecture, Static RAM, Dynamic RAM (DRAM), DRAM structure, and operation, DRAM Read/Write cycles, DRAM refreshing, Expansion of word size and capacity.

Programmable Logic Devices- Basic idea, PLD architecture (PROM), PAL, PLAs, Applications of a programmable Logic Device – GAL 16V 8A, Programming PLDs, Development software.

UNIT – IV: Digital Instruments

Dual slope Integrating Type DVM, Integrating Type DVM, Continuous Balance DVM, 3-1/2 digit, Resolution and sensitivity of Digital meters, General specification of DVM, MP based Ramp type DVM, Digital multimeters, Digital Frequency meter, Digital measurement of time and frequency, Digital PH meter, Automation in Digital Instruments, Digital Phase meter, Digital capacitance meter, IEEE 488 Bus.

Books for study:

1. Ronald J.Tocci, “Digital Systems-Principles and Applications”, 6/e, PHI, New Delhi, 1999.
2. H.S. Kalsi, “Electronic Instrumentation”, TMH, 1995. (Unit-IV)
3. Herbert Taub and Donald Schilling, “Digital Integrated Electronics”, McGraw Hill, 1985.
4. S.K. Bose, “Digital Systems”, 2/e, New Age International (P) Limited, 1992.
5. D.K. Anvekar and B.S. Sonde, “Electronic Data Converters: Fundamentals & Applications”, TMH, 1994.
6. A.P. Malvino and D.P. Leach, “Digital Principles and Applications”, TMH, 1991.

ELE-103(a)	Programming in C with Data structures	L-5,T-1,P-6	4Credits

Pre-requisite: Basicknowledgeabout Software fundaments

Course Objectives: The aimandobjective ofthe course on**Programming in C with Data structures**isto introduce thestudents of M.Sc. class to the fundamentals of C Language, Arrays, Structures, Unions and Bit Fields, Ques, Trees and their applications so that they can use the Computer Language in writing the programs for various applications.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understand the fundamentals of C Language such as Expressions and I/O Statements, Operators and control statements.
CO2	Explainthe arrays, User Define Functions,Pointers and their applications
CO3	Understand about Declaration of structure, Stack and Recursion and theirapplications.
CO4	Understand the Linked Lists, Trees, different Algorithms, and their Applications. They are able to write the programs in controlling devices.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	1	-	1	-	1	-
CO2	3	3	2	1	2	2	1	-	-	2	1	-
CO3	2	2	3	2	2	2	1	-	1	-	1	-
CO4	3	3	2	2	2	2	1	-		2	1	-

EL*E*-103(a) PROGRAMMING IN C WITH DATA STRUCTURES

UNIT – I: Fundamentals of C language

C character set – Identifiers and keywords – Constants – Variables – Data types – Declarations of variables Declaration of storage class – Defining symbolic constants Assignment statement

Operators: Arithmetic operators – Relational operators – Logic operators – Assignment operators – Increment and decrement operators – Conditional operators

Expressions and I/O Statements: Arithmetic expressions – Precedence of arithmetic operators Type converters in expressions – Mathematical (library) functions – Data input and output – The getchar and putchar functions – Scanf-Printif –Simple programs
Control Statements: If-Else statement – Switch statement – The ? Operator – GOTO –While, Do-while, FOR statements – BREAK and CONTINUE statements.

UNIT –II : Arrays

One dimensional and two dimensional arrays – Initialization Type declaration –Inputting and outputting of data for arrays – Programs of matrices addition, subtraction and multiplication

User Define Functions: The form of C functions- Return values and their types –Calling a function – Category of functions, Nesting of functions, Recursion, ANSI C functions – Function declaration, Scope and life time of variables in functions.

Pointers : Accessing the address of variable Declaration and Initialization of pointer variables, Accessing the value of the variable through its pointer-Pointer Expressions – Pointers and Arrays – Pointers and structures.

UNIT – III: Structures, Unions and Bit Fields

Declaration of structure, Initializing a structure, Functions and structures, Arrays of structures, Arrays within a structure, Structures within a structure, Pointers and structures, Unions, Bit Fields, Typedef, Enumerations.

The Stack- Representing stacks in C, Example: Infix, Postfix, and Prefix.
Recursion- Recursive definition and Processes, Recursion in C, The Towers of Hanoi Problem.

UNIT – IV: Queues and Lists

Linked Lists, Lists in C - Trees- Binary Trees, Binary Tree Representations, Example: The Huffman Algorithm, Representing Lists as Binary Trees, Trees and their Applications.

Books for study:

1. D. Ravichandran, “Programming in C”, New Age International (P) Limited, 1996.)
2. Y. Langsam, M.J. Augenstein and A.M. Tenenbaum, “Data Structures using C and C++” 2/e, Pearson Education, Inc., 1996.
3. Balaguruswamy, “Programming in ‘C’, TataMcGraw Hill.
4. R. Kruse, C.L. Tondo, and B. Leung, “Data Structures & Program Design in C” 2/e, Pearson Education, Inc., 1997.
5. T. Sudha and B. Poornima, “C programming with Data structures”, Anmol Publications Pvt. Ltd., 2005.
6. Byron Gottfried, Programming with ‘C’ , Tata McGraw Hill
7. Rajaraman ,Computer oriented numerical methods .
8. YeswanthKanetkar ,Let Us C .
9. K.R. Venugopal Prasad, Programming with C

ELE-103(b)	Python Programming	L-5,T-1,P-0	4Credits

Pre-requisite: Understandingofgraduatelevel Programming Fundamentals.

CourseObjectives: Theaimandobjectiveofthecourseon**Python Programming**istofamiliarize the students of M.Sc. students with the fundamentals of Python Language, Object and Classes, Functions and Modules, I/O and Error Handling,etc.,sothattheycanusetheseinsolvingsimple and difficult problems.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understand the basics of Dynamic Types, Conventions, String Operations, Operators, Loop, Lists and functions.
CO2	Learn about Object and Classes in Python and comparewith anyother high-level language.
CO3	UseFunctions and Modulesin solving various problems.
CO4	Understand I/O and Error Handling in Python, solve the problems.

MappingofcourseoutcomeswiththeprogramoutcomesPO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	-	1	2	-	1
CO2	3	3	3	1	2	1	-	-	3	2	-	1
CO3	3	3	3	2	2	1	1	-	1	2	-	1
CO4	3	3	3	-	-	2	-	-	2	2	-	1

ELE-103(b) Python Programming

UNIT – I:**Introduction to Python Programming Language:**

Introduction to Python Language,Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical Operators, True or False,Bit Wise Operators,The while Loop, break and continue,The for Loop, Lists,Tuples,Sets,Dictionaries,Sorting Dictionaries,Copying Collections, In Functions.

UNIT –II :Object and Classes :

Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes.

UNIT –III : Functions and Modules :

Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword andOptional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Modules, Standard Modules – sys,□Standard Modules – math,□Standard Modules – time,ThedirFunction**.**

UNIT –IV :I/O and Error Handling In Python :

Introduction, Data Streams,□Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions.

Books for Study:

1. Mike, Dive into Python
2. Mark Lutz ,Learning Python, 4th Edition
3. Mark Lutz, Programming Python, 4th Edition

ELE-103(c)	Programming in Matlab	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingofgraduate level electronics

CourseObjectives: Theaimandobjectiveofthecourseon Programming in Matlabistofamiliarize the M.Sc. students with the Mat lab Environment, Control Flow Instructions, Structured Data Types, Plotting in Mat lab,Handle Graphics for Manipulating Plots, Writing the programs in solving the problems for various applications.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Applybasicsknowledgeof various instructions in Matlab and script files.
CO2	Study and understanding of various control flow instructions.
CO3	Study and understanding of various Structured Data Types
CO4	AnalyzetheoutcomeofthePlotting in Mat lab,Handle Graphics for Manipulating Plots, Writing the programs in solving the problems for various applications.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	1	1
CO2	3	3	3	1	2	1	1	-	-	-	1	1
CO3	3	3	3	2	2	1	1	-	-	-	1	1
CO4	3	3	3	3	2	2	2	-	2	-	1	1

ELE-103(c) PROGRAMMING IN MATLAB

UNIT –I :Mat lab Environment

Defining Variables, Functions, Display Formats, Saving the Variables Stored in Memory, Predefined Variables, Complex Numbers, Matrices and Vectors, Strings, Input and Output Statements, Plotting in Mat lab, Mat Lab Help Facilities and Mat Lab Script Files.

UNIT –II:Control Flow

IF –END, IF – ELSE- END, ELSE IF, SWITCH –CASE, FOR Loops, WHILE Loops, General Structure of a Function, Scope of Variables, Passing Parameters, Global Variables, The RETURN Statement, Nar gin and nargout, Recursive Function.

UNIT-III : Structured Data Types

Introduction, Arrays in Mat lab, Addressing Arrays, Examples of Using Arrays, Designing Mat lab Functions to Handle Array Inputs, Dynamic Arrays, Cell Arrays, Structures

UNIT-IV : Plotting in Mat lab

Basic Two – Dimensional Plots, Line Styles, Markers, and Colors, Plot Color, Plotting Grid, The AXIS Command, Placing Text on a Plot, Modifying Text with Tex Commands, Obtaining Numerical values from a plot, Various Mat lab 2 –D Plot Types, Handle Graphics for Manipulating Plots.

Books for Study

1. Marc E. Herniter,Programming in MATLAB, Vikas Publishing House, 2001.
2. Paratap R: Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers, 2010.

ELE-104(a)	Signals and System Analysis	L-5,T-1,P-0	4Credits

Pre-requisite: Understandingof graduatelevels Mathematical analysis

Course Objectives: The aim and objective of the course on Signals and System Analysis for the students of M.Sc. Electronics to equip them with the knowledge of Signals and Systems, Fourier Series Representation of Periodic Signals, Laplace and Z- Transforms for analysis.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	Havethebasicknowledgeof different Continuous-Time and Discrete-Time Signalsand systems and their properties.
CO2	Understand the *Fourier Series Representation of Periodic Signals*and their properties.
CO3	Know the Properties, Analysis and Characterization of LTI systems using the Laplace transforms.
CO4	Study the Properties of the Z- Transform, Analysis and Characterization of LTI systems using the z-transforms.

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	2	-	-	2	1	-	1
CO2	3	2	3	3	-	2	2	-	2	1	-	1
CO3	3	2	3	3	2	2	-	-	2	-	-	1
CO4	3	2	3	3	-	2	2	-	2	-	-	1

ELE-104 (a): SIGNALS& SYSTEM ANALYSIS

UNIT – I: Signals and Systems

Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, The unit Impulse and Unit Step functions, Continuous-Time and Discrete-Time Systems, Basic System Properties.

Linear Time-Invariant Systems- Discrete-Time LTI systems, Continuous-Time LTI systems, Properties of Linear Time-Invariant Systems, Casual LTI Systems described by differential and difference equations.

UNIT – II: Fourier Series Representation of Periodic Signals

A Historical perspective, The response of LTI systems to complex exponentials, Fourier Series representation of Continuous-time periodic signals, Convergence of the Fourier series, Properties of Continuous-Time Fourier Series, Fourier Series representation of Discrete-Time periodic signals, Properties of Discrete-Time Fourier series.

Continuous-Time Fourier Transform- Representation of aperiodic signals: The Continuous-Time Fourier Transform, The Fourier Transform for Periodic signals, Properties of the Continuous-Time Fourier Transform, The Convolution property, The multiplication property.

UNIT – III: Laplace Transforms

Laplace Transform, the region of Convergence for Laplace Transforms, The inverse Laplace transform, Geometric evaluation of the Fourier Transform from the Pole-Zero plot, Properties of the Laplace Transform, Analysis and Characterization of LTI systems using the Laplace transform.

UNIT – IV: Z-transform

the Z-transform, The region of convergence for the Z-transform, The inverse Z-transform, Geometric evaluation of the Fourier Transform from the Pole-Zero plot, Properties of the Z- Transform, Analysis and Characterization of LTI systems using the z-transforms, System function algebra and block diagram representations, The Unilateral z-Transform.

Books for study:

1. A.V. Oppenheim, A.S. Willsky, “Signals & Systems”, 2/e, Pearson Education, Inc., 1997.
2. R.E. Ziemer, W.H. Tranter and D.R. Fannin, “Signals and Systems – Continuous and Discrete”, 4/e, Pearson Education, Inc., 2001.
3. Douglas K. Lindner, “Introduction to Signals and Systems”, McGraw-Hill, 1999.
4. Simon Haykin and Barry VanVeen, “Signals and Systems” John Wiley & Sons (Asia) Pte. Ltd., 2001.
5. B.P. Lathi, “Signal Processing & Linear Systems”, Oxford University Press, 1998.
6. P.RameshBabu, Signal and Systems, Scitech Publishers, 2018.

PLE-104(b)	OpticalCommunications	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevelBasic Electronics

Course Objectives: The aim and objective of the course on OpticalCommunicationsforthestudentsofM.Sc. Electronics toequipthemwiththeknowledgeof Optical Communications.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	understand optical fibers and waveguides used in communication system
CO2	Understand **Attenuation and wave propagation in Optical Fibers**.
CO3	Study different types sources and detectors used in Optical Communication system.
CO4	Differentiate losses in optical fiber link and state transmission characteristics of optical fiber

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	-	2	-	-	-
CO2	3	3	3	3	2	1	2	-	1	2	-	-
CO3	3	3	3	3	2	1	2	-	1	-	-	-
CO4	3	3	3	3	2	1	2	-	2	2	-	-

ELE-104 (b): OPTICAL COMMUNICATIONS

UNIT – I

Introduction, Measurement of Information, Channel Capacity, Communication System Architecture, Basic Optical Communication System, Advantage of Optical Communication System.

Step-index Fibers, Graded Index Fibers, Modes & Rays, Stab Wave guide.

UNIT – II

Attenuation in Optical Fibers: Introduction, Absorption, Scattering, Very Low Loss Materials, All Plastic & Polymer-Clad-Silica Fibers.

Wave Propagation:Wave propagation in Step-Index & Graded Index Fiber, Overall Fiber Dispersion-Single Mode Fibers, Multimode Fibers, Dispersion-Shifted Fiber, Dispersion, Flattened Fiber, Polarization.

UNIT – III

Source & Detectors: Design & LED's for Optical Communication, Semiconductor Lasers for Optical Fiber Communication System, Semiconductor Photodiode Detectors, Avalanche Photodiode Detector & Photo multiplier Tubes

UNIT – IV

Optical Fiber Communication System: Telecommunication, Local Distribution Series, Computer Networks, Local Data Transmission & Telemetry, Digital Optical Fiber Communication System-First Generation, System-Second Generation Future System.Data Communication Networks – Network Topologies, Mac Protocols, Analog System.Advanced Multiplexing Strategies – Optical TDM, Sub carrier Multiplexing, WDM Network.

Books for study:

1. A. Yariv, Optical Electronics, SBS College Publishing, Newyork 1985
2. F. T. S. Yu ,Optical Information Processing, Wiley, Newyork, 1983
3. John M. Senior, Optical Fiber Communications, PHI, 2009.
4. Gerd Keiser, Optical Fiber Communications, McGraw-Hill Education, 2010

ELE-104(c)	Wireless Communications	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevelchemistryandphysics

Course Objectives: The aim and objective of the course on Wireless Communicationsis to familiarize the M.Sc. students with the basics of the recently emergingmobile technologies.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	understand the basics of digital modulation techniques
CO2	Understand various coding and error correction techniques
CO3	Know GSM mobile communication standards, its architecture, logical channels, advantages and limitations.
CO4	Familiarize with optical and satellite communication techniques

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	-	2	-	2	2	-	1
CO2	3	2	1	2	2	2	-	-	2	2	-	-
CO3	3	2	1	2	1	2	2	-	2	2	-	1
CO4	3	2	1	2	2	-	-	-	2	2	-1	-

ELE-104 (c): WIRELESS COMMUNICATIONS

Unit – I: Base band data transmission

Digital Modulation techniques: BPSK, QPSK, DPSK, QASK, BFSK, MSK, M-ary techniques. Base band binary data transmission system – Inter symbol interference – Nyquist pulse shaping criteria – line coding, pulse shaping, and scrambling techniques. Detection of error probability: Gaussian probability function – properties – error function complementary – error function.

Unit – II: Codes for error detection and correction

Parity check coding, Linear block codes, Cyclic codes, Convolutional codes. Encoding, Decoding of convolutional codes, State, Tree and Trellis diagrams. Maximum likelihood – Viterby algorithm, Sequential decoding Burst error correction - Interleaving techniques – Block and convolutional interleaving, Types of ARQ, Performance of ARQ. Comparison of coded and uncoded system.

Unit – III: Introduction to wireless communication

Global system for mobile (GSM): cellular concept, system design. Transmission system, Receiving system; frequency re-use; channel interference and system capacity. wireless networking: 1G, 2G, 3G wireless networks, traffic routing: wireless data service.

Unit – IV :Spread Spectrum Modulation

Introduction, Spread spectrum modulation; modulation performance in fading and multipath channel; multiple access techniques as applied to wireless communications.

Books for study:

1.B.P. Lathi, Modern Digital and Analog communication system, Oxford 3rd edition, 2018.

2. Bernard Sklar, Digital Communications Fundamentals and Applications, Pearson Education, 2009.
3. Wayne Tomoasi, Electronic communication Systems, Pearson Education, 2014.
4. Jochen H. Schiller, Mobile Communications, Pearson Education, 2010.
5. William C. Y. Lee,Wireless and Cellular Communications, McGraw-Hill, 2009.
6. Ramjee Prasad, OFDM for Wireless Communications Systems, Artech House, Universal Personal Communications, 2004.

ELE-201	AdvancedMicroprocessorsand Microcomputers	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevel Electronics

Course Objectives: **The aim and objective of the course on AdvancedMicroprocessorsand Microcomputers**is to familiarize thestudents of M.Sc. class to the basic aspects of microprocessors and different programming and interfacing techniques.

CourseOutcomes: Attheend ofthecourse,the studentwill be able to

CO1	Understanding of microprocessor architecture and evaluation
CO2	Develop skill of writing programs in ALP for various applications of 8086 Microprocessor
CO3	Interface various peripherals with 8086.
CO4	Understanding interrupts and direct memory access

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	-	-
CO2	3	3	-	2	2	1	1	-	-	2	2	-
CO3	3	3	2	1	2	1	1	-	-	2	-	-
CO4	3	3	1	-	2	1	1	-	1	2	2	-

ELE-201: ADVANCED MICROPROCESSORS AND MICROCOMPUTERS

UNIT – I: Microprocessors and its Architecture

Internal 8086 microprocessor architecture, Real mode and protected modes of memory addressing, Memory paging.

Addressing modes- Data addressing modes, program memory-addressing modes, Stack-memory addressing modes.

Instruction Set- Data movement instructions, Arithmetic and logic instructions, Program control instructions, Assembler details.

UNIT – II: Programming the Microprocessor

Modular programming, using the keyboard and video display, Data conversions.

Hardware Specifications- Pin-outs and the pin functions, clock-generator (8284A), Bus buffering and latching, Bus timing, Ready and Wait state, Minimum mode versus maximum mode.

UNIT – III: Memory Interface

Memory devices, Address decoding, 8088 and 80188 (8-bit) memory interface, 8086, 80186, 80286 and 80386 (16-bit) memory interface.

Basic I/O Interface- Introduction to I/O interface, I/O port address decoding, 8255, 8279, 8254, ADC and DAC (excluding multiplexed display & keyboard display using 8255).

UNIT – IV: Interrupts

Basic interrupt processing, Hardware interrupts, expanding the interrupt structure, 8259A PIC.

Direct Memory Access- Basic DMA operation, 8237 DMA controller.

Bus Interface- PCI bus, **Advanced Microprocessors-** 80186, 80188 and 80286 Microprocessors;

Books for study:

1. B.B. Brey, “The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium pro processor architecture, programming, and interfacing”, 4/e, PHI, 1999.
2. Douglas V.Hall, “Microprocessors and Interfacing, Programming and Hardware”, 2/e, McGraw Hill International Edition, 1992.
3. Muhammad Ali Mazidi and Janice GillispieMazidi, “The 80x86 IBMPC and Compatible Computers (Volumes I & II)”, 2/e, Prentice-Hall, Inc., 1998.
4. Walter A. Triebel and Avatar Singh, “Software, Hardware and Applications”, PHI, 1995.
5. Yu Cheng Lin and Glenn A. Gibson, “Microcomputer systems: The 8086/8088 Family Architecture, Programming and Design”, PHI, 1992.
6. K.J. Ayala, “The 8086 Microprocessor: Programming & Interfacing the PC”, Penram International Publishing (India) Pvt. Ltd.,1995.
7. K.M. Bhurachandi and A.K. Ray, Advanced Microprocessors and Peripherals ,McGraw Hill, 2017.

ELE- 202	Digital Communications	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingofgraduatelevel electronics

Course Objectives: The aim and objective of the course on Digital Communications is to expose the M.Sc. students to the basics of the Digital Modulation Techniques, Information theory and coding, Spread Spectrum modulation.

CourseOutcomes: At theend ofthe course, thestudent will be ableto

CO1	Understandthe electro statistics and magneto statistics and also the properties of propagation of electromagnetic radiation in different media
CO2	Know about the properties of laser beam and the working of different lasers and applications
CO3	Describe the fourier analysis in optics problems and to understand the concept of holography
CO4	Analyze the propagation of light in optical fibers and to know the various applications of optical fibers

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	2	1	1	-	**1**	1	**-**	-
CO2	3	2	2	1	2	1	-	-	**1**	1	**-**	-
CO3	3	3	3	-	2	1	2	-	**1**	1	-	-
CO4	3	2	3	2	3	-	2	-	**1**	1	-	-

ELE-202 DIGITAL COMMUNICATIONS

UNIT – I: Random Variables and Processes

Probability, Random variables, Cdf, Pdf, Relation between probability and probability density, Average value and variance of a random variable, The Gaussian Probability density, The error function, Mean and Variance of the sum of the random variables, Correlation between random variables, Central Limit theorem, Error probability, Random processes, Autocorrelation, The complementary Error Function.

UNIT-II: Digital -Modulation Techniques

BPSK, DPSK, QPSK, M-ary PSK, QASK, BFSK, M-ary FSK, MSK, Baseband signal receiver, Matched filter and probability of error, Coherent reception, Correlation, PSK, FSK, Non-coherent detection of FSK, Differential PSK, QPSK.

UNIT – III: Information Theory and Coding

Discrete messages, The concept of amount of information, Average information, Entropy, Information rate, Coding to increase average information per bit, Shannon's theorem, Capacity of a Gaussian channel, Efficiency of Orthogonal Signal transmission, Coding, Parity check bit coding for error detection, Coding for error detection and correction, Block codes, Block codes- coding and decoding, Convolutional Coding, Decode a Convolutional code, Probability of error of Convolutional codes.

UNIT – IV: Spread-spectrum modulation

Spread-spectrum overview, Pseudo-Noise sequences, Direct-sequence spread-spectrum systems, Frequency Hopping Systems, Synchronization.

Encryption and Decryption- Models, Goals, and Early Cipher Systems, The Secrecy of a Cipher System, Practical Security, Stream Encryption, Public Key Cryptosystems.

Books for study:

1. Taub and Schilling, “Principles of Communication Systems”, 2/e, TMH, 1991. (UNITs I-III)
2. Bernard Sklar, “Digital Communications: Fundamentals and Applications”, 2/e, Pearson Education, Inc., 2001 (UNIT - IV).
3. Simon Haykin, “Communication Systems”, 3/e, John Wiley & Sons (Asia) Pte. Ltd., 1994.
4. Harold Kolimbiris, “Digital Communications Systems”, Pearson Education, Inc., 2000.
5. K. Sam Shanmugam, “Digital and Analog Communications Systems”, John Wiley & Sons (Asia) Pte. Ltd., 2000.
6. Gary M. Miller and Jeffrey S. Beasley, “Modern Electronic Communication”, 7/e, PHI, 2003.

ELE-203(a)	Semiconductor Materials and devices	L-5,T-1,P-0	4Credits

Pre-requisite: Courseon semiconductor materials

CourseObjectives: Theaimandobjectiveofthecourseon**Semiconductor Materials and devices**is to expose the students of M.Sc. to experimental aspectsofdifferent semiconductor devise technologies, characterization and fabrication.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understandvariousexperimentaltechniquesforsemiconductor junctions and interfaces, I-V characteristics to understand the function of devices.
CO2	To understand the function of Solid State Microwave devices.
CO3	To understand the various Power semiconductor devices and their applications
CO4	To get familiarization with Optoelectronic Devices and their properties.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	2	-	1	1	1	-
CO2	3	2	1	3	2	1	-	-	1	1	-	1
CO3	3	2	1	2	3	2	1	-	2	2	-	-
CO4	3	2	1	3	3	1	1	-	-	2	2	2

ELE-203(a) SEMICONDUCTOR MATERIALS AND DEVICES

UNIT-I: Semiconductor Devices

Principle of operation, Fabrication methods and doping profiles, Analysis of the ideal diffusion transistor, Real transistors, Static I-V characteristics, Charge control equations, The diffusion transistor at high frequencies, the drift transistor, high frequency performance.

Junction and MOS Field Effect Transistors- Principle of operation, Static I-V characteristics of the idealized model, JFET structures, Semiconductor surfaces, C-V characteristics of the MOS capacitor, the Si-SiO_2 system, Basic structures and the operating principle of MOSFET, Current-Voltage characteristics.

UNIT-II: Solid State Microwave Devices

Varactor diodes, PIN diodes, Tunnel diodes, Transferred Electron Devices (TEDs) – GUNN diode, Avalanche Transit Time Devices – IMPATT diode, TRAPATT diode, BARITT diodes.

UNIT-III: Power Semiconductor Devices

Schockley diode, Thyristor, Light Activated Silicon Controlled Rectifier (LACSR), Silicon Controlled Switch, GTO, IGBT, MCT, ETO, RCT, DIAC, TRIAC.

UNIT-IV: Optoelectronic Devices

Solar Cells – Photovoltaic effect, GaAs solar cells, Thin film solar cells, Photo detectors, Photo diode, Avalanche photo diode, LEDs, LED materials and their structures, Semiconductor Lasers – p-n junction laser, Hetero junction laser, Laser diode materials, fabrication and structures.

Books for study:

1. M.S. Tyagi, “Introduction to Semiconductor Materials and Devices”, John Wiley & Sons (Asia) Pte. Ltd., 2000. (UNIT-I& UNIT-IV)
2. M. Kulkarni, “Microwave and Radar Engineering”, Umesh Publications, 3/e, 2003. (UNIT – II)
3. Alok Jain, “Power Electronics and Its Applications”, Penram International Publishing (India) Pvt. Ltd., 2002. (UNIT-III)
4. Samuel Y. Liao, “Microwave Devices and Circuits”, 3/e, PHI, 1998.
5. Ben G. Streetman and Sanjay Banerjee, “Solid State Electronic Devices”, Pearson Education, Inc., 2000.
6. S.M. Sze, “Physics of Semiconductor Devices”, 2/e, John Wiley & Sons (Asia) Pte. Ltd., 2004.
7. Jasprit Singh, “Semiconductor Devices: Basic Principles” John Wiley & Sons (Asia) Pte. Ltd., 2004.

ELE-203(b)	SensorsandTransducers	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingofgraduatelevel electronics/physics

CourseObjectives: Theaimandobjectiveofthecourseon**SensorsandTransducers** istofamiliarize the students of M.Sc. with the various electronic sensors used in the industry and to understand the working principles of the sensors so that they can design and use them in industry or in real time applications.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Applybasicsknowledgeofsensors and transducersinunderstanding the measurement systems.
CO2	Study and understanding of various types of Displacement and Strain Transducers
CO3	Study and understanding of various types of Pressure transducers
CO4	Study and understanding of Opto -Electronic Transducers

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	1	1
CO2	3	3	3	1	2	1	1	-	-	-	1	1
CO3	3	3	3	2	2	1	1	-	-	-	1	1
CO4	3	3	3	3	2	2	2	-	2	-	1	1

ELE- 203(b) SENSORS AND TRANSDUCERS

UNIT-I

Definition of a transducer/sensor, Role of a transducer in a generalized measurement system, Classification of transducers, Characteristics of transducers. Significant parameters of a transducer.

Temperature sensors: Temperature scales, Mechanical temperature sensors, Resistance type temperature sensors,Platinum resistance thermometer, Thermisters, Thermocouples.,Solid state sensors, Quartz thermometer, Radiation type sensors - Optical pyrometers, Calibration of thermometers

UNIT-II

Displacement and Strain Transducers: Displacement transducers - Variable resistance, inductance and capacitance. Linear voltage differential Transformer (LVDT) Strain -Definition, Principle of working of strain gauges, Gauge factor, Types of strain gauges, Materials for strain gauges. Temperature compensation.

UNIT-III

Pressure transducers: Manometers, Elastic transducers - Diaphragms, Bellows, Bourdon or helical tubes, Electrical pressure transducers - Variable resistance, inductance and capacitance. Piezoelectric pressure transducer, Vibrating element pressure sensors, Pressure calibration.

UNIT-IV

Opto -Electronic Transducers: Photoemission tube, Photomultiplier tube, Photoconductive cell, Photovoltaic cell (solar cell). Photodiode, Photo-transistor, Photo FET, Light emitting diode, Liquid crystal display, Optoelectronic couplers. Laser diode

Books for study:

1. B.C. Nakra and K.K. Chaudary, Instrumentation Measurement Analysis, Mc Graw Hill, 3/e.
2. C. **Rangan**,. G **Sarma**,. V.S.V. **Mani**, Instrumentation - Devices and Systems, TMH, New Delhi 2017.
3. A.K, Sawhney, A course in Electrical and Electronic Measurements and Instrumentation, DhanpatRai Publishers, 2012.
4. Willard, Merritt, Dean and Settle,Instrumental Methods of Analysis,CBS Publishers & Distributors, 2004.

ELE-203(c)	**Atmospheric and space instrumentation techniques**	**L-3,T-1,P-2**	**4Credits**

Pre-requisite: Understandingof graduatelevel electronics/physics

Course Objectives: The aim and objective of the course on**Atmospheric and space instrumentation techniques**is to familiarize thestudents of M.Sc. class to the basic aspects of atmospheric instrumentation techniques and their use for measurement of atmospheric parameters.

CourseOutcomes: Attheend ofthecourse,the studentwill be able to

CO1	Understanding of Dynamics atmospheric structure
CO2	Understand the various elements in the atmosphere.
CO3	Understanding of various Ground Based Instruments for the Measurement of atmospheric elements.
CO4	Enrich the measurement techniques such as Radars.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	-	-
CO2	3	3	-	2	2	1	1	-	-	2	2	-
CO3	3	3	2	1	2	1	1	-	-	2	-	-
CO4	3	3	1	-	2	1	1	-	1	2	2	-

ELE-203 (c) ATMOSPHERIC AND SPACE INSTRUMENTATION TECHNIQUES

UNIT – I

Evolution of the planetary Atmosphere, Structure, Composition, Chemistry and Dynamics of the earth's atmosphere.

UNIT – II

Automatic weather station, temperature, humidity, radiation and wind measurements, lightning detector. Measurements of aerosols and trace gases: microtops, aerosol sample collection, ion chromatography,0_3,CO,NO_x and SO_2 measurements, CH4 measurements with Flame lonisation Detector.

UNIT – III

Ground Based Instruments for the Measurement of Temperature, Pressure, Humidity, Wind Speed & Direction, Rainfall Rate Ground Based (Remote Sensing type) – Meteorological Radars, Clear Air Radars, Lidar&Sodar –Air Bone Instruments- Radiosonde,RawinSonde, Rocket Sonde –Satellite Instrumentation (Space Borne Instrument).

UNIT – IV

Radar Meteorology: Basic Meteorology – Radar – Principles and Technology – Propagation Scattering and Attenuation of Microwaves in the lower Atmosphere –Weather Radar Signal Processing and Display – Phenomena Observed by Weather Radar – Operational Weather Radar –Observation of Precipitating Systems – Estimation of Precipitation.

Books for study:

1.WMO: Guide to Instruments and Methods of Observation, WMO No 8,2018

2. Heard D: Analytical Techniques for Atmospheric Measurement, 1st edition,2006

3. Paratap R: Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers, 2010

4. https://www.wmo.int/pages/prog/www/IMOP/CIMO -Guide.html

ELE-204(a)	**Control Systems**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite:Understandingofgraduatelevel electronics

Course Objectives: The aim and objective of the course on **Control Systems**is to equiptheM.Sc.Studentswiththe signals for controlling the systems in real life.

CourseOutcomes: At theend ofthecourse,the studentwillable to

CO1	Understand the basics and applications of**open loop and closed loop ,Mathematical modelling of dynamic systems**.
CO2	Know the *Transient and steady-state response analyses*in control systems.
CO3	Understanding of Root Locus analysis.
CO4	Design the control systems using frequency response.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	1	1
CO2	3	3	2	2	-1	-	1	-	2	-	1	-
CO3	3	3	2	-	1	1	1-	-	2	-	1	-
CO4	3	3	2	2	2	1	1	-	2	-	1	2

ELE-204(a) CONTROL SYSTEMS

UNIT – I: Introduction to Control Systems

Examples of Control Systems, Closed-loop control versus Open-loop control.

Mathematical modeling of dynamic systems- Transfer function and impulse-response function, automatic control systems, modeling in state space, State-space representation of dynamic systems, Electrical and Electronic systems, Signal flow graphs.

UNIT – II: Transient and steady-state response analyses

First-order and second-order systems, Routhe's stability criterion, Effects of Integral and derivative control actions on system performance, Steady-state errors in unity-feedback control systems.

UNIT – III: Root-Locus analysis

Root-Locus plots, General rules for constructing Root Loci, Positive-feedback Systems.

Control systems design by the Root-Locus method- Preliminary design considerations, Lead and Lag compensations, Lag-Lead compensation.

Frequency–Response analysis- Bode diagrams, Polar plots, Log-Magnitude-versus-Phase plots, Nyquist stability criterion, Stability analysis, Relative stability.

UNIT –I V: Control System Design by Frequency Response

Lead compensation, Lag Compensation, Lead-Lag Compensation.

PID Controls- Tuning rules for PID controllers, Modifications of PID control schemes, Two degrees of freedom control, Zero placement approach to improve Response characteristics.

Books for study:

1. K. Ogata, "Modern Control Engineering", 4/e, PHI, 2003.
2. D. Roy Choudhury, "Modern Control Engineering", PHI, 2005.
3. B.C. Kuo, "Automatic Control Systems", 7/e, PHI, 1995.
4. I J Nagrath, and Dr. M Gopal, Control Systems, New Age International (P) Ltd., Publishers 2008.

ELE-204(b)	**Bio-Medical Instrumentation**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite:Understandingofgraduatelevel electronics

Course Objectives: The aim and objective of the course on Bio-Medical Instrumentation is to equiptheM.Sc.StudentswiththeBio Signal Acquisition and Recording, Physiological Assist Devices, Bio Telemetry, advanced bio-medical instruments.

CourseOutcomes: At theend ofthecourse,the studentwillable to

CO1	Understanding of Bio-signal analysis and recording.
CO2	**Understanding of Physiological Assist Devices such as** Pacemakers, Defibrillators, Nerve and Muscle Stimulators, Heart Lung Machine, Kidney Machine and **Special Equipment**.
CO3	Use of Biotelemetry and **Operation Theatre Equipment**
CO4	Understanding of safety and **Advanced Biomedical Instrumentation techniques.**

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	2	1	-	-
CO2	3	3	2	2	2	1	1	-	2	1	-	-
CO3	3	3	2	2	2	1	1	-	2	1	-	-
CO4	3	3	2	2	2	1	1	-	2	1	-	-

ELE-204(b) BIO-MEDICAL INSTRUMENTATION

UNIT-I

Human Physiological Systems, Bio Potentials and Electrodes: Introduction, Cells and their Structure, Transport of ions Through Cell Membrane, Resting and Action Potentials, Bioelectric Potentials, Physiological Systems of Human Body, Electrodes Biomedical Instrumentation System.

Bio Signal Acquisition and Recording:Physiological Signal Amplifiers, Isolation Amplifiers, Pre Amplifiers, Line Driving Amplifiers, Characteristics of Recording System, Electrocardiography (ECG), Electroencephalography (EEG), Electromyography (EMG), Electro- Retinography (ERG), Electro Oculography (EOG), Accuracy in Recording

UNIT - II

Physiological Assist Devices: Introduction, Pacemakers, Defibrillators, Nerve and Muscle Stimulators, Heart Lung Machine, Kidney Machine.

Special Equipment: Blood Cell Counter, Audiometer, Digital Thermometer, X Ray. Machine, Radiography and Fluoroscopy, Image Intensifies, Angiography.

UNIT - III

Bio Telemetry: Elements of Biotelemetry Systems, Design of aBiotelemetry System, Radio telemetry System, Uses of Biotelemetry.

Operation Theatre Equipment: Introduction, Surgical Diathermy Ventillators, Anaesthesia Machine, Cardiac Output Measurement, Pulmonary Function Analyzer, Oxymeters.

UNIT-IV

Safety Instrumentation:Radiation Safety Instrumentation: Dosimeters, Radiation Alarm, Physiological Effects due to 50 Hz Frequency, Micro Shock and Macro Shock, Hospital Architecture.

Advanced Biomedical Instrumentation: Lasers in Biomedical Instrumentation, Endoscopes, Cryogenic Surgery, Computer Tomography Scanner (CT), Applications, Thermography, Applications, Ultrasonic Image Forming Systems, Applications, Magnetic Resonance Imaging (MRI), PositronEmission Tomography.

Books for study:

1. Biomedical Instrumentation and Measurement by Harry E. Thomas
2. Hand book of Biomedical Instrumentation by R.S. Khandpur
3. Biomedical Instrumentation & Measurements by Leslie Cromwell, Fred J. Waibell, Erich A.Pfeiffer
4. Hand Book of Bio medical Engineering by Jacob Klime
5. Bio Medical Electronics by Joseph Duboy
6. Transducers for Bio medical Measurements by Richards SC Cobbold
7. Bio medical Instrumentation by M. Arumugam
8. Biomedical Instruments, Theory and Practice by Welkowitz and Dentsch
9. Biological Engineering by Schwan
10. Biomedical Engineering systems by Clines and Mulism

ELE-204(c)	Data Mining and Information Security	L-5,T-1,P-0	4Credits

Pre-requisite: Courseonelectronics/Statistics

CourseObjectives: Theaimandobjectiveofthecourseon Data Mining and Information Security is to expose the students of M.Sc. students to theoretical and experimental aspectsof Data mining and analysis, network security, Cryptographytechniques.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understand Data warehousing components
CO2	Understanding of Data mining metrics, data mining tasks, and exploratory Data Analysis.
CO3	KnowledgeabouttheSecurity Trendsand different algorithms.
CO4	Applytheknowledgeof Cryptographytechniquesfor Digital Signatures and Authentication Protocols.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	-	-	-	-	1	1	-
CO2	3	2	2	3	2	-	-	-	1	-	1	-
CO3	3	2	1	2	3	-	1	-	2	2	-	-
CO4	3	2	1	3	3	1	1	-	2	-	2	-

ELE-204(c): DATA MINING AND INFORMATION SECURITY

UNIT-I

Data warehousing components: Introduction, Access tools, Data Marts, Data Mining data warehousing, Industry, Methodology. Classical Techniques, Statistics, Neighborhoods, clustering, The classics, Nearest Neighbor, Tree Network and Rules, Neural Network – Rule Induction.

UNIT-II

Basic Data Mining Taks, classification, regression, time series analysis, prediction, clustering, summarization, association rules, sequence discovery. Data mining versus knowledge discovery in data bases. The development of data mining issues. Data mining metrics, social implications of data mining, data mining from a data base perspective. Exploratory Data Analysis.

UNIT-III

Security Trends-The OSI architecture-Security Attacks-Security Services –Security Mechanisms- A Model for Network Security Classical Encryption Techniques,Symmetric Cipher Model, Substitution Techniques Transportation Techniques, Rotor Machines –Steganography. Public-Key Encryption and Hash Functions Introduction to Number TheoryPrime Numbers – Fermat's and Euler's Theorems, Testing for Primality – The Chinese Remainder Theorem, Discrete Logarithms.

UNIT-IV

Public-key Cryptography and RSA: Principles of Public-Key Cryptosystems, The RSA Algorithm, Digital Signatures and Authentication Protocols**:** Digital Signatures, Authentication Protocols-Digital Signature Standard Authentication Applications **:**Kerberos-X.509 Authentication Service, Public Key Infrastructure .

Books for study:

1. Margaret H. Dunham, Data Mining – Introductory and Advanced Topics, Pearson Education, 2006.
2. John W Tuekey), Exploratory Data Analysis, Addison-Wesley, 1997.
3. Edward R. Tufte, Visual Display of Quantitative Information, Graphics Press USA, 2001.
4. William Stallings, Cryptography and Network Security: Principles and Practices,7/e, Pearson Education, 2017.

ELE-301	Digital Signal Processing	L-5,T-1,P-0	4Credits

Pre-requisite: Basicknowledgeof Signals

Course Objectives: The aim and objective of the course on **Digital Signal Processing**is to introducethe students of M.Sc. class to the formal structure of the subject and to equip them with thetechniques of Sampling of Continuous-Time signals, Structures for Discrete-time systems,Discrete Fourier Transform,Architecture of TMS320C5X processorso thattheycan usethesein various branches of Electronics as per their requirement.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understandtheneedfor Sampling of Continuous-Time signals anditsbasicprinciples.
CO2	Understand the need of Structures for Discrete-time systems
CO3	Understandthe need of Discrete Fourier Transform methods in solving problems
CO4	Understanding the Architecture of TMS320C5X processor, assembly language instructions and its importance.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	2	1	-	2	1	-	-
CO2	3	2	2	2	2	2	1	-	-	2	2	-
CO3	3	2	2	2	2	2	1	-	-	-	-	-
CO4	3	2	2	2	2	2	2	-	2	2	-	1

ELE-301: DIGITAL SIGNAL PROCESSING

UNIT – I: Sampling of Continuous-Time signals

Periodic sampling, Frequency-domain representation of sampling, Reconstruction of a band limited signal from its samples, Discrete-Time processing of continuous-time signals, Continuous-Time processing of discrete-time signals, Changing the sampling rate using discrete-time processing, Multirate signal processing, Digital processing of analog signals.

UNIT – II: Structures for Discrete-time systems

Block diagram representation of linear constant-coefficient difference equations, Signal flow graph representation of linear constant- coefficient difference equations, Basic structures for IIR systems, Basic network structures for FIR systems, Overview of finite-precision numerical effects, The effects of coefficient quantization.

Filter design techniques- Design of discrete-time IIR filters from Continuous-time filters, Design of FIR filters by windowing, Examples of FIR filter design by the Kaiser Window method, Optimum approximations of FIR filters.

UNIT – III: The Discrete Fourier Transform

Representation of periodic sequences: the discrete Fourier series, The Fourier transform of periodic signals, Sampling the Fourier transform, Fourier representation of Finite-domain sequences: The discrete Fourier transform, Linear convolution using the discrete Fourier transform.

Computation of the Discrete Fourier Transform- Efficient computation of the discrete Fourier transform, The Goertzed Algorithm, Decimation-in-time FFT algorithms, Decimation-in-frequency FFT algorithms, Practical considerations, The Chirp Transform algorithm.

UNIT – IV: Architecture of TMS320C5X

Bus structure, Central Arithmetic Logic Unit(CALU), Auxiliary Register ALU, Index Register, Auxiliary Register Compare Register, Block Move Address Register, Block Repeat Registers, Parallel Logic Unit, Memory-Mapped Registers, Program Controllers.

TMS320C5X Assembly Language Instructions- Assembly Language Syntax, Addressing modes, Load/Store instructions, Addition/Subtraction instructions, Move instructions, Multiplication instructions, The NORM instruction, Program control instructions, Peripheral control.

Books for study:

1. Alan V. Oppenheim, Ronald W. Shafer and John R. Buck, “Discrete-Time Signal Processing”, 2/e, Pearson Education, Inc., 2000. (UNIT- I to UNIT-III)
2. B. Venkataramani and M. Bhaskar, “Digital Signal Processors: Architecture, Programming and Applications”, TMH, 2002. (UNIT-IV)
3. Sanjit K. Mitra, “Digital Signal Processing: A Computer Based Approach”, TMH, 1998.
4. Johnny R. Johnson, “Introduction to Digital Signal Processing”, PHI, 2000.
5. John G. Proakis, Dimitris G. Manolakis, “Digital Signal Processing, Principles, Algorithms and Applications” 3/e, PHI, 2000.
6. Boaz Porat, “A Course in Digital Signal Processing”, John Wiley & Sons (Asia) Pte. Ltd., 1997.
7. D.J. Defatta, J.G. Luca and W.S. Hodgkiss, “Digital Signal Processing: A System Design Approach”, John Wiley & Sons (Asia) Pte. Ltd., 1995.
8. Texas Instruments TMS 320C5X User’s Guide, 1997.
9. P. Ramesh Babu, Digital Signal Processing,6/e, Scitech Publications (India) Pvt Ltd , 2015.
10. A.NagurKani, Digital Signal Processing, 2/e, Tata McGraw-Hill Education India, 2012.

ELE -302	Digital system design – VHDL	L-5,T-1,P-0	4Credits

Pre-requisite: Courseon graduate level electronics

CourseObjectives: Theaimandobjectiveofthecourseon Digital System Design – VHDL is to expose the students of M.Sc. to experimental aspectsofVerlog Hardware Descriptive language and Model simulation.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understandvarious**Basic Language Elements**and model analysis.
CO2	Understand Data flow and structural modeling.
CO3	Apply the knowledge **Subprograms, Overloading, Packages and Libraries**for various applications
CO4	To get familiarization with Advanced features for Model simulation

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	2	-	1	1	1	-
CO2	3	2	1	3	2	1	-	-	1	1	-	1
CO3	3	2	1	2	3	2	1	-	2	2	-	-
CO4	3	2	1	3	3	1	1	-	-	2	2	2

ELE-302: DIGITAL SYSTEM DESIGN – VHDL

UNIT – I

Basic terminology, Entity declaration, Architecture body, Configuration declaration, Package declaration, Package body, Model analysis, Simulation.

Basic Language Elements- Identifiers, Data objects, Data types, Operators.Entity declaration, Architecture body, Process statement, Variable assignment statement, Signal assignment statement, Wait statement, If statement, Case statement, Null statement, Loop statement, Exit statement, Next statement, Assertion statement, Report statement, other sequential statements, Multiple processes, Postponed processes.

UNIT –II: Data Flow Modelling

Concurrent signal assignment statement, Concurrent versus sequential signal assignment, Delta delay revisited, Multiple drivers, Conditional signal assignment statement, selected signal assignment statement, The unaffected value block statement, concurrent assertion statement, Value of a signal.

Structural Modeling- Component declaration, Component instantiation, Resolving signal values.

UNIT – III

Generics, Configuration specification, Configuration declaration, Default binding rules, Conversion functions, Direct instantiation, Incremental binding.

Subprograms and Overloading- Subprograms - Subprogram overloading, Operator overloading, Signatures, Default values for parameters.

Packages and Libraries- Package declaration, Package body, Design file, Order of analysis, Implicit visibility, Explicit visibility.

UNIT – IV: Advanced Features

Entity statements, Generate statements, Aliases, Qualified expressions, Type conversions, Guarded signals, Attributes, Aggregate targets, More on block statements, Shared variables, Groups, More on ports.

Model Simulation- Simulation – Writing a Test Bench, Dumping results into a text file – Reading vectors from a text file – A test bench example – Initializing a memory.

Book s for study:

1. J. Bhasker, “VHDL primer”, 3/e, Addison Wesley Longman (Singapore) Pte.Ltd., 2000.
2. ZainalabedinNavabi, “VHDL– Analysis and Modeling of Digital Systems”, McGraw-Hill International Editions, 1998.
3. Joseph Pick,“VHDL – Techniques, Experiments, and Caveats”, McGraw-Hill International, 96.
4. John P. Uyemura, “Introduction to VLSI circuits and Systems”, John Wiley & Sons (Asia) Pte. Ltd., 2003.

ELE-303(a)	Microcontrollers and Applications	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevel basic processors

Course Objectives: The aim and objective of the course on Microcontrollers and Applications forthestudentsofM.Sc. electronics istoequipthemwiththeknowledgeof microcontrollers and other processors used in the industry.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	Understand about the basic functions and structure of Microcontrollers such as 8051.
CO2	Get familiarized with 8051 controllers
CO3	understand about the basic Atmel microcontrollers and programming
CO4	Understanding of PIC 16F8XXflash microcontrollers and their interfacing with I/O devices for industrial applications

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	-	-	2	1	1	-
CO2	3	2	3	3	2	1	2	-	2	-	1	-
CO3	3	2	3	3	2	-	-	-	2	1	1	-
CO4	3	2	3	3	2	1	2	-	2	1	1	-

ELE-303(a) MICROCONTROLLERS AND APPLICATIONS

UNIT - I :**Introduction to Microcontrollers**

Microcontrollers and Microprocessors, Embedded versus External Memory Devices, 8-bit and 16-bit Microcontrollers, CISC & RISC processors.

8051 Microcontrollers– MCS-51 architecture, Registers in MCS-51, 8051 pin description, pin connections, Parallel I/O ports and Memory organization.

UNIT – II: 8051 addressing modes, instructions and programming

8051 addressing modes, Instruction Set, Assembly language Programming tools, Development Systems and Tools.

MCS—51 Interrupts, Timer/Counters, and Serial communications- Interrupts in MCS-51, Timers and Counters, Serial Communication.

UNIT - III :**Design with Atmel Microcontrollers**

Atmel Microcontrollers, Architectural overview of Atmel 89C51 and Atmel 89C2051, Pin description of 89C51, and 89C2051, Using Flash Memory devices ATMEL 89CXX and 89C20XX, Power saving options.

Applications- Waveform generation- Sine, Square, Pulse, Ramp, Staircase, Pulse Width Measurement, Frequency Counter.

UNIT – IV: **PIC 16F8XX Flash Microcontrollers**

Pin diagram of 16F8XX, STATUS Register, OPTION_REG Register, Power Control Register, PIC 16F8XX program memory, data memory, Data EEPROM and Flash Program EEPROM, Interrupts in 16F877, I/O ports and Timers.

Interfacing and Industrial Applications of Microcontrollers- Interfacing of Keyboard, 7-segment LED, LCD, ADC, and DAC, Optical Rotary shaft encoder, LVDT, Angular speed measurement, Digital thermometer, load cell.

Books for Study:

1. Ajay V. Deshmukh, “Microcontrollers: Theory and Applications”, Tata Mc Graw-Hill, New Delhi, 2005.
2. M.A. Mazidi and J.G. Mazidi, “The 8051 Microcontrollers and Embedded Systems”, Pearson Education, Inc., 2002.
3. K.J. Ayala, “The 8051 Microcontroller Architecture, Programming & Applications”, 2/e, Penram International Publishing (India) Pvt. Ltd.,1996.
4. John B. Peatman, “Designing with PIC Microcontrollers”, Pearson Education, Inc., 1998.
5. MykePredko, “Programming and Customizing the 8051 Microcontroller”, TMH, 1999.
6. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, Pearson Education, 2009.

ELE-303(b)	Computer Organization	L-5,T-1,P-0	4Credits

Pre-requisite: Understandingof graduatelevelElectronics/Computer Science

Course Objectives: The aim and objective of the course on **Computer Organization**forthestudentsofM.Sc. Electronics istoequipthemwiththeknowledgeof Basic Structure of Computers, Mircrooperations and Pipeline Processing.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	Understand basics of structures of Computers.
CO2	Know Register Transfer language and micro operations
CO3	Understand Microprogrammed control, Computer Arithmetic and Memory system.
CO4	Input-OutputOrganization, Pipeline and Vector Processing.

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	2	1	1	-	2	1	-	-
CO2	3	2	-	3	2	1	2	-	2	1	-	-
CO3	3	2	-	3	2	1	2	-	2	1	-	-
CO4	3	2	-	3	2	1	2	-	2	1	-	-

ELE-303(b): COMPUTER ORGANIZATION

UNIT-I

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation, Fixed Point Representation, Floating – Point Representation, Error Detection codes.

UNIT-II

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language, Register Transfer Bus and memory transfers, Arithmetic Mircrooperatiaons, logic micro operations, shift micro operations, Arithmetic logic shift unit, Instruction codes, Computer Registers, Computer instructions– Instruction cycle Memory – Reference Instructions, Input – Output and Interrupt. STACK organization. Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction set computer.

UNIT –III

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, microprogram example, design of control unit, Hard wired control, Microprogrammed control.

COMPUTER ARITHMETIC : Addition, subtraction, multiplication and Division Algorithms Floating – point Arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.

THE MEMORY SYSTEM : Basic concepts, semiconductor RAM memories, Read-only memories, Cache memories performance considerations, Virtual memories secondary storage, Introduction to RAID.

UNIT-IV

INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP) Serial communication; Introduction to peripheral component Interconnect (PCI) bus, Introduction to standard serial communication protocols like RS232, USB, IEEE1394.

PIPELINE AND VECTOR PROCESSING : Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Books for study:

1. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, 5/e, McGraw Hill.
2. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI.
3. Computer Organization and Architecture – William Stallings 6/e, Pearson/PHI.
4. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.
5. Fundamentals or Computer Organization and Design, – SivaraamaDandamudi, Springer Int.
6. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, 4/e, Elsevier
7. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

ELE-303(c)	Digital Image Processing	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevel electronics

Course Objectives: The aim and objective of the course on Digital Image Processingfor the studentsofM.Sc. Electronics is toequipthemwiththeknowledgeofimage processing systems and applications.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	understand about the Fundamentals of Image Processing
CO2	Get familiarized with Image enhancement.
CO3	Understand about the Image Segmentation and Feature Analysis.
CO4	Understand about the Multi Resolution Analysis and Compressions.

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	-	-	2	1	1	-
CO2	3	2	3	3	2	1	2	-	2	-	1	-
CO3	3	2	3	3	2	-	-	-	2	1	1	-
CO4	3	2	3	3	2	1	2	-	2	1	1	-

ELE-303(c): DIGITAL IMAGE PROCESSING

Unit-I: Fundamentals of Image Processing

Introduction – Steps in image processing systems – Image acquisition – Sampling and Quantization – Pixel relationships – Color fundamentals and models, File formats, Image operations – Arithmetic, Geometric and Morphological.

Unit-II: Image Enhancement

Spatial Domain: Gray level Transformations – Histogram processing – Spatial filtering smoothing and sharpening. Frequency Domain: Filtering in frequency domain – DFT, FFT, DCT – Smoothing and sharpening filters –Homomorphic Filtering.

Unit-III: Image Segmentation and Feature Analysis

Detection of Discontinuities – Edge operators – Edge linking and Boundary Detection – Thresholding – Region based segmentation – Morphological Watersheds – Motion Segmentation, Feature Analysis and Extraction.

Unit-IV: Multi Resolution Analysis and Compressions

Multi Resolution Analysis: Image Pyramids – Multi resolution expansion – Wavelet Transforms. Image compression: Fundamentals – Models – Elements of Information Theory – Error free compression – Lossy Compression –Compression Standards.

Applications of Image Processing:Image classification – Image recognition – Image understanding – Video motion analysis – Image fusion –Steganography – Digital compositing – Mosaics – Colour Image Processing.

Books for Study

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, 2nd Edition, Pearson Education, 2003.
2. Anil K. Jain, Fundamentals of Digital Image Processing, Pearson Education, 2003.
3. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis and Machine Vision, 2ndEdition, Thomson Learning, 2001

ELE-305	Peripheral interface controllers	L-2, T-0, P-0	4credits

Pre-requisite: Understandingof graduatelevel Electronics

Course Objectives: The aim and objective of the course on **Peripheral interface controllers**forthestudentsofM.Sc. Electronics istoequipthemwiththeknowledge PIC microcontrollers used in the industry.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	understand about the basics of **Assembler and Assembler Programs**
CO2	Get familiarized with PIC microcontrollers and interfacing I/O devices.

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	-	-	2	1	1	-
CO2	3	2	3	3	2	1	2	-	2	-	1	-

ELE-305: PERIPHERAL INTERFACE CONTROLLERS

Unit - I: Assembler and Assembler Programs

Basic idea – PIC 16 series instruction set and ALU – Assemblers and Assembler format – creating simple programs – Adopting a development environment – Building structured programs – Flow control: Branching and Subroutines – Generating time delays and intervals – Logical instruction – Arithmetic instructions.

Unit - II: PIC Microcontroller PIC 16F873A

Block diagram and CPU – Memory and memory maps – Interrupts – Oscillator, Reset and Power supply – Parallel ports.

PIC 16F87XA Timer 0 and Timer 1 – 16F87XA Timer 2, Comparator and PR2 register – capture/Compare/PWM (CCP) Module – Pulse width modulation – ADC module.

Interface: LED displays – Liquid crystal displays –Sensors –Actuators.

Books for Study

1. Designing Embedded Systems with PIC Microcontrollers: Principles and Applications by Tim Wilmshurst, First Edition, Newnes – ElsevierPublishers, 2007.

2.PIC Microcontroller and Embedded Systems by Muhammad Ali Mazidi, Rolind D. Mckinlayznd Danny Causey, Pearson Education, 2011.

ELE-306(a)	Microprocessors, PC hardware and interfacing	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingofgraduatelevelspectroscopy

Course Objectives: The aim and objective of the course on **Microprocessors, PC hardware and interfacing** forthestudentsofM.Sc. Electronics is toequipthemwiththeknowledgeofAtomic,Rotational,Vibrational,Raman, andElectronicspectra.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	Havethebasicknowledgeof8086 Based system design and peripheral interfaces
CO2	Understand the Motherboard of IBM PC
CO3	Understand with Peripherals
CO4	Understand about I/O Serial and Parallel ports.

Mappingof courseoutcomeswiththe program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	1	-	2	1	-	
CO2	3	2	3	3	2	1	2	-	2	1	1	-
CO3	3	2	3	3	2	1	2	-	2	1	-	-
CO4	3	2	-	3	2	1	2	-	2	1	-	-

ELE-306(a) MICROPROCESSORS, PC HARDWARE AND INTERFACING

UNIT-I: 8086 Based system design and peripheral interfaces

Pins and signals, Basic system components, interfacing memory, interfacing I/O devices, interfacing data converters, interfacing stepper motor, interrupts, direct memory access, parallel I/O methods, programmable peripheral interface (8255A), priority interrupt controller (8259A), direct memory access controller(8237), programmable interval timer (8254), serial I/O.

UNIT- II :The Motherboard of IBM PC

Motherboard Components, Microprocessor, Support Chips, Memory, Support Functions, I/O buses, System Resources, Interrupt Requests, DMA Channels, I/O Addresses, Utilization of System Resources, ROM BIOS Services, Drives: Principles of Magnetic Storage, Floppy Disk Drive, Hard Disk Drive, IDE Interface, CD – ROM Drive

UNIT- III :Peripherals

Video Display System: CRT Display, Video Adapter, Graphics Accelerators, LCD Monitor, Video Programming, Keyboard, Mouse, Printer, I/O Buses:ISA Bus, MCA bus, EISA Bus, Local Buses, VL Bus, PCI Bus, AGP.

UNIT-IV: PARALLEL AND SERIAL PORTS

Parallel Port: Standard Parallel port, IEEE1824 standard, Enhanced Parallel port, Enhanced Capabilities Port, Serial Port: Pins and Signals of Serial port, BIOS serial port services, UART, Universal Serial Bus: Features of USB, USB system, USB Transfer, USB controller.

Books for Study

1. Microprocessors, PC Hardware and Interfacing by N. Mathivanan, PHI.
2. B.B. Brey, “The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium pro processor architecture, programming, and interfacing”, 4/e, PHI, 1999.
3. Douglas V.Hall, “Microprocessors and Interfacing, Programming and Hardware”, 2/e, McGraw Hill International Edition, 1992.
4. Muhammad Ali Mazidi and Janice GillispieMazidi, “The 80x86 IBMPC and Compatible Computers (Volumes I & II)”, 2/e, Prentice-Hall, Inc., 1998.
5. Walter A. Triebel and Avatar Singh, “Software, Hardware and Applications”, PHI, 1995.
6. Yu Cheng Lin and Glenn A. Gibson, “Microcomputer systems: The 8086/8088 Family Architecture, Programming and Design”, PHI, 1992.

7. K.J. Ayala, “The 8086 Microprocessor: Programming & Interfacing the PC”, Penram International Publishing (India) Pvt. Ltd.,1995.

ELE-306(b)	Satellite Communications	L-5,T-1,P-0	4Credits

Pre-requisite: Graduate level Electronics

Course Objectives: The aim and objective of the course on Satellite Communicationsis tofamiliarize the students of M.Sc. to the various aspects related to**Satellite Communication**sothattheycanpursuethisemergingresearchfieldascareer.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understanding the basics of Satellite Communication
CO2	AcquireknowledgeofMultiple Access Techniques
CO3	Understand theSatellite Orbits and Inclination.
CO4	Understanding of Satellite systems, Indian satellites and applications

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	1	2	-	1	2	1	-
CO2	3	2	2	2	3	2	2	-	1	2	-	-
CO3	3	3	-	2	3	2	2	-	1	2	1	-
CO4	3	2	3	2	3	2	2	-	1	2	-	-

ELE-306(b) :SATELLITE COMMUNICATIONS

UNIT- I : Principles of Satellite Communication

Synchronous Satellites, International Regulation and Frequency CoordinationSatellite Frequency Allocations and Band Spectrum, General and Technical Characteristics of a Satellite Communication System Advantages of Satellite Communication, Advent of Digital Satellite Communication, Modem and Codec, General Link Design Equations, System Noise Temperature, C/N and G/T ratio, Atmospheric and Ionospheric Effects on Link Design, Uplink Design, Complete Link Design, Interference Effects on Complete Link Design, Earth Station Parameters.

UNIT- II: Multiple Access Techniques

Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Demand Assignment TDMA (DATDMA), Process Gain and Jam Margin, Direct Sequence Spread Spectrum Techniques, PN Sequency, DS –CDMA, Frequency Hopping Spread Spectrum Communication System (FM-SS), Frequency Hopping Spread Spectrum Code Division Multiple Access (FH-SS CDMA), Synchronization, Application of Spread Spectrum Techniques, Hybrid Systems

UNIT- III: Satellite Orbits and Inclination

Introduction, Synchronous Orbit, Orbital Parameters, Satellite Location With Respect to the Earth, Look Angles, Earth Coverage and Slant Range, Eclipse Effects, Satellite Placement in Geostationary Orbit, Station Keeping, Satellite Stabilization, Earth Station Design Requirement, Earth Station Subsystems, Monitoring and Control, Frequency Coordination, Small Earth Station, Very Small Aperture Terminals (VSATs), Mobile and Transport Earth Stations.

UNIT IV: Satellite systems, Indian satellites and applications

Types of satellite systems, Characteristics of satellite systems, Satellite system infrastructures, Call setup, INSAT satellites, IRS satellite program.

Introduction to Satellite Applications, Satellite Application–Different Areas, Satellite Television, Telephone Services via Satellite, Data Communication Services, Satellites for Earth Observation, Satellites for Weather Forecast, Satellites for Scientific Studies, Satellites for Military Applications.

Books for Study:

1. Dr. D.C. Agrawal “Satellite communications”, 5/e, Khanna Publishers, 2002. (UNIT-V)
2. Wayne Tomasi, “Electronic Communication Systems: Fundamentals through Advanced”, 4/e, Pearson Education, Inc., 2001.
3. M.Richharia, “Satellite Communications Systems”, 2/e, Macmillan Press Ltd., 1999.
4. Partt, Bostian and Allnutt, “Satellite Communications”, 2/e, John Wiley & Sons, 2003.
5. MonojitMitra, Satellite Communication, PHI, 2010.

ELE- 401	Advanced Communication Systems	L-5,T-1,P-0	4Credits

Pre-requisite: Preliminarycourseof Communication systems

CourseObjectives: Theaimandobjectiveofthecourseon**Advanced Communication Systems**is tointroduce the M.Sc. students to equip him/her with the Cellular Concept, Mobile Radio propagation and channel coding, Multiple Radio Access, Multiple Division Techniques, Optical and Satellite communications

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understand the Cellular concept.
CO2	Understand the Mobile Radio propagation and channel coding
CO3	Understand the Multiple Radio Access, Multiple Division Techniques, Channel Allocation.
CO4	Know theOptical, Satellite communications and their applications.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	1	1	1	-	2	1	2	-
CO2	3	2	3	-	1	1	1	-	2	1	2	-
CO3	3	2	2	2	1	1	1	-	2	1	2	-
CO4	3	3	2	2	1	1	1	-	2	1	2	-

ELE-401: ADVANCED COMMUNICATION SYSTEMS

UNIT – I : Cellular Concept

History of cellular systems, Characteristic and fundamentals of cellular systems, cellular system infrastructure, cell area, signal strength and cell parameters, capacity of a cell, frequency reuse, Co-channel interference, Cell splitting and sectoring.

UNIT – II: Mobile Radio propagation and channel coding

Types of radio waves, propagation mechanisms, Free-space propagation, Pathloss, Slow and Fast Fading, Doppler effect, Delay spread, Inter symbol interference, co-channel Interference, Coherence Bandwidth, Linear Block codes, Cyclic and Convolutional codes, Interleaves, Turbo codes, ARQ Techniques.

UNIT –III: Multiple Radio Access, Multiple Division Techniques, Channel Allocation

Multiple Radio Access Protocols, Contention-based protocols, Concepts and models of FDMA, TDMA, and CDMA, Modulation Techniques, Static versus Dynamic allocation, Fixed channel allocation schemes, Dynamic and other channel allocation schemes, Allocation in specialized system structure, Channel modeling, Modeling for handoff calls.

UNIT - IV :**Optical and Satellite communications**

History of optical fibers, Optical fibers versus Metallic cable Facilities, Electromagnetic spectrum, Optical fiber communications system block diagram, Fiber types, Light propagation, Propagation of light through an optical fiber, Optical fiber configurations, Acceptance angle and Acceptance cone, Losses in optical fiber cables, Optical fiber system link budget.

Satellite systems, Indian satellites and applications- Types of satellite systems, Characteristics of satellite systems, Satellite system infrastructures, Call setup, INSAT satellites, IRS satellite program, Satellite applications.

Books for Study:

1. Dharma PrakashAgrawal and Quing-An Zeng, “Introduction to wireless and Mobile Systems” Vikas Publishing House Pvt. Ltd., 2003.(UNIT–I to UNIT–III).
2. Wayne Tomasi, “Electronic Communication Systems: Fundamentals through Advanced”, 4/e, Pearson Education, Inc., 2001. (UNIT –IV)
3. Dr. D.C. Agrawal “Satellite communications”, 5/e, Khanna Publishers, 2002. (UNIT-IV).
4. William Stallings, “Wireless Communications and Networking”, PHI, 2003,
5. M.Richharia, “Satellite Communications Systems”, 2/e, Macmillan Press Ltd., 1999.
6. Partt, Bostian and Allnutt, “Satellite Communications”, 2/e, John Wiley & Sons, 2003.

ELE-402	**Introduction to VLSI Circuits**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite:Understandingofgraduatelevel Semiconductor materials

Course Objectives: The aim and objective of the course is to equipthe students of M.Sc.withthe**Introduction to VLSI Circuits** thathe/sheneedsforunderstandingtheoreticaltreatmentindifferentcoursestaughtinthisclassandfordeveloping astrongbackgroundif he/she chooses to pursueresearch inphysics asacareer.

CourseOutcomes: At theend ofthecourse,the studentwillable to

CO1	Demonstrate a clear understanding of CMOS fabrication flow and technology scaling.
CO2	Analyze CMOS based logic circuit
CO3	Realize logic circuits with different design styles
CO4	Analysis of CMOS Logic Circuits and Designing High-speed CMOS Logic Networks.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	2	1	-	-
CO2	3	3	2	2	2	1	1	-	2	1	-	-
CO3	3	3	2	2	2	1	1	-	2	1	-	-
CO4	3	3	2	2	2	1	1	-	2	1	-	-

ELE-402: INTRODUCTION TO VLSI CIRCUITS

UNIT - I :**An Overview of VLSI and Logic Design with MOSFETs**

Complexity and Design, Basic concepts, Ideal switches and Boolean operations, MOSFETs as switches, Basic logics gates in CMOS, Complex logic gates in CMOS, Transmission Gate circuits, Clocking and data flow control.

UNIT – II: Physical Structure and Fabrication of CMOS ICs

Integrated Circuit layers, MOSFETs, CMOS layers, Designing FET arrays, Overview of silicon processing, Material growth and deposition, Lithography, The CMOS process flow, Design rules.

UNIT - III :**Elements of Physical Design and Electrical Characteristics of MOSFETs**

Basic concepts, Layout of basic structures, Cell concepts, FET sizing and the unit transistor, Physical design of logic gates, Design hierarchies, MOS physics, nFET current-voltage equations, FET RC model, pFET characteristics, Modeling of small MOSFETs.

UNIT – IV: **Analysis of CMOS logic gates**

DC characteristics of the CMOS inverter, Inverter switching characteristics, Power dissipation, DC characteristics: NAND and NOR gates, NAND and NOR transient response, Analysis of complex logic gates, Gate design for transient performance, Transmission gates and pass transistors.

Designing High-speed CMOS Logic Networks- Gate delays, Driving Large capacitive loads, Logical effort, BiCMOS drivers.

Books for Study:

1. John P. Uyemura, “Introduction to VLSI circuits and Systems”, John Wiley & Sons (Asia) Pte. Ltd., 2003.

2. S.K. Ghandhi, “VLSI Fabrication principles”, 2/e, John Wiley & Sons (Asia) Pte. Ltd., 2003.

3.S.M. Sze, “VLSI Technology”, 2/e, McGraw-Hill, 1988.

4.N.H.E. Weste and K. Eshraghian, “Principles of CMOS VLSI design”, Pearson Education, Inc., 1999.

5.Yuan Taur and T.H. Ning, “Fundamentals of Modern VLSI devices”, Cambridge University Press, 1998.

6.R.L. Geiger, P.E. Allen and N.R. Strader, “VLSI design Techniques for Analog and Digital Circuits”, McGraw-Hill, 1990.

7.Douglas A. Pucknell and Kamran Eshraghian, Basic VLSI Design, PHI, 1995.

ELE-403(a)	Data Communications and Networking	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingofgraduatelevelelectronics/Networking.

Course Objectives: The aim and objective of the course on **Data Communications and Networking** is to expose the M.Sc. students to the Basic concepts Networking, Multiplexing, Data Link Protocols, LAN, ISDN, SONET used in the Communication electronics.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understand the basic conceptsnetworks and Transmission of digital data.
CO2	Know the different types of Multiplexing and Data link protocols.
CO3	Understand the various types of local area networks.
CO4	Understand the ISDN, ATM, SONET and related frames and protocols.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	1	1	-	-	3	-	1
CO2	3	2	1	1	1	1	-	-	-	3	-	1
CO3	3	2	2	1	2	1	-	-	-	3	-	1
CO4	3	2	1	1	1	2	-	-	-	3	-	1

ELE-403 (a) DATA COMMUNICATIONS AND NETWORKING

UNIT – I: Basic concepts

Line configuration, Topology, Transmission mode, Categories of networks.

OSI Model: Functions of the layers, TCP/IP protocol suite

Transmission of digital data: Interfaces and modems, digital data transmission, DTE-DCE interface, other interface standards, modems, 56K modem, cable modem.

UNIT –II: Multiplexing

FDM, WDM, TDM, Multiplexing applications: Telephone system, DSL, FTTC.

Data link control: Line discipline, Flow control, Error control.

Data link protocols: Asynchronous and synchronous protocols, Character-oriented and bit-oriented protocols, Link access procedures.

UNIT – III: LAN

Project 802, Ethernet, Token bus, Token ring, FDDI.

Switching: Circuit switching, Packet switching, Message switching.

PPP: PPP layers, LCP, Authentication, NCP.

UNIT – IV: ISDN

Services, Subscriber access to the ISDN, ISDN layers, Broad band ISDN.

X.25: X.25 layers, Other protocols related to X.25.

Frame Relay: Operation, Layers, Congestion control, Leaky Bucket algorithm, Traffic control, other features.

ATM: Design goals, ATM architecture, Switching, Switching fabrics, ATM layers, Service classes, ATM applications.

SONET/SDH: Physical configuration, SONET layers, SONET frame.

Books for study:

1. Behrousz A. Forouzan, “Data Communications and Networking”, 2/e, TMH, 2000.
2. William Stallings, “Data and Computer Communications”, 5/e, PHI, 2000.
3. Andrew S. Tanenbaum, “Computer Networks”, PHI, 3/e, 1999.
4. Leon-Garcia &IndraWidjaja, “Communication Networks”, TMH, 2000.
5. Douglas E. Commer, “Computer Networks and Internets”, Addison Wesley Longman (Singapore) Pte.Ltd., 2/e,2000.
6. Uyless Black, “Computer Networks”, PHI, 2/e, 1999.

ELE-403(b)	Industrial Electronics	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevel electronics

CourseObjectives: The aimandobjectiveofthecourseon**Industrial Electronics** is to expose the M.Sc.students to the basics of Solid state devices, Power and optoelectronic devices, I/O devices and Robots.

CourseOutcomes: Atthe end ofthecourse, thestudent willbeable to

CO1	UnderstandtheSolid State Devices Used in Industrial Logic Circuits.
CO2	Know the use of Solid state Devices in Power electronics.
CO3	Understand input and output devices such as sensors and drives.
CO4	Know the Types of robotsand their function in the Industry.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	1	-	1	2	-	2	3	-	-
CO2	2	2	1	2	1	1	1	-	1	-	-	-
CO3	3	2	-	2	1	1	2	-	1	3	-	-
CO4	2	2	-	2	1	1	2	-	1	-	-	-

ELE-403(b): INDUSTRIAL ELECTRONICS

UNIT- I: Solid State Devices Used in Industrial Logic Circuits

Introduction, relay logic, typical logic circuits, relay logic used to control a pneumatic cylinder, using relay logic to determine robot program for inserting studs into taillights for automobiles, solid state devices used for logic, solid state logic blocks,solid state logic equivalent to the cougar taillight assembly circuit, connecting inputs to solid state logic devices, outputs for logic circuits, solid state relays, comparison of solid state logic and relay logic, solid state and relay logic circuits to control part bins for robotic automated workcells.

UNIT- II: Power electronics

Silicon controlled rectifiers (SCRs), TRIACs, power transistors, insulated –gate bipolar transistors, junction field –effect transistors (J –FETs), solid –state devices used for firing circuits, unijunction transistor (UJT), programmable unijunction transistors, using a DIAC to provide a pulse for thyristors, other solid state devices used as triggers, light –activated solid state devices, photoelectronics, lasers, and fiber optics, optoelectronic devices, optoisolators and optointerupters, optodevices used for displays.

UNIT- III:Input and Output Devices

Temperature sensors, pressure sensors, flow sensors, density and viscosity sensors, level sensors, position sensors, motion sensors, PH sensors, humidity sensors, solenoid valves, proportional valves, relays, contactors, and motor starters, variable frequency drives, dc drives, stepper motors, linear stepper motors, servomotors.

UNIT- IV: Robots and others motion control systems

Types of robots, types of robot control, types of robot programs, computer numerical control (CNC) machines, basic parts of a robot system, other types of robot actuators, input and output signals for robots, input circuits for robot signals, output circuits for robot signals, input and output modules, data communications for industrial electronics, network architectures, data formats, protocols and standards, parts and media of the physical layer, typical network topologies

Books for study:

1. Thomas E. Kissel,Industrial Electronics, 3/e, PHI, 2003.
2. A.K, Sawhney, A course in Electrical and Electronic Measurements and Instrumentation, DhanpatRai Publishers, 2012.

ELE-403 (c)	EMI & EMC	L-3,T-1,P-2	4Credits

Pre-requisite:graduate levelcoursein Physics/Electronics.

Course Objectives: The main objective of the course on **EMI & EMC**isto introduce the basic conceptsof EMI environment, Standards, Specifications of EMI, Grounding and Shielding techniques applicable in the Industry.

CourseOutcomes: At theend ofthe course, thestudent will be ableto

CO1	Understanding of EMI Environment.
CO2	Know the Specifications, Standards, Limits of EMI.
CO3	Know the Grounding principles and Bonding guidelines.
CO4	Understanding the theory of Shielding, Need of Gaskets and their properties, Basic Filter Component Characteristics and guidelines.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	**3**	2	3	1	2	-	3	2	3	-
CO3	3	3	3	-	3	1	-	-	3	-	3	-
CO3	3	2	-	2	2	1	1	-	1	2	1	-
CO4	3	3	-	3	-	1	1	-	3	-	3	-

ELE-403 (c) EMI & EMC

Unit-I: EMI Environment

Sources of EMI, conducted and radiated EMI, Transient EMI, EMI – EMC definitions and unit parameters. EMI Coupling Principles conducted Radiated and Transient Coupling, Common impedance Ground Coupling, Radiated Common Mode and Ground loop coupling, Radiated Differential mode coupling, near field cable to cable to coupling, Power mains and power supply coupling.

Unit-II: EMI Specification / Standards / Limits

Units of specification, Civilian standards, Military standards. EMI Measurement Open area test site (OATS) – OATS measurements – Measurement of RE, RS, and Test site – Antennas – Measurement precautions – TEM cell – Measurements using TEM cell – Reverberating chamber.

Unit-III: Grounding Technique and Bonding

Grounding Principles – Precautions – Measurement of ground resistance – System grounding for EMC – Single-Point, Multi-Point and Hybrid Grounds, Bonding Shape and material for bond strap – Guidelines for good bonds.

Unit-IV: Shielding and Electrical Gaskets and Filtering

Transmission Line Theory of Shielding, Absorption Loss, Reflection Loss, Shielding Effectiveness, Shielding Materials, Apertures in Shielded Walls, Waveguide below Cut-off, The Need for Gaskets, Common Gaskets Material Use, Properties and Characteristics of RF Gaskets, Common-Mode and Differential-Mode Filtering, Basic Filter Component Characteristics, Filtering Guidelines.

Books for Study

1. Henry W. Ott, Noise Reduction Techniques in Electronic System.
2. V.P. Kodali, Engineering EMC Principles, Measurements and Technologies.
   Bernhard Keiser, Principles of Electromagnetic Compatibility.

ELE-405	Internet of Things	L-3,T-1,P-0	4Credits

Pre-requisite: Understandingof graduatelevel electronics/computer science

Course Objectives: The aim and objective of the course on **Internet of Things** is to familiarize the M.Sc. students with the basics and Characteristics of IoT, IoT development boards, Wireless Technologies, data handling and analysis, Applications of IoT.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understanding of the basics and Characteristics of IoT, IoT development boards.
CO2	Know the Wireless Technologies.
CO3	Know the data handling and analysis of the data.
CO4	The use of IoT for Automation, Management, Logistics, Agriculture, Health and Lifestyle, Industry.

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	1	2	-	2	-	-	-
CO2	3	2	1	2	2	2	2	-	2	-	1	2
CO3	3	2	1	2	1	2	2	-	2	-	-	2
CO4	3	3	1	2	2	2	2	-	2	-	1	-

ELE- 405: INTERNET OF THINGS

UNIT-I

Definitions & Characteristics of IoT, IoTArchitectures,Physical & Logical Design of IoT, Enabling Technologies in IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT frameworks, IoT and M2M.

IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, WirelessSensorsNetworks : The node, Connecting nodes, Networking Nodes, WSN and IoT.

UNIT- II

Wireless Technologies For IoT : WPAN Technologies for Iot : IEEE 802.15.4 , Zigbee , HART , NFC,Z –Wave, BLE , Bacnet, Modbus. IP Based Protocols For Iot : IPv6,6LowPAN,RPL,REST,AMPQ,CoAP, MQTT.Edge connectivity and protocols.

UNIT- III

Date Handling & Analytics: Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications, Edge/Fog Computing

UNIT- IV

Applications of IoT:Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

Books for Study

1. Olivier Hersent, David Boswarthick, and Omar Elloumi, “The Internet of Things:Key Applications and Protocols” WileyPublications.
2. VijayaMadisetti and ArshdeepBahga, “Internet of Things (A Hands – on Approach)” 1st Edition, VPT,2014.
3. Daniel Minoli, “Building the Internet of Things with IPV6 and MIPv6: The Evolving World of M2M Communications” ISBN: 978 -1 -118 -47347 -4, Willy Publications.
4. Pethuru Raj and Anupama C. Raman, “Internet of Things: Enabling Technologies, Platforms, and Use Cases” CRC Press.

ELE-406(a)	Embedded Systems with PIC Microcontrollers	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevel microprocessors.

Course Objectives: The aim and objective of the course on **Embedded Systems with PIC Microcontrollers**is thestudentsofM.Sc.toequipthemwiththeknowledgeof microcontrollers and other processors used in the industry.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	understand about the basic functions and structure of embedded systems
CO2	Get familiarized with Embedded system Design Tools and Hardware
CO3	understand about the basic programming concepts of embedded systems
CO4	know about the applications of PIC microcontrollers

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	-	-	2	1	1	-
CO2	3	2	3	3	2	1	2	-	2	-	1	-
CO3	3	2	3	3	2	-	-	-	2	1	1	-
CO4	3	2	3	3	2	1	2	-	2	1	1	-

ELE-406(a): EMBEDDED SYSTEMS WITH PIC MICROCONTROLLERS

Unit - I: Introduction to Embedded Systems

Embedded systems in today's world – examples of Embedded systems – Microprocessors and Microcontrollers – Microchip and PIC microcontroller – Introduction to PIC microcontrollers using the 12 series.

Architecture of 16F84A – Memory organization – in 16F84A – Timing generation – Power-up and Reset functions in 16F84A.

Unit - II: Hardware Details of 16F84A

Parallel ports: Basic idea – Technical challenge – connecting to the parallel port – Parallel ports of PIC16F84A – Clock oscillator – Power supply – Interrupts – Timers and counters – watch dog timer – Sleep mode.

Unit - III: Assembler and Assembler Programs

Basic idea – PIC 16 series instruction set and ALU – Assemblers and Assembler format – creating simple programs – Adopting a development environment – Building structured programs – Flow control: Branching and Subroutines – Generating time delays and intervals – Logical instruction – Arithmetic instructions.

Unit - IV: PIC Microcontroller PIC 16F873A

Block diagram and CPU – Memory and memory maps – Interrupts – Oscillator, Reset and Power supply – Parallel ports.

PIC 16F87XA Timer 0 and Timer 1 – 16F87XA Timer 2, Comparator and PR2 register – capture/Compare/PWM (CCP) Module – Pulse width modulation – ADC module.

Interface: LED displays – Liquid crystal displays –Sensors –Actuators.

Books for Study

1. Tim Wilmshurst, Designing Embedded Systems with PIC Microcontrollers: Principles and Applications, First Edition, Newnes – Elsevier Publishers, 2007.

2. Ramesh Gaonkar, Fundamentals of Microcontrollers and applications in Embedded Systems, Penram International Publishing (India) Pvt. Ltd., 2007.

3. Ajay V. Deshmukh, Microcontrollers: Theory and Applications, Tata Mc Graw- Hill, New Delhi, 2005.

4. John B. Peatman,Designing with PIC Microcontrollers , Pearson EducationInc.,1998.

5. Mahammad Ali Mazidi and Janice GillispieMazidi, The 8051 Microcontroller and Embedded systems, Pearson Education Asia, Pvt. Ltd., 2000.

ELE-406 (b)	Microwaves	L-3,T-1,P-2	4Credits

Pre-requisite Graduate level coursein Electronics/Physics

Course Objectives: The main objective of the course on **Microwaves** is to introduce the basics of Electromagnetic Theory, Transmission Line theory, waveguides and Antennas.The students also exposed to various industrial applications of Microwaves.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understanding of Electromagnetic Theory
CO2	Understanding of Transmission line theory
CO3	Know different types of Waveguides.
CO4	Use of various types of antennas.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	3	-	2	-	3	1	-	-
CO3	2	3	3	3	3	1	-	-	3	2	-	-
CO3	2	2	2	2	2	-	1	-	1	1	-	-
CO4	3	3	3	3	3	-	-	-	3	3	-	-

ELE-406(b): MICROWAVES

UNIT – I: Electromagnetic Theory

Maxwell's equations, Fields in media and boundary conditions, the wave equation and the basic plane wave solutions, General plane wave solutions, Energy and power, Plane wave reflection from media interface, Oblique incidence at a dielectric interface, The reciprocity theorem, Image theory, Uniqueness theorem.

UNIT – II: Transmission Line theory

The lumped element circuit model for a transmission line, Field analysis of transmission lines, Terminated lossless line, Smith chart, Quarter wave transformer, Generator and load mismatches, Lossy transmission lines.

UNIT –III: Transmission lines and waveguides

General solutions for TEM, TE and TM waves, Parallel plate waveguide, Rectangular waveguide, circular waveguide, Co-axial line, Surface waves on a grounded dielectric slab, Strip line, Microstrip. Matching with lumped elements, Single stub tuning, Double stub tuning, The quarter wave transformer, Theory of small reflections, Binomial multisection matching transformers.

UNIT – IV: Antennas

Types of antennas, Hertz and Marconi antennas, Yagi-Uda antenna, Rhombus antenna, Reflector antenna, Lens antenna, Horn antenna, Helical antenna, Log periodic antenna, Phased array antenna, Microstrip antenna.

Books for Study:

1. David M. Pozar, "Microwave Engineering", 2/e, John Wiley & Sons (Asia) Pte. Ltd, 1999.
2. A.K. Maini, "Microwaves and Radar: Principles and Applications", 2/e, Khanna Publishers, 2001.
3. M. Kulkarni, "Microwave and Radar Engineering", Umesh Publications, 3/e, 2003.
4. Samuel Y. Liao, "Microwave Devices and Circuits", 3/e, PHI, 1998.
5. Wayne Tomasi, "Electronic Communication Systems: Fundamentals through Advanced", 4/e, Pearson Education, Inc., 2001.
6. Gary M. Miller and Jeffrey S. Beasley, "Modern Electronic Communication", 7/e, PHI, 2003.

Model Question Paper

M.Sc. DEGREE EXAMINATION – APRIL/DECEMBER

First SEMESTER

Branch - Electronics

Paper 1- ELE-101: ANALOG INTEGRATED CIRCUITS AND APPLICATIONS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is linear regulator? Mention its application.
2. Draw the circuit of voltage to frequency converter (V – F) and explain it s working.
3. Explain any one of the application of comparator with neat sketch.
4. Explain the principle of PLL with neat sketch.
5. Discuss the various performance specifications of DAC.
6. Explain how ADC can be realized using DAC.
7. What is an Oscillator ? Explain its Principle.
8. Explain the working of the Differentiator.

SECTION -B

Answer ALL questions. Each question carries 15 marks.

(Marks: 4 x 15 =60)

9. (a) Explain the working of sine wave generator with the help of relevant circuit and derive its frequency of oscillations.

(Or)

(b) Explain the working of a monolithic timer 555 IC with the help of its functional diagram.

10. (a) Construct and explain the working of logarithmic and antilogarithmic amplifiers.

(Or)

(b) Write about the working of peak detector and sample and hold amplifier.

11. (a) Discuss the working of successive approximation ADC.

(Or)

(b) Discuss the working of R -2R ladder DAC . Find the output voltage from a 50 bit ladder that had a digital input of 11011. Assume 0 = 0V and 1 = +10V.

12. (a) What is Instrumentation Amplifier ? Discuss the working.

(Or)

(b) What are the Active Filters? Explain the working of Higher order Filter.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

First SEMESTER

Branch - Electronics

Paper 2 –ELE-102: DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is combinational logic circuit? Explain the sum of product from simplification.
2. Construct a -4- bit parallel binary adder and explain its working.
3. Explain the working of JK –FF with relevant sketch.
4. Write about 4 – bit shift register counter.
5. Explain the working of Bilateral switch with a neat sketch.
6. Write down the characteristics of TTL series and ECL family.
7. Draw the structure of dynamic RAM and explain.
8. Write about PAL.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Design and construct a 3 –bit full – adder and explain its working.

(Or)

(b) What is Karnaugh map? Explain looping pairs quads octets in a K- map with suitable examples.

10. (a) Construct a 4 –bit ripple counter and explain its working with neat sketch.

(Or)

(b) Mention the differences between synchronous and asynchronous counters.

(c) Construct mod -10 counter and explain its working with neat sketch.

11. (a) Write down the characteristics of CMOS.

(b) Discuss how TTL can drive the CMOS and Vice –Versa with relevant sketches.

(Or)

(c) Discuss THE COMPARATIVE STUDY AMONG TTL,ECL and CMOS.

(d) Explain the loading and fan – out in TTL.

12. (a) Discuss the architecture of PLD.

(Or)

(b) Distinguish between SRAM and DRAM.

(c) Explain the applications of PLDs.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

First SEMESTER

Branch - Electronics

Paper 3- ELE-103(a): PROGRAMMING IN "C" WITH DATA STRUCTURES

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. Write down the examples for identifiers and keywords.
2. Explain Go To statement.
3. What is the concept of Recursion?
4. Explain the pointer variables.
5. Explain stacks used in C – language.
6. Write a C – program for 2X2 matrix addition.
7. Explain Binary tree.
8. Give some applications of trees.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Explain arithmetic, relational, logical and assignment operators in "C".

(Or)

(b) Write a C –program to find the average of a set of 15 numbers by using while statement.

(C) Write a "C" program TO CONVERT Fahrenheit temperature to Celsius temperature.

10. (a) Write a program using pointers to compute the sum of 8 elements stored in an array.

(b) Write a program using pointers to determine the length of the character string.

(Or)

(C) Write a program for matrix multiplication.

(d) Writea programfor matrix Subtraction.

11. (a) What is meant by arrays of structures? And explain it.

(b) Write a program to store elements in a stack.

(Or)

(c)Write a program to read information for one person from the keyboard and print the same on the screen (struct person contain person name, date of joining and salary).

(d) Explain how structures defined.

12. (a) State and explain Huffman algorithm.

(b) With a suitable example, explain how lists are represented as Binary Trees .

(Or)

(c) Explain linked lists, Lists in C.

(d) Explain circular queue with suitable examples.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

First SEMESTER

Branch - Electronics

Paper 3- ELE-103(b): Python PROGRAMMING

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. Write down theStrengths and Weaknesses of Python Language.
2. Explain Control Flow and Syntax.
3. What are the Classes in Python ?
4. Write a note on Inheritance.
5. Explain the Optional Parameters in Python.
6. Write a short note on the dirFunction in Python.
7. Explain about Data Streams.
8. What are Run Time Errors ?

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Explain Relational, Logical, True or False and Bit Wise Operators in "Python".

(Or)

(b) Write about Dynamic Types, Naming Conventions, String Values and String Operations.

10. (a) What are the Principles of Object Orientation ? Discuss.

(Or)

(b) Writeabout File Organizationin Python.

(c) Discuss on Custom Exception Classes.

11. (a) Discuss on Variable Number of Arguments.

(b) Write about Passing Collections to a Function.

(Or)

(c)What are the Modulesin Python ? Discuss on Standard Modules – sys, – math, and –time.

12. (a) Write about Access Modes in Python.

(b) Discuss the Additional File Methods in Python.

(Or)

(c) What are the Handling IO Exceptions ? Explain.

(d) Explain about Exception Model in Python.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

First SEMESTER

Branch - Electronics

Paper 3- ELE-103(c): PROGRAMMING IN MATLAB

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. Define a variable in MATLAB.
2. Explain Mat Lab Script File.
3. What is the concept of Recursive Function?
4. Explain thenargin and nargout variables.
5. Explainuse of Arrays in Matlab.
6. Write a note on structures in Matlab.
7. Explain how Placing Text on a Plot in Matlab ?
8. Write a note on basic two-dimensional plots.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Explain Functions, Display Formats, and Predefined Variables in Matlab.

(Or)

(b) Write a program to plot the functions in Matlab using PLOT function

(i) sin(x) for $-10 \leq x \leq 10$ (ii) sin(x) cos(x) for $-10 \leq x \leq 10$

(iii) cos(x)sin(x) exp(x/10) for $-1 \leq x \leq 1$.

10. (a) Study the different methods for control flow available in MATLAB.

(Or)

(b) Write a MATLAB program that finds all perfect numbers 2 and n, where n is an integer entered by a user. A perfect number is one whose prime factors add to the number.

11. (a) Design Mat lab Functions to handle input parameters that are scalars or arrays.

(Or)

(b)Write a program that reads a text file and generates a histogram of lengths of the words contained in the file.

12. (a) Discuss how to handle Graphics for Manipulating Plots.

(Or)

(b) Explain how to Obtain Numerical values from a plot in Matlab.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FIRST SEMESTER

Branch - Electronics

Paper 4- ELE -104(a): SIGNALS & SYSTEM ANALYSIS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is the difference between continuous – Time signal and Discrete – Time signal and how to obtain a discrete signal from continuous signal.
2. Explain the impulse response of an LTI system.
3. Write down the two properties of LTI system to represent signals and what is the output when the input X (t) is applied to an LTI system with impulse response of h (t).
4. What is the significance of parseval 's relation and give its relation for continuous – Time periodic signals.
5. Find the Laplace transforms of the given function.
   f(t) =4 cos (4t) – 9 sin (4t) + 2 cos (4t)
6. Find the inverse Laplace transform of the given function.
   F (s) = 6/S – 1 /S – 8 +4/S -2
7. Find the Z – transform of the sequence.
   x(n) = {2, -1,3,2,1,0,2,3, -1}
8. Write down the important properties of region of convergence for the –z transform.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Explain the transformations of the independent variables with proper diagrams.

   (Or)

   (b) Describe the basic system properties.

10. (a) Explain the properties of the continuous Time Fourier Series.

(Or)

(b) Explain the properties of the continuous Time Fourier transform.

11 (a) Explain the properties of the Laplace Transform.

(Or)

(b) Find the inverse Laplace transform of

i) F (S) = 2s -5/s2 + 4s +8

ii) F (S) = 4s + 2/s2 + 6s +34

12 (a) Discuss the properties of the Z –Transforms.

(Or)

(b) Explain the relationship between the Z –Domain and the frequency domain withproper equation and diagrams.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 4- ELE -104(b): OPTICAL COMMUNICATIONS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is Channel Capacity ? Explain.
2. State the Advantage of Optical Communication System.
3. What are Very Low Loss Materials?
4. Explain the effect of Polarization in wave propagation.
5. What are the optical sources ?
6. Explain the working Avalanche Photodiode.
7. What are the Computer Networks ? Discuss.
8. What are the Mac Protocols ?

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Discuss the Communication System Architecture.

   (b) Explain the Basic Optical Communication System.

   (Or)

   (c) Distinguish between Step-index Fibers and Graded Index Fibers.

   (d) Explain the working ofStab Wave guide.

10. (a)Discuss the attenuation effects in Plastic and Polymer-Clad-Silica Fibers.

    (Or)

    (b) Explain the Wave propagation in Step-Index Fiber.

    (c) Discuss the wave propagation in Multimode Fibers.

11. (a) Distinguish between LEDs and Semiconductor Lasers.

(b) Design the Semiconductor Lasers for Optical Fiber Communication System.

(Or)

(c) What are the Semiconductor Photodiode Detectors ? Explain the working of Photo multiplier Tube.

12. (a) Discuss in detail about Digital Optical Fiber Communication System.

(Or)

(b) What are the Network Topologies ? Discuss the working of Optical TDM system.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FIRST SEMESTER

Branch - Electronics

Paper 4: ELE-104 (c): WIRELESS COMMUNICATIONS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. Explain the QPSK modulation technique.
2. Give a note on error probability.
3. What are linear block codes?
4. Write a note on convolution interleaving technique.
5. Explain spread spectrum modulation.
6. Explain in brief the traffic routing.
7. Draw the block diagram of a communication satellite system.
8. What is G/T ratio? Explain.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 = 60)

9. (a) Explain the principle of PSK generation and detection .Distinguish between PSK and DPSK.

(Or)

(b) State and explain Nyquist pulse shaping criteria

10. (a) Discuss the decoding of convolution codes with examples.

(Or)

(b) Draw the Trellis diagram for a convolution order. What are different types of ARO?

11. (a) With a neat block diagram explain the principle and working of a mobile communication system.

(Or)

(b) Explain 2g wireless network system what is wireless data services.

12. (a) Explain the multiple access format of satellite systems in India.

(Or)

(b) Give a detailed note on optical fibers.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 1- ELE-201: ADVANCED MICROPROCESSORS AND MICROCOMPUTERS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Explain the program memory addressing modes of Microprocessor.
2. Write a brief note on assembler.
3. Distinguish between minimum mode and maximum modes of 8086 microprocessor.
4. Write about modular programming.
5. Format the control word of 8255 to make all ports are output ports.
6. Interface the DAC with 8086 up and explain its working.
7. Explain the concept of DMA date transfer technique.
8. Write a brief note on interrupts available in 8086 microprocessor.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9.(a) Draw the internal architecture of a microprocessor and explain each block in detail.

(Or)

(b)Explain data movement and logical instructions of microprocessor with suitable examples.

(c) Describe the memory paging.

10. (a)Write a brief note on 8284 A clock generator.

(b) Explain in detail bus buffering, Latching and timing.

(Or)

(c) Explain the pin functions of 8086 microprocessor.

(d) Write about data conversions with suitable examples.

11.(a) Draw the block diagram of 8254 and explain each block in detail.

(Or)

(b) Explain the interfacing of 8 –bit A/D converter to a μP with help of relevant sketch.

12. (a) Draw the block diagram of 8237 DMA controller and explain each block in detail.

(Or)

(b) Write about Advanced microprocessors

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 2- ELE -202: DIGITAL COMMUNICATIONS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is a sampling function? Where is it used?
2. State and explain the central limit theorem.
3. What is meant by quantization error? Explain.
4. Explain the M – ary FSK.
5. What is a discrete message? Explain with an example.
6. What are convolution codes? Explain them.
7. Explain what is meant by spread spectrum.
8. What is meant by encryption? Why is it used?

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) What is power spectral density? Explain its significance.

(b) Obtain an equation for auto correlation of a periodic function.

(Or)

(c) Obtain an equation for probability density.

(d) Explain how to obtain a correlation between random variables.

10. (a) Explain the method of multiplexing the PCM signals.

(b) With suitable diagrams, explain Adaptive Delta modulation.

(Or)

(c) Distinguish between BPSK and QPSK methods.

(d) What is a matched filter? Explain its working.

11. (a) Define the terms: i) Average information, ii) Entropy

(b) State and explain the Shannon, s theorem.

(Or)

(c) Explain the efficiency of orthogonal signal transmission.

(d) What are block codes? How are they coded and decoded?

12. (a) Write the equation for Pseudo – Noise and explain the terms.

(b) Explain with diagrams what is meant by frequency Hopping?

(Or)

(c) What is meant by early cipher system? Explain

(d) Write a note on public key cryptosystems.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 3 ELE- 203(a): SEMICONDUCTOR MATERIALS AND DEVICES

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What is Photovoltaic effect ? Explain.
2. What is LED ? Explain it's structure.
3. What is tunnel diode ? Explain it's Characteristics.
4. What is PIN diode ? Explainit's I-V characteristics.
5. What is Light Activated Silicon Controlled Rectifier ?
6. Write a note on Schockley diode.
7. What are the regions of operation of a Transistor ?
8. Explain the Current-Voltage characteristics of MOSFET.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Distinguish between Photo diodeand Avalanche photo diode. Explain their working.

(Or)

(b)What are the Laser diode materials ? Explain the fabrication and structures.

10. (a) What is IMPATT diode ? Explain it's principle of operation.

(Or)

(b) What areTransferred Electron Devices (TEDs)? Explain thePrinciple of working of GUNN diode.

11. (a) What is TRIAC ? Explain it's operation.

(Or)

(b)What is GTO ? Explain it’s structure and working.

12. (a) Discuss the Analysis of the ideal diffusion transistor

(Or)

(b)What is JFET ? Explain it’s principle of operation.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 2- ELE- 203(b): SENSORS AND TRANSDUCERS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks

(Marks: 4 x 5 = 20)

1. What is a sensor ? Explain it's role.
2. Write the Significant parameters of a transducer.
3. Distinguish between displacement and strain gauge transducers.
4. What is a gauge factor ? Explain.
5. What are the different types Pressure transducers ?
6. Write a note on Electrical pressure transducers .
7. What is Photoconductive cell ?
8. Write a brief note on laser diode.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9.(a) Discuss the Classification of transducers. Explain Characteristics of transducers.

(Or)

(b)What is a temperature sensor ? Explain the working of Optical pyrometer.

10.(a) What are the types of strain gauges ? Discuss the materials used for strain gauges.

(Or)

(b) What is LVDT ? Explain thePrinciple of working of LVDT.

11.(a) What are the Elastic pressure transducers ? How to measure the pressure using helical tubes with a neat sketch.

(Or)

(b)Describe the working of Piezoelectric pressure transducer.

12. (a) Distinguish between Photoemission tube and Photomultiplier tube.
Explain their working.

(Or)

(b) Describe the working of Photo-transistor andPhoto FET. What are their advantages ?

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 3: ELE-203 (c) ATMOSPHERIC AND SPACE INSTRUMENTATION TECHNIQUES

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Write a note onplanetary Atmosphere**.**
2. Briefly discuss on structure of Atmosphere.
3. What are the trace gases in the atmosphere ?
4. What are the atmospheric parameters ?
5. What is a Lidar ? Mention it's uses.
6. What are the applications of Sodar ?
7. What is Radar? Explain it's principle.
8. Write a short not on Propagation of Microwaves in the lower Atmosphere.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9.(a) **Discus** on Dynamics of the earth's atmosphere.

(Or)

(b) Explain theComposition of the earth's atmosphere.

10.(a) Discuss the working of Automatic weather station.

(Or)

(b) What is Flame ionization Detector ? Discuss the measurement of CH_4 using Flame ionisation detector.

11. (a) Explain the working of Radiosonde. Discuss its applications.

(Or)

(b) Explain the working of Rocket Sonde ? Explain it's uses.

12. (a) Discuss working of Operational Weather Radar.

(Or)

(b) Discuss on Weather Radar Signal Processing system.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 4- ELE-204 (a): CONTROL SYSTEMS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Give certain examples for control systems.
2. Explain the significance of signal flow graphs.
3. Compare the transient and steady – state responses.
4. Explain the sources of steady – state responses.
5. Explain the method of sketching the root locus graph.
6. How is that Bode diagram different from polar plot?
7. What is meant by compensation in control system?
8. What are the methods for improving response characteristics?

SECTION -B

Answer ALL questions. Each question carries 15 marks.(Marks: 4 x 15 =60)

9. (a) Compare the features of closed – loop and open - loop control systems.
   (b) with a neat diagram explain a closed – loop control system.

   (Or)

   (c) What is impulse response ? Explain with an example.
   (d) What is a dynamic system? Explain with an example the state – space representation of a dynamic system.
10. (a) Explain the transient response in a first – order system.
    (b) Explain with example the effect of integral on a considered system performance.

    (Or)

    (C) State and explain Routhe'S Stability criterion.

(d) Assume a unity feedback system and explain the steady – State errors.

11. (a) Explain the general rules for constructing Root Ioci

(b) Discuss the theory behind lag compensation techniques based on the Root – Locus approach.

(Or)

(c) Compare the log – Magnitude with phase – plots.

(d) State Nyquist stability criterion. Explain relative stability with example.

12. (a) Explain Lead – Lag compensation in the light of frequency response.

(b)Discuss the Ziegler – Nicholas rules for tuning PID controllers.

(Or)

(c) Explain what is meant by set – point kick?

(d) With an example, explain the Zero – placement approach to improve response characteristics.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 4: ELE-204(b) MEDICAL INSTRUMENTATION

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What are Bioelectric Potentials ?
2. WriteCharacteristics of Recording System.
3. Write a short note on Pacemakers.
4. What is purpose of Blood Cell Counter?
5. What are the elements of Biotelemetry Systems ?
6. Write a note on Oxymeter.
7. Distinguish between Micro Shock and Macro Shock.
8. What are the applications of Computer Tomography Scanner (CT) ?

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Discuss on Biomedical Instrumentation System.

(Or)

(b)Discuss on Electrocardiography (ECG)and Electromyography (EMG).

10. (a) Explain the working of Heart Lung Machine.

(Or)

(b) Discuss on Radiography and Angiography.

11. (a) Design of aBiotelemetry System.

(Or)

(b)Discuss the working of Pulmonary Function Analyzer.

12. (a) What is Magnetic Resonance Imaging (MRI) ? Explain its functioning and uses.

(Or)

(b) Describe the Hospital Architecture.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 4:ELE-204(c): DATA MINING AND INFORMATION SECURITY

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What is Data Mining? Explain.
2. Explain clustering.
3. Distinguish between Data mining and knowledge discovery in data bases.
4. What are the social implications of data mining ?
5. Write a short note on the OSI architecture.
6. Write a note onHash Functions.
7. Briefly discuss on Public Key Infrastructure
8. Explain the RSA Algorithm.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Discuss Data warehousing Components.

(Or)

(b)ExplainClassical Techniques. Discuss on Tree Network and Rules.

10. (a) Discuss the development of data mining issues.

(Or)

(b) Discuss on Exploratory Data Analysis.

11. (a)Discuss on Model for Network Security Classical Encryption Techniques.

(Or)

(b)Explain Fermat's and Euler's Theorems.

12. (a) Discuss the Principles of Public-Key Cryptosystems.

(Or)

(b)Write about Digital Signature Standard Authentication Applications.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

THIRD SEMESTER

Branch - Electronics

Paper-1: ELE-301: DIGITAL SIGNAL PROCESSING

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Explain the Digital Processing of analog signals with the help of relevant sketch.
2. What is sampling? Describe the sampling theorem.
3. Compare FIR and IIR filters.
4. Describe the block diagram representation of linear constant – coefficient difference equations.
5. Write about Goertzed Algorithm.
6. Compute the 4 – point DFT of a given sequence x (n) = {1,1,0,0}.
7. Explain the addressing modes of TMS320C5X DSP with suitable examples.
8. Write about assembly language syntax of TMS320C5X DSP.

SECTION –B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) What is multirate signal processing?

   (b) Explain the interpolation and decimation process of sampling rate of conversion with an example.

   (Or)

   (c) Write about reconstruction of a band limited signal from its samples.

   (d) Explain the discrete time processing of continuous time signal and vice –versa with the help of relevant sketches.

10. (a) Explain the steps to design FIR Filter using windows.

    (b) Discuss the design procedure of FIR Filter using Kaiser window method.

    (Or)

(c) Write about the Basic structure of IIR system.

(d) Discuss the design procedure of IIR Filter by using Bilinear Transformation (BLT).

11. (a) Determine the DFT of the following sequence using DIF –FFT algorithm. X(n) = {1, 1, 1, 0, 0, 1, 1, 1}.

(Or)

(b) Write about practical considerations in FFT implementation.

(c) Explain the linear convolution using DFT with suitable example.

12. (a) Draw the architecture of TMS320C5X DSP and explain briefly each block in it.

(Or)

(b) Discuss the following instructions with suitable examples:

(i) Load/store instructions. (ii) Move instructions and

(iii) Multiplication instructions

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

THIRD SEMESTER

Branch - Electronics

Paper 2-ELE-302: DIGITAL SYSTEM DESIGN -VHDL

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Define Entity declaration with suitable example.
2. Explain the concept of simulation.
3. Explain If statement with suitable example.
4. Explain Delta delay revisited.
5. Explain default binding rules.
6. Write a VHDL code for logic AND gate.
7. Write VHDL code for half adder.
8. Explain the concept of Shared variables.

SECTION -B

Answer ALL questions. Each question carries 15 Marks

(Marks: 4 x 15 =60)

9. (a) Explain configuration declaration, package declaration, and package body with proper examples.

   (Or)

   (b) Explain the basic language elements Identifiers, data objects, data types and Operators.

10. (a) Describe process statement in VHDL with suitable example.

(b) Explain sequential statement with suitable example.

(Or)

(c) Describe loop statement, exit statement, next statement with proper examples.

11. (a) Write a VHDL code for D – flip flop and J.K. flip flop.

(Or)

(b)Write a VHDL code for S –R flip flop

(c) Explain design file and orders of analysis.

12. (a) Describe generate statements, Aliases and qualified expressions with examples.

(Or)

(b) Write a VHDL code for 4- bit shift register.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

THIRD SEMESTER

Branch - Electronics

Paper 3- ELE -303(a): MICROCONTROLLERS AND APPLICATIONS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is meant by a processor? Draw the functional block diagram of a microprocessor and explain.
2. What is meant by n – bit processor? Draw the block diagram of a microprocessor and explain each functional block.
3. What are the different development software tools required for the designing of any application?
4. Discuss the addressing modes of 8051 microcontroller with examples?
5. Explain the Pin description of 89C51?
6. Explain sine wave generation mechanism using AT89C51 Microcontroller?
7. Explain the I/O Ports of PICI6F877 With their corresponding port configuration registers?
8. Explain the Interfacing of key board with PICI6F8XX microcontroller?

SECTION -B

Answer ALL questions. Each question carries 15 marks.(Marks: 4 x 15 =60)

9. (a) Explain the Architecture of the 8051 microcontroller and explain each of its functional units ?

(b) Explain the memory organization of the 8051 microcontroller?

(Or)

(c) Enumerate the differences between micro controller and microprocessors V.r.t embedded versus external memory devices.

(d) Explain the CISC and RISC processors characteristics with examples?

10. (a)What is meant by the serial communication? What are the different modes of serial Communication? What are the advantages of serial communication?

(b) Explain the RS -232 Protocol Standard ?

(Or)

(c) Explain the concepts of Timers and Counters in microcontroller?

(d) Explain in detail the TMOD and TCON registers of 8051 microcontrollers?

11. (a) Explain the Architecture of ATMEL 89C2051 microcontroller ?

(b) Explain selecting criteria of a microcontroller for designing of any application?

(Or)

(c) What is meant by the PWM? How a PWM can be generated by microcontrollers? Give its applications?

(d) Construct and explain the working of Ramp and Stair case wave from generators in detail?

12. (a) Draw and explain the pin diagram of PIC 16F8XX microcontrollers?

(b) Explain the STATUS REGISTER and OPTION REGISTER of PIC 16 F8XX microcontrollers?

(Or)

(c) Draw and explain the interfacing of LCD with PICI16F8XX microcontrollers?

(d) Differentiate between the LCD and Graphical LCD and write their applications?

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

THIRD SEMESTER

Branch - Electronics

Paper 3-ELE-303(b): COMPUTER ORGANISATION

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What are computer types ?
2. What are Basic operational concepts ?
3. Write a note on Register Transfer Bus.
4. What are the logic micro operations?
5. Explain the concept of address sequencing .
6. Explain the Decimal Arithmetic operations.
7. What are the Peripheral Devices ?
8. Explain the concept of pipelining.

SECTION -B

Answer ALL questions. Each question carries 15 marks.(Marks: 4 x 15 =60)

9. (a) Discuss on Data Representation.

(b) Explain the functions of system software.

(Or)

(c) Explain the performance of multiprocessors.

(d) What is a subroutine? How is it serviced?

10. (a) What are the addressing modes ? Explain.

(b) Discuss on Reduced Instruction set computer.

(Or)

(c) Describe the Stack Organization in computer systems.

(d) With the help of neat sketch, Discuss the Arithmetic logic shift unit.

11. (a) Explain the design of control unit.

(b) Distinguish betweenHard wired control and Microprogrammed control.

(Or)

(c) Discuss the basic concepts of memory system.

(d) Discuss on Read-only memories.

12. (a) Explain the peripheral component Interconnect (PCI) bus.

(b) Distinguish between RS232 and IEEE1394communication protocols.

(Or)

(c) Distinguish between pipelineprocessing and vector processing.

(d) Write about Array Processors.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

THIRD SEMESTER

Branch - Electronics

Paper-1: ELE-303 (c): DIGITAL IMAGE PROCESSING

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Write the file format in image Processing.
2. What are Pixel relationships ?
3. Distinguish between DFT and DCT.
4. Write a short note on Homomorphic filtering.
5. What are the Edge operators ?
6. What are the differences between Region based segmentation and motion segmentation ?
7. What are the Image Pyramids ?
8. Write a note on Image Classification.

SECTION –B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) What are the steps in image processing system? Explain.

(Or)

(b) Explain the image operations.

.

10. (a) Explain the Gray level Transformations.

(Or)

(b) Explain the function of smoothing and sharpening.

11. (a) Discuss on Edge linking and Boundary detection.

(Or)

(b) Discuss on Morphological water sheds.

12. (a) What are the applications of image processing? Explain.

(Or)

(b) Discuss the elements of information Theory.

Model Question Paper

M.Sc DEGREE EXAMINATION APRIL/DECEMBER

Branch-ELECTRONICS

Paper 4-ELE-305: Peripheral interface controllers

(Under NEP w.e.f.2021-2022)

Time: 3 Hours Max. Marks :40

SECTION – A

Answer any Two questions. Each question carries 5 marks. (Marks: 2 × **5=10**)

1. What is an assembler? Discuss the assembler format.
2. What are the main ideas of computer programming?
3. Write about the registers file structure of a PIC16F873 A microcontroller.
4. List various I/O ports available in 16F873 A and Explain briefly.

SECTION – B

Answer any **TWO** questions. Each question carries 15 marks. (Marks: **2 × 15=30**)

5. (a) Draw the block diagram of PIC 16 series ALU. Explain.

(or)

(b) Explain how building structured programs can be constructed.

6. (a) Draw and explain the architecture of PIC 16F873 A microcontroller.

(or)

(b) Write a detailed note on the memory organization of PIC 16F873 A.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

THIRD SEMESTER

Branch - Electronics

Paper 6: ELE-306(a) MICROPROCESSORS, PC HARDWARE AND INTERFACING

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Write a note on Bus cycles.
2. What are the modes of operation of 8254 IC ?
3. List the different types of connectors found on modern motherboards.
4. Write a note on IDE Interface.
5. What are the video display standards ?
6. What are the functions of a keyboard controller in a PC ?
7. What is IEEE1824 standard ?
8. List the important features of USB .

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) What is a stepper motor ? Explain the interfacing of stepper motor with 8086 Microprocessor.

(Or)

(b) Discuss on Parallel I/O methods.

10. (a) Discuss the functions of mother board components.

(Or)

(b) Explain the working of Floppy Disk Drive.

11. (a) Discuss on CRT display systems and CRT interfacing.

(Or)

(b) What is an EISA bus ? List it's features, Pins and signals.

12. (a) Describe the Intel 8x931 USB peripheral Controller.

(Or)

(b) Discuss on Standard Parallel Port.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

THIRD SEMESTER

Branch - Electronics

Paper 2-ELE-306(b):SATELLITE COMMUNICATIONS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks (Marks: 4 x 5 = 20)

1. What are the advantages of Satellite Communication ?
2. What are the satellite earth station parameters ?
3. Write a short note on Hybrid Systems.
4. Distinguish between TDMA and DATDMA.
5. What is Synchronous Orbit ?
6. Write a note on Frequency Coordination.
7. What are the Types of satellite systems
8. Write a note on IRS satellite program.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) What are synchronous satellites ? Discuss on Frequency Allocations and Band Spectrum .

(Or)

(b) Derive General Link Design Equations. Explain.

10. (a) What are Multiple Access Techniques ? Explain Code Division Multiple Access (CDMA).

(Or)

(b) What isSynchronization ? Discuss the application of SpreadSpectrumTechniques.

11. (a) What are Orbital Parameters ? How to find the Satellite Location with Respect to the Earth.

(Or)

(b)Discuss on Satellite Placement in Geostationary Orbit.

12. (a) Discuss the Characteristics of satellite systems. What are the INSAT satellites.

(Or)

(b) Discuss Satellite Applications in different Areas.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FOURTH SEMESTER

Branch - Electronics

Paper 1 –ELE -401: ADVANCED COMMUNICATIONS SYSTEMS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4x5 =20)

1. Write a brief note on history of cellular system.
2. Explain the cell splitting and sectoring
3. Describe the slow and fast fading. What is Doppler effect? Write briefly.
4. Explain the ARQ techniques.
5. Write about contention based protocols.
6. Describe the modelling for handoff calls.
7. Write about Electromagnetic spectrum.
8. Explain the satellite applications.

SECTION -B

Answer ALL questions. Each question carries 15 Marks.(Marks: 4 x 15 =60)

9. (a) Describe the characteristics and fundamentals of cellular systems and cellular system Infrastructure.

(Or)

(b) Write about

(i) Capacity of a cell (ii) Frequency reuse

(iii) Co – channel interference

10. (a) Derive an expression for the free space propagation loss. What is inter Symbol Interference? Explain.

(Or)

(b) Describe the convolution codes used in date transmission with suitable diagrams.

11. (a) Describe the models of FDMA, TDMA and CDMA modulation techniques.

(Or)

(b) Describe the fixed channel allocation schemes and dynamic and other channel allocation scheme.

12. (a) Describe the propagation of light through an optical fiber and optical fiber configurations.

(Or)

(b) Describe the characteristics of satellite systems and satellite system infrastructure.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FOURTH SEMESTER

Branch - Electronics

Paper 2 –ELE -402: INTRODUCTION TO VLSI CIRCUITS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Explain the overview of Design steps involved in the fabrication of VLSI circuits.
2. Explain the Design and applications of Transmission Gate circuits.
3. What is a MOSFET? Explain the working of MOSFET?
4. Explain the concept of Lithography.
5. Write a note on FET sizing and unit Transistors.
6. Explain in detail the FET RC model.
7. Write a brief note on power dissipation.
8. Give the over view of Bi – CMOS drivers.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Explain MOSFETs as switches with a neat diagram.

(Or)

(b) Draw a neat sketch and explain basic logic gates in CMOS.

10. (a) Discuss briefly the concept of CMOS layers in detail.

(Or)

(b) Explain the overview of materials growth and their deposition in VLSI Technology.

11. (a) Write briefly on layout basic structured sequences.

(Or)

(b) Explain briefly the n – FET current and voltage equation with a neat diagram.

12. (a) Draw a neat diagram and explain briefly the DC characteristics of the CMOS inverter.

(Or)

(b) Discuss briefly the Designing of High Speed CMOS logic Networks.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FOURTH SEMESTER

Branch - Electronics

Paper 3 – ELE -403(a): DATA COMMUNICATIONS AND NETWORKING

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Write about categories of networks.
2. Explain the working of 56K modem.
3. Write about FDM and TDM.
4. Explain the link access procedure.
5. Explain the FDDI working.
6. Discuss about NCP.
7. Explain the other protocols related to X.25.
8. Explain the ATM design goals.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Describe OSI model and explain the functions of the each layer.

(Or)

(b) Discuss about digital data transmission concepts and explain the DTE –DCE Interface.

10. (a) Discuss about the data link control procedures. Write about.
    (i) Flow control.
    (ii) Line control and error control schemes.

(Or)

(b) Describe the asynchronous and synchronous data link protocols.

11. (a) Discuss about circuit switching, packet switching and message switching.

(Or)

(b) Describe point to point protocol in computer networking . What is the use of link control protocol.

12. (a) Describe the operator of frame relay and its layers and congestion control.

(Or)

(b) Describe the physical configuration of SONET/SDH and its layers.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FOURTH SEMESTER

Branch - Electronics

Paper 3- ELE-403(b): INDUSTRIAL ELECTRONICS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What is generic Programmable logic controller?
2. Mention the Classification of PLCS.
3. Explain how an SCR is turned on by its gate?
4. Write a note on high Voltage bipolar Transistor.
5. What is a sensor? Discuss its function.
6. Mention the applications of Flow seniors.
7. What are the types of Robots?
8. What are the types of network Topologies?

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Describe the four basic parts of any Programmable controller.

(or)

(b) Explain the counter Operation in PLC.

10. (a) Explain the operation of a TRAIC and its characteristics.

(Or)

(b)What is inverter? Explain The Operation of PWM Inverter.

11. (a) What are the different types of Pressure sensors ? Explain the working of Bourdon tube Pressure sensor?

(Or)

(b) What is a Motion sensor ? Discuss the working of ac accelerometer?

12. (a) Discuss the basic parts of a Robot system.?

(Or)

(b) Explain the parts and media of the Physical layer?

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FOURTH SEMESTER

Branch - Electronics

Paper 3- ELE-403(c): EMI & EMC

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What are the sources of EMI ?
2. Write a short note on near field cable to cable coupling.
3. What are the Military Standards of EMI ?
4. Write a short note on Reverberating Chamber.
5. What are the grounding principles ?
6. Write a short note on material bond strap.
7. What are the basic filter component Characteristics?
8. What are the filtering guidelines ?

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Discuss on EMI Coupling Principles.

(or)

(b) Explain the radiated common mode and radiated differential mode couplings.

10. (a) Discuss the open area test site (OATS) measurements.

(Or)

(b)What is Antenna ? Explain the measurement precautions.

11. (a) Discuss the measurement og ground resistance.

(Or)

(b) Explain the guidelines for good bonds.

12. (a) Explain the Transmission line theory of Shielding.

(Or)

(b) What is the importance of Gaskets ?Explain the properties and characteristics of RF Gaskets.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FOURTH SEMESTER

Branch - Electronics

Paper 3- ELE-405: INTERNET OF THINGS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What are the characteristics of IOT?
2. Write a short note on Arduino IDE.
3. What is Zigbee ? Explain.
4. Write a note on Edge protocols.
5. What are the characteristics of Big data ?
6. Write a Short note on Edge/Fog Computing
7. What is the IOT design Ethics ?
8. Write a short note on Industrial IOT.

SECTION –B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Describe the IOT Architecture.

(or)

(b) Discuss RFID Principles and Components.

10. (a) Discuss on WPAN Technologies for IOT.

(or)

(b) Explain the IP based protocols for IOT.

11. (a) Discuss on Data Handling Technologies.

(or)

(b) What are the types of data analytics? Discuss.

12. (a) What are the applications of IOT? Explain.

(or)

(b) Discuss on IOT in Environmental Protection.

Model Question Paper

M.Sc DEGREE EXAMINATION APRIL/DECEMBER

Branch-ELECTRONICS

Paper 4-ELE-406(a): EMBEDDED SYSTEMS WITH PIC MICROCONTROLLERS

(Under NEP w.e.f.2021-2022)

Time: 3 Hours Max. Marks : 80

SECTION – A

Answer any four questions. Each question carries 5 marks. (Marks: **4 × 5=20**)

1. Mention the difference between Microcontrollers and Microprocessors.
2. Write a note on concept of PIPELINED in instructions execution of PIC 16F84A.
3. Discuss the Option Register in 16F84A PIC microcontroller.
4. Discuss the concept of Sleep Mode in 16F84A PIC microcontroller
5. What is an assembler? Discuss the assembler format.
6. What are the main ideas of computer programming?
7. Write about the registers file structure of a PIC16F873 A microcontroller.
8. List various I/O ports available in 16F873 A and Explain briefly.

SECTION – B

Answer any **FOUR** questions. Each question carries 15 marks. (Marks: **4 × 15=60**)

9. (a) Draw the internal architecture of PIC 16F84A microcontroller and explain its working briefly.

(or)

(b) Discuss the memory organization in PIC 16F84A microcontroller.

10. (a) Discuss the Parallel Ports in PIC 16F84A microcontroller.

(or)

(b) Discuss the Timer 0 module of PIC 16F84A microcontroller.

11. (a) Draw the block diagram of PIC 16 series ALU. Explain.

(or)

(b) Explain how building structured programs can be constructed.

12. (a) Draw and explain the architecture of PIC 16F873 A microcontroller.

(or)

(b) Write a detailed note on the memory organization of PIC 16F873 A.

Model Question Paper

M.Sc DEGREE EXAMINATION APRIL/DECEMBER

Branch-ELECTRONICS

Paper 4- ELE-406(b): MICROWAVES

(Under NEP w.e.f.2021-2022)

Time: 3 Hours **Max. Marks : 80**

SECTION – A

Answer any four questions. Each question carries 5 marks. (Marks: **4 × 5=20**)

1. What are the Maxwell's equations ?
2. Write a note on Image theory.
3. What is Smith chart ?
4. What are Lossy transmission lines ?
5. What is Microstrip ?
6. Distinguish between Rectangular waveguideand circular waveguide.
7. Write about quarter wave transformer.
8. What are the Types of antennas ?

SECTION – B

Answer any **FOUR** questions. Each question carries 15 marks. (Marks: **4 × 15=60**)

9. (a) Write the wave equation and discuss the basic plane wave solutions.

(or)

(b) Discuss on (i)The reciprocity theorem (ii) Uniqueness theorem.

10. (a) Explain the lumped element circuit model for a transmission line.

(or)

(b) What is Generator ?Discusson load mismatches.

11. (a) Discuss the Surface waves on a grounded dielectric slab.

(or)

(b) Discuss the General solutions for TEM and TM waves.

12. (a) Discuss the working of Traveling Wave Tubes (TWT) and write it's applications.

(or)

(b) What is antenna ? Describe the Helical antenna and it's working.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF PSYCHOLOGY



Course

M.Sc. PSYCHOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

- The post graduate Department of Psychology was established in 1959 with Major S. Parthasarathy as its founder head. Even before starting the department, since the inception of University College in 1954, psychology was taught at B.A. (Hons) and M.A. (Philosophy) level. The Department of Psychology offering the specializations like Health Psychology, Organizational behavior, Rehabilitation Psychology, Aging and Counseling Psychology. Students are exposed to practical and project work in addition to field studies. The department earned UGC-SAP (1990-1995) in the thrust area of life span developmental psychology with an emphasis on aging & DRS-I 2011-2016 & II 2017-2022) with special emphasis on Health and Aging. The department successfully completed 33 projects funded by UGC, ICSSR, ICMR and in collaboration with foreign agencies like ESRC, UK. The department conducted 4 exhibitions in 1961, 1967, 1977 and 1986 to popularize the strength and importance of the Psychology Department. The department successfully organized many international and national conferences. The Department has a Counseling Center to cater the needs of the students and public in general. 187 students have obtained their Ph.D., Degree and the department has published 598 articles in national and international journals

Vision

- To develop skillful and qualified psychologists by providing theoretical and experimental learning in all applied areas of Psychology to disseminate the knowledge to the community for a healthy society.

Mission

- To help the students' masters and keep abreast the knowledge in all fields of psychology.
- To equip the students with different techniques to apply in the field essentially and develop their career accordingly
- To support research and areas of research necessary for the advancement of knowledge in all discipline
- To analyze their strength and promote self-esteem confidence and well-being through education and support services.

Programme Specific Outcomes

- Students acquire enhanced knowledge of the fundamental concepts of Psychology and its applications from each other.
- Understand the principles and practices of advanced psychology and gain expertise in the field of behavioural sciences
- Students will be able to relate the physical and psychological determinants relevance to the human behaviour
- Understand the advanced aspects of new trends in Psychology such as evolution & biological psychology

Programme Objectives

- Students will gain necessary knowledge and develop specialized skills in the different areas of psychology .
- Students will think, predict, evaluate critically and analyse the human behaviour with the help of psychological applications to cater the needs of Local al and global problems.
- Students will be able to implement the scientific skills for development of educational, vocational , adolescent , family , different organisations etc.,

Programme Outcomes

Upon completion of the M.Sc. Psychology programme, the candidate should be able to:

No.	Programme Outcomes
PO1	**Scientific knowledge**: To apply the knowledge of Psychology, management , education sociology social work and linguistics.
PO2	**Problem analysis**: To identify, formulate, review literature, and analyze scientific problems in reaching conclusions using first principles of behavioral sciences and related other sciences
PO3	**Investigation**: To apply the knowledge based on research and related methods, including design of experiments, data collection, analysis and interpretation to provide valid conclusions
PO4	**Design & Development**: To plan, design and develop experiments to measure the experimental/survey/ observation data taking the safety and environmental considerations
PO5	**Modern tool usage**: To select standardized/ updated psychological testing material for investigating the identified problem with an understanding of its limitations.
PO6	**Psychologist & Society**: To asses and solve the problems related to societal, health and safety issues using the professional skills learned.
PO7	**Environment and sustainability**: To demonstrate the knowledge acquired for understanding the environmental issues and evolve methods for sustainable development.
PO8	**Ethics**: To understand ethical principles, professional ethics and responsibilities, and apply to solve Psychological/societal problems.
PO9	**Individual & Team work**: To function effectively as an individual / member of a team / team leader to solving different issues,
PO10	**Communication**: To effectively communicate on various issues particularly with

	psychosocial problems /community problems with in society, writing of reports and design of presentations.
PO11	**Project Management and Finance:** Acquire basic and advanced skills in various fields of psychology for self-employment and entrepreneurship
PO12	**Lifelong learning**: To recognize the importance of learning process throughout the life in view of psychological changes that occur from time-to-time.

Program Educational Objectives

1. Exposure of students to theory & practical knowledge and to provide them systematic tools of traditional and modern types to acquire this knowledge and skill.
2. To update the syllabus essential for appearing in NET, SET and other competitive exams of UPSC and APPSC.
3. To make aware the students to know the psychological resources of country, to utilize by sustainable methods and conservation of living resources.
4. To develop trained and knowledgeable human resource for educational and research institutions and industries; to use this human resource for self reliant India.
5. To develop self employable ability and to apply knowledge for several sectors such as schools, industries, clinical setting; it will also provide employment to other dependents.

Semester-I

Sl. No.	Course Code	Title of the Course	Core / Foundation / Elective	Hours of Teaching	No. of Credits	Marks		Total
				Theory Practical		IA	SEE	
1.	PSY 101	General Psychology-I (CC)	Core	6	4	20	80	100
2.	PSY 102	Social Psychology (CC)		6	4	20	80	100
3.	PSY 103	a. Psychopathology-I (CF) b. Psychological Measurement-I(CF) c. Positive Psychology (CF)	Compulsory Foundation	6	4	20	80	100
4.	PSY 104	a. Child Development Psychology b. Psychological Measurement & Statistics c. Forensic Psychology		6	4	20	80	100
5.	PSY 105	Paper 1 & 3	Practical-I	6	4	--	--	100
6.	PSY 106	Paper 3 & 4	Practical-II	6	4	--	--	100
			Total	36	24	120	480	600

Semester-II

Sl. No.	Course Code	Title of the Course	Core / Foundation / Elective	Hours of Teaching	No. of Credits	Marks		Total
				Theory Practical		IT	SEE	
1.	PSY 201	General Psychology -II (CC)	Core	6	4	20	80	100
2.	PSY 202	Applied Social Psychology-(CC)		6	4	20	80	100
3.	PSY 203	a. Psychopathology-II(CF) b. Psycho-Diagnosis (CF) c. Computer Application in Psychological Research-(CF)	Compulsory Foundation	6	4	20	80	100
4.	PSY 204	a. Life Span Development Psychology : Infancy to Adolescence (Prenatal to Adolescents) b. Consumer Behavior c. Industrial & Organizational Psychology	Elective Foundation	6	4	20	80	100
5.	PSY 205	Paper 1 & 3	Practical-I	6	4	--	--	100
6.	PSY 206	Paper 3 & 4	Practical-II	6	4	--	--	100
			Total	36	24	120	480	600

Semester-III

Sl. No.	Course Code	Title of the Course	Core / Foundation / Elective	Hours of Teaching	No. of Credits	Marks		Total
				Theory Practical		IT	SEE	
1.	PSY 301	Counseling Psychology (CC)	Core	6	4	20	80	100
2.	PSY 302	Psychology of Personality (CC)		6	4	20	80	100
3.	PSY 303	a. Organizational Behavior & HRM (GE) b. Therapeutic Approaches in Counseling-I c. Health Psychology(GE)	Generic Elective	6	4	20	80	100
4.	PSY 304	Core & Generic Elective	Practicals	6	4	--	--	100
5.	PSY 305	Stress Management Theory & Practical	Skill Oriented	6	4	10	90 (40+50)	100
6.	PSY 306	Personality Development (OE)	Open Elective	6	4	20	80	100
			Total	36	24	120	480	600

Semester-IV

Sl. No.	Course Code	Title of the Course	Core / Foundation / Elective	Hours of Teaching	No. of Credits	Marks		Total
				Theory Practical		IT	SEE	
1.	PSY 401	Therapeutic Approaches in Counseling-II(CC)	Core	6	4	20	80	100
2.	PSY 402	Theories of Personality (CC)		6	4	20	80	100
3.	PSY 403	a. Research Methodology-(GE)	Generic Elective	6	4	20	80	100
		b. Organizational Development (GE)						
		c. Rehabilitation Psychology (GE)						
4.	PSY 404	Core & Generic Elective	Practicals	6	4	--	--	100
5.	PSY 405	As per allotment (Theory and Practice)	Project work	6	4	--	--	100
6.	PSY 406	Life Skills (OE)	Open Elective	6	4	20	80	100
			Total	36	24	80	320	600

Semester – I

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-101	**GENERAL PSYCHOLOGY-I**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the concepts and scope of psychology
b. To comprehend the biological basis of behavior
c. To study the perception and sensation
d. To understand the concepts and learning theories

Unit – I: Psychology as Science

a. Definition, Nature, Scope and Aims of Psychology
   Historical Origins -The rise of Experimental Psychology.
b. The Emergence, development and decline of the Schools of Psychology.
   Basic and Applied Fields of Psychology.
   Methods of Study – Observation method, Experimental method,
   Survey and Case study method.

Unit – II: Biological Basis of Behaviour

a. Genetic perspective – Chromosomes, DNA, Genes Dominant – Recessive Genes Principle.

   The Evolutionary Perspective – Natural Selection
   The Environmental perspective – Principle of learning - Nature and Nurture controversy.

b. Nervous System: Basic unit and divisions of Nervous system – Localization of brain functions. Endocrine System: Pituitary, Adrenaline, Thyroid, Parathyroid, Gonads and Pancreas. Receptors, Connectors, Effects and Adjuster mechanisms.
Sensory process – Senses and sensory organs, general characteristics of Senses and Sensory thresholds, Subliminal Perception, Signal Detection Theory.

Unit – III: Perceptual Process

a. Relationship between sensation and perception, Approaches to perception – Gestalt, information Processing approach, the Cognitive approach, Integrative approach. .

b. Perceptual experiences – Visual space perception, Perceptual constancies; Perceptual movement. Errors in perception, Perceptual Defence and Vigilance,
Factors influencing perception – Learning, motivation, values and socio economic status, culture and perception.

Unit – IV: Learning:

a. Nature and definition of Learning
Experimental approaches to learning – Connectionist and Cognitive

b. Brief discussion of learning theories, Pavlov, Thorndike, Skinner, Hull, Tolman and Miller.

Measurement in learning and learning curves
Transfer of training of education and transfer, experimental analysis of transfer of training, stimulus and response similarly.

Motor and verbal learning - Motor skills, distribution of practice, warm up, patterns of movement & knowledge of results.

References:

1. Boring, E.G (1950). History of Experimental Psychology. New York: Appleton-Century – Crofts ,
2. Carlson, N.R. (1977). Physiology of Behaviour, Boston: Allyn and Bacon.
3. Dennis Coon, (2006). Psychology: A Modular approach to Mind and Behaviour, USA: Thomson Higher Education.
4. Hilgard, E.R, Atkinson, R.C. & Atkison, R.R., (1976). Introduction to Psychology (6th edition), New Delhi: Oxford and IBM Publishing Company Private Limited.
5. Kendler, H.H. (1975). Basic Psychology, (3rd edition), London: *Addision* – Wesley Publishing, Company.
6. Nolen-Hoeksema, Fredrickson, Loftus & Wagenaar (2009). Atkinson and Hilgard's Psychology – An Introduction. New Delhi: Cengage Learning India Pvt. Ltd.
7. Parameswaram, E.G. & Beena, C. (1988). An Invitation to Psychology (First edition), New Delhi: Tata Mc Graw Hill Publishing Company Limited.
8. Ralph Norman Haber (1968). Contemporary Theory and Research Visual Perception, New York: University of Rochester.
9. Robert S. Feldman (2011). Understanding Psychology (10th Edition). New Delhi: Tata – McGraw Hill Education Pvt. Ltd.,
10. Ruch, F.L. (1970). Psychology and Life, Bombay: D.B. Taraporevala Sons and Company Pvt. Ltd.

Outcomes:

1. Understood the concepts and scope of psychology
2. Comprehended the biological basis of behavior
3. Studied the perception and sensation
4. Understood the concepts and learning theories

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	1	2	3	-	3	3	2	-	2
CO_2	3	3	2	1	1	3	-	2	3	2	-	2
CO_3	3	3	3	1	2	3	-	3	3	2	-	3
CO_4	3	2	3	2	1	2	-	2	3	3	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-102	**SOCIAL PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the concepts of social psychology
b. To comprehend the social perception and cognition.
c. To study the socialization
d. To understand the meaning and theories of attitudes

Unit – I: Introduction

a. Definition, understanding social behaviour

   Historical origins; relationship with other social sciences
b. Research methods in social psychology: Field, Observation, Experimental, Survey.

Unit – II: Social Perception and Social Cognition

a. Person perception and object perception; Bem's theory of self perception. Social perception; communication; social interaction.

b. The process of attribution; Kelley's theory of causal attribution: Major sources of bias; practical applications of attribution theory.

   Social Cognition – Major cognitive strategies: affect and cognition, self awareness, applications of self awareness.

Unit – III: Socialization

a. Definition and goals of socialization, socialization process; the context of socialization

b. Social motives: Sex role identity, agencies of socialization, the development of self concept, self evaluation.

Theories of Moral development (Piaget & Kohlberg).

Unit – IV: Attitudes

a. Formation of attitudes, Components of attitudes, functions of attitudes, the link between attitudes and behaviour.

b. Attitude scales: Likert, Thurston, Bogardas scales; Measurement: Self report and other techniques.

Theories of Attitude formation and change: Balance theory, congruity theory, and cognitive dissonance theory.

References:

Akbar, Hussain (2012). Social Psychology, New Delhi: Dorling Kindersley Pvt. Ltd.

Baron, R.A., & Byrne, D. (1988). Social Psychology; Understanding Human Interaction, New Delhi: Prentice – Hall of India Pvt. Ltd.,

Robert, A. Baron, Nyla, R. Branscome, Donn Byrne & Gopabharadwaj (2009). Social Psychology, New Delhi, Pearson Publication

Seidenberg, B., & Sandowsku, A. (1976). Social Psychology, An Introduction. Stuttgart: The Free Press, Macmillan Publishing Co. Inc.,

Outcomes:

1. Understood the concepts of social psychology
2. Comprehended the social perception and cognition.
3. Studied the Socialization
4. Understood the meaning and theories attitudes

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	1	2	3	1	3	3	3	-	3
CO_2	3	3	2	1	1	3	-	2	3	3	-	3
CO_3	2	3	3	1	2	3	1	3	3	3	-	3
CO_4	3	2	2	2	1	3	-	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-103a	**PSYCHOPATHOLOGY-I**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the meaning abnormal behavior and historical and current trends
b. To comprehend the models of abnormal behaviour and approaches to therapies
c. To know the classification and assessment of abnormal behaviour
d. To evaluated different approaches to therapies for abnormal behaviour

Unit – I: Abnormal Psychology

a. Meaning and Definitions of Psychological abnormality.
   Criteria of normality and abnormality.
b. Historical - How abnormality viewed and treated in the past: Current trends.

Unit – II: Models of Abnormality

a. Biological model; Psychodynamic model
b. Behaviouristic model; Cognitive model
   Humanistic – Existential and Socio-cultural model

Unit – III: Classification and Assessment

a. Clinical Assessment and Diagnosis
   Classification of Psychological Disorders – DSM V; ICD.10.
b. Causes of abnormal behaviour; Biological, Psych-social and Socio Cultural factors.

Unit – IV: Approaches to Therapies

a. Biological therapy: Chemo therapy, Electro therapy, Brain –wave therapy
b. Psychosocial Approaches to therapy; Psychoanalytic therapy, Behaviour therapy, Humanistic – Existential therapies, Interpersonal therapy, Transactional Analysis and

Group Therapy, Socio-cultural approaches to therapy; Current issues and trends in Treatment.

References:

Arun Kumar (2006). Abnormal Psychology. New Delhi: ANMOL Publications Pvt. Ltd.

Carson. Butcher Mineka (2003). Abnormal Psychology and Modern life, (XI edition). Singapore: Pearson Education Pvt. Ltd.,

Irwin G. Sarason & Barbara R. Sarason (2009). Abnormal Psychology, (XI Edition), New Delhi: PHI Learning Pvt., Ltd.,

James, N. Butcher, Susan Mineka & Jil M. Hooley (2011). Abnormal Psychology – Core Concepts (Second edition). New York: Allyn & Bacon Pearson Education, Inc.

Lauren B. Alloy, John, H. Riskind & Margaret J. Manos (2005). Abnormal Psychology, (IX edition) New Delhi: Tata McGraw Hill Publishing Co. Ltd.,

William J. Ray (2015). Abnormal Psychology – Neuroscience Perspectives on Human Behaviour and Experience. New Delhi: Sage Publications.

Outcomes:

1. Understood the meaning abnormal behavior and historical and current trends
2. Comprehended the models of abnormal behaviour and approaches to therapies
3. Learned about classification and assessment of abnormal behaviour
4. Able to evaluate different approaches to therapies for abnormal behaviour

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	-	2	2	-	2	-	-	-	2
CO_2	3	3	2	-	-	2	-	2	-	-	-	1
CO_3	3	3	3	-	-	3	-	1	-	-	-	2
CO_4	3	2	3	-	-	3	-	-	-	1	-	-

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-103b	**PSYCHOLOGICAL MEASUREMENT-I**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the assessment and psychological measurements
b. To comprehend the development of psychological tests and principles of test construction.
c. To know the Principles of Test Construction
d. To understand the test Development and test Standardization Procedures

Unit – I: Psychological Measurement

a. Introduction – Psychological Assessment and Psychometrics – Nature, Psychophysical Measurements – Psychophysical Theory-Psychophysics and Sensory limens, Psychophysical laws.

b. Modern Psychophysics – Psychological Scaling methods – Rating scales – Attitude Scales

Unit –II: Developments in Psychological Measurement

a. Early History of Psychological Measurement – Psychophysics – Mental Testing – Contributions of Galton and Binet; Interest in the mentally deficiency; Later Developments; Contemporary Status of Psychological Measurement.

b. The Psychological Test: Definition, Types – Factors influencing test performance – Test administrative procedures – Testing conditions – rapport, examiner effects, situational variables – test anxiety.

Ethical and Professional Concerns in Testing – Control in the use of Psychological tests; Sources of Psychological tests.

Unit – III: Principles of Test Construction

a. Test Formulation – Content selection - Item writing – Item analysis – Objectives and use of Item analysis; Item Difficulty; Item validity, Item discrimination – Item reliability – Internal consistency.

b. Reliability – basic concepts, methods of test reliability – reliability of speed & power tests – Special problems in reliability.

   Validity – basic concepts, methods of test validity – general problems.

Unit – IV: Test Development and Test Standardization Procedures

a. Basic steps in Test development: Instructions in Test Administration

b. Development of Norms – Types of norms – Interpretation of Test scores – Statistical Indices – Computers usage in Testing.

References:

1. Anastasi, A. (2005). Psychological Testing, New Delhi: Pearson Education Pvt. Ltd.,
2. Cronbach, L.J. (1970). Essentials of Psychological Testing. New York: Harper & Row.
3. Freeman R.S. (1966). Psychological Testing, 3rd Edition, New Delhi: Oxford IBH Co. Pvt. Ltd.,
4. Guilford, J.P. (1989). Psychometric Methods, New Delhi: Tata McGraw Hill Publishing Co. Ltd.
5. Keith Coaley (2014). An Introduction to Psychological Assessment & Psychometrics, Singapore: Sage Publications Asia Pacific Pvt. Ltd.,
6. Thomas A. Stetz, Leslie A. Miller & Robert L. Lovler (2016). Student Study Guide for Foundations of Psychological Testing. New Delhi: Sage Publications.

Outcomes:

1. Understood the assessment and psychological measurements
2. Comprehended the development of psychological tests and principles of test construction.
3. Learned the Principles of Test Construction
4. Understood the test Development and test Standardization Procedures

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	1	3	3	3	1	3	2	2	-	2
CO_2	3	3	3	2	3	1	2	2	-	3	-	2
CO_3	3	3	3	3	3	3	1	1	-	3	-	2
CO_4	3	3	3	3	2	2	2	-	-	2	-	1

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-103c	**POSITIVE PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

1. To understand the human strength of positive psychology
2. To acquaint students with positive subjective states and processes
3. To enable students to appreciate importance of positive Individual Traits
4. To understand the Positive behaviour in Institutions

Unit-1: Introduction to Positive Psychology

a. Need for a science of human strengths and virtues
b. Deconstruction of illness ideology and inclusion of human strengths
c. Positive Psychology: Assumptions, Goals and Definitions
d. History of positive psychology; three pillars of positive psychology

Unit-2: Positive Subjective States

a. Model of well-being
b. Subjective well-being and positive emotions
c. The flow experience
d. Positive Emotions; Optimism and Hope

Unit-3: Positive Individual Traits

a. Love and self-compassion; self-efficacy
b. Creativity &Wisdom
c. Purpose, courage and resiliency

d. Empathy and Altruism

Unit-4: Positive Institutions

a. Positive schooling

b. Health and wellness; aging well and role of family

c. Psychology of forgiveness for healthy society

d. The Me/We balance: Building better communities

References

1. Lyubomirsky, S. (2013). The myths of happiness: What should make you happy, but doesn't, what shouldn't make you happy, but does. New York, NY: Penguin.
2. Mahrer, A. R. (2009). The optimal person. Laval, QC: Howard Gontovnick Publications. Metz, T. (2013). Meaning in life. New York, NY: Oxford University Press
3. Ungar, M. (2008). Resilience across cultures. British journal of social work, 38(2), 218-235.
4. Badhwar, N. K. (2014). Well-being: Happiness in a worthwhile life. New York, NY: Oxford University Press.
5. Oxford Handbook of Positive Psychology and Work Edited by Nicola Garcea, Susan Harrington, and P. Alex Linley.
6. Huy P. Phan and Bing H. Ngu (2017). Positive Psychology: The use of the Framework of Achievement Bests to Facilitate Personal Flourshing. In "Quality of Life and Quality of Working Life", book edited by Ana Alice Vilas Boas.

Outcomes:

1. Understood the human strength of positive psychology
2. Acquainted students with positive subjective states and processes
3. Enabled students to appreciate importance of positive Individual Traits
4. Understood the Positive behaviour in Institutions

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	1	-	-	3	2	2	2	3	-	2
CO_2	3	2	2	1	-	3	2	2	2	2	-	2
CO_3	3	2	2	-	-	3	2	2	-	2	-	2
CO_4	3	2	2	-	-	3	3	2	-	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-104a	**CHILD DEVELOPMENT PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To expose the student to the basics of Child Development
b. To help student understand research in child development
c. To understand the biological development of a child
d. To evaluate personality development of a child

Unit-I: Child development

Nature of child development: the field of child development , Domains of child development, Periods of child development , The psychoanalytic perspective ,Behaviorism and social learning theory, Piaget's cognitive-developmental theory

Unit-II: research in child development

Research strategies in child development, Systematic observation, Self-Reports interviews and questionnaires, Psycho-physiological methods, The clinical or case study method, Methods for studying culture

Unit-III: biological development

Foundations of Development, The genetic code, the sex cell, Patterns of Genetic inheritance, Child birth, Approaches to children, Birth complications, Oxygen deprivation, Preterm and low-birth weight infants Motor and perceptual development in infancy, the course of physical development, factors affecting physical growth

Unit-IV: personality development

Personality and social development , Emotional development, Functions of emotions, Emotions and cognitive processing, Development of emotional expression Happiness, anger and sadness, fear, self-conscious emotions, Emergence of self and development of self concept, Self-esteem, structure, changes if level of self–esteem , Social problem solving, Training social problem solving

Reference

1. John W. Santrock : Life-Span Development
2. Laura E. Berk : Child Development seventh edition
3. Child Development and Adjustment Lester D.Crow and Alice crow surjeet publications.

Outcomes:

1. Exposed the students to the basics of Child Development
2. Helped the student understand research in child development
3. Understood the biological development of a child
4. Able to evaluated personality development of a child

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	-	3	-	-	3	1	2	-	-	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	2	2	1	2	3	2	2	2	1	-	2
CO_4	3	3	2	2	2	3	2	2	-	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-104b	**PSYCHOLOGICAL MEASUREMENTS AND STATISTICS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To become acquaint with intelligence and achievement tests
b. To learn the measurement of personality tests
c. To understand the Statistics for Psychological Measurement
d. To know the Distribution of Scores on Variables

Unit- I: Intelligence and Achievement Tests

a. Intelligence Tests – Definition, Binet's Scales; Wechsler Scales (WISC, WAIS); Individual Vs. Group tests; Verbal Vs. performance Scales of intelligence; Intelligence tests as clinical instruments; Multifactor Test Batteries

   Tests of Intellectual Impairment

   Achievement Test – Definition; Characteristics of Achievement Tests; Achievement Tests for Special Areas.

b. Special Abilities – Definition of Aptitude, Motor and Manual tests; DAT Battrey, Multiple Aptitude Test Battery, Special Aptitude tests; Evaluation of Aptitude test.

   Tests of interests, Values and Attitudes.

Unit – II: Personality Tests

a. Self Report Measures - Personality Inventories - 16 PF, MMPI, CPI; EPI (Eysenck).

b. Projective Tests – Thematic Apperception test, Children Apperception test, Rorschach Ink Blot test, Picture Arrangement test, Rosenzweig Picture Frustration test, CAT.

Situation Tests: Semantic Differential, Socio-metric methods, Psychodrama.
Neuropsychological Tests as diagnostic tools.

Unit – III: Statistics for Psychological Measurement

a. Introduction to statistics – Importance in Psychological Measurement.

b. Measures of Central Tendency of scores, Measures of Variation of scores, Measures of Associations, Multi Variate statistical methods.

Unit – IV: Distribution of Scores on Variables

a. Graphic Representation of test data
b. Frequency distribution – Normal Probability Curve (NPC)
Tests of significance of Some Statistics
Use of Statistical Packages – SPSS in psychological research.

References:

Anastasi, A. (2005). Psychological Testing, New Delhi: Pearson Education Pvt. Ltd.,

Cronbach, L.J. (1970). Essentials of Psychological Testing. New York: Harper & Row.

Freeman R.S. (1966). Psychological Testing, 3rd Edition, New Delhi: Oxford IBH Co. Pvt. Ltd.,

Guilford, J.P. (1989). Psychometric Methods. New Delhi: Tata McGraw Hill Publishing Co. Ltd.

Keith Coaley (2014). An Introduction to Psychological Assessment & Psychometrics, Singapore: Sage Publications Asia Pacific Pvt. Ltd.,

Leslie A. Miller, Robert L. Lovler & Sandra A. Mclntire (2013). Psychological Testing. New Delhi: Sage Publications.

Milter, L.A., Lovler, R.L., & McIntire, S.A. (2013). Psychological Testing – A Practical Approach, New Delhi: Sage Publications Pvt. Ltd.,

Ramamurti, P.V. (2014). An Introduction to Psychological Measurements, New Delhi: PHI Learning Pvt. Ltd.,

The Mental Measurement Year Book, Baros (Latest).

Thomas A. Stetz, Leslie A. Miller & Robert L. Lovler (2016). Student Study Guide for Foundations of Psychological Testing. New Delhi: Sage Publications.

Outcomes :

1. The students acquainted with intelligence and achievement tests
2. The students learned the measurement of personality tests
3. They are clear in understanding the Statistics for Psychological Measurement
4. They have knowledge on Distribution of Scores on Variables.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	3	2	1	3	-	2	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	3	3	2	2	2	2	2	-	2	-	2
CO_4	3	3	3	2	2	1	1	1	1	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-104c	**FORENSIC PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To expose the student to the basics of forensic Psychology
b. To help student understand the concept of psychology of Crime
c. To acquaint the students on psychological investigation of Crime
d. To understand psychology of violence

Unit-I : Introduction to Forensic Psychology:

Historical overview, Functions of Forensic Psychologists, Psychology and law.

Unit-II : Psychology of Crime:

Developmental Theories and Psychobiological bases of crime, Risk Assessment & Violence Prediction, Eyewitness Testimony and Expert Testimony.

Unit-III : Psychological Investigation of Crime:

Scientific Lie Detection: Polygraph, Verbal & NonVerbal Cues, Hypnosis and Narcoanalysis, Behavioural Analysis; Understanding the criminal personality- antisocial personality, psychopath & sociopath; Personality Profiling

Unit-IV: Psychology of Violence:

Workplace and domestic violence, Child Abuse, Victim Psychology, Correctional Psychology: Recognizing the suffering: Rape Trauma Syndrome and Post traumatic Stress Disorder, Coping with criminal victimization, rehabilitation of victim and offender

References:

1. Bartol, C. R. &Bartol, A. M. (2004). Introduction to forensic psychology. Thousand Oaks, CA: Sage Publications.
2. Brown, J. M., & Campbell, E. A. (Eds.) (2010). The Cambridge handbook of forensic psychology. Cambridge, England: Cambridge University Press.
3. Costanzo, M. & Krauss, D. (2010).Legal and forensic psychology. New York: Worth Publishers.
4. G., Hollin, C., & Bull, R. (Eds.) (2008). Forensic Psychology. Chichester, England: John Wiley & Sons, Ltd.
5. Huss Matthew T. (2009). Forensic psychology: Research, clinical practice, and applications. West Sussex, UK: Wiley-Blackwell.
6. Joanna R. Adler, Jacqueline M Gray (Eds) (2010) Forensic psychology, N.Y.: William Publishing,
7. Towl, Graham J., &Crighton,David A. (Eds) (2010) Forensic psychology, West Sussex: N.J. John Wiley & Sons Ltd.
8. Weiner, Irving B. & Hess, Allen K. (Eds) (2006) Handbook of Forensic Psychology, N.J. John Wiley & Sons L

Outcomes:

1. Exposed the student to the basics of forensic Psychology
2. Students understood the concept of psychology of Crime
3. They acquainted knowledge on psychological investigation of Crime
4. Students understood psychology of violence of various forms.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	2	-	-	2	-	2	1	2	-	-
CO_2	3	3	3	-	-	2	2	2	-	-	-	2
CO_3	3	3	3	2	2	2	2	3	2	2	-	2
CO_4	3	3	3	-	-	3	2	3	2	2	-	-

Semester - II

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-201	**GENERAL PSYCHOLOGY – II**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

1. To understand fundamentals of motivation and emotion
2. To understand basic concepts of memory and forgetting
3. To comprehend the thinking and intelligence
4. To evaluate the personality of individuals

Unit – I: Motivation and Emotion

a. Historical antecedents of motivation from mechanism to cognition. Motivation sequence and motivational concepts – instinct, drive, motive and incentive. Physical and Psycho - social motives – A brief study of motivational theories – Freud, Mc Dougall, Maslow, S-R and Cognitive. Measurement of Motivation – Issues and techniques – cross cultural perspective of motivation.

b. Emotions – nature, development, differentiation and expression of emotions, physiological basis of emotion. Brief review of theories of emotion – Physiological – James – Lange theory, Cannon Bard theory, Behavioural facial feedback theory and Schachter two factory theory and cognitive appraisal theory of emotion. Measurement of emotions – Physiological, expressive and cognitive measures.

Unit – II: Memory and Forgetting

a. Models of memory – information processing model – sensory memory, short – term memory, long –term memory, encoding, storage and retrieval.

b. Factors influencing memory – Repetition, meaningful learning, whole Vs part learning, massed and spaced practicing, Motivation, feed back and passage time Measurement of Memory – study habits, mnemonic devices, Nature of forgetting, theories of forgetting: Interference theory, motivation theory, Decay theory, Trace-change theory.

Unit – III: Thinking

a. Nature and tools of thinking, Tools of thinking – images and types of image
   Concepts – development and process of concept formation and types of concepts. Language – Structure of language, acquisition of language and the relationship between language and thinking.

b. Varieties of thinking: Reasoning – inductive and deductive reasoning. Problem solving – types of problem solving – trial and error, insight, algorithms. Heuristics steps and impediments in problem solving. Critical thinking, Inference and pittals. Piaget model of cognitive development.

Unit – IV: Intelligence and personality

a. Nature and distribution of intelligence
   Differences in intelligence – individual, gender and racial factors, Influence of heredity and environment – Assessment, Theories of Intelligence – Spearman, Thurston, Stenberg and Gardner.
b. Personality: Definition, Nature & Development, determinants of personality. Classification of personality (type & trait) and measurement.

References:

1. Bemard Weiner, (1972). Theories of motivation from mechanism to cognition. Los Angeles; Noida: Rand Mcnally
2. Eva Dreikurs Ferguson (1975). Motivation an experimental approach. Edwerdsville: Southern Illinois University
3. Goleman, Daniel (1998). Working with Emotional intelligence. New York: Banatain books.
4. Hilgard, E.G. Atkinson R.C., & Atkinson R.R. (1976). Introduction to Psychology, (6th edition). New Delhi: Oxford & IBM Publishing Company Private Limited,

5. Kendler. H.H (1975). Basic Psychology (3rd Edition). London: Addison – Wesley Publishing Company.
6. Parameswaram, E.G. & Beena, C. (1988), Invitation to Psychology, (First edition) – New Delhi : Tata Mc Graw Hill Publishing Company Ltd,.
7. Robert Plutachik, (2010) Emotion: A Psycho Evolutionary Synthesis, New York: Harper & Row Publishers.
8. Ruch, F.L (1970). Psychology and life. Bombay: D.B: Taraporevala sons and Company Pvt. Ltd.,
9. Sdorow, Lester (2012). Psychology. Iowa Brown Publishers Duduque.

Outcomes:

1. The students understood the fundamentals of motivation and emotion
2. They understood the basic concepts of memory and forgetting
3. Comprehended the thinking and intelligence
4. Able to evaluated the personality of individuals

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	1	-	-	3	3	2	-	3	-	3
CO_2	3	3	2	-	-	2	-	2	-	2	-	3
CO_3	3	3	2	2	2	2	2	3	2	2	-	3
CO_4	3	3	2	2	2	3	2	3	2	2	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-202	**APPLIED SOCIAL PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the Social Influence
b. To acquaint with social exchange process in social behaviour.
c. To comprehend the prejudice and discrimination
d. To understand what is psychological groups and individuals.

Unit – I: Social Influence

a. Forms of Social influence: Conformity, compliance and obedience Asch's experiments on conformity; factors affecting conformity; the bases of conformity.

b. Compliance: Tactics used in compliance; Ingratiation, reciprocity and multiple requests, guilt and compliance. Obedience: Milgram's Studies on destructive obedience, resisting the effects of destructive obedience, modeling as a basis for unintentional social influence.

Unit – II: Social Exchange Process

a. The nature of co-operation and competition, bargaining and negotiation, resolving interpersonal conflicts through bargaining; perceived fairness in social exchange; equity and inequity, factors for restoring fairness in social exchange.

b. Prosocial behaviour: altruism: Characteristics influencing altruism, theories of altruism: reinforcement theory, cognitive theory: Bystander effect, explanations, the characteristics of the helper and the helpee; Interpersonal attraction and love: Types of love. Determinants of attraction: physical attractiveness, attitude, similarity and reciprocity.

Unit – III: Prejudice and Discrimination:

a. Sources of prejudice. Combating prejudice, sex & gender prejudice: nature and origin, discrimination against women.

b. Aggression and Violence. Theoretical perspectives, social and cultural determinants of aggression; individual determinants, prevention and control of human aggression.

Unit –IV: Groups and Individuals

a. Groups: Nature and functions: group formation, how groups function: roles, Status, norms and cohesiveness; groups and task performance: Social Facilitation, Theories of Social Facilitation; Social Loafing, Decision making by groups.

b. Leadership: Definition, types of leaders, characteristics of a leader, functions of a leader, theories of leadership.

References:

Baron, R.A., & Byrne, D. (1988). Social Psychology; Understanding Human Interaction, New Delhi: Prentice Hall of India Pvt. Ltd.

Kulkarni, P.D. (1979). Social Policy and Social Development in India. Madras: Association of Schools of Social work in India.

Madison, B. (1980). The Meaning of Social Policy: Comparative Dimension in Social Welfare, London: Groom Hoim.

Misra, G. (1990). Applied Social Psychology in India. Sage publications India Pvt. Ltd.,

Pandey, J. (1980). (Ed.) Perspectives on Experimental Social Psychology in India, New Delhi: Concept Publishers.

Seidenberr, B. & Sandowky, A. (1978). Social Psychology: An Introduction. Stuttgart: The Free press, Macmillan Publishing Co. Inc.,

Sharma, P.N & Shastri, C. (1984). Social Planning: Concepts and Techniques, Lucknow: Print House.

Sinha, D., & Rao, H.S.R. (1988). Social values and Development, New Delhi, Sage Publications.

Outcomes:

1. Students understood about Social Influence
2. Acquainted with social exchange process in social behaviour.
3. Comprehended the prejudice and discrimination
4. To understand what is psychological groups and individuals.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	1	1	-	-	3	3	2	-	3	-	3
CO_2	3	3	2	-	-	2	-	2	-	2	-	3
CO_3	3	3	2	2	2	2	2	3	2	2	-	3
CO_4	3	3	2	2	2	3	2	3	2	2	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-203a	**PSYCHOPATHOLOGY-II**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To understand anxiety and mood disorders
b. To acquaint with somatic disorders.
c. To study Psychosis and Cognitive Disorders
d. To understand Psychological Disorders Across the Life Span

Unit – I: Anxiety and Mood Disorders

a. Generalized Anxiety disorders and phobias - Panic, Obsessive - compulsive disorders
b. Mood disorders – Suicide - Etiology and treatment

Unit – II: Psycho - Somatic Disorders

a. Stress-Coping and maladaptive behaviour, psychosomatic disorders, Eating disorders
b. Substance - related disorders, sexual disorders, Etiology and treatment

Unit – III: Psychosis and Cognitive Disorders

a. Schizophrenia and sub types, Cognitive disorders : Amnesic disorders
b. Dementia: Delirium, etiology and treatment

Unit – IV: Psychological Disorders Across the Life Span

a. Personality disorders
b. Disorders of childhood, adulthood and old age, etiology and treatment

References:

Carson. Butcher Mineka (2003). Abnormal Psychology and Modern life (11th Edition). New Delhi: Pearson Education Pvt. Ltd.,

Irwin G.Sarason & Barbara R.Sarason (2009). Abnormal Psychology (XI edition). New Delhi: PHI Learning Pvt. Ltd.,

Lauren B. Alloy, John, H. Riskind & Margaret J. Manos (2005). Abnormal Psychology, (IX edition) New Delhi: Tata McGraw Hill Publishing Co. Ltd.,

William J. Ray (2015). Abnormal Psychology – Neuroscience Perspectives on Human Behaviour and Experience. New Delhi: Sage Publications.

Outcomes:

a. Understood anxiety and mood disorders
b. Acquainted with somatic disorders.
c. Studied Psychosis and Cognitive Disorders
d. Understood Psychological Disorders Across the Life Span

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	-	2	2	-	2	-	-	-	2
CO_2	3	3	2	-	-	2	-	2	-	-	-	1
CO_3	3	3	3	-	-	3	-	1	-	-	-	2
CO_4	3	2	3	-	-	3	-	-	-	1	-	-

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-203b	**PSYCHODIAGNOSIS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives

1. To get knowledge of psychological tests and their use in diagnosis.
2. To make students able to diagnose patients with the help of projective tests.
3. To get understanding of different diagnostic systems.
4. To Learn how to take case history of patients and to make differential diagnosis.

Unit -I : Psycho-diagnosis:

Introduction and rationale, factors influencing psychological testing pits all of psychological testing, Case-history and Mental status examination, Tests of Primary Mental Abilities: a) Attention and Concentration b) Perception c) Memory d) Thinking and Reasoning e) Intelligence

Unit-II : Tests of Differential Diagnosis

a) Tests of Thought Disorder b) Questionnaire for Differential Diagnosis c) Rating Scales

Unit-III : Personality Tests:

Rorschach Test, Interview and Adjustment Test.

Unit-IV : Neuropsychological Assessment:

Psycho-physiological Assessment: Assessment of psycho- physiological indices of arousal/anxiety (e.g. GSR, EMG and ECG) and to correlate with those of subjective reports of the same.

References

1. Sattler, J.M. (1982). Assessment of Children's Intelligence and Special Abilities, W.B. Sounders Co. Philadelphia.
2. Anastasi, A. (1968). Psychological Testing. McMillan, London.
3. Bellack, A.S. (Eds.) (1981). Behavioural Assessment: A practical Handbook, Pergamon.
4. Tallent (1983). Psychological Report Writing. Prentice-Hall, New Delhi.
5. Bender, L.A. (1938). Visual motor-Gestalt Test and its Clinical Use, American Orthopsychiaric Association Research Monograph (No. 3) New York: American Orthopsychiatric Association.
6. Hassnay, H.J. (Ed.) (1986). Experimental Techniques in Human Neuropsychology, New York: Oxford Press.
7. Exner, J.E. (1986). The Rorschach: A Comprehensive System: Volume 1. Basic Foundation (2nd ed.) New York: Wiley.
8. Exner, J.E. (1978). The Rorschach: A Comprehensive System: Volume 2. Current Research and Advanced Interpretation. New York: Wiley.
9. Exner, J.E. and Weiner, I.B. (1982). The Rorschach: A Comprehensive system: Volume 3. Assessment of Children and Adolescents. New York. Wiley.
10. Knoff, H.M. (Ed.) (1986). The Assessment of Child and Adolescent Personality. New York: Ginlford Press.
11. Green, Roger, L. (1991). MMPI: An interpretive manual, Massachusettes: Allyn and Bacon.
12. Beck, S.J. (1978). Roschach's test: 3rd revised edition, Vol. I, II & III, New York: Grune and Stratton.

Outcomes:

1. Acquired the knowledge of psychological tests and their use in diagnosis.
2. Students are able to diagnose patients with the help of projective tests.
3. Understood of different diagnostic systems.
4. Learned how to take case history of patients and to make differential diagnosis

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	3	2	1	3	-	2	-	2

CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	3	3	2	2	2	2	2	-	2	-	2
CO_4	3	3	3	2	2	1	1	1	1	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-203c	**COMPUTER APPLICATIONS IN PSYCHOLOGICAL RESEARCH**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives

a. To understand the basic components of computer
b. To know and working in Ms Office, power point and internet services.
c. To comprehend the application of computer knowledge through creating emails, scientific journals and data scoring
d. To be able to understand **Statistical Packages**

Unit – I: Introduction to Computers

a. Definitions – Basic components of computer –block diagram – Input / Output devices – Key board- Mouse and scanner – directories and sub-directories.
b. Evolution of Computer generations – Fundamentals in Computers

Unit – II: MS Office-I

a. MS word: Creating, Opening and saving files- Editing and formatting text- spell and grammar check- auto correct- creating of tables and columns- mail merge- word art- concept of a macro print preview.
b. MS PowerPoint: Creating power point slide- editing and formatting the presentation etc.,

Unit – III: MS Office-II & Internet Services

a. MS Excel: Work sheet- entering data and creating work sheets and work books- opening and saving workbooks- editing and formatting-sorting, filtering and pivot tables- creating graphs and charts- mathematical and statistical functions. MS accesses; opening and saving, features and data entry and usage.

b. Use of Internet Services – Creating e-mail- sending mails- browsing websites of Psychology, browsing scientific journals- search engines- data storing

Unit – IV: Statistical Packages

a. Use of Statistical Packages in Psychological Researches - Introduction to SPSS - What is SPSS – Purposes – Using the Windows in SPSS
b. SPSS Windows – SPSS file types – Creating and modifying Data Files – Data Modification – Descriptive Statistics – Inferential Statistics.

References:

Linda Hobbs Collier (2010). Essential Skills - Have You Used Yours Today? Skill Book - Practical Computer (Training Package) Use. Newfoundland and Labrador Laubach Literacy Council Inc.

Manfred T., Grotenhuis & Anneke Matthijssen (2016). Basic SPSS Tutorial. New Delhi: Sage Publications.

Manfred T., Grotenhuis & Chris Visscher (2014). How to use SPSS Syntax. New Delhi: Sage Publications.

Vinod Babu Bandari. (2012). Fundamentals of Information Technology including lab work.. New Delhi: Pearson. ITL-Educational Solutions Limited.

Outcomes:

1. Understood the basic components of computer
2. Acquainted with Ms Office, power point and internet services.
3. Comprehended the application of computer knowledge through creating emails, scientific journals and data scoring
4. Able to understand Statistical Packages and its application

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	3	2	1	3	-	2	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	3	3	2	2	2	2	2	-	2	-	2
CO_4	3	3	3	2	2	1	1	1	1	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-204a	**LIFE SPAN DEVELOPMENTAL PSYCHOLOGY: INFANCY TO ADOLESCENCE**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand human development
b. To become aware of infancy and babyhood
c. To comprehend the Early and Late Childhood and Adolescence.
d. To know the development of Adolescence

Unit – I: Human Development

a. Principles and factors of development; scope of life span development; periods of the human life span, Perspectives on human development; the mechanistic perspective, the organismic perspective, the psychoanalytic perspective and the humanistic perspective.

b. Fertilization; the mechanisms of heredity; heredity and environment; chromosomal abnormalities; prenatal diagnosis of birth defects; Prenatal influences, maternal nutrition, maternal drug intake and other maternal-factors; prenatal stages and characteristics.

Unit – II: Infancy and Babyhood

a. Infancy and babyhood: The birth process, birth complications, infancy; sub divisions, physical characteristics; major adjustments; physical and psychological development of infants, growth and motor development, environmental influences on motor development, mortality in infancy; early learning, classical conditioning, operant conditioning, habituation.

b. Intellectual development: The psychometric approach, Piagetian approach, Information processing approach, language and speech development.

Social and Personality Development: the psychosexual (Freud) and psychosocial (Erilkson) theories, emotions, the family's role in personality and social development; socialization developmental tasks; physical and psychological hazards

Unit – III: - Early and Late Childhood

a. Early childhood: Physical growth and motor development; childhood health and illness; sleep pattern and problems. Intellectual development: Piaget's pre-operational stage; language' early childhood; the development of social speech; schooling: preschool, benefits. Social and personality development: Theoretical perspectives on personality: Sigmund Freud, Erikson, effect of child-rearing practices on personality development. Play: social play and cognitive play, implications, Hazards of early childhood.

b. Late childhood:

Physical development, growth, motor development, intellectual development, Piaget's stage of concrete operations, moral development, Piaget's theory, Kohlberg's studies. Language development: Communication ability, measuring intelligence in school children, creativity in children. Children in School: the teachers influence, educating handicapped children, learning disability. Social and personality development, theoretical perspectives; Freud, Erikson; social groups, influences, self-concept in school children; the child in the family; emotional disturbances; Hazards of late childhood.

Unit – IV: - Adolescence

a. Physical development: physiological changes of adolescence, psychological impact of physical changes; health problems. Intellectual development: Piaget's stages of concept development, moral development: Kohlberg's stage of normal development;

b. Social and personality development: theoretical perspectives on personality development Hall, Freud, Erikson; the search for identity; Relationship with parents, peers, friends, sexual identity.

References:

Hurlock, E.B. (1980). Developmental Psychology - A Life span. Approach, New Delhi: McGraw Hill Inc.

Olds S.W. & Paplia, D.E. (1986). Human Development, New Delhi: Tata McGraw Hill Inc.

Goulet, L.R. & Baltes, P.B. (1970). Life span Developmental Psychology, New York: Academic Press Inc.

Bakes, P.B. & Brim, O.G. (1978). Life span development, New York: Academic Press, (Vol-I & Vol-lI).

Baltes, P.B & Schaie, K.W. (1973). Life span developmental psychology: Life Span Personality and Socialization. New York: Academic Press.

Lerner, R.M & Hultsch, D.P. (1983). Human Development. A life span perspective, New York: McGraw Hill Publications.

Outcomes:

1. To understood human development
2. The students became aware of infancy and babyhood
3. To comprehended the Early and Late Childhood and Adolescence.
4. The students are aware of the development of Adolescence

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	-	3	-	-	3	1	2	-	-	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	2	2	1	2	3	2	2	2	1	-	2
CO_4	3	3	2	2	2	3	2	2	-	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-204b	**CONSUMER BEHAVIOR**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To understand concept of consumer behaviour and market research
b. To comprehend the economic theory of buyer behaviour
c. To study the effect of psychological theories of motives
d. Advertisement - advertisement purposes-role of communication

Unit-I :

a. Motivation - Definition of motivation – motivation process – motivational implication and themes of motivation.

b. Consumer behavior and market research; definition of marketing - Types of markets.

Unit-II :

a. Economic theory of buyer behavior, psychological model – perception, learning attitudes, personality, psychographics (lifestyles) market research-approaches.

b. survey technique ; questionnaire survey method – experimental methods.

Unit-III :

a. Consumer buying motives – primary versus selective; product versus patronage

b. Motives Positive versus negative motives; emotional versus rational motives.

Unit-IV:

a. Advertisement - advertisement purposes-role of communication. Theme or appeal sale promotions; the objectives of sales promotion.

b. Features of salesmanship building the sales force, packaging & branding.

References

1. Consumer Behavior - Insights from Indian Market Majumudar Ramanuj, PHI, 2nd Edition.
2. Consumer Behavior, Blackwell and Engel, Cengage Publication, Indian Edition

Outcomes:

1. The students understood the concept of consumer behaviour and market research
2. Comprehended the economic theory of buyer behaviour
3. Studied the effect of psychological theories of motives
4. Acquainted with the advertisement - advertisement purposes-role of communication

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	3	2	-	2	2	3	3	2	-	2
CO_2	3	2	2	2	2	2	2	2	3	3	-	2
CO_3	3	2	2	-	-	2	2	2	-	2	-	2
CO_4	3	2	1	2	2	2	2	2	2	3	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-204c	**INDUSTRIAL AND ORGANIZATIONAL PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To understand the psychological, social and economic contribution in developing industrial psychology.
b. To comprehend the personal psychology
c. To know the selection, interviews and evaluation.
d. To comprehend the employment interview

Unit-I

a. The Economic, Social and Psychological Foundations of Industrial and Organizational Psychology.
b. Industrial Psychology its Scope, Methods, the Classical Hawthorne Studies

Unit-II

a. Personnel Selection Methods of Training
b. Job Analysis the structure and function of groups

Unit-III

a. Personnel Psychology, Concerns of personnel Psychology
b. Logic of selection and recruitment, the organization as a dynamic and developing system

Unit- IV

a. The employment interview: application Black and Psychological Tests

b. Evaluation of Personnel evaluation of Managers, Increasing organizational Effectiveness.

Reference :

1. E.J.Mc Cormick (1985) Introduction to Industrial psychology, ND: J. Wiley.
2. Edgar H. Schein (1983) Organisational Psychology (3rd Edition) Eastern, Economy Edition.Printice Hall of India, private limited , New Delhi-110001

Outcomes:

1. Understood the psychological, social and economic contribution in developing industrial psychology.
2. Comprehended the personal psychology
3. Have knowledge the selection, interviews and evaluation.
4. Comprehended the employment interview

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	-	2	2	3	3	2	-	2
CO_2	3	2	2	2	2	2	2	2	3	3	-	2
CO_3	3	2	2	-	-	2	2	2	-	2	-	2
CO_4	3	2	1	2	2	2	2	2	2	3	1	1

SEMESTER-III

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-301	**COUNSELLING PSYCHOLOGY-I**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives :

a. To understand the meaning of counseling and ethics in counseling
b. To comprehend the process of counseling and techniques
c. To understand the counseling process
d. To be acquainted with the counseling techniques

Unit- I: Introduction

a. Definition and Nature of Counseling. Historical development, goals and expectations of counseling - past and current status of counseling.
b. Counseling and guidance – its relation with psychotherapy, Social Work and Clinical Psychology - Limitations.

Unit –II: Counselee Characteristics - Ethics in Counselling

a. Characteristics of Counselee - Characteristics of an effective counselor, selection and training of counselors - The role and functions of counselors.
b. Legal and ethical considerations in counseling

Unit – III: Counselling Process

a. Counseling process - the Counseling set up - Structure and Influence of external conditions - phase of counseling.
b. Termination and follow up. Handling transference and resistance - Group counseling.

Unit-IV: Techniques

a. Counseling techniques – verbal and non-verbal techniques - tools of counseling, the psychological tests used in counseling.
b. Evaluation of counseling – Value orientations in counseling

References

Hansen. J.C. Stevis, R.R. & Warker. J.R. (1982). Counseling theory and process. New York: Allyn & Bacon.

Jacobs, Masson & Harvill (1998). Group Counselling Strategies & Skills. New York: Books / Cole Publishing Company.

Lewis & Lewis E.C. (1974). The Psychology of Counseling. New Delhi: Harper & Row.

Linda Seligman & Lourie W. Reichenberg (2011). Theories of Counselling and Psychotherapy - Systems, Strategies and Skills (Third Edition). New Delhi: PHI Learning Pvt. Ltd.

Mick Cooper & John McLeod (2011). Pluralist Counselling and Psychotherapy. New Delhi: Sage Publications

Narayana Rao, S. (1991). Counseling and Guidance (Second Edition) New Delhi: Tata McGraw Hill Publishing Company Ltd.,

Richard Nelson – Jones (2005). Introduction to Counseling skills, Texts & Activities, New Delhi: Sage Publications.

Richard Nelson-Jones (2011). Theory and Practice of Counselling & Therapy (5th Edition). New Delhi: Sage Publications Ltd.

Shertzer, B.S. Stone (1968). Fundamental of Counseling. CA: Houghton MifflinCo.,

Steffles & Grant, W.H. (1972). Theories of Counseling, New Delhi: Tata McGraw Hill.

Outcomes:

1. Understood the meaning of counseling and ethics in counseling
2. Comprehended the process of counseling and techniques
3. Understood the counseling process
4. Acquainted with the counseling techniques

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	2	2	3	2	3	-	3
CO_2	3	3	3	3	3	2	3	3	3	3	-	3
CO_3	3	3	3	2	2	3	1	2	2	3	-	3
CO_4	3	3	2	3	3	3	3	2	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-302	**PSYCHOLOGY OF PERSONALITY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To introduce nature of personality.
b. To realize the determinants of personality
c. To know the development of Personality.
d. To understand the Assessment of personality.

Unit – I: Definitions and Nature of Personality

a. Issues and approaches to personality - Personality Vs.

   Character, Personality Vs Individuality,

b. How Personality consciousness show itself, Is personality consistent?

Unit – II: Determinants

a. Determinants of Personality - Hereditary potentials, environmental factors, heredity Vs. social determinants - family, educational determinants;

b. Physical, intellectual, emotional, gender determinants

Unit – III: Development

a. Development of personality, early personality development, socialization – toilet training, sex typing
b. Mechanisms of socialization – identification

Unit – IV: Assessment

a. Assessment of personality, principles of assessment – standardization - reliability, validity, norms;

b. Techniques of assessment - direct and indirect case study method, personality tests psychometric test, projective tests.

References:

Guilford J.P. (1959). Personality. New Delhi: Mc Graw Hill Book Company Inc.

Hurlock E.B. (1976). Personality Development. New Delhi: Tata McGraw Hill Publishing Company.

Lazarus R.S. (1971). Personality (Second edition) New Delhi: Prentice – Hall Inc.

Stranger R. (1974). Psychology of Personality (Fourth edition), New Delhi: Tata McGraw Hill Publishing Company.

Outcomes:

1. Understood nature of personality.
2. Realized the determinants of personality
3. Found that the development of Personality.
4. Understood the Assessment of personality.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	1	2	1	2	3	-	3
CO_2	3	2	3	1	2	1	3	-	3	3	-	3
CO_3	3	3	2	2	2	3	1	2	2	3	-	3
CO_4	3	3	2	3	1	3	3	2	1	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-303a	**ORGANIZATIONAL BEHAVIOUR & HRM**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives

a. To understand organization and the Individual differences
b. To comprehend the motivation and leadership
c. To study the decision making and organizational effectiveness.
d. To know the organizational change due to development

Unit - I: Introduction

a. What is an Organization? Individual differences in organizations, learning organizations, Organisational culture Psychological process in organization - personality.

b. Learning principles, perception, Social perception, learning contact, psychological contact and commitment.

Unit- II: Motivation – Leadership

a. Motivation**:** Concept; motivation process; theories of motivation. psychological groups: definition; types of groups; functions fulfilled by groups, group process, dynamic of groups, structure of groups, why people join groups?

b. Leadership: Who is a leader? leadership, characteristics of an effective and ineffective leaders; leadership styles; theories of leadership.

Unit - III: Decision Making Conflicts

a. Decision making: Individual decision making and group decision making: Decision making Techniques; conflict - Nature and sources of conflict - consequences of conflict.

b. Types of conflict: Management of conflicts. Power - Bases of power; Sources of power, Impression Management.

Unit - IV: Organisational Effectiveness & Change

a. Organisational effectiveness and management of change – what is effectiveness, concept, nature, models: values bases effectiveness an social constraints - methods of improving organizational effectiveness, management of change and development.

b. Meaning of organization change, cultural process; structured change; models of change; stress management - meaning of stress, sources of stress, consequences of organization stress and coping strategies.

References:

Fred Luthans (2001). Organisational Behaviour, New Delhi: McGraw Hill Irwin.

Porter, L.W. Lawler, E.E. & Hackman, J.R. (1975). Behaviour in Organization" New Delhi:

McGraw Hill Irwin.

Stephen P. Robbins & Timothy A. Judge (2016) Organizational Behavior, Global Edition, and 17th Edition

Outcomes :

a. The students understood organization and the Individual differences
b. Comprehended the motivation and leadership
c. They realized how to take decision making and organizational effectiveness.
d. The students are aware of organizational change due to development

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	-	2	2	3	3	2	-	2
CO_2	3	2	2	2	2	2	2	2	3	3	-	2
CO_3	3	2	2	-	-	2	2	2	-	2	-	2
CO_4	3	2	1	2	2	2	2	2	2	3	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-303b	**THERAPEUTIC APPROACHES IN COUNSELING**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To enable the student to have an insight into the psychoanalytic Approach in counseling
b. To enable the student to understand the behaviour therapy
c. To know the procedures involved in the person centered Approach in counseling.
d. To understand the concept and application of Existential Therapy

Unit - I: Psychoanalytic Therapy

a. Psychoanalytic Therapy (Sigmund Freud)- Introduction – Key concepts –view of human nature, structure of personality – conscious and unconscious – anxiety- ego- Defense mechanisms – development of personality.
b. The therapeutic process – therapeutic goals – Therapist's function and role – clients experience in therapy – relationship between therapist and client – application – therapeutic techniques and procedures.

Unit – II: Behaviour Therapy

a. Behavior Therapy (Arnold Lazarus) – Introduction – Historical background – Four areas of development (Classical Conditioning- Operant Conditioning –Social learning approach – Cognitive Behavior therapy) Key concepts – View of human nature - therapeutic goals – Therapist's function and role – clients experience in therapy – Relationship between therapist and clients.

b. Applications of therapeutic techniques Relaxation training and related methods - Systematic desensitization Exposure Therapies - Eye movement, desensitization and reprocessing - Assertion training - Self management and self directed behavior.

Unit III: Person Centered Therapy (Carl Rogers)

a. Introduction – Historical background – Existentialism and Humanism.
   Key Concepts: View of human nature- Basic characteristics – Therapeutic Process: Therapeutic goals – Therapist's function and role - Client's experience in therapy – relationship between therapist and client.

b. Applications – Therapeutic techniques and procedures: Evolution of person- centered methods. The role of assessment – Areas of application.

Unit IV: Existential Therapy (Viktor Frankl and Rollo May)

a. Introduction – Historical background - Key concepts – View of human nature –The capacity for Self-awareness – Freedom and responsibility– Striving for identity and relationship to others – The search for meaning.Anxiety as condition for leaving – Awareness of death and non being.
b. The Therapeutic Process: Therapeutic goals – Therapist's function and role – clients experience in therapy – relationship between therapists and client – application – Therapeutic Techniques and procedures.

References:

1. Brammer, L.H and Schoston, E.L. (1968). Therapeutic Psychology (Second edition) New Delhi: Prentice Hall.
2. Gerald Corey (2001). Theory and Practice of Counseling and Psychotherapy (6th edition) Brooks/Cole: Thomson Learning.
3. Hensen, J.C., Steive, R.R & Waker, J.R. (1982). Counseling Theory and Process, New York: Allyb and Bcan.
4. Kavita Singh (2015). Counseling Skills for Managers (Second Edition). New Delhi: Prentice Hall of India

5. Mc Gowan & LyLe D. Schmidt (1962). Counseling Readings in Theory and Practice, New York: Holt & Reinehart
6. Narayana Rao, S. (1991). Counseling and Guidance (Second Edition) New Delhi: Tata Mcgraw Hill Publishing Company Ltd,
7. Patterson, C.J. (1973). Theories of Counselling and Psychotherapy (Second edition) New Haper and Row.
8. Richanrd Nelson, Jones (2005). Introduction to Counselling skills, Tests and Activities (Second edition), New Delhi: Sage Publications.

Outcomes:

1. enabled the student to have an insight into the psychoanalytic Approach in counseling
2. The student have understood the behaviour therapy
3. They become aware of the procedures involved in the person centered Approach in counseling.
4. Understood the concept and application of **Existential Therapy**

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	2	2	3	2	3	-	3
CO_2	3	3	3	3	3	2	3	3	3	3	-	3
CO_3	3	3	3	2	2	3	1	2	2	3	-	3
CO_4	3	3	2	3	3	3	3	2	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-303c	**HEALTH PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives :

a. To understand the concept of the Health psychology
b. To acquaint with and health behaviour.
c. To comprehend the health behaviour enhancement and management.
d. To know the future of the health psychology

Unit – I: Introduction

a. Introduction, definition - need for health psychology - relating health psychology to other fields - maintaining a healthy state and coping with illness – Biomedical and Bio-medico-social model.

b. Environmental psychology - environmental effects on Human Behaviour - the effect of human behaviour environment, urban life - health care, Socio-cultural perspective - cross cultural studies - epidemiological studies - social pathology - divorce - communal violence.

Unit –II: Health Behaviour - Enhancement

a. Health Behaviour and Primary prevention Health behaviours - changing health habits through cognitive behavioural approaches – Trans-theoretical model and Social engineering – Health enhancing behaviours - Health compromising behaviours.

b. Stress and Coping – Sources of stress and moderators of stress experience - coping resources and coping styles - Social support - Management of stress.

Unit-III: Management

a. Management of chronic illness - quality of life - emotional responses to chronic illness - personal issues - coping and rehabilitation - psychological intervention - heart disease, Hypertension, Stroke and diabetes.
b. Psychological issues in advancing to hospital care - problems of survivors. Psycho-neuro-immunology, AIDS, Cancer and Arthritis.

Unit – IV: Future

a. Challenges for the future Health promotion - Stress and Management - Health services - Management of serious illness - Trends for the future - Becoming a health Psychologist.

b. Organized efforts to mental health - governmental and voluntary organisations; international efforts for mental health - limitations in mental health efforts.

References:

Baron, R.A & Byrne, D. (1999). Social Psychology. New Delhi: Prentice Hall of India Pvt. Ltd.

Coleman, J.C. (1975). Abnormal Psychology and Modern Life. Bombay: Taraporeval Sons & Co.,

David F. Marks, Michael Murray, Brian Evans & Emee Vida Estacio (2011). Health Psychology (Third Edition). New Delhi: Sage Publications India Pvt. Ltd.,

Hans Selye (1980). Selyes Guide to stress research, Van Nostrand, New Delhi: Reinhold Company,

Sarason, I.G & Sarason, B.R. (2000). Abnormal Psychology. New Delhi: Prentice of Hall of India, N.D.

Taylor, S.E (2006). Health Psychology (6th edition) New Delhi: Tata McGraw Hill.

Teisi Thou (2011). Health Psychology. New Delhi: ABD Publications.

Outcomes:

1. Understood the concept of the Health psychology
2. Acquainted with and health behaviour.
3. Comprehended the health behaviour enhancement and management
4. Realized the future of the health psychology.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	2	-	3	2	2	3	3	-	3
CO_2	3	1	1	1	1	3	3	3	1	3	-	3
CO_3	3	1	-	-	-	3	3	3	2	3	-	3
CO_4	3	-	3	1	-	3	3	3	2	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-305	**STRESS MANAGEMENT**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

1. To introduce meaning of stress and psychophysiology
2. To realize the illness/disease and intervention
3. To understand the techniques of stress management
4. To comprehend and implement the techniques of stress management and counseling

Unit-1:

Stress and Stress Psychophysiology:

a. The Pioneers, Stress theory, The Stressor, Stress Reactivity, A Definition of Stress, Stress Management Goals

b. Stress Psychophysiology: The brain, endocrine system, autonomic nervous system, cardiovascular system, gastrointestinal system, muscles and skin, symptoms and stress

Unit-2:

a. Stress and Illness/Disease, and Intervention a. Hot Reactors, Psychosomatic Disease, Stress and the Immunological System, Stress and Serum Cholesterol, Specific Conditions, Post-traumatic Stress Disorder, Stress and Other Conditions

b. Intervention – A model of stress, setting up roadblocks, Comprehensive stress management, Eustress and the model, Taking control and Making a commitment

Unit-3:

a. Intrapersonal and Interpersonal Life-Situation Interventions – Intrapersonal Interventions: – Eliminating unnecessary stressors; nutrition and stress; noise and stress; life events and stress; hassles and chronic stress; success analysis

b. Interpersonal Interventions – Asserting oneself, conflict resolution, communication, time management, social support networking

Unit-4:

a. Relaxation Techniques, Meditation and Autogenic Training and Imagery

b. Progressive Relaxation, Biofeedback and Other Relaxation Techniques

References :

1. Greenberg, J. S. (2008). Comprehensive Stress Management. (10th ed). New York: McGraw Hill publications.
2. Bam, B. P. (2008). Winning Habits: Techniques for Excellence in Sports. New Delhi: Pearson Power, Dorling Kindersley India pvt. ltd.
3. Hariharan, M., & Rath, R. (2008). Coping with Life Stress: The Indian Experience. New Delhi: Sage publications India pvt ltd.
4. Rice, P.L. (1999). Stress and Health. (3rd ed). Brooks/Cole publishing co.
5. Schafer, W. (2000). Stress Management for Wellness. (4th ed). Wadsworth/ Thomson Learning.
6. Schafer, W. (2002). Stress Management. (4th ed). New Delhi: Wadsworth Cengage Learning India pvt ltd; first Indian reprint 2008.
7. Wilson, E. (2007). Stress Proof Your Life: 52 Brilliant Ideas for Taking Control. New Delhi: Pearson Power.

Outcomes:

1. To introduce meaning of stress and psychophysiology
2. To realize the illness/disease and intervention
3. To understand the techniques of stress management
4. To comprehend and implement the techniques of stress management and counseling

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	1	1	1	2	2	2	2	3	-	3
CO_2	3	1	2	-	-	3	2	2	2	3	-	3
CO_3	3	3	3	3	3	3	3	3	2	2	-	3
CO_4	3	3	2	2	2	3	2	2	2	2	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-306	**PERSONALITY DEVELOPMENT (OE)**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To study biological, psychological determinants
b. To know socio cultural determinants & Soft Skills
c. To acquaint with soft skills
d. To learn more on Soft skills

Unit – I: Introduction

a. Personality – definition – nature – biological.
b. Psychological and socio cultural determinants

Unit – II: Theories & Assessment

a. Theoretical Perspectives – Psychoanalytical, behavioural, humanistic, factor analytical (trait) and cognitive.
b. Assessment of Personality.

Unit – III: Soft Skills - I

a. Soft skills Development 1: Communication Skills; Interpersonal Skills – Planning
b. Decision making – Competence development – perceptual, social and academic

Unit – IV: Soft Skills - II

a. Soft skills Development – II: Promoting healthy personality – Positive thinking, developing self-confidence and self efficiency
b. Stress management, time management and leadership development

Practicals for 50 marks.

References:

1. Baron, R.A. & Byme, D. (2001). Social Psychology: Understanding Human Interaction. New Delhi: Prentice – Half India Pvt. Ltd.,
2. Berko, Roy, M. Wolvin, A.D. & Curtis Hall Ray (1990). The Business of Communicating (4th edition), Dubuque, IA: Brown.
3. Gelb, M. (2002). Present yourself. London: Aurum Press.
4. Proctor, R.W. & Dutta, A. (1995). Skill acquisition and human performance. Thousand Oaks: Sage.
5. Ram. U. (1998). Suffering and stress management: West versus East: Pune: Deep Publications.
6. Smitth. Robert, M. (1990). Learning how to learn: Applied theory for adults. Buckingham: open University Press.
7. Townsend, A. (1996). Assertion training, Oxford: FPA Education Unit.

Outcomes:

1. Studied biological, psychological determinants
2. The students aware of socio cultural determinants & Soft Skills
3. The students acquainted with soft skills
4. They learned more on Soft skills

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	2	-	-	-	2	2	-	-	2	-	2
CO_2	3	3	3	3	2	3	2	2	2	2	-	2
CO_3	3	2	2	2	2	3	2	2	2	2	-	2
CO_4	3	2	2	2	2	2	2	2	-	2	-	2

SEMESTER-IV

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-401	**THERAPEUTIC APPROACHES IN COUNSELLING**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To enable the student to have an insight into the Gestalt Therapy
b. To acquaint with the therapeutic Approach to the Reality Therapy
c. To enable the students to cognitive behaviour therapy
d. The students involved in the An Integrative Approach

Unit-I: Gestalt Therapy (Fritz Perls and Laura Perls)

a. Introduction – Key concepts – View of Human nature – some principals of Gestalt therapy theory – The therapeutic process- therapeutic goals – therapist's- function and role – Client's experience in therapy – relationship between therapist and client.

b. Application – Therapeutic techniques and procedures – the experiments in Gestalt therapy – preparing clients for Gestalt experiments – the role of confrontation – techniques of gestalt therapy.

Unit-II: The Reality Therapy (William Glasseer)

a. Introduction- Key concepts – view of human nature – a choice theory explanation of behavior – characterizes of reality therapy. The Therapeutic process – therapeutic goals – therapist function and role – client's experience in therapy – relationship between therapist and client.

b. Application – therapeutic techniques and procedures – the practice of reality therapy – the counselling environment – procedures that lead to change – The 'WDEP' System (W= Wants, D= Direction, E= Evaluation and P= Planning), Applications of reality therapy

Unit- III : Cognitive Behavior Therapy(Albert Ellis and Aaron T. Beck)

a. Introduction: Development of rational emotive behavior therapy.
   Key Concepts: view of human nature – view of emotional disturbance- A-B-C Theory of personality. Therapeutic process), therapeutic goals – Therapist's function and role – Client's experience in therapy relationship between therapist and client.
b. Application – Therapeutic techniques and procedures – The practice of rational emotive behavior therapy – Applications of REBT to client populations.

Unit-IV An Integrative Approach :

a. Introduction: The trends towards psychotherapy integration – The future of psychotherapy – some predictions – integration of multi cultural issues and counselling – Integration of spiritual / religious issues in counselling – the challenges of developing an Integrative perspective.

b. Issues related to therapeutic process: Therapeutic goals – Therapist function and role – clients experience in therapy – Relationship between therapist and client.

References:

Brammer, L.H and Schoston, E.L. (1968). Therapeutic Psychology (Second edition) New Delhi: Prentice Hall.

Gerald Corey (2001). Theory and Practice of Counseling and Psychotherapy (6th edition) Brooks/Cole: Thomson Learning.

Hensen, J.C., Steive, R.R. & Waker, J.R. (1982). Counseling Theory and Process, New York: Allyb and Bcan.

Kavita Singh (2015). Counseling Skills for Managers (Second Edition). New Delhi: Prentice Hall of India

Mc Gowan & LyLe D. Schmidt (1962). Counseling Readings in Theory and Practice, New York: Holt & Reinehart

Narayana Rao, S. (1991). Counseling and Guidance (Second Edition) New Delhi: Tata Mcgraw Hill Publishing Company Ltd,

Patterson, C.J. (1973). Theories of Counselling and Psychotherapy (Second edition) New Haper and Row.

Richanrd Nelson, Jones (2005). Introduction to Counselling skills, Tests and Activities (Second edition), New Delhi: Sage Publications.

Outcomes:

1. To enable the student to have an insight into the Gestalt Therapy
2. To acquaint with the therapeutic Approach to the Reality Therapy
3. To enable the students to cognitive behaviour therapy
4. The students involved in the An Integrative Approach

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	2	2	3	2	3	-	3
CO_2	3	3	3	3	3	2	3	3	3	3	-	3
CO_3	3	3	3	2	2	3	1	2	2	3	-	3
CO_4	3	3	2	3	3	3	3	2	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-402	**THEORIES OF PERSONALITY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To understand the Psychoanalytic Approach
b. Behavioural approaches to personality.
c. To comprehend the Humanistic approach
d. To acquaint with the eastern theories of personality

Unit – I: Psychoanalytical Theory

a. The Psychoanalytic Approach. Freud

b. Neo Freudians – Jung, Adler, Erickson, Horney, Sullivan, Fromm.

Unit – II: Behaviouristic Theory

a. The Behavioural Approaches – Pavlov, Skinner, Bandura

b. Cognitive Approaches: Rotter, Kelly & Mischel.

Unit –III: Humanistic Theory

a. Maslow, Roger, Allport, Cattell, Eysenck & Sheldon.
b. The Hurmanistic and Dispositional Approaches

Unit – IV: Eastern Theories

a. The Eastern Approaches: Abhidhamma,
b. Indian Psychology, Eastern Psychologies and Western Personality Theories.

References:

Bischof L.J. (1968). Interpreting Personality theories (Second edition), New York: Harper International

Campbell, Hall C.S & Lindzey, G. (2010). Theories of Personality. New York: John Wiley and sons,

Eysenck H.J. & Bysenck M.W. (1985). Personality and Individual Differences, New York: Plenum.

Ryckman R.M. (1989). Theories of Personality (4th edition), Belmor C.A., Brooks/ Cole. New Book.

Outcomes:

1. Understood the Psychoanalytic Approach
2. Learned on behavioural approaches to personality.
3. The students comprehended the Humanistic approach
4. The students acquainted with the eastern theories of personality

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	2	-	-	-	2	2	-	-	2	-	2
CO_2	3	3	3	3	2	3	2	2	2	2	-	2
CO_3	3	2	2	2	2	3	2	2	2	2	-	2
CO_4	3	2	2	2	2	2	2	2	-	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-403a	**RESEARCH METHODOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives :

a. To understand basic research and applied research including experimental research.
b. To comprehend the problem & hypothesis
c. To know Sampling & Data Collection
d. To understand about research designs.

Unit – I: Introduction to Research Methodology

a. Types of Research: Basic Research, Expost facto, Applied Research and other Researches: Formation of Experimental Research.
b. Research Variables and their Control: Independent variables – dependent variables and extraneous variables, and experimental control.

Unit – II: Problem & Hypothesis

a. Problem : Selection of problem – statement of the problem and ways in which a problem is manifested, Types of Problems.
b. Hypothesis : The nature of hypothesis, the manner of stating a hypothesis, Criteria of hypothesis and formulation of hypothesis

Unit – III: Sampling & Data Collection

a. Sampling: Procedures of sampling – randomization – purposive sampling – Stratified and Random sampling, Probabilistic and Non – Probabilistic Methods.
b. Methods of Data collection: Interview method, survey method, questionnaires and rating scales.

Unit – IV: Research Designs

a. Research Designs: Two Randomized group design, two matched group design, more than two group design, Factorial Design – 2x2, 2x2x2 design – Concept of ANOVA, MANOVA AND MANCOVA.

   Role of Computers in the analysis of data – Statistical Packages – Ethics in Human Research

b. Presenting research results: Writing a research project report: Publishing an article and making an oral presentation.

References:

Edwards, A.L, (1968). Experimental Design in Psychological Research. New Delhi: Amerind Publishing Company Pvt Ltd,.

Kerlinger, F.N. (1973). Foundations of Behavioural Research, New Delhi: Surjeet Publications.

Henry, E. Garrett, (1981). Statistics in Psychology and Education (Tenth Edition), Bombay.

Rosenthal, R. & Rosnow, R.L. (1991). Essentials of Behavioural research: Methods and Data Analysis (2nd edition). New York: McGrawHill.

Elmes D.G. Kantowitz B.H & Roediger H.L. (1995). Research Methods in Psychology. New York: West Publishing Company.

Howell, D.C. (2002). Statistical Methods for Psychology (5th edition). Belmont, CA: Wadsworth.

Kothari, C.R. (2004). Research Methodology: Methods and Techniques (second revised Edition), New Delhi: New Age International Pvt. Ltd.

John, J. Shaughnessy, Gugene B. Zechmeister & Jeanne S. Zechmeister (2008). Research Methods in Psychology (Eighth Edition), New Delhi: McGrawHill,

Mangal, S.K. (2010). Statistics in Psychology and Education, New Delhi: Pretice – Hall of India.

Gerard Guthrie (2010). Basic Research Methods (First Edition). New Delhi: Sage Publications.

George Argyrous (2011). Statistics for Research (Third Edition). New Delhi: Sage Publications.

Bridget Somekh & Cathy Lewin (2011). Theory and Methods in Social Research (2nd Edition). New Delhi: Sage Publications.

Colin Dyer (2013). Research in Psychology – A practical guide to Methods and Statistics. New Delhi: John Wiley & Sons. Inc.

Mark Israel (2015). Research Ethics and Integrity for Social Scientists (2nd Edition). New Delhi: Sage Publications.

Amit Kumar (2011). Methods in Psychological Research (First Edition). New Delhi: Anmol Publications Pvt. Ltd.,

Krishnaswami, O.R. & Ranganatham (2006). Methodology of Research in Social Sciences (First Edition). New Delhi: Himalaya Publishing House.

Wilson Prabhakaram (2012). Methods in Behavioural Research (First Edition). New Delhi: Anmol Publications Pvt. Ltd.,

Outcomes:

1. Understood basic research and applied research including experimental research.
2. The students comprehended the problem & hypothesis
3. Gained knowledge on Sampling & Data Collection
4. Understood the application of research designs

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	3	2	1	3	-	2	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	3	3	2	2	2	2	2	-	2	-	2
CO_4	3	3	3	2	2	1	1	1	1	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-403b	**ORGANIZATIONAL DEVELOPMENT**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives

a. To understand Needs Assessment, Specification of Instructional Objectives, Learning outcomes
b. To apply the knowledge of Training and development phase Incorporating the findings of Learning Research
c. To know about transfer and maintenance of training Alternative training media
d. To know the application of Evaluating training Effectiveness

Unit-I : Needs assessment

a. Organization Analysis, Task analysis, Person analysis, An Example of Needs.

b. Assessment, Specification of Instructional Objectives, Learning outcomes, Stating instructional objectives

Unit-II : Training and development phase Incorporating the findings of Learning Research

a. Practice and Recite, Use Distributed Practice, Use Whole-Task learning for tasks High on complexity and organization, Give knowledge of results, Set goals, Give positive reinforcement.

b. Provide models, Make learning a Team Effort, Gagne's model of instructional design

Unit-III : Transfer and maintenance of training Alternative training media

a. On-the-job Techniques, Off-the-job Techniques

b. Choosing among alternative methods

Unit-IV: Evaluating training Effectiveness

a. Criteria for evaluation, Summative versus formative evaluations, Research design in training evaluation, Individual differences among trainees
b. **Special Training Needs** Retraining, Training for work force diversity, Training the chronically unemployed

References :

1. Robert L. Dipboye, Carlla, S Smith, William C Howell: Understanding Industrial and Organizational Psychology: An Integrated Approach: Harcourt Brace College Publishers(1994)

Outcome:

1. Learned the assessment, instructional objectives.
2. Applied the knowledge of training and development incorporating the findings of research
3. Studied the transfer and maintenance of training and alternative training media
4. Gained the evaluating training effectiveness

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	-	2	2	3	3	2	-	2
CO_2	3	2	2	2	2	2	2	2	3	3	-	2
CO_3	3	2	2	-	-	2	2	2	-	2	-	2
CO_4	3	2	1	2	2	2	2	2	2	3	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-403c	**REHABILITATION PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To understand historical development – Models of disabilities in the past and present scenario
b. To comprehend Assessment of Disability, Psychological Aspects
c. To know Behavioral Management
d. To acquaint with Organizational services

Unit-I: Introduction

a. Rehabilitation Psychology - Field and Scope - Foundations- historical development – Models of disabilities – Disability in Indian setting the past and present scenario.

b. Individuals with Disabilities – Disabilities in early and middle childhood, adolescence and early & late adulthood, Sensory and physical disabilities, Learning and behavioral disability, Needs and concerns of disabled in all groups

Unit – II: Assessment of Disability, Psychological Aspects

a. Diagnostics and assessment – Learning and behavioural disability – Research methods
b. Psychosocial aspects of disability: Attitudes, stereotypes prejudices and discrimination towards the disabled Minority and under privileged status.

Unit – III: Behavioural Management

a. Behavioural analysis – Principles and Techniques
b. Common Techniques of Management of problems of the disabled

Unit – IV: Organization of Services

a. Organization and management of rehabilitation services – Collaboration with families of disabled persons – Special education strategies for learning and behavioural disability – Assistive technologies and quality of life in the disabled.

b. Statutory provisions and policy on disability rehabilitation – Areas of governmental focus – Financial and social security – Constitutional and policy provisions – Role of NGOs in rehabilitation of disabled – Professional standards, ethical concerns

References:

Bateman, B.D & Herr. C.M. (2006). Writing Measurable IEP Goals and Objectives, Verona. WI: Attainment Co. Inc.

Frank, R. & Eliot, J. (2002). Hand Book of Rehabilitation Psychology, Washington DC: American Psychological Association.

Gargivlo, R.M. (2006). Special Education in Contemporary Society An introduction to Experimental Psychology 2' ed. Belmont, CA: Wordsworth / Thomson.

Karna, G.N (1999) United Nations and the Rights of Disabled Persons; A Study in Indian Perspective, New Delhi: APH.

Karna, G.N (2002) Disability Studies in India – Retrospects and prospects (SDRS), New Delhi: Gyan Publishing House.

Karna, G.N. (2000) Disability Studies in India; Issues and Challenges, International Journal of Disability Studies, 1(1)20-40.

Loright B.A (1960), Physical Disability: A Psychological Approach New York: Harper & Row.

Smart, J (2002) Disability Society and the Individual. Austin, TX: Pro-ed.

Verma V.P. (2002). Social Rehabilitation of the Blind. International Jr. of Disability studies, 1, (1) pp 72-80.

Outcomes:

1. The students understood historical development – Models of disabilities in the past and present scenario
2. The students comprehended Assessment of Disability, Psychological Aspects

3. The students are aware of Behavioral Management
4. They acquainted with Organizational services

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	-	2	2	3	3	2	-	2
CO_2	3	2	2	2	2	2	2	2	3	3	-	2
CO_3	3	2	2	-	-	2	2	2	-	2	-	2
CO_4	3	2	1	2	2	2	2	2	2	3	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-406	**LIFE SKILLS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To learn the concept of life skills and its importance in relation to personality development of an individual.
b. To know the different types of life skills relevance to individual and social situations.
c. To adapt the good interpersonal and communicative skills.
d. To become aware of the components of life skills and the method of imparting knowledge of life skills.

Unit – I: Introduction

a. Introduction to life skills, the performance of life skills, the relationship between life skills and individual personality development.

b. Life skills development and its effects on relationship patterns.

Unit – II: Types of Life Skills

a. Types of life skills: Thinking skills – Decision making, Goal Setting and Motivation, Positive Thinking.

b. Overcoming doubt, fear, procrastination and perfectionism. Problem solving, Creativity.

Unit – III: Life Skills in Specific

a. Interpersonal Skills – Coping Skills – Communication skills, Negotiation skills.

b. Leadership, Team Building- Presentation Skills.

Unit – IV: Management

a. Self-management skills: Self-awareness, building confidence and self-esteem anger management, stress management, relaxation techniques.

b. Designing life skills intervention – assessment of life skills – designing modules.

References:

Baron.A. Robert. Branscombe, R. Nyla et al. (2010). (12th Edition) New Delhi: Tata McGraw Hill..

Bishop, S. (1999). Assertiveness skills – A source book of activities, New Delhi: Viva Publishers Pvt. Ltd.

Burnard, P. (1999). Interpersonal Skills – A source book of activities, New Delhi: Viva Publishers Pvt.Ltd.

Kelly, J. (1987). Career Skills. London: MacMllian Press.

Prakash B. (Ed). (2003). Adolescence and life skills Common Wealth Youth Program, Asian Center, Common wealth Secretariat. New Delhi: Tata McGraw Hill.

Shulman, L. (1979). Skills of Helping: Individuals & Groups. Chennai: Ezhilagam Publications.

Stella Cottrell, (2005). Critical Thinking Skills: Developing Effective Analysis and Argument, Noida: Palgrave Macmillan Ltd., RGNIYD.

Outcomes:

1. Learned the concept of life skills and its importance in relation to personality development of an individual.
2. They became aware of the components of life skills and the method of imparting knowledge of life skills.
3. The students have learned more on Life Skills in Specific
4. They acquainted with Self management skills

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	-	-	3	3	2	2	3	-	3
CO_2	3	3	2	-	-	2	3	1	2	3	-	3
CO_3	3	3	2	-	-	3	3	2	2	3	-	3
CO_4	3	3	-	-	-	1	3	1	1	3	-	3

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF PSYCHOLOGY



Course

M.Sc. COUNSELING PSYCHOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per

NEP-2020

About the Department

- The post graduate Department of Psychology was established in 1959 with Major S. Parthasarathy as its founder head. Even before starting the department, since the inception of University College in 1954, psychology was taught at B.A. (Hons) and M.A. (Philosophy) level. The Department of Psychology offering the specializations like Health Psychology, Organizational behavior, Rehabilitation Psychology, Aging and Counseling Psychology. Students are exposed to practical and project work in addition to field studies. The department earned UGC-SAP (1990-1995) in the thrust area of life span developmental psychology with an emphasis on aging & DRS-I 2011-2016 & II 2017-2022) with special emphasis on Health and Aging. The department successfully completed 33 projects funded by UGC, ICSSR, ICMR and in collaboration with foreign agencies like ESRC, UK. The department conducted 4 exhibitions in 1961, 1967, 1977 and 1986 to popularize the strength and importance of the Psychology Department. The department successfully organized many international and national conferences. The Department has a Counseling Center to cater the needs of the students and public in general. 187 students have obtained their Ph.D., Degree and the department has published 598 articles in national and international journals

Vision

- To develop skillful and qualified psychologists by providing theoretical and experimental learning in all applied areas of Psychology to disseminate the knowledge to the community for a healthy society.

Mission

- To help the students' masters and keep abreast the knowledge in all fields of psychology.
- To equip the students with different techniques to apply in the field essentially and develop their career accordingly
- To support research and areas of research necessary for the advancement of knowledge in all discipline
- To analyze their strength and promote self-esteem confidence and well-being through education and support services.

Programme Specific Outcomes

- Students acquire enhanced knowledge of the fundamental concepts of Psychology and its applications from each other.
- Understand the principles and practices of advanced psychology and gain expertise in the field of behavioural sciences
- Students will be able to relate the physical and psychological determinants relevance to the human behaviour
- Understand the advanced aspects of new trends in Psychology such as evolution & biological psychology

Programme Objectives

- Students will gain necessary knowledge and develop specialized skills in the different areas of psychology .
- Students will think, predict, evaluate critically and analyse the human behaviour with the help of psychological applications to cater the needs of Local al and global problems.
- Students will be able to implement the scientific skills for development of educational, vocational , adolescent , family , different organisations etc.,

Programme Outcomes

Upon completion of the M.Sc. Psychology programme, the candidate should be able to:

No.	Programme Outcomes
PO1	**Scientific knowledge**: To apply the knowledge of Psychology, management , education sociology social work and linguistics.
PO2	**Problem analysis**: To identify, formulate, review literature, and analyze scientific problems in reaching conclusions using first principles of behavioral sciences and related other sciences
PO3	**Investigation**: To apply the knowledge based on research and related methods, including design of experiments, data collection, analysis and interpretation to provide valid conclusions

PO4	**Design & Development**: To plan, design and develop experiments to measure the experimental/survey/ observation data taking the safety and environmental considerations
PO5	**Modern tool usage**: To select standardized/ updated psychological testing material for investigating the identified problem with an understanding of its limitations.
PO6	**Psychologist & Society**: To asses and solve the problems related to societal, health and safety issues using the professional skills learned.
PO7	**Environment and sustainability**: To demonstrate the knowledge acquired for understanding the environmental issues and evolve methods for sustainable development.
PO8	**Ethics**: To understand ethical principles, professional ethics and responsibilities, and apply to solve Psychological/societal problems.
PO9	**Individual & Team work**: To function effectively as an individual / member of a team / team leader to solving different issues,
PO10	**Communication**: To effectively communicate on various issues particularly with psychosocial problems /community problems with in society, writing of reports and design of presentations.
PO11	**Project Management and Finance:** Acquire basic and advanced skills in various fields of psychology for self-employment and entrepreneurship
PO12	**Lifelong learning**: To recognize the importance of learning process throughout the life in view of psychological changes that occur from time-to-time.

Program Educational Objectives

- Exposure of students to theory & practical knowledge and to provide them systematic tools of traditional and modern types to acquire this knowledge and skill.
- To update the syllabus essential for appearing in NET, SET and other competitive exams of UPSC and APPSC.

- To make aware the students to know the psychological resources of country, to utilize by sustainable methods and conservation of living resources.
- To develop trained and knowledgeable human resource for educational and research institutions and industries; to use this human resource for self reliant India.
- To develop self employable ability and to apply knowledge for several sectors such as schools, industries, clinical setting; it will also provide employment to other dependents.

SRI VENKATESWARA UNIVERSITY : : TIRUPATI

SVU COLLEGE OF SCIENCES

MASTER OF SCIENCES

P.G. Degree Programme (CBCS) Regularations-2016

Amended as per NEP-2020

(with effect from the batch admitted in the academic year 2021-22)

CHOICE BASED CREDIT SYSTEM (CBCS)

First and Second Semester are Common for M.Sc. Psychology and

M.Sc. Counseling Psychology (Self Supporting)

(NEW SYLLABUS)

M.Sc. (Counseling Psychology) Degree Course

First Semester : SEMESTER-I

Semester-I

Sl. No.	Course Code	Title of the Course	Core / Foundation / Elective	Hours of Teaching	No. of Credits	Marks		Total
				Theory Practical		IA	SEE	
1.	PSY 101	General Psychology-I (CC)	Core	6	4	20	80	100
2.	PSY 102	Social Psychology (CC)		6	4	20	80	100
3.	PSY 103	a. Psychopathology-I (CF) b. Psychological Measurement-I(CF) c. Positive Psychology (CF)	Compulsory Foundation	6	4	20	80	100
4.	PSY 104	a. Child Development Psychology b. Psychological Measurement & Statistics c. Forensic Psychology		6	4	20	80	100
5.	PSY 105	Paper 1 & 3	Practical-I	6	4	--	--	100
6.	PSY 106	Paper 3 & 4	Practical-II	6	4	--	--	100
			Total	36	24	120	480	600

Semester-II

Sl. No.	Course Code	Title of the Course	Core / Foundation / Elective	Hours of Teaching	No. of Credits	Marks		Total
				Theory Practical		IT	SEE	
1.	PSY 201	General Psychology -II (CC)	Core	6	4	20	80	100
2.	PSY 202	Applied Social Psychology-(CC)		6	4	20	80	100
3.	PSY 203	a. Psychopathology-II(CF) b. Psycho-Diagnosis (CF) c. Computer Application in Psychological Research-(CF)	Compulsory Foundation	6	4	20	80	100
4.	PSY 204	a. Life Span Development Psychology : Infancy to Adolescence (Prenatal to Adolescents) b. Consumer Behavior c. Industrial & Organizational Psychology	Elective Foundation	6	4	20	80	100
5.	PSY 205	Paper 1 & 3	Practical-I	6	4	--	--	100
6.	PSY 206	Paper 3 & 4	Practical-II	6	4	--	--	100
			Total	36	24	120	480	600

Semester-III

Course Code	Title of the Course	Core / Foundation / Elective	Hours of Teaching	No. of Credits	Marks		Total
			Theory Practical		IA Marks	SEE	
THIRD SEMESTER							
CPSY 301	Counseling Process	Core	6	4	20	80	100
CPSY 302	Counseling Skills		6	4	20	80	100
CPSY 303	a. Therapeutic Approaches in Counseling-I	Generic Elective	6	4	20	80	100
	b. Counseling in Organizational Settings						
	c. Health Psychology (GE)						
CPSY 304	Practicals	Core & Generic Elective	6	4	--	--	100
CPSY 305	Stress Management & Counseling Psychology Theory & Practical	Skill Oriented	6	4	10	90 (40+50)	100
CPSY 306	Personality Development	Open Elective	6	4	20	80	100
Total			36	24	120	480	600

Semester-IV

FOURTH SEMESTER							
CPSY 401	Applications of Counseling in Special Areas	Core	6	4	20	80	100
CPSY 402	Therapeutic Approaches in Counseling–II(CC)		6	4	20	80	100
CPSY 403	a. Counseling in Hospital Settings	Generic Elective	6	4	20	80	100
	b. Counseling in Community Settings						
	c. Counseling the Family						
CPSY 404	Practicals	Core & Generic Elective	6	4	--	--	100
CPSY 405	Through allotment (Theory and Practice)	Project work	6	4	--	--	100
CPSY 406	Life Skills (OE)	Open Elective	6	4	20	80	100
		Total	36	24	80	320	600

Semester – I

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-101	**GENERAL PSYCHOLOGY-I**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the concepts and scope of psychology
b. To comprehend the biological basis of behavior
c. To study the perception and sensation
d. To understand the concepts and learning theories

Unit – I: Psychology as Science

a. Definition, Nature, Scope and Aims of Psychology
   Historical Origins -The rise of Experimental Psychology.
b. The Emergence, development and decline of the Schools of Psychology.
   Basic and Applied Fields of Psychology.
   Methods of Study – Observation method, Experimental method,
   Survey and Case study method.

Unit – II: Biological Basis of Behaviour

a. Genetic perspective – Chromosomes, DNA, Genes Dominant – Recessive Genes Principle.

   The Evolutionary Perspective – Natural Selection
   The Environmental perspective – Principle of learning - Nature and Nurture controversy.

b. Nervous System: Basic unit and divisions of Nervous system – Localization of brain functions. Endocrine System: Pituitary, Adrenaline, Thyroid, Parathyroid, Gonads and Pancreas. Receptors, Connectors, Effects and Adjuster mechanisms.
Sensory process – Senses and sensory organs, general characteristics of Senses and Sensory thresholds, Subliminal Perception, Signal Detection Theory.

Unit – III: Perceptual Process

a. Relationship between sensation and perception, Approaches to perception – Gestalt, information Processing approach, the Cognitive approach, Integrative approach. .

b. Perceptual experiences – Visual space perception, Perceptual constancies; Perceptual movement. Errors in perception, Perceptual Defence and Vigilance,
Factors influencing perception – Learning, motivation, values and socio economic status, culture and perception.

Unit – IV: Learning:

a. Nature and definition of Learning
Experimental approaches to learning – Connectionist and Cognitive

b. Brief discussion of learning theories, Pavlov, Thorndike, Skinner, Hull, Tolman and Miller.

Measurement in learning and learning curves
Transfer of training of education and transfer, experimental analysis of transfer of training, stimulus and response similarly.

Motor and verbal learning - Motor skills, distribution of practice, warm up, patterns of movement & knowledge of results.

References:

1. Boring, E.G (1950). History of Experimental Psychology. New York: Appleton-Century – Crofts ,
2. Carlson, N.R. (1977). Physiology of Behaviour, Boston: Allyn and Bacon.
3. Dennis Coon, (2006). Psychology: A Modular approach to Mind and Behaviour, USA: Thomson Higher Education.
4. Hilgard, E.R, Atkinson, R.C. & Atkison, R.R., (1976). Introduction to Psychology (6th edition), New Delhi: Oxford and IBM Publishing Company Private Limited.
5. Kendler, H.H. (1975). Basic Psychology, (3rd edition), London: *Addision* – Wesley Publishing, Company.
6. Nolen-Hoeksema, Fredrickson, Loftus & Wagenaar (2009). Atkinson and Hilgard's Psychology – An Introduction. New Delhi: Cengage Learning India Pvt. Ltd.
7. Parameswaram, E.G. & Beena, C. (1988). An Invitation to Psychology (First edition), New Delhi: Tata Mc Graw Hill Publishing Company Limited.
8. Ralph Norman Haber (1968). Contemporary Theory and Research Visual Perception, New York: University of Rochester.
9. Robert S. Feldman (2011). Understanding Psychology (10th Edition). New Delhi: Tata – McGraw Hill Education Pvt. Ltd.,
10. Ruch, F.L. (1970). Psychology and Life, Bombay: D.B. Taraporevala Sons and Company Pvt. Ltd.

Outcomes:

1. Understood the concepts and scope of psychology
2. Comprehended the biological basis of behavior
3. Studied the perception and sensation
4. Understood the concepts and learning theories

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	1	2	3	-	3	3	2	-	2
CO_2	3	3	2	1	1	3	-	2	3	2	-	2
CO_3	3	3	3	1	2	3	-	3	3	2	-	3
CO_4	3	2	3	2	1	2	-	2	3	3	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-102	**SOCIAL PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the concepts of social psychology
b. To comprehend the social perception and cognition.
c. To study the socialization
d. To understand the meaning and theories of attitudes

Unit – I: Introduction

a. Definition, understanding social behaviour

   Historical origins; relationship with other social sciences
b. Research methods in social psychology: Field, Observation, Experimental, Survey.

Unit – II: Social Perception and Social Cognition

a. Person perception and object perception; Bem's theory of self perception. Social perception; communication; social interaction.

b. The process of attribution; Kelley's theory of causal attribution: Major sources of bias; practical applications of attribution theory.

   Social Cognition – Major cognitive strategies: affect and cognition, self awareness, applications of self awareness.

Unit – III: Socialization

a. Definition and goals of socialization, socialization process; the context of socialization

b. Social motives: Sex role identity, agencies of socialization, the development of self concept, self evaluation.

   Theories of Moral development (Piaget & Kohlberg).

Unit – IV: Attitudes

a. Formation of attitudes, Components of attitudes, functions of attitudes, the link between attitudes and behaviour.

b. Attitude scales: Likert, Thurston, Bogardas scales; Measurement: Self report and other techniques.

   Theories of Attitude formation and change: Balance theory, congruity theory, and cognitive dissonance theory.

References:

Akbar, Hussain (2012). Social Psychology, New Delhi: Dorling Kindersley Pvt. Ltd.

Baron, R.A., & Byrne, D. (1988). Social Psychology; Understanding Human Interaction, New Delhi: Prentice – Hall of India Pvt. Ltd.,

Robert, A. Baron, Nyla, R. Branscome, Donn Byrne & Gopabharadwaj (2009). Social Psychology, New Delhi, Pearson Publication

Seidenberg, B., & Sandowsku, A. (1976). Social Psychology, An Introduction. Stuttgart: The Free Press, Macmillan Publishing Co. Inc.,

Outcomes:

1. Understood the concepts of social psychology
2. Comprehended the social perception and cognition.
3. Studied the Socialization
4. Understood the meaning and theories attitudes

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	1	2	3	1	3	3	3	-	3
CO_2	3	3	2	1	1	3	-	2	3	3	-	3
CO_3	2	3	3	1	2	3	1	3	3	3	-	3
CO_4	3	2	2	2	1	3	-	3	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-103a	**PSYCHOPATHOLOGY-I**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the meaning abnormal behavior and historical and current trends
b. To comprehend the models of abnormal behaviour and approaches to therapies
c. To know the classification and assessment of abnormal behaviour
d. To evaluated different approaches to therapies for abnormal behaviour

Unit – I: Abnormal Psychology

a. Meaning and Definitions of Psychological abnormality.
   Criteria of normality and abnormality.
b. Historical - How abnormality viewed and treated in the past: Current trends.

Unit – II: Models of Abnormality

a. Biological model; Psychodynamic model
b. Behaviouristic model; Cognitive model
   Humanistic – Existential and Socio-cultural model

Unit – III: Classification and Assessment

a. Clinical Assessment and Diagnosis
   Classification of Psychological Disorders – DSM V; ICD.10.
b. Causes of abnormal behaviour; Biological, Psych-social and Socio Cultural factors.

Unit – IV: Approaches to Therapies

a. Biological therapy: Chemo therapy, Electro therapy, Brain –wave therapy
b. Psychosocial Approaches to therapy; Psychoanalytic therapy, Behaviour therapy, Humanistic – Existential therapies, Interpersonal therapy, Transactional Analysis and Group Therapy, Socio-cultural approaches to therapy; Current issues and trends in Treatment.

References:

Arun Kumar (2006). Abnormal Psychology. New Delhi: ANMOL Publications Pvt. Ltd.

Carson. Butcher Mineka (2003). Abnormal Psychology and Modern life, (XI edition). Singapore: Pearson Education Pvt. Ltd.,

Irwin G. Sarason & Barbara R. Sarason (2009). Abnormal Psychology, (XI Edition), New Delhi: PHI Learning Pvt., Ltd.,

James, N. Butcher, Susan Mineka & Jil M. Hooley (2011). Abnormal Psychology – Core Concepts (Second edition). New York: Allyn & Bacon Pearson Education, Inc.

Lauren B. Alloy, John, H. Riskind & Margaret J. Manos (2005). Abnormal Psychology, (IX edition) New Delhi: Tata McGraw Hill Publishing Co. Ltd.,

William J. Ray (2015). Abnormal Psychology – Neuroscience Perspectives on Human Behaviour and Experience. New Delhi: Sage Publications.

Outcomes:

1. Understood the meaning abnormal behavior and historical and current trends
2. Comprehended the models of abnormal behaviour and approaches to therapies
3. Learned about classification and assessment of abnormal behaviour
4. Able to evaluate different approaches to therapies for abnormal behaviour

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	-	2	2	-	2	-	-	-	2
CO_2	3	3	2	-	-	2	-	2	-	-	-	1
CO_3	3	3	3	-	-	3	-	1	-	-	-	2
CO_4	3	2	3	-	-	3	-	-	-	1	-	-

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-103b	**PSYCHOLOGICAL MEASUREMENT-I**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the assessment and psychological measurements
b. To comprehend the development of psychological tests and principles of test construction.
c. To know the Principles of Test Construction
d. To understand the test Development and test Standardization Procedures

Unit – I: Psychological Measurement

a. Introduction – Psychological Assessment and Psychometrics – Nature, Psychophysical Measurements – Psychophysical Theory-Psychophysics and Sensory limens, Psychophysical laws.

b. Modern Psychophysics – Psychological Scaling methods – Rating scales – Attitude Scales

Unit –II: Developments in Psychological Measurement

a. Early History of Psychological Measurement – Psychophysics – Mental Testing – Contributions of Galton and Binet; Interest in the mentally deficiency; Later Developments; Contemporary Status of Psychological Measurement.

b. The Psychological Test: Definition, Types – Factors influencing test performance – Test administrative procedures – Testing conditions – rapport, examiner effects, situational variables – test anxiety.

Ethical and Professional Concerns in Testing – Control in the use of Psychological tests; Sources of Psychological tests.

Unit – III: Principles of Test Construction

a. Test Formulation – Content selection - Item writing – Item analysis – Objectives and use of Item analysis; Item Difficulty; Item validity, Item discrimination – Item reliability – Internal consistency.

b. Reliability – basic concepts, methods of test reliability – reliability of speed & power tests – Special problems in reliability.

   Validity – basic concepts, methods of test validity – general problems.

Unit – IV: Test Development and Test Standardization Procedures

a. Basic steps in Test development: Instructions in Test Administration

b. Development of Norms – Types of norms – Interpretation of Test scores – Statistical Indices – Computers usage in Testing.

References:

1. Anastasi, A. (2005). Psychological Testing, New Delhi: Pearson Education Pvt. Ltd.,
2. Cronbach, L.J. (1970). Essentials of Psychological Testing. New York: Harper & Row.
3. Freeman R.S. (1966). Psychological Testing, 3rd Edition, New Delhi: Oxford IBH Co. Pvt. Ltd.,
4. Guilford, J.P. (1989). Psychometric Methods, New Delhi: Tata McGraw Hill Publishing Co. Ltd.
5. Keith Coaley (2014). An Introduction to Psychological Assessment & Psychometrics, Singapore: Sage Publications Asia Pacific Pvt. Ltd.,
6. Thomas A. Stetz, Leslie A. Miller & Robert L. Lovler (2016). Student Study Guide for Foundations of Psychological Testing. New Delhi: Sage Publications.

Outcomes:

1. Understood the assessment and psychological measurements
2. Comprehended the development of psychological tests and principles of test construction.
3. Learned the Principles of Test Construction
4. Understood the test Development and test Standardization Procedures

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	1	3	3	3	1	3	2	2	-	2
CO_2	3	3	3	2	3	1	2	2	-	3	-	2
CO_3	3	3	3	3	3	3	1	1	-	3	-	2
CO_4	3	3	3	3	2	2	2	-	-	2	-	1

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-103c	**POSITIVE PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

1. To understand the human strength of positive psychology
2. To acquaint students with positive subjective states and processes
3. To enable students to appreciate importance of positive Individual Traits
4. To understand the Positive behaviour in Institutions

Unit-1: Introduction to Positive Psychology

a. Need for a science of human strengths and virtues
b. Deconstruction of illness ideology and inclusion of human strengths
c. Positive Psychology: Assumptions, Goals and Definitions
d. History of positive psychology; three pillars of positive psychology

Unit-2: Positive Subjective States

a. Model of well-being
b. Subjective well-being and positive emotions
c. The flow experience
d. Positive Emotions; Optimism and Hope

Unit-3: Positive Individual Traits

a. Love and self-compassion; self-efficacy
b. Creativity &Wisdom
c. Purpose, courage and resiliency

d. Empathy and Altruism

Unit-4: Positive Institutions

a. Positive schooling

b. Health and wellness; aging well and role of family

c. Psychology of forgiveness for healthy society

d. The Me/We balance: Building better communities

References

1. Lyubomirsky, S. (2013). The myths of happiness: What should make you happy, but doesn't, what shouldn't make you happy, but does. New York, NY: Penguin.
2. Mahrer, A. R. (2009). The optimal person. Laval, QC: Howard Gontovnick Publications. Metz, T. (2013). Meaning in life. New York, NY: Oxford University Press
3. Ungar, M. (2008). Resilience across cultures. British journal of social work, 38(2), 218-235.
4. Badhwar, N. K. (2014). Well-being: Happiness in a worthwhile life. New York, NY: Oxford University Press.
5. Oxford Handbook of Positive Psychology and Work Edited by Nicola Garcea, Susan Harrington, and P. Alex Linley.
6. Huy P. Phan and Bing H. Ngu (2017). Positive Psychology: The use of the Framework of Achievement Bests to Facilitate Personal Flourshing. In "Quality of Life and Quality of Working Life", book edited by Ana Alice Vilas Boas.

Outcomes:

1. Understood the human strength of positive psychology
2. Acquainted students with positive subjective states and processes
3. Enabled students to appreciate importance of positive Individual Traits
4. Understood the Positive behaviour in Institutions

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	1	-	-	3	2	2	2	3	-	2
CO_2	3	2	2	1	-	3	2	2	2	2	-	2
CO_3	3	2	2	-	-	3	2	2	-	2	-	2
CO_4	3	2	2	-	-	3	3	2	-	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-104a	**CHILD DEVELOPMENT PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To expose the student to the basics of Child Development
b. To help student understand research in child development
c. To understand the biological development of a child
d. To evaluate personality development of a child

Unit-I: Child development

Nature of child development: the field of child development , Domains of child development, Periods of child development , The psychoanalytic perspective ,Behaviorism and social learning theory, Piaget's cognitive-developmental theory

Unit-II: research in child development

Research strategies in child development, Systematic observation, Self-Reports interviews and questionnaires, Psycho-physiological methods, The clinical or case study method, Methods for studying culture

Unit-III: biological development

Foundations of Development, The genetic code, the sex cell, Patterns of Genetic inheritance, Child birth, Approaches to children, Birth complications, Oxygen deprivation, Preterm and low-birth weight infants Motor and perceptual development in infancy, the course of physical development, factors affecting physical growth

Unit-IV: personality development

Personality and social development , Emotional development, Functions of emotions, Emotions and cognitive processing, Development of emotional expression Happiness, anger and sadness, fear, self-conscious emotions, Emergence of self and development of self concept, Self-esteem, structure, changes if level of self–esteem , Social problem solving, Training social problem solving

Reference

1. John W. Santrock : Life-Span Development
2. Laura E. Berk : Child Development seventh edition
3. Child Development and Adjustment Lester D.Crow and Alice crow surjeet publications.

Outcomes:

1. Exposed the students to the basics of Child Development
2. Helped the student understand research in child development
3. Understood the biological development of a child
4. Able to evaluated personality development of a child

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	-	3	-	-	3	1	2	-	-	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	2	2	1	2	3	2	2	2	1	-	2
CO_4	3	3	2	2	2	3	2	2	-	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-104b	**PSYCHOLOGICAL MEASUREMENTS AND STATISTICS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To become acquaint with intelligence and achievement tests
b. To learn the measurement of personality tests
c. To understand the Statistics for Psychological Measurement
d. To know the Distribution of Scores on Variables

Unit- I: Intelligence and Achievement Tests

a. Intelligence Tests – Definition, Binet's Scales; Wechsler Scales (WISC, WAIS); Individual Vs. Group tests; Verbal Vs. performance Scales of intelligence; Intelligence tests as clinical instruments; Multifactor Test Batteries

   Tests of Intellectual Impairment

   Achievement Test – Definition; Characteristics of Achievement Tests; Achievement Tests for Special Areas.

b. Special Abilities – Definition of Aptitude, Motor and Manual tests; DAT Battrey, Multiple Aptitude Test Battery, Special Aptitude tests; Evaluation of Aptitude test.

   Tests of interests, Values and Attitudes.

Unit – II: Personality Tests

a. Self Report Measures - Personality Inventories - 16 PF, MMPI, CPI; EPI (Eysenck).

b. Projective Tests – Thematic Apperception test, Children Apperception test, Rorschach Ink Blot test, Picture Arrangement test, Rosenzweig Picture Frustration test, CAT.

Situation Tests: Semantic Differential, Socio-metric methods, Psychodrama.

Neuropsychological Tests as diagnostic tools.

Unit – III: Statistics for Psychological Measurement

a. Introduction to statistics – Importance in Psychological Measurement.

b. Measures of Central Tendency of scores, Measures of Variation of scores, Measures of Associations, Multi Variate statistical methods.

Unit – IV: Distribution of Scores on Variables

a. Graphic Representation of test data
b. Frequency distribution – Normal Probability Curve (NPC)
   Tests of significance of Some Statistics
   Use of Statistical Packages – SPSS in psychological research.

References:

Anastasi, A. (2005). Psychological Testing, New Delhi: Pearson Education Pvt. Ltd.,

Cronbach, L.J. (1970). Essentials of Psychological Testing. New York: Harper & Row.

Freeman R.S. (1966). Psychological Testing, 3rd Edition, New Delhi: Oxford IBH Co. Pvt. Ltd.,

Guilford, J.P. (1989). Psychometric Methods. New Delhi: Tata McGraw Hill Publishing Co. Ltd.

Keith Coaley (2014). An Introduction to Psychological Assessment & Psychometrics, Singapore: Sage Publications Asia Pacific Pvt. Ltd.,

Leslie A. Miller, Robert L. Lovler & Sandra A. Mclntire (2013). Psychological Testing. New Delhi: Sage Publications.

Milter, L.A., Lovler, R.L., & McIntire, S.A. (2013). Psychological Testing – A Practical Approach, New Delhi: Sage Publications Pvt. Ltd.,

Ramamurti, P.V. (2014). An Introduction to Psychological Measurements, New Delhi: PHI Learning Pvt. Ltd.,

The Mental Measurement Year Book, Baros (Latest).

Thomas A. Stetz, Leslie A. Miller & Robert L. Lovler (2016). Student Study Guide for Foundations of Psychological Testing. New Delhi: Sage Publications.

Outcomes :

1. The students acquainted with intelligence and achievement tests
2. The students learned the measurement of personality tests
3. They are clear in understanding the Statistics for Psychological Measurement
4. They have knowledge on Distribution of Scores on Variables.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	3	2	1	3	-	2	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	3	3	2	2	2	2	2	-	2	-	2
CO_4	3	3	3	2	2	1	1	1	1	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-104c	**FORENSIC PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To expose the student to the basics of forensic Psychology
b. To help student understand the concept of psychology of Crime
c. To acquaint the students on psychological investigation of Crime
d. To understand psychology of violence

Unit-I : Introduction to Forensic Psychology:

Historical overview, Functions of Forensic Psychologists, Psychology and law.

Unit-II : Psychology of Crime:

Developmental Theories and Psychobiological bases of crime, Risk Assessment & Violence Prediction, Eyewitness Testimony and Expert Testimony.

Unit-III : Psychological Investigation of Crime:

Scientific Lie Detection: Polygraph, Verbal & NonVerbal Cues, Hypnosis and Narcoanalysis, Behavioural Analysis; Understanding the criminal personality- antisocial personality, psychopath & sociopath; Personality Profiling

Unit-IV: Psychology of Violence:

Workplace and domestic violence, Child Abuse, Victim Psychology, Correctional Psychology: Recognizing the suffering: Rape Trauma Syndrome and Post traumatic Stress Disorder, Coping with criminal victimization, rehabilitation of victim and offender

References:

1. Bartol, C. R. &Bartol, A. M. (2004). Introduction to forensic psychology. Thousand Oaks, CA: Sage Publications.
2. Brown, J. M., & Campbell, E. A. (Eds.) (2010). The Cambridge handbook of forensic psychology. Cambridge, England: Cambridge University Press.
3. Costanzo, M. & Krauss, D. (2010).Legal and forensic psychology. New York: Worth Publishers.
4. G., Hollin, C., & Bull, R. (Eds.) (2008). Forensic Psychology. Chichester, England: John Wiley & Sons, Ltd.
5. Huss Matthew T. (2009). Forensic psychology: Research, clinical practice, and applications. West Sussex, UK: Wiley-Blackwell.
6. Joanna R. Adler, Jacqueline M Gray (Eds) (2010) Forensic psychology, N.Y.: William Publishing,
7. Towl, Graham J., &Crighton,David A. (Eds) (2010) Forensic psychology, West Sussex: N.J. John Wiley & Sons Ltd.
8. Weiner, Irving B. & Hess, Allen K. (Eds) (2006) Handbook of Forensic Psychology, N.J. John Wiley & Sons L

Outcomes:

1. Exposed the student to the basics of forensic Psychology
2. Students understood the concept of psychology of Crime
3. They acquainted knowledge on psychological investigation of Crime
4. Students understood psychology of violence of various forms.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	2	-	-	2	-	2	1	2	-	-
CO_2	3	3	3	-	-	2	2	2	-	-	-	2
CO_3	3	3	3	2	2	2	2	3	2	2	-	2
CO_4	3	3	3	-	-	3	2	3	2	2	-	-

Semester - II

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-201	**GENERAL PSYCHOLOGY – II**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

1. To understand fundamentals of motivation and emotion
2. To understand basic concepts of memory and forgetting
3. To comprehend the thinking and intelligence
4. To evaluate the personality of individuals

Unit – I: Motivation and Emotion

a. Historical antecedents of motivation from mechanism to cognition. Motivation sequence and motivational concepts – instinct, drive, motive and incentive. Physical and Psycho - social motives – A brief study of motivational theories – Freud, Mc Dougall, Maslow, S-R and Cognitive. Measurement of Motivation – Issues and techniques – cross cultural perspective of motivation.

b. Emotions – nature, development, differentiation and expression of emotions, physiological basis of emotion. Brief review of theories of emotion – Physiological – James – Lange theory, Cannon Bard theory, Behavioural facial feedback theory and Schachter two factory theory and cognitive appraisal theory of emotion. Measurement of emotions – Physiological, expressive and cognitive measures.

Unit – II: Memory and Forgetting

a. Models of memory – information processing model – sensory memory, short – term memory, long –term memory, encoding, storage and retrieval.

b. Factors influencing memory – Repetition, meaningful learning, whole Vs part learning, massed and spaced practicing, Motivation, feed back and passage time Measurement of Memory – study habits, mnemonic devices, Nature of forgetting, theories of forgetting: Interference theory, motivation theory, Decay theory, Trace-change theory.

Unit – III: Thinking

a. Nature and tools of thinking, Tools of thinking – images and types of image
   Concepts – development and process of concept formation and types of concepts. Language – Structure of language, acquisition of language and the relationship between language and thinking.

b. Varieties of thinking: Reasoning – inductive and deductive reasoning. Problem solving – types of problem solving – trial and error, insight, algorithms. Heuristics steps and impediments in problem solving. Critical thinking, Inference and pittals. Piaget model of cognitive development.

Unit – IV: Intelligence and personality

a. Nature and distribution of intelligence
   Differences in intelligence – individual, gender and racial factors, Influence of heredity and environment – Assessment, Theories of Intelligence – Spearman, Thurston, Stenberg and Gardner.
b. Personality: Definition, Nature & Development, determinants of personality. Classification of personality (type & trait) and measurement.

References:

1. Bemard Weiner, (1972). Theories of motivation from mechanism to cognition. Los Angeles; Noida: Rand Mcnally
2. Eva Dreikurs Ferguson (1975). Motivation an experimental approach. Edwerdsville: Southern Illinois University
3. Goleman, Daniel (1998). Working with Emotional intelligence. New York: Banatain books.
4. Hilgard, E.G. Atkinson R.C., & Atkinson R.R. (1976). Introduction to Psychology, (6th edition). New Delhi: Oxford & IBM Publishing Company Private Limited,

5. Kendler. H.H (1975). Basic Psychology (3rd Edition). London: Addison – Wesley Publishing Company.
6. Parameswaram, E.G. & Beena, C. (1988), Invitation to Psychology, (First edition) – New Delhi : Tata Mc Graw Hill Publishing Company Ltd,.
7. Robert Plutachik, (2010) Emotion: A Psycho Evolutionary Synthesis, New York: Harper & Row Publishers.
8. Ruch, F.L (1970). Psychology and life. Bombay: D.B: Taraporevala sons and Company Pvt. Ltd.,
9. Sdorow, Lester (2012). Psychology. Iowa Brown Publishers Duduque.

Outcomes:

1. The students understood the fundamentals of motivation and emotion
2. They understood the basic concepts of memory and forgetting
3. Comprehended the thinking and intelligence
4. Able to evaluated the personality of individuals

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	1	-	-	3	3	2	-	3	-	3
CO_2	3	3	2	-	-	2	-	2	-	2	-	3
CO_3	3	3	2	2	2	2	2	3	2	2	-	3
CO_4	3	3	2	2	2	3	2	3	2	2	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-202	**APPLIED SOCIAL PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand the Social Influence
b. To acquaint with social exchange process in social behaviour.
c. To comprehend the prejudice and discrimination
d. To understand what is psychological groups and individuals.

Unit – I: Social Influence

a. Forms of Social influence: Conformity, compliance and obedience Asch's experiments on conformity; factors affecting conformity; the bases of conformity.

b. Compliance: Tactics used in compliance; Ingratiation, reciprocity and multiple requests, guilt and compliance. Obedience: Milgram's Studies on destructive obedience, resisting the effects of destructive obedience, modeling as a basis for unintentional social influence.

Unit – II: Social Exchange Process

a. The nature of co-operation and competition, bargaining and negotiation, resolving interpersonal conflicts through bargaining; perceived fairness in social exchange; equity and inequity, factors for restoring fairness in social exchange.

b. Prosocial behaviour: altruism: Characteristics influencing altruism, theories of altruism: reinforcement theory, cognitive theory: Bystander effect, explanations, the characteristics of the helper and the helpee; Interpersonal attraction and love: Types of love. Determinants of attraction: physical attractiveness, attitude, similarity and reciprocity.

Unit – III: Prejudice and Discrimination:

a. Sources of prejudice. Combating prejudice, sex & gender prejudice: nature and origin, discrimination against women.

b. Aggression and Violence. Theoretical perspectives, social and cultural determinants of aggression; individual determinants, prevention and control of human aggression.

Unit –IV: Groups and Individuals

a. Groups: Nature and functions: group formation, how groups function: roles, Status, norms and cohesiveness; groups and task performance: Social Facilitation, Theories of Social Facilitation; Social Loafing, Decision making by groups.

b. Leadership: Definition, types of leaders, characteristics of a leader, functions of a leader, theories of leadership.

References:

Baron, R.A., & Byrne, D. (1988). Social Psychology; Understanding Human Interaction, New Delhi: Prentice Hall of India Pvt. Ltd.

Kulkarni, P.D. (1979). Social Policy and Social Development in India. Madras: Association of Schools of Social work in India.

Madison, B. (1980). The Meaning of Social Policy: Comparative Dimension in Social Welfare, London: Groom Hoim.

Misra, G. (1990). Applied Social Psychology in India. Sage publications India Pvt. Ltd.,

Pandey, J. (1980). (Ed.) Perspectives on Experimental Social Psychology in India, New Delhi: Concept Publishers.

Seidenberr, B. & Sandowky, A. (1978). Social Psychology: An Introduction. Stuttgart: The Free press, Macmillan Publishing Co. Inc.,

Sharma, P.N & Shastri, C. (1984). Social Planning: Concepts and Techniques, Lucknow: Print House.

Sinha, D., & Rao, H.S.R. (1988). Social values and Development, New Delhi, Sage Publications.

Outcomes:

1. Students understood about Social Influence

2. Acquainted with social exchange process in social behaviour.
3. Comprehended the prejudice and discrimination
4. To understand what is psychological groups and individuals.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	1	1	-	-	3	3	2	-	3	-	3
CO_2	3	3	2	-	-	2	-	2	-	2	-	3
CO_3	3	3	2	2	2	2	2	3	2	2	-	3
CO_4	3	3	2	2	2	3	2	3	2	2	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-203a	**PSYCHOPATHOLOGY-II**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To understand anxiety and mood disorders
b. To acquaint with somatic disorders.
c. To study Psychosis and Cognitive Disorders
d. To understand Psychological Disorders Across the Life Span

Unit – I: Anxiety and Mood Disorders

a. Generalized Anxiety disorders and phobias - Panic, Obsessive - compulsive disorders
b. Mood disorders – Suicide - Etiology and treatment

Unit – II: Psycho - Somatic Disorders

a. Stress-Coping and maladaptive behaviour, psychosomatic disorders, Eating disorders
b. Substance - related disorders, sexual disorders, Etiology and treatment

Unit – III: Psychosis and Cognitive Disorders

a. Schizophrenia and sub types, Cognitive disorders : Amnesic disorders
b. Dementia: Delirium, etiology and treatment

Unit – IV: Psychological Disorders Across the Life Span

a. Personality disorders
b. Disorders of childhood, adulthood and old age, etiology and treatment

References:

Carson. Butcher Mineka (2003). Abnormal Psychology and Modern life (11th Edition). New Delhi: Pearson Education Pvt. Ltd.,

Irwin G.Sarason & Barbara R.Sarason (2009). Abnormal Psychology (XI edition). New Delhi: PHI Learning Pvt. Ltd.,

Lauren B. Alloy, John, H. Riskind & Margaret J. Manos (2005). Abnormal Psychology, (IX edition) New Delhi: Tata McGraw Hill Publishing Co. Ltd.,

William J. Ray (2015). Abnormal Psychology – Neuroscience Perspectives on Human Behaviour and Experience. New Delhi: Sage Publications.

Outcomes:

a. Understood anxiety and mood disorders
b. Acquainted with somatic disorders.
c. Studied Psychosis and Cognitive Disorders
d. Understood Psychological Disorders Across the Life Span

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	-	2	2	-	2	-	-	-	2
CO_2	3	3	2	-	-	2	-	2	-	-	-	1
CO_3	3	3	3	-	-	3	-	1	-	-	-	2
CO_4	3	2	3	-	-	3	-	-	-	1	-	-

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-203b	**PSYCHODIAGNOSIS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives

1. To get knowledge of psychological tests and their use in diagnosis.
2. To make students able to diagnose patients with the help of projective tests.
3. To get understanding of different diagnostic systems.
4. To Learn how to take case history of patients and to make differential diagnosis.

Unit -I : Psycho-diagnosis:

Introduction and rationale, factors influencing psychological testing pits all of psychological testing, Case-history and Mental status examination, Tests of Primary Mental Abilities: a) Attention and Concentration b) Perception c) Memory d) Thinking and Reasoning e) Intelligence

Unit-II : Tests of Differential Diagnosis

a) Tests of Thought Disorder b) Questionnaire for Differential Diagnosis c) Rating Scales

Unit-III : Personality Tests:

Rorschach Test, Interview and Adjustment Test.

Unit-IV : Neuropsychological Assessment:

Psycho-physiological Assessment: Assessment of psycho- physiological indices of arousal/anxiety (e.g. GSR, EMG and ECG) and to correlate with those of subjective reports of the same.

References

1. Sattler, J.M. (1982). Assessment of Children's Intelligence and Special Abilities, W.B. Sounders Co. Philadelphia.
2. Anastasi, A. (1968). Psychological Testing. McMillan, London.
3. Bellack, A.S. (Eds.) (1981). Behavioural Assessment: A practical Handbook, Pergamon.
4. Tallent (1983). Psychological Report Writing. Prentice-Hall, New Delhi.
5. Bender, L.A. (1938). Visual motor-Gestalt Test and its Clinical Use, American Orthopsychiaric Association Research Monograph (No. 3) New York: American Orthopsychiatric Association.
6. Hassnay, H.J. (Ed.) (1986). Experimental Techniques in Human Neuropsychology, New York: Oxford Press.
7. Exner, J.E. (1986). The Rorschach: A Comprehensive System: Volume 1. Basic Foundation (2nd ed.) New York: Wiley.
8. Exner, J.E. (1978). The Rorschach: A Comprehensive System: Volume 2. Current Research and Advanced Interpretation. New York: Wiley.
9. Exner, J.E. and Weiner, I.B. (1982). The Rorschach: A Comprehensive system: Volume 3. Assessment of Children and Adolescents. New York. Wiley.
10. Knoff, H.M. (Ed.) (1986). The Assessment of Child and Adolescent Personality. New York: Ginlford Press.
11. Green, Roger, L. (1991). MMPI: An interpretive manual, Massachusettes: Allyn and Bacon.
12. Beck, S.J. (1978). Roschach's test: 3rd revised edition, Vol. I, II & III, New York: Grune and Stratton.

Outcomes:

1. Acquired the knowledge of psychological tests and their use in diagnosis.
2. Students are able to diagnose patients with the help of projective tests.
3. Understood of different diagnostic systems.
4. Learned how to take case history of patients and to make differential diagnosis

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	3	2	1	3	-	2	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	3	3	2	2	2	2	2	-	2	-	2
CO_4	3	3	3	2	2	1	1	1	1	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-203c	**COMPUTER APPLICATIONS IN PSYCHOLOGICAL RESEARCH**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives

a. To understand the basic components of computer
b. To know and working in Ms Office, power point and internet services.
c. To comprehend the application of computer knowledge through creating emails, scientific journals and data scoring
d. To be able to understand **Statistical Packages**

Unit – I: Introduction to Computers

a. Definitions – Basic components of computer –block diagram – Input / Output devices – Key board- Mouse and scanner – directories and sub-directories.
b. Evolution of Computer generations – Fundamentals in Computers

Unit – II: MS Office-I

a. MS word: Creating, Opening and saving files- Editing and formatting text- spell and grammar check- auto correct- creating of tables and columns- mail merge- word art- concept of a macro print preview.
b. MS PowerPoint: Creating power point slide- editing and formatting the presentation etc.,

Unit – III: MS Office-II & Internet Services

a. MS Excel: Work sheet- entering data and creating work sheets and work books- opening and saving workbooks- editing and formatting-sorting, filtering and pivot tables- creating

graphs and charts- mathematical and statistical functions. MS accesses; opening and saving, features and data entry and usage.

b. Use of Internet Services – Creating e-mail- sending mails- browsing websites of Psychology, browsing scientific journals- search engines- data storing

Unit – IV: Statistical Packages

a. Use of Statistical Packages in Psychological Researches - Introduction to SPSS - What is SPSS – Purposes – Using the Windows in SPSS
b. SPSS Windows – SPSS file types – Creating and modifying Data Files – Data Modification – Descriptive Statistics – Inferential Statistics.

References:

Linda Hobbs Collier (2010). Essential Skills - Have You Used Yours Today? Skill Book - Practical Computer (Training Package) Use. Newfoundland and Labrador Laubach Literacy Council Inc.

Manfred T., Grotenhuis & Anneke Matthijssen (2016). Basic SPSS Tutorial. New Delhi: Sage Publications.

Manfred T., Grotenhuis & Chris Visscher (2014). How to use SPSS Syntax. New Delhi: Sage Publications.

Vinod Babu Bandari. (2012). Fundamentals of Information Technology including lab work.. New Delhi: Pearson. ITL-Educational Solutions Limited.

Outcomes:

1. Understood the basic components of computer
2. Acquainted with Ms Office, power point and internet services.
3. Comprehended the application of computer knowledge through creating emails, scientific journals and data scoring
4. Able to understand Statistical Packages and its application

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	3	2	1	3	-	2	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	3	3	2	2	2	2	2	-	2	-	2
CO_4	3	3	3	2	2	1	1	1	1	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-204a	**LIFE SPAN DEVELOPMENTAL PSYCHOLOGY: INFANCY TO ADOLESCENCE**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives:

a. To understand human development
b. To become aware of infancy and babyhood
c. To comprehend the Early and Late Childhood and Adolescence.
d. To know the development of Adolescence

Unit – I: Human Development

a. Principles and factors of development; scope of life span development; periods of the human life span, Perspectives on human development; the mechanistic perspective, the organismic perspective, the psychoanalytic perspective and the humanistic perspective.

b. Fertilization; the mechanisms of heredity; heredity and environment; chromosomal abnormalities; prenatal diagnosis of birth defects; Prenatal influences, maternal nutrition, maternal drug intake and other maternal-factors; prenatal stages and characteristics.

Unit – II: Infancy and Babyhood

a. Infancy and babyhood: The birth process, birth complications, infancy; sub divisions, physical characteristics; major adjustments; physical and psychological development of infants, growth and motor development, environmental influences on motor development, mortality in infancy; early learning, classical conditioning, operant conditioning, habituation.

b. Intellectual development: The psychometric approach, Piagetian approach, Information processing approach, language and speech development.

Social and Personality Development: the psychosexual (Freud) and psychosocial (Erilkson) theories, emotions, the family's role in personality and social development; socialization developmental tasks; physical and psychological hazards

Unit – III: - Early and Late Childhood

a. Early childhood: Physical growth and motor development; childhood health and illness; sleep pattern and problems. Intellectual development: Piaget's pre-operational stage; language' early childhood; the development of social speech; schooling: preschool, benefits. Social and personality development: Theoretical perspectives on personality: Sigmund Freud, Erikson, effect of child-rearing practices on personality development. Play: social play and cognitive play, implications, Hazards of early childhood.

b. Late childhood:

Physical development, growth, motor development, intellectual development, Piaget's stage of concrete operations, moral development, Piaget's theory, Kohlberg's studies. Language development: Communication ability, measuring intelligence in school children, creativity in children. Children in School: the teachers influence, educating handicapped children, learning disability. Social and personality development, theoretical perspectives; Freud, Erikson; social groups, influences, self-concept in school children; the child in the family; emotional disturbances; Hazards of late childhood.

Unit – IV: - Adolescence

a. Physical development: physiological changes of adolescence, psychological impact of physical changes; health problems. Intellectual development: Piaget's stages of concept development, moral development: Kohlberg's stage of normal development;

b. Social and personality development: theoretical perspectives on personality development Hall, Freud, Erikson; the search for identity; Relationship with parents, peers, friends, sexual identity.

References:

Hurlock, E.B. (1980). Developmental Psychology - A Life span. Approach, New Delhi: McGraw Hill Inc.

Olds S.W. & Paplia, D.E. (1986). Human Development, New Delhi: Tata McGraw Hill Inc.

Goulet, L.R. & Baltes, P.B. (1970). Life span Developmental Psychology, New York: Academic Press Inc.

Bakes, P.B. & Brim, O.G. (1978). Life span development, New York: Academic Press, (Vol-I & Vol-lI).

Baltes, P.B & Schaie, K.W. (1973). Life span developmental psychology: Life Span Personality and Socialization. New York: Academic Press.

Lerner, R.M & Hultsch, D.P. (1983). Human Development. A life span perspective, New York: McGraw Hill Publications.

Outcomes:

1. To understood human development
2. The students became aware of infancy and babyhood
3. To comprehended the Early and Late Childhood and Adolescence.
4. The students are aware of the development of Adolescence

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	-	3	-	-	3	1	2	-	-	-	2
CO_2	3	3	3	2	2	3	2	3	2	-	-	2
CO_3	3	2	2	1	2	3	2	2	2	1	-	2
CO_4	3	3	2	2	2	3	2	2	-	2	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-204b	**CONSUMER BEHAVIOR**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To understand concept of consumer behaviour and market research
b. To comprehend the economic theory of buyer behaviour
c. To study the effect of psychological theories of motives
d. Advertisement - advertisement purposes-role of communication

Unit-I :

a. Motivation - Definition of motivation – motivation process – motivational implication and themes of motivation.

b. Consumer behavior and market research; definition of marketing - Types of markets.

Unit-II :

a. Economic theory of buyer behavior, psychological model – perception, learning attitudes, personality, psychographics (lifestyles) market research-approaches.

b. survey technique ; questionnaire survey method – experimental methods.

Unit-III :

a. Consumer buying motives – primary versus selective; product versus patronage

b. Motives Positive versus negative motives; emotional versus rational motives.

Unit-IV:

a. Advertisement - advertisement purposes-role of communication. Theme or appeal sale promotions; the objectives of sales promotion.

b. Features of salesmanship building the sales force, packaging & branding.

References

1. Consumer Behavior - Insights from Indian Market Majumudar Ramanuj, PHI, 2nd Edition.
2. Consumer Behavior, Blackwell and Engel, Cengage Publication, Indian Edition

Outcomes:

1. The students understood the concept of consumer behaviour and market research
2. Comprehended the economic theory of buyer behaviour
3. Studied the effect of psychological theories of motives
4. Acquainted with the advertisement - advertisement purposes-role of communication

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	-	2	2	3	3	2	-	2
CO_2	3	2	2	2	2	2	2	2	3	3	-	2
CO_3	3	2	2	-	-	2	2	2	-	2	-	2
CO_4	3	2	1	2	2	2	2	2	2	3	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
Psy-204c	**INDUSTRIAL AND ORGANIZATIONAL PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	
(Common for both M.Sc. Psychology and M.Sc. Counseling Psychology)			

Objectives :

a. To understand the psychological, social and economic contribution in developing industrial psychology.
b. To comprehend the personal psychology
c. To know the selection, interviews and evaluation.
d. To comprehend the employment interview

Unit-I

a. The Economic, Social and Psychological Foundations of Industrial and Organizational Psychology.
b. Industrial Psychology its Scope, Methods, the Classical Hawthorne Studies

Unit-II

a. Personnel Selection Methods of Training
b. Job Analysis the structure and function of groups

Unit-III

a. Personnel Psychology, Concerns of personnel Psychology
b. Logic of selection and recruitment, the organization as a dynamic and developing system

Unit- IV

a. The employment interview: application Black and Psychological Tests

b. Evaluation of Personnel evaluation of Managers, Increasing organizational Effectiveness.

Reference :

1. E.J.Mc Cormick (1985) Introduction to Industrial psychology, ND: J. Wiley.
2. Edgar H. Schein (1983) Organisational Psychology (3rd Edition) Eastern, Economy Edition.Printice Hall of India, private limited , New Delhi-110001

Outcomes:

1. Understood the psychological, social and economic contribution in developing industrial psychology.
2. Comprehended the personal psychology
3. Have knowledge the selection, interviews and evaluation.
4. Comprehended the employment interview

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	-	2	2	3	3	2	-	2
CO_2	3	2	2	2	2	2	2	2	3	3	-	2
CO_3	3	2	2	-	-	2	2	2	-	2	-	2
CO_4	3	2	1	2	2	2	2	2	2	3	1	1

COUNSELING PSYCHOLOGY (SELF-SUPPORTING)

THIRD SEMESTER

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-301	**COUNSELLING PROCESS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. Understand the meaning and definition of counseling and counselling as helping profession.

b. Counselling and its relation with guidance psychotherapy, Clinical psychology and social work.

c. Legal. Professional and ethical considerations in counselling.

d. The communications skills involving verbal and non verbal methods and effectively managing transference and resistance in the process of counseling.

Unit I:

a) The concept of counselling – Definition of counselling – counselling as helping profession- helping relationship – counselling and related fields – guidance, Psychotherapy, clinical psychology and social work.

b) Factors contributing to the emergence of counselling- Counselling movements in modern times – History of counselling movement- Present status of counselling in India

Unit II:

a) Goals and expectations of counselling – The characteristics an effective counselor- The roles and functions of counselor- counselor skills

b) Legal. Professional and ethical considerations in counselling – Conflicting responsibility – Confidentiality – Competence and representation and ethics in research – legal

considerations – the legal recognition of counselors – Privileged communications – Expert Testimony and liability for negligence or malpractice.

Unit III:

a) The counselling setup – Influence of external conditions.
b) Phases of counselling – Phase I – Establishment of purpose
Phase – II Definitions of the counselling process

Phase – III Clarification and understanding of the clients needs

Phase – IV Progress towards the goal

Phase – V Consolidation and planning

Unit IV:

a. Structuring the relationship – Verbal and non verbal techniques – Handling transference and resistance - value orientation in counseling process

b. Types of counselling – Essentials of individual, family and group counselling – Evaluation of counselling.

References:

Brammer, L.H and Schoston, E.L. (1968). Therapeutic Psychology (Second edition) New Delhi: Prentice Hall.

Gerald Corey (2001). Theory and Practice of Counseling and Psychotherapy (6th edition) Brooks/Cole: Thomson Learning.

Hensen, J.C., Steive, R.R & Waker, J.R. (1982). Counseling Theory and Process, New York: Allyb and Bcan.

Kavita Singh (2015). Counseling Skills for Managers (Second Edition). New Delhi: Prentice Hall of India

Mc Gowan & LyLe D. Schmidt (1962). Counseling Readings in Theory and Practice, New York: Holt & Reinehart

Narayana Rao, S. (1991). Counseling and guidance (second edition) New Delhi: Tata Mcgraw Hill Publishing Company Ltd,

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-302	**COUNSELLING SKILLS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To introduce to the micro- skills of counselling through a series of exercises and guided practice.

b. To involve the students and work toward self – exploration with the aim of working toward a greater appreciation and understanding of the many facets of the self.

c. To provide a space where participants can grow, in the sense of allowing an encounter with them first and based on this encounter to achieve a better understanding of how they impact on other people.

d. To equip the students in terms of knowing personality types, ego states and different aspects of the self and the ability to assess others are envisaged.

Unit – I: Knowing and understanding the self

a. Understanding one's personality type using MBTI - Understanding ego states
b. Understanding different aspects of the using the Johari Window

Unit – II: Counselling Skills

a. Attending Behavior - Opening Communication - Observation Skills - Paraphrasing and summarizing – Skills in Three tire model of counseling
b. Nothing and reflecting feelings - Confrontation (supporting while challenging)

Unit – III: Communication Skills

a. Non – Verbal communication - Verbal Communication - Listening Barriers
b. Tips to Enhance Listening - Counsellor's qualities.

Unit – IV: Three stages of counselling

a. The relating stage: Understanding the internal frame of reference starting the help process, managing resistance.

   The understanding stage: assessing feelings and physical reactions, assessing thinking, communication and action, challenges feedback.

b. The changing stage: helping to solve problem, improving communication, actions and thinking, negotiating home-work termination.

References:

Berne, E. (1964). Game people play: The Psychology of Human relationships, Harmonds worth: Penguin

Hirsh, S.K., & Kummerow,J.M(1990) Introduction to type in organizations, Palo Alto: Consulting Psychologists press.

Ivery, A.E. & Ivery, M.B. (1999) International interviewing and Counseling: Facilitating client development in a multicultural society, Pacific Grove: Brooks/Cole.

Nelson –Jones, R. (2005) Introduction to counselling skills; Tests and activities, London: Sage Publications Inc.

Summerton, O. (1994), Becoming OK: Transactional analysis Basic concepts. Bombay: Alfreuby Publishers.

Outcomes

1. Understood the micro-skills of counselling through a series of practices.
2. Got an idea about who to understand the people and interpret their feelings with positive appreciation
3. To provide a space where participants can grow, in the sense of allowing an encounter with them first and based on this encounter to achieve a better understanding of how they impact on other people.
4. The ability to examine and assess the clients with scientific manner.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	2	2	3	2	3	-	3
CO_2	3	3	2	2	3	3	2	3	2	2	-	2
CO_3	3	3	2	2	2	3	3	1	2	3	-	3
CO_4	3	3	2	3	3	3	2	2	3	3	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-303a	**THERAPEUTIC APPROACHES IN COUNSELING-I**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To enable the student to have an insight into the Therapeutic Approaches of counseling.
b. To enable the student to understand the major Therapeutic techniques
c. To understand the procedures involved in the Therapeutic Approaches of counseling.
d. To understand the human behavior and insight of the client.

Unit - I: Psychoanalytic Therapy

a. Psychoanalytic Therapy (Sigmund Freud)- Introduction – Key concepts –view of human nature, structure of personality – conscious and unconscious – anxiety- ego- Defense mechanisms – development of personality .

b. The therapeutic process – therapeutic goals – Therapist's function and role – clients experience in therapy – relationship between therapist and client – application – therapeutic techniques and procedures.

Unit – II: Behaviour Therapy

a. Behavior Therapy (Arnold Lazarus) – Introduction – Historical background – Four areas of development (Classical Conditioning- Operant Conditioning –Social learning approach – Cognitive Behavior therapy) Key concepts – View of human nature - therapeutic goals – Therapist's function and role – clients experience in therapy – Relationship between therapist and clients.
b. Applications of therapeutic techniques Relaxation training and related methods - Systematic desensitization Exposure Therapies - Eye movement, desensitization and reprocessing - Assertion training - Self management and self directed behavior.

Unit III: Person Centered Therapy (Carl Rogers)

a. Introduction – Historical background – Existentialism and Humanism. Key Concepts: View of human nature- Basic characteristics – Therapeutic Process: Therapeutic goals – Therapist's function and role - Client's experience in therapy – relationship between therapist and client.
b. Applications – Therapeutic techniques and procedures: Evolution of person- centered methods. The role of assessment – Areas of application.

Unit IV: Existential Therapy (Viktor Frankl and Rollo May)

a) Introduction – Historical background - Key concepts – View of human nature –The capacity for Self-awareness – Freedom and responsibility– Striving for identity and relationship to others – The search for meaning. Anxiety as condition for leaving – Awareness of death and non being.
b) The Therapeutic Process: Therapeutic goals – Therapist's function and role – clients experience in therapy – relationship between therapists and client – application – Therapeutic Techniques and procedures.

References:

Brammer, L.H and Schoston, E.L. (1968). Therapeutic Psychology (Second edition) New Delhi: Prentice Hall.

Gerald Corey (2001). Theory and Practice of Counseling and Psychotherapy (6th edition) Brooks/Cole: Thomson Learning.

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Kavita Singh (2015). Counseling Skills for Managers (Second Edition). New Delhi: Prentice Hall of India

Mc Gowan & LyLe D. Schmidt (1962). Counseling Readings in Theory and Practice, New York: Holt & Reinehart

Narayana Rao, S. (1991). Counseling and Guidance (Second Edition) New Delhi: Tata Mcgraw Hill Publishing Company Ltd,

Patterson, C.J. (1973). Theories of Counselling and Psychotherapy (Second edition) New Haper and Row.

Richanrd Nelson, Jones (2005). Introduction to Counselling skills, Tests and Activities (Second edition), New Delhi: Sage Publications.

Outcomes

1. Understood the various Therapeutic Approaches of counseling.
2. Understood the techniques relevant to therapies.
3. To acquires the basic procedures.
4. Learned how to touch in the insight of the client

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	2	2	3	2	3	-	3
CO_2	3	3	3	3	3	2	3	3	3	3	-	3
CO_3	3	3	3	2	2	3	1	2	2	3	-	3
CO_4	3	3	2	3	3	3	3	2	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-303b	**COUNSELING IN ORGANIZATIONAL SETTINGS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To introduce the students about basic Principles of Organizational behaviour
b. To explain the role of counselor at work place and to understand the causes and problems of the employees in work environment
c. To improve the leadership styles in employees working in different sectors.
d. To educate the impact of group on individual to enhance the adjustment and commitments

Unit-I :

a. Introduction to Organizational Psychology Definition, Historical Influences in Organizational Psychology Placing the Counselor in the context of the Organization.

b. Organizational Differences between Workplace Counseling, Mentoring, Coaching and Training.

Unit-II :

a. Organizational Socialization – Definition and Dimensions,

b. Stages Role of the Workplace Counselor at each Stage.

Unit-III :

a. Individual Behaviour in Organizations Productive and Counterproductive Behaviour in Organizations - definitions Job Satisfaction Employee Absenteeism Employee turnover Occupational Stress Special groups in organisational counseling.

b. Chronic absentees -Accident prone - Employees with family problems - Employees with alcoholism & drug addiction - Maladjusted employees - Indisciplined employees.

Unit-IV :

a. Leadership behaviour Definition and theories Models of leadership behaviour, Management of Counterproductive Behaviour and Stress – Application of Basic Skills and Approaches of counseling to Specific Problems, Using techniques of Time-management, Stress Management, Cognitive Behaviour Approaches, Handling Procrastination and Perfectionist Behaviours at Workplace.

b. Group Behaviour in organizations Definition and Characteristics of Groups Stages of Groups Impact of Groups on Individual Group Effectiveness – Determinants and Enhancement Intergroup Interactions – Types and patterns Intergroup Conflicts – Reduction Strategies, Stress management and Performance – From Analysis to Intervention Vocational counselling: counseling for career planning & development. Adjustment on the job. Promotion counseling.

References:

1. Jex, S.M. (2002). Organizational Psychology: A Scientist-Practitioner Approach. John Wiley and Sons. Inc, New York.
2. Arnol J., & Robertson, I.T., & Coopen, C.L. (1995). Work Psychology- Understanding human behaviour in workplace. London: Mcmillan.
3. Lilly Nerry Psychology at work, 2nd Edn. Tata McGraw Hill.
4. Kinicki, A., & Kreitner, R. (2006). Organizational behaviour: Concept, skill, practices, 2nd Edn. New Delhi: Tata Mc-Graw Hill.
5. Sonnentag, S. (2002). Psychological Management of Individual Performance. John Wiley & Sons Ltd.

Outcomes

1. Understood the basic Principles of Organizational behaviour
2. Acquired the role of counselor at work place and identified the causes and problems in work environment

3. To adopted the leadership styles to lead the employees.

4. Enhanced the adjustment and commitment styles in work environment.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	-	2	2	3	3	2	-	2
CO_2	3	2	2	2	2	2	2	2	3	3	-	2
CO_3	3	2	2	-	-	2	2	2	-	2	-	2
CO_4	3	2	1	2	2	2	2	2	2	3	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-303c	**HEALTH PSYCHOLOGY**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives :

a. To understand the concept of the Health psychology
b. To acquaint with and health behaviour.
c. To comprehend the health behaviour enhancement and management.
d. To know the future of the health psychology

Unit – I: Introduction

a. Introduction, definition - need for health psychology - relating health psychology to other fields - maintaining a healthy state and coping with illness – Biomedical and Bio-medico-social model.

b. Environmental psychology - environmental effects on Human Behaviour - the effect of human behaviour environment, urban life - health care, Socio-cultural perspective - cross cultural studies - epidemiological studies - social pathology - divorce - communal violence.

Unit –II: Health Behaviour - Enhancement

a. Health Behaviour and Primary prevention Health behaviours - changing health habits through cognitive behavioural approaches – Trans-theoretical model and Social engineering – Health enhancing behaviours - Health compromising behaviours.

b. Stress and Coping – Sources of stress and moderators of stress experience - coping resources and coping styles - Social support - Management of stress.

Unit-III: Management

a. Management of chronic illness - quality of life - emotional responses to chronic illness - personal issues - coping and rehabilitation - psychological intervention - heart disease, Hypertension, Stroke and diabetes.

b. Psychological issues in advancing to hospital care - problems of survivors. Psycho-neuro-immunology, AIDS, Cancer and Arthritis.

Unit – IV: Future

a. Challenges for the future Health promotion - Stress and Management - Health services - Management of serious illness - Trends for the future - Becoming a health Psychologist.

b. Organized efforts to mental health - governmental and voluntary organisations; international efforts for mental health - limitations in mental health efforts.

References:

Baron, R.A & Byrne, D. (1999). Social Psychology. New Delhi: Prentice Hall of India Pvt. Ltd.

Coleman, J.C. (1975). Abnormal Psychology and Modern Life. Bombay: Taraporeval Sons & Co.,

David F. Marks, Michael Murray, Brian Evans & Emee Vida Estacio (2011). Health Psychology (Third Edition). New Delhi: Sage Publications India Pvt. Ltd.,

Hans Selye (1980). Selyes Guide to stress research, Van Nostrand, New Delhi: Reinhold Company,

Sarason, I.G & Sarason, B.R. (2000). Abnormal Psychology. New Delhi: Prentice of Hall of India, N.D.

Taylor, S.E (2006). Health Psychology (6th edition) New Delhi: Tata McGraw Hill.

Teisi Thou (2011). Health Psychology. New Delhi: ABD Publications.

Outcomes:

1. Understood the concept of the Health psychology
2. Acquainted with and health behaviour.
3. Comprehended the health behaviour enhancement and management
4. Realized the future of the health psychology.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	2	-	3	2	2	3	3	-	3
CO_2	3	1	1	1	1	3	3	3	1	3	-	3
CO_3	3	1	-	-	-	3	3	3	2	3	-	3
CO_4	3	-	3	1	-	3	3	3	2	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-305	STRESS MANAGEMENT & COUNSELING PSYCHOLOGY	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To introduce meaning of stress and coping styles

b. To understand the sources of stress

c. To understand the techniques of stress management

d. To comprehend and implement the techniques of stress management and counseling

Unit-I: Scientific Foundations - Physiological Arousal and Behaviour Change

a. Definition, Indian and Western Concept of Stress, Theoretical models of Stress

b. Sources of stress (Neuro-endocrinology, personality, environment, intrapersonal and interpersonal sources of stress), Consequences of stress, Stressful Behaviour and Health Status- somatic and anxiety problems

Unit-III: Life Situations and Perception of Stress

a. Stress among children and adolescence; Family stressors and interventions

b. Stress among the elderly; Stress among trauma victims

Unit-IV: Stress and Coping, Assessment Management and Counseling Techniques

a. Concepts and theoretical perspectives of coping; Personal coping resources; Coping styles and strategies; Coping with adjustive demands.

b. Assessment of stress and coping; Behavioural Techniques of Management Syllabus-Applied Psychology, C.U., 2018 28 ; Health promoting and health damaging

lifestyles; Cognitive Behavioural techniques of management; Social Skills Training; Indigenous techniques

References :

1. Bramer, L.M. and Shostrom, E.L. (1982). Therapeutic Psychology. Fundamentals of Counseling and Psychotherapy. New Jersey Prentice Hall.

2. Chen, D.D. (2017). Stress Management and Prevention: Applications to Daily Life, Taylor and Francis, 3rd Edition.

6. Garfield, S.L. (Ed) (1980). Psychotherapy: An Eclectic Approach. New York, John Wiley and Sons.

7. Gelso, S. and Fretz, B. (2001). Counselling Psychology: Practices, Issues and Intervention (India Edition). Cengage Learning.

8. Goldberger, L. & Brezenitz, S. (1982). Handbook of stress: Theoretical and Clinical Approaches. NY Free Press.

9. Greenberg J. S., (2009). Comprehensive Stress Management, 10th Ed. Tata McGraw-Hill Publications. 10. Hodges, S. (2003). Counselling adults with learning disabilities. Palgranemacmillan.

11. Horn, S. & Munajo, M. (1997). Theory Research and Intervention. Open Univ Press.

12. Kar, C. (2013). Exceptional Children: Their Psychology and Education. Sterling Publishes Pvt. Ltd.

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16. Lovallo, W.R. (2004). Stress and Health: Biological and Psychological Interactions (Behavioral Medicine and Health Psychology), 2nd Edition. Sage Publications.

17. Mishra, G. (1999). Psychological Perspective of Stress and Health. Concept.

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19. Palmer, S. and Dryden, W. (2010). Counselling for Stress Problems. Sage. New Delhi.

22. Scott, M., Stradling, S.G. & Dryden, W. (1995). Developing cognitive behavioural counselling. Sage.

23. Wolberg, L.R. (1988). The Techniques of Psychotherapy (4th Ed) Part 1 & 2, New York, Grune and Stralton.

Outcomes

1. Understood the stress and coping styles
2. Acquired the sources of stress
3. Learned the techniques of stress management
4. To comprehend the implementation of stress management and counseling techniques

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	1	1	1	1	2	2	2	2	3	-	3
CO_2	3	1	2	-	-	3	2	2	2	3	-	3
CO_3	3	3	3	3	3	3	3	3	2	2	-	3
CO_4	3	3	2	2	2	3	2	2	2	2	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-306	**PERSONALITY DEVELOPMENT**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To study biological, psychological determinants
b. To know socio cultural determinants & Soft Skills
c. To acquaint with soft skills
d. To learn more on Soft skills

Unit – I: Introduction

a. Personality – definition – nature –
b. biological, psychological and socio cultural determinants

Unit – II: Theories & Assessment

a. Theoretical Perspectives – Psychoanalytical, behavioural, humanistic, factor analytical (trait) and cognitive.
b. Assessment of Personality.

Unit – III: Soft Skills - I

a. Soft skills Development 1: Communication Skills; Interpersonal Skills
a. Planning – decision making – Competence development – perceptual, social and academic

Unit – IV: Soft Skills - II

a. Soft skills Development – II: Promoting healthy personality –
b. Positive thinking, developing self confidence and self efficiency, stress management, time management and leadership development

Practicals for 50 marks.

References:

Baron, R.A. & Byme, D. (2001). Social Psychology: Understanding Human Interaction. New Delhi: Prentice – Half India Pvt. Ltd.,

Berko, Roy, M. Wolvin, A.D. & Curtis Hall Ray (1990). The Business of Communicating (4th edition), Dubuque, IA: Brown.

Gelb, M. (2002). Present yourself. London: Aurum Press.

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Hardingham, Alison (1990). How to get things done, London: Sheldon Press.

Haris, T.A. (1993). I m OK-you're OK London: Pan Books

Hind. T.A. (1993). Transferable personal skills: A students guide. Sunderiand: Business Education Publishers.

Proctor, R.W. & Dutta, A. (1995). Skill acquisition and human performance. Thousand Oaks: Sage.

Ram. U. (1998). Suffering and stress management: West versus East: Pune: Deep Publications.

Smitth. Robert, M . (1990). Learning how to learn: Applied theory for adults. Buckingham: Open university Press.

Townsend, A. (1996). Assertion training, Oxford: FPA Education Unit.

Outcomes:

1. Studied biological, psychological determinants
2. The students aware of socio cultural determinants & Soft Skills
3. The students acquainted with soft skills

4. They learned more on Soft skills

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}
CO_1	3	3	2	-	-	3	3	2	2	3	-	3
CO_2	3	3	2	-	-	2	3	1	2	3	-	3
CO_3	3	3	2	-	-	3	3	2	2	3	-	3
CO_4	3	3	-	-	-	1	3	1	1	3	-	3

FOURTH SEMESTER

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-401	**APPLICATIONS OF COUNSELLING IN SPECIAL AREAS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To sensitize students about the special counseling needs or concerns in different stages of life –span.

b. To provide an opportunity to understand the applications of Counseling to Handle special concerns of Counseling in different area of life.

c. To focus on career, personal and vocational counseling

d. To learn to organize Counseling programs to handle special concerns in Different settings viz., School, college, community and so on.

Unit – I: Introduction

a. Life Span Development & Counseling - Characteristics and developmental needs of life span – infancy & Childhood- Later Childhood- Adolescence – Early adult – The mid Life years – the later years of life.

b. Counseling Needs of Childhood and Adolescence - Children with special needs and their Counseling Concerns – Educational and Behavioral problems.

Unit – II: Counseling Needs of Young Adulthood

a. Career counseling – Its relation to personal Counseling - employee- employer relationship in the context of changing world of work.

b. Career Counseling for women, minorities, the poor, people with disability – dual career couples - career counseling theories. Counseling Needs in the adult years - family interactions - social interactions - martial relationships - theories of family counseling

Unit – III: Focused Counseling- Special Groups

a. Addiction – Alcohol/ substance abuse counseling - symptoms of addiction and abuse – cause – addiction problems - special counseling technique - abuse in special population – the youth, the elderly the disabled.

b. Counseling the Special concern groups - the clients from multicultural contexts - homosexuals – gays and lesbians - the persons with HIV and their families - the chronically disabled and their families - concerns of the aged – health & disability, terminally iii, empty nest, post retirement years, bereavement – facing death- crisis counseling.

Unit – IV: Rehabilitation Counseling

a. Vocational rehabilitation, psychiatric rehabilitation, drug addict - rehabilitation, rehabilitation of retarded, physically disabled - health counseling- preventive counseling (medical & surgical counseling - nutritional counseling) – health and stress control – fertility counseling – planned pregnancy counseling & problems of pregnancy control.

b. Development of Counseling Programme - Need assessment, development of programme, organization of counseling centers in schools, college and universities - counseling programs in the community

References:

Osipow, S.H. (1983). Theories of Career Development. New Jersy: Prentice Hall: Ince.,

Kottler, J.A. and Brown, R.W. (2000). Introduction to Therapeutic Counseling. New York: Brooks – Cole.,

Gorge, R.L, & Christian, T.S (2000). Counseling: Theory & Practice. New Delhi: Jersy: Prentice Hall.

Street, E. (1994). Counseling for Family Problems. London: Sage Publications.

Thomas, R.Murray (1990). Counseling and Life Span Development. New Delhi: Sage Publications India Pvt.Ltd.

Outcomes

1. Understood how to handle the client with various problems and hailing into different age groups.
2. Learned how to handle the clients with specific problems
3. To attained what is career, personal, vocational and other applied areas of counseling
4. Gained how to organize Counseling programs to handle special concerns in Different social settings.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	2	2	3	2	3	-	2
CO_2	3	3	3	2	3	3	2	3	3	3	-	3
CO_3	3	3	3	2	2	3	1	3	2	3	-	2
CO_4	3	3	3	2	3	3	2	2	3	3	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-402	**THERAPEUTIC APPROACHES IN COUNSELLING-II**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To enable the student to have an insight into the therapeutic approaches of counseling
b. To enable the students to understand the major Therapeutic techniques
c. To understand specific procedures involved in the therapeutic approaches of counseling
d. To know the different psycho therapeutic models of counseling.

Unit I: Gestalt Therapy (Fritz Perls and Laura Perls)

a. Introduction – Key concepts – View of Human nature – some principals of Gestalt therapy theory – The therapeutic process- therapeutic goals – therapist's- function and role – Client's experience in therapy – relationship between therapist and client.

b. Application – Therapeutic techniques and procedures – the experiments in Gestalt therapy – preparing clients for Gestalt experiments – the role of confrontation – techniques of gestalt therapy.

Unit II: The Reality Therapy (William Glasseer)

a. Introduction- Key concepts – view of human nature – a choice theory explanation of behavior – characterizes of reality therapy. The Therapeutic process – therapeutic goals – therapist function and role – client's experience in therapy – relationship between therapist and client.

b. Application – therapeutic techniques and procedures – the practice of reality therapy – the counselling environment – procedures that lead to change – The 'WDEP' System (W= Wants, D= Direction, E= Evaluation and P= Planning), Applications of reality therapy

Unit III : Cognitive Behavior Therapy(Albert Ellis and Aaron T. Beck)

a. Introduction: Development of rational emotive behavior therapy.
Key Concepts: view of human nature – view of emotional disturbance- A-B-C Theory of personality. Therapeutic process), therapeutic goals – Therapist's function and role – Client's experience in therapy relationship between therapist and client.

b. Application – Therapeutic techniques and procedures – The practice of rational emotive behavior therapy – Applications of REBT to client populations.

Unit IV An Integrative Approach :

a. Introduction: The trends towards psychotherapy integration – The future of psychotherapy – some predictions – integration of multi cultural issues and counselling – Integration of spiritual / religious issues in counselling – the challenges of developing an Integrative perspective.

b. Issues related to therapeutic process: Therapeutic goals – Therapist function and role – clients experience in therapy – Relationship between therapist and client.

References:

Brammer, L.H and Schoston, E.L. (1968). Therapeutic Psychology (Second edition) New Delhi: Prentice Hall.

Gerald Corey (2001). Theory and Practice of Counseling and Psychotherapy (6th edition) Brooks/Cole: Thomson Learning.

Hensen, J.C., Steive, R.R. & Waker, J.R. (1982). Counseling Theory and Process, New York: Allyb and Bcan.

Kavita Singh (2015). Counseling Skills for Managers (Second Edition). New Delhi: Prentice Hall of India

Mc Gowan & LyLe D. Schmidt (1962). Counseling Readings in Theory and Practice, New York: Holt & Reinehart

Narayana Rao, S. (1991). Counseling and Guidance (Second Edition) New Delhi: Tata Mcgraw Hill Publishing Company Ltd,

Patterson, C.J. (1973). Theories of Counseling and Psychotherapy (Second edition) New Haper and Row.

Richanrd Nelson, Jones (2005). Introduction to Counseling skills, Tests and Activities (Second edition), New Delhi: Sage Publications.

Outcomes

1. Understood the therapeutic approaches of counseling
2. Improve the major skills in therapeutic techniques
3. Gained specific methods involved in therapy
4. Adopted the different psycho therapeutic models of counseling.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	2	2	3	2	3	-	3
CO_2	3	3	3	3	3	2	3	3	3	3	-	3
CO_3	3	3	3	2	2	3	1	2	2	3	-	3
CO_4	3	3	2	3	3	3	3	2	3	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-403a	**COUNSELING IN HOSPITAL SETTINGS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To introduce the students to the basic concepts of Health Psychology

b. To help students to understand the Process of Illness and Psychological Factors

c. To understand about the role and scope of a Counselor in Hospital Settings

d. To understand the importance of Verbal and Non-verbal Communication in Patient care

Unit-I:

a. Relevance of Health Psychology Mind-body relationship Need for Health Psychology. Relating health psychology to other fields. Bio medical and Bio-psychosocial models in Health Psychology Health enhancing behaviours and Health compromising behaviours in Individuals Individual Differences and Personal Characteristics Life Styles and Risk factor.

b. Trans theoretical Model of Change, Modifications of health behaviour, Changing Health beliefs, Cognitive behavioral approaches, Social Engineering, Social Cognitive theory, Self-regulative theory Concepts from Positive Psychology - Positive Mental Heath, Happiness, Well-being Models of Well-being

Unit-II:

a. Psychological Factors in Health and disease General psychological Factors in Health and disease, psychological Factors in General Specific Disease process. Coronary heart diseases and Type-A behaviour pattern Anorexic and Bulimic Syndromes.

b. Essential Hypertension. Recurrent Head Ache. Psychogenic physical diseases. Biological factors, psychological Measures, Socio-cultural measure. Diabetes, Obesity, Cardiovascular Disorders

Unit-III:

a. The Process of Illness Concept of health, illness, disease and well being Help-seeking – Psychological Triggers Illness as an Expression of Emotional needs, The sick role. Medical Communication and Role of Counselor Process of Medical Care – Premises Language in Medical Care –

b. Verbal and Non-verbal Communication in Patient care – Variations, Listening to Patients, Educating Patients, Helping Patients to ask Questions, Helping Patients to Remember

Unit-IV:

a. Pain and its management Definition. Significance of Pain. Nature of Pain. Overview of Theories of Pain. Pain Control Techniques- Cognitive-behavioural methods, Behaviour Modification Management of Chronic pain. Medical Treatment of Pain.

b. Chronic Illness and Terminal Illness Chronic Illness and Disability Dealing with Chronic Illness Page 32 of 36 Chronic Illness Across Lifespan Caring for the Terminally Ill Existential Issues – Meaning Making, Patient's experience of Dying Grief and Bereavement Counseling.

References:

1. Sarafino, P.E. Health Psychology: Bio-psychosocial interactions, 3rd Edn.
2. Taylor, E. Health Psychology. 2nd Edn, Mcgraw Hill.
3. Asha Kaul. Effective communication methods
4. Carr, A. (2008) Positive Psychology – The science of Happiness and human strengths. London, Routledge.

5. Bornstein, M.H, Davison, L, Keyes, C.l.M., & Moore, K.A. (Eds) (2003) Well being – Positive development across the life course. London, Lawrance Erlbaum associates.

6. Snyder, C.R. & Lopez, S.J. (2007) Positive Psychology – The scientific and practical explorations of human strengths. Thousand Oaks, Sage Publications.

7. Shith Toe, R.W. Psychology and Diabetes: Psycho social factors in management and control. London: Chapman and Hall.

8. Gibson, H.B. (Ed). Psychology-Pain and Anasthesia.

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10. Dunne EJ Melntosh, J,l Dunne Maxim, K. (eds) Suicide and its After math. Understanding and Counseling the Survivors. New York. WW Norton. 1987 .

Outcomes:

1. Understood the concepts of Health Psychology in clinical setup.
2. Acquired the causes of Illness and Psychological Factors
3. Got a clinical picture about the role and scope of a Counselor in Hospital Settings
4. Learned the importance of Verbal and Non-verbal Communication in Patient care

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	3	2	3	2	3	-	2
CO_2	3	3	3	3	3	3	1	3	2	3	-	2
CO_3	3	3	3	2	3	3	1	2	2	3	-	3
CO_4	3	3	3	3	3	3	1	3	2	3	-	2

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-403b	**COUNSELING IN COMMUNITY SETTINGS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To introduce the students about the basics of Community Psychology
b. To understand the Qualitative methods of research.
c. To know the role of self-help groups to support community.
d. To introduce students to the variety of models and techniques used in Community settings.

Unit-I:

a. Principles and Theories of Community Psychology Community Psychology – Description, History and Evolution, Related concepts Principles of Community psychology.
b. Ecological Approach to Mental Health Problems – Contributions of James Kelly General Systems Theory –Application to Mental Health Problems.

Unit-II:

a. Action Research Types - Practical and Emancipatory Action Research Methods of Data Collection – Experiencing, Enquiring, Examining Community Needs Assessment

b. Conducting Surveys, Using SWOT analysis, Analyzing Community Problems Other Qualitative methods - Focus Group discussions, Interviews – personal and group, Using Public records and Archival data Project Implementation and Evaluation.

Unit-III:

a. Risk, Resilience and Empowerment Psychosocial Stress – Key determinants of community functioning Identification of risk and protective factors in the community Working with various groups in the community.

b. Child, Adolescent, Old-aged, Persons with Disability, Role of Advocacy, Self-help Groups in the Community.

Unit-IV:

a. Methods of Community Intervention I Prevention – Primary, Secondary, Tertiary Crisis Intervention – features, techniques, and current status, Disaster Management Consultation – Definition, Types, Functions of a Consultant, Phases of Consultation, Methods of Community Intervention II Mental Health Education.

b. Practice of Mental Health Education, Technique, Target group, Content, Effectiveness of Mental Health Education Psychosocial Rehabilitation – Principles and Methods Partnerships with Local Self-government, and other agencies.

References:

1. Korchin, S. J. (1986). Modern Clinical Psychology: Principles of Intervention in the Clinic and Community. CBS Publishers and Distributors.
2. Sanborne, E. (2002). A Value Framework for Community Psychology.
3. Levine, M., Perkins, D. D. & Perkins, D. V. (2005). Principles of Community Psychology. III Edition. Oxford University Press.
4. Kagan, C., Barton, M. & S. Asiya() Pre publication Draft of Chapter in Handbook of Qualitative methods in Psychology.
5. Dalal, A. ().Psychosocial Interventions for Community Development. In G. Misra (Ed.), Psychology in India, Vol. 3. New Delhi: Pearson. 6. Souvenir. National Seminar on Psychology in India: Past, Present, Future. 200

Outcomes:

1. Studied about the basics of Community Psychology
2. To comprehend the research methods to collect and analyze the data .
3. Understood the role of supporting agencies to promote community guidance
4. Adopted different rehabilitation practices

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	3	2	2	3	3	3	3	3	-	3
CO_2	3	3	3	3	2	3	3	3	3	3	-	3
CO_3	3	-	-	-	-	2	1	2	1	3	-	3
CO_4	3	-	-	-	-	2	2	2	-	2	-	2

Course Code	Course Title		No of Hours Per week	No of Credits
CPsy-403c	**FAMILY COUNSELING**		04	4
	Sessional Marks: 20 Marks: 80		End Semester Examination	

Objectives:

1. To impart training to students in family issues
2. To understand the need and importance of family counseling.
3. To understand how to use tools in counseling
4. To acquire skills to handle family issues.

Unit- I: Introduction

a. Definition and Nature of Counseling.
b. Areas of Counseling, Family Counselling.

Unit –II: Counselee characteristics – Process

a. Characteristics of Counselee - Characteristics of an effective counselor.
b. Counseling process - the Counseling set up - Structure and Influence of external conditions - phase of counseling - Termination and follow up. Handling transference and resistance

Unit-III: Counselling Techniques

a. Counseling techniques — verbal and non-verbal techniques – tools of counseling, the psychological tests used in counseling.
b. Evaluation of counseling — Value orientations in counseling

Unit – IV: Family Counselling

a. Family Counseling - Family Interactions – Dynamics, Intergenerational Issues, couple counseling – areas of family counseling - Martial Relationships.
b. Interventions for Family Counseling

References:

Brammer, L.H. & Schostorn (1968). EL Therapeutic Psychology (2nd Edition), New Delhi: Prentice Hall.

McGowan & Lyle D Schmidt. (1962). Counseling Readings in Theory and Practice. New York: Holt & Reinhart.

Street, E. (2014). Counseling for Family Problems. London: Sage Publications.

Thomas, R. & Murray (2008). Counseling and Life Span Development. New Delhi: Sage Publications India Pvt. Ltd.

Outcomes

1. Understand the need and importance of family counseling.
2. Improved how to handle the family issues
3. To maximized use of tools in counseling
4. Learned the specific skills to handle family issues.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	-	2	2	-	2	2	3	1	3	-	3
CO_2	3	3	2	-	-	3	2	3	2	3	-	3
CO_3	3	3	2	3	2	3	2	3	2	3	-	3
CO_4	3	3	3	3	2	3	2	3	2	3	-	3

Course Code	Course Title	No of Hours Per week	No of Credits
CPsy-406	**LIFE SKILLS**	04	4
Sessional Marks: 20		End Semester Examination Marks: 80	

Objectives:

a. To learn the concept of life skills and its importance in relation to personality development of an individual.
b. To know the different types of life skills relevance to individual and social situations.
c. To adapt the good interpersonal and communicative skills.
d. To become aware of the components of life skills and the method of imparting knowledge of life skills.

Unit – I: Introduction

a. Introduction to life skills, the performance of life skills, the relationship between life skills and individual personality development.

b. Life skills development and its effects on relationship patterns.

Unit – II: Types of Life Skills

a. Types of life skills: Thinking skills – Decision making, Goal Setting and Motivation, Positive Thinking.

b. Overcoming doubt, fear, procrastination and perfectionism. Problem solving, Creativity.

Unit – III: Life Skills in Specific

a. Interpersonal Skills – Coping Skills – Communication skills, Negotiation skills.

b. Leadership, Team Building- Presentation Skills.

Unit – IV: Management

a. Self-management skills: Self-awareness, building confidence and self-esteem anger management, stress management, relaxation techniques.

b. Designing life skills intervention – assessment of life skills – designing modules.

References:

Baron.A. Robert. Branscombe, R. Nyla et al. (2010). (12th Edition) New Delhi: Tata McGraw Hill..

Bishop, S. (1999). Assertiveness skills – A source book of activities, New Delhi: Viva Publishers Pvt. Ltd.

Burnard, P. (1999). Interpersonal Skills – A source book of activities, New Delhi: Viva Publishers Pvt.Ltd.

Kelly, J. (1987). Career Skills. London: MacMllian Press.

Prakash B. (Ed). (2003). Adolescence and life skills Common Wealth Youth Program, Asian Center, Common wealth Secretariat. New Delhi: Tata McGraw Hill.

Shulman, L. (1979). Skills of Helping: Individuals & Groups. Chennai: Ezhilagam Publications.

Stella Cottrell, (2005). Critical Thinking Skills: Developing Effective Analysis and Argument, Noida: Palgrave Macmillan Ltd., RGNIYD.

Outcomes:

1. Learned the concept of life skills and its importance in relation to personality development of an individual.
2. They became aware of the components of life skills and the method of imparting knowledge of life skills.
3. The students have learned more on Life Skills in Specific
4. They acquainted with Self management skills

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**
CO_1	3	3	2	-	-	3	3	2	2	3	-	3
CO_2	3	3	2	-	-	2	3	1	2	3	-	3
CO_3	3	3	2	-	-	3	3	2	2	3	-	3
CO_4	3	3	-	-	-	1	3	1	1	3	-	3

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF STATISTICS



Course

M.Sc. STATISTICS

Choice Based Credit System (CBCS)

Academic Year 2023– 24

Amended as per NEP-2020

About the Department

The department of Statistics was established in the year 1958 as a part of Mathematics Department then separated as an independent department in the year 1962. The department offers three post graduate courses (i) M.Sc., Statistics (ii) M.Sc., Applied Statistics and (iii) M.Sc., Applied Statistics (Self Finance Course). The department is active in organizing various academic programmes like conferences and workshop apart from teaching, research and consultancy. During the last five years department has organized about 20 events covering wide areas like Operations Research, Time Series, Stochastic modeling, Geo-Statistics, Bio-Statistics, Data Envelopment Analysis, Statistical computing.

The thrust areas of ongoing research in the department are time Series, Econometrics, Regression Models, Biostatistics, Operations Research, Stochastic modeling, Data Envelopment Analysis and etc. The UGC has identified the department for special assistance sanctioned 44 Lakhs plus 2 project fellows at SAP- DRS-I and 40 Lakhs plus 10 research fellows under BSR and DST FIST 16.5 lakhs.

VISION: To en-corporate certain specific objectives and scale to prepare the students to take up challenges in any one or more functional domain

1. ACADEMICS

2. BASIC AND APPLIED RESEARCH

3. RESEARCH AND DEVELOPMENT

4. SOFTWARE SKILLS

5. INDURSTRY

6. STATISTICAL ANALYSIS

MISSION: To bring out professional having knowledge of basic laws of nature together with strong fundamentals of in core areas of statistics viz. linear algebra, probability and distributions, statistical inference, multivariate analysis, econometric methods, operations research-i, time series analysis and forecasting methods , operations research-ii. Specializations subjects like….Sampling techniques, stochastic process, linear models and applied regression analysis, computer programming and data analysis, demography and official statistics, bio-statistics, statistical process and quality control, advanced econometric models. Technical subjects like… statistical analysis using excel and spss, python, design and analysis of experiments, industrial statistics and quality control, statistical analysis using R + R practical's

PROGRAM SPECIFIC OUTCOMES:

- **PSO 1:** To obtain sound statistical knowledge for data analysis and developing inferences.
- **PSO 2:** To design and develop models for various phenomenon and obtaining optimal strategies.
- **PSO 3:** To become a good data scientist.
- **PSO 4:** To become competent to pursue research or a career in Statistics.
- **PSO 5:** To inculcate scientific attitude and enriched with interdisciplinary and transdisciplinary applications of Statistics for developing sound decisions.

PROGRAM OBJECTIVES:

At the program the student will be able to

- **P01:** Apply the scientific knowledge to solve the statistical data analysis problems
- **PO2:** Identify, formulate and analyze advanced scientific problems reading substantiated conclusions for all kind of disciplines like medical, biological series and so on.
- **PO3:** Creative design solutions for advanced scientific problems `and design system components using statistical analysis that meet the specified need with appropriate attention to health and safety risks.
- **PO4:** Using statistical analysis understanding the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
- **PO5:** Create, select and apply appropriate techniques, resources and modern statistical tools to complex statistical problems with understanding of the limitations.
- **PO6:** analyzing the impact of marketing sales into the society using data science techniques.
- **PO7:** By statistical methods demonstrating the knowledge and understanding the scientific principles and applying the statistical tools to manage projects and in multidisciplinary environments.
- **PO8:** apply ethical principles and norms of scientific practices
- **PO9:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings by statistical approach.

- **PO10:** Understanding the working of various analog communication techniques by using data science methods
- **PO11:** Project management of finance in collaboration with various firms by data science techniques
- **PO12:** Recognize the need and have the preparation and ability to engage independent and life-long learning in the broadest context of scientific and technological change by statistical approach.

PROGRAM EDUCATIONAL OBJECTIVES

At the end program the student will be able to

- **PEO1:** Apply principals of basic scientific concepts in understanding and predictions of statistical sciences
- **PEO2:** Develop human resources with specializations in theoretical and experimental techniques required for carrier in academic, research and industry
- **PEO3:** Engage in lifelong learning and adopt changing in professional and society needs

PROGRAM OUTCOMES

- **PO 1:** To obtain sound scientific knowledge in Statistical and applied aspects of Statistics.
- **PO 2:** To describe the phenomenon of various systems and processes.
- **PO 3:** To handle and analyse data bases with sound computer skills and develop interpretations.
- **PO 4:** To model the random phenomenon of various systems and processes using Statistical analysis.
- **PO 5:** To become a data scientist for assessing in decision making.
- **PO 6:** To get a wide range of opportunities and private, corporate and government sector organisations.
- **PO 7:** To analyse and develop strategies for industrial and service organisations.
- **PO 8:** To be able to train non statisticians to handle Statistical and data analytics.
- **PO 9:** To get knowledge about various Statistical packages like SPSS, Python, R etc.,
- **PO10:** To expertize in theoretical and applied principles of Statistics needed to enter the job force.

- **PO11:** To perform Statistical inference in several circumstances and interpret the result applied contest.
- **PO12:** To Communicate concepts in Probability and Statistics using Technical and Non-Technical Language.

S.V. UNIVERSITY, TIRUPATI

DEPARTMENT OF STATISTICS

M.Sc., STATISTICS

CBCS Pattern (With effect from January, 2021)

The course of Study and Scheme of Examinations

NEP 2021

SEMESTER-I

Sl. No	Course Code	Components of Study	Title of the Course	Contact Hours	No. of Credits	IA Marks	End SEM Exam Marks	Total Marks
1	ST - 101	Core	Linear Algebra	6	4	20	80	100
2	ST - 102	Core	Probability and Distributions	6	4	20	80	100
3	ST - 103	Generic Elective	a. Sampling Techniques b. Stochastic Process	6	4	20	80	100
4	ST - 104	Compulsory Foundation **(Related to Subject)**	a. Statistical Analysis using Excel and SPSS b. Python	6	4	20	80	100
5	ST - 105	Core	Practical-I (75 Practical + 25 Record)	9	4	-	-	100
6	ST - 106	Elective Foundation	Practical-II (75 Practical + 25 Record)	9	4	-	-	100
7	ST - 107	Audit Course	Human Values and Professional Ethics-I	--	--	100	--	--
	Total			**42**	**24**			**600**

*** Among the Generic Electives the student shall choose <u>ONE</u>**

****Among** Compulsory Foundation **student shall choose <u>ONE</u>**

SEMESTER-II

Sl. No.	Course Code	Components of Study	Title of the Course	Contact Hours	No. of Credits	IA Marks	End SEM Exam Marks	Total Marks
1	ST - 201	Core	Statistical Inference	6	4	20	80	100
2	ST - 202	Core	Multivariate Analysis	6	4	20	80	100
3	ST - 203	Optional-I	(a) Linear Models and Applied Regression Analysis (b) Computer Programming – C^{++}	6	4	20	80	100
4	ST - 204	Optional-II	a. Design and Analysis of Experiments b. Industrial Statistics and Quality Control	6	4	20	80	100
5	ST - 205	Core	Practical-III (75 Practical + 15 Viva- voce + 10 Record)	9	4	-	-	100
6	ST - 206	Elective Foundation	Practical-IV (75 Practical + 15 Viva- voce + 10 Record)	9	4	-	-	100
7	ST - 207	Audit Course	Human Values and Professional Ethics-II	--	--	100	--	--
	Total			**42**	**24**			**600**

- **Student have to choose one paper from Optional-1**
- **Student have to choose one paper from Optional-II**

SEMESTER-III

Sl. No.	Course Code	Components of Study	Title of the Course	Contact Hours	No. of Credits	IA Marks	End SEM Exam Marks	Total Marks
1	ST - 301	Core	Econometric Methods	6	4	20	80	100
2	ST - 302	Core	Operations Research-I	6	4	20	80	100
3	ST - 303	Core	Practical-V (75 Practical + 25 Record)	9	4	-	-	100
4	ST - 304	Generic Elective * **(Related to Subject)**	(a) Demography and Official Statistics (b) Bio-Statistics	6	4	20	80	100
5	ST-305 Skill Oriented Course	Mandatory (Theory + Practical-VI)	Statistical Analysis Using R + R Practicals	9 (3T+ 6P)	4	10	90 (40T+50 P)	100
6	ST - 306	Open Elective **(For other Department)**	(a) Statistics for Biological and Earth Sciences (b) Statistics for Social and Behavioral Sciences	6	4	20	80	100
	Total			**42**	**24**			**600**

*** Among the Generic Electives the student shall choose <u>ONE</u>**

****Open Elective papers is for other department**

SEMESTER-IV

Sl. No.	Course Code	Components of Study	Title of the Course	Contact Hours	No. of Credits	IA Marks	End SEM Exam Marks	Total Marks
1	ST - 401	Core	Time Series Analysis and Forecasting Methods	6	4	20	80	100
2	ST - 402	Core	Operations Research-II	6	4	20	80	100
3	ST - 403	Generic Elective * **(Related to Subject)**	(a) Advanced Econometric Models (b) Total Quality Management and Six - Sigma	6	4	20	80	100
4	ST - 404	Core	Practical-VII (75 Practical + 15 Viva-voce + 10 Record)	9	4	-	-	100
5	ST - 405	Project Work / Multidisciplinary (Theory + Practical-VIII)	**Student Project:** Data Centre / Institutions / Companies and etc., (or) Statistical Process and Quality Control (Theory + Practical)	9 (3T+ 6P)	4	10	90 (40T+ 50P)	100
6	ST - 406	Open Elective **(For other Dept.)**	(a) Business Analytics (b) Survival Analysis	6	4	20	80	100
	Total			**42**	**24**			**600**

*** Among the Generic Electives the student shall choose <u>ONE</u>**

**** Open Elective papers is for other department**

** Primary or Secondary data collected from banks, fields or any other relevant areas are analyzed and submitted

<u>Student Project</u> : Dissertation - 60 Marks

Viva Voce - 10 Marks

Presentation - 30 Marks

Total - 100Marks

ST 101: LINEAR ALGEBRA

Unit-I: Algebra of matrices; Elementary transformations; Rank and Inverse of a matrix; Nullity; Partitioned matrices; Kronecker product; Generalized inverse of matrix; Moore-Penrose generalized inverse; Solutions of simultaneous equations.

Unit-II: Finite dimensional Vector Spaces; VectorSpaces and Subspaces; Linear dependence and independence; Basis and dimension of a vector space; Completion theorem; Inner product Spaces; Orthonormal basis and Gram-Schmidt orthogonalization process; Orthogonal projection of a vector.

Unit-III: Linear transformationsand properties; Orthogonal and unitary transformations; Real quadratic forms; Reduction and classification of quadratic forms; Hermitian forms; Sylvesters law of inertia; Canonical reduction of quadratic form.

Unit-IV: Characteristic roots and vectors; Cayley – Hamilton theorem; Minimal polynomial; Similar matrices; Spectral decomposition of a real symmetric matrix; Reduction of a pair of real symmetric matrices; Hermitian matrices.

References

1. Graybill, F.A. (1983). Matrices with applications in statistics, 2nd ed. Wadsworth, Belmont (California).
2. Rao, C. R. (1985). Linear statistical inference and its applications, Wiley Eastern Ltd., New Delhi.
3. Searle, S. R. (1982). Matrix Algebra useful for Statistics, John Wiley and Sons. Inc.
4. Bellman, R. (1970), Introduction to Matrix Analysis, 2nd ed. McGraw Hill, New York.
5. Campbell, H.G. (1980), Linear Algebra with Applications, 2nd Edition, Prentice-Hall, Englewood Cliffs (new Jersey), 1980.
6. Biswas, S. (1984), Topics in Algebra of Matrices, Academic Publications.
7. Hadley, G. (1987), Linear Algebra, Narosa Publishing House.
8. Halmos, P.R. (1958), Finite-dimensional Vector Spaces 2nd ed. D.Van Nostrand Company, Inc.
9. Hoffman, K. and Kunze, R, (1971). Linear Algebra, 2nd ed., Prentice Hall
10. Rao, A.R. and Bhimasankaram, P. (1992), Linear Algebra, Tata McGraw Hill Publishing Company Ltd.
11. Rao, C.R. and Mitra, S.K. (1971), Generalized Inverse of Matrices and its Applications, John Wiley and Sons, Inc.
12. Narayan, S. (1970), Theory of Matrices, S. Chand &Company, New Delhi.

Subject Code	Subject Name	Credits Allotted		Total
ST-101	**Linear Algebra**	Theory	Practical	4
		4	---	
Course Objective	1. To Prepare Students about algebra of matrices and vector spaces. 2. To explain about roots vectors and linear transformations with an			

	examples
Course Out comes	Students understood for estimation of elementary transformations in matrix and their solutions. Students learnt about characteristic roots and vectors with numerical examples. They also know theoretical proofs of theorems.

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**1**				**3**	**2**	**2**	**2**
CO2	**3**	**2**	**3**	**2**	**1**				**3**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**1**				**3**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**1**				**3**	**2**	**2**	**2**

ST 102: PROBABILITY AND DISTRIBUTIONS

Unit-I: Classes of sets, fields, σ -fields, minimal σ -field, Borel σ – field in R^K, sequence of sets, limsup and liminf of a sequence of sets. Measure, Probability measure, properties of a measure, Lebesgue and Lebesgue-Stieltjes measures, Measurable functions, Random variables, sequence of random variables, almost sure convergence, convergence in probability (and in measure). Monotone convergence theorem, Fatou's lemma, Dominated convergence theorem.

Unit-II: Expectation of a random variable, inequalities on expectations, Markov, Holder, Jensen and Liapiunov inequalities. Borel- Cantelli - Lemma, Independence, Weak law and strong law of large numbers for iid sequences, Chebyshev's theorem, khinchine's theorem, Kolmogorov theorems (statements only), convergence in distribution.

Unit-III: Laplace and Weibull distributions.Functions of random variables and their distributions, sampling distributions: central Chi Square, t and F distributions and its properties, applications, relation between t and F, F and χ^2; Fisher's Z-distribution, fisher's Z-transformation. Non-central chi-square, t and F distributions and their properties.

Unit-IV: Multiple and partial correlation coefficients, multiple linear regression, inter relationship among partial and multiple correlation and regression coefficients. Null distributions of simple, partial and multiple correlation coefficients.Order statistics and their distributions, joint and marginal distributions of order statistics, distribution of range. Extreme values and their asymptotic distributions.

References

1. Ash, Robert. (1972). Real Analysis and Probability. Academic Press.
2. Billingsley, P. (P. (1986) Probability and Measure. Wiley.
3. Kingman, J F C and Taylor, S. J. (1966). Introduction to Measure and Probability. Cambridge University Press.
4. Loeve, M (1963), Probability theory
5. Bhatt B.R (1998), Modern Probability theory, Wiley Eastern
6. Rohatgi V.K. (1984): An Introduction to probability theory and mathematical statistics.
7. Rao C.R (1973): Linear Statistical Inference and its Applications, 2/e, Wiley Eastern.
8. Pitman J. (1993): Probability, Narosa Publishing House.

9. Johnson, N.L and Kotz, S.M. (1972): Distributions in Statistics, Vol. I , II & III. Houghton and Miffin.
10. David H.A (1981): Order Statistics, II Edition, and John Wiley.
11. Feller W (1966): Introduction to probability theory and its applications, Vol. III, second edition. Wiley Eastern.

Subject Code	Subject Name	Credits Allotted		Total
ST-102	**Probability and Distributions**	Theory	Practical	4
		4	---	
Course Objective	1. To Explain about classes of sets and Probability measures 2. To discuss on random variables and convergence in probability and the important theorems with proofs. 3. To discuss about inequalities on expectations with their derivations and laws of numbers. 4. To explain about different discrete and continuous distributions and their Properties. 5. To learn about derivations and properties of various sampling distributions. 6. To explain order Statistics and their properties			
Course Out comes	1. Students must have knowledge about random variables, expectations, sets and their properties and inequalities where ever necessary. 2. Students also know the weak law, strong law and central limit theorem and their importance 3. Students know about different continuous and discrete distributions and their properties. 4. They have awareness about central and non central sampling distributions and order Statistics. Idea about simple, partial and multiple correlation coefficients.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**1**	**1**				**1**		**2**	**3**
CO2	**3**	**2**	**1**	**1**	**1**				**1**		**2**	**3**
CO3	**3**	**2**	**1**	**1**	**1**				**1**		**2**	**3**
CO4	**3**	**2**	**1**	**1**	**1**				**1**		**2**	**3**

ST 103 (a) : SAMPLING TECHNIQUES

Unit-I: Review of basic concepts of sampling theory such as sampling design, sampling scheme, sampling strategy etc., Sampling with varying probability with and without replacement, PPS WR/WOR methods – Lahiri's sample scheme, Hansen – Hurwitz, Des Raj estimators for a general sample size and Murthy estimator for a sample of size 2, Symmentrized Des Raj estimator.

Unit-II: Hurwitz – Thompson estimator (HTE) of a finite population total / mean, expression for V(HTE) and its unbiased estimator. IPPS scheme of a sampling due to Midzuno – Sen and JNK Rao (sample size 2 only). Rao – Hartley-Cochran sampling scheme for a sample of size n with random grouping.

Unit-III: Ratio and Regression methods of estimation, Two stage sampling, Multi stage sampling, Cluster sampling. Resampling methods and its applications.

Unit-IV: Double sampling for difference, ratio, regression and PPS estimators; Large scale sample surveys, Errors in surveys, A mathematical model for errors of measurement, Sampling and Non-sampling errors, Sources and types of non-sampling errors, Remedies for non-sampling errors.

References

1. Chaudhuri. A and Mukerji. R (1988): Randomized Response Theory and Techniques, New Yory, Marcel Dekker Inc.
2. Cochran W.G (1988): Sampling Techniques III Edition (1977) Wiley.
3. Des Raj and Chandak (1988): Sampling Theory. Narosa.
4. Murthy M.N (1977): Sampling Theory and Methods. Statistical Publishing Society.
5. Sukhatme et al (1984): Sampling Theory of Surveys with Applications. Iowa State University Press & IARS
6. Sing D and Chudary F.S (1986): Theory and Analysis of Sample Survey Designs. New Age International Publishers.
7. Hedayat A.S and Sinha B.K. (1991): Design and Inference in Finite Population Sampling. Wiley.
8. Mukhopadhyay P(1996): Inferential problems in Survey Sampling. New Age International.
9. Wolter K.M (1985): Introduction to Variance Estimator. Springer. Verlag.

10. Hansen M.M and Hurwitz W.M and Mandow W.G (1954): Sample Survey Methods and Theory, Vol. I and Methods and Applications Vol. II, John Wiley and Sons.

11. Philli. I. Good (2013):Introduction to statistics through resampling methods and R, 2nd edition.

Subject Code	Subject Name	Credits Allotted		Total
ST-103 (a)	**Sampling Techniques**	Theory	Practical	4
		4	----	
Course Objective	1. Discuss about basic concepts of sampling techniques PPS WR/WOR models. 2. To study about Hurwitz Thompson estimator, PPS scheme. 3. To learn about Ratio and Regression methods and their properties. 4. To explain Double sampling for difference estimators using ratio regression and PPS's, Non sampling error and their remedies.			
Course Out comes	1. Students learnt different sampling techniques of with replacement/ without replacement and Different sampling models. 2. Students studied Non-Sampling errors and different remedies.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**3**	**3**	**1**			**2**		**2**	**2**
CO2	**3**	**2**	**1**	**3**	**3**	**1**			**2**		**2**	**2**
CO3	**3**	**2**	**1**	**3**	**3**	**1**			**2**		**2**	**2**
CO4	**3**	**2**	**1**	**3**	**3**	**1**			**2**		**2**	**2**

ST 103 (b) : STOCHASTIC PROCESSES

Unit-I: Introduction to stochastic processes (sp's): classification of sp's according to state apace and time domain. Countable state Markov chains (MC's), Chapman – Kolmogorov equations, calculation of n – step transition probability and its limit. Stationary distribution, classification of states,, transient MC, random walk and gambler's ruin problem.

Unit-II: Discrete state space continuous time MC: Kolmogorov – Feller differential equations, Poisson process, birth and death process; Applications to queues and storage problems. Wiener process as a limit of random walk, first – passage time and other problems.

Unit-III: Renewal theory: Elementary renewal theorem and applications. Statement and uses of key renewal theorem, study of residual life time process: weakly stationary and strongly stationary process; Moving averages and auto regressive process.

Unit-IV: Branching process: Galton – Watson branching process, probability of ultimate extinction, distribution of population size. Martingale in discrete time, inequality, convergence and smoothing properties.Statistical inference in MC and Markov process.

References

1. Adke, S.R and Manjunath, S.M (1984): An Introduction to Finite Markov Processes, Wiley Eastern.
2. Bhat, B.R (2000): stochastic Models: Analysis and Applications, New Age International, India.
3. Cinlar, E (1975): Introduction to Stochastic Processes, Prentice Hall.
4. Feller, W (1968): Introduction to Probability and its Applications, Vol. 1, Wiley Eastern.
5. Harris, T.E (1963): The Theory of Branching Processes, Springer – Verlag.
6. Hoel, P.G., Port, S.C and Stone, J.C (1972): Introduction to Stochastic Processes, Houghton Miffin & Co.
7. Jagers, P (1974): Branching Process with Biological Applications, Wiley.
8. Karlin, S and Taylor, H.M (1975): A First Course in Stochastic Processes, Vol. 1, and Academic Press.
9. Medhi, J (1982): Stochastic Processes, Wiley Eastern.
10. Parzen, E (1962): Stochastic Processes, Holden – Day.

Subject Code	Subject Name	Credits Allotted		Total
ST-103 (b)	**Stochastic Process**	Theory	Practical	4
		4	----	
Course Objective	1. To explain stochastic process and their classification according to space and domain. 2. To discuss about Birth and death process, Renewal theory and its applications, stochastic process and their importance, Markov			

	chains, Poisson process, Renewal theory, Branching process etc.
Course Out comes	1. Students understoodstochastic processes, Markov chains, Poisson process, Renewal theory, Branching process, etc.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**1**	**1**				**1**	**1**	**2**	**1**
CO2	**3**	**2**	**1**	**1**	**1**				**1**	**1**	**2**	**1**
CO3	**3**	**2**	**1**	**1**	**1**				**1**	**1**	**2**	**1**
CO4	**3**	**2**	**1**	**1**	**1**				**1**	**1**	**2**	**1**

ST 104 (A) :STATISTICAL ANALYSIS USING EXCEL AND SPSS

Unit-I: Review of Excel, sorting, filtering and construction of charts. Curve fitting and interpretation of the output. Statistical functions in Excel - Calculating theoretical probability using Binomial, Poisson and Normal distributions. Matrix operations- Transpose, Product and Inverse operations using Excel. Pivot tables and look up functions.

Unit-II: Data Analysis Pak in Excel, descriptive statistics, tests of hypothesis, ANOVA, Correlation and Regression, Random Number Generation from different distributions, Binomial, Poisson, Uniform, Normal and from discrete distributions with given mean and variance. Forecasting Using Excel – Moving Averages and Exponential Smoothing, Use of functions, Linest, Logest, Forecast, Growth, Trend for trend analysis. The use of solver for optimization – Application to LPP.

Unit-III: Introduction to SPSS, Different Menu's in SPSS, creating a data file, opening excel files,variables and labels,selecting casesby filtering,recoding of data, merging of files, Sorting of Cases and Variable, SPSS Output and its transfer to excel and word. Analysis categorical data- Scales of Measurements, Data reliability-test rest method, Cronbach's alpha.

Unit-IV: Using SPSS Analysis tools, descriptive statistics, cross tabs (with stress on procedures and syntax). Post-hoc analysis for multiple comparisons using Tukey's test, Duncan's Multiple Range Test, Dunnet's test and Scheffe's test with interpretation. Selection of variables in Multiple Linear Regression – stepwise procedures and analysis of residuals. Procedure for Binary Logistic regression, Factor analysis, Linear Discriminant analysis and Cluster analysis.

<table>
<tr><td>Subject Code</td><td>Subject Name</td><td colspan="2">Credits Allotted</td><td>Total</td></tr>
<tr><td rowspan="2">ST 104 (A)</td><td rowspan="2">Statistical Analysis Using Excel And SPSS</td><td>Theory</td><td>Practical</td><td rowspan="2">4</td></tr>
<tr><td>4</td><td>----</td></tr>
<tr><td>Course Objective</td><td colspan="4">1. To explain about Excel and functions.
2. To discuss about Data Analysis Pak in Excel.
3. To describe about SPSS.
4. To discuss SPSS Analysis tools.</td></tr>
<tr><td>Course Out comes</td><td colspan="4">1. Students understoodabout Excel and functions.
2. Students Know about Data Analysis Pak in Excel.
3. Student describes about SPSS.</td></tr>
</table>

	4. Students have knowledge aboutSPSS Analysis tools.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**2**	**3**	**1**			**1**	**2**	**3**	**3**
CO2	**3**	**3**	**2**	**2**	**3**	**1**			**1**	**2**	**3**	**3**
CO3	**3**	**3**	**2**	**2**	**3**	**1**			**1**	**2**	**3**	**3**
CO4	**3**	**3**	**2**	**2**	**3**	**1**			**1**	**2**	**3**	**3**

ST 104 (B) :PYTHON

UNIT – I:Introduction to Python Programming Language:

Introduction to Python Language,Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical Operators, True or False, Bit Wise Operators, The while Loop, break and continue, The for Loop, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections, In Functions.

UNIT –II :Object and Classes :

Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes.

UNIT –III : Functions and Modules :
Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Modules, Standard Modules – sys,□Standard Modules – math,Standard Modules – time,The dir Function**.**

UNIT –IV : I/O and Error Handling In Python :

Introduction, Data Streams,□Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions.

Books for Study:

1. Dive into Python, Mike
2. Learning Python, 4th Edition by Mark Lutz
3. Programming Python, 4th Edition by Mark Lutz

Course Outcomes:

1: Able to understand the concept of Python Programming.
2: Expertise in Object and Classes.
3: To be able to explore Functions and Modules learning.
4: Able to understand the concept of I/O and Error Handling In Python.

Course Out comes:

1. Students have done Python Programming and their Object and Classes.
2. Students have understandI/O and Error Handling In Python

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**2**				**1**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**2**				**1**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**2**				**1**	**2**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**2**				**1**	**2**	**3**	**2**

ST 105 : PRACTICAL-I

At least 24 practicals covering papers relating to the subjectsLinear Algebra, Sampling Techniques in this semester must be carried out. (75 marks for practical examination + 25 marks for record in the semester)

<table>
<tr><td>Subject Code</td><td>Subject Name</td><td colspan="2">Credits Allotted</td><td>Total</td></tr>
<tr><td rowspan="2">ST-105</td><td rowspan="2"><u>PRACTICALS</u></td><td>Theory</td><td>Practical</td><td rowspan="2">4</td></tr>
<tr><td>----</td><td>4</td></tr>
<tr><td>Course Objective</td><td colspan="4">1. To write different problems manually solving through calculators.
2. To write problems and solving them on computers using Statistical software like Excel and other relevant softwaresetc.,</td></tr>
<tr><td>Course Out comes</td><td colspan="4">Numerical problems related to, Linear Algebra and Sampling Techniques are solved by executing programs on computers.</td></tr>
</table>

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

ST 106 : PRACTICAL-II

At least 24 practicals covering papers relatingto the subjects Probability, Distribution, Ms Excel and SPSS in this semester must be carried out. (75 marks for practical examination + 25 marks for record in the semester)

<table>
<tr><td>Subject Code</td><td>Subject Name</td><td colspan="2">Credits Allotted</td><td>Total</td></tr>
<tr><td rowspan="2">ST-106</td><td rowspan="2"><u>PRACTICALS</u></td><td>Theory</td><td>Practical</td><td rowspan="2">4</td></tr>
<tr><td>----</td><td>4</td></tr>
<tr><td>Course Objective</td><td colspan="4">1. To write different problems manually solving through calculators.
2. To write problems and solving them on computers using Statistical software like Excel and other relevant softwares like easy fit etc.,</td></tr>
<tr><td>Course Out comes</td><td colspan="4">Numerical problems related to Probability and Distribution Theory, are solved by executing programs on computers.</td></tr>
</table>

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

ST 107 : HUMAN VALUES AND PROFESSIONAL ETHICS-1

UNIT-I: Definition and Nature of Ethics-Its relation to Religion ,Politics, Business, Legal ,Medical And Environment,Need And Implementation Ethics-Goals-Ethical Values in Various Professions.

UNIT-II: Nature Of Values-Good and Bad, Ends and Means, Actual and Potential Values, Objectives and Subjective Values ,Analysis Of Basic Moral Concepts-rights, Ought, Duty, Obligation, Justice. Responsibility and Freedom .Good Behavior and Respect for Elders, Character and Conduct.

UNIT-III: Ahimsa (Non-Violence), Satya (Truth),Brahmacharya (Celibacy),Asteya (Non-possession) and APARIGRAHA (Non-stealing).Purusharthas (Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama(Fulfillment bodily desires).Moksha (Liberation)

UNIT-IV: Bhagavad Gita-(a) Niskama karma.(b).Buddhism-The four noble truths-Arya Astanga marga, (c) Jainisam- mahavratas and anuvratas. Values embedded in various religions, Religious tolerance, Gandhian ethics.

UNIT-V: Crime and Theories or punishment-(a) Reformative , Retributive and Deterrent ,(b) Views on manu and Yajnavalkya.

References:

1. R.Subramanian ,Professional Ethics, Oxford University Press.
2. Joha S Mackenjie:A Manual Of Ethics.
3. The Ethics of Management by Larue Tone Hosmer.Richard D.Irwin Lnc.
4. Management Ethics Integrity at Work by Joseph A.Petrick and John F.Quinn.Respons Books;New Delhi.
5. “Ethics in Management” By S.A.Sherlekar, Himalaya Publication House.
6. Harold H.Titus ; Ethics For Today.
7. Maitra,S.K;Hindu Ethics.
8. William Lilly;Introducation Ethics.
9. Sinha: A Manual of Ethics.
10. Manu:Manava Dharma Sastra or the Institute of Manu:Comparising the Indian Syastem of Duties :Raligious and civil (ed.) G.C.Halighton.
11. Susrpta samh ita: Tr.Kaviraj Kunjanlal , Kunjalal Brishagratha .Chowkarnaba Sanskrit series. Vol LII andIII , Varanasi , Vol I 00, 16’20,21-32 and 74-77 only.
12. Caraka samhita :Tr.Dr.Ram karan sarma and vaidya bhagavan dash, Chowkarnaba Sanskrit series office. Varanasi I,11.111 Vol IPP 183-191.
13. Ethics, Theory and contemporary issues.Barbara mackinnon wadsworth / Thomsaon learning,2001.
14. Analyzing moral.issues,Judith A.Boss.May Field Publishing Company-1999.
15. An introduction to applied ethics(ed.)John H.Piet and Ayodhya Prasad.cosmo publications.

16. Text book for intermediate first year ethics and human values. Board of intermediate education-Telugu-academy, Hyderabad.
17. I.C.Sharma ethics philosophy of india.Nagin & co julundhar.

ST 201: STATISTICAL INFERENCE

Unit-I: Point estimation –Unbiasedness, Consistency, Efficiency and Sufficiency; Fisher-Neyman factorization theorem, complete sufficient statistics, minimum variance unbiased estimator (MVUE), Cramer - Rao inequality, Battacharayas inequality, Rao – Blackwell theorem. Exponential family, Maximum Likelihood estimation method, method of moments, method of minimum chi-squares and interval estimation.

Unit-II: Tests of hypothesis: Basic concepts, Most Powerful (MP) test, Neyman – Pearson Lemma, Consistency and Unbiased tests, Uniformly Most Powerful (UMP) test, UMP Unbiased tests, similar critical regions, Lehmann –Scheffe theorem, Likelihood Ratio Tests, Asymptotic Distribution of LR test, Bartlett's test for homogeneity of variances and Wald Test.

Unit-III: Non – Parametric tests of significance; Sign Test, Wilcoxon-Mann-Whitney U-test, Run test, Kolmogorov-Simrnov one and two sample tests, Median test, Kendall's τ test. Concept of asymptotic relative efficiency, CAN, BAN, CAUN and BEST CAUN estimators, MLE in Pitman family and Double Exponential distribution, MLE in Censored Truncated distribution.

Unit-IV: Statistical decision theory – decision problems and two person games, problems of inference viewed as decision problems, non-randomized and randomized decision rules, Loss and Risk functions, admissibility, complete and essentially complete class, complete class theorem.Bayes principle, determination of Bayes rule Minimax principle, determination of minimax rule, minimax theorem. Minimax estimates of parameters of Binomial, Poisson and Normal distributions.

References:

1. Rohtagi, V.K (1988): An Introduction to Probability and Mathematical Statistics, Wiley Eastern
2. Rao C.R (1973), Linear Statistical Inference and its applications, (Revised Edition), Wiley Eastern
3. Lehmann, E.L (1986), Theory of point estimation, (Student Edition)
4. Lehmann, E.L (1986), Testing Statistical Hypothesis (Student Edition)
5. Gibbons, J.D (1985), Non-parametric statistical inference, 2nd Edition, Mercel Dacker Inc
6. Siegal Sidney (1987), Non-parametric Statistics for behavioral sciences, 3rd Edition, Springer Verlog
7. Kendal, M.G and Stuart, A (1968), The advanced theory of statistics, Vol-II, Chales Griffin and Co., London
8. Ferguson, T.S (1967), Mathematical Statistics – a decision theoretic approach,

Academic Press
9. Goon, A.M, Gupta, M and Das Gupta, B (1980), An outline of statistical theory, Vol-II, World Press, Calcutta.

Subject Code	Subject Name	Credits Allotted		Total
ST 201	**STATISTICAL INFERENCE**	Theory	Practical	4
		4	----	
Course Objective	1. To study the Estimation methods of point and their different measures and theorems, inequality. 2. To discuss about Testing of hypothesis that contains NP Lemma, UHP test, Bartlett's, Wald test, LR test and some theorems relates to hypothesis testing. 3. To discuss different Non-parametric tests with examples. Asymptotic relative efficiency and truncated distributions. 4. To study the Game theory and their problems, minimax rule, minimax theorem and minimum estimates of parameters using different distributions.			
Course Out comes	Students know about point estimation, testing of hypothesis, Non parametric models, Game theory, theorems and Proofs where ever necessary.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**2**	**2**	**1**				**1**		**1**	**2**
CO2	**3**	**2**	**2**	**2**	**1**				**1**		**1**	**2**
CO3	**3**	**2**	**2**	**2**	**1**				**1**		**1**	**2**
CO4	**3**	**2**	**2**	**2**	**1**				**1**		**1**	**2**

ST 202: MULTIVARIATE ANALYSIS

Unit-I: Multivariate normal distribution, marginal and conditional distributions, characteristics functions, Maximum likelihood estimators of parameters, distribution of sample mean vector and dispersion matrix, distribution of quadratic form in the exponent of the multivariate normal density.

Unit-II: Hotelling's T^2 and its applications – T^2 distribution, application of T^2 to single sample, two sample and multiple sample problems, optimum properties of T^2 test. Mahalobis D^2 statistic and its distribution, Multivariate Analysis of Variance (MANOVA) of one and two-way classified data.

Unit-III: Classification and discrimination: procedures for classification into two multivariate normal populations, Fisher's Discriminant function, classification into more than two multivariate normal populations, Wishart distribution and its properties, concept of sample generalized variance and its distribution.

Unit-IV: Principal Component Analysis – properties, method of extraction of principal components; Canonical variables and canonical correlations; Factor Analysis – mathematical model, estimation of factor loading, concept of factor rotation; Cluster Analysis – similarities and dissimilarities, Hierarchical clustering: single and complete linkage method.

References

1. Anderson, T.W (1983), An introduction to Multivariate Statistical Analysis, Wiley, 2nd Edition.
2. Rao, C.R (1973), Linear Statistical Inference and its applications, 2nd edition, Wiley
3. Srivastava. M.S and Khatri, C.G (1979), An introduction to Multivariate Statistics, North Holland
4. Morrison,F(1985): Multivariate Statistical Methods, Mc Graw Hill Book Company.
5. Johnson A.R and Wishern, D.W (1996), Applied Multivariate Statistical Analysis, Prentice Hall of India
6. Sharma, S (1996), Applied Multivariate Techniques, Wiley
7. Krishisagar, A.M (1972), Multivariate Analysis, Marcel Dekker
8. K.C. Bhuyan(2005): Multivariate Analysis and its Applications, Central

Subject Code	Subject Name	Credits Allotted		Total
ST 202	**Multivariate analysis**	Theory	Practical	4
		4	----	
Course Objective	1. To study about Multivariate normal distributions and their properties, it's importance. 2. To discuss Hotelling's T^2, Mahalanobis D^2 statistic and its applications and properties. 3. To explain MANOVA with one and two way classified data. 4. To discuss about Principal Component Analysis, Factor Analysis and Cluster Analysis with appropriate methods.			
Course Out comes	1. Students learnt about importance of multivariate variables and their distributions 2. T^2, D^2, MANOVA models are understood and know it's			

	importance. 3. Classification analysis methods explained according to their classification algorithm.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**1**	**3**	**1**			**2**		**1**	**1**
CO2	**3**	**3**	**2**	**1**	**3**	**1**			**2**		**1**	**1**
CO3	**3**	**3**	**2**	**1**	**3**	**1**			**2**		**1**	**1**
CO4	**3**	**3**	**2**	**1**	**3**	**1**			**2**		**1**	**1**

ST 203 (A) :LINEAR MODELS AND APPLIED REGRESSION ANALYSIS

Unit-I: Two and Three variable Linear Regression models; General linear model: Assumptions; OLS estimation; BLUE; Tests of significance of individual regression coefficients; Testing the equality between two regressions coefficients; Test of significance of complete regression.

Unit-II: Criteria for model selection; Goodness of fit measures; R^2 and adjusted R^2 Criteria; C_p criterion; testing the general linear hypothesis; Chow test for Equality between sets of regression coefficients in two linear models; test for structural change; restricted least squares estimation; Generalized Mean Squared error criterion.

Unit-III: Non-normal disturbances and their consequences; test for normality; Jarque-Bera test; Shapiro-Wilk test, Minimum Absolute Deviation (MAD) estimation; Box-Cox transformations.
Statistical analysis of residuals, OLS residuals, BLUS residual, Studentised residual, Predicted residual, tests against heteroscadasticity.

Unit-IV: Non-Linear regression; Non linear least squares estimation; Maximum Likehoodestimation; Idea of computational methods; Gradient methods, Steepest descent method and Newton-raphson method; testing general Nonlinear hypothesis; Wald test, Lagrange multiplier test and likelihood ratio Test. Robust , probit, binomial logistic ,multiple logistic regression.

References

1. Johnston, J (1984): Econometric Methods, III rd edition. MC Graw Hill.
2. Gujarathi, D (1979): Basic Econometrics, MC Graw Hill.
3. Judge, C.G., Griffiths, R.C.Hill, W.E ., Lutkephol, H and Lee, T.C (1985): The Theory and Practice of Econometrics, John Wiley and Sons.
4. Draper, N and Smith, B (1981): Applied Regression Analysis, Second Edition

Subject Code	Subject Name	Credits Allotted		Total
ST 203(a)	**Linear models and Applied Regression Analysis**	Theory	Practical	4
		4	----	
Course Objective	1. To discuss about linear regression models and their assumptions. 2. To study about different criteria for model selection and their Goodness of fit measures. 3. To explain Non normal disturbances and their consequences and statistical analysis of residuals. 4. To discuss about Non-linear regression estimation methods.			

Course Out comes	1. Students learnt about different linear and non-linear regression models and their appropriate computational procedures. 2. They know R^2, adjusted R^2 and C_p criteria for model selection.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**2**	**2**	**1**			**2**		**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**1**			**2**		**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**1**			**2**		**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**1**			**2**		**1**	**2**

ST 203 (B) :COMPUTER PROGRAMMING – C^{++}

UNIT-I: Object oriented programming principles, Declaration of classes, array of classes, Pointer to classes, constructors such as void constructor, copy constructor, Destructor,

UNIT-II: Friend functions, inline functions, static class members, this pointer, Single, Multiple inheritances: Types of derivation such as public, private, protected inheritance and member access controls, ambiguity in inheritance,

UNIT-III: Virtual base class, container classes. Function overloading, Operator Overloading, Overloading of assignment, binary, unary operators.

UNIT-IV: Polymorphism, Early binding, virtual functions, Late binding, pure virtual functions, abstract base classes, constructor under inheritance, destructor under inheritance, virtual destructors.Templates and Exception Handling. Data File operations, structures and file operations, classes and file operations.

References

1. R.Decker and So Hirshfield (1998): The Object Concept: An Introduction to Computer Programming using C^{++}; PWS Publishing.
2. S.B.Lippmann and J.Lajoie (1998): C^{++} Primer. Third edition. Addison- Wesley. P.Nauahton (1996).The Java Handbook. Tata McGraw-Hill
3. W.J. Savitch (2001): Problem Solving with C^{++}The Object of Programming. Third Edition. Addison-Wesley Longman.
4. Deital&Deital: C^{++}; Prentice-Hall Inc.
5. Sarang: Object Oriented programming with C^{++}; Prentice-Hall Inc.
6. Balaguruswamy, E : Programming with C^{++}; Tata McGraw-Hill.

Subject Code	Subject Name	Credits Allotted		Total
		Theory	Practical	
ST-203(B)	**COMPUTER PROGRAMMING – C^{++}**	4	----	4
Course Objective	1. Understandprinciplesofobjectorientedprogramming,definingclasses, Creatingobjects,initializingobjectsanddestroyingobjects. 2. nderstandfriendfunctions,inlinefunctions,singleandmultipleinheritance, Differenttypesofderivationandambiguityininheritance. 3.Understandvirtualbaseclassandcontainerclasses.Learntooverloadfunctionsa ndoperators. 4.Understandpolymorphism,virtualfunctions,purevirtualfunctions,constructor sanddestructorsunderinheritance. 5. Understandtemplates,exceptionhandling,useofdatafiles.			
Course Out comes	1:Understandprinciplesofobject-orientedprogramming,classes,differenttypesofconstructorsanddestructors. 2:Understandfriendfunctions,differenttypesofinheritanceandtheiruse. 3:Understandfunctionoverloadingandoperatoroverloading,overloadingofunary andbi-naryoperators. 4:Understandthedefinitionsofabstractbaseclasses, similaritiesanddifferencesofvirtualfunctions,andtheiruseinpolymorphism.			

	5.Understandtheutilityoffunctiontemplatesandclasstemplates,exceptionhandling mechanismsanduseofdatafiles.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**2**	**2**				**2**	**2**	**1**	**1**
CO2	**3**	**2**	**1**	**2**	**2**				**2**	**2**	**1**	**1**
CO3	**3**	**2**	**1**	**2**	**2**				**2**	**2**	**1**	**1**
CO4	**3**	**2**	**1**	**2**	**2**				**2**	**2**	**1**	**1**

ST 204 (A) : DESIGN AND ANALYSIS OF EXPERIMENTS

Unit-I: Linear Model; Estimability of linear parametric functions; BLUE, Gauss-Markoff theorem; Generalized Gauss-Markoff theorem, ANOVA model, ANOVA for Two way and three way classifications, ANCOVA technique for one way and two-way classifications. Multiple comparisons tests using Tukey's, Duncans, Sheffe's and Dunnet's tests.

Unit-II: Latin squares and their construction, Mutually orthogonal Latin squares; Missing plot technique in Latin square Design, Graeco-Latin square Design; Analysis of Factorial Experiments involving factors with two and three levels in randomized blocks.

Unit-III: Necessity of confounding, Types of confounding, complete and partial confounding in 2^n, 3^2 and 3^3 factorial designs, Analysis of confounded factorial designs; Fractional Replication, Split Plot design.

Unit-IV: Incomplete Block Designs; B I B D, Inter and Intra Block analysis of a BIBD, Types of BIBD, construction of BIBD's using Mutually orthogonal Latin squares; Concepts of Youden square and lattice Design, Two-Associate PBIB design, Analysis of P B I B design.

References

1. M.N. Das and N.C.Giri (1979), Design and Analysis of Experiments, Wiley, Eastern, Pvt. Ltd., New Delhi.

2. C.D. Montgomery (1976), Design and Analysis of Experiments, Wiley & Sons, New York

3. M.C.Chakbravarthy, (1962), Mathematics of Design of Experiments, Asia Publishing House, Calcutta.

4. Oscar Kempthrone (1974), The Design and Analysis of Experiments, Wiley Eastern, Pvt. Ltd., New Delhi.

5. W.T. Federer (1972), Experimental Designs Theory and Application, Mac Millan Company, New York.

6. Angela Dean and Daniel Ross (1999), Design and Analysis of Experiments, Springer-Verlag.

7. D.D.Joshi (1987), Linear Estimation and Design of Experiments, Wiley Eastern, Pvt. Ltd., New Delhi.

8. P.W.M.John (1971), Statistical Design and Analysis of Experiments, Macmillan

9. F.Pukelshiem (1993), Optimal Design of Experiments, Wiley & Sons

10. D.Raghava Rao (1971), Construction and combinatorial problems in Design of Experiments, Wiley & Sons

11. Aloke Day (1986), Theory of Block Designs, Wiley Eastern, Pvt. Ltd., New Delhi.

Subject Code	Subject Name	Credits Allotted		Total
ST 204	**Design and Analysis of Experiments**	Theory	Practical	4
		4	----	
Course Objective	1. To learn ANOVA and ANCOVA for one and two way classifications analysis and their multiple comparison tests. 2. To explain Latin squares, different types of Latin squares and their missing plots. 3. To discuss on Confounding, their types, confounding 2^n, 3^2 and 3^3 factorial designs etc. 4. To discuss about BIBD, PBIBD construction analysis.			
Course Out comes	1. Students learnt ANOVA, ANCOVA technique for one way and two-way classifications. Multiple comparisons tests using Tukey's, Duncans, Sheffe's and Dunnet's tests. 2. Students understood about Latin squares and their construction, missing plot technique etc. 3. Students explained about Incomplete Block Designs and their analysis, etc.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**3**	**1**			**2**		**2**	**3**
CO2	**3**	**3**	**3**	**2**	**3**	**1**			**2**		**2**	**3**
CO3	**3**	**3**	**3**	**2**	**3**	**1**			**2**		**2**	**3**
CO4	**3**	**3**	**3**	**2**	**3**	**1**			**2**		**2**	**3**

ST 204 (B) :INDUSTRIAL STATISTICS AND QUALITY CONTROL

UNIT-I: General Theory of Control Charts: Control charts for attribute and variables: O.C. and A.R.L. of control charts; control by gauging; Moving average and exponentially weighted moving average charts;Cu-sum charts using V-masks and decision intervals. Capability indices: Cp, Cpk and Cpm.

UNIT-II: Acceptance sampling plans for attribute inspection: Single, double and sequential sampling plans; Plans for inspection by variables for one-sided and two-sided specifications;

UNIT-III: Mil Std and ISI plans; Continuous sampling plans of Dodge type and Wald-Wolfwitz type and their properties.

UNIT-IV: Industrial Experimentation, Fractional factorial experiments, Response surface methodology, Six sigma in process improvement and product development, Lean thinking, Value stream analysis, 5 s.

Reference Books:

1. Cowden D J (1957): Statistical Methods in Quality Control. 1st Edition. Prentice-Hall Inc.
2. Duncan Acheson (1986): Quality Control and Industrial Statistics. 5th Edition. IrvinMittag and Rinne (1993): Statistical Methods for Quality Assurance. 2nd Edition.Chapman and Hall Ltd.
3. Montgomerv. D.C (2012): Introduction to Statistical Quality Control. 7th Edition. John Wiley and Sons
4. R.C. Guptha(2001): Statistical Quality Control. 9th Edition.Khanna Publishers.
5. Ott, E.R. (1975): Process Quality Control. 4th Edition. McGraw Hill
6. Phadke, M.S. (1989): Quality Engineering through Robust Design. 1st Edition. Prentice Hall
7. Wetherill, G.B. (1977): Sampling Inspection and Quality Control. 2nd Edition.Chapman and Hall Ltd.
8. Wetherill, G.B. and Brown, D.W.(1991): Statistical Process Control. Theory and Practice.3rd Edition. Chapman & Hall Ltd.

Subject Code	Subject Name	Credits Allotted		Total
ST 204 (B)	**Industrial Statistics and Quality Control**	Theory	Practical	4
		4	----	
Course Objective	1: Can identify the cause of defects using statistical quality management techniques. 2: Able to apply statistical quality control techniques to minimise the variability in manufacturing and business process. 3: Acquainted with Six Sigma and lean thinking in industrial experimentation. 4: Expertise in the most import field of applied statistics that contributes to quality control in all most all industries.			
Course Out comes	1: Able to understand basics of production process monitoring and apply concept of control charts to it.			

	2: Apply acceptance and continuous sampling plan in production process. 3: Able to construct sampling inspection plans for attributes and variables. 4: Able to learn some advanced control charts and capability indices. 5: Able to construct Six Sigma limits.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**1**	**3**	**2**			**1**	**1**	**2**	**1**
CO2	**3**	**2**	**2**	**1**	**3**	**2**			**1**	**1**	**2**	**1**
CO3	**3**	**2**	**2**	**1**	**3**	**2**			**1**	**1**	**2**	**1**
CO4	**3**	**2**	**2**	**1**	**3**	**2**			**1**	**1**	**2**	**1**

ST 205 : PRACTICAL-III

At least 24 practicals covering all papers relating to the subject in this semester must be carried out. (75 marks for practical examination + 15 marks for viva-voce + 10 marks for record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
ST-205	**PRACTICALS**	Theory	Practical	4
		----	4	
Course Objective	1. To exercise different practical problems manually through calculators. 2. To discuss problems relates to semester - II papers.			
Course Out comes	Students know about the solving of Numerical problems related to semester –II. . .			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**
CO2	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**
CO3	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**
CO4	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**

ST 206 : PRACTICAL-IV

At least 20 practicals covering all papers relating to the subject in this semester must be carried out. (75 marks for practical examination + 15 marks for viva-voce + 10 marks for record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
ST-206	**PRACTICALS**	Theory	Practical	4
		----	4	
Course Objective	1. To exercise different practical problems manually through calculators. 2. To discuss problems relates to semester - II papers.			
Course Out comes	Students know about the solving of Numerical problems related to semester –II. . .			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**
CO2	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**
CO3	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**
CO4	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**

ST 206: HUMAN VALUES AND PROFESSIONAL ETHICS-II

UNIT-I: Value Education –Definition-Relevance to present day-Concept of Human Values-self introduction-self-esteem-family values-Components , Structure and responsibilities of family-Neutralization of anger-Adjustability-Threats of family life –Status of women in family and society –Caring for need elderly –Time allotment for sharing ideas and concerns.

UNIT-II: Medical ethics-Views if charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners.Code of ethics for medical and healthcare professionals.Euthanasia ,ethical obligation to animals,ethical issues in relation to health care professional patients. Social justice in health care , human cloning , problems of abortion .Ethical issues ingenetic engineering and ethics issues raised by new biological technology of knowledge.

UNIT-III: Business ethics – Ethical standards of business-immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories causes of unethical behavior , ethical abuses and work ethics.

UNIT-IV: Environmental Ethics- Ethical Theory , man And Nature- Ecological Crisis , Pest Control , Pollution and Waste , Climate Change, Energy and Population, Justice and Environmental Health.

UNIT-V: Social ethics – Organ trade. Human trafficking, Human rights violation and social disparities, Feminist ethics. Surrogacy / pregnancy, Ethics of media-Impact of newspapers, Television , Movies and Internet.

References:

1. Joha S Mackenjie:A Manual Of Ethics.
2. The Ethics of Management by Larue Tone Hosmer.Richard D.Irwin Lnc.
3. Management Ethics Integrity at Work by Joseph A.Petrick and John F.Quinn.Respons Books;New Delhi.
4. “Ethics in Management” By S.A.Sherlekar, Himalaya Publication House.
5. Harold H.Titus ; Ethics For Today.
6. Maitra,S.K;Hindu Ethics.
7. William Lilly;Introducation Ethics.
8. Sinha: A Manual of Ethics.
9. Manu:Manava Dharma Sastra or the Institute of Manu:Comparising the Indian Syastem of Duties :Raligious and civil (ed.) G.C.Halighton.
10. Susrpta samh ita: Tr.Kaviraj Kunjanlal , Kunjalal Brishagratha .Chowkarnaba Sanskrit series. Vol LII andIII , Varanasi , Vol I 00, 16’20,21-32 and 74-77 only.
11. Caraka samhita :Tr.Dr.Ram karan sarma and vaidya bhagavan dash, Chowkarnaba Sanskrit series office. Varanasi I,11.111 Vol IPP 183-191.
12. Ethics, Theory and contemporary issues.Barbara mackinnon wadsworth / Thomsaon learning,2001.
13. Analyzing moral.issues,Judith A.Boss.May Field Publishing Company-1999.

14. An introduction to applied ethics(ed.)John H.Piet and Ayodhya Prasad.cosmo publications.
15. Text book for intermediate first year ethics and human values. Board of intermediate education-Telugu-academy, Hyderabad.
16. I.C.Sharma ethics philosophy of india.Nagin & co julundhar.

ST 301: ECONOMETRIC METHODS

Unit-I: Quick review of Inference in general linear model; multi collinearity; Sources and consequences; detection, Farrar-Glauber Test; remedies, Ridge family of estimators and its properties; Heteroscedasticity; sources and consequences; Tests for Heteroscedasticity; Glejser's test Goldfeld-Quandt test; remedies, estimation under Heteroscedasticity.

Unit-II: Autocorrelation; sources and consequences; first order auto regressive Scheme; Durbin-Watson test; Remedies; Estimation under autocorrelation; Stochastic Regressors; Errors-in-Variables linear model; IV and ML estimation methods.

Unit-III: Finite Distributed lag models; Arithmetic lag; Inverted V-lag; Almon's Polynomial lag and Shiller's lag models; Infinite distributed lag models; Geometric lag model; OLS and IV methods of estimation; Koyek's two step and Wallis three step procedures; Pascal lag model.

Unit-IV: Simultanious linear equations models; identification; rank and order conditions; indirect least squares, IV and LIML methods; two stage least squares; k-class estimators; three stage least squares and FIML methods of estimation.

References

1. Johnston, J (1984): Econometric Methods, III rd Edition, MC Graw Hill.
2. Judge, C.G., Griffths, and Hill, R.C. et al (1985): Theory and Practice of Econometrics, John Wiley.
3. Gujarathi, D (1979): Basic Econometrics, Mc Graw hill.
4. Intrilligator, M.D (1980): Econometric Models, Techniques and Applications, Prentice Hall.

Subject Code	Subject Name	Credits Allotted		Total
ST-301	**ECONOMETRIC METHODS**	Theory	Practical	4
		4	----	
Course Objective	1. To explain about heteroscedasticity, multicollinearity and their sources, consequences and tests. 2. To discuss about Autocorrelation, different orders of Autocorrelation and their estimation procedures. 3. To explain different lag models and their estimate procedures.			

	4. To discuss about simultaneous linear equations model and their different methods and estimation.
Course Out comes	1. Students learnt heteroscedasticity, multicollinearity and autocorrelation and their estimation procedures. 2. Students understood about different lag models and simultaneous linear equations model with their estimation methods.

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**2**	**3**	**1**			**1**		**2**	**2**
CO2	**3**	**2**	**1**	**2**	**3**	**1**			**1**		**2**	**2**
CO3	**3**	**2**	**1**	**2**	**3**	**1**			**1**		**2**	**2**
CO4	**3**	**2**	**1**	**2**	**3**	**1**			**1**		**2**	**2**

ST 302: OPERATIONS RESEARCH – I

Unit-I: Definition and scope of Operations research; phases in Operations Research; models and their solutions (Review of Linear Programming). Definition of Dual-Primal, Relationships- Dual Simplex Sensitivity or Post Optimal Analysis, Revised Simplex method.

Unit-II: Non-linear programming - Kuhn Tucker conditions. Wolfe's algorithm for solving quadratic programming problems. Integer programming – Branch and bound algorithm and cutting plane algorithm.

Unit-III: Flows in networks max-flow-min-cut theorem. Project Management; PERT and CPM probability of project completion, PERT – crashing.

Unit-IV: Decision making in the face of competition, two-person games, pure and mixed strategies, existence of solution and uniqueness of value in zero- sum games, finding solution in 2x2, and 2xm, and mxn games. Non – zero sum games, co-operative and competitive games, equilibrium solutions and their existence in bi- matrix games. Nash equilibrium solution.

References

1. Taha H.A (1982) Operational Research: An Introduction; Macmillan.
2. Hiller F. Sand Leiberman G.J. (1962) Introduction to Operations Research; Holden Day
3. Kanti Swarup; Gupta P.K and Singh M.M (1985) Operations Research; Sultan Chand.
4 .Philips D.T, Ravindran A and Solberg J Operations Research, Principles and Practice.
5. Curchman C.W; Ackoff R.L and Arnoff E.L(1957) introduction to Operations Research; John Wiley
6. Hadley G (1964) Non-Linear and Dynamic programming Addison Weslay.
7. Mckinsey J.C.C(1952) Introduction to the theory of games Mc Graw Hill.P.K.Gupta; D.S.Hira Operations Research S.CHand.

Subject Code	Subject Name	Credits Allotted		Total
ST-302	**Operations Research-I**	Theory	Practical	4
		4	----	
Course Objective	1. To introduce operations research, Dual-primal, Revised simplex methods. 2. To discuss Non-linear programming and integer programming and their related problems. 3. To explain Network flow charts, CPM and PERT, project management models. 4. To discuss Game theory of 2×2, 2×m, m×n and non-zero sum games with their illustrations.			
Course Out comes	1. Students understood about Dual primal, Revised simplex methods. 2. Students learnt non-linear programming, integer programming, CPM, PERT, different models of games.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**
CO2	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**
CO3	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**
CO4	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**

ST 303 (A) :DEMOGRAPHY AND OFFICIAL STATISTICS

Unit-I: Nature, Scope and limitations of demography; Sources of Demographic data in India; Measures of Mortality; life-tables; construction of abridged life table; Measures of fertility Stochastic models for reproduction, Reproduction rates: GRR and NRR; Concepts of Migration and Urbanization.

Unit-II: Population Projections: Stable and Stationary populations, Lotka's model; Use of Leslie matrix. Population estimates; Chandrasekhar and Deming's method, component method, Stochastic models of population growth, Exponential and logistic population growth models: Birth and death model, Birth-death and migration model.

Unit-III: Population Genetics: Concepts of Genotypes and Phenotypes; Basic Mating from Single gene cross, Punnet Square method, Mendal's laws of heredity; Random mating; Hardy-Weinberg Equilibrium law; Calculation of Gene frequencies, Estimation of Gene frequencies in ABO blood group system.

Unit-IV: Statistical systems in India; CSO, NSSO and their functions; scope and content of population Census in India; Methods of conducting population census, Economic census and Agricultural census in India and defects; Sources of forest statistics.

References

1. Suddender Biswas (1988), Stochastic Process in Demography and Applications, Wiley Eastern Ltd, New Delhi.
2. K.B. Pathak and F. Ram (1992), Techniques of Demographic Analysis, Himalayan Publishing House, Bombay.
3. Osacr Kempthorne (1973), An Introduction to Genetic Statistics, Jagmohan Book Agency, New Delhi.
4. William D. Stansfield (1969), Theory and Problems of Genetics, Schaum's Outline Series, MC Graw Hill, New York.
5. B.N. Gupta (1994), Statistics, Sahitya Bhavan, Agra.
6. B.L. Agrawal (1994), Basic Statistics, 2nd Edition, Wiley Eastren, New Delhi.
7. Asthana (1970), Indian Official Statistics.

<table>
<tr><td>Subject Code</td><td>Subject Name</td><td colspan="2">Credits Allotted</td><td>Total</td></tr>
<tr><td rowspan="2">ST 303(b)</td><td rowspan="2">Demography and official statistics</td><td>Theory</td><td>Practical</td><td rowspan="2">4</td></tr>
<tr><td>4</td><td>----</td></tr>
<tr><td>Course Objective</td><td colspan="4">1. To study about demography and their importance, different reproduction.
2. To explain population Genetics, CSO, NSSO and their scope and contents in population census in India.</td></tr>
<tr><td>Course Out comes</td><td colspan="4">1. Students know the growth rates, life tables, GRR, NRR and growth models.</td></tr>
</table>

	2. Students understood about gene frequencies, genotypes, phenotypes etc. 3. Students learnt about population census methods, organizations in India and their functions.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**2**	**2**	**1**			**2**		**1**	**1**
CO2	**3**	**2**	**2**	**2**	**2**	**1**			**2**		**1**	**1**
CO3	**3**	**2**	**2**	**2**	**2**	**1**			**2**		**1**	**1**
CO4	**3**	**2**	**2**	**2**	**2**	**1**			**2**		**1**	**1**

ST 303 (B) : BIO-STATISTICS

Unit-I: Structure of Biological assay , Types of Biological assays: Direct assays, Potency ratio, Fieller's theorem, Behren's distribution, Two generalizations of Fieller's theorem.

Unit-II: Quantitative dose-response relationships, Linear dose-response regression, Parallel line bioassay, Slope Ratio Bioassay, Quantal responses, Estimation of median effective dose, Transformations: Probit and Logit transformations.

Unit-III:: Basic Biological concepts: Gene, Chromosomes, Alleles, Concepts of Geno types and Phenotypes, Family studies, Basic mating from single gene cross, Matrix approach to basic matings of single gene cross, Checker board method, Mendal's law of heredity: Geneotypes and Pheno type ratios, Branching system method.

Unit-IV: Types of matings, Random Mating, Concept of Gene pool, Gene frequency, Hardy–Weinberg law of equilibrium, Calculation of Gene frequencies, Genotypic frequency, Generation matrix approach to inbreeding, Estimation of Gene frequencies in ABO blood group system, Maximum Likelihood Method, Minimum Chi-Square method, Genetic parameters; Heritability Coefficients, Genetic Correlations, Repeatability, selection index; Inbreeding coefficient.

References

1. D.J. Finney (1971): Statistical Methods in Biological Assay, Charles Griffen and Company, London.
2. D.J. Finney (1971): Probit Analysis, 3rd Edition, S.Chand and Company Ltd, New Delhi.
3. William D. Stansfield. (1969): Theory and Problems of Genetics, Schaum's Outline Series, MC Graw Hill, New York.
4. Oscar Kempthorne (1973): An Introduction to Genetic Statistics, Jagmohan Book agency, New Delhi.
5. J.P. Jain (1992): Statistical Techniques in Quantitative Genetics, 2nd Edition, Hindustan Publishing House, New Delhi.
6. Basu, S. B. (1996), Quantitative Genetics Research Technique, Kalyani Publishers, New Delhi.

Subject Code	Subject Name	Credits Allotted		Total
ST 304 (b)	**Bio-Statistics**	Theory	Practical	4
		4	----	
Course Objective	1. To understand about Biological assay and their types, distribution and some of theorems. 2. To learn dose response relationships, their estimation, transformations. 3. To discuss Geno types and phenol types, Matrix operations to base			

	mattings of single gen cross etc. 4. To estimate Gene frequency using different methods.
Course Out comes	Students learnt about Biological assay, their distribution and theorems, dose response relationships, basic concepts of biological assay, estimation methods of gene frequencies, etc.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**1**	**2**	**1**			**2**		**2**	**3**
CO2	**3**	**3**	**2**	**1**	**2**	**1**			**2**		**2**	**3**
CO3	**3**	**3**	**2**	**1**	**2**	**1**			**2**		**2**	**3**
CO4	**3**	**3**	**2**	**1**	**2**	**1**			**2**		**2**	**3**

ST 304 : PRACTICAL-V

At least 20 practicals covering all papers relating to the subject in this semester must be carried out. (75 marks for practical examination + 25 marks for Record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
ST-304	**PRACTICAL**	Theory	Practical	4
		----	4	
Course Objective	1. To solve the different practical problems manually through calculators and computers. 2. To do the Practical problems related to semester - III papers.			
Course Out comes	Students solved the Numerical problems related to semester -III theory papers . .			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**
CO2	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**
CO3	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**
CO4	**3**	**3**	**2**	**3**	**3**				**2**	**2**	**3**	**1**

ST 305 :STATISTICAL ANALYSIS USING R + R PRACTRICALS

PRACTRICALS - VI

R PROGRAMMING

UNIT-I: Familiarizing with R environment, Using R console as a calculator, R atomic types, methods of creating vectors, combining vectors and repeating vectors, different ways of subsetting vectors using indexing, names and logicals. Arithmetic and logical operations. Using character vectors for text data, manipulating text using strsplit(), paste(), cat(), grep(), gsub() functions; handling factor data. Working with dates.

UNIT – II: Creating Matrices, getting values in and out of matrices, performing matrix calculations; Working with multidimensional Arrays; creating data frames, getting values in and out of data frames, adding rows to data frame, adding variables to data frame; creating lists, extracting components from a list, changing values of components of lists. Getting data into and out of R - reading data in CSV files, EXCEL files, SPSS files and working with other data types. Getting data out of R – working with write.csv() and write.table() functions.

UNIT – III: Writing Scripts and functions in R. writing functions with named, default and optional arguments. functions using as arguments. Debugging your code. Control statements in R – conditional control using if, if-else, ifelse; looping control using for, while, repeat; transfer of control using break and next. Manipulating and processing data - creating subsets of data, use of merge() function, sorting and ordering of data. Group manipulation using apply family of functions - apply, sapply, lapply, tapply.Base graphics. Use of high-level plotting functions for creating histograms, scatter plots, box-whiskers plot, bar plot, dot plot, Q-Q plot and curves. Controlling plot options using low-level plotting functions - Adding lines, segments, points, polygon, grid to the plotting region; Add text using legend, text, mtext; and Modify/add axes, Putting multiple plots on a single page

UNIT – IV:Working with probability distributions - normal, binomial, Poisson and other distributions. Summary statistics, hypothesis testing - one and two-sample Student's t-tests, Wilcoxon U-test, paired t-test, paired U-test, correlation and covariance, correlation tests, tests for association- Chi-squared test and goodness-of- fit tests. Formula notation, one-way and two-way ANOVA and post-hoc testing, graphical summary of ANOVA and post-hoc testing, extracting means and summary statistics; linear regression.

References:

1. Mark Gardener(2012), Beginning R - The Statistical Programming Language, Wiley India Pvt Ltd.
2. Andrie de Vries and JorisMeys(2015), R Programming for Dummies, Wiley India Pvt Ltd.
3. Jared P. Lander(2014), R For Everyone - Advanced Analytics and Graphics, Pearson Education Inc.

Subject Code	Subject Name	Credits Allotted		Total
ST 305	**STATISTICAL ANALYSIS USING R + R PRACTRICALS (R PROGRAMMING)**	Theory 4	Practical ----	4
Course Objective	1: Able to create and manipulate vectors,matrices,arrays,data frames and lists. Should beabletoworkwithcharacterdata,factordataanddates. 2: AbletowritescriptsandfunctioninRandreaddatafrom.csvfiles,EXCELfiles andSPSSfiles. 3: Abletodistinguishbetweenhigh-levelandlow-levelplottingfunctionsavailable inbaseR. 4: Abletousebuilt-infunctionstoanswerquestionsrelatingtoprobability distributions,parametricandnonparametrichypothesistesting,correlationand regressionanalysis,andone-wayandtwo-wayANOVA.			
Course Out comes	1: UnderstandtheatomictypesofR,differentmethodsofcreatingandfilteringof vectors,manipulationoftextdata,factordataanddates. 2: Understandhowtocreate,subsetandmodifydatastructureslikematrices, arrays,dataframesandlists.Understandhowtoreaddataintoandoutof R. 3: Understand the control statements of R, writing functions and scripts in R and debuggingfeatures ofR.Understandtheuseofapply familyoffunctions. 4: Understandtheusethehigh-levelplottingfunctionsinRtocreategraphsin baseRandthe low-levelplottingfunctionstocustomizethe graphs. 5: Understandtheuseofbuilt-infunctionstoperformhypothesestesting, correlationandregressionanalysis,andANOVA.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**1**			**2**	**1**	**2**	**1**
CO2	**3**	**3**	**3**	**3**	**3**	**1**			**2**	**1**	**2**	**1**
CO3	**3**	**3**	**3**	**3**	**3**	**1**			**2**	**1**	**2**	**1**
CO4	**3**	**3**	**3**	**3**	**3**	**1**			**2**	**1**	**2**	**1**

ST 306 (A): STATISTICS FOR BIOLOGICAL AND EARTH SCIENCES

Unit - I: Statistical measures: Statistical diagrams and graphs; Frequency distributions; Measures of central tendency: Arithmetic mean, Median and Mode; Measures of variation: Range, Quartile Deviation, Mean Deviation, Standard deviation, Coefficient of variation; Karl Pearson's coefficient of Skewness.

Unit- II : Random Variable and Probability Distributions: Definition of Probability, Additive and Multiplicative laws of probability (statements only), Random variable, Binomial, Poisson, Normal and Exponential distributions (properties and applications), CurveFitting: Principle of least squares; Fitting of a straight line, Exponential curve and Power curve; Correlation and Regression Analysis: Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient; Simple linear regression; Multiple and Partial correlation coefficients; Multiple linear regression; Yules coefficient of Association.

Unit –III: Tests of Significance: Basic concepts; Z- test for proportions and means; Applications of t, χ^2 and F tests; Paired t-test; Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) techniques for one way and two way classifications (single observation per cell), Confidence limits.

Unit- IV: Special Statistical Tools: Experimental designs CRD, RBD and LSD and their analysis; concept of critical difference; Duncan's Multiple range test; Elements of Principal components Analysis, Factor Analysis; Cluster Analysis and Discriminant analysis; Hotelling's T^2 and Mahalanobis D^2 statistics; Multivariate Analysis of Variance (MANOVA); Canonical correlations; Concept of Probit analysis.

References

1. Bailey, N.T.J.(1959), Statistical Methods in Biology, The English Universities Press Ltd.,
2. Pillai, S.K., and Sinha, H.C.(1968), Statistical Methods for Biological workers, Ram Prasad and sons, Agra.
3. Basu, S.P.(1996), Quantitative Genetics Research techniques, Kalyani publishers, New Delhi.

4. Misra, B.N., and Misra, M.K.(1998), Introductory Practical Biostatistics, Naya Prakash, Kolkata.

5. Johnson, R.A., and Wichern, D.W.(2001), Applied Multivariate Statistical Analysia, Third edition, Prentice Hall of India, New Delhi.

6. Federer, W.T.(1963), Experimental Designs and its applications, Macmillon.

Subject Code	Subject Name	Credits Allotted		Total
ST 306 (a)	**Statistics for Biological and Earth sciences**	Theory	Practical	4
		4	----	
Course Objective	1. To learn basic statistics and their worked out examples. 2. To discuss about different tests like t, F, χ^2 and Z fro means, proportions, variances, standard deviation etc. with illustrations. 3. To explain ANOVA and ANCOVA for one way and two way classification and their importance in analysis. 4. To discuss Special statistical tools and multivariate analysis.			
Course Out comes	1. Students learnt about Graphs, measures of averages, measures of dispersion etc. 2. Students understood about Basic probability and important distributions with workout examples. 3. Students used t, F, χ^2, ANOVA and ANCOVA and non-parametric tests with examples. 4. Students used Advanced statistics tools with working illustrations.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**1**	**2**	**1**	**2**		**1**		**2**	**1**
CO2	**3**	**2**	**1**	**1**	**2**	**1**	**2**		**1**		**2**	**1**
CO3	**3**	**2**	**1**	**1**	**2**	**1**	**2**		**1**		**2**	**1**
CO4	**3**	**2**	**1**	**1**	**2**	**1**	**2**		**1**		**2**	**1**

ST 306 (B): STATISTICS FOR SOCIAL AND BEHAVIOURAL SCIENCES

Unit- I: Statistical Measures: Measures of central tendency: Arithmetic Mean, Median and Mode; Measures of Variation: Range, Quartile Deviation, Standard Deviation, Coefficient of Variation, Measures of Skewness.

Unit- II: Probability and Distributions: Concept of Probability, Laws of Probability (statements only); Random Variable; Probability Distributions: Binomial, Poisson and Normal distributions (properties and applications).

Unit- III: Tests of Significance: Basic concepts; Random sampling techniques; Standard error of statistic; Large sample tests for proportions and means; Small sample tests: Applications of t, χ^2 and F tests; Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) techniques for one way and two way classifications (single observation per cell); Nonparametric tests: Wilcoxon Signed Rank test, Median test and Mann-Whitney U-test.

Unit- IV: Special statistical tools: Computation of Linear and Compound Growth rates and their tests of significance; Chow test for Structural change; Granger Causality test; Stepwise regression; R^2 and $\overline{R}^2$statistics; Multiple Range tests: l.s.d. test and Duncan's test: ANOVA for Ranked data; Krushkal-wallis test, Friedman test; Elements of Factor analysis and Discriminant analysis.

References

1. Gupta, S.C.(1997), Fundamentals of Statistics, Himalayan Publishers, Mumbai.
2. Kshirasagar, A.M. (1972), Multivariate Analysis, Marcel Decker, New York.
3. Gujarati, D.(1995), Basic Econometrics, Mc Graw Hill.
4. Ferguson, C.A.(1971), Statistical Analysis in Psychology and Education, McGraw Hill.
5. Johnson, R.A., and Wichern, D.W. (2001), Applied Multivariate Statistical Analysis, Third Edition, Prentice-Hall of India (p) Ltd.,. New Delhi.

Subject Code	Subject Name	Credits Allotted		Total
ST 306 (b)	**Statistics for social and behavioral sciences**	Theory	Practical	4
		4	----	
Course Objective	1. To learn about Basic statistics measures with examples. 2. To discuss important concepts, probability distributions like Binomial, Poisson and Normal properties and applications. 3. To explain Parametric and non-parametric test and discussed with illustrations. 4. To discuss advanced statistical tools with examples.			
Course Out comes	1. Students learnt about Graphs, measures of averages, measures of dispersion etc. 2. 3. Students understood about basic probability and important distributions with workout examples. 4. Students applied t, F, χ^2, ANOVA and ANCOVA and non-parametric tests and discussed with examples. 5. Students used Advanced statistics tools with illustrations.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**1**	**2**	**1**	**2**	**1**			**1**		**2**	**2**
CO2	**3**	**1**	**2**	**1**	**2**	**1**			**1**		**2**	**2**
CO3	**3**	**1**	**2**	**1**	**2**	**1**			**1**		**2**	**2**
CO4	**3**	**1**	**2**	**1**	**2**	**1**			**1**		**2**	**2**

ST 401: TIME SERIES ANALYSIS AND FORECASTING METHODS

Unit-I: Review of Time Series Analysis. Growth models: Modified Exponential Curve, Gompertz curve, Logistic curve and their Fitting; Measurement of cyclical component: Harmonic analysis, auto regression series: Markoff and Yule's series, Periodogram and correlogram analysis, measurement of irregular component: variate difference method.

Unit-II: Need and uses of forecasting, classification and characteristics of forecasts, forecasting based on regression techniques: simple and multiple linear regression and non-linear regression techniques, moving averages smoothing methods: simple and double, multi average methods; explanatory version time series forecasting, test for trend seasonality.

Unit-III: Exponential smoothing methods: trend adjusted exponential smoothing, double and triple exponential smoothing, win ten's method, chow's adaptive control methods, brown's one parameter adaptive method: Box-Jenkins three parameter smoothing, Harrison's Harmonic smoothing methods, tracking signal.

Unit-IV: Box-Jenkin's time series methods: 1. Moving average 2. Autoregressive (AR) 3. ARMA and 4. AR integrated MA (ARIMA) models, estimation of ARIMA model parameters, forecasting with ARIMA models, Diagnostic checking of the model: Analysis of residuals, forecasting using transfer function model, concept of Kalmon's Filters.

References

1. Thomopouls, N.T (1980): Applied Forecasting Methods. Engle Wood Cliffs, N.J, Prentice Hall.
2. Wheel Wishart, S.C; and S. Makridaks (1980): Forecasting Methods for Management III edition, New York. John Wiley.
3. Sullivan, William G. and Wayne Claycambe. W (1977): Fundamentals of Forecasting. Prentice Hall. Virginia.
4. Gupta. S.C and V.K. Kapoor (1995): Fundamentals of Applied Statistics, Sulthan & Chand Sons. New Delhi.
5. Bovas, Abraham and Johannes Ledolter (1983): Statistical Methods for Forecasting, John Wiley & Sons. New York.

6. Box, G.E.P and Jenkkins, G.M (1976): Time Series Analysis Forecasting and Control, Holden Day, San Francisco.

7. Anderson, T.W (1971): The Statistical Analysis of Time Series, John Wiley, New York.

8. Markidakis, S Steven C. Wheel Wright and Victor E. Mcgee (1983): Forecasting: Methods and Applications, 2nd Edition, New York, John Wiley & Sons.

Subject Code	Subject Name	Credits Allotted		Total
ST401	**Time series Analysis and forecasting methods**	Theory 4	Practical ----	4
Course Objective	1. To fit growth curves, measurement of cyclical and irregular component with simple examples. 2. To discuss Forecasting and their techniques like regression, non-linear regression, exponential smoothing, etc. 3. To explain Box Jenkins time series models and their estimation of parameters, fitting and diagnostic checking.			
Course Out comes	1. Students understood about Time series analysis with some important growth models and their fitting. 2. Students learnt Forecasting using regression, non-linear regression techniques, single, double, triple and adoptive exponential smoothing models. 3. Students have experience in AR, MA, ARMA, ARIMA models fitting, diagnostic checking etc.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**
CO2	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**
CO3	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**
CO4	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**

ST 402: OPERATIONS RESEARCH – II

Unit-I: Bellman's principle of optimality, general formulation, computational methods and application of Dynamic programming. Multi-stage decision processes and Dynamic programming. Goal Programming and stochastic programming.

Unit-I1: Queuing models-specifications and effectiveness measures.Steady state solutions of M/M/1 and M/M/c models with associated distributions of queue length and waiting time. M/G/1 Queue and Pollazcek Khinchine result. Steady-state solutions of M/Ek/1 and Ek/M/1 queues. Bulk queues.

Unit-I1I: Analytical structure of inventory problems; EOQ formula of Harris, its sensitivity analysis and extensions allowing quantity discounts and shortages. Multi-item inventory, subject to constraints.Models with random demand, the static risk model.(s-S) policy for inventory and its derivation in the case of exponential demand; multi-echelon inventory models.Models witlh variable supply and models for perishable items; estimation of EOQ in some simple cases.

Unit-IV: Replacement problems; block and age replacement polices; dynamic programming approach for maintenance problems; replacement of items with long life. Group and individual replacement policies.

References

1. Hadley G (1964) Non-Linear and Dynamic programming Addison Weslay.
2. Kleinrock L.(1975) Queueing systems vol.1, Theory; John Wiley.
3. Saaty T.L(1961) : Elements of Queueing Theory with Applications.
4. Gross D and Harris. C.M(1974) Fundamentals of queueing theory ; John Wiley.
5. Philips D.T, Ravindran A and Solberg J Operations Research, Principles and Practice.
6. Curchman C.W; Ackoff R.L and Arnoff E.L(1957) introduction to Operations Research;John Wiley

7. Mckinsey J.C.C(1952) Introduction to the theory of games Mc Graw Hill.P.K.Gupta; D.S.Hira Operations Research S.CHand.

Subject Code	Subject Name	Credits Allotted		Total
ST- 402	**Operations Research-II**	Theory	Practical	4
		4	----	
Course Objective	1. To perform Dynamic programming and their applications and computation procedure with illustration. 2. To discuss different Queuing models steady state solutions with examples. 3. To explain Inventory models with and without shortages, S-splicy, EOQ estimation with simple examples. 4. To understand Replacement problems such as block and age replacement problems, individual and group replacement policies			

	with examples.
Course Out comes	Students learnt about Queuing models, Dynamic programming, Goal programming, Stochastic programming, inventory control models, replacement problems with some simple examples.

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**
CO2	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**
CO3	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**
CO4	**3**	**1**	**1**	**1**	**2**				**2**		**3**	**3**

ST 403 (A): ADVANCED ECONOMETRIC MODELS

Unit-I: Generalized linear Model; Aitken's theorem; GLS estimator, Asymptotic distribution of GLS estimator; Analysis of residuals, OLS, BLUEs and Recursive residuals; Sudentized and predicted residuals; Granger's test of causality; nested and non nested statistical models; Cox and J tests.

Unit-II: Specificiation error; Consequences; specification bias; Ramsey's RESET test; Lagrange Multiplier test for adding variables; comparing two linear regression models; Dummy variable approach; Stepwise and Piecewise linear regression; Switching Regression Model.

Unit-III: Qualitative and limited dependent variable models; the linear probability model; probit model; Logit model and their estimation; concept of limited dependent variables; specification of Tobit model; concepts of censored and Truncated samples; estimation in censored and Truncated Samples.

Unit-IV: Sets of linear regression models; specification of the Seemingly Unrelated Regression Equations (SURE) model; OLS and GLS estimation of SURE model; Zellner's Feasible GLS estimator; Seemingly Unrelated Unrestricted Residuals (SUUR) estimator; Seemingly Unrelated Restricted Residuals (SURR) estimator; Reduction of the Zeller's Feasible GLS estimator to the OLS estimator.

References

1. Johnston, J (1984): Econometric Methods, III rd edition , MC Graw Hill.
2. Judge, C.G., Griffths, and Hill, R.C. et al (1985): Theory and Practice of Econometrics, John Wiley.
3. Gujarathi, D (1979): Basic Econometrics, Mc Graw hill.
4. Srivastava, V.K and Giles, D.E.A (1987), Seemingly Unrelated Regression Equations Models: Estimation and Inference, Marcel Dekker, Inc
5. Cook. D and Weisberg. S (1982), Residuals and Inference in Regression, Chapman and Hall.

Subject Code	Subject Name	Credits Allotted		Total
ST403(A)	**Advanced Econometric Models**	Theory	Practical	4
		4	----	
Course Objective	1. To explain OLS, GLS, BLUE and Recursive residuals with their properties. 2. To discuss different regression models and their importance. 3. To perform estimation in censored and Truncated Samples. 4. To fit sets of linear regression models and their related estimators.			
Course Out comes	1. Students understood GLM, SURE, nested and non nested statistical models. 2. Students learnt about specification error, adding, switching models. 3. Students performed Probit, logit models and their estimation.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**2**	**2**				**1**		**2**	**3**
CO2	**3**	**2**	**1**	**2**	**2**				**1**		**2**	**3**
CO3	**3**	**2**	**1**	**2**	**2**				**1**		**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**				**1**		**2**	**3**

ST403 (B): TOTAL QUALITY MANAGEMENT AND SIX SIGMA

Unit I: Need for TQM, evolution of quality, Definition of quality, TQM philosophy – Contributions of Deming, Juran, Crosby, Taguchi and Ishikawa.

Unit II: Vision, Mission, Quality policy and objective, Planning and Organization for quality, Quality policy Deployment, Quality function deployment, Analysis of Quality Costs.

Unit III: Customer focus, Leadership and Top management commitment, Employee involvement – Empowerment and Team work, Supplier Quality Management, Continuous process improvement, Training, performance Measurement and customer satisfaction.

Unit IV : SIX SIGMA AND PDSA: An overview of six sigma methodology, DMAIC,DFSS and lean six sigma; product / process understanding : SIPOC, VSM, FMEA ; The Seven QC Tools of Quality, New Seven management tools, Bench Marking, JIT, POKA YOKE, 5S, KAIZEN, Quality circles.

Reference

1. Narayana V. and Sreenivasan, N.S.(1996): "Quality Management – Concepts and Tasks", New Age International.
2. Zeiri(1991): "Total Quality Management for Engineers", Wood Head Publishers.
3. Juran J.M and Frank M.Gryna Jr.(1982): "Quality Planning and Analysis", TMH, India.
4. Brain Rethery(1993): ISO 9000, Productivity and Quality Publishing Pvt.Ltd.
5. D.Mills(1993): Quality Auditing, Chapman and Hall.

Subject Code	Subject Name	Credits Allotted		Total
ST 403 (b)	**TOTAL QUALITY MANAGEMENT AND SIX SIGMA**	Theory	Practical	4
		4	----	
Course Objective	1. To learn TQM, quality and their philosophy. 2. To discuss Planning and Organization . 3. To learn about SIX SIGMA AND PDSA			
Course Out comes	Students learnt about TQM, quality and SIX SIGMA AND PDSA			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**1**	**2**	**2**				**1**		**1**	**1**
CO2	**3**	**1**	**1**	**2**	**2**				**1**		**1**	**1**
CO3	**3**	**1**	**1**	**2**	**2**				**1**		**1**	**1**
CO4	**3**	**1**	**1**	**2**	**2**				**1**		**1**	**1**

ST 404 : PRACTICAL –VII

At least 20 practicals covering all papers relating to the subject in this semester must be carried out. (75 marks for practical examination + 15 marks for viva-voce + 10 marks for record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
ST- 404	**PRACTICAL VII**	Theory	Practical	4
		-----	4	
Course Objective	1. To perform different practical problems manually through calculators and computers. 2. To solve Practical problems related to semester - IV papers.			
Course Out comes	Students have awareness on Numerical problems relating to semester 4 theory papers . .			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**2**			**3**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**2**			**3**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**3**	**2**			**3**	**2**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**2**			**3**	**2**	**3**	**2**

ST 405 :STUDENT PROJECT
Data Centre / Institutions / Companies and etc.,

Subject Code	Subject Name	Credits Allotted		Total
ST 405	**STUDENT PROJECT**	Theory	Practical	4
		Dissertation submission 60 Marks Presentation 30 Marks +Viva-voce 10 Marks	----	
Course Objective	1. To collect primary data from industry, institutions, etc. 2. To collect secondary data from internet or any records. 3. To analyze the collected data and submit a report in the form a dissertation.			
Course Out comes	1. Students collected primary data or secondary data and enter the data in particular software, analyzed the data and interpret it. 2. Students submitted the report in the form of dissertation.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**2**			**3**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**2**			**3**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**3**	**2**			**3**	**2**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**2**			**3**	**2**	**3**	**2**

ST 403 (A): STATISTICAL PROCESS AND QUALITY CONTROL

Unit-I: Basic concepts of quality, causes of variation, principle of Shewart's control chart, control charts for attributes and variables. Control limits and probability limits. Process monitoring and control, process capability, modified control chart. Capability indices C_p, C_{pk}, and C_{pm}. Concept of Six sigma and its relationship with process capability.

Unit-II: The OC and ARL of Shewart's control charts. Control by gauging, Moving Average and Exponentially Weighted Moving Average charts. CUSUM charts using V-mask and decision interval methods. Multivariate control charts – Control Ellipsoid, Hotelling's T^2 chart.

Unit-III: Acceptance sampling plans for attribute inspection – Type-A and Type-B OC curves. Single, double and sequential sampling plans and their properties. Sampling plans with rectifying inspection-concept of AOQ, AOQL. Design of Single sampling plan with given ATI.Plans for inspection by variables with one-sided and two-sided specifications.

Unit-IV: Sampling plans for continuous inspection-construction of Dodge CSP-1, CSP-2 and Multi level plans and their properties.Chain sampling and its applications.Design of Skip lot sampling plan and its ASN. Sampling plans with inspection error- derivation of AOQ and ATI in presence of errors.

References

1. Montgomery D.C (2009), Introduction to Statistical Quality Control, 6/e, John Wiley and Sons, New York.
2. Edward G. Schilling, Dean V. Neubauer, (2009), Acceptance sampling in quality control Second Edition, Taylor & Francis.
3. Mittage, H.J and Rinne, H (1993): Statistical Methods of Quality Assurance, Chapmann Hall, London, UK.
4. Ott. E.R (1975), Process Quality Control, Mc Graw Hill
5. Phadke, M.S (1989), Quality Engineering through Robust Design, Prentice Hall
6. Duncan, A.J (1974), Quality Control and Industrial Statistics, 3rd Ed., New York, Irwin.

7. Philip J. Ross (1989), Taguchi techniques for quality engineering, McGraw Hill

Subject Code	Subject Name	Credits Allotted		Total
ST - 406	**STATISTICAL PROCESS AND QUALITY CONTROL**	Theory	Practical	4
		2	2	
Course Objective	1. To understand the basic concepts of control charts for variables and their indices. 2. To discuss different control charts like Shewart's moving average, multivariate etc. with their applications. 3. To explain different sequential sampling plans and six sigma tool etc. with their properties and applications..			
Course Out comes	1. Students understood the basic concepts of control charts for variables and their indices. 2. Students performed different control charts like Shewart's moving average, multivariate etc. with their applications. 3. Students used different sequential sampling plans and six sigma tool etc. in solving the problems.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**3**	**2**	**3**				**2**		**1**	**2**
CO2	**3**	**2**	**3**	**2**	**3**				**2**		**1**	**2**
CO3	**3**	**2**	**3**	**2**	**3**				**2**		**1**	**2**
CO4	**3**	**2**	**3**	**2**	**3**				**2**		**1**	**2**

ST 406 (A) BUSINESS ANALYTICS

UNIT-I: BUSINESS MATHEMATICS**:** Matrix Algebra: Addition, Multiplication, Transpose and Inverse of Matrices; Determinants, Solution of Linear Equations; Limits of Algebraic functions; Rules for Differentiation; Linear programming problem-Graphical Method; Applications.

UNIT-II: BUSINESS ANALYSIS**:** Statistical Measures: Mean, Median and Mode; Standard Deviation and Coefficient of Variation; Correlation and Regression analysis; Linear and Compound growth rates; Measures of Association; concepts of R^2 and $\overline{R}^2$.

UNIT-III: BUSINESS STATISTICAL INFERENCE**:** Elements of Probability; Concepts of Binomial, Poisson and Normal Distributions; Sampling Techniques: Simple Random Sampling and Stratified Random Sampling; Determination of sample size; Tests of Significance: z, t, χ^2 and F tests, ANOVA Technique.

UNIT-IV: BUSINESS INFORMATICS**:** Time series Analysis; Determination of Trend and seasonal components, Basic Forecasting Methods; computer Applications to Business Analysis; Statistical Quality Control: control charts $\overline{X}$,R, p, npand c-charts.

References:

1. Azel and Sounderpandian, Complete Business Statistics, TMH.
2. JK Sharma, Business Statistics, Pearson.
3. RS Bhardwaj, Mathematics for Economics and Business, EB.
4. RP Hooda, Statistics for Business and Economics, McMillan.
5. GC Beri, Business Statistics, TMH.
6. Glynn Davis and BrankoPecar, Business Statistics using Excel, Oxford University press, 2010.
7. J.K. Sharma, Fundamentals of Business Statistics, 2nd Edition, Vikas Publication, 2014.
8. SC Gupta, Fundamentals of Statistics, Himalaya Publications, 2013.
9. N.D. Vohra, Business Statistics, Tata McGraw Hill, 2013.
10. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons Publishers, New Delhi.
11. S.C. Gupta and V.K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & Sons Publishers, New Delhi.

12. R. Pannerselvam, Research Methodology, Published by PHI Learning Private Limited, New Delhi.

13. Donald R Cooper and Pamela S Schnidler, Business Research Methods, Nineth Edition, Tata Mc Graw Hill Publishing Company Limited, New Delhi.

Subject Code	Subject Name	Credits Allotted		Total
ST 406-(a)	**Business Analytics**	Theory	Practical	4
		4	----	
Course Objective	1. To learn basic statistics and their worked out examples. 2. To discuss different tests like t, F, χ^2 and Z fro means, proportions, variances, standard deviation etc. with an illustrations. 3. To study ANOVA and ANCOVA for one way and two way classification and their importance in analysis. 4. To use special statistical tools and multivariate analysis.			
Course Out comes	1. Students learnt Graphs, measures of averages, measures of dispersion etc. 2. Students studied basic probability and important distributions with workout examples. 3. Students used t, F, χ^2, ANOVA and ANCOVA and non-parametric tests and discussed with examples. 4. Students performed advanced statistics tools for solving the problems.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**				**1**	**1**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**3**				**1**	**1**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**3**				**1**	**1**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**				**1**	**1**	**3**	**2**

ST406 (B) : SURVIVAL ANALYSIS

UNIT – I: Functions of Survival Time – Definition, Relationship of Survival Functions; Nonparametric Methods of Estimating Survival Functions: Product-Limit Estimate of Survival Function – Kaplan-Meier Estimator of Survival Function.

UNIT – II: Nonparametric Methods for Comparing Two Survival Distributions – Gehan's Generalized Wilcoxon Test, Cox - Mantel test, Logrank Test, Peto and Peto's Generalized Wilcoxon Test, Cox's F-test and Mantel-Haenszel Test.

UNIT – III: Parametric Methods for Comparing Two Survival Distributions: Exponential, Weibull and Gamma distributions only. Nonparametric and Parametric Methods for Identifications of Prognostic Factor Relating to Survival Time, Cox Proportional Hazard (PH) Model for Survival Data.

UNIT – IV: Analytical Estimation Procedures for Survival Distributions: Exponential, Weibull, Log-Normal and Gamma distributions only.Graphical Methods for Survival Distributions Fitting: Probability Plotting, Hazard Plotting Methods, Tests of Goodness-of-Fit, A Regression Method for Fitting Survival Distribution.

REFERENCES:

1. Elisa T.Lee (1992): Statistical Methods for Survival Data Analysis, John Wiley Sons.
2. Miller, R.G. (1981): Survival Analysis, New York, John Wiley & Sons, Inc.
3. Cross A.J. and Clark V.A. (1975): Survival Distribution, Reliability Applications in the Biomedical Sciences, John Wiley and Sons.
4. Elandt Johnson, R.C., Johnson N.L. (1999): Survival Models and Data Analysis, New York, John Wiley & Sons, Inc.
5. Collett, D. (1994), Modeling Survival Data in Medical Research, London: Chapman & Hall.
6. Cox, D. R. and Oakes, D. (1984), Analysis of Survival Data, London: Chapman & Hall.
7. Lawless, J. F. (1982), Survival Models and Methods for Lifetime Data, New York: John Wiley & Sons, Inc.

Subject Code	Subject Name	Credits Allotted		Total
ST 406 (b)	**Survival analysis**	Theory	Practical	4
		4	----	
Course Objective	1. To learn Survival functions and their estimation models. 2. To discuss Distributions relating to survival analysis.			
Course Out comes	Students learnt about survival functions, their estimating methods, Distributions and their comparison for survival distributions.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**1**	**1**					**1**		**2**	**2**
CO2	**3**	**3**	**1**	**1**					**1**		**2**	**2**
CO3	**3**	**3**	**1**	**1**					**1**		**2**	**2**
CO4	**3**	**3**	**1**	**1**					**1**		**2**	**2**

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF STATISTICS



Course

M.Sc., APPLIED STATISTICS

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

The department of Statistics was established in the year 1958 as a part of Mathematics Department then separated as an independent department in the year 1962. The department offers three post graduate courses (i) M.Sc., Statistics (ii) M.Sc., Applied Statistics and (iii) M.Sc., Applied Statistics (Self Finance Course). The department is active in organizing various academic programmes like conferences and workshop apart from teaching, research and consultancy. During the last five years department has organized about 20 events covering wide areas like Operations Research, Time Series, Stochastic modeling, Geo-Statistics, Bio-Statistics, Data Envelopment Analysis, Statistical computing.

The thrust areas of ongoing research in the department are time Series, Econometrics, Regression Models, Biostatistics, Operations Research, Stochastic modeling, Data Envelopment Analysis and etc. The UGC has identified the department for special assistance sanctioned 44 Lakhs plus 2 project fellows at SAP- DRS-I and 40 Lakhs plus 10 research fellows under BSR and DST FIST 16.5 lakhs.

VISION: To en-corporate certain specific objectives and scale to prepare the students to take up challenges in any one or more functional domain

1. ACADEMICS

2. BASIC AND APPLIED RESEARCH

3. RESEARCH AND DEVELOPMENT

4. SOFTWARE SKILLS

5. INDURSTRY

6. STATISTICAL ANALYSIS

MISSION: To bring out professional having knowledge of basic laws of nature together with strong fundamentals of in core areas of statistics viz. linear algebra, probability and distributions, statistical inference, multivariate analysis, econometric methods, operations research-i, time series analysis and forecasting methods , operations research-ii. Specializations subjects like….Sampling techniques, stochastic process, linear models and applied regression analysis, computer programming and data analysis, demography and official statistics, bio-statistics, statistical process and quality control, advanced econometric models. Technical subjects like… statistical analysis using excel and spss, python, design and analysis of experiments, industrial statistics and quality control, statistical analysis using R + R practical’s

Program Specific Outcomes: At the end of the program the student will be able to

- **PSO1:** Understand the basic and advanced concepts of probability, distributions.
- **PSO2:** Perform and design experiments in the area of Bio-statistics, advanced Bio-statistics, Time series
- **PSO3:** Apply knowledge on software like Excel, SPSS and R software

Program Objectives: at the program the student will be able to

- **P01:** Apply the scientific knowledge to solve the statistical data analysis problems
- **PO2:** Identify, formulate and analyze advanced scientific problems reading substantiated conclusions for all kind of disciplines like medical, biological series and so on.
- **PO3:** Creative design solutions for advanced scientific problems `and design system components using statistical analysis that meet the specified need with appropriate attention to health and safety risks.
- **PO4:** Using statistical analysis understanding the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

- **PO5:** Create, select and apply appropriate techniques, resources and modern statistical tools to complex statistical problems with understanding of the limitations.
- **PO6:** analyzing the impact of marketing sales into the society using data science techniques.
- **PO7:** By statistical methods demonstrating the knowledge and understanding the scientific principles and applying the statistical tools to manage projects and in multidisciplinary environments.
- **PO8:** apply ethical principles and norms of scientific practices
- **PO9:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings by statistical approach.
- **PO10:** Understanding the working of various analog communication techniques by using data science methods
- **PO11:** Project management of finance in collaboration with various firms by data science techniques
- **PO12:** Recognize the need and have the preparation and ability to engage independent and life-long learning in the broadest context of scientific and technological change by statistical approach.

Program Outcomes

- **PO 1:** To get a wide range of opportunities and private, corporate and government sector organisations.
- **PO 2:** To get knowledge about various Statistical packages like SPSS, Python, R etc.,
- **PO 3:** To analyse and develop strategies for industrial and service organisations.
- **PO 4:** To handle and analyse data bases with sound computer skills and develop interpretations.
- **PO 5:** To expertize in theoretical and applied principles of Statistics needed to enter the job force.
- **PO 6:** To obtain sound scientific knowledge in Statistical and applied aspects of Statistics.
- **PO 7:** To perform Statistical inference in several circumstances and interper the result inan applied contest.
- **PO 8:** To be able to train non statisticians to handle Statistical and data analytics.
- **PO 9:** To model the random phenomenon of various systems and processes using Statistical analysis.
- **PO10:** To describe the phenomenon of various systems and processes.
- **PO11:** To become a data scientist for assessing in decision making.
- **PO12:** To Communicate concepts in Probability and Statistics using Technical and Non-Technical Language.

Program Educational Objectives

At the end program the student will be able to

- **PEO1:** Apply principals of basic scientific concepts in understanding and predictions of statistical sciences
- **PEO2:** Develop human resources with specializations in theoretical and experimental techniques required for carrier in academic, research and industry
- **PEO3:** Engage in lifelong learning and adopt changing in professional and society needs

S.V. UNIVERSITY, TIRUPATI

DEPARTMENT OF STATISTICS

M.Sc., APPLIED STATISTICS

CBCS Pattern (With effect from January, 2021)

The course of Study and Scheme of Examinations

NEP 2021

SEMESTER-I

Sl. No.	Course Code	Components of Study	Title of the Course	Contact Hours	No. of Credits	IA Marks	End SEM Exam Marks	Total Marks
1	APST - 101	Core	Linear Algebra	6	4	20	80	100
2	APST - 102	Core	Probability and Distributions	6	4	20	80	100
3	APST - 103	Generic Elective	a. Sampling Techniques b. Stochastic Process	6	4	20	80	100
4	APST - 104	Compulsory Foundation **(Related to Subject)**	a. Statistical Analysis using Excel and SPSS b. Phython	6	4	20	80	100
5	APST - 105	Core	Practical-I (75 Practical + 25 Record)	6	4	-	-	100
6	APST - 106	Elective Foundation	Practical-II (75 Practical + 25 Record)	6	4	-	-	100
7	APST - 107	Audit Course	Human Values and Professional Ethics-I	--	--	100	--	--
	Total			**36**	**24**			**600**

*** Among the Generic Electives the student shall choose <u>ONE</u>**

****Among** Compulsory Foundation **student shall choose <u>ONE</u>**

SEMESTER-II

Sl. No.	Course Code	Components of Study	Title of the Course	Contact Hours	No. of Credits	IA Marks	End SEM Exam Marks	Total Marks
1	APST - 201	Core	Statistical Inference	6	4	20	80	100
2	APST - 202	Core	Multivariate Analysis	6	4	20	80	100
3	APST - 203	Optional-I	(a) Linear Models and Applied Regression Analysis (b) Computer Programming – C^{++}	6	4	20	80	100
4	APST - 204	Optional-II	a. Design and Analysis of Experiments b. Industrial Statistics and Quality Control	6	4	20	80	100
5	APST - 205	Paper 1&3	Practical-III (75 Practical + 15 Viva- voce + 10 Record)	6	4	-	-	100
6	APST - 206	Paper 2 &4	Practical-IV (75 Practical + 15 Viva- voce + 10 Record)	6	4	-	-	100
7	APST - 207	Audit Course	Human Values and Professional Ethics-II	--	--	100	--	--
	Total			**36**	**24**			**600**

- **Student have to choose one paper from Optional-1**
- **Student have to choose one paper from Optional-II**

SEMESTER-III

Sl. No.	Course Code	Components of Study	Title of the Course	Contact Hours	No. of Credits	IA Marks	End SEM Exam Marks	Total Marks
1	APST - 301	Core	Applied Econometrics	6	4	20	80	100
2	APST - 302	Core	Applied Operations Research	6	4	20	80	100
3	APST - 303	Core	Practical- V (75 Practical +25 Record)	6	4	-	-	100
4	APST - 304	Generic Elective * **(Related to Subject)**	(a) Applied Demography and Official Statistics (b) Advanced Bio-Statistics	6	4	20	80	100
5	APST - 305	Mandatory (Theory + Practical VI)	Statistical Analysis Using R + R Practicals	9 (3T +6P)	4	10	90 (40T+50P)	100
6	APST - 306	Open Elective **(For other Department)**	(a) Statistics for Biological and Earth Sciences (b) Statistics for Social and Behavioral Sciences	6	4	20	80	100
	Total			**39**	**24**			**600**

*** Among the Generic Electives the student shall choose <u>ONE</u>**

SEMESTER-IV

Sl. No.	Course Code	Components of Study	Title of the Course	Contact Hours	No. of Credits	IA Marks	End SEM Exam Marks	Total Marks
1	APST - 401	Core	Applied Forecasting Methods	6	4	20	80	100
2	APST - 402	Core	Reliability and Survival Analysis	6	4	20	80	100
3	APST - 403	Generic Elective * **(Related to Subject)**	(a) Statistics for Research, industry and Community Development (b) Advanced Econometric Models	6	4	20	80	100
4	APST - 404	Core	Practical-VII (75 Practical + 15 Viva-voce + 10 Record)	9	4	-	-	100
5	APST - 405	Project Work /Multidisciplinary (Theory + Practical-VIII)	**Student Project:** Data Centre / Institutions / Companies and etc., (OR) Statistical Process and Quality Control (Theory + Practical)	9 (3T+ 6P)	4	10	90 (40T+50P)	100
6	APST - 406	Open Elective **(For other Department)**	(a) Statistics for Marketing Research (b) Statistical Analysis Using SPSS	6	4	20	80	100
	Total			**39**	**24**			**600**

*** Among the Generic Electives the student shall choose <u>ONE</u>**

**** Open Elective papers is for other department**

****** Primary or Secondary data collected from banks, fields or any other relevant areas are analyzed and submitted

<u>Student Project</u> : Dissertation - 60 Marks
Viva Voce - 10 Marks
Presentation - 30 Marks
Total - 100Marks

APST 101: LINEAR ALGEBRA

Unit-I: Algebra of matrices; Elementary transformations; Rank and Inverse of a matrix; Nullity; Partitioned matrices; Kronecker product; Generalized inverse of matrix; Moore-Penrose generalized inverse; Solutions of simultaneous equations.

Unit-II: Finite dimensional Vector Spaces; VectorSpaces and Subspaces; Linear dependence and independence; Basis and dimension of a vector space; Completion theorem; Inner product Spaces; Orthonormal basis and Gram-Schmidt orthogonalization process; Orthogonal projection of a vector.

Unit-III: Linear transformationsand properties; Orthogonal and unitary transformations; Real quadratic forms; Reduction and classification of quadratic forms; Hermitian forms; Sylvesters law of inertia; Canonical reduction of quadratic form.

Unit-IV: Characteristic roots and vectors; Cayley – Hamilton theorem; Minimal polynomial; Similar matrices; Spectral decomposition of a real symmetric matrix; Reduction of a pair of real symmetric matrices; Hermitian matrices.

References

1. Graybill, F.A. (1983). Matrices with applications in statistics, 2nd ed. Wadsworth, Belmont (California).
2. Rao, C. R. (1985). Linear statistical inference and its applications, Wiley Eastern Ltd., New Delhi.
3. Searle, S. R. (1982). Matrix Algebra useful for Statistics, John Wiley and Sons. Inc.
4. Bellman, R. (1970), Introduction to Matrix Analysis, 2nd ed. McGraw Hill, New York.
5. Campbell, H.G. (1980), Linear Algebra with Applications, 2nd Edition, Prentice-Hall, Englewood Cliffs (new Jersey), 1980.
6. Biswas, S. (1984), Topics in Algebra of Matrices, Academic Publications.
7. Hadley, G. (1987), Linear Algebra, Narosa Publishing House.
8. Halmos, P.R. (1958), Finite-dimensional Vector Spaces 2nd ed. D.Van Nostrand Company, Inc.
9. Hoffman, K. and Kunze, R, (1971). Linear Algebra, 2nd ed., Prentice Hall
10. Rao, A.R. and Bhimasankaram, P. (1992), Linear Algebra, Tata McGraw Hill Publishing Company Ltd.
11. Rao, C.R. and Mitra, S.K. (1971), Generalized Inverse of Matrices and its Applications, John Wiley and Sons, Inc.
13. Narayan, S. (1970), Theory of Matrices, S. Chand &Company, New Delhi.

Subject Code	Subject Name	Credits Allotted		Total
APST-101	**Linear Algebra**	Theory	Practical	4
		4	---	
Course Objective	1. To Prepare Students about algebra of matrices and vector spaces. 2. To explain about roots vectors and linear transformations with an examples			
Course Out comes	Students understood for estimation of elementary transformations in matrix and their solutions. Students learnt about characteristic roots and vectors with numerical examples. They also know theoretical proofs of theorems.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**1**				**3**	**2**	**2**	**2**
CO2	**3**	**2**	**3**	**2**	**1**				**3**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**1**				**3**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**1**				**3**	**2**	**2**	**2**

APST 102: PROBABILITY AND DISTRIBUTIONS

Unit-I: Classes of sets, fields, σ -fields, minimal σ -field, Borel σ – field in R^K, sequence of sets, limsup and liminf of a sequence of sets. Measure, Probability measure, properties of a measure, Lebesgue and Lebesgue-Stieltjes measures, Measurable functions, Random variables, sequence of random variables, almost sure convergence, convergence in probability (and in measure). Monotone convergence theorem, Fatou's lemma, Dominated convergence theorem.

Unit-II: Expectation of a random variable, inequalities on expectations, Markov, Holder, Jensen and Liapiunov inequalities. Borel- Cantelli - Lemma, Independence, Weak law and strong law of large numbers for iid sequences, Chebyshev's theorem, khinchine's theorem, Kolmogorov theorems (statements only), convergence in distribution.

Unit-III: Laplace and Weibull distributions.Functions of random variables and their distributions, sampling distributions: central Chi Square, t and F distributions and its properties, applications, relation between t and F, F and χ^2; Fisher's Z-distribution, fisher's Z-transformation. Non-central chi-square, t and F distributions and their properties.

Unit-IV: Multiple and partial correlation coefficients, multiple linear regression, inter relationship among partial and multiple correlation and regression coefficients. Null distributions of simple, partial and multiple correlation coefficients.Order statistics and their distributions, joint and marginal distributions of order statistics, distribution of range. Extreme values and their asymptotic distributions.

References

1. Ash, Robert. (1972). Real Analysis and Probability. Academic Press.
2. Billingsley, P. (P. (1986) Probability and Measure. Wiley.
3. Kingman, J F C and Taylor, S. J. (1966). Introduction to Measure and Probability. Cambridge University Press.
4. Loeve, M (1963), Probability theory
5. Bhatt B.R (1998), Modern Probability theory, Wiley Eastern
6. Rohatgi V.K. (1984): An Introduction to probability theory and mathematical Statistics.
7. Rao C.R (1973): Linear Statistical Inference and its Applications, 2/e, Wiley Eastern.
8. Pitman J. (1993): Probability, Narosa Publishing House.
9. Johnson, N.L and Kotz, S.M. (1972): Distributions in Statistics, Vol. I , II & III. Houghton and Miffin.
10. David H.A (1981): Order Statistics, II Edition, and John Wiley.
11. Feller W (1966): Introduction to probability theory and its applications, Vol. III, second edition. Wiley Eastern.

Subject Code	Subject Name	Credits Allotted		Total
APST-102	**Probability and Distributions**	Theory	Practical	4
		4	---	
Course Objective	1. To Explain about classes of sets and Probability measures 2. To discuss on random variables and convergence in probability and the important theorems with proofs. 3. To discuss about inequalities on expectations with their derivations and laws of numbers. 4. To explain about different discrete and continuous distributions and their Properties. 5. To learn about derivations and properties of various sampling distributions. 6. To explain order Statistics and their properties			
Course Out comes	1. Students must have knowledge about random variables, expectations, sets and their properties and inequalities where ever necessary. 2. Students also know the weak law, strong law and central limit theorem and their importance 3. Students know about different continuous and discrete distributions and their properties. 4. They have awareness about central and non central sampling distributions and order Statistics. Idea about simple, partial and multiple correlation coefficients.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**1**	**1**				**1**		**2**	**3**
CO2	**3**	**2**	**1**	**1**	**1**				**1**		**2**	**3**
CO3	**3**	**2**	**1**	**1**	**1**				**1**		**2**	**3**
CO4	**3**	**2**	**1**	**1**	**1**				**1**		**2**	**3**

APST 103 (A) : SAMPLING TECHNIQUES

Unit-I: Review of basic concepts of sampling theory such as sampling design, sampling scheme, sampling strategy etc., Sampling with varying probability with and without replacement, PPS WR/WOR methods – Lahiri's sample scheme, Hansen – Hurwitz, Des Raj estimators for a general sample size and Murthy estimator for a sample of size 2, Symmentrized Des Raj estimator.

Unit-II: Hurwitz – Thompson estimator (HTE) of a finite population total / mean, expression for V(HTE) and its unbiased estimator. IPPS scheme of a sampling due to Midzuno – Sen and JNK Rao (sample size 2 only). Rao – Hartley-Cochran sampling scheme for a sample of size n with random grouping.

Unit-III: Ratio and Regression methods of estimation, Two stage sampling, Multi stage sampling, Cluster sampling. Resampling methods and its applications.

Unit-IV: Double sampling for difference, ratio, regression and PPS estimators; Large scale sample surveys, Errors in surveys, A mathematical model for errors of measurement, Sampling and Non-sampling errors, Sources and types of non-sampling errors, Remedies for non-sampling errors.

References

1. Chaudhuri. A and Mukerji. R (1988): Randomized Response Theory and Techniques, New Yory, Marcel Dekker Inc.
2. Cochran W.G (1988): Sampling Techniques III Edition (1977) Wiley.
3. Des Raj and Chandak (1988): Sampling Theory. Narosa.
4. Murthy M.N (1977): Sampling Theory and Methods. Statistical Publishing Society.
5. Sukhatme et al (1984): Sampling Theory of Surveys with Applications. Iowa State University Press & IARS
6. Sing D and Chudary F.S (1986): Theory and Analysis of Sample Survey Designs. New Age International Publishers.
7. Hedayat A.S and Sinha B.K. (1991): Design and Inference in Finite Population Sampling. Wiley.
8. Mukhopadhyay P(1996): Inferential problems in Survey Sampling. New Age International.
9. Wolter K.M (1985): Introduction to Variance Estimator. Springer. Verlag.
10. Hansen M.M and Hurwitz W.M and Mandow W.G (1954): Sample Survey Methods and Theory, Vol. I and Methods and Applications Vol. II, John Wiley and Sons.
11. Philli. I. Good (2013):Introduction to statistics through resampling methods and R, 2nd edition.

Subject Code	Subject Name	Credits Allotted		Total
APST-103 (a)	**Sampling Techniques**	Theory	Practical	4
		4	----	
Course Objective	1. Discuss about basic concepts of sampling techniques PPS WR/WOR models. 2. To study about Hurwitz Thompson estimator, PPS scheme. 3. To learn about Ratio and Regression methods and their properties. 4. To explain Double sampling for difference estimators using ratio regression and PPS's, Non sampling error and their remedies.			
Course Out comes	1. Students learnt different sampling techniques of with replacement/ without replacement and Different sampling models. 2. Students studied Non-Sampling errors and different remedies.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**3**	**3**	**1**			**2**		**2**	**2**
CO2	**3**	**2**	**1**	**3**	**3**	**1**			**2**		**2**	**2**
CO3	**3**	**2**	**1**	**3**	**3**	**1**			**2**		**2**	**2**
CO4	**3**	**2**	**1**	**3**	**3**	**1**			**2**		**2**	**2**

APST 103 (B) : STOCHASTIC PROCESSES

Unit-I: Introduction to stochastic processes (sp's): classification of sp's according to state apace and time domain. Countable state Markov chains (MC's), Chapman – Kolmogorov equations, calculation of n – step transition probability and its limit. Stationary distribution, classification of states,, transient MC, random walk and gambler's ruin problem.

Unit-II: Discrete state space continuous time MC: Kolmogorov – Feller differential equations, Poisson process, birth and death process; Applications to queues and storage problems. Wiener process as a limit of random walk, first – passage time and other problems.

Unit-III: Renewal theory: Elementary renewal theorem and applications. Statement and uses of key renewal theorem, study of residual life time process: weakly stationary and strongly stationary process; Moving averages and auto regressive process.

Unit-IV: Branching process: Galton – Watson branching process, probability of ultimate extinction, distribution of population size. Martingale in discrete time, inequality, convergence and smoothing properties.Statistical inference in MC and Markov process.

References

1. Adke, S.R and Manjunath, S.M (1984): An Introduction to Finite Markov Processes, Wiley Eastern.
2. Bhat, B.R (2000): stochastic Models: Analysis and Applications, New Age International, India.
3. Cinlar, E (1975): Introduction to Stochastic Processes, Prentice Hall.
4. Feller, W (1968): Introduction to Probability and its Applications, Vol. 1, Wiley Eastern.
5. Harris, T.E (1963): The Theory of Branching Processes, Springer – Verlag.
6. Hoel, P.G., Port, S.C and Stone, J.C (1972): Introduction to Stochastic Processes, Houghton Miffin & Co.
7. Jagers, P (1974): Branching Process with Biological Applications, Wiley.
8. Karlin, S and Taylor, H.M (1975): A First Course in Stochastic Processes, Vol. 1, and Academic Press.
9. Medhi, J (1982): Stochastic Processes, Wiley Eastern.
10. Parzen, E (1962): Stochastic Processes, Holden – Day.

Subject Code	Subject Name	Credits Allotted		Total
APST-103 (b)	**Stochastic Process**	Theory	Practical	4
		4	----	
Course Objective	1. To explain stochastic process and their classification according to space and domain. 2. To discuss about Birth and death process, Renewal theory and its applications, stochastic process and their importance, Markov chains, Poisson process, Renewal theory, Branching process etc.			
Course Out comes	Students understoodstochastic processes, Markov chains, Poisson process, Renewal theory, Branching process, etc.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1				1	1	2	1
CO2	3	2	1	1	1				1	1	2	1
CO3	3	2	1	1	1				1	1	2	1
CO4	3	2	1	1	1				1	1	2	1

APST 104 (A) :STATISTICAL ANALYSIS USING EXCEL AND SPSS

Unit-I: Review of Excel, sorting, filtering and construction of charts. Curve fitting and interpretation of the output. Statistical functions in Excel - Calculating theoretical probability using Binomial, Poisson and Normal distributions. Matrix operations- Transpose, Product and Inverse operations using Excel. Pivot tables and look up functions.

Unit-II: Data Analysis Pak in Excel, descriptive statistics, tests of hypothesis, ANOVA, Correlation and Regression, Random Number Generation from different distributions, Binomial, Poisson, Uniform, Normal and from discrete distributions with given mean and variance. Forecasting Using Excel – Moving Averages and Exponential Smoothing, Use of functions, Linest, Logest, Forecast , Growth, Trend for trend analysis. The use of solver for optimization – Application to LPP.

Unit-III: Introduction to SPSS, Different Menu's in SPSS, creating a data file, opening excel files,variables and labels,selecting casesby filtering,recoding of data, merging of files, Sorting of Cases and Variable, SPSS Output and its transfer to excel and word. Analysis categorical data- Scales of Measurements, Data reliability-test rest method, Cronbach's alpha.

Unit-IV: Using SPSS Analysis tools, descriptive statistics, cross tabs (with stress on procedures and syntax). Post-hoc analysis for multiple comparisons using Tukey's test, Duncan's Multiple Range Test, Dunnet's test and Scheffe's test with interpretation. Selection of variables in Multiple Linear Regression – stepwise procedures and analysis of residuals. Procedure for Binary Logistic regression, Factor analysis, Linear Discriminant analysis and Cluster analysis.

Subject Code	Subject Name	Credits Allotted		Total
APST-103 (b)	**Statistical Analysis Using Excel and SPSS**	Theory 4	Practical ----	4
Course Objective	1. To Learn the students about the Statistical functions in Excel. 2. To teach the students the concept of Data Analysis Pak in Excel. 3. To give the introduction of SPSS and its concepts to the students. 4. To teach the students concepts like multiple comparision tests, Regression analysis etc.			
Course Out comes	1. Students can learn how to enter the data MS-Excel. 2. Students can analyze the data in Excel and SPSS. 3. Students can learn how to transfer the data in one data Analysis application to Another. 4. Students can predict the future data using SPSS Procedures.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**	**2**	**3**	**1**			**1**	**2**	**3**	**3**
CO2	**3**	**3**	**2**	**2**	**3**	**1**			**1**	**2**	**3**	**3**
CO3	**3**	**3**	**2**	**2**	**3**	**1**			**1**	**2**	**3**	**3**
CO4	**3**	**3**	**2**	**2**	**3**	**1**			**1**	**2**	**3**	**3**

APST 104 (B) :PYTHON

UNIT – I:Introduction to Python Programming Language:

Introduction to Python Language,Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical Operators, True or False, Bit Wise Operators, The while Loop, break and continue, The for Loop, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections, In Functions.

UNIT –II :Object and Classes :

Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes.

UNIT –III : Functions and Modules :
Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Modules, Standard Modules – sys,□Standard Modules – math,Standard Modules – time,The dir Function**.**

UNIT –IV : I/O and Error Handling In Python :

Introduction, Data Streams,□Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions.

Books for Study:

1. Dive into Python, Mike
2. Learning Python, 4th Edition by Mark Lutz
3. Programming Python, 4th Edition by Mark Lutz

Subject Code	Subject Name	Credits Allotted		Total
APST-104 (B)	**Python**	Theory	Practical	4
		4	----	
Course Objective	1: Able to understand the concept of Python Programming. 2: Expertise in Object and Classes. 3: To be able to explore Functions and Modules learning. 4: Able to understand the concept of I/O and Error Handling In Python.			
Course Out comes	1. Students have done Python Programming and their Object and Classes. 2. Students have understandI/O and Error Handling In Python			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2				1	2	3	2
CO2	3	3	3	3	2				1	2	3	2
CO3	3	3	3	3	2				1	2	3	2

APST 105 : PRACTICAL-I

At least 24 practicals covering papers relating to the subjects Linear Algebra, Probability and Distributions in this semester must be carried out. (75 marks for practical examination + 25 marks for record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
APST-105	**PRACTICALS**	Theory	Practical	4
		----	4	
Course Objective	1. To write different problems manually solving through calculators. 2. To write problems and solving them on computers using Statistical software like Excel and other relevant softwares like easy fit etc.,			
Course Out comes	Numerical problems related to Probability and Distribution Theory, Linear Algebra etc., are solved by executing programs on computers.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

APST 106 : PRACTICAL-II

At least 20 practicals covering papers relating to the subjects Linear Algebra, Probability and Distributions in this semester must be carried out. (75 marks for practical examination + 25 marks for record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
APST-106	**PRACTICALS**	Theory	Practical	4
		----	4	
Course Objective	1. To write different problems manually solving through calculators. 2. To write problems and solving them on computers using Statistical software like Excel and other relevant softwares like etc.,			
Course Out comes	Numerical problems related to Probability and Distribution Theory, Linear Algebra etc., are solved by executing programs on computers.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

APST 107 : HUMAN VALUES AND PROFESSIONAL ETHICS-1

UNIT-I: Definition and Nature of Ethics-Its relation to Religion ,Politics, Business, Legal ,Medical And Environment,Need And Implementation Ethics-Goals-Ethical Values in Various Professions.

UNIT-II: Nature Of Values-Good and Bad, Ends and Means, Actual and Potential Values, Objectives and Subjective Values ,Analysis Of Basic Moral Concepts-rights, Ought, Duty, Obligation, Justice. Responsibility and Freedom .Good Behavior and Respect for Elders, Character and Conduct.

UNIT-III: Ahimsa (Non-Violence), Satya (Truth),Brahmacharya (Celibacy),Asteya (Non-possession) and APARIGRAHA (Non-stealing).Purusharthas (Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama(Fulfillment bodily desires).Moksha (Liberation)

UNIT-IV: Bhagavad Gita-(a) Niskama karma.(b).Buddhism-The four noble truths-Arya Astanga marga, (c) Jainisam- mahavratas and anuvratas. Values embedded in various religions, Religious tolerance, Gandhian ethics.

UNIT-V: Crime and Theories or punishment-(a) Reformative , Retributive and Deterrent ,(b) Views on manu and Yajnavalkya.

References:

1. R.Subramanian ,Professional Ethics, Oxford University Press.
2. Joha S Mackenjie:A Manual Of Ethics.
3. The Ethics of Management by Larue Tone Hosmer.Richard D.Irwin Lnc.
4. Management Ethics Integrity at Work by Joseph A.Petrick and John F.Quinn.Respons Books;New Delhi.
5. “Ethics in Management” By S.A.Sherlekar, Himalaya Publication House.
6. Harold H.Titus ; Ethics For Today.
7. Maitra,S.K;Hindu Ethics.
8. William Lilly;Introducation Ethics.
9. Sinha: A Manual of Ethics.
10. Manu:Manava Dharma Sastra or the Institute of Manu:Comparising the Indian Syastem of Duties :Raligious and civil (ed.) G.C.Halighton.
11. Susrpta samh ita: Tr.Kaviraj Kunjanlal , Kunjalal Brishagratha .Chowkarnaba Sanskrit series. Vol LII andIII , Varanasi , Vol I 00, 16’20,21-32 and 74-77 only.
12. Caraka samhita :Tr.Dr.Ram karan sarma and vaidya bhagavan dash, Chowkarnaba Sanskrit series office. Varanasi I,11.111 Vol IPP 183-191.
13. Ethics, Theory and contemporary issues.Barbara mackinnon wadsworth / Thomsaon learning,2001.
14. Analyzing moral.issues,Judith A.Boss.May Field Publishing Company-1999.
15. An introduction to applied ethics(ed.)John H.Piet and Ayodhya Prasad.cosmo publications.
16. Text book for intermediate first year ethics and human values. Board of intermediate education-Telugu-academy, Hyderabad.
17. I.C.Sharma ethics philosophy of india.Nagin & co julundhar.

APST 201: STATISTICAL INFERENCE

Unit-I: Point estimation –Unbiasedness, Consistency, Efficiency and Sufficiency; Fisher-Neyman factorization theorem, complete sufficient statistics, minimum variance unbiased estimator (MVUE), Cramer - Rao inequality, Battacharayas inequality, Rao – Blackwell theorem. Exponential family, Maximum Likelihood estimation method, method of moments, method of minimum chi-squares and interval estimation.

Unit-II: Tests of hypothesis: Basic concepts, Most Powerful (MP) test, Neyman – Pearson Lemma, Consistency and Unbiased tests, Uniformly Most Powerful (UMP) test, UMP Unbiased tests, similar critical regions, Lehmann –Scheffe theorem, Likelihood Ratio Tests, Asymptotic Distribution of LR test, Bartlett's test for homogeneity of variances and Wald Test.

Unit-III: Non – Parametric tests of significance; Sign Test, Wilcoxon-Mann-Whitney U-test, Run test, Kolmogorov-Simrnov one and two sample tests, Median test, Kendall's τ test. Concept of asymptotic relative efficiency, CAN, BAN, CAUN and BEST CAUN estimators, MLE in Pitman family and Double Exponential distribution, MLE in Censored Truncated distribution.

Unit-IV: Statistical decision theory – decision problems and two person games, problems of inference viewed as decision problems, non-randomized and randomized decision rules, Loss and Risk functions, admissibility, complete and essentially complete class, complete class theorem.Bayes principle, determination of Bayes rule Minimax principle, determination of minimax rule, minimax theorem. Minimax estimates of parameters of Binomial, Poisson and Normal distributions.

References:

1. Rohtagi, V.K (1988): An Introduction to Probability and Mathematical Statistics, Wiley Eastern
2. Rao C.R (1973), Linear Statistical Inference and its applications, (Revised Edition), Wiley Eastern
3. Lehmann, E.L (1986), Theory of point estimation, (Student Edition)
4. Lehmann, E.L (1986), Testing Statistical Hypothesis (Student Edition)
5. Gibbons, J.D (1985), Non-parametric statistical inference, 2nd Edition, Mercel Dacker Inc
6. Siegal Sidney (1987), Non-parametric Statistics for behavioral sciences, 3rd Edition, Springer Verlog
7. Kendal, M.G and Stuart, A (1968), The advanced theory of statistics, Vol-II, Chales Griffin and Co., London
8. Ferguson, T.S (1967), Mathematical Statistics – a decision theoretic approach, Academic Press
9. Goon, A.M, Gupta, M and Das Gupta, B (1980), An outline of statistical theory, Vol-II, World Press, Calcutta.

Subject Code	Subject Name	Credits Allotted		Total
APST 201	**STATISTICAL INFERENCE**	Theory	Practical	4
		4	----	
Course Objective	1. To study the Estimation methods of point and their different measures and theorems, inequality. 2. To discuss about Testing of hypothesis that contains NP Lemma, UHP test, Bartlett's, Wald test, LR test and some theorems relates to hypothesis testing. 3. To discuss different Non-parametric tests with examples. Asymptotic relative efficiency and truncated distributions. 4. To study the Game theory and their problems, minimax rule, minimax theorem and minimum estimates of parameters using different distributions.			
Course Out comes	Students know about point estimation, testing of hypothesis, Non parametric models, Game theory, theorems and Proofs where ever necessary.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**2**	**2**	**1**				**1**		**1**	**2**
CO2	**3**	**2**	**2**	**2**	**1**				**1**		**1**	**2**
CO3	**3**	**2**	**2**	**2**	**1**				**1**		**1**	**2**
CO4	**3**	**2**	**2**	**2**	**1**				**1**		**1**	**2**

APST 202: MULTIVARIATE ANALYSIS

Unit-I: Multivariate normal distribution, marginal and conditional distributions, characteristics functions, Maximum likelihood estimators of parameters, distribution of sample mean vector and dispersion matrix, distribution of quadratic form in the exponent of the multivariate normal density.

Unit-II: Hotelling's T^2 and its applications – T^2 distribution, application of T^2 to single sample, two sample and multiple sample problems, optimum properties of T^2 test. Mahalobis D^2 statistic and its distribution, Multivariate Analysis of Variance (MANOVA) of one and two-way classified data.

Unit-III: Classification and discrimination: procedures for classification into two multivariate normal populations, Fisher's Discriminant function, classification into more than two multivariate normal populations, Wishart distribution and its properties, concept of sample generalized variance and its distribution.

Unit-IV: Principal Component Analysis – properties, method of extraction of principal components; Canonical variables and canonical correlations; Factor Analysis – mathematical model, estimation of factor loading, concept of factor rotation; Cluster Analysis – similarities and dissimilarities, Hierarchical clustering: single and complete linkage method.

References

1. Anderson, T.W (1983), An introduction to Multivariate Statistical Analysis, Wiley, 2nd Edition.
2. Rao, C.R (1973), Linear Statistical Inference and its applications, 2nd edition, Wiley
1. Srivastava. M.S and Khatri, C.G (1979), An introduction to Multivariate Statistics, North Holland
2. Morrison,F(1985): Multivariate Statistical Methods, Mc Graw Hill Book Company.
3. Johnson A.R and Wishern, D.W (1996), Applied Multivariate Statistical Analysis, Prentice Hall of India
4. Sharma, S (1996), Applied Multivariate Techniques, Wiley
5. Krishisagar, A.M (1972), Multivariate Analysis, Marcel Dekker
6. K.C. Bhuyan(2005): Multivariate Analysis and its Applications, Central

Subject Code	Subject Name	Credits Allotted		Total
APST 202	**Multivariate analysis**	Theory	Practical	4
		4	----	
Course Objective	1.To study about Multivariate normal distributions and their properties, it's importance. 2. To discuss Hotelling's T^2, Mahalanobis D^2 statistic and its applications and properties. 3. To explain MANOVA with one and two way classified data. 4. To discuss about Principal Component Analysis, Factor Analysis and Cluster Analysis with appropriate methods.			
Course Out comes	1. Students learnt about importance of multivariate variables and their distributions 2. T^2, D^2, MANOVA models are understood and know it's importance. 3. Classification analysis methods explained according to their classification algorithm.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	3	1			2		1	1
CO2	3	3	2	1	3	1			2		1	1
CO3	3	3	2	1	3	1			2		1	1
CO4	3	3	2	1	3	1			2		1	1

APST 203(A): LINEAR MODELS AND APPLIED REGRESSION ANALYSIS

Unit-I: Two and Three variable Linear Regression models; General linear model: Assumptions; OLS estimation; BLUE; Tests of significance of individual regression coefficients; Testing the equality between two regressions coefficients; Test of significance of complete regression.

Unit-II: Criteria for model selection; Goodness of fit measures; R^2 and adjusted R^2 Criteria; C_p criterion; testing the general linear hypothesis; Chow test for Equality between sets of regression coefficients in two linear models; test for structural change; restricted least squares estimation; Generalized Mean Squared error criterion.

Unit-III: Non-normal disturbances and their consequences; test for normality; Jarque-Bera test; Shapiro-Wilk test, Minimum Absolute Deviation (MAD) estimation; Box-Cox transformations.
Statistical analysis of residuals, OLS residuals, BLUS residual, Studentised residual, Predicted residual, tests against heteroscadasticity.

Unit-IV: Non-Linear regression; Non linear least squares estimation; Maximum Likehoodestimation; Idea of computational methods; Gradient methods, Steepest descent method and Newton-raphson method; testing general Nonlinear hypothesis; Wald test, Lagrange multiplier test and likelihood ratio Test. Robust , probit, binomial logistic ,multiple logistic regression.

References

1. Johnston, J (1984): Econometric Methods, III rd edition. MC Graw Hill.
2. Gujarathi, D (1979): Basic Econometrics, MC Graw Hill.
3. Judge, C.G., Griffiths, R.C.Hill, W.E ., Lutkephol, H and Lee, T.C (1985): The Theory and Practice of Econometrics, John Wiley and Sons.
4. Draper, N and Smith, B (1981): Applied Regression Analysis, Second Edition

Subject Code	Subject Name	Credits Allotted		Total
APST 203(a)	**Linear models and Applied Regression Analysis**	Theory	Practical	4
		4	----	
Course Objective	1. To discuss about linear regression models and their assumptions. 2. To study about different criteria for model selection and their Goodness of fit measures. 3. To explain Non normal disturbances and their consequences and statistical analysis of residuals. 4. To discuss about Non-linear regression estimation methods.			
Course Out comes	1. Students learnt about different linear and non-linear regression models and their appropriate computational procedures. 2. They know R^2, adjusted R^2 and C_p criteria for model selection.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**2**	**2**	**1**			**2**		**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**1**			**2**		**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**1**			**2**		**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**1**			**2**		**1**	**2**

APST 203(B): COMPUTER PROGRAMMING – C++

UNIT-I: Object oriented programming principles, Declaration of classes, array of classes, Pointer to classes, constructors such as void constructor, copy constructor, Destructor,

UNIT-II: Friend functions, inline functions, static class members, this pointer, Single, Multiple inheritances: Types of derivation such as public, private, protected inheritance and member access controls, ambiguity in inheritance,

UNIT-III: Virtual base class, container classes. Function overloading, Operator Overloading, Overloading of assignment, binary, unary operators.

UNIT-IV: Polymorphism, Early binding, virtual functions, Late binding, pure virtual functions, abstract base classes, constructor under inheritance, destructor under inheritance, virtual destructors.Templates and Exception Handling. Data File operations, structures and file operations, classes and file operations.

References

1. R.Decker and So Hirshfield (1998): The Object Concept: An Introduction to Computer Programming using C++; PWS Publishing.
2. S.B.Lippmann and J.Lajoie (1998): C++ Primer. Third edition. Addison- Wesley. P.Nauahton (1996).The Java Handbook. Tata McGraw-Hill
3. W.J. Savitch (2001): Problem Solving with C++The Object of Programming. Third Edition. Addison-Wesley Longman.
4. Deital&Deital: C++; Prentice-Hall Inc.
5. Sarang: Object Oriented programming with C++; Prentice-Hall Inc.
6. Balaguruswamy, E : Programming with C++; Tata McGraw-Hill.

Subject Code	Subject Name	Credits Allotted		Total
APST - 203(B)	**COMPUTER PROGRAMMING – C++**	Theory 4	Practical ----	4
Course Objective	1. Understandprinciplesofobjectorientedprogramming,definingclasses, creatingobjects,initializingobjectsanddestroyingobjects. 2. Understandfriendfunctions,inlinefunctions,singleandmultipleinheritance, Differenttypesofderivationandambiguityininheritance. 3.Understandvirtualbaseclassandcontainerclasses.Learntooverloadfunctionsan doperators. 4.Understandpolymorphism,virtualfunctions,purevirtualfunctions,constructors anddestructorsunderinheritance. 5. Understandtemplates,exceptionhandling,useofdatafiles.			
Course Outcomes	1:Understandprinciplesofobject-orientedprogramming,classes,differenttypesofconstructorsanddestructors. 2:Understandfriendfunctions,differenttypesofinheritanceandtheiruse. 3:Understandfunctionoverloadingandoperatoroverloading,overloadingofunaryand bi-naryoperators. 4:Understandthedefinitionsofabstractbaseclasses, similaritiesanddifferencesofvirtualfunctions,andtheiruseinpolymorphism. 5:Understandtheutilityoffunctiontemplatesandclasstemplates,exceptionhandlin gmechanismsanduseofdatafiles.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2				2	2	1	1
CO2	3	2	1	2	2				2	2	1	1
CO3	3	2	1	2	2				2	2	1	1
CO4	3	2	1	2	2				2	2	1	1

APST 204 (A) : DESIGN AND ANALYSIS OF EXPERIMENTS

Unit-I: Linear Model; Estimability of linear parametric functions; BLUE, Gauss-Markoff theorem; Generalized Gauss-Markoff theorem, ANOVA model, ANOVA for Two way and three way classifications, ANCOVA technique for one way and two-way classifications. Multiple comparisons tests using Tukey's, Duncans, Sheffe's and Dunnet's tests.

Unit-II: Latin squares and their construction, Mutually orthogonal Latin squares; Missing plot technique in Latin square Design, Graeco-Latin square Design; Analysis of Factorial Experiments involving factors with two and three levels in randomized blocks.

Unit-III: Necessity of confounding, Types of confounding, complete and partial confounding in 2^n, 3^2 and 3^3 factorial designs, Analysis of confounded factorial designs; Fractional Replication, Split Plot design.

Unit-IV: Incomplete Block Designs; B I B D, Inter and Intra Block analysis of a BIBD, Types of BIBD, construction of BIBD's using Mutually orthogonal Latin squares; Concepts of Youden square and lattice Design, Two-Associate PBIB design, Analysis of P B I B design.

References

1. M.N. Das and N.C.Giri (1979), Design and Analysis of Experiments, Wiley, Eastern, Pvt. Ltd., New Delhi.
2. C.D. Montgomery (1976), Design and Analysis of Experiments, Wiley & Sons, New York
3. M.C.Chakbravarthy, (1962), Mathematics of Design of Experiments, Asia Publishing House, Calcutta.
4. Oscar Kempthrone (1974), The Design and Analysis of Experiments, Wiley Eastern, Pvt. Ltd., New Delhi.
5. W.T. Federer (1972), Experimental Designs Theory and Application, Mac Millan Company, New York.
6. Angela Dean and Daniel Ross (1999), Design and Analysis of Experiments, Springer-Verlag.
7. D.D.Joshi (1987), Linear Estimation and Design of Experiments, Wiley Eastern, Pvt. Ltd., New Delhi.
8. P.W.M.John (1971), Statistical Design and Analysis of Experiments, Macmilla
9. F.Pukelshiem (1993), Optimal Design of Experiments, Wiley & Sons
10. D.Raghava Rao (1971), Construction and combinatorial problems in Design of Experiments, Wiley & Sons
11. Aloke Day (1986), Theory of Block Designs, Wiley Eastern, Pvt. Ltd., New Delhi.

Subject Code	Subject Name	Credits Allotted		Total
APST 204(A)	**Design and Analysis of Experiments**	Theory	Practical	4
		4	----	
Course Objective	1. To learn ANOVA and ANCOVA for one and two way classifications analysis and their multiple comparison tests. 2. To explain Latin squares, different types of Latin squares and their missing plots. 3. To discuss on Confounding, their types, confounding 2^n, 3^2 and 3^3 factorial designs etc. 4. To discuss about BIBD, PBIBD construction analysis.			
Course Out comes	1. Students learnt ANOVA, ANCOVA technique for one way and two-way classifications. Multiple comparisons tests using Tukey's, Duncans, Sheffe's and Dunnet's tests. 2. Students understood about Latin squares and their construction, missing plot technique etc. 3. Students explained about Incomplete Block Designs and their analysis, etc.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**2**	**3**	**1**			**2**		**2**	**3**
CO2	**3**	**3**	**3**	**2**	**3**	**1**			**2**		**2**	**3**
CO3	**3**	**3**	**3**	**2**	**3**	**1**			**2**		**2**	**3**
CO4	**3**	**3**	**3**	**2**	**3**	**1**			**2**		**2**	**3**

APST 204 (B) : INDUSTRIAL STATISTICS AND QUALITY CONTROL

UNIT-I: General Theory of Control Charts: Control charts for attribute and variables: O.C. and A.R.L. of control charts; control by gauging; Moving average and exponentially weighted moving average charts;Cu-sum charts using V-masks and decision intervals. Capability indices: Cp, Cpk and Cpm.

UNIT-II: Acceptance sampling plans for attribute inspection: Single, double and sequential sampling plans; Plans for inspection by variables for one-sided and two-sided specifications;

UNIT-III: Mil Std and ISI plans; Continuous sampling plans of Dodge type and Wald-Wolfwitz type and their properties.

UNIT-IV: Industrial Experimentation, Fractional factorial experiments, Response surface methodology, Six sigma in process improvement and product development, Lean thinking, Value stream analysis, 5 s.

Reference Books:

1. Cowden D J (1957): Statistical Methods in Quality Control. 1st Edition. Prentice-Hall Inc.
2. Duncan Acheson (1986): Quality Control and Industrial Statistics. 5th Edition. IrvinMittag and Rinne (1993): Statistical Methods for Quality Assurance. 2nd Edition.Chapman and Hall Ltd.
3. Montgomerv. D.C (2012): Introduction to Statistical Quality Control. 7th Edition. John Wiley and Sons
4. R.C. Guptha(2001): Statistical Quality Control. 9th Edition.Khanna Publishers.
5. Ott, E.R. (1975): Process Quality Control. 4th Edition. McGraw Hill
6. Phadke, M.S. (1989): Quality Engineering through Robust Design. 1st Edition. Prentice Hall
7. Wetherill, G.B. (1977): Sampling Inspection and Quality Control. 2nd Edition.Chapman and Hall Ltd.
8. Wetherill, G.B. and Brown, D.W.(1991): Statistical Process Control. Theory and Practice.3rd Edition. Chapman & Hall Ltd.

Subject Code	Subject Name	Credits Allotted		Total
APST 204(B)	**INDUSTRIAL STATISTICS AND QUALITY CONTROL**	Theory 4	Practical ----	4
Course Objective	1: Can identify the cause of defects using statistical quality management techniques. 2: Able to apply statistical quality control techniques to minimise the variability in manufacturing and business process. 3: Acquainted with Six Sigma and lean thinking in industrial experimentation. 4: Expertise in the most import field of applied statistics that contributes to quality control in all most all industries.			
Course Out comes	1: Able to understand basics of production process monitoring and apply concept of control charts to it. 2:Apply acceptance and continuous sampling plan in production process. 3:Able to construct sampling inspection plans for attributes and variables. 4:Able to learn some advanced control charts and capability indices. 5: Able to construct Six Sigma limits.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**1**	**3**	**2**			**1**	**1**	**2**	**1**
CO2	**3**	**2**	**2**	**1**	**3**	**2**			**1**	**1**	**2**	**1**
CO3	**3**	**2**	**2**	**1**	**3**	**2**			**1**	**1**	**2**	**1**
CO4	**3**	**2**	**2**	**1**	**3**	**2**			**1**	**1**	**2**	**1**

APST 205 : PRACTICAL-III
Paper-1&3

At least 20 practicals covering all papers relating to the subject in this semester must be carried out. (75 marks for practical examination + 15 marks for viva-voce + 10 marks for record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
APST-205	**PRACTICALS**	Theory	Practical	4
		----	4	
Course Objective	1. To exercise different practical problems manually through calculators. 2. To discuss problems relates to semester - II papers.			
Course Out comes	Students know about the solving of Numerical problems related to semester –1and 3 papers. . .			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

APST 206 : PRACTICAL-IV
Paper-2&4

At least 20 practicals covering all papers relating to the subject in this semester must be carried out. (75 marks for practical examination + 15 marks for viva-voce + 10 marks for record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
APST-206	**PRACTICALS**	Theory	Practical	4
		----	4	
Course Objective	1. To exercise different practical problems manually through calculators. 2. To discuss problems relates to semester - II papers.			
Course Out comes	Students know about the solving of Numerical problems related to semester –2 and 4. . .			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

APST 207: HUMAN VALUES AND PROFESSIONAL ETHICS-II

UNIT-I: Value Education –Definition-Relevance to present day-Concept of Human Values-self introduction-self-esteem-family values-Components , Structure and responsibilities of family-Neutralization of anger-Adjustability-Threats of family life –Status of women in family and society –Caring for need elderly –Time allotment for sharing ideas and concerns.

UNIT-II: Medical ethics-Views if charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners.Code of ethics for medical and healthcare professionals.Euthanasia ,ethical obligation to animals,ethical issues in relation to health care professional patients. Social justice in health care , human cloning , problems of abortion .Ethical issues ingenetic engineering and ethics issues raised by new biological technology of knowledge.

UNIT-III: Business ethics – Ethical standards of business-immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories causes of unethical behavior , ethical abuses and work ethics.

UNIT-IV: Environmental Ethics- Ethical Theory , man And Nature- Ecological Crisis , Pest Control , Pollution and Waste , Climate Change, Energy and Population, Justice and Environmental Health.

UNIT-V: Social ethics – Organ trade. Human trafficking, Human rights violation and social disparities, Feminist ethics. Surrogacy / pregnancy, Ethics of media-Impact of newspapers, Television , Movies and Internet.

References:

1. Joha S Mackenjie:A Manual Of Ethics.
2. The Ethics of Management by Larue Tone Hosmer.Richard D.Irwin Lnc.
3. Management Ethics Integrity at Work by Joseph A.Petrick and John F.Quinn.Respons Books;New Delhi.
4. “Ethics in Management” By S.A.Sherlekar, Himalaya Publication House.
5. Harold H.Titus ; Ethics For Today.
6. Maitra,S.K;Hindu Ethics.
7. William Lilly;Introducation Ethics.
8. Sinha: A Manual of Ethics.
9. Manu:Manava Dharma Sastra or the Institute of Manu:Comparising the Indian Syastem of Duties :Raligious and civil (ed.) G.C.Halighton.
10. Susrpta samh ita: Tr.Kaviraj Kunjanlal , Kunjalal Brishagratha .Chowkarnaba Sanskrit series. Vol LII andIII , Varanasi , Vol I 00, 16’20,21-32 and 74-77 only.
11. Caraka samhita :Tr.Dr.Ram karan sarma and vaidya bhagavan dash, Chowkarnaba Sanskrit series office. Varanasi I,11.111 Vol IPP 183-191.
12. Ethics, Theory and contemporary issues.Barbara mackinnon wadsworth / Thomsaon learning,2001.
13. Analyzing moral.issues,Judith A.Boss.May Field Publishing Company-1999.
14. An introduction to applied ethics(ed.)John H.Piet and Ayodhya Prasad.cosmo publications.
15. Text book for intermediate first year ethics and human values. Board of intermediate education-Telugu-academy, Hyderabad.
16. I.C.Sharma ethics philosophy of india.Nagin & co julundhar.

APST 301: APPLIED ECONOMETRICS

Unit-I: Quick review of inference in classical linear regression model; Estimation and tests of significance of linear and compound growth rates; Incremental analysis; Testing the function form of regression; choosing between linear and log-linear regression models; Likelihood Ratio, Wald and Lagrange Multiplier tests.

Unit-II: Multicollinearity; Sources, consequences and detection of Multicollinearityl Farrar-Glauber test; remedial measures; Heteroscedasticity: Sources and consequences; Tests for Heteroscedasticity; Glejser's test, Goldfield-Quandt test and Breusch-Pagan-Godfrey test; Estimation of parameters under Heteroscedasticity;

Unit-III: Autocorrelation; sources and consequences; first order autoregressive scheme; tests for autocorrelation Durbin-Watson test; Remedies; Estimation of parameters under Autocorrelation; Stochastic Regressors; Errors in variables linear model, IV and ML methods of estimation.

Unit-IV: Finite distributed lag models; Almon's Polynomial approach; Infinite distributed lag models; Geometric lag model; Koyck's approach; IV method; simultaneous linear equations models; Problem of identification; Indirect least squares, LIML, Two stage least squares; three stage least squares and FIML estimation methods.

References:

1. Johnston, J (1984): Econometric Methods, III rd edition , MC Graw Hill.
2. Judge, C.G., Griffths, and Hill, R.C. et al (1985): Theory and Practice of Econometrics, John Wiley.
3. Gujarathi, D. (1979): Basic Econometrics, Mc Graw hill.
4. Intrilligator, M.D (1980): Econometric Models, Techniques and Applications, Prentice Hall.

Subject Code	Subject Name	Credits Allotted		Total
APST-301	**APPLIED**	Theory	Practical	4

	ECONOMETRICS	4	----	
Course Objective	1. To study about classical linear regression model and their estimation. 2. To discuss about Autocorrelation, different orders of Autocorrelation and their estimation procedures. 3. To explain different lag models and their estimate procedures. 4. To explain about simultaneous linear equations model and their different methods and estimation.			
Course Out comes	1. Students know about heteroscedasticity, multicollinearity and autocorrelation and their estimation procedures. 2. Students understood about different lag models and simultaneous linear equations model with their estimation methods.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**2**	**3**	**1**			**1**		**2**	**2**
CO2	**3**	**2**	**1**	**2**	**3**	**1**			**1**		**2**	**2**
CO3	**3**	**2**	**1**	**2**	**3**	**1**			**1**		**2**	**2**
CO4	**3**	**2**	**1**	**2**	**3**	**1**			**1**		**2**	**2**

APST 302: APPLIED OPERATIONS RESEARCH

Unit-I: Definition and scope of Operations research; phases in Operations Research; models and their solutions (Review of Linear Programming). Definition of Dual-Primal, Relationships- Dual Simplex Sensitivity or Post Optimal Analysis, Revised Simplex method.

Unit-I1: Non-linear programming - Kuhn Tucker conditions. Wolfe's algorithm for solving quadratic programming problems. Integer programming – Branch and bound algorithm and cutting plane algorithm.

Unit-III: Flows in networks max-flow-min-cut theorem. Project Management; PERT and CPM probability of project completion, PERT – crashing. Decision making in the face of competition, two-person games, pure and mixed strategies, existence of solution and uniqueness of value in zero- sum games, finding solution in 2x2, and 2xm, and mxn games.

Unit-IV: Queuing models-specifications and effectiveness measures. Steady state solutions of M/M/1 and M/M/c models with associated distributions of queue length and waiting time. M/G/1 Queue and Pollazcek Khinchine result. Steady-state solutions of M/Ek/1 and Ek/M/1 queues. Bulk queues.

References

1. Taha H.A (1982) Operational Research: An Introduction; Macmillan.
2. Hiller F. Sand Leiberman G.J. (1962) Introduction to Operations Research; Holden Day
3. Kanti Swarup; Gupta P.K and Singh M.M (1985) Operations Research; Sultan Chand.
4. Philips D.T, Ravindran A and Solberg J Operations Research, Principles and Practice.
5. Curchman C.W; Ackoff R.L and Arnoff E.L(1957) introduction to Operations Research; John Wiley
6. Hadley G (1964) Non-Linear and Dynamic programming Addison Weslay.
7. Mckinsey J.C.C(1952) Introduction to the theory of games Mc Graw Hill.P.K.Gupta; D.S.Hira Operations Research S.CHand.

Subject Code	Subject Name	Credits Allotted		Total
APST-302	**APPLIED OPERATIONS RESEARCH**	Theory	Practical	4
		4	----	
Course Objective	1. To explain different queuing models like M/M/I, M/M/C, M/G/I and bulk queues etc. 2. To learn about Non-linear programming and integer programming and their related problems. 3. To discuss about Network flow charts, CPM and PERT, project management models. 4. To study about Game theory of 2×2, 2×m, m×n and non-zero sum games with their illustrations.			
Course Out comes	1. Students understood about Dual primal, Revised simplex methods. 2. Students gains the knowledge related to non-linear programming, integer programming, CPM, PERT and different models of games.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	2				2		3	3
CO2	3	1	1	1	2				2		3	3
CO3	3	1	1	1	2				2		3	3
CO4	3	1	1	1	2				2		3	3

APST 303 : PRACTICAL - V

At least 20 practicals covering all papers relating to the subject in this semester must be carried out. (75 marks for practical examination + 15 marks for Viva-voce + 10 marks for record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
APST-303	**PRACTICAL-V**	Theory	Practical	4
		----	4	
Course Objective	1. To perform different practical problems manually through calculators and computers. 2. To solve Practical problems related to semester - III papers.			
Course Out comes	Students obtained the solutions related to Numerical problems and also to semester -III theory papers.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

APST 304(A): ADVANCED BIOSTATISTICS

Unit-I: Structure of Biological assay, Direct assays, Potency ratio, Feller's theorem and its generalization. Quantitative dose-response relationships, Linear dose-response regression, Parallel line bioassay, Slope Ratio Bioassay, Quantal responses, estimation of median effective dose, Transformations: Probit and Logit transformations.

Unit-II:: Basic Biological concepts: Gene, Chromosomes, Alleles, Concepts of Geno types and Phenotypes, Family studies, Basic mating from single gene cross, Matrix approach to basic matings of single gene cross, Checker board method, Mendal's law of heredity: Geneotypes and Pheno type ratios, Branching system method.

Unit-III: Types of matings, Random Mating, Concept of Gene pool, Gene frequency, Hardy–Weinberg law of equilibrium, Calculation of Gene frequencies, Genotypic frequency, Generation matrix approach to inbreeding, Estimation of Gene frequencies in ABO blood group system, Maximum Likelihood Method, Minimum Chi-Square method, Genetic parameters; Heritability Coefficients, Genetic Correlations, Repeatability, selection index; Inbreeding coefficient.

Unit-IV: Statistical Methods in Clinical Trials- phase I, II, III and IV trails. Statistical design for clinical trials- fixed sample trials. Simple randomized design, stratified randomized design, crossover and sequential designs – open and close sequential design. Dynamic randomization, Permuted block randomization; Single, double and triple blinding methods.

References

1. D.J. Finney (1971): Statistical Methods in Biological Assay, Charles Griffen and Company, London.
2. D.J. Finney (1971): Probit Analysis, 3rd Edition, S.Chand and Company Ltd, New Delhi.
3. William D. Stansfield. (1969): Theory and Problems of Genetics, Schaum's Outline Series, MC Graw Hill, New York.
4. Oscar Kempthorne (1973): An Introduction to Genetic Statistics, Jagmohan Book agency, New Delhi.
5. J.P. Jain (1992): Statistical Techniques in Quantitative Genetics, 2nd Edition, Hindustan Publishing House, New Delhi.
6. Basu, S. B. (1996), Quantitative Genitics Research Technique, Kalyani Publishers, New Delhi.
7. Elisa T. Lee &John Wenyu Wang (2003): Statistical methods for Survival Data analysis, 3rd Edition, John Wiley
8. Jerrold H. Zar (1999): Biostatistical Analysis, 4th edition, Pearson.
9. Armitage, P, Berry G and Mathews J.N.S. (2002): Statistical Methods in Medical Research, 4/e, Blockwell Scientific Publications.
10. Rastogi. V.B. (2006), Fundamental of Biostatistics. ANE Books, India.

Subject Code	Subject Name	Credits Allotted		Total
ST 304 (A)	**ADVANCED BIOSTATISTICS**	Theory	Practical	4
		4	----	
Course Objective	1. To discuss about Clinical trials and their statistical designs. 2. To know the Dose response relationships, their estimation, transformations. 3. To study Geno types and phenol types, Matrix operations to base mattings of single gen cross etc. 4. To estimate Gene frequency using different methods.			
Course Out comes	Students are familiar about Biological assay, their distribution and theorem, dose response relationships, basic concepts of biological assay, estimation methods of gene frequencies.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**	**1**	**2**	**1**			**2**		**2**	**3**
CO2	**3**	**3**	**2**	**1**	**2**	**1**			**2**		**2**	**3**
CO3	**3**	**3**	**2**	**1**	**2**	**1**			**2**		**2**	**3**
CO4	**3**	**3**	**2**	**1**	**2**	**1**			**2**		**2**	**3**

APST 304(B): APPLIED DEMOGRAPHY AND OFFICIAL STATISTICS

Unit-I: Indian and International Statistical Systems, Functions of CSO and NSSO; Organization of large scale sample surveys; Data dissemination systems. Non-Governmental statistical organizations, Methods of conducting population census and Economic census in India.Indian population census.

Unit-II: Official Statistics and their limitations; Methods of collection of official statistics; System of collection of Agricultural Statistics, Crop forecasting and estimation; Agricultural census in India defects; Statistics related to Forests, Fisheries; Trade, Labour, Finance, Price and Industries; CMI, SSMI and ASI publications.

Unit-III: Definition, Scope and limitations of demographic analysis; Sources of Demographic data in India; Mortality measures, Construction of life tables; Abridged life tables; Measures of fertility and Reproduction.

Unit-IV: Methods for population projection, Use of Leslie matrix, Stable and Stationary populations; Lokta's model; Models for population growth and their fitting; Stochastic models for population growth; Concept of Migration and Urbanization, Chandrasekhar nand Demings method, Stochastic model for Birth and Deaths.

References

1. B.N. Gupta (1994), Statistics, Sathiya Bhawan, Agra.
2. B.L. Aggarwal (1994), Basic Statistics, general edition, Wiley eastern, New Delhi.
3. Asthana, B.N.(1970), Indian official Statistics.
4. S. Biswas (1988), Stochastic Process in Demography and Applications, Wiley Eastern, New Delhi.
5. K.B. Pathak and F. Ram (1992), Techniques of Demographic Analysis, Himalayan Publishing House, Bombay.

Subject Code	Subject Name	Credits Allotted		Total
ST 304(b)	**Applied**	Theory	Practical	4

	Demography and official statistics	4	----	
Course Objective	1. To study about demography and their importance, different reproduction. 2. To explain population Genetics, CSO, NSSO and their scope and contents in population census in India. 3. To describe about Official Statistics and their related topics. 4. To have knowledge about Official Statistics			
Course Out comes	5. Students know the growth rates, life tables, GRR, NRR and growth models. 6. Students understood about gene frequencies, genotypes, phenotypes etc. 7. Students learnt about population census methods, organizations in India and their functions.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**2**	**2**	**2**	**1**			**2**		**1**	**1**
CO2	**3**	**2**	**2**	**2**	**2**	**1**			**2**		**1**	**1**
CO3	**3**	**2**	**2**	**2**	**2**	**1**			**2**		**1**	**1**
CO4	**3**	**2**	**2**	**2**	**2**	**1**			**2**		**1**	**1**

APST 305 : STATISTICAL ANALYSIS USING R + R PRACTRICALS

PRACTRICALS - VI

R PROGRAMMING

UNIT-I: Familiarizing with R environment, Using R console as a calculator, R atomic types, methods of creating vectors, combining vectors and repeating vectors, different ways of subsetting vectors using indexing, names and logicals. Arithmetic and logical operations. Using character vectors for text data, manipulating text using strsplit(), paste(), cat(), grep(), gsub() functions; handling factor data. Working with dates.

UNIT – II: Creating Matrices, getting values in and out of matrices, performing matrix calculations; Working with multidimensional Arrays; creating data frames, getting values in and out of data frames, adding rows to data frame, adding variables to data frame; creating lists, extracting components from a list, changing values of components of lists. Getting data into and out of R - reading data in CSV files, EXCEL files, SPSS files and working with other data types. Getting data out of R – working with write.csv() and write.table() functions.

UNIT – III: Writing Scripts and functions in R. writing functions with named, default and optional arguments. functions using as arguments. Debugging your code. Control statements in R – conditional control using if, if-else, ifelse; looping control using for, while, repeat; transfer of control using break and next. Manipulating and processing data - creating subsets of data, use of merge() function, sorting and ordering of data. Group manipulation using apply family of functions - apply, sapply, lapply, tapply.Base graphics. Use of high-level plotting functions for creating histograms, scatter plots, box-whiskers plot, bar plot, dot plot, Q-Q plot and curves.

UNIT – IV: Controlling plot options using low-level plotting functions - Adding lines, segments, points, polygon, grid to the plotting region; Add text using legend, text, mtext; and Modify/add axes, Putting multiple plots on a single page.Working with probability distributions - normal, binomial, Poisson and other distributions. Summary statistics, hypothesis testing - one and two-sample Student's t-tests, Wilcoxon U-test, paired t-test, paired U-test, correlation and covariance, correlation tests, tests for association- Chi-squared test and goodness-of- fit tests. Formula notation, one-way and two-way ANOVA and post-hoc testing, graphical summary of ANOVA and post-hoc testing, extracting means and summary statistics; linear regression.

References:

1. Mark Gardener(2012), Beginning R - The Statistical Programming Language, Wiley India Pvt Ltd.
2. Andrie de Vries and JorisMeys(2015), R Programming for Dummies, Wiley India Pvt Ltd.
3. Jared P. Lander(2014), R For Everyone - Advanced Analytics and Graphics, Pearson Education Inc.

Subject Code	Subject Name	Credits Allotted		Total
APST 305	**STATISTICAL ANALYSIS USING R + R PRACTRICALS PRACTRICALS - VI R PROGRAMMING**	Theory 4	Practical ----	4
Course Objective	1: Able to create and manipulate vectors,matrices,arrays,data frames and lists. Should beabletoworkwithcharacterdata,factordataanddates. 2:AbletowritescriptsandfunctioninRandreaddatafrom.csvfiles,EXCELfiles andSPSSfiles. 3:Able to distinguish between high-level and low-level plotting functions available inbaseR. 4: Abletousebuilt-infunctionstoanswerquestionsrelatingtoprobability distributions,parametricandnonparametrichypothesistesting,correlationand regressionanalysis,andone-wayandtwo-wayANOVA.			
Course Out comes	1:UnderstandtheatomictypesofR,differentmethodsofcreatingandfilteringof vectors,manipulationoftextdata,factordataanddates. 2:Understandhowtocreate,subsetandmodifydatastructureslikematrics arrays,dataframesandlists.UnderstandhowtoreaddataintoandoutofR. 3: Understand the control statements of R, writing functions and scripts in R and Debugging features of R. Understand the use of apply family of functions. 4: Understandtheusethehigh-levelplottingfunctionsin Rtocreategraphsin baseRandthe low-levelplottingfunctionstocustomizethe graphs. 5: Understandtheuseofbuilt-infunctionstoperformhypothesestesting, correlationandregressionanalysis,andANOVA.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**1**			**2**	**1**	**2**	**1**
CO2	**3**	**3**	**3**	**3**	**3**	**1**			**2**	**1**	**2**	**1**
CO3	**3**	**3**	**3**	**3**	**3**	**1**			**2**	**1**	**2**	**1**
CO4	**3**	**3**	**3**	**3**	**3**	**1**			**2**	**1**	**2**	**1**

APST 306 (A): STATISTICS FOR BIOLOGICAL AND EARTH SCIENCES

Unit - I: Statistical measures: Statistical diagrams and graphs; Frequency distributions; Measures of central tendency: Arithmetic mean, Median and Mode; Measures of variation: Range, Quartile Deviation, Mean Deviation, Standard deviation, Coefficient of variation; Karl Pearson's coefficient of Skewness.

Unit- II : Random Variable and Probability Distributions: Definition of Probability, Additive and Multiplicative laws of probability (statements only), Random variable, Binomial, Poisson, Normal and Exponential distributions (properties and applications), CurveFitting: Principle of least squares; Fitting of a straight line, Exponential curve and Power curve; Correlation and Regression Analysis: Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient; Simple linear regression; Multiple and Partial correlation coefficients; Multiple linear regression; Yules coefficient of Association.

Unit –III: Tests of Significance: Basic concepts; Z- test for proportions and means; Applications of t, χ^2 and F tests; Paired t-test; Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) techniques for one way and two way classifications (single observation per cell), Confidence limits.

Unit- IV: Special Statistical Tools: Experimental designs CRD, RBD and LSD and their analysis; concept of critical difference; Duncan's Multiple range test; Elements of Principal components Analysis, Factor Analysis; Cluster Analysis and Discriminant analysis; Hotelling's T^2 and Mahalanobis D^2 statistics; Multivariate Analysis of Variance (MANOVA); Canonical correlations; Concept of Probit analysis.

References

1. Bailey, N.T.J.(1959), Statistical Methods in Biology, The English Universities Press Ltd.,
2. Pillai, S.K., and Sinha, H.C.(1968), Statistical Methods for Biological workers, Ram Prasad and sons, Agra.
3. Basu, S.P.(1996), Quantitative Genetics Research techniques, Kalyani publishers, New Delhi.
4. Misra, B.N., and Misra, M.K.(1998), Introductory Practical Biostatistics, Naya Prakash, Kolkata.
5. Johnson, R.A., and Wichern, D.W.(2001), Applied Multivariate Statistical Analysia, Third edition, Prentice Hall of India, New Delhi.
6. Federer, W.T.(1969), Experimental Designs and its appliucations.

Subject Code	Subject Name	Credits Allotted		Total
APST 306 (a)	**Statistics for Biological and Earth sciences**	Theory	Practical	4
		4	----	
Course Objective	1. To learn about basic statistics and their worked out examples. 2. To study Different tests such as t, F, χ^2 and Z fro means, proportions, variances, standard deviation etc. with illustrations. 3. To study ANOVA and ANCOVA for one way and two way classification and their importance in analysis 4. To discuss Special statistical tools and multivariate analysis.			
Course Out comes	1. Students learnt about Graphs, measures of averages, measures of dispersion etc. 2. Students studied Basic probability and important distributions with workout examples. 3. Students performed t, F, χ^2, ANOVA and ANCOVA and non-parametric tests with examples. 4. Students studied Advanced statistics tools with illustrations.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**1**	**2**	**1**	**2**		**1**		**2**	**1**
CO2	**3**	**2**	**1**	**1**	**2**	**1**	**2**		**1**		**2**	**1**
CO3	**3**	**2**	**1**	**1**	**2**	**1**	**2**		**1**		**2**	**1**
CO4	**3**	**2**	**1**	**1**	**2**	**1**	**2**		**1**		**2**	**1**

APST 306 (B): STATISTICS FOR SOCIAL AND BEHAVIOURAL SCIENCES

Unit- I: Statistical Measures: Measures of central tendency: Arithmetic Mean, Median and Mode; Measures of Variation: Range, Quartile Deviation, Standard Deviation, Coefficient of Variation, Measures of Skewness.

Unit- II: Probability and Distributions: Concept of Probability, Laws of Probability (statements only); Random Variable; Probability Distributions: Binomial, Poisson and Normal distributions (properties and applications).

Unit- III: Tests of Significance: Basic concepts; Random sampling techniques; Standard error of statistic; Large sample tests for proportions and means; Small sample tests: Applications of t, χ^2 and F tests; Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) techniques for one way and two way classifications (single observation per cell); Nonparametric tests: Wilcoxon Signed Rank test, Median test and Mann-Whitney U-test.

Unit- IV: Special statistical tools: Computation of Linear and Compound Growth rates and their tests of significance; Chow test for Structural change; Granger Causality test; Stepwise regression; R^2 and $\overline{R}^2$ statistics; Multiple Range tests: LSD. test and Duncan's test: ANOVA for Ranked data; Krushkal-wallis test, Friedman test; Elements of Factor analysis and Discriminant analysis.

References

1. Gupta, S.C.(1997), Fundamentals of Statistics, Himalayan Publishers, Mumbai.
2. Kshirasagar, A.M. (1972), Multivariate Analysis, Marcel Decker, New York.
3. Gujarati, D.(1995), Basic Econometrics, Mc Graw Hill.
4. Ferguson, C.A.(1971), Statistical Analysis in Psychology and Education, McGraw Hill.
5. Johnson, R.A., and Wichern, D.W. (2001), Applied Multivariate Statistical Analysis, Third Edition, Prentice-Hall of India (p) Ltd.,. New Delhi.

Subject Code	Subject Name	Credits Allotted	Total

ST 306 (b)	**Statistics for social and behavioural sciences**	Theory	Practical	4
		4	----	
Course Objective	1. To learn Basic statistics measures with examples 2. To discuss about important concepts, probability distributions like Binomial, Poisson and Normal properties and applications 3. To perform Parametric and non-parametric test with illustrations. 4. To study advanced statistical tools with examples.			
Course Out comes	1. Students learnt Graphs, measures of averages, measures of dispersion etc. 2. Students understood about Basic probability and important distributions and studied with workout examples. 3. Students performed t, F, χ^2, ANOVA and ANCOVA and non-parametric tests and discussed with examples. 4. Students learnt about Advanced statistics tools with working illustrations			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**1**	**2**	**1**	**2**	**1**			**1**		**2**	**2**
CO2	**3**	**1**	**2**	**1**	**2**	**1**			**1**		**2**	**2**
CO3	**3**	**1**	**2**	**1**	**2**	**1**			**1**		**2**	**2**
CO4	**3**	**1**	**2**	**1**	**2**	**1**			**1**		**2**	**2**

APST 401: APPLIED FORECASTING METHODS

Unit-I: Need and uses of forecasting, classification and characteristics of forecasts, forecasting based on regression techniques: simple and multiple linear regression and non-linear regression techniques, moving averages smoothing methods: simple and double, multi average methods; explanatory version time series forecasting, test for trend seasonality.

Unit-II: Exponential smoothing methods: trend adjusted exponential smoothing, double and triple exponential smoothing, winten's method, Chow's adaptive control methods, brown's one parameter adaptive method: Box-Jenkins three parameter smoothing, Harrison's Harmonic smoothing methods, tracking signal.

Unit-III: Auto regressive series, yules series, markoff series, deseasonalisting and detrending an observed time series, auto-covariance, Auto Correlation Function(ACF),Partial Auto Correlation Function(PACF) and their properties, conditions for stationary and invertibility. Period gram and correlogram analysis.

Unit-IV: Box-Jenkin's time series methods: Moving average , Autoregressive , ARMA and AR integrated MA (ARIMA) models, estimation of ARIMA model parameters, forecasting with ARIMA models, Diagnostic checking of the model: Analysis of residuals, forecasting using transfer function model, concept of Kalmon's Filters relation for outline.

References

1. Thomopouls, N.T (1980): Applied Forecasting Methods. Engle Wood Cliffs, N.J, Prentice Hall.
2. Wheel Wishart, S.C; and S. Makridaks (1980): Forecasting Methods for Management III edition, New York. John Wiley.
3. Sullivan, William G. and Wayne Claycambe. W (1977): Fundamentals of Forecasting. Prentice Hall. Virginia.
4. Gupta. S.C and V.K. Kapoor (1995): Fundamentals of Applied Statistics, Sulthan & Chand Sons. New Delhi.
5. Bovas, Abraham and Johannes Ledolter (1983): Statistical Methods for Forecasting, John Wiley & Sons. New York.
6. Box, G.E.P and Jenkkins, G.M (1976): Time Series Analysis Forecasting and Control, Holden Day, San Francisco.
7. Anderson, T.W (1971): The Statistical Analysis of Time Series, John Wiley, New York.
8. Markidakis, S Steven C. Wheel Wright and Victor E. Mcgee (1983): Forecasting: Methods and Applications, 2nd Edition, New York, John Wiley & Sons.

Subject Code	Subject Name	Credits Allotted		Total
APST401	**APPLIED FORECASTING METHODS**	Theory	Practical	4
		4	----	
Course Objective	1. To fitgrowth curves, measurement of cyclical and irregular component with simple examples. 2. To discuss Single, Double, Triple, adoptive exponential smoothing models and its importance. 3. To explain Auto correlation functions and their properties. 4. To discuss about Box Jenkins time series models and their estimation of parameters, fitting and diagnostic checking.			
Course Out comes	1. Students understood Time series analysis with some important growth models and their fitting 2. Students forecasting using regression, non-linear regression techniques, single, double, triple and adoptive exponential smoothing models. 3. Students obtained knowledge on AR, MA, ARMA, ARIMA, models fitting, diagnostic checking, etc.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**1**	**2**	**1**				**1**		**1**	**2**
CO2	**3**	**3**	**1**	**2**	**1**				**1**		**1**	**2**
CO3	**3**	**3**	**1**	**2**	**1**				**1**		**1**	**2**
CO4	**3**	**3**	**1**	**2**	**1**				**1**		**1**	**2**

APST 402: RELIABILITY AND SURVIVAL ANALYSIS

Unit-I: Reliability: Concept and Measures of Reliability, bath tub curve, Reliability and failure density in terms of hazard rate; Hazard models, System Reliability Models: Reliability of Series and parallel systems, Mixed configuration models, Non-series-parallel systems; r-out of n- systems, Fault tree analysis.

Unit-II: Reliability improvement methods: Redundancy, element, unit and stand by redundancies; Maintainability and availability; Reliability allocation; Life testing and Reliability estimation; Exponential failure model, Normal, Gamma and weibull distributions and their applications in reliability estimation.

Unit-III: Functions of Survival time: Definitions, Relationships of Survival Functions; Non-parametric Methods of Estimating Survival Functions: Kaplan Meier Product limit Estimate; Non-parametric methods for comparing two survival distributions: Gehan's generalized wilcoxon test, Cox-Mantel test, log rank test, Peto and peto's generalized wilcoxon test, Cox's F test and Mantel-Haenszel test.

Unit-IV: Graphical Methods for survival distributions fitting: Probability plotting, hazard plotting methods, testing of goodness of fit; Analytical Estimation Procedures for Survival distributions: Exponential, Weibull, Lognormal and Gamma Distributions only; Regression method for fitting Survival distributions; Parametric methods for comparing two survival distributions: Exponential, Weibull and Gamma Distributions only; Non-parametric and Parametric methods for identification of Prognostic factor relating survival time

References

1. L.S. Srinath (1998): Reliability Engineering, Applied East west Press PVT Ltd., New Delhi.

2. E. Balaguruswamy (1984): Reliability Engineering, Tata MC Graw Hill publishing company, New Delhi.

3. S.K. Sinha and B.K. Kale (1980): Life Testing and reliability Estimation, Wiley Eastern Ltd, New Delhi.

4. S.K. Sinha (1986): Reliability and Life Testing, Wiley Eastern Ltd, New Delhi.

5. Elisa T.Lee (1992), Statistical methods for survival data analysis, John Wiley sons.

6. Miller, R.G (1981), Survival Analysis, John Wiley

7. Cross A.J and Clark, V.A (1975), Survival distribution, reliability applications in the biomedical sciences, John Wiley and sons.

8. Elandt Johnson, R.E., Johnson, N.L.,(1999), Survival Models and Data Analysis, John Wiley and sons

Subject Code	Subject Name	Credits Allotted	Total

APST402	**RELIABILITY AND SURVIVAL ANALYSIS**	Theory	Practical	4
		4	----	
Course Objective	1. To discuss about reliability and their measures, analysis mixed configuration, series and parallel systems with examples. 2. To explain Redundancy for unit, element and stand by with simple applications. 3. To discuss Distributions for life testing and reliability estimation with their applications. 4. To understand Survival functions, survival distributions and fittings.			
Course Out comes	Students learnt about and survival analysis with their related distributions, relationships, non-parametric methods for computing survival analysis. .			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**1**	**1**				**1**		**3**	**2**
CO2	**3**	**3**	**2**	**1**	**1**				**1**		**3**	**2**
CO3	**3**	**3**	**2**	**1**	**1**				**1**		**3**	**2**
CO4	**3**	**3**	**2**	**1**	**1**				**1**		**3**	**2**

APST 403(A): STATISTICS FOR RESEARCH, INDUSTRY AND COMMUNITYDEVELOPMENT

UNIT- I: Response Surface Designs: First and Second order Response Surface models; Rotatable designs; concept of connected design; outliers and Winsorized t - statistic; Stepwise regression; Specification of Random coefficients Regression model; Specification of variance components model; MINQUE Theory; Non parametric regression, the partially linear regression model.

UNIT-II: Simulation: Scope and limitations; Simulation models; Generation of RandomNumbers; Monte-Carlo simulation; Simulation of Queueing, Inventory Systems; Networks and Job sequencing.Data Envelopment Analysis (DEA): Non parametric approach to productive efficiency; Input, output correspondences for Frontier production function; Mathematical Programming for productive efficiency: Farrell and Timmer approaches with reference to Cobb-Douglas production function.

UNIT-III: Demand Analysis: Laws of Demand and Supply; price and partial elasticities of demand; Pigous method for Time Series and Family Budget data; Engel's curve; Pareto law of Income distribution;Production Functions: Basic concepts; Isoquants; Cobb-Douglas, CES and Translog Production functions and their properties and estimation; Tools for Data Mining.

UNIT-IV: Social Surveys for Community Development: Objects, Types of Social Survey; Steps in social survey; Gallop polls; Prephology, Data collection; Kinds of measurement; Scaling methods: Thurstone, Likert and Guttman methods; Concepts of Validity and Reliability; Methods of calculating reliability coefficients; Test Reliability; ANOVA for Ranked data: Kruskal-Wallis and Friedman tests; Elements of cluster analysis, Factor analysis., path coefficient analysis and Discriminant analysis.

References

1. Das, M.N. and Giri, N.C. (1979), Design and Analysis for Experiments, Wiley Eastern (P)Ltd., New Delhi.
2. Montgomery, C.D. (1976), Design and Analysis of Experiments, Wiley & Sons, New York.
3. Johnston, J., and Dinardo, J. (1997), Econometric Methods, Fourth Edition, Mc Graw-Hill International Editions, New York.
4. Judge., C.G., et.al (1985), Theory and Practice of Econometrics, John Wiley.
5. Taha, H.A. (1992), Operations Research, An Introduction, Fourth Edition,

Subject Code	Subject Name	Credits Allotted		Total
APST 403(A)	**STATISTICS FOR RESEARCH, INDUSTRY AND COMMUNITYDEVELOPMENT**	Theory	Practical	4
		4	----	
Course Objective	1. To understand Response surface models, stepwise, partially linear and non-parametric regression models with their applications. 2. To discuss Simulation models, demand analysis and their related tools 3. To explain Social server, steps in social server measurements with examples.			
Course Out comes	Students have done Simulation models, response surface models, demand analysis, social survey and their related measures.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**3**	**1**	**2**				**1**		**3**	**2**
CO2	**3**	**2**	**3**	**1**	**2**				**1**		**3**	**2**
CO3	**3**	**2**	**3**	**1**	**2**				**1**		**3**	**2**
CO4	**3**	**2**	**3**	**1**	**2**				**1**		**3**	**2**

APST 403 (B): ADVANCED ECONOMETRIC MODELS

Unit-I: Generalized linear Model; Aitken's theorem; GLS estimator, Asymptotic distribution of GLS estimator; Analysis of residuals, OLS, BLUEs and Recursive residuals; Sudentized and predicted residuals; Granger's test of causality; nested and non nested statistical models; Cox and J tests.

Unit-II: Specificiation error; Consequences; specification bias; Ramsey's RESET test; Lagrange Multiplier test for adding variables; comparing two linear regression models; Dummy variable approach; Stepwise and Piecewise linear regression; Switching Regression Model.

Unit-III: Qualitative and limited dependent variable models; the linear probability model; probit model; Logit model and their estimation; concept of limited dependent variables; specification of Tobit model; concepts of censored and Truncated samples; estimation in censored and Truncated Samples.

Unit-IV: Sets of linear regression models; specification of the Seemingly Unrelated Regression Equations (SURE) model; OLS and GLS estimation of SURE model; Zellner's Feasible GLS estimator; Seemingly Unrelated Unrestricted Residuals (SUUR) estimator; Seemingly Unrelated Restricted Residuals (SURR) estimator; Reduction of the Zeller's Feasible GLS estimator to the OLS estimator.

References

1. Johnston, J (1984): Econometric Methods, III rd edition , MC Graw Hill.
2. Judge, C.G., Griffths, and Hill, R.C. et al (1985): Theory and Practice of Econometrics, John Wiley.
3. Gujarathi, D (1979): Basic Econometrics, Mc Graw hill.
4. Srivastava, V.K and Giles, D.E.A (1987), Seemingly Unrelated Regression Equations Models: Estimation and Inference, Marcel Dekker, Inc
5. Cook. D and Weisberg. S (1982), Residuals and Inference in Regression, Chapman and Hall.

Subject Code	Subject Name	Credits Allotted		Total
APST403(B)	**Advanced Econometric Models**	Theory	Practical	4
		4	----	
Course Objective	1. To explain OLS, GLS, BLUE and Recursive residuals with their properties. 2. To discuss different regression models and their importance. 3. To perform estimation in censored and Truncated Samples. 4. To fit sets of linear regression models and their related estimators.			
Course Out comes	1. Students understood GLM, SURE, nested and non nested statistical models. 2. Students learnt about specification error, adding, switching models. 3. Students performed Probit, logit models and their estimation.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**3**	**2**	**1**				**1**	**1**	**3**	**3**
CO2	**3**	**2**	**3**	**2**	**1**				**1**	**1**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**1**				**1**	**1**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**1**				**1**	**1**	**3**	**3**

APST 404 :PRACTICALS -VII

At least 20 practicals covering all papers relating to the subject in this semester must be carried out. (75 marks for practical examination + 15 marks for viva-voce + 10 marks for record in the semester)

Subject Code	Subject Name	Credits Allotted		Total
APST 403	**PRACTICAL –VII**	Theory	Practical	4
		-----	4	
Course Objective	1. To solve different practical problems manually through calculators and computers. 2. To do Practical problems related to semester - VII papers.			
Course Out comes	Students solved Numerical problems related to semester –IV theory papers . .			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

APST 405: STUDENT PROJECT

Data Centre / Institutions / Companies and etc.,

Subject Code	Subject Name	Credits Allotted		Total
APST 405	**STUDENT PROJECT**	Theory	Practical	4
		Dissertation submission 75 Marks +Viva-voce 25 Marks	----	
Course Objective	1. To take primary data from industry, institutions, etc. for analysis. 2. To collect data through internet or any records called secondary data for analysis.			
Course Out comes	1. Students collected the primary data or secondary data and questioner preparation, data entry in particular software, analysis and interpretation and submitted in the form of a report.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

APST 405 : STATISTICAL QUALITY CONTROL

Unit-I: Basic concepts of quality, causes of variation, principle of Shewart's control chart, control charts for attributes and variables. Control limits and probability limits. Process monitoring and control, process capability, modified control chart. Capability indices C_p, C_{pk}, and C_{pm}. Concept of Six sigma and its relationship with process capability.

Unit-II: The OC and ARL of Shewart's control charts. Control by gauging, Moving Average and Exponentially Weighted Moving Average charts. CUSUM charts using V-mask and decision interval methods. Multivariate control charts – Control Ellipsoid, Hotelling's T^2 chart.

Unit-III: Acceptance sampling plans for attribute inspection – Type-A and Type-B OC curves. Single, double and sequential sampling plans and their properties. Sampling plans with rectifying inspection-concept of AOQ, AOQL. Construction of Dodge CSP-1, CSP-2 and Multi level plans and their properties. Chain sampling and its applications. Design of Skip lot sampling plan and its ASN.

Unit-IV: Total Quality Management - Quality as a corporate strategy, six magnificent tools of process control, quality planning, costs of quality, analysis of quality costs, Zero Defects programme, quality circles, ISO 9000 and its modifications. Taguchi's contributions to Quality Engineering.

References

1. Montgomery D.C (2009), Introduction to Statistical Quality Control, 6/e, John Wiley and Sons, New York.
2. Edward G. Schilling, Dean V. Neubauer, (2009), Acceptance sampling in quality control Second Edition, Taylor & Francis.
3. Mittage, H.J and Rinne, H (1993): Statistical Methods of Quality Assurance, Chapmann Hall, London, UK.
4. Ott. E.R (1975), Process Quality Control, Mc Graw Hill
5. Phadke, M.S (1989), Quality Engineering through Robust Design, Prentice Hall
6. Duncan, A.J (1974), Quality Control and Industrial Statistics, 3rd Ed., New York, Irwin.
7. Philip J. Ross (1989), Taguchi techniques for quality engineering, McGraw Hill

Subject Code	Subject Name	Credits Allotted		Total
APST 404(a)	**Statistical Quality Control**	Theory	Practical	4
		4	----	
Course Objective	1. To discuss the basic concepts of control charts for variables and their indices. 2. To explain different control charts like Shewart's moving average, multivariate etc. with their applications. 3. To understand different sequential sampling plans and six sigma tool etc. with their properties and applications.			
Course Out comes	1. Students with their knowledge incontrol charts. 2. Students with their knowledge in Concept of Six sigma and its relationship with process capability. 3. Student have awareness about OC and ARL of Shewart's control charts 4. Students have awareness about Total Quality Management.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**			**2**	**3**	**1**	**2**

APST 406 (A) : STATISTICS FOR MARKETING RESEARCH

UNIT-I: RESEARCH METHODOLOGY: Types of Research;Hypotheses;Research Design; Collection of Data; Marketing Surveys; Sampling Techniques; Research Tools: Scaling Techniques; Problems in Marketing Research; Case study Method; Preparation of Research Report.

UNIT-II: STATISTICS FOR MARKETING: Statistical Measures: Mean, Median and Mode; Standard Deviation and Coefficient of Variation; Correlation and Regression analysis; Multiple correlation and Regression; Coefficient of Association; Linear and Compound growth rates.

UNIT-III: MARKETING INFERENTIAL TECHNIQUES: Elements of probability; Concepts of Binomial, Poisson and Normal distributions; Tests of Significance: z, t, χ^2 and F tests, ANOVA Technique; Non parametric Tests; Components of Experimental Designs: CRD, RBD and LSD.

UNIT-IV: ADVANCED STATISTICS FOR MARKETING: Basic Time Series and Forecasting Methods; Determination of Trend; Process and Product control; control charts$\overline{X}$,R, p, npand c-charts; Operation Research Techniques: Linear Programming Problem-Graphical Method, concept of PERT, CPM; Concepts of Multivariate Statistical Techniques: Factor Analysis, Discriminant Analysis, Cluster Analysis, Computer Applications to Marketing Research.

References:

1. Azel and Sounderpandian, Complete Business Statistics, TMH.
2. JK Sharma, Business Statistics, Pearson.
3. RS Bhardwaj, Mathematics for Economics and Business, EB.
4. RP Hooda, Statistics for Business and Economics, McMillan.
5. GC Beri, Business Statistics, TMH.
6. Glynn Davis and BrankoPecar, Business Statistics using Excel, Oxford University press, 2010.
7. J.K.Sharma,Fundamentals of Business Statistics, 2nd Edition, Vikas Publication, 2014.
8. SC Gupta, Fundamentals of Statistics, Himalaya Publications, 2013.
9. N.D. Vohra, Business Statistics, Tata McGraw Hill, 2013.
10. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons Publishers, New Delhi.
11. S.C. Gupta and V.K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & Sons Publishers, New Delhi.
12. R. Pannerselvam, Research Methodology, Published by PHI Learning Private Limited, New Delhi.
13. Donald R Cooper and Pamela S Schnidler, Business Research Methods, Nineth Edition, Tata Mc Graw Hill Publishing Company Limited, New Delhi

Subject Code	Subject Name	Credits Allotted		Total
APST 406(a)	**STATISTICS FOR MARKETING RESEARCH**	Theory	Practical	4
		4	----	
Course Objective	1. To give introduction about Research Design and Statistics for Research. 2. To discuss on different Statistical measures like measures of central tendency, measures of dispersion etc. 3. To explain univariate and multivariate statistical techniques with simple applications.			
Course Out comes	1. Students learnt about Research design and how to frame questionnaire etc. 2. Statistics relating to research like univaraite test like Z, t, F, ANOVA, CRD, RBD and LSD are done. 3. Multivariate statistical techniques like factor analysis, dissemination analysis and cluster analysis are used.			

Mapping of course outcomes with the program outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**	**1**	**3**				**1**	**2**	**3**	**3**
CO2	**3**	**3**	**2**	**1**	**3**				**1**	**2**	**3**	**3**
CO3	**3**	**3**	**2**	**1**	**3**				**1**	**2**	**3**	**3**
CO4	**3**	**3**	**2**	**1**	**3**				**1**	**2**	**3**	**3**

APST 406(B) : STATISTICAL ANALYSIS USING SPSS

Unit-I: Introduction to SPSS, Different Menu's in SPSS, creating a data file, opening excel files,variables and labels,selecting casesby filtering,recoding of data, merging of files,

Unit-II : Sorting of Cases and Variable, SPSS Output and its transfer to excel and word.Analysis categorical data- Scales of Measurements, Data reliability-test rest method, Cronbach's alpha.

Unit-III : Analysis tools – frequency tables, descriptive, cross tabulations, chi square tests. Compare-Means, ANOVA, Independent Sample t-test, Paired Sample t-test, One-way ANOVA.

Unit-IV: General Linear Model-Univariate, Multivariate, Repeated Measures.Correlation – Simple and Partial, Multiple Linear Regression-Selection variables into the model-Stepwise Multiple Linear Regression.

References

1. Statistics Made Simple-Do it Yourself on PC by K.V.S. Sarma
2. A Handbook of Statistical Analyses using SPSS-Sabine Landau and Brian S. Everitt
3. SPSS for Beginners -Vijay Gupta

Subject Code	Subject Name	Credits Allotted		Total
APST 406 (b)	**Statistical analysis using SPSS**	Theory	Practical	4
		4	----	
Course Objective	1. To understand SPSS software data entry, import and export of data 2. To use Statistical analysis tools using SPSS 3. To explain Bivariate, Multivariate statistics measures using SPSS			
Course Out comes	Students obtained knowledge about enter the data and analyzed the data using SPSS software.			

Mapping of course outcomes with the program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2				1	3	3	2
CO2	3	3	3	1	2				1	3	3	2
CO3	3	3	3	1	2				1	3	3	2
CO4	3	3	3	1	2				1	3	3	2

SRI VENKATESWARA UNIVERSITY COLLEGE OF SCIENCES

TIRUPATI - 517 502

DEPARTMENT OF VIROLOGY

Two-Year M.Sc., Virology Program

Semester Pattern Syllabus

[Choice Based Credit System (CBCS)]

Academic year 2023-24 onwards

Department of Virology

Sri Venkateswara University College of Sciences

Sri Venkateswara University

Program code	Program Name	Name of the Department
VIR-272	M. Sc. Virology	Dept. of Virology

About the Department

- The M.Sc. Virology program offered by the Department of Virology at Sri Venkateswara University College of Sciences (SVUCS), SV University, Tirupati, was started in 1987 with the UGC approval by the great initiative and incredible efforts taken by (Late) Prof. M.V. Nayudu, Founder of M. Sc Virology program and the Virology Department at SV University). (Late) Prof. P. Sreenivasulu and Prof. D.V.R. Sai Gopal has worked along with Prof. M. V. Nayudu in laying the strong foundation to the M. Sc Virology program through their extraordinary strategies and research contributions. From the inception, Dept. of Virology is committed to achieve excellence in education, research, and extension through systematic and focused teaching and hands-on-practical training in contemporary areas of Virology. The M. Sc Virology program brings together a variety of researchers as faculty members, who made significant contributions in their specializations and are working together for a common goal of identification, characterization, diagnosis, and management of viruses. Faculty members are not only working on basic aspects; they are also looking at translational approaches through their research interests. The M. Sc Virology program is strengthened by various research projects, sophisticated instrumentation to conduct advanced research and periodical update of the curriculum. The platform aims at equipping the students with necessary scientific skills for Virology related careers in research, industry and higher education sectors. The students in this program acquire wide knowledge, critical thinking skills and experience in conducting advanced strategic research and entrepreneurship in core Virology and other major interdisciplinary areas. The curriculum of M.Sc. Virology program is developed keeping in view of the student centric learning practices, which are entirely outcome-oriented and curiosity-driven. Emphasis will be given to train students in theoretical concepts and practical hands-on experience to face the challenges that are recurrent in the field of Virology and to foster employability, responsibility, and lifelong learning, which is the

need of the hour to make India's emergence as a global leader where Virology students can contribute for the innovation and manufacturing of viral vaccines and therapeutics through pharma and biotech industries.

The M.Sc. Virology program curriculum framework focuses on pragmatist approach whereby application of theoretical concepts is taught with substantial coverage of practical and field-based studies. The curriculum is designed to educate the students with the basic and advanced concepts of Virology and other major interdisciplinary disciplines by using modern pedagogical tools and concepts such as e-learning platforms, as well as to promote and develop skills and competencies that have enduring value beyond the classroom. While designing these frameworks, emphasis is given on the objectively measurable teaching-learning outcomes to ensure employability of the students. The Program has two academic years with four semesters. The first semester of the program covers the fundamental theory and practical concepts of Biological Chemistry, Analytical Techniques and General Microbiology and Virology with a foundation add-on course on Human and Professional Ethics-I. In the second semester, the students will explore the basic and advanced theory and practical orientation of towards the concepts of Cell biology, Molecular Genetics, Molecular Biology, Recombinant DNA Technology, Immunology and Human and Professional Ethics-II is included as a foundation add-on course. The theoretical and practical knowledge acquired in the basic and advanced aspects of interdisciplinary courses in the first and second semesters will help the students to understand the various aspects of viruses in the third and fourth semesters, where third semester covers core courses such as Plant Virology, Plant Viruses and Diseases and Molecular Virology or Tumor Virology (Generic Elective), Molecular Techniques as a skill oriented course and Communicative English and Fundamentals of Computers as an skill enhancement add on course. In the forth semester students will explore the core courses such as Animal and Human Virology, Animal and Human Viruses and Diseases and Applied Virology or Virus-based Biotechnology (Generic Elective), Industrial Biotechnology as a multidisciplinary course and Research Aptitude and Entrepreneurship as skill enhancement add-on course. Apart from these courses, students will get an opportunity to select one of the open elective courses of other programs offered by different Departments in the University in the third and fourth semesters and the Dept. of Virology offers open electives courses such as Basic Virology and Agricultural, Animal and Human Viruses in the third semester and Clinical Virology and Emerging and Reemerging Viruses in the fourth semester for the students of other departments in the campus. The curriculum is strengthened by adding topics such as laboratory bio-safety, GMP measures

and IPR, and this knowledge will make the students to take safety measures while working with viruses and to protect their ideas/discoveries. The pragmatic core of the framework has been designed such a way to enable the learners implementing the concepts to address the real-world problems. The educational tours to the adjacent Universities/institutes/research stations and involving the students in extension activities such as vaccination programs, awareness camps and rallies will make them competent to think about base level problems and motivate them to find the solutions for the same. Above all, this framework is aimed to mold master graduates to acquire critical thinking, scientific reasoning, moral ethical reasoning and qualification descriptors that are specific outcomes pertinent to the discipline and as responsible Indian citizens who have adequate knowledge and skills in reflective thinking, rational skepticism, scientific temper, digital literacy to contribute for betterment of the society and mankind.

VISION
➢ To serve as a “centre for academic excellence” by assuring systematic and focussed teaching and research in the frontier areas of Virology and to provide a conducive environment to the students for learning and quality training to promote professional development and individual well-being.

MISSION
➢ Providing quality post graduate education of high standards in Virology and achieving excellence in teaching and research. ➢ Introducing students to basic and advanced concepts/technologies/methods related to identification, characterization, detection and management of economically important, emerging and reemerging viruses infecting microbes, plants, animals and humans along with wide practical frameworks that can provide quality training of international standards and employability opportunities. ➢ Pursuing cutting edge research in the key areas of Virology and Microbiological Sciences through sponsored research projects. ➢ Establishing national/international collaborations with premier research institutes/universities for advancing scientific knowledge in contemporary areas of Virology and interdisciplinary areas of microbial sciences. ➢ Preparing students to have qualities such as honesty, integrity, carefulness, courage, resilience, self-discipline, openness, innovative thinking and determination to keep going forward, which make them ethically strong and to cotribute to the betterment of society and human kind.

Program Specific Outcomes (PSOs)

After completion of M.Sc. program in Virology, the students will be able to

S. No	Program Specific Outcomes (PSOs)
1	Demonstrate comprehensive knowledge and practical skills in the area of Virology starting from General Virology, Plant, Animal and Human Virology, Plant, Animal and Human Virus Diseases to advanced Molecular Virology, Applied Virology, Tumor Virology, Clinical Virology, Bio-safety and IPR, Virus Epidemiology and Disease management, Virus-Host-Vector interactions, Viral Vaccines, Emerging and reemerging Viruses, Virus-based Bio-nanotechnology that are relevant and required to create employment opportunities in academia and Pharmaceuticals and Biotech-based industries.
2	Develop knowledge and transferable skills in the fields of Biological Chemistry, Analytical Techniques, General Microbiology, Cell and Molecular Biology, Recombinant DNA Technology, Immunology, Molecular Techniques and Industrial Biotechnology with an introduction to Biostatistics and Bioinformatics to facilitate interdisciplinary research and for the participation and qualification in competitive examinations like GATE, UGC-CSIR-NET, APSET, GRE, Civil services and others.
3	Use knowledge and skills required for identifying problems and issues, collection of relevant quantitative and/or qualitative data, designing strategies for identification, characterization of important, emerging, and reemerging virus pathogens infecting microbes, plants, animals, and humans and for promoting national and international collaborative linkages with academic institutions, industries and research organizations for knowledge exchange and possible process/product development.
4	Gain in depth knowledge on the overall virus world and their characteristics such as history, origin, classification, nomenclature, etiology, structure, genome organization, transmission, multiplication, pathogenesis, epidemiology, strains, diagnosis and management of pathogenic viruses, which will help to design and develop affordable point-of-care diagnostics, novel prophylactic (vaccines) and

	therapeutic interventions to combat the infectious diseases caused by harmful viruses of microbes, plants, animals and humans.
5	Get exposure to open elective courses such as Tissue Culture, Mushroom Cultivation, Industrial Microbiology, Psychology, Aquaculture and Fishery Sciences, Medicinal and Ethno Botany, Hydroponics, Herbal drugs, Food and Nutrition etc., which will open new avenues and employment opportunities.
6	Acquire knowledge on foundation courses such as human and professional ethics, communicative English and basic computers and laboratory bio-safety measures, good microbiological practices (GMPs), IPR, human and professional ethical practices and principles, responsibilities and norms that need to be followed in personal and professional life to contribute to the welfare of the society and mankind.

Program Objectives

S. No.	Program Objectives
1	To update, extend and deepen students 'knowledge on Virology concepts thorough a flexible, research-intensive cafeteria program akin to academia and industry requirements.
2	To enhance career opportunities in industry, clinical settings both locally and globally or as a preparation for further higher education through in–house state of the art laboratory exposures and outbound dissertation activities fostering global competencies among students.
3	To impart in-depth practical oriented knowledge to students in various thrust areas of Virology, so as to meet the demands of industry and academia.
4	To empower the students to acquire technological knowhow by connecting disciplinary and interdisciplinary aspects of Virology.
5	To enrich the innovative thinking among students with right mixes of intellectual ability, existing policies at generating and safeguarding the product of their intellect, equipped with entrepreneurship abilities contributing to self and national

	development.
6	To inculcate the capability to work as independent scientists and entrepreneurs with sound subject knowledge, strong ethics and communication skills.

Program Outcomes (POs)

After completion of M.Sc. program in Virology, the students will be able to

S. No	Program Outcomes (POs)
PO-1 Disciplinary Knowledge	Develop the ability to demonstrate understanding, comprehensive knowledge and skills in various methodological and analytical approaches that are used in contemporary areas of Virology, which will make them to be eligible for higher studies, jobs in various academic and pharma/industrial sectors.
PO-2 Communication Skills	Demonstrate the ability to express, communicate and share thoughts, scientific concepts and ideas and experimental results clearly, concisely, and effectively, both in writing and orally.
PO-3 Critical thinking and problem solving	Develop the capability to evaluate basic concepts, theories and mechanisms related to Virology based on empirical evidence by following strategic scientific approach to acquire knowledge to find solutions to virus problems related to microbes, plants, animals, and humans.
PO-4 Analytical reasoning	Demonstrate the ability to evaluate the reliability and relevance of evidence, identify logical flaws in others argument, analyse and synthesize data from a variety of sources; draw valid conclusions with supporting evidences and examples and address opposing viewpoints.
PO-5 Scientific reasoning and research-related Skills	Develop the ability to review of scientific literature, independently carry out a complete scientific work process, including the understanding of theoretical background, defining, and formulating problems, hypothesis generation, collection, analysis and evaluation of data, and interpretation and presentation of

	results of an experiment or investigation in the field of Virology.
PO-6 Collaboration/ Cooperation /Teamwork:	Demonstrate high competence and multidisciplinary subject experience within selected topics related to Virology as a team member and ability to facilitate cooperative or coordinated effort and to contribute to a multidisciplinary team in the interest of common cause; ability to promote national and international collaborative linkages for knowledge exchange and possible process/product development in the field of Virology.
PO-7 Information/Digital literacy	Acquire the ability to use ICT (Information and communication Technology) in a variety of learning situations, demonstrate the ability to access, evaluate and use a variety of relevant information sources and to use appropriate software for the analysis of data.
PO-8 Self-directed learning	Develop the ability to work independently and to identify appropriate resources required for a project and manage a project through to completion.
PO-9 Usage of modern tools and techniques	Acquire the ability to demonstrate the practical skills in use of appropriate modern tools, advanced technologies and methods and skills necessary for designing and conducting experiment or investigation with an understanding of limitations.
PO-10 Moral and ethical awareness/reasoning:	Demonstrate the ability to assess and predict the technological, ethical, and social effects of one's own work /disciplines and of Virology, use bio-safety measures, ethical practices and avoid unethical behavior such as fabrication, misrepresentation of data or committing plagiarism, not adhering to intellectual property rights, and adopt objective, unbiased and truthful actions in all aspects of work.
PO-11 Leadership readiness/qualities	Acquire teamwork abilities and leadership qualities through various activities during their course work and demonstrate capability to map out the tasks of a team or an organization, and set direction, formulate an inspiring vision, build a team who can help achieve the vision; motivate, and inspire team members to engage with that vision, and use management skills to guide the

	team to the right destination in a smooth and efficient way.
PO-12 **Lifelong learning**	Acquire the knowledge and skills that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development and adopt to meet the demands of workplace through knowledge/skill development/re-skilling.

Program Educational Objectives (PEOs)

S. No.	Program Educational Objectives (PEOs)
1	To make the students competent in the field of Virology and its allied areas.
2	To equip the students to pursue higher education and research in reputed academic institutions/ institutes at national and international level.
3	To provide students with the concepts and research approaches for their higher career in the field of Virology and develop their scientific interest.
4	To develop a working knowledge of plant, animal and human viruses with respect to the development of product and processes for virus management
5	To impart knowledge on the importance of Laboratory Biosafety, Bioethics, IPR, entrepreneurship, Communication and management skills so as to become next generation of Indian Virologists
6	To involve the students in virus extension activities, vaccination programs and public awareness campaigns of emerging and re-emerging virus diseases.

S.V. UNIVERSITY, TIRUPATI:: SVU COLLEGE OF SCIENCES

CBCS Pattern (With effect from academic year2021-2022)

M.Sc., VIROLOGY

COURSE PATTERN AND SCHEME OF EXAMINATION & CURRICULAM

Sl. No.	Components of Study	Course Code	Title of the Course	Credit hours	No. of Credits	IA Marks	Sem End	Total

SEMESTER -I

				/week			Exam Marks	
1	Core-Theory (Mandatory)	VIR-101	Biological Chemistry	6	4	20	80	100
2	Core-Theory (Mandatory)	VIR-102	Analytical Techniques	6	4	20	80	100
3	*Compulsory Foundation-Theory (Optional)	VIR-103A (Or)	General Microbiology (Or)	6	4	20	80	100
		VIR-103B	Microbial Physiology and Metabolism	6	4	20	80	100
4	*Elective Foundation-Theory (Optional)	VIR-104A (Or)	General Virology (Or)	6	4	20	80	100
		VIR-104B	Enzyme Technology	6	4	20	80	100
5	Practical-I (Core 1 and 3A or 3B)	VR-105A (Or)	Biological Chemistry & General Microbiology (Or)	9	4	-	100	100
		VR-105B	Biological Chemistry & Microbial Physiology and Metabolism	9	4	-	100	100
6	Practical-II (Core 2 and 4A or 4B)	VIR-106A (Or)	Analytical Techniques & General Virology (Or)	9	4	-	100	100
		VIR-106B	Analytical Techniques & Enzyme Technology	9	4	-	100	100
Total				**36 T and 36 P	24	80	520	600
7	***Audit Course (Self-Study)	VIR-107	Human and Professional Ethics-I	0	-	100	-	0

***Among the foundations courses, the student shall choose one followed by the relevant practical.**

****36 h T (Theory) and 36 h P (Practicals) for two batches**

*****Marks of audit course are not included for overall grade**

SEMESTER-II

Sl. No.	Components of Study	Course Code	Title of the Course	Credit hours/ week	No. of Credits	IA Marks	Sem End Exam Marks	Total
1	Core-Theory (Mandatory)	VIR-201	Cell Biology and Tissue Culture	6	4	20	80	100
2	Core-Theory (Mandatory)	VIR-202	Microbial Genetics and Molecular Biology	6	4	20	80	100
3	*Compulsory	VIR-203A	Recombinant DNA	6	4	20	80	100

	Foundation - Theory (Optional)	(Or)	Technology (Or)					
		VIR-203B	Biostatistics and Bioinformatics	6	4	20	80	100
4	*Elective Foundation-Theory (Optional)	VIR-204A (Or)	Immunology (Or)	6	4	20	80	100
		VIR-204B	Food and Environmental Biotechnology	6	4	20	80	100
5	Practical-I (Core 1 and 3A or 3B)	VIR-205A (Or)	Cell Biology and Tissue culture & Recombinant DNA Technology (Or)	9	4	-	100	100
		VIR-205B	Cell Biology and Tissue culture & Biostatistics and Bioinformatics	9	4	-	100	100
6	Practical-II (Core 2 and 4A or 4B)	VIR-206A (Or)	Microbial Genetics and Molecular Biology & Immunology (Or)	9	4	-	100	100
		VIR-206B	Microbial Genetics and Molecular Biology & Food and Environmental Biotechnology	9	4	-	100	100
Total				****36 T and 36 P**	**24**	**80**	**520**	**600**
7	***Audit Course (Self-Study)	VIR-207	Human and Professional Ethics-II	**0**	**-**	**100**	**-**	**-**

***Among the foundations courses, the student shall choose one followed by the relevant practical.**

****36 h T (Theory) and 36 h P (Practicals) for two batches**

*****Marks of audit course are not included for overall grade.**

SEMESTER-III

	Components of Study	Course Code	Title of the Course	Credit hours/ week	No. of Credits	IA Marks	Sem End Exam Marks	Total
1	Core-Theory (Mandatory)	VIR-301	Plant Virology	6	4	20	80	100
2	Core-Theory (Mandatory)	VIR-302	Plant Virus Diseases	6	4	20	80	100
3	*Generic Elective-Theory (Optional)	VIR-303A (Or)	Molecular Virology	6	4	20	80	100
		VIR-303B	Tumor Virology	6	4	20	80	100
4	Practical (Core 1, 2 and 3A or 3B)	VIR-304A (Or)	Plant Virology and Virus Diseases& Molecular Virology	9	4	-	100	100
		VIR-304B	Plant Virology and Virus Diseases& Tumor Virology	9	4	-	100	100
5	Skill Oriented Course (Mandatory)	VIR-305A	Theory- Molecular Techniques	3	2	10	40	50
		VIR-305B	Practical-Molecular Techniques	6	2	-	50	50
6	**Open Elective-Theory (Optional) **(Offered to other departments)**	VIR-306A (Or)	Basic Virology	6	4	20	80	100
		VIR-306B	Agricultural, Animal and Human Viruses	6	4	20	80	100
Total				***39 T and 30 P	**24**	**90**	**510**	**600**
7	****Skill enhancement Add-on Course (Self-Study)	VIR-307	Communicative English and Fundamentals of Computers	-	-	**100**	-	-

***Among the electives, the student shall choose one followed by the relevant practical.**

****Open Elective: Courses offered to students of others disciplines.**

Minimum strength to offer the open elective course is 10 students.

*****39 h T (Theory) and 30 h P (Practicals) for two batches**

******Marks of Add-on courses are not included for overall grade.**

SEMESTER-IV

	Course Code	Components of Study	Title of the Course	Credit hours/ week	No. of Credits	IA Marks	Sem End Exam Marks	Total
1	Core-Theory (Mandatory)	VIR-401	Animal and Human Virology	6	4	20	80	100
2	Core-Theory (Mandatory)	VIR-402	Animal and Human Virus Diseases	6	4	20	80	100
3	*Generic Elective-Theory (Optional)	VIR-403A (Or)	Applied Virology	6	4	20	80	100
		VIR-403B	Virus-based Biotechnology	6	4	20	80	100
4	*Practical	VIR-404A (Or)	Animal and Human Virology and Virus Diseases& Applied Virology	9	4	-	100	100
		VIR-404B	Animal and Human Virology and Virus Diseases & Virus-based Biotechnology	9	4	-	100	100
5	**Multidisciplinary Course	VIR-405A	Theory-Industrial Biotechnology	3	2	10	40	50
		VIR-405B	Practical- Industrial Biotechnology (Or)	6	2	-	50	50
	**Project work	VIR-405C	Project work related to Virology	-	4	-	100	100
6	***Open Elective-Theory (Optional) **(Offered to other departments)**	VIR-405A (Or)	Clinical Virology	6	4	20	80	100
		VIR-406B	Emerging and Reemerging Viruses	6	4	20	80	100
Total				****39 T and 30 P	**24**	**90**	**510**	**600**
7	*****Skill Enhancement Add-on Course (Self-Study)	VIR-407	Research Aptitude and Entrepreneurship	-	-	**100**	-	-

***Among the generic electives, the student shall choose one followed by the relevant practical.**

****Individual student can choose either project work or multidisciplinary course based on their interest.**

*****Open Elective: Courses offered to students of others disciplines. Minimum strength to offer the open elective course is 10 students.**

******39 h T (Theory) and 30 h P (Practicals) for two batches.**

*******The marks of Add-on courses are not included for overall grade**

M.Sc. VIROLOGY

CBCS Pattern (With effect from the Academic year 2021-2022)

SEMESTER-I

VIR-101: BIOLOGICAL CHEMISTRY (Mandatory)

(Core Theory-I)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: I	**Credits: 4 Credits**

Course Educational Objectives:

1. To impart analytical knowledge in Biochemistry, to learn the basic concepts of chemical processes of living organisms and the classification, structure, properties and functions of biomolecules of life (carbohydratesand lipids),
2. To learn, the classification, structure, properties and functions of , proteins classification and mechanism of action of enzymes andenzyme kinetics.
3. To learn, the classification, structure, properties and functions of nucleic acids, hormones, growth regulators and importance of vitamins and
4. To learn about the principles of thermodynamics and metabolism of nucleic acids, lipids, proteins and carbohydrates.

UNIT-I

An overview on basic concepts of Chemistry of life: The major elements and biomolecules of life and their primary characteristics; bonding properties of carbon, stabilizing forces of biomolecules-atomic bonds, covalent and non-covalent bonds, Van der Waals forces; polarity, hydrophilic and hydrophobic interactions; electron transfer and oxidation/reduction; functional groups of organic compounds; hydrogen ion concentration of biological systems, concept of buffers, normal, molar solutions and physiological buffer systems.

Carbohydrates: Classification of carbohydrates; outline structure and properties of important mono-, di-, and oligosaccharides and their identification and functions; structure, occurrence and biological importance of structural polysaccharides (cellulose, chitin, agar, pectins, proteoglycans, sialic acids).

Lipids: Building blocks of lipids; classification of lipids; fatty acids - physicochemical properties, separation, distribution in nature, characterization and saponification and iodine number. Nomenclature, outline structures, properties and functions of glycerides, neutral lipids (waxes, fats, oils), phospholipids, sphingolipids and glycolipids; steroids- plant sterol, ergosterol, cholesterol; lipoproteins- classification, composition and importance.

UNIT-II

Amino acids: Classification, structure and physicochemical properties.

Peptides: Characteristics of peptide bond, properties and functions of peptides, determination of amino acid composition and sequence in peptides.

Proteins: structural organization of proteins - primary, secondary, tertiary and quaternary with examples; classification, properties and biological functions of proteins; Ramachandran's plot; chaperones.

Catalytic proteins (enzymes): Classification, nomenclature, composition and structures, enzymes as biocatalysts, outlines of purification and assay of enzymes; Enzyme kinetics-Michaelis-Menten equation, factors influencing enzyme catalyzed reactions, regulation of enzyme activity, activators and inhibitors;mechanism of action of enzymes (e.g., chymotrypsin); regulatory enzymes, allosteric enzymes, isoenzymes, coenzymes, ribozymes, abzymes, immobilized enzymes.

UNIT- III

Nucleic acids: Types and composition of nucleic acids, structure, properties and functions of nitrogenous bases, nucleosides, nucleotides and polynucleotides; functions of nucleotides; denaturation and renaturation of nucleic acids, factors influencing hybridization, cot values.

Hormones and Growth regulators: Introduction to hormones and growth regulators and their functions.

Vitamins: Classification (fat soluble and water soluble), sources and importance of vitamins.

Bioenergetics: Thermodynamic principles in biology, free energy, ATP cycle, pH and buffers, acids and bases, energy transducers, redox potentials, free energy changes in redox reactions.

UNIT- IV

Carbohydrate metabolism: ATP biosynthesis (Glycolysis, TCA and ETC).

Lipid metabolism: Overview of lipid metabolism (synthesis and degradation of triacylglycerides); oxidation of saturated and unsaturated fatty acids.

Protein metabolism: Hydrolysis of proteins-exo- and endo-proteinases, outlines of biosynthesis and catabolism of amino acids in microbes (deamination, decarboxylation and transamination reactions); urea cycle.

Nucleotide metabolism: Biosynthesis of bases, nucleosides and nucleotides including deoxyribonucleotides, regulation of nucleotide synthesis; break down of nucleic acids-exo- and endo-nucleases (RNases and DNases) and phosphodiesterases, salvage pathways.

Course Outcomes: At the end of the course the student will be able to

CO1: Acquire knowledge on major elements and biomolecules of life and their characteristics.

CO2: Learn the classification, structure, properties and functions of carbohydrates, lipids, proteins, classification and properties of enzymes and enzyme kinetics

CO3: Explain the types, structure and functions of nucleic acids, hormones, growth regulators and vitamins.

CO4: Learn the concepts of bioenergetics and biosynthesis of carbohydrate, lipid, carbohydrates, and proteins. and learn the concepts of bioenergetics and biosynthesis of carbohydrate, lipid, carbohydrates, and proteinsanduse this knowledge to compete for UGC-CSIR-NET, GATE, APSET and other scientific examinations

Learning Resources and Suggested Books:

1. Medical Biochemistry, (2018)John W Baynes, Marek H. Dominiczak, Hab Med FRCPath, 5th Edition, 712 pages, Publisher: Elsevier.
2. Biochemistry (2017) by Roger L. Miesfeld, Megan M. McEvoy(First Edition) , Publisher: W. W. Norton & Company.
3. Marks' Basic Medical Biochemistry, A Clinical Approach, (2017) Michael Lieberman, Alisa Peet MD, Publisher: LWW; Fifth, North American edition.
4. Fundamentals of Biochemistry: Life at the Molecular Level. (2016) Donald Voet, J. G. Voet et al.
5. Biochemistry, (2001)Stryer 5th edition, W.H. Freeman,
6. Principles of Biochemistry, (2000) Lehninger, 3rd edition by Nelson and Cox (Worth).
7. NMS Biochemistry 4th edition (1999) Victor L. Davidson and Donald B Sittman.
8. Microbial Physiology (1999), 3rd ed. by A.G. Moat & J.W. Foster, Wiley- Liss.
9. Microbial Physiology and Metabolism. (1995), by D.R. Caldwell. WM.C. Brown Publ.
10. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1982), 2nd ed. by David Freifelder. W.H. Freeman and Company.
11. Schaum's Outline of Biochemistry, Philip Kuchel, Simon Easterbrook-Smith, Vanessa Gysbers, Third Edition (Schaum's Outlines) 3rd Edition.
12. Review of Physiological Chemistry (Latest edition) by Harold A. Harper. Lange Medical

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**

CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**-**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**2**	**2**	**-**

VIR-102: ANALYTICAL TECHNIQUES (Mandatory)

(Core Theory-II)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: I	**Credits: 4 Credits**

Course Educational Objectives:

1. To understand the approaches involved in characterization and concentration of biomolecules and to train students in adopting various techniques involved in biological research such as microscopic,
2. To understand the approaches involved in chromatographic, centrifugal, and electrophoretic techniques.
3. To learn about various radioisotopes, spectroscopy and cell countingtechniques that are used for characterization of biomolecules and
4. To learn about basic concepts of biostatistics such as measures of central tendency and dispersion, correlation and regression analysis, probability distribution and tests of significance.

UNIT-I

Characterization of Biomolecules: Introduction and various approaches for characterization of biomolecules.

Concentration of Biomolecules: Salting out with ammonium sulfate, flash evaporation, lyophilization, dialysis and diafiltration (tangential flow filtration using membrane cut-offs), membrane filtration and their applications.

Microscopy- Principles, methods and applications of light, bright-field, dark-field, phase-contrast, fluorescent microscopes; Principles, methods and applications of scanning electron microscope (SEM) and transmission electron microscope (TEM); Specimen preparation, fixation and staining techniques for bright field and electron microscopes and microtomy.

UNIT-II

Chromatography: Principle, theoryand applications of partition (paper chromatography), adsorption (TLC), column (ion-exchange, gel permeation, affinity); Principle and applications of GLC, HPLC, FPLC, GC/LC-MS and MALDI-TOF.

Centrifugation: Theory and applications of preparative and analytical centrifugation and rotors (differential, rate zonal and equilibrium density gradient), sedimentation analysis; isolation of cells, sub-cellular organelles, viruses and macromolecules.

Electrophoresis: Principle,theory and applications of electrophoresis- paper, gel (starch, acrylamide and agarose), vertical, horizontal submarine, gradient, 2D-PAGE, pulse-field, capillary and isoelectric focusing; isolation, blotting techniques (southern, northern and western blotting) and their applications.

UNIT- III

Radioisotope techniques: Nature andtypes of radioactivity,half-life of radioisotopes, detection and measurement of different types of radioisotopes normally used in biology, incorporation of radioisotopes in biological tissues and cells, autoradiography, molecular imaging of radioactive material, biological effects and applications of radioisotopes, safety guidelines in handling isotopes.

Spectroscopy: Properties of light (absorption, transmission, refraction, reflection, phase formation, scattering, interference), Beers- Lambert law; Principle, instrumentation and theory and applications of UV-visible, IR, ESR, mass, MALDI, NMR spectrophotometry; fluorimetry, CD; X-ray diffraction, X-ray crystallography and surface plasmon resonance.

Cell counting: Detection of molecules in living cells, in situ localization (FISH), hemocytometer, cell viability and cytotoxicity; immunofluorescence, flow cytometry and MTT based assays.

UNIT-IV

Introduction: Definition and scope of Biostatistics, statistical diagrams and graphs.

Measures of central tendency: arithmetic mean, median and mode**.**

Vital statistics: Death rate and ratio, measures of morbidity measures of mortality.

Measures of dispersion: standard deviation, variance and coefficient of variation.

Analysis: Introduction to correlation analysis and regression analysis.

Probability and probability distribution: Binomial, Poisson and normal distributions.

Tests of significance: Applications of t-test, F-test, analysis of variance (ANOVA), X^2 test.

Course Outcomes: At the end of the course the student will be able to

CO1: Define the list of approaches used for characterization and concentration of biomolecules and understand the types, principle and instrumentation of microscopy and its applications.

CO2: Define the types, working principles and methodology of chromatography, spectroscopy and cell counting techniques.

CO3: Understand the properties of radioisotopes and their applications, learn the types, principles and applications of spectroscopic and centrifugation techniques.

CO4: Define basic concepts of statistics and apply basic statistical methods to Virology related research experiments involving statistical data.

Learning Recourses and Suggested books:

1. Biomolecular Thermodynamics: From Theory to Application (Foundations of Biochemistry and Biophysics) (2017) 1st Edition, Publisher: CRC Press.
2. Study Guide with Student Solutions Manual and Problems Book for Garrett/Grisham's Biochemistry (2016) Reginald H. Garrett , Charles M. Grisham 6th Edition, Publisher: Cengage Learning.
3. Biochemical Calculations: How to solve Mathematical Problems in General Biochemistry(2010) Irwin H. Segel International Edition Paperback – 1910, 2nd edition, Publisher: Wiley India Private Limited.
4. Analytical techniques in Biochemical and biophysics for macromolecules (2009) AvinashUpadyay, NirmalaneduUpadyay and Nath.
5. Discovering Statistics Using SPSS. Andy Field. Latest edition (2005). Publisher: SAGE Publications.
6. Basic and Clinical Biostatistics. Beth Dawson, Robert G. Trapp, Robert Trapp. Latest edition. (2004).
7. Jerrold H.Zar. (2010). Bio-Statistical Analysis. 5th edition, New Jersey, Prentice Hall.
8. Gupta, S.C. (2010). Fundamentals of Statistics. Himalayan Publishers
9. Arora, P.N. Sumeet Arora & S. Arora (2007). Comprehensive Statistical Methods. S. Chand & Company, New Delhi.
10. Misra, B.N. & M.K. Misra (1998). Introductory Practical Biostatistics. Naya Prakash, Kolkata

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**		
CO4	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**2**	**1**	**2**	**1**

VIR-103A: GENERAL MICROBIOLOGY (Optional)

(Compulsory Foundation -Theory)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: I	**Credits: 4 Credits**

Course Educational Objectives:

1. To learn about fundamentals aspects of microbiology including origin, evolution of microorganisms, different groups of microorganisms and their importance, microscopy principles and applications, morphology, and structure of bacteria,
2. To learn about Microbiological media, isolation, cultivation and enumeration methods of microorganisms, microbial growth characteristics, maintenance, and preservation of microbial cultures.
3. To develop knowledge on microbial taxonomy, transport of nutrients in microbes, control strategies of microorganism,
4. To develop knowledge on general characteristics, structure and reproduction of fungi, algae, and protozoan parasites.

UNIT – I

Fundamentals of microbiology: Origin and evolution of microorganisms, Pioneers in microbiology, different groups of microorganisms, Importance of microorganisms in plants, animal and human welfare;recent trends and development in modern microbiology.

Microbial taxonomy: General criteria for microbial classification- Hackel's three kingdom concept - Whittaker's five kingdom concept - three domain concept of Carl Woese, Outline of Bergey's manual and its importance in systematic bacteriology;

General characteristics of Archaea, evolutionary significance; general characteristics of Spirochetes, Rickettsias.

Morphology and structure of bacteria - Morphological types - cell walls of Gram negative - Gram positive bacteria - cell wall, antigenic properties - capsule - cell membranes - structure - composition – properties; Structure and function of flagella, cilia, pili; nucleoid, endospores, bacterial cell division.

UNIT-II

Microbiological media and isolation of microorganisms: Types of media- natural and synthetic; basal, defined, complex, enrichment, selective, differential, maintenance and transport media; Isolation /enumeration methods from different natural samples (streak plate, pour plate, spread plate, stab culture, slant culture and hanging drop methods); pure cultures techniques for microorganisms.

Microbial growth: Definition, microbial growth curve, batch culturing, continuous, synchronous, biphasic culturing, generation time, factors influencing the growth-physical chemical and biological; microbial growth measurement methods.

Maintenance and preservation of microbial cultures: Short term and long term preservation methods; repeated sub-culturing, oil overlay, sterile soil/sand, glycerol-deep freezing, drying methods, freeze-drying (lyophilization), and revival of microbial cultures.

UNIT-III

Microbial nutrition: Microbial nutrient requirements – macro-nutrients, micro-elements, growth factors, sources of nutrients, nutritional classification of bacteria - Phototroph, Chemotroph, Autotroph (lithotroph), Heterotroph (organotroph), Photoautotroph, Photoheterotroph, Chemoautotroph, Chemoheterotroph, nutritional patterns of pathogens – Saprophytes, Auxotroph.

Control of Microorganisms: Sterilization by physical and chemical agents-heat, radiation, pH, surface tension, osmotic pressure, filters, acids, bases, alcohols, aldehydes, ketones, phenols, soaps, antimicrobial agents, antibiotics-classification, mode of action and resistance.

UNIT-IV

Fungi: General characteristics structure and importance of fungi-*Saccharomyces*, *Pichia,Pencillium*, *Rhizopus*, *Trichoderma*.

Actinomycetes: General characteristics, structure and economic importance of actinomycetes.

Algae: General characteristics, structure and economic importance of algae -*Chlorella,* Cyanobacteriaand *Gracellaria*.

Protozoan parasites: General characteristics, structure of pathogenic protozoan parasites-*Entamoeba* and *Leishmania.*

Microbial Diseases and Host pathogen interaction: Normal microbiota, reservoirs of infections; Nosocomial infections, emerging infectious diseases, human diseases caused by bacteria, fungi, protozoa, parasitic helminths of clinical importance (e.g., TB, Aspergillosis, Malaria, filariasis).

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the origin, evolution, different groups and importance of microorganisms and learn the types, principles and applications of microscopy, morphology, and structure of bacteria.

CO2: Learn the basic concepts of media preparation, isolation, cultivation, enumeration, growth measurement, maintenance, and preservation methods of microorganisms.

CO3: Explain the general criteria for microbial classification, general characteristics of microorganisms, mechanism of nutrient transport in microbes and strategies used for control of microorganisms.

CO4: Describe the general characteristics, structure, reproduction of important fungi, algae and protozoan parasites.

Learning Resources and Suggested Books:

1. Brock Biology of Microorganisms 16th Edition (2020) Madigan MT, Martinko JM, Dunlap PV, Clark DP Prentice Hall publisher USA.
2. *Foundations in Microbiology*, (10th Edition) (2018)Kathleen Park Talaro and Barry Chess, Tata McGraw, India.
3. Microbiology, 10th Edition (2017) Lansing M Prescott, Donald A Klein, John P Harley, Mc Graw Hill publisher.
4. Microbiology and Parasitology (2016) B. S. Nagoba,Elsevier Health Sciences.
5. Textbook of Microbiology (2016) R. Ananthanarayan,OrientBlacksman publications.
6. Textbook of Microbiology, (2013) Dubey RC, Maheswari DK S. Chand & Co.
7. Microbiology, 8th Edition International Student Version Jacquelyn G. Black (Marymount University) (2012), Wiley publication.
8. Understanding Microbes: An Introduction to a Small World Jeremy W. Dale (2012), Wiley-Blackwell.
9. Microbiology, 7th Edition (2009) Michael J Pelczar, Microbiology, Tata McGraw, India.
10. Advances in Applied Microbiology. (2007) Wayne W. Umbreit and D. Pearlman. Academic Press
11. Molecular Microbiology: Diagnostic Principles and Practice (2004) Persing DH, Tenover FC, Versalovic J, eds. American Society for Microbiology Press,
12. Microbial Physiology 4th Edition (2002) John W. Foster Michael P. Spector John Wiley & Sons, Inc.
13. Advances in Microbial Physiology (2002) A.H. Rose. Academic Press, New York.
14. Microbial Physiology and Metabolism (1995) Caldwell D.R. Brown Publishers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**-**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**1**	**2**	**3**	**3**	**1**	**2**	**1**	**1**	**-**

(Or)

VIR-103B: MICROBIAL PHYSIOLOGY AND METABOLISM (Optional)

(Compulsory Foundation - Theory)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: I	**Credits: 4 Credits**

Course Educational Objectives:

1. To learn about fundamental aspects of nutrition and growth requirements and the mechanism of transport of nutrients in different groups of microorganisms and their importance
2. To learn about microbial growth characteristics metabolism of growth and microbial photosynthesis
3. To develop knowledge on microbial metabolism of Carbohydrates, Aerobic and Anaerobic respiration
4. To develop knowledge on lipid, protein, nucieotide metabolismof microorganisms.

Unit I

Nutrition and growth: Elemental nutrient requirements of microbes; nutritional groups of bacteria; autotrophy-photoautotrophy and bacterial photosynthesis; chemoautotrophy and autotrophic metabolism; heterotrophy- photoheterotrophy and chemoheterotrophy, heterotrophic metabolism in bacteria; nutritional mutants and their use in metabolic studies.

Transport of nutrients in microbes: Structural organization of plasma membrane in relation to transport, types and mechanisms of transport (passive, simple, facilitated, active, chemical modification) with reference to sugars, amino acids and ions; methods for studying of transport, coupling of transport of ions and metabolites to ATP/proton gradient.

Unit II

Microbial Growth: Definition; salient features of growth curve; generation time; specific growth rate; batch and continuous culture; synchronous growth; diauxic growth curve.; factors influencing the microbial growth; measurement of cell numbers; cell mass and metabolic activity; environment and microbial growth.

Microbial metabolism: The concepts of microbial metabolism, primary and secondary metabolism and their significance.

Photosynthesis: Oxygenic, anoxygenic photosynthesis; fixation of CO_2; Calvin cycle - C3 and C4 pathway;chemolithotrophic electron transport systems;methanogenesis;Biolumenescence.

Unit III

Carbohydrate metabolism: Pathways underlying the utilization of different sugars (EMP, ED, HMP and phosphoketolase) in microorganisms, gluconeogenesis; synthesis of peptidoglycans and glycoproteins.

Aerobic respiration: TCA cycle- intracellular location and reactions of the cycle, amphibolic nature of the cycle, energetics of the cycle; the glyoxalate cycle; mechanisms of substrate-level phosphorylation; respiratory electron transport in mitochondria; mechanism of oxidative phosphorylation.

Anaerobic respiration: Nature of fermentation, the relationship of oxygen to growth and fermentation, biochemical mechanisms of lactic acid, ethanol and acetone fermentations, study of fermentations, relationships between fermentation and energy production; nitrate and sulphate respiration.

UNIT-IV

Lipid metabolism: Biosynthesis of triacyl glycerols, phospholipids and glycolipids; oxidation of saturated and unsaturated fatty acids; microbial metabolism of aromatic and aliphotic hydrocarbons.

Protein and nitrogen metabolism: Metabolism of amino acids-amino acid biosynthesis and utilization; catabolism of amino acid, transamination, decarboxylation and oxidative deamination; Urea cycle.

Metabolism of nucleotides: Purine and pyrimidine biosynthesis, regulation of purine and pyrimidine biosynthesis,inhibitors of nucleotide synthesis.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the fundamental aspects of nutrition and growth requirements and the mechanism of transport of nutrients in different groups of microorganisms and their importance

CO2: Learn the basic concepts ofmicrobial growth characteristics metabolism of growth and microbial photosynthesis

CO3: Explain the general criteria for microbial metabolism of Carbohydrates, Aerobic and Anaerobic respiration

CO4: Describe the lipid, protein, nucieotide metabolismof microorganisms

Learning Resources and Suggested Books:

1. Doelle H.W. 1969. Bacterial Metabolism.Academic Press.
2. Gottschalk G. 1979. Bacterial Metabolism. Springer Verlag. Moat AG. 1979.
3. Bacterial Physiology and Metabolism. Academic Press.
4. Moat A G., Foster J W., 2009.Spector M P. Microbial Physiology, 4th Ed: Wiley India Pvt
5.Lodish, H., Berk A., Kaiser C. A., Krieger M., Scott M.P., Bretscher A., Ploegh H., and Matsudaira P., Molecular Cell Biology, 6th Edition, Freeman, W. H. and Co., 2008.
6. James Darnell, Molecular Cell Biology, 6th Edition, W. H. Freeman & Co, 2007.
7.Microbial Physiology and Metabolism. 1995, by D.R. Caldwell. Wm.C. Brown Publ.
8.Microbial Physiology. 1999, 3rd ed. by A.G. Moat & J.W. Foster.Wiley- Liss.
9.Principles of Biochemistry. Lehninger. 2000.
10.Foundations in Microbiology. 1996. By K. Talaro& A. Talaro, Wm. C. Brown Publ.
11. Microbiology. 2000. By Prescott et al. Wm. C. Brown Publ.
12.Molecular Cell Biology. 2000 - by Lodish et al.
13.General Microbiology, 1999 by Stanier et al., Macmillan Educational Ltd.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**1**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**1**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**2**	**3**	**3**	**1**	**2**	**2**	**2**	**2**

VIR-104A: GENERAL VIROLOGY (Optional)

(Elective Foundation-Theory)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: I	**Credits: 4 Credits**

Course Educational Objectives:

1.To understand the history, properties, nomenclature and classification of viruses and development of virology and

2. To learn about methods used for isolation, cultivation, and purification of viruses.

3. To acquire knowledge about the methods used for quantitation of viruses and major characteristics of important plant and animal virus families and biology and applications of major RNA and DNA viruses of insects,

4. To acquire knowledge about bacteriophages, algal and fungal viruses, subviral agents, importance of viruses in human welfare.

UNIT-I

History: History, origin and evolution of viruses, pioneers of Virology and properties of viruses.

Nomenclature and classification of viruses: Criteria used for naming and classification, Current ICTV classification of viruses of bacteria, plants and animals and humans.

Morphology and properties of viruses: Physical- morphology and structure, sedimentation, electrophoretic mobility, buoyant density; Biochemical- chemical composition, nucleic acids, proteins, enzymes, lipids, carbohydrates, polyamines, cations, virus stability; Biological- Host range, inclusion bodies and transmission.

Transmission of viruses: Non-vector and vector mode of transmission of viruses**.**

UNIT-II

Laboratory Bio-safety: Principles of bio-safety, biosafety levels, containment facilities, maintenance and handling of laboratory animals and requirements of virology laboratory.

Isolation, cultivation and maintenance of viruses: Isolation and cultivation of plant and animal viruses (experimental plants and tissue culture, experimental animals, embryonated eggs, organ cultures, primary and secondary cell cultures, suspension and monolayer cell cultures, cell strains, cell lines).

Purification of viruses: Extraction of viruses from tissues, clarification, and concentration of viruses in clarified extracts by physical and chemical methods, further purification of viruses by rate zonal / equilibrium density gradient centrifugation, Criteria of virus purity, Quantitation and preservation of purified virus preparations.

UNIT-III

Assay of viruses: Infectivity assay methods (plaque, pock, end point, local / systemic assay of plant viruses), physical (EM), serological (HA, HI, immunofluorescence, ELISA) and molecular (viral protein and nucleic acid based) approaches.

Replication: Introduction to virus replication, steps involved in virus replication and general strategies.

Management of viruses: Cultural practices, Sanitation, control of vectors,vaccines, antiviral drugs and chemotherapy.

UNIT-IV

Bacteriophages: Biology of major RNA (MS_2, Qβ) and DNA (T4, lambda, Øx174, M_{13}) bacteriophages, replication of M13, T4 and lambda phages; biology of cyanophages.

Algal and fungal viruses: Biology of viruses of *Phycodnaviridae*, *Partitiviridae* and *Totiviridae*.

Biology of sub-viral agents: Satellite viruses, sat-RNAs, DI particles, viroids, virusoids and prions.

Course Outcomes: At the end of the course the student will be able to

CO1: Learn the discovery, nature, origin and evolution of viruses and the physical, biochemical, and biological properties of viruses, criteria used for nomenclature and classification of bacteria, plant and animal viruses.

CO2: Describe the methods used for isolation, cultivation, and purification of viruses and criteria of purity.

CO3: Define biological, physical, biochemical, and serological methods used for quantitation of viruses, major characteristics of important plant and animal virus families and biology and applications of major RNA and DNA viruses of insects.

CO4: Understand the biology of major bacteriophages, algal and fungal viruses, subviral agents and importance of viruses in human welfare with suitable examples.

Learning Resources and Suggested Books:

1. Evidence-Based Diagnosis: An Introduction to Clinical Epidemiology 2nd Edition, by Thomas B. Newman, Michael A. Kohn (2020).2 edition, Publisher: Cambridge University Press.
2. Virusphere: From Common Colds to Ebola Epidemics--Why We Need the Viruses That Plague Us (2020). 1st edition, Frank Ryan (Author), Publisher: Prometheus.
3. Guide to Clinical and Diagnostic Virology (2019), (ASM Books) 1st Edition, by ReetiKhare, Publisher: ASM Press.
4. Virology (2019), P. Saravanan.

5. Recent Advances in Animal Virology (2019) 1st Edition, Kindle Edition, by Yashpal Singh Malik, Raj Kumar Singh, Mahendra Pal Yadav, 471 pages, Publisher: Springer
6. Virology (2017) Ren Warom, Titan Books.
7. Virus: An Illustrated Guide to 101 Incredible Microbes (2016), 1st Edition (ASM Books) Fourth Edition, by Marilyn J. Roossinck, Carl Zimmer,Publisher: Princeton University Press.
8. A Planet of Viruses: (2015) 2nd ed, by Carl Zimmer (2015) University of Chicago Press.
9. Schaechter's Mechanisms of Microbial Disease (2012).Fifth, North American Edition, by N. Cary Engleberg MD, Terence Dermody , Victor DiRitaPublisher: LWW; Fifth, North American edition
10. Introduction to Modern Virology. (2001). 5th ed. Dimmock et al., Blackwell Sci. Publ.
11. Plant Virology. (2001). 4th edi. By R. Hull. Academic Press.
12. Fundamental Virology, 4th ed. (2001). D.M. Knipe and P.M. Howley.
13. Principles of Virology: (2000). by S.J. Flint et al., ASM Press.
14. Basic Virology, (1999). By Waginer and Hewelett, Black Well Science Publ.
15. Veterinary Virology. 3rd ed. (1999). Murphy et al., Academic Press.
16. Principles of Molecular Virology. (1997). 2nded. A. Cann. Academic Press.
17. Medical Virology. (1994). 4th edition. D.O. White and F.J. Fenner. Academic Press. Plant Virology. (2001). 4thed. By R. Hull. Academic Press.
18. Field's Virology Vol 1 and 2. B.N. Fields, D.M. Knipe, P.M. Howley, R.M. Chanock, J.L.Melnick, T.P. Monath, B. Roizman, and S.E. Straus, eds.), (2007) 3rd Edition. Lippincott-Raven,Philadelphia, PA.
19. Principles of Molecular Virology. (1997). 2nded. A. Cann. Academic Press.
20. Virology: (1994). 3rded. Frankel Conrat et al, Prentice Hall.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**1**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**-**
CO4	**1**	**1**	**1**	**1**	**3**	**3**	**3**	**1**	**2**	**1**	**3**	**1**

(Or)

VIR-104B: ENZYME TECHNOLOGY (Optional)

(Elective Foundation-Theory)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: I	**Credits: 4 Credits**

Course Educational Objectives:

1.To impart knowledge in Nomenclature and classification; general types properties and Kinetics of Enzymes

2.To learn, the properties and functions of viral enzymes, and mechanism of action of enzymes.

3. To learn, about enzyme immobilization and Biosensors

4.To learn about the Applications of Enzymesin food processing, textile and pharmaceutical industries; Catalytic enzymes

Unit-I

Enzymes: Nomenclature and classification; general types and properties of enzymes.

Kinetics of Enzymes: Enzyme specificity- stereospecificity, reaction specificity, substrate specificity; factors affecting enzyme activity- temperature, pH, time; Michaelis-Menten equation - Analyses of kinetic data-Lineweaver-burk plot; kinetics of single substrate reactions, multisubstrate reactions – mechanisms and kinetics; turnover number; types of inhibition and models -substrate, product; allosteric regulation of enzymes; deactivation kinetics.

Unit-II

Viral enzymes: DNA dependent DNA polymerase, RNA dependent RNA polymerase, protease, ligase, integrase, helicase, primase, reverse transcriptase, Hemagglutinin esterase, Thymidine kinase, neuraminidase, Lysins, polyadenylate polymerase, SARS-CoV replicase complex, vaccinia virus G4 disulfide oxidoreductase; **Proteinases:** 2A proteinase ($2A^{pro}$), 3C proteinase ($3C^{pro}$), 3C-like proteinases, (M^{pro} /$3CL^{pro}$), papain-like proteinases (PL^{pro}: $PL1^{pro}$ and $PL2^{pro}$); Chymotrypsin-like serine proteases, Glycosyltransferases.

Unit-III

Enzyme Immobilization and Biosensors: Physical and chemical techniques for enzyme immobilization – adsorption, matrix entrapment, encapsulation, cross-linking, covalent binding – examples, advantages and disadvantages, design of enzyme electrodes and their application as biosensors in industry, healthcare and environment.

Unit-IV

Applications of Enzymes: Enzymes in industrial processing- Role of cellulases, hemicellulases, lipases, proteases, laccases and pectinases; Enzymes in organic synthesis – esters, amide, peptide; modified and artificial enzymes; enzymes in food processing, textile and pharmaceutical industries; Catalytic enzymes.

Course Outcomes: At the end of the course the student will be able to

CO1: Acquire knowledge on Nomenclature and classification; general types properties and Kinetics of Enzymes

CO2: Learn the the properties and functions of viral enzymes, and mechanism of action of enzymes.

CO3: Learn the enzyme immobilization and Biosensors and their applicationsin industry, healthcare and environment.

CO4: Learn the Applications of Enzymesin food processing, textile and pharmaceutical industries; Catalytic enzymes

Learning Resources and Suggested Books/Manuals:

1. Berg.J.M, Tymoczko.J.L, Stryer, L. Biochemistry. 6th ed. Freeman, 2006.
2. Zubay. Biochemistry. 4th ed. William C. Brown Publication, 1998
3. Voet and Voet. Biochemistry.4th edition, John Wiley& sons, 2010.
4. A. Lehningeretal., Principles of Biochemistry, Freeman & company, 2005.
5. L. Stryer, Biochemistry. Freeman & company, 2001.
6. West and Todd., Basic Biochemistry, Oxford and IBH publishing Co. Pvt. Ltd, 2000.
7. Thomas M. Devlin., Text book of Biochemistry with clinical correlations. Wiley-Liss Publications - New York, 1997.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**1**	**3**	**3**	**3**	**-**	**-**	**1**	**1**	**1**

PRACTICAL: VIR-105A: BIOLOGICAL CHEMISTRY &GENERAL MICROBIOLOGY

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Lab manuals, E-learning resources, textbooks and study materials	
Semester: I	**Credits: 4 Credits**

Course Educational Objectives:

1.To estimate carbohydrates, nucleic acids, amino acids, proteins, glucose, bilirubin, and inorganic phosphorus using qualitative and quantitative tests and to determine the activity of enzymes.

2 To learn the safety measures in handling different types of microorganisms and to practice various methods used for isolation, cultivation, and identification of the microorganisms from different sources and checking growth parameters at various conditions.

List of Experiments:

1. Preparation of reagents and buffers
2. Calculation of percentage, molarity and normality of solutions
3. Qualitative tests for identification of carbohydrates
4. Qualitative tests for identification of amino acids
5. Qualitative tests for identification of nucleic acids
6. Estimation of proteins (Lowry method)
7. Estimation of glucose (Anthrone method)
8. Estimation of glycine
9. Estimation of bilirubin
10. Estimation of cholesterol
11. Estimation of inorganic phosphorous
12. Determination of activity of peroxidase and polyphenol oxidase from leaves
13. Isolation and assay of an enzyme (amylase or phosphorylase) from potato extract
14. Sterilization, disinfection, safety in microbiological laboratory(theory)
15. Orientation of instruments - Compound microscope, Autoclave, Incubator cum

shaker, Laminar Airflow.

16. Sterilization methods (dry, wet, UV, chemical agents).
17. Preparation of media for cultivation of microorganisms.
18. Enumeration of microorganisms from soil.
19. Enumeration of microorganisms from water
20. Plating techniques- streak plate, pour and spread plate methods
21. Bacterial staining techniques: Simple, Gram and spore staining
22. Lactophenol-cotton blue staining for fungi.
23. Hanging drop method for bacterial motility.
24. Determination of bacterial growth curve.
25. Effect of pH on bacterial growth.
26. Effect of temperature on bacterial growth.
27. Effect of salt concentration on bacterial growth
28. Antibiotic sensitivity assay – Disc and Well diffusion method
29. Isolation of bacteriophages from sewage water

Course Outcomes: At the end of the course the student will be able to

CO1: Learn to calculate normality, molarity, molecular weight and percentage of chemical substances and qualitative and quantitative estimation of major biomolecules such as proteins, carbohydrates, lipids and nucleic acids.

CO2: Know how to isolate and check the activity of enzymes from various sources.

CO1: Define laboratory safety measures that needs to be followed in Virology and Microbiology laboratories and know how to use different sterilization methods and preparation of media.

CO2: Acquire the practical skills to use cultivation, staining and characterization methods for different microorganisms and to check their stability under various conditions.

Learning Resources and Suggested Books/Manuals:

1. Biomolecular Thermodynamics: From Theory to Application (Foundations of Biochemistry and Biophysics) (2017), 1st Edition, Publisher: CRC Press.
2. Study Guide with Student Solutions Manual and Problems Book for Garrett/Grisham's Biochemistry (2016), Reginald H. Garrett , Charles M. Grisham 6th Edition, Publisher: Cengage Learning.
3. Microbiology Tools & Techniques (2008) Kanika Sharma-Ane books, India.
4. Protein Purification Techniques 2nd ed.-(2001)-Simon Roe-Oxford University Press.
5. Practical Biochemistry: Principles and Techniques (1995), 4th ed. by K. Wilson and J.Walker, Cambridge University Press.
6. Introduction to Practical Biochemistry. (2000). by S.K. Sawhney and Randhir Singh (eds.) Narosa Publ. House
7. Laboratory Manual in Biochemistry, (1996). By J. Jayaraman.
8. Modern Experimental Biochemistry. (1993). 2nd ed. by R.F. Boyer. The Benjamin Cummings Publ. Company.
9. Biochemical Methods for Agricultural Sciences, (1992). By S. Sadasivam and A. Manikam.
10. Physical Biochemistry: Applications to Biochemistry and Molecular Biology, (1982), 2nd ed. by David Freifelder. W.H. Freeman and Company.
11. Diagnostic Microbiology. 11th Edition. (2002). By B.A. Forbes et al., Mosby publisher
12. Practical Microbiology, (2002) by R.C. Dubey and D.K. Maheshwari.
13. Laboratory Manual in Microbiology, (2000). By P. Gunasekaran
14. Microbiological Applications: Laboratory Manual in General Microbiology, 7th ed. by J. Benson.
15. Microbiology: A Laboratory Manual. 4th edition. By J.G. Cappuccino and N. Sherman.
16. Experiments in Microbiology, Plant Pathology, Tissue culture and Mushroom cultivation. 3rdedition.By K.R. Aneja.
17. Laboratory Experiments in Microbiology by Johnson.
18. Laboratory Manual in Microbiology by Alcamo.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**1**	**-**	**1**
CO3	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**1**	**1**	**3**
CO4	**1**	**1**	**2**	**2**	**1**	**3**	**3**	**1**	**2**	**2**	**1**	**2**

(Or)

PRACTICAL: VIR-105B: BIOLOGICAL CHEMISTRY &MICROBIAL PHYSIOLOGY AND METABOLISM

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Lab manuals, E-learning resources, textbooks and study materials	
Semester: I	**Credits: 4 Credits**

Course Educational Objectives:

1. To estimate carbohydrates, nucleic acids, amino acids, proteins, glucose, bilirubin, and inorganic phosphorus using qualitative and quantitative tests and to determine the activity of enzymes.

2. To learn the various methods of optimization of cultural conditions for bacterial growth and antibiotic assay methods

List of Experiments:

1. Preparation of reagents and buffers
2. Calculation of percentage, molarity and normality of solutions
3. Qualitative tests for identification of carbohydrates
4. Qualitative tests for identification of amino acids
5. Qualitative tests for identification of nucleic acids
6. Estimation of proteins (Lowry method)
7. Estimation of glucose (Anthrone method)
8. Estimation of glycine
9. Estimation of bilirubin
10. Estimation of cholesterol
11. Estimation of inorganic phosphorous
12. Determination of activity of peroxidase and polyphenol oxidase from leaves
13. Isolation and assay of an enzyme (amylase or phosphorylase) from potato extract
14. Microbiological laboratory safety measures (theory)
15. Orientation of instruments - Compound microscope, Autoclave, Incubator cum shaker, Laminar Airflow.

16. Sterilization Methods (dry, wet, UV, chemical agents).
17. Preparation of media for cultivation of microorganisms.
18. Enumeration of microorganisms from soil.
19. Enumeration of microorganisms from water
20. Plating techniques- streak plate, pour and spread plate methods
21. Bacterial staining techniques: Simple, Gram and spore staining
22. Lactophenol-cotton blue staining for fungi.
23. Hanging drop method for bacterial motility.
24. Determination of bacterial growth curve.
25. Effect of pH on bacterial growth.
26. Effect of temperature on bacterial growth.
27. Effect of salt concentration on bacterial growth
28. Antibiotic sensitivity assay – Disc and Well diffusion method
29. Isolation of bacteriophages from sewage water

Course Outcomes: At the end of the course the student will be able to

CO1: Learn to calculate normality, molarity, molecular weight and percentage of chemical substances and qualitative and quantitative estimation of major biomolecules such as proteins, carbohydrates, lipids and nucleic acids.

CO2:Knowhow to isolate and check the activity of enzymes from various sources.

CO2:Acquire the practical skills to usecultivation, staining and characterization methods for different microorganisms and to check their stability under various conditions.

CO1: Define the various methods of optimization of cultural conditions for bacterial growth and antibiotic assay methods

Learning Resources and Suggested Books/Manuals:

1. Biomolecular Thermodynamics: From Theory to Application (Foundations of Biochemistry and Biophysics) (2017), 1st Edition, Publisher: CRC Press.
2. Study Guide with Student Solutions Manual and Problems Book for Garrett/Grisham's Biochemistry (2016), Reginald H. Garrett , Charles M. Grisham 6th Edition, Publisher: Cengage Learning.
3. Microbiology Tools & Techniques (2008) Kanika Sharma-Ane books, India.
4. Protein Purification Techniques 2nd ed.-(2001)-Simon Roe-Oxford University Press.
5. Practical Biochemistry: Principles and Techniques (1995), 4th ed. by K. Wilson and J.Walker, Cambridge University Press.
6. Introduction to Practical Biochemistry. (2000). by S.K. Sawhney and Randhir Singh (eds.) Narosa Publ. House
7. Laboratory Manual in Biochemistry, (1996). By J. Jayaraman.
8. Modern Experimental Biochemistry. (1993). 2nd ed. by R.F. Boyer. The Benjamin Cummings Publ. Company.
9. Biochemical Methods for Agricultural Sciences, (1992). By S. Sadasivam and A. Manikam.
10. Physical Biochemistry: Applications to Biochemistry and Molecular Biology, (1982), 2nd ed. by David Freifelder. W.H. Freeman and Company.
11. Diagnostic Microbiology. 11th Edition. (2002). By B.A. Forbes et al., Mosby publisher
12. Practical Microbiology, (2002) by R.C. Dubey and D.K. Maheshwari.
13. Laboratory Manual in Microbiology, (2000). By P. Gunasekaran
14. Microbiological Applications: Laboratory Manual in General Microbiology, 7th ed. by J. Benson.
15. Microbiology: A Laboratory Manual. 4th edition. By J.G. Cappuccino and N. Sherman.
16. Experiments in Microbiology, Plant Pathology, Tissue culture and Mushroom cultivation. 3rdedition.By K.R. Aneja.
17. Laboratory Experiments in Microbiology by Johnson.
18. Laboratory Manual in Microbiology by Alcamo.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**2**	**1**	**3**	**2**	**3**	**3**	**1**	**2**	**2**	**1**	**1**

PRACTICAL: VIR-106A: ANALYTICAL TECHNIQUES & GENERAL VIROLOGY

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Lab manuals, E-learning resources, textbooks and study materials	
Semester: I	**Credits: 4 Credits**

1. To acquire hands-on experience in using various analytical tools such as ultrafiltration, electrophoresis, spectroscopy, chromatography and centrifugation techniques for the isolation and characterization of biomolecules isolated from various sources.

2. To demonstrate the practical skills in isolation of bacteriophages, cultivation of viruses in embryonated eggs and plants, transmission of plant viruses and checking the stability of plant viruses.

List of Experiments:

1. Laboratory equipment and their maintenance (Theory excercise)
2. Measurement of pH
3. Cell counting by Hemocytometer
4. Determination of λ max for colored solutions
5. Determination of λ max of DNA & RNA by UV spectrophotometry
6. Separation of lipids by TLC
7. Separation of amino acids by paper chromatography
8. Separation of leaf or virus proteins by SDS-PAGE
9. Separation of DNA by submarine agarose gel electrophoresis
10. Isolation of chloroplasts by sucrose density gradient centrifugation (demo)
11. Cultivation of viruses in embryonated eggs: different routes of inoculation.
12. Mechanical transmission of plant virus
13. Aphid transmission of plant virus (demo)
14. Graft transmission of plant virus
15. Determination of thermal inactivation point (TIP) of plant virus
16. Determination of dilution end point (DEP) of plant virus
17. Determination of longevity in vitro (LIV) of plant virus
18. Determination of chlorophylls in healthy and virus infected leaves.

Course Outcomes: At the end of the course the student will be able to

CO1:Learn to useultrafiltration, chromatography, and electrophoresis techniquesfor isolation and characterization of biomolecules.

CO2:Acquire the skills to usespectroscopic and centrifugal methods for characterization of biomolecules.

CO3:Learn to isolate bacteriophages from different sources and cultivate viruses in embryonated eggs and plants.

CO4: Demonstrate the mechanical, aphid and graft transmission of plant viruses and methods used to check the stability of viruses and determine the effect of virus infection on plants through chlorophyll estimation.

Learning Resources and Suggested Books/Manuals:

1. Biomolecular Thermodynamics: From Theory to Application (Foundations of Biochemistry and Biophysics) (2017), 1st Edition, Publisher: CRC Press.
2. Study Guide with Student Solutions Manual and Problems Book for Garrett/Grisham's Biochemistry (2016), Reginald H. Garrett , Charles M. Grisham 6th Edition, Publisher: Cengage Learning.
3. Microbiology Tools & Techniques (2008) Kanika Sharma-Ane books, India.
4. Protein Purification Techniques 2nd ed.-(2001)-Simon Roe-Oxford University Press.
5. Practical Biochemistry: Principles and Techniques (1995), 4th ed. by K. Wilson and J.Walker, Cambridge University Press.
6. Physical Biochemistry: Applications to Biochemistry and Molecular Biology, (1982), 2nd ed. by David Freifelder. W.H. Freeman and Company.
7. Virology Methods Manual, (1996). B.W.J. Mahy and H.O. Kangro. Academic Press
8. Molecular Virology: A Practical Approach. (1993). Davison and R.M. Elliot. Oxford University Press.
9. Virology Lab Fax. (1993). D.R. Harper. Bioscientific Publication. Academic Press.
10. Virology - A Laboratory Manual, (1992). By Burleson, et al., Academic Press.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**-**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**2**	**2**
CO4	**1**	**2**	**1**	**2**	**1**	**3**	**3**	**1**	**2**	**1**	**1**	**-**

(Or)

PRACTICAL: VIR-106B: ANALYTICAL TECHNIQUES &ENZYME TECHNOLOGY

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Lab manuals, E-learning resources, textbooks and study materials	
Semester: I	**Credits: 4 Credits**

1. To acquire hands-on experience in using various analytical tools such as ultrafiltration, electrophoresis, spectroscopy, chromatography and centrifugation techniques for the isolation and characterization of biomolecules isolated from various sources.

2.To demonstrate the practical skills on quantitative anad qualitative assay of enzymes and their kinetics

List of Experiments:

1. Laboratory equipment and their maintenance (Theory excercise)
2. Measurement of pH
3. Cell counting by Hemocytometer
4. Determination of λ max for colored solutions
5. Determination of λ max of DNA & RNA by UV spectrophotometry

6. Separation of lipids by TLC
7. Separation of amino acids by paper chromatography
8. Separation of leaf or virus proteins by SDS-PAGE
9. Separation of DNA by submarine agarose gel electrophoresis
10. Isolation of chloroplasts by sucrose density gradient centrifugation (demo)
11. Enzyme Kinetics – determination of rate constant
12. Estimation of glucose by Benedict's method
13. Estimation of urea by Diacetyl monoxime method
14. Estimation of urease enzyme in horse gram
15. Estimation of blood sugar
16. Amylase activity from saliva
17. Effect of temperature, pH, time on Enzyme (alkaline phosphatase) activity
18. Determination of acid phosphatase activity

Course Outcomes: At the end of the course the student will be able to

CO1: Learn to use ultrafiltration, chromatography, and electrophoresis techniques for isolation and characterization of biomolecules.

CO2: Acquire the skills to use spectroscopic and centrifugal methods for characterization of biomolecules.

CO3: Learn to estimate the blood sugar, urea. quantitative and qualitative assay of enzymes and their kinetics

CO4: Know how to isolate and check the activity of enzymes from various source

Learning Resources and Suggested Books/Manuals:

1. Biomolecular Thermodynamics: From Theory to Application (Foundations of Biochemistry and Biophysics) (2017), 1st Edition, Publisher: CRC Press.
2. Study Guide with Student Solutions Manual and Problems Book for Garrett/Grisham's Biochemistry (2016), Reginald H. Garrett , Charles M. Grisham 6th Edition, Publisher: Cengage Learning.

3. Microbiology Tools & Techniques (2008) Kanika Sharma-Ane books, India.
4. Protein Purification Techniques 2nd ed.-(2001)-Simon Roe-Oxford University Press.
5. Practical Biochemistry: Principles and Techniques (1995), 4th ed. by K. Wilson and J.Walker, Cambridge University Press.
6. Introduction to Practical Biochemistry. (2000). by S.K. Sawhney and Randhir Singh (eds.) Narosa Publ. House
7. Laboratory Manual in Biochemistry, (1996). By J. Jayaraman.
8. Modern Experimental Biochemistry. (1993). 2nd ed. by R.F. Boyer. The Benjamin Cummings Publ. Company.
9. Biochemical Methods for Agricultural Sciences, (1992). By S. Sadasivam and A. Manikam.
10. Physical Biochemistry: Applications to Biochemistry and Molecular Biology, (1982), 2nd ed. by David Freifelder. W.H. Freeman and Company.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**2**
CO4	**1**	**-**	**-**	**3**	**3**	**3**	**3**	**1**	**2**	**1**	**2**

VIR-107: HUMAN VALUES AND PROFESSIONAL ETHICS– I

(Audit Theory Course-Self Study)

Self-Study	**Internal test Assessment: 100 marks**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures by experts	**Assignments, quizzes and seminars**
Semester: I	**Non credited course**

Course Educational Objectives:

1.To enable the students to imbibe and internalize the moral values and ethical principles

2. To learn ethics moral and social values and ethical behavior in the personal and Professional lives.

3.To learn the rights and responsibilities and to appreciate the rights of others and to create awareness on religious values and other good acts and facts of life.

4. To acquire knowledge about the important facts of Bhagavad Gita, values hidden in religions, religious tolerance and aware of crime, and punishment theories

UNIT-I

Definition and nature of Ethics, its relation to religion, politics, business, legal, medical and environment; need and importance of professional ethics - goals - ethical values in various professions.

UNIT-II

Nature of Values - good and bad, ends and means, actual and potential values, objective and subjective values, analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, good behavior and respect for elders.

UNIT-III

Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing); Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama (Fulfillment Bodily Desires), Moksha(Liberation).

UNIT-IV

Bhagavad Gita - (a) Niskama karma (b) Buddhism- The Four Noble Truths - Arya astangamarga, (c) Jainism- mahavratas and anuvratas; Values embedded in various religions, religious tolerance, Gandhian ethics.

Crime and Theories of punishment: (a) Reformative, Retributive and Deterrent (b) Views on manu and Yajnavalkya.

Course Outcomes: At the end of the course the student will be able

CO1: Aware of the moral values and ethical principles ethics for successful personaland professional life.

CO2: Learn the moral values and good behavioral concepts that need to be followed for a better life, learn to respect others, and develop civil sense to act as responsible citizen by developing sufficient knowledge and skills in critical thinking, scientific reasoning, moral ethical reasoning that are pertinent to the discipline

CO3: Acquire the knowledge about the importance of non-violence, truth, righteousness, and other good acts of life and develop commitment.

CO4: Learn to live peacefully by having knowledge about the important facts of Bhagavad Gita, values hidden in religions, religious tolerance and aware ofcrime, and punishment theories.

Learning Resources and Suggested Books:

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
10. Susruta Samhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. CarakaSamhita:Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, (2001).
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, (1999).
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Textbook for Intermediate logic, Ethics and Human Values, board of Intermediate Education&Telugu Academic Hyderabad
16. Sharma I.C Ethical Philosophy of India. Nagin&co Jalandhar.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**-**	**1**
CO3	**2**	**3**	**3**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**2**	**1**	**3**	**3**	**1**	**2**	**1**	**1**	**1**

SEMESTER-II

VIR-201: CELL BIOLOGY AND TISSUE CULTURE (Mandatory)
(Core Theory-1)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: II	**Credits: 4 Credits**

Course Educational Objectives:

1.To understand the structure and contents of prokaryotic and eukaryotic cells,

2.To understand general principles and pathways of cell communication and cell signaling.

2. To describe the concepts and methodologies of plant tissue cultures.

4.To describe the concepts and methodologies of and animal tissue and organ cultures, cell counting and introduction to stem cell cultures

UNIT – I

Prokaryotic and eukaryotic cells: Discovery of cell, cell theory, prokaryotic and eukaryotic cell structure; structural organization and functions of intracellular organelles-cell wall, cell membranes, nucleolus, nucleus (chromosomes, ploidy, chromatin and nucleosomes), mitochondria, golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplasts; Sub-cellular fractionation and criteria of functional integrity; Cytoskeleton - Microtubules, microfilaments and their dynamics; centrosome, cilia.

Cell cycle: Mitosis and meiosis, molecular events and regulation of cell cycle in eukaryotes, check points (role of Rb and p53), cyclins and protein kinases, MPF (maturation promoting factor).

Apoptosis: Neurotrophic factors, caspases, pathways of apoptosis; Cancer–Cellular, molecular and genetic basis of cancer.

UNIT – II

Membrane transport: Structural organization of plasma membrane in relation to transport of nutrients; Diffusion (simple and facilitated) and active transport (primary and secondary), carrier proteins (uni, sym and antiporters), channel proteins (voltage and ligand gated); Bulk transport-pino, phago and exocytosis; receptor mediated endocytosis, coupling of transport of ions and metabolites to ATP/proton gradient.

Cell Signaling and cell-cell interactions: Cell surface receptors -ion channel-linked, G-protein-linked and enzyme-linked receptors and intracellular receptors; Types of intracellular signaling – autocrine, paracrine, contact-dependent, synaptic and endocrine signaling; Intracellular signaling proteins- Types and their role; cAMP pathway of signal transduction; cGMP, phospholipids and calcium ions, MAP kinase pathway, JAK – STAT pathway; Cell junctions - tight junction, desmosome, hemidesmosome and gap junctions; Cell adhesion molecules - cadherins, integrins and selectins;Bacterial chemotaxis and quorum sensing.

UNIT – III

Introduction to tissue culture: Principles and types of tissue culture, Culture media - balanced salt solutions; Composition and metabolic functions of media; Defined media and their applications; role of serum and supplements, serum-free media; maintenance of sterility, use of antibiotics, mycoplasma and other contaminations**.**

Animal tissue culture:*In vitro* cultures**-**Primary culture – Mechanical and enzymatic mode of disaggregation, establishment of primary culture; Subculture - Passage number, split ratio, seeding efficiency, criteria for subculture; Cell lines – Definite and continuous cell lines, characterization, authentication, maintenance and preservation of cell lines; Normal*vs*. transformed cells, growth characteristics of transformed cells

Cell counting: Hemocytometer, coulter counter; Cell viability and cytotoxicity; Dye exclusion and inclusion tests, clonogenic assay, MTT based assay.

Three dimensional cultures: Organoids and Histotypic cultures.

UNIT – IV

Plant tissue culture: Introduction to totipotency of plant cell; Tissue cell culture- Initiation and maintenance of callus and suspension culture, single cell clones, organogenesis, somatic embryogenesis, synthetic seeds, shoot tip culture, rapid clonal propagation and production of virus-free plants; Cryopreservation and germplasm conservation.

Somatic hybridization: Protoplast isolation, culture and fusion, selection of hybrid cells & regeneration of hybrid plants, cybrids; Embryo culture, anther, pollen and ovary culture for production of haploid plants and its significance.

Course Outcomes: At the end of the course the student will be able to

CO1: Discuss the structure and contents of prokaryotic and eukaryotic cells,
CO2: Discuss general principles and pathways of cell communication and cell signaling.
CO2: Understand the concepts and methodologies of plant tissue cultures

CO4: Understand the concepts and methodologies of plant and animal tissue and organ cultures, cell counting and introduction to stem cell cultures.

Learning Resources and Suggested books:

1. Molecular biology of the cell 5th Edition (2008) Alberts A et al. Garland Publishers, New York
2. Cell and Molecular Biology (2006) De Robertis, E. D. P and E.M.F. De Robertis.Lippincott Williams and Wilkins.
3. Molecular Cell Biology.6th edition (2006) Lodish, H., A. Berk, C. A. Kaiser, M. P.Scott. 6thEdn. Ploegh and Paul Matsudaria.
4. Gupta and Jangir . Cell Biology (Fundamentals and Applications).Agrobios,India.
5. Geoffrey M.Cooper.The cell (A Molecular Approach).2nd Ed,2000.
6. EDR De Roberties and EMR De RobertiesJr.cell and Molecular Biology. Indian Edition, B.I.Publications, Pvt.Ltd.
7. Bruce Alberts Molecular biology of the cell.

8. J.D. Watson, N.H. Hopkins, J.W. Roberts, J.A. Steitz and A.M. Weiner, Molecular Biology of the Gene, 5th edition, The Benjamin/Cummings Publ., Inc., California, 2004..
9. J. Darnell, H. Lodish and D. Baltimore, Molecular Cell Biology, Scientific American Books, Inc., USA, 1998.
10. Benjamin Lewin, Gene VII , Oxford University Press, U.K., 2000
11. William H Elliott and D C.Elliolt , Biochemistry & Molecular biology, Oxford University press. 2000.
12. David freifelder and G.M.Malacinik, Essentials of molecular biology 1996.
13. T.A. Brown (Ed. Molecular Biology LabFAx), Bios Scientific Publishers Ltd., Oxford, 1981
14. B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts, and J.D. Watson Molecular Biology of the Cell (2nd Edition), Garland publishing, Inc. New York, 1994.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**-**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**-**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**3**	**3**	**1**	**2**	**2**	**2**	**1**

VIR-202: MICROBIAL GENETICS AND MOLECULAR BIOLOGY(Mandatory)
(Core Theory-1I)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: II	**Credits: 4 Credits**

Course Educational Objectives:

1. To gain understanding ofprokaryotic and eukaryotic genome organization, modern concept of genes, plasmids, mobile genetic elements
2. To learn gene transfer and mapping mechanisms in bacteria, genetics of viruses and requirements and mechanism of DNA replication.
3. To attain knowledge about the mechanism of DNA damage and repair, concept of mutations and their importance, processes involved in transcription,
4. To attain knowledge about the mechanism of translation, regulation of gene expression and gene silencing mechanisms.

UNIT-I

Genetic notations, conventions and terminology

Evidences for nucleic acids as information carriers: Genomes- types, diversity in size, structure and organization in viruses, prokaryotes (nucleoid) and eukaryotes (chromosomes, ploidy, chromatin and nucleosomes); Chloroplast and mitochondrial genomes; **Genes -** The modern concept of the genes, gene structure and architecture, types of genes.

Plasmids: Detection, types, properties, purification, transfer, replication and curing, significance / importance.

Mobile genetic elements: Prokaryotes - types and structure of bacterial transposons, and molecular mechanism of transposition; Eukaryotes – types and their structure, and molecular mechanism of transposition; Exploitation of transposable elements in genetics.

UNIT-II

Gene transfer mechanisms and gene mapping in bacteria: Natural and artificial transformation; Conjugation; Transduction (generalized, abortive, specialized and cotransduction).

Genetic recombination: Requirements for recombination; Molecular models of recombination.

Genetics of viruses: Recombination in bacteriophages-T2 and fine structure of rII locus of T4 phage.

Replication of nucleic acids: Concepts and strategies / models of replication, molecular mechanisms of DNA replication in prokaryotes and eukaryotes; rolling circle replication, inhibitors of DNA replication.

UNIT-III

DNA damage and repair: Types of damage, repair mechanisms – mismatch repair, short patch repair, nucleotide / base excision repair, recombination repair and SOS system.

Transcription (RNA biosynthesis): Transcription factors (transcription activators and repressors), and machinery,types of RNA polymerases, steps involved in transcription, RNA processing, RNA editing, splicing and polyadenylation,inhibitors of transcription, RNA transport.

Translation (Protein biosynthesis) : Genetic code and its elucidation, structure and composition of prokaryotic and eukaryotic ribosomes, structural features of rRNA, mRNA and tRNAs in relation to function, steps in protein biosynthesis in prokaryotes and eukaryotes; post-translational modification of proteins and their sorting and targeting; inhibitors of protein biosynthesis.

UNIT-IV

Regulation of gene expression: An overview on levels of regulation, terminology and operon concepts, enzyme induction and repression; positive and negative regulation in *E. coli*- lac and ara operons; regulation by attenuation- trp operon; antitermination- N protein in lambda phage;Global regulatory responses- heat shock response.

Mutations: Types, causes and consequences of mutations; Mutagens and their mode of action; Isolation and analysis of bacterial / phage mutants; Importance of mutants in genetic analysis.

Gene silencing mechanisms: Transcriptional and post-transcriptional gene silencing;RNA silencing (RNA interference).

Course Outcomes: At the end of the course the student will be able to

CO1: Learn the terminology of molecular genetics, distinguish the prokaryotic and eukaryotic genome organization and describe modern concept of genes, plasmids, and mobile genetic elements.

CO2: Understand the gene transfer and mapping mechanisms in bacteria, genetics of viruses and learn about requirements and mechanism of DNA replication.

CO3: Acquire the knowledge about mechanism of DNA damage and repair, concept of mutations and their importance, requirements, and mechanism of transcription.

CO4: Understand the requirements and processes of translation, compare the levels of regulation of gene expression in prokaryotes and eukaryotesandlearn about gene silencing mechanisms.

Learning Resources and Suggested books:

1. Lewin's Gene XII (2017)Jocelyn E. Krebs Elliott S. Goldstein Stephen T. Kilpatrick
2. *Principles of Genetics*, *7th Edition* (2016)D.Peter *Snustad*, Michael J. *Simmons*. Wiley publications
3. Molecular biology 5th Edition (2015) Robert F. Weaver*McGraw-Hill*.

4. Molecular Biology of the Gene 7th Edition (2013) James D. Watson / Tania A. Baker et al. Pearson publications.
5. Molecular Genetics of Bacteria, 5th Edition (2010)Jeremy W. Dale, Simon F. Park, Wiley publications
6. Molecular biology of the cell 5th Edition (2008) Alberts A et al. Garland Publishers, New York
7. Cell and Molecular Biology (2006) De Robertis, E. D. P and E.M.F. De Robertis.Lippincott Williams and Wilkins.
8. Concepts of Genetics, Seventh edition (2007), William S. Klug & Michael R. Cummings. Darling Kindergluy.
9. Molecular Cell Biology. 6th edition (2006) Lodish, H., A. Berk, C. A. Kaiser, M. P. Scott. 6thEdn. Ploegh and Paul Matsudaria.
10. The cell (molecular approach) 4th Edition (2004) Cooper G. M Hausman R, ASM press
11. Molecular Genetics of Bacteria. 2nd Edition, (2003). By S. Snyder and W. Champness. ASM press.
12. Advanced Molecular Biology: A Concise Reference. (1998), by R.M. Twyman. Viva Books Pvt. Ltd.
13. Molecular Biology. (1995) David Freifelder, Narosa Publ. House.
14. Essentials of *Molecular Biology* (1994)George M. Malacinski and *David Freifelder.*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**-**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**2**	**2**	**2**	**3**	**3**	**1**	**2**	**1**	**1**	**-**

VIR-203A: RECOMBINANT DNA TECHNOLOGY (Optional)

(Compulsory Foundation-Theory)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and Assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: II	**Credits: 4 Credits**

Course Educational Objectives:

1.To learn the scope, importance of genetic engineering, basic steps of gene cloning and the role of enzymes, vectors, oligonucleotides, and hosts in gene manipulation.

2.To learn basic and advanced tools and techniques, approaches and strategies used in gene manipulation in prokaryotic and eukaryotic systems

3. To learnthe gene cloning strategies and learn the concepts and applications of genomics, proteomics, transcriptomics, and introduction to metagenomics,viromics.

4. To understand the strategies used for gene expression in heterologous hosts and applications/implications of genetic engineering in agriculture, medicine, industry and biology.

UNIT-1

Scope and importance of recombinant DNA technology

Tools for Recombinant DNA Technology:Gene vectors-Plasmids, bacteriophage vectors, cosmids, yeast vectors, artificial chromosomes (YACs, BACs), Ti plasmid-based vectors, baculovirus-based vectors, plant and animal virus vectors, shuttle vectors, expression vectors (prokaryotic-e.g., *E. coli* and eukaryotic-e.g., yeast)

Enzymes: DNA and RNA polymerases, Restriction endonucleases, DNA joining enzymes, nucleases and other nucleic acid modifying enzymes.

Oligonucleotides: Linkers, adaptors, homopolymer tails, primers, promoters, Ori, marker genes

Source DNA: Genomic DNA, cDNA, PCR products and chemically synthesized oligonucleotides

Cloning and expression host systems: Bacteria, yeast, insect cells, plants and animal cells.

UNIT-II

Techniques for gene manipulation: DNA sequencing-Chemical, dideoxy chain termination, primer walking, automated DNA sequencing and pyrosequencing methods.

PCR: Principle, factors affecting PCR, different types of PCR and their applications.

DNA profiling: RFLP, AFLP, RAPD and DNA finger printing and their applications.

Nucleic acid blotting and hybridization: Preparation of DNA and RNA probes, hybridization formats and applications of hybridization-based tests.

Microarray Technology:DNA microarrays and chips- principles and applications;protein microarrays and antibody microarrays.

Site directed mutagenesis and protein engineering: Different types of site-directed mutagenesis approaches for changing genes and introduction to protein engineering;Yeast two hybrid systems (protein-protein interactions)

UNIT-III

Gene cloning strategies: Construction of genomic DNA and cDNA libraries; construction of cell specific recombinant vectors, introduction of recombinant vectors into targeted cells by different approaches, screening and identification of recombinant clones.

Omics: Genomics-Mapping and sequencing genomes, functional genomics-transcriptome and gene expression profiling; **Proteomics**- proteome, tools for proteomicsand analysis of protein expression;Introduction to metagenomics, metabolomics, viromics.

Bioinformatics tools: Glossary,Biological databases-GenBank, Swiss-Prot, UniProt, EMBL, NCBI and PDB; database searching using BLAST and FASTA; Protein structure prediction

approaches, sequence analysis using multiple sequence alignment and phylogenic tree construction, primer designing for PCR.

UNIT-IV

Production of recombinant molecules in heterologous expression systems: ***Bacterial cell system***- optimization of cloned gene expression, affinity tags, fusion proteins and purification of recombinant proteins (e.g., *E. coli*-Insulin); **Yeast cellsystem** – Expression of cloned genes (e.g., *Pichia*: hepatitis B surface antigen (induction with methanol) using AOX promoter); **Insect cell system** - Overexpression of cloned genes using baculovirus based vectors (e.g., bacmid).

Plant cell system: High level expression of cloned genes using agrobacterium mediated transformation and plant virus-based vectors (e.g., CaMV),genetic modification of plants to improve agronomic traits like resistance to herbicides, pests, pathogens, drought, salt; control of fruit ripening and to improve nutritional quality and crop yields, transgenic plants as bioreactors;

Animal cell system-High level expression of cloned genes in CHO cells (Mab production) and using virus-based vectors (e.g., Adenovirus-based vector-Covishield),genetic modification of animals like mice, sheepand cow for new /improved traits like body size and milk quantity, transgenic animals as bioreactors, gene editing (CRISPER-CAS), gene knock out.

Impact of recombinant DNA technology: Applications and implications of recombinant DNA technology in biology, agriculture, medicine and industry.

Course Outcomes: At the end of the course the student will be able to

CO1: Explain the scope, importance of genetic engineering, basic steps of gene cloning and the role of enzymes, vectors, oligonucleotides, and hosts in gene manipulation.

CO2: Describe the methods used for construction of genomic and cDNA libraries, major techniques (e.g., DNA sequencing, PCR, DNA profiling, nucleic acid hybridization, microarrays, site directed mutagenesis) used in gene manipulations and their applications.

CO3: Discuss the gene cloning strategies and learn the concepts and applications of genomics, proteomics, transcriptomics, and introduction to metagenomics, viromics.

CO4: Understand the basic and advanced concepts of gene expression in prokaryotic and eukaryotic systems, analyze the applications and implications of genetic engineering.

Learning Resources and Suggested books:

1. Recombinant DNA technology (2019) Siddra Ijaz and Imran UlHaq, Cambridge Scholar publishing, UK.
2. Application of Recombinant DNA technology (2018). Vance Hunter and Franky Stickland, ED-Tech Press, UK.
3. Wilson and Walkers Principles and Techniques of Biochemistry and Molecular Biology. (2018).
   Andreas Hofmann, Samuel Clokie, Kindle Edition.
4. Basic concepts of Recombinant DNA technology (2016) by Somnath De. Edu Pedia Publications, New Delhi.
5. Genetic Engineering: Principles and Methods (2012) Jane K. Setlow (Editor)
6. From Genes to Genomes: Concepts and Applications of DNA Technology. (2011) Jeremy W. Dale, Malcolm von Schantz, Nicholas Plant.
7. Principles of Gene Manipulation and Genomics. Seventh edition (2008) S.B. Primrose and R.M .Twyman. Blackwell pub.
8. Recombinant DNA Genes and Genomes: A Short course. Third edition (2007) James D. Watson, Amy A. Caudy, Richard M. Mayes & Jan A. Witkow.
9. Gene Cloning and DNA Analysis – An Introduction. Fifth edition (2006)T.ABrown. Blackwell Pub.
10. An introduction to genetic engineering. 2nd edition. (2004) By D.S.T. Nicholl. Cambridge University Press.

11. DNA Science: A First course. Second edition (2003) David A. MicklosGrag, A. Freyer& David A, Crotty.
12. Principles of genome analysis and genomics. (2003). 3rd edition. S.B. Primrose and R.M.Twyman. Blackwell Science.
13. Prokaryotic genomics. (2003). Michel Blot (Ed). Springer International.
14. Recombinant DNA and biotechnology: A guide for Teachers: 2nd ed. H. Kreuzer and A. Massey. ASM Press.
15. Recombinant DNA and biotechnology: A guide to students: 2nd ed. H. Kreuzer and A. Massey. ASM Press.
16. Principles of Gene Manipulation: An introduction to genetic engineering. (2001). 6th ed. Old and Primrose. Blackwell Scientific Publ.
17. Functional Genomics: A Practical Approach. (2000), by S.P. Hunt and R. Liveey (eds.). Oxford University Press.
18. Genome analysis. (2000). 4 Vols. CSH Press.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**2**	**2**
CO4	**1**	**1**	**1**	**3**	**3**	**3**	**3**	**1**	**2**	**1**	**1**	**1**

(Or)

VIR-203B: BIOSTATISTICS AND BIOINFORMATICS (Optional)

(Compulsory Foundation-Theory)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and Assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: II	**Credits: 4 Credits**

Course Educational Objectives:

1. To understand basic concepts of statistics, construction of histogram, normal distribution, mean, median and standard deviation, comparison of means and variances, examples of proportion and count data
2. To learn about analysis of variance, correlation and regression and statistical parameters for biological assays.
3. To learn basics of personal computer and its components, windows operating system, Microsoft office-2000, basics of internet browsing of biological data, computer networking and information networks.

To learn basics of databases and tools, sequence analysis, phylogenetic analysis using bioinformatics tools and predictive methods using nucleotide and protein databases

UNIT-I

Introduction: Definition and applications of statistics in biology: population and universe, the sample and population, statistical inference; parameter and statistics; Construction of a histogram; Interpretation of histogram, the normal distribution; Variables, Random Variables, discrete and Continuous variables, Population sample and random sample; Mean, Mode, Quartiles, Geometric and Harmonic means; Frequency, Frequency distribution; Frequency curve, frequency polygon and histogram.

UNIT-II

Measures of dispersion: Range, Variance, coefficient of variance, SD,SE

Probability distribution: Normal, binomial and poison.

Tests of hypothesis: Students t –test,x2(chi-square)-distribution; Correlation coefficient and analysis of variance ANOVA.

Statistical basis of biological assays: Response-Dose metameter; Delusion Assays, Direct and indirect assays. Quantal Responses,Probit, logit, LD_{50}, ED_{50}, PD_{50} - Standard line interpolation assay, parallel assay (4 point, 6 point assays), slope ratio assay.

UNIT-III

Introduction of Genomic Data and Data Organization: Sequence Data Bank – Introduction to sequence data banks – protein sequence data bank,NBRF-PIR, SWISSPROT, Signal peptide data bank, Nucleic acid sequencedata bank-GenBank, EMBL, nucleotide sequence data bank, AIDS Virus sequence data bank, rRNA data bank. Structural data banks – protein Data Bank (PDB), The Cambridge Structural Database (CSD); Genome data bank – Metabolic pathway data; Microbial and Cellular Data Banks, Introduction to MSDN (Microbial Strain Data Network), Numerical Coding Systems of microbes, Hybridoma Data bank structure, Virus Information System, Cell line information system; other important Data banks in the area of Biotechnology/life sciences/ biodiversity.

Sequence analysis: Wisconsin GCG, DNASIS, DNASTAR, CLONE MANAGER packages for nucleotide sequence analysis; sequence alignment and database searching; practical aspects of multiple sequence alignment.

UNIT-IV

Phylogenetic analysis: Phylogenetic models; multiple alignment procedures (CLUSTAL, ALIGN, PHYLIP); tree building methods and trees evaluation; rooting trees, phylogenetic software.

Predictive methods for analyzing nucleic acid and protein structure and function: Detecting regulatory elements in the DNA; physical properties of proteins based on sequences, different protein structural motifs, RNA binding domains and folding classes; Transcription factors and their DNA binding; Protein structure predictions.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand basic concepts of statistics, construction of histogram, normal distribution, mean, median and standard deviation, comparison of means and variances, examples of proportion and count data.

CO2:Learn the concepts of analysis of variance, correlation and regression and applications of statistical parameters for biological assays.

CO3:Learn basics of personal computer and its components, windows operating system, Microsoft office-2000, basics of internet browsing of biological data, computer networking and information networks.

CO4:Acquire knowledge about databases and tools, sequence analysis, phylogenetic analysis using bioinformatics tools and predictive methods using nucleotide and protein databases

Learning Resources and Suggested books:

1. Biostatistics by Daniel.
2. Campbell R.C. (1974: Statistics for Biologists, Cambridge University Press, Cambridge.
3. Statistics made simple-Do it yourself on PC. 2001. By K.V.S. Sarma. Printice Hall of India Publ.
4. An introduction to Biostatistics. 1997. Third Edition. P.S.S. Sundar Rao and J. Richard, Prentice-Hall of India Pvt. Ltd., New Delhi.
5. Fundamentals of Biostatistics. 1994. First Edition. Irfan A. Khan and Atiya Khanum, Ukaaz Publications.
6. Biostatistics. 1996. First Edition. P.N. Arora and P.K. Malhan, Himalaya Publishing House.
7. Statistics for Biologists. 1980. D.J. Finney.
8. Statistics and Experimental design: An Introduction for Biologists and Biochemists. 1994. 3rd edition. G.M. Clarke. Edward Arnald Publications.
9. Statistical methods. 1967. 6th edition. Snedecor and Cochran, Oxford Press. 1967.
10. Introduction to Bioinformatics, 2001 by T.A. Attwood & D.J. Parry-Smith, Pearson Education Asia Publ.

11. Bioinformatics : Methods and Protocols, Edited by StephemMisener and Stephen A. Krawetz. 2000. Methods in Molecular Biology Series. Humana Press.
12. Bioinformatics : A Practical guide to the analysis of genes and proteins. 1998. Edited by A.D. Baxevanis and B.F.
13. Francis Ouellette. Wiley -Interscience. Computational Methods in Molecular Biology by S.L. Saizberg.
14. Computer Applications in Biotechnology. 1998. by T. Yosida. Introduction to Bioinformatics by Atwood.
15. Bioinformatics - From Nucleic Acids and Proteins to Cell Metabolism. 1995, by Schomburg and Label VCH Publ.
16. Bioinformatics : Sequence and Genome Analysis. By D.W. Mount. CSHL Press.
17. Bioinformatics : Methods and Protocols,. Ed by S.Misener and S.A. Krawetz. Humana Press, 2000.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**3**	**3**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**1**	**2**	**1**

VIR-204A: IMMUNOLOGY (Optional)

(Elective Foundation-Theory)

Course Educational Objectives:

1. To compare innate and adaptive immunity and to learn about various components of immune system,
2. To learn about antigens, antibodies, *in vitro* and *in vivo* antigen and antibody interactions and immune effector mechanisms.
3. To elucidate the mechanism of humoral and cell mediated immune responses, MHCs, hypersensitivity reactions.
4. To acquire knowledge on autoimmune and immunodeficiency disorders, transplantation and transfusion immunology and concepts and applications of conventional and modern vaccines.

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: II	**Credits: 4 Credits**

UNIT-I

History: Historical perspectives and milestones in immunology.

Cells and Organs of the Immune system: Basic features of stem cells, Hematopoiesis, Cells of the immune system-Lymphoid cells, stem cells, Mononuclear cells, Granulocytes, Mast cells, Dendritic cells; Lymphoid organs- primary and secondary lymphoid organs.

Types of immunity: Innate and adaptive immunity.

Antigens: Types, properties, immunogenicity versus antigenicity, factors influencing immunogenicity; epitopes, haptens, mitogens, super antigens.

UNIT-II

Antibodies: Types, structures and biological activities of Immunoglobulins, antigenic determinants; principle, production and applications of polyclonal and monoclonal antibodies; Introduction to recombinant antibodies and their advantages.

Antigen and antibody interactions: Affinity, Avidity, Cross reactivity; *In vivo* serological reactions- Phagocytosis, Opsonization, Neutralization; *In vitro* serological tests- Precipitation tests, Immunoelectrophoresis (AGDD, rocket), Agglutinations tests- HA & HI, latex agglutination, Enzyme linked immunosorbent assays (ELISAs), Radio immunoassay (RIA), Immunofluorescent and Immunosorbent electron microscopy.

Immune effector mechanisms: Cytokines- properties and functions; Toll-like receptors (TLRs); Complement cascade system- complement components, functions, activation pathways.

UNIT-III

Major histocompatability complex (MHC): Organization and cellular distribution of MHC molecules, HLA antigens- Class I, II, III and their functions.

Humoral immune response: Primary and secondary humoral immune responses; induction and mechanism.

Cell mediated immune response: Antigen processing and presentation, Induction and mechanism, antibody-dependent cell mediated cytotoxicity (ADCC).

Immune response: Immune mechanisms against viral, bacterial and parasitic infections.

Hypersensitivity: Type I, II, III and IV hypersensitivity reactions.

UNIT-IV

Immunopathology: Immunodeficiency disorders (congenital and acquired).

Autoimmunity: Induction, mechanisms of tissue damage in autoimmunity; Autoimmune diseases- thyroid diseases, Diabetes mellitus, Multiple sclerosis, Rheumatoid arthritis and their therapy.

Transfusion Immunology: Blood cell components, blood group systems in human, Rh typing, transfusion reactions, and diseases associated with blood transfusion – Hemolytic anemia.

Transplantation Immunology: Transplantation antigens, types of transplants, Graft versus host reactions; Immunosuppressive therapy of allograft response.

Vaccines: Conventional and modern vaccines and their applications.

Course Outcomes: At the end of the course the student will be able to

CO1: Discuss the history of immunology, types of immunity, cells and organs of immune system and types and properties of antigens.

CO2: Understand the types, structure and biological activities of antibodies, concepts of *in vivo* and *in vitro* antigen-antibody interactions and discuss the properties and functions of cytokines, Toll-like receptors and complement components and activation pathways

CO3: Describe the induction and mechanism of humoral and cell mediated immune responses, interaction between innate and adaptive immune responses through MHCs and antigen presentations and hypersensitivity reactions.

CO4: Learn about the basis of autoimmune and immunodeficiency disorders, basic of transplantation and cancer immunology, concepts, and applications of conventional and modern vaccines.

Learning Resources and Suggested books:

1. Immunology: A short course, 8th edition (2020) Coico, John Wiley & Sons, Limited
2. Immunology, 9th Edition (2020) David Male, Victoria Male, Ray Stokes Peebles, Elsevier
3. Advances in Immunology (2019) Frederick W. Alt. Elsevier
4. Applied Immunology and Biochemistry (2019) Taylor Barker, ED-Tech Press, UK.
5. Cellular and Molecular Immunology (2019), Reece Davis, ED-Tech Press, UK.
6. Immunology (2015) I. Kannan, MJP Publishers, Chennai.
7. Immunology. (2000). 4th edition. J. Kuby. W.H. Freeman and Company.
8. Immunology. (1996). 4th edition. I.Roitt, J. Brostoff and David Male. Mosby publications.
9. Fundamental Immunology. (1992). 2nd edition. R.M. Coleman, M.F. Lombard and R.E.Sicard. Wm. C. Brown Publishers.
10. Immunology. (1997). 3rd edition. R.M. Hyde. B.I. Waverly Pvt. Ltd.
11. Immunology. (1995). 4th edition. I.R. Tizard. Saunders College Publishing.
12. Immunology – The Science of self and non-self-discrimination. (1982). Jon Klein. John Wiley and Sons.
13. Immunology – An illustrated outline. (1986). David Male. Churchill Living Stone.
14. Viruses that affect immune system. (1991). H.Y. Fan, I.S.Y. Chen, N.Rosenberg and W. Sugden. American Society for Microbiology.
15. Immunobiology: The immune system in health and disease.(1994). C.A.Janeway, Jr., P.Travers. Current biology Ltd.
16. Advanced Immunology. D.M. Male *et al.,* The C.V.Mosby Co.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**-**	**1**

(OR)

VIR-204B: FOOD AND ENVIRONMENTAL BIOTECHNOLOGY (Optional)

(Elective Foundation-Theory)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: II	**Credits: 4 Credits**

Course Educational Objectives:

1. To acquire the knowledge on the role of microbes in food, neutraceuticals organic foods and functional foods
2. To learn the types of fermentation processes and to learn about Importance of microorganisms in food production; Probiotics and prebiotics Food quality assurance and food laws
3. To understand the Food quality assurance and use of biosensors, biofilters, biofuel cells
4. To learn Biosorption of heavy metals, GEMs and their products, Concept of biosafety

UNIT-I

Microbes in Food industry: Industrial production and preservation of fermented foods; Dairy products – cheeses, yogurt and acidophilus milk; yeast and yeast products: brewer's yeast, baker's yeast, bread making, enzymes used in food industry; edible mushrooms and their cultivation: oyester, Button and Paddy straw mushrooms; medical importance of mushroom products, nutraceuticals, organic foods and functional foods.

UNIT-II

Food technology: Starter culture technology- Importance of microorganisms in food production; Probiotics and prebiotics- Impact on Human health by using milk, milk products and other antiobesitymolecules from microbes, plants and animals; Food additives, food colors and

sweeteners- Quality material used in food processing (example organic acid, cellulose and cellulose derivatives); Food quality assurance and food laws- food spoiled by different microorganisms and their control measures, food quality maintained by EFSA (European food safety authority) and FDA (Food and Drug authority).

UNIT-III

Food quality assurance and food laws - Commercial blends of microorganisms and enzymes, immobilized cells and enzymes, biotechnological approaches for recovery of useful products; Microbial techniques for treatment of industrial effluents in pulp and paper, tanning and leather, distillery and dye industries – primary treatment, secondary treatment, aerobic process, treatment by bacteria and fungi and enzymatic treatment; treatment of industrial and other wastes; bio-mining and bioleaching of ores; bioremediation of oil spills; waste water treatment; removal of heavy metals, microbial degradation of pesticides and aromatic compounds; use of biosensors, biofilters, biofuel cells and biochips in industry, healthcare and environment.

UNIT-IV

Biosorption of heavy metals: Metal binding targets and organisms, metal-microbial interactions, biomethylation of elements, commercial biosorbents, metal precipitation, phytoremediation; bio-medical waste management – waste category, waste class and description,treatment and disposal systems,cost of biomedical waste management;

GEMs and their products: Construction and release of GEMs and their applications; GEMs impact on the environment.

Concept of bio-safety: Bio-safety levels, good microbiological practices, biosafety guidelines, biohazards, biological weapons, bioethical issues, general approval procedures.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the the role of microbes in food ,neutraceuticals organic foods and functional foods

CO2: Learn the Importance of microorganisms in food production; Probiotics and prebiotics Food quality assurance and food laws

CO3: Describe the Food quality assurance and use of biosensors, biofilters, biofuel cells

CO4: Learn the Biosorption of heavy metals, GEMs and their products, Concept of biosafety

Learning Resources and Suggested books / manuals:

1. Food Microbiology by William C Frazier. Tata Mgraw Hill
2. Food Microbiology by dams and Moss. Springer Verlag
3. Basic food microbiology by Banwart. Cbs Publishers & Distributors Pvt Ltd.
4. Principles of Microbiology by Ronald M. Atlas (1995), Amy Mc Cullen
5. Fundamental Principles Of Bacteriology A J Salle
6. Crueger&Crueger Biotechnology: A Text Book of Industrial microbiology 2nd edition.
7. Demain, A.L Biology of Industrial Microorganisms 3
8. Hobbs, B.C. and Rioberts,D 1993 Food Poisoning and Food Hygiene Edward Anold, London.
9. Hui Y H 2006 Food Biochemistry and Food Processing Blackwell.
10. J oshi, V.K. Ashok Pondey 1999 Biotechnology and Food fermentation Vol. I & II.
11. Patel, A.H. Industrial microbiology. Prescott and Dunn's, Industrial Microbiology 4th edution.
12. Reed, G. Industrial Microbiology, CBS Publishers
13. Microbial Technology Vol. I & II. Pepplelr&Perllman (EDS).
14. Microbial Ecology – Fundamentals and applications. Atlas and Bartha
15. Bioremediation (1994) Baker, K.H and Herson, D.S.McGraw Hill, Inc. New York
16. Biotreatment of Industrial & Hazardous Waste (1993) M.V.Levin and Gealt, M.A McGraw Hill. Inc
17. Concepts and Techniques of Geographic Information Systems (2009) C.P.Lo.Albert and K.W.Yeung 2nd.

18. Ecology and environmental biology (2011) Saha T K Books & Allied (p) Ltd edition, Prentice Hall, Inc.
19. Environment Impact Assessment (1996) Larry W. Canter McGraw-Hill Book Company
20. Environmental Audit (2002) Mhaskar A.K. Enviro Media Publications
21. Environmental Biology (2000) Varma&Agarwal S. Chand Limited 16.Environmental biotechnology(2010) RanaRastogi Publications.
22. Environmental Protection and Laws (1995) Jadhav and BhosaleV.M.Himalaya publishing House

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**1**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**1**	**2**	**1**

PRACTICAL: VIR-205A: CELL BIOLOGY AND TISSUE CULTURE&RECOMBINANT DNA TECHNOLOGY

Course Educational Objectives:

1. To learn laboratory safety practices to be followed to set up molecular biology laboratory and to set up ribonuclease free environment in the laboratory and to acquire the practical skills in conducting various experiments related to cell biology such as identification of stages of mitosis, isolation of cells, DNA and RNA from plant and animal tissues and to practice plasmid curing, replica plate and gradient plate techniques.

2. To acquire practical skills in conducting plasmid isolation, PCR, recovery of DNA, restriction enzyme digestion of DNA, transformation of bacteria with recombinant plasmid DNA, preparation of southern blots and dot-blots and to discuss the problems related to molecular biology and recombinant DNA technology and to learn the basic bioinformatics tools for DNA analysis.

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Textbooks, E-learning resources, Lab manuals	
Semester: II	**Credits: 4 Credits**

List of Practicals:

1. Preparation of cytological studies for identification of stages of mitosis using onion root tips
2. Examination of cells isolated from sheep kidney.
3. Demonstration of chromosomal (structural and numerical) aberrations (theory exercise).
4. Study of polytene chromosomes (theory exercise).
5. Preparation of sucrose density gradients (step and linear).
6. Safety practices and precautions to be followed to set up Molecular Biology lab with ribonuclease free environment (theory exercise)
7. Preparation of phenol for nucleic acid isolation (theory exercise).
8. Concentration of nucleic acids (theory exercise).
9. Isolation of plasmids from bacteria through alkaline lysis method.

10. Restriction enzyme analysis of plasmids.
11. Recovery of DNA from gels – low melting point agarose extraction of DNA
12. Transformation of bacteria with recombinant plasmid DNA
13. Southern blotting (demo).
14. Preparation of dot-blots for hybridization (demo).
15. Problems related to recombinant DNA technology.
16. Bioinformatics tools: NCBI, PDB search, BLAST-n, BLAST-p, multiple sequence alignment, phylogenetic tree construction, Bioedit, expasy tools (demo and learning exercises).

Course Outcomes: At the end of the course the student will be able to

CO1: Learn the safety practices and precautions to be followed in setting up molecular biology laboratory with ribonuclease free environment.
CO2: Isolate cells, DNA and RNA from plant and animal tissues, demonstrate mitosis, plasmid curing, replica plate and gradient plate methods.
CO3:Acquire practical skills to isolate plasmids, restriction enzyme digestion of DNA, recovey of DNA from gels, transformation of bacteria and demonstrate the southern and dot blot preparation for hybridization.
CO4: Solve the problems related to molecular biology and recombinant DNA technology and learn the basic bioinformatic tools that are important for DNA analysis.

Learning Resources and Suggested books / manuals:

1. Molecular Biology Techniques. A Classroom Laboratory Manual4th Edition. (2020). Sue Carson Heather Miller Melissa Srougi D. Scott Witherow, Academic Press.
2. Biotechnology: DNA to Protein: A laboratory project in molecular biology. (2002). T. Thiel, S. Bissen, E.M. Lyons. Tata McGraw-Hill publishing company.
3. Culture of Animal Cells: A Manual of Basic Technique. (1987). R.I. Freshney. Alan R. Liss Inc.
4. Plant tissue culture: Theory and Practice, (1996). S.S. Bhojwani and M.K. Razdan, Elsevier Pub.
5. Methods in Biotechnology. (2001). By Ignacimuthu.

6. Molecular cloning- A laboratory manual. (2001). I, II, III Vols. By Russell and Sambrook. CSH Publs.
7. Current Protocols in Molecular Biology, (2000). Ausubel et al.
8. Current Protocols in Molecular Biology, (2000). Ausbel et al.
9. Biotechnology: A Laboratory Course. (1996). 2nd ed. J.M. Becker, et al., Acad. Press.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**1**	**2**	**2**	**2**	**-**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**3**	**3**	**-**	**2**	**2**	**2**	**1**

(Or)

PRACTICAL: VIR-205B: CELL BIOLOGY AND TISSUE CULTURE & BIOSTATISTICS AND BIOINFORMATICS

Lecture: 6 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Textbooks, E-learning resources, study materials	
Semester: IV	**Credits: 4 Credits**

Course Educational Objectives:

1. To acquire the practical skills in conducting various experiments related to Cell Biology such as isolation of cells, preparation of cell and tissue cultures, isolation of mitochondria, study of chromosomes and identification of stages of mitosis in onion root tips.

2. To learn using MS Office, creating tables in MS-Word, creating database, spreadsheet and statistical graphs, sample statistics with Excel.internet, worldwide web and searching for databases, searching for research material in PubMed, use of bioinformatics tools for the analysis of DNA and to analyze the virus genome using Bio Edit.

List of Practicals:

1. Preparation of cytological studies for identification of stages of mitosis using c root tips
2. Examination of cells isolated from sheep kidney.
3. Demonstration of chromosomal (structural and numerical) aberrations (th exercise).
4. Study of polytene chromosomes (theory exercise).
5. Preparation of sucrose density gradients (step and linear).
6. Creating database & Statistical graphs in EXCEL
7. Histogram, pie, line diagram, scatter diagram, error bars
8. Simple Statistics with Excel
9. Creating and use of spread sheet to biological applications
10. Problems on mean, median and mode
11. Problems on variance, coefficient of variance, standard deviation (SD) and stan error (SE)

12. Probability distribution: Normal, binomial and poison
13. Test of hypotheses: Students t-test, X2 distribution (Chi square), correl coefficient and analysis of variance (ANOVA).
14. Use of internet, worldwide web, searching for data bases
15. Locating research material on Medline
16. Learning to use NCBI and EMBL.
17. Analysis of Viral genome sequences using programmes like Bioedit, DNAstar.
18. Searching DNA databases with FASTA and BLAST
19. Pairwise sequence alignments
20. Phylogeny & tree building
21. Protein structure prediction.

Course Outcomes: At the end of the course the student will be able to

CO1: Learn the safety practices and precautions to be followed in setting up molecular biology laboratory with ribonuclease free environment.
CO2: Isolate cells, DNA and RNA from plant and animal tissues, demonstrate mitosis, plasmid curing, replica plate and gradient plate methods.
CO3: Learn how to use MS office and create, edit tables in MS word and to develop knowledge to do simple statistics with Excel, to create statistical graphs and spread sheets in Excel for biological applications

CO4:Use internet, web tools, databases, and search engines for designing, planning, and executing biological research experiments or investigations. Analyze viral genome sequences using programs like Bio Edit and learn to use NCBI, EMBL for nucleic acid/protein analysis and phylogenetic tree construction.

Learning Resources and Suggested books / manuals:

1. Molecular biology of the cell 5th Edition (2008) Alberts A et al. Garland Publishers, New York
2. Cell and Molecular Biology (2006) De Robertis, E. D. P and E.M.F. De Robertis.Lippincott Williams and Wilkins.

3. Molecular Cell Biology.6th edition (2006) Lodish, H., A. Berk, C. A. Kaiser, M. P.Scott. 6thEdn. Ploegh and Paul Matsudaria.
4. Culture of Animal Cells: A Manual of Basic Technique. (1987). R.I. Freshney. Alan R. Liss Inc.
5. Plant tissue culture: Theory and Practice, (1996). S.S. Bhojwani and M.K. Razdan, Elsevier Pub.
6. Statistical Methods, S.P. Gupta 2. Fundamentals of mathematical statistics.
7. S.C. Gupta &Kapoor 3. Statistical methods in biological and Health Science, J.S. Milton & J.O. Tsokan
8. Primrose SB. Principles of Genome Analysis, A guide mapping and sequencing DNA from different organisms. 2nd/Edn. 1998. Blackwell Science, Oxford ISBN 0-632-04983-9.
9. Bioinformatics: Sequence and Genome Analysis by David W. Mount, Cold Spring Harbor Laboratory Press.
10. Biological Sequence Analysis : Probabilistic Models of Proteins and Nucleic Acids by Richard Durbin, Sean R. Eddy, Anders Krogh, Graeme Mitchison, Cambridge University Press.
11. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Second Edition by Andreas D. Baxevanis, B. F. Francis Ouellette, Wiley-Interscience
12. Foundations to bioinformatics – Evolution, similar macromolecular components, constancy of gene number and core proteome in closely related organisms.
13. Bioinformatics data – nucleic acid sequence, protein sequence, protein structure, genomic, proteomic and metabolomics information.
14. Bioinformatics databases – types, design, file formats, access tools with examples.
15. Bioinformatics tools and Resources – free online tools, downloadable free tools, software packages, internet.
16. Bioinformatics - From Nucleic Acids and Proteins to Cell Metabolism. 1995, by Schomburg and Label VCH Publ.
17. Bioinformatics: Sequence and Genome Analysis. By D.W. Mount. CSHL Press.
18. Bioinformatics: Methods and Protocols,. Ed by S.Misener and S.A. Krawetz. Humana Press, 2000.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**-**	**1**

PRACTICAL: VIR-206A: MICROBIAL GENETICS AND MOLECULAR BIOLOGY & IMMUNOLOGY

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Textbooks, E-learning resources, Lab manuals	
Semester: II	**Credits: 4 Credits**

Course Educational Objectives:

1. To learn laboratory safety practices to be followed to set up Cell and Molecular Biology laboratories and to set up ribonuclease free environment in the laboratories and to acquire the practical skills in conducting various experiments related to Cell Biology such as isolation and estimation of DNA and RNA from microbial, plant and animal sources and to practice Ames test, plasmid curing, replica plate and gradient plate techniques.

2.To determine the number of WBC and RBC, estimation of hemoglobin, blood group and Rh typing and to conduct theory exercises on production, purification and analysis of polyclonal antibodies and identification of primary and secondary lymphoid organsvirtuallyand to perform *in vitro* serological tests such as immune diffusion, immune-electrophoresis, ELISA and western blotting.

List of Practicals:

1. Isolation of microbial DNA.
2. Analysis of DNA by spectroscopy and AGE.
3. Isolation of microbial RNA.
4. Analysis of RNA by spectroscopy and formaldehyde denaturing gel electrophoresis.
5. Curing of plasmids.
6. Isolation of microbial mutants by gradient plate method.
7. Induction of mutations in bacteria by physical / chemical agents by replica plate method.
8. Problems related to microbial genetics and molecular biology

9. Primary and secondary lymphoid organs (Theory exercise)
10. Total counting of RBC & WBC
11. Differential count of W.B.C.
12. Hemoglobin estimation.
13. Blood typing & Rh determination.
14. Production of polyclonal antibodies- demonstration of different routes of antigen administration into rabbit (demo)
15. Single & double immunodiffusion tests
16. Radial immunodiffusion assay
17. Rocket immunoelectrophoresis
18. DAC- ELISA (indirect)
19. Dot immunobinding assay (DIBA)
20. Electroblot immunoassay (EBIA)

Course Outcomes: At the end of the course the student will be able to

CO1: Learn the safety practices and precautions to be followed in setting up Cell and Molecular Biology laboratory with ribonuclease free environment.

CO2: Isolate and estimate DNA and RNA from microbial, plant and animal tissues and demonstrate curing of plasmids, replica plating techniques, conjugation in bacteria, Ames test, induction of mutations in bacteria by physical/chemical agents, isolation of microbial mutants by gradient plate method.

CO3: Identify of primary and secondary lymphoid organs in virtual animal model and illustrate basic immunology techniques such as counting of RBC and WBC, estimation of hemoglobin, identification of the blood groups and Rh.

CO4: Demonstrate antigen-antibody interactions by conducting *in vitro* serological tests such as immunodiffusion and immune-electrophoresis, DAC-ELISA, Dot-ELISA and western blotting and apply this practical oriented knowledge in Cell Biology and

Immunology to foster employability in private industries, higher education in premier institutes

Learning Resources and Suggested books/manuals:

1. Molecular Biology of the Cell, A. Alberts, D. Bray, J. Lewis, M. Raff, K. Robertsand J.D. Watson, (Garland Publishing, New York and London).
2. Molecular Biology, A Comprehensive Introduction to Prokaryotes and Eukaryotes, D. Freifelder (Jones and Bartlett, USA).
3. Recombinant DNA, A Short Course, J.D. Watson, J. Tooze and D.T. Kurtz.(Scientific American Book, W.A. Preemon).
4. Molecular Cloning, Laboratory Manual, Maniatis, E.F. Fritsch and J. Sambrook (Cold Spring Harber Laboratory, New York).
5. Modern Genetics (2nd /Edn, 1984), A.J. Ayala and W. Castra (GoomHelns, London).
6. Techniques in Molecular Biology (1992), J. Walker and W. Castra (GeomHelns, London).
7. Practical Methods in Molecular Biology (1991), R.F. Schecleif and PC. Wensik (SpringerVerlag).
8. Genes V (1994), Benjamin Lewin (Oxford University Press).
9. Immunology: A Laboratory ManualSpiral-bound– November 1, (1994) by Myers.
10. Handbook of Immunology. G.P. Talwar, (1983), Vikas Publishing House, India.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**-**	**1**

(Or)

PRACTICAL: VIR-206B:MICROBIAL GENETICS AND MOLECULAR BIOLOGY & FOOD AND ENVIRONMENTAL BIOTECHNOLOGY

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Textbooks, E-learning resources, Lab manuals	
Semester: II	**Credits: 4 Credits**

Course Educational Objectives:

1. To learn laboratory safety practices to be followed to set up Cell and Molecular Biology laboratories and to set up ribonuclease free environment in the laboratories and to acquire the practical skills in conducting various experiments related to Cell Biology such as isolation and estimation of DNA and RNA from microbial, plant and animal sources and to practice Ames test, plasmid curing, replica plate and gradient plate techniques.
2. To analyse the quality of water, milk and food and production of bofertilisers and biopesticides and biodegradation of pesticides

List of Practicals:

1. Isolation of microbial DNA
2. Isolation of microbial RNA
3. Curing of plasmids.
4. Isolation of microbial mutants by gradient plate method.
5. Induction of mutations in bacteria by physical / chemical agents by replica plate method.
6. Problems related to microbial genetics and molecular biology.
7. Qualitative and quantitative analysis of carbohydrates and proteins in food.
8. Preparation and evaluation of cheese or fermented product.
9. Determination of fat content in milk

10. Estimation of vitamins- vitamin A, C and riboflavin.
11. Determination of aflatoxin in food.
12. Tests for pesticidal residues in food
13. Biomass estimation by different methods
14. Isolation of microbes involved in preparation of biofertilizersby biological enrichment method.
15. Production of microbial biofertilizers and biopesticides.
16. Efficacy testing for biofertilizers (nodulation test for rhizobia) and biopesticides.
17. Qualitative and quantitative estimation of biodegradation of pesticide/ insecticide/fungicide.
18. Estimation of BOD & COD
19. Testing for microbiological quality of potable water (Coli form test)
20. Microbial degradation of organic matter.
21. Testing for effect of chemical pesticides on soil microbial respiration 9. Testing for microbial biodegradation of pesticides.
22. Visiting agricultural research stations and forms.

Course Outcomes: At the end of the course the student will be able to

CO1: Learn the safety practices and precautions to be followed in setting up Cell and Molecular Biology laboratory with ribonuclease free environment.
CO2: Isolate and estimate DNA and RNA from microbial, plant and animal tissues and demonstrate curing of plasmids.replica plating techniques, conjugation in bacteria, Ames test, induction of mutations in bacteria by physical/chemical agents, isolation of microbial mutants by gradient plate method.
CO3:Learn preparation of fermented food products, analyse the quality of water, milk and food ,vitamins
CO4:Acquire the practical skills in the production of bofertilisers and biopesticides and biodegradation of pesticides

Learning Resources and Suggested books/manuals:

1. Culture of Animal Cells: A Manual of Basic Technique. (1987). R.I. Freshney. Alan R. Liss Inc.

2. Plant tissue culture: Theory and Practice, (1996). S.S. Bhojwani and M.K. Razdan, Elsevier Pub.
3. Swaminathan M.S. Dr. Hand Book of Food and Nutrition
4. Sumati R. Mudambi and M.V, Rajgopal. Fundamentals of Food and Nutrition.
5. Nutrient Requirements and Recommended Dietary Allowances for Indians. National Instituteof Nutrition, Indian Council of Medical Research, 2010
6. Aurand, L.W. and Woods, A.E. 1973. Food Chemistry. AVI, Westport 5. Birch, G.G., Cameron, A.G. and Spencer, M. 1986. Food Science, 3rd Ed. Pergamon Press,New York.
7. Fennema, O.R. Ed. 1976. Principles of Food Science: Part-I Food Chemistry. MarcelDekker,New York 7
8. Meyer, L.H. 1973. Food Chemistry. East-West Press Pvt. Ltd., New Delhi
9. Potter, N.N. 1978. Food Science. 3rd Ed. AVI, Westport
10. Fellows, P. and Ellis H. 1990. Food Processing Technology: Principles and Practice, NewYork
11. Jelen, P. 1985. Introduction to Food Processing. Prentice Hall, Reston Virginia, USA
12. Lewis, M.J. 1990. Physical Properties of Food and Food Processing Systems.Woodhead
13. Stanburry P.P. and Whitaker, A. 1984. Principles of Fermentation Technology.PergamonPress, Oxford UK 13. Rosenthal, I. 1991. Milk and Milk Products. VCH, New York
14. Joshi, V.K. and Pandey, A. Ed. 1999. Biotechnology.Food Fermentation, (2 Vol. set).Education Publ. New Delhi
15. R.A Garg: The Food Safety and Standard Act, 2006 along with Rules and regulation,(2011) Commercial Law Publisher (India) Pvt. Ltd

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**-**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**2**	**2**	**1**

VIR 207 - HUMAN VALUES AND PROFESSIONAL ETHICS-II

(Audit Theory Course-Self Study)

Self-Study	**Internal test Assessment: 100 Marks** **Seminars, quizzes and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures by experts	
Semester: II	**Non-credited course**

Course Educational Objectives:

1. To learn the concepts of value education, professional ethics and human values, structure and responsibilities of family system, research ethics, codes of ethics
2. To inculcate knowledge and exposure on safety and risk and to expose student to right attitudinal and behavioral aspects,
3. To enable the students to understand the moral values and ethics followed by medical and health care professionals and businesspeople.
4. To increase the awareness among students about environment and create attitude towards sustainable lifestyle and discuss the social ethics and ethics of media.

UNIT-I

Value Education: Definition, relevance to present day, Concept of Human Values - self introspection,Self-esteem; Family values-Components, structure and responsibilities of family, Neutralization of anger, Adjustability, Threats of family life, Status of women in family and society, Caring for needy and elderly, Time allotment for sharing ideas and concerns.

UNIT-II

Medical ethics: Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners; Code of ethics for medical and healthcare professionals; Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and

patients; Social justice in health care, human cloning, problems of abortion; Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

UNIT-III

Business ethics: Ethical standards of business-Immoral and illegal practices and their solutions; Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

UNIT-IV

Environmental ethics- Ethical theory, man and nature: Ecological crisis, pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

Social ethics: Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy; Ethics of media- Impact of Newspapers, Television, Movies and Internet.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the definition of value education, concept of human and family values, components, structure, and responsibilities of family system and acquire reflective thinking, rational skepticism.

CO2: Describe the moral responsibilities and ethical issues of medical and health care professionals, avoid unethical things, learn ethical issues raised in genetic engineering and new biological technologies.

CO3: Learn to practice ethical standards in business by understanding ethical theories and maintain work ethics to build trust between businessman and consumer and avoid unethical behavior and ethical abuse and develop scientific temper, digital literacy.

CO4: Learn to practice environmental ethics by taking responsibility to protect environment and ecosystem and understand the importance of maintenance of social ethics and ethics of media.

Learning resources and suggested books:

1. John S Mackenzie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:NewDelhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haughton.
10. Susruta Samhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. CarakaSamhita:Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, (1999).
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Textbook for Intermediate First Year Ethics and Human Values, Board of Intermediate Education-Telugu Akademi, Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin&co Jalandhar

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	2	3	1	3
CO2	3	3	3	3	2	3	2	2	2	3	1	2

CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**3**	**1**	**2**
CO4	**1**	**1**	**-**	**2**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	**1**

SEMESTER-III

VIR-301: PLANT VIROLOGY (Mandatory)

(Core Theory -I)

Lecture: 6 hours/week	**Internal test Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: III	**Credits: 4 Credits**

Course Educational Objectives: epidemiological concepts of plant viruses and plant virus management strategies to conduct biological research as well as to get employability in agricultural research stations and biotechnology industries.

1. To define/explain the various concepts related to Plant Virology such as plant virus-host interactions with respect to induction of disease and virus movement strategies,
2. To Learn the vector and non-vector modes of plant virus transmission, virus-vector relationships and molecular mechanisms involved in virus vector interactions
3. To understand the plant virus ecological and epidemiological concepts, approaches used for detection
4. To understand the plant virus control practices and to know about concepts related to conventional and transgenic virus resistance mechanisms.

UNIT-I

Virus-host interactions: Effects of virus infection on host metabolism; molecular mechanisms of plant viral pathogenesis-role of viral genes in disease induction, host proteins induced by virus infection, processes involved in disease induction, local and systemic symptoms.

Movement/transport of viruses: Cell to cell and long-distance movement, virus distribution in plants.

UNIT-II

Transmission of viruses: Non-vector – sap/mechanical, seed and pollen, graft, dodder, contact; Vector- virus vector relationships, Molecular mechanisms of virus-vector interactions, arthropods-aphids, leaf and plant hoppers, whiteflies, beetles, thrips, mealy bugs; mites, fungi, nematodes; effects of viruses on vectors, agroinfection.

Characterization and identification of viruses and virus strains: Biological, physical, molecular and immunological approaches.

UNIT-III

Virus ecology and epidemiology of virus diseases: Biological and physical factors influencing survival and spread of viruses and virus diseases; Cropping practices and virus spread; Disease gradients, disease progress curves, mono- and polycyclic diseases; Forecasting of virus diseases.

Assessment of disease incidence and yield losses: Field surveys for determination of incidence of virus diseases, Impact of viruses on crop yield, approaches for assessment of yield losses.

Detection of plant viruses: Biological, physical, chemical, immunological and molecular approaches for identification and diagnosis of plant viruses.

UNIT-IV

Management of virus diseases: Direct and indirect approaches-antiviral agents, crop cultural practices, elimination / avoidance of sources of infection, use of virus-free seeds and planting materials, production of virus-free plants by tissue culture technology, avoidance/control of vectors (chemical and non-chemical approaches),cross- protection,suppression of disease symptoms by chemicals / botanicals.

Production of virus resistant plants:Genetic resistance of plants against viruses; generation of transgenic and non-transgenic-mediated virus resistance in plants; plant quarantine and its role in virus disease control.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the induction of plant virus diseases, virus-host interactions and movement strategies.

CO2: Learn the vector and non-vector modes of plant virus transmission, virus-vector relationships and molecular mechanisms involved in virus vector interactions and the approaches used for identification and characterization of the viruses and virus strains.

CO3: Acquire the knowledge on plant virus spread and survival in nature and approaches used to detect plant viruses and diseases.

Learning resources and suggested books:

1. Molecular Plant Virology, Volume 1 (2017) Davis, Taylor & Francis Group.
2. Applied Plant Virology (2014), Calum Rae Wilson.
3. Handbook of Plant Virology (Crop Science) (2006), Jawaid Khan, Jeanne Dijkstra.
4. Plant Virology, 4th ed. 2001 by R. Hull (R.E.F. Matthews). Academic Press.
5. Plant Viruses. By M.V. Nayudu. (2008). Tata –McGraw Hill.
6. Techniques in diagnoses of Plant Viruses (Plant Pathogens-6) (2008) Govind P.Rao, Rodrigo A. Valverde & C.I. Dovas, Stadium Press.
7. Plant viruses as molecular pathogens. (2001). J. A. Khan and J. Dijkstra (Eds). CBS Publishers and distributors, New Delhi.
8. Control of Plant virus diseases by Hadidi et al (editors), (1998), American Phytopathological Society, USA.
9. Diagnosis of Plant Virus Diseases. (1993) by R.E.F. Matthews. CRC Press.
10. Plant Virus Epidemics- Monitoring, modeling and predicting outbreaks. (1986). G.D. Mc Lean, et. al., Academic Press.
11. Applied Plant Virology. (1985). D.G.A. Walkey. Heinemann Publications.
12. Symptoms of Plant Virus Diseases (1978) by L. Bos.
13. Plant Virology - The Principles. (1976) by A. Gibbs and B.D. Harrison, Edward Arnold.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**-**	**1**

VIR-302: PLANT VIRUS DISEASES(Mandatory)

(Core Theory-2)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: III	**Credits: 4 Credits**

Course Educational Objectives:

1. To understand the distribution, incidence and impact, symptoms, causal virus characteristics, diagnosis, disease cycle and management of the virus diseases associated with cereals and millets, oil seed vegetable and tuber crops.

2. To understand the distribution, incidence and impact, symptoms, causal virus characteristics, diagnosis, disease cycle and management of the virus diseases associated with vegetable and tuber crops

3.To acquire knowledge on the distribution, incidence and impact, symptoms, causal virus characteristics, diagnosis, disease cycle and management of the virus diseases associated with food legume, fruit crops.

4.To acquire knowledge on the distribution, incidence and impact, symptoms, causal virus characteristics, diagnosis, disease cycle and management of the virus diseases associated with cash, spice and beverage crops and flowering and foliage ornamentals

UNIT-I

Cereals and millets: **Rice**- Tungro, dwarf, grassy stunt, stripe, and yellow mottle;**Wheat**- soil-borne wheat mosaic, streak mosaic, spindle streak mosaic and mosaic caused by BYDV;**Barley**

and Oat – yellow dwarf, stripe mosaic and yellow mosaic;**Maize andSorghum** – sugarcane mosaic, maize streak, dwarf mosaic, stripe virus diseases.

Oil seed crops: **Groundnut** – bud necrosis, stem necrosis, mottle, stripe, rosette and clump;**Sunflower** – necrosis and mosaic;**Sesamum** – leaf curl; **Rape seed and mustard** – mosaic;**Coconut** – cadangcadangviriod disease.

UNIT – II

Vegetables: **Tomato** – leaf curl, spotted wilt, mosaic (tobamo), yellow mosaic/golden yellow mosaic, fern leaf / shoestring;**Chilli** – leaf curl, vein banding and mosaic caused by TMV, CMVandChilliveinal mottle virus (ChiVMV);**Brinjal** – mosaic caused by CMV / TMV/ PVY;**Okra** – yellow vein mosaic and leaf curl;**Onion andgarlic**– yellow dwarf mosaic, latent and iris yellow spot;**Cucurbits** – CMV, squash mosaic, leaf curl, watermelon mosaic, bud necrosis and cucumber green mottle mosaic;**Radish** – mosaic;**Carrot** – red leaf, mottley dwarf and thin leaf;**Cabbage andCauliflower**- turnip mosaic, cauliflower mosaic and turnip yellow mosaic.

Tuber crops:Potato- leaf roll, rugose mosaic, mild mosaic / latent caused PVX, PVM and PVS and potato spindle tuber viriod diseases; **Sweet potato** – chlorotic stunt and feathery mottle;**Cassava** – common, African and Indian mosaic virus diseases;**Colocasia and Cocoyam** – Feathery mottle, Babone and Alomae diseases;**Greater yam** – mosaic.

UNIT-III

Food legumes: French bean- Common mosaic, yellow/golden mosaic, leaf roll and CMV infection;**Soybean** – mosaic, dwarf and TRSV infections;**Pea -** seed-borne mosaic, enation mosaic, BYMV;**Cowpea** – yellow and severe mosaic, golden yellow mosaic, SBMV and CMV;**Chickpea** – stunt, chlorotic dwarf, CMV and AMV infections;**Pigeonpea**– sterility mosaic;**Lentil** –bean leaf roll and yellow mosaic;**Black gram / Green gram** - yellow mosaic and leaf crinkle; **Horse gram** - yellow mosaic.

Fruit crops: Banana / Plantain - bunchy top, streak, infectious chlorosis (CMV) and bract mosaic;**Citrus -** tristeza, yellow mosaic, psorosis and exocortis; **Papaya**- ring spot, leaf curl and mosaic;**Grapevine** -fern leaf and leaf roll; **Apple**– mosaic;**Pineapple -** wilt.

UNIT-IV

Cash crops: Sugarcane- mosaic, streak mosaic, Fiji disease, yellow leaf virus; **Sugarbeet -**curly top yellows, western yellows, beet mosaic, beet necrotic yellow vein;**Cotton -**yellow mosaic,leaf curl;**Kenaf**- yellow vein mosaic;**Tobacco -** mosaic and leaf curl.

Spice and beverage crops: Small cardamom – mosaic;**Large cardamom -** foorkey and chirke diseases;**Black Pepper -** stunt and yellow mottle;**Zinger** – chlorotic fleck;**Vanilla-**mosaic;**Cocoa -** swollen shoot.

Flowering and foliage ornamentals:Tulips– Flower breaking;**Rose –** mosaic;**Gladiolus–**bean yellow mosaic;**Orchids –** cymbidium mosaic and odontoglassum ring spot viruses;**Carnations -** mottle, ring spot and etched ringspot;**Chrysanthimum –**aspermy, ring mottle and stunt viroid;**Aroids –** dasheen mosaicand Konjac mosaic viruses.

Course Outcomes: At the end of the course the student will be able to

CO1: Describe the incidence and impact, symptoms, causal virus characteristics, diagnosis, disease cycle and management of the major virus diseases of cereals, millets and oil seed crops.

CO2: Learn the incidence and impact, symptoms, causal virus characteristics, diagnosis, disease cycle and management of the major virus diseases of vegetable and tuber crops.

CO3: Acquire the knowledge of incidence and impact, symptoms, causal virus characteristics, diagnosis, disease cycle and management of the major virus diseases of food legume and fruit crops.

CO4: Discuss the incidence and impact, symptoms, causal virus characteristics, diagnosis, disease cycle and management of the major virus diseases of cash, spice, beverage, flowering and foliage ornamental crops

Learning resources and suggested books:

1. Characterization, Diagnosis & Management of Plant Viruses: Industrial crops (vol.I) (Plant pathogens series-I) (2008)-Govind P.Rao, S.M. Paul Khurana & S L.Lenardan-Studium press LLC, U.S.A
2. Characterization, Diagnosis & Management of Plant Viruses: Horticultural crops (vol.2) (Plant pathogens series-2) (2008)-Govind P.Rao, Arben Myrta and Kal-Shu Ling-Studium press LLC, U.S.A
3. Characterization, Diagnosis & Management of Plant Viruses: Vegetables & Pulse crops(vol.3) (Plant pathogens series-3) (2008)-Govind P.Rao, P.Lavakumar and R.J. Holguin-Pena-Studium press LLC, U.S.A
4. Characterization, Diagnosis & Management of Plant Viruses: Grain crops & Ornamentals(vol.4) (Plant pathogens series-4) (2008)-Govind P.Rao, Claude Bragard and B S.M.Lebas-Studium press LLC, U.S.A
5. Plant pathology, Fifth edition-(2008)- GeorgenAgrios-Elsevier.
6. Techniques in diagnoses of Plant Viruses (Plant Pathogens -6)-(2008) Govind P.Rao, Rodrigo A. Valverde & C.I. Dovas, Stadium Press.
7. Viruses and Virus-Like Diseases of Major crops in Developing Countries-(2003). G Loebenstein& G. Thottappilly. Kluwer Academic Pub.
8. Viruses and Virus diseases of *Poaceae*(*Gramineae*)-(2004).H.Lapierre& P.A. Siganoret. INRA editions-France.
9. Viruses of Plants. (1996). By A.A. Brunt et al., CAB International.
10. Virology in the Tropics. (1994). N. Rishi, et al., (editors). Malhotra Publishing House.
11. Control of Plant Virus diseases by Hadidi et al., (1998). American Phytopathological Society, USA.AmericanPhytopathological Society- Monographs on disease of different crops.
12. CMI/AAB Descriptions of Plant Viruses.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**2**	**3**	**3**	**3**	**1**	**-**	**1**	**2**	**1**

VIR-303A: MOLECULAR VIROLOGY (Optional)

(GenericElective-Theory)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: III	**Credits: 4 Credits**

Course Educational Objectives:

1. To understand molecular architecture of viruses and molecular mode of inactivating agents on viruses .
2. To learn about types of viral genomes and steps involved in virus replication and expression and replication of DNA viruses.
3. To acquire knowledge about expression and replication of RNA viruses and subviral agents
4. To discuss about the regulation of viral genome expression and molecular mechanisms involved in tumor virology.

UNIT-I

Molecular architecture of viruses: Principles of virus structure- Icosahedral and helical tubes (TMV), cubic symmetry, virus structure designs and their characteristics- simple icosahedral symmetric capsids with Jelly-Roll Beta barrel sub-units (Polio, TBSV, SeMV), ds DNA (Pox virus, Adeno), dsRNA viruses (Reovirus), enveloped positive-stranded RNA viruses (tospo), T4 phage; principles of disassembly.

Molecular mode of inactivating agents on viruses: Physical agents – ionizing radiation, non-ionizing radiation, temperature (heat), ultrasonic vibration; Chemical agents – inorganic, organic solvents, ions, chelating agents, hydroxylamines, dyes.

UNIT-II

Viral genomes: Structure and diversity of viral genomes- DNA genomes- linear and circular, double and single stranded. RNA genomes- positive and negative, linear, circular, double and single stranded, mono, bi, tri and multipartite genomes.

Replication of viruses: An overview of virus replication cycles, Baltimore classification of viruses based on viral genome expression;Replication strategies, host cell functions required in virus replication, sites of replication and assembly; importance of mutants in assembly studies.

Replication of DNA viruses: Replication of dsDNA (pox, lambda), ssDNA (phi x 174, parvo).

UNIT-III

Replication of RNA Viruses: Viruses with positive sense ssRNA - Qβ, Picorna-, Toga-, Tobamo-, Poty-, and Bromoviruses; Negative and Ambisense ss RNA viruses- Orthomyxo-, Bunya- and Rhabdoviruses; dsRNA viruses- Reo- and Birnaviruses. ssRNA viruses with DNA intermediate - RSV and HIV; dsDNA viruses with RNA intermediate- CaMV, HBV.

Replication of sub-viral agents: Viroids, Hepatitis D, Sat-viruses, Sat-RNAs, DI particles, Prions.

UNIT-IV

Regulation of viral genome expression:T4, lambda phage, influenza, HIV and adenovirus;functions of virus encoded products;assembly of viruses- self-assembly from mature virion components, assembly of virus with helical structure (TMV), isometric structure (Picorna) and with complex structure (T4), enveloped viruses (Retroviruses);maturation of virus particles; Eukaryotic viruses - recombination and re-assortment, cross- and multiplicity reactivation, complementation, phenotypic mixing, ploidy, transduction of genes by retroviruses.

Tumor Virology: Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancers, metastasis, interaction of cancer cells with normal

cells, apoptosis, molecular mechanisms of tissue transformation and tumorigenesis by viruses; therapeutic interventions of uncontrolled cell growth, oncolytic viruses and mechanism.

Course Outcomes: At the end of the course the student will be able to

CO1: Acquire knowledge about principles of virus architecture and effect of physical and chemical agents on viruses.

CO2: Learn about structure and diversity of viral genomes, general concepts of replication of viruses and expression and replication of DNA viruses

CO3: Learn about expression and replication of different RNA viruses and subviral agents such as viroids, Satellite viruses, defective interfering particles and prions.

CO4: Describe the regulation of viral genome expression and concepts/molecular mechanisms of transformation of cells by tumor viruses and therapeutic interventions and oncolytic viruses.

Learning resources and suggested books:

1. Principles of Virology- Molecular biology, pathogenesis and control. (2004). S.J.Flint, L.W.Enquist,
R.M.Krug, V.R.Racaniello and A.M.Skalka.ASM press.
2. Medical Virology. (2001). 5th edition. D.O. White, F.J. Fenner. Academic Press.
3. Introduction to Modern Virology. (2001). 5th edition. Dimmock et al. Blackwell Sci.
4. Matthews' Plant Virology. (2001). 4th edition. R. Hull. Academic Press.
5. Fundamental Virology.(2001).4th Edition. Editors-in-Chief David M.Knipe, Peter.M.Howley. Lippincott.
6. Basic Virology.(1999).E.K. Wagner and M.J.Hewlett. Blackwell Science, INC.,
7. Principles of Molecular Virology. (1997).Second edition. A.J. Cann. Acad. Press.
8. Fields Virology. (1996). 3rd Edition. B.N. Fields, D.M. Knipe, P.M. Howley.
9. Virology. (1994). 3rd edition. Fraenkel Conrat, P.C. Kimbal and J.A. Levy. Printice Hall.
10. Encyclopedia of Virology. (1994). R.G. Webster and A. Granoff (9ed.). Vol. I,II and III.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**3**	**3**	**3**	**3**	**1**	**2**	**1**	**-**	**1**

(OR)

VIR-303B: TUMOR VIROLOGY(Optional)

(Generic Elective-Theory)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: III	**Credits: 4 Credits**

Course Educational Objectives:

1. To understand basic concepts and mechanism of tumors, oncogenes, tumor suppressor genes
2. To acquire knowledge on basic aspects and molecular mechanisms of carcinogenesis and viruses associated with tumors.
3. To learn about different RNA viruses causing tumors, cell transformation mechanisms, immune responses to tumors and tumor therapy strategies.
4. To learn about different DNA viruses causing tumors, cell transformation mechanisms, immune responses to tumors and tumor therapy strategies

UNIT-I

Tumor: Terminology, types of tumors, transformation andtumorogenesis, angiogenesis, differences between normal and transformed cells.

Oncogenes: Cellular/proto oncogenes, viral oncogenes; gene products and their role in cell cycle and growth regulation.

Tumor suppressor genes/antioncogenes: Discovery, characterization and their role in tumor suppression.

UNIT-II

Carcinogens and carcinogenesis: Physical, chemical and biological carcinogens and their mechanism and screening.

Chromosome abnormalities in neoplasms: Molecularmechanisms in carcinogenesis-Translocation, amplification, deletion of oncogenes and consequences.

Viruses associated with tumors: Molecular mechanisms of tissue transformation and tumorogenesis by viruses.

UNIT-III

RNA Viruses: Retroviruses causing tumors in animals and humans; viral oncogene products and their role in tumorogenesis;activation of expression of cellular genes by retroviruses; viral genetic information in transformed cells; HepatitisC virus associated with hepato cellular carcinoma.

DNA Viruses: Tumors caused by*Adeno-, Hepadna-, Herpes-, Papilloma-, Polyoma- and Poxviridae* members.

UNIT-IV

Transformation: Transformation by activation of cellular signal transduction pathways;transformation via cell cycle control pathways;other mechanisms of transformation and oncogenesis.

Tumor immunology: Cancer and Immune system, tumor specific antigens, tumors of the immune system, immune responses to tumors.

Tumor therapy: Physical (radiation), chemical and immunotherapy; inhibitors of angiogenesis; oncolytic viruses and their mechanism.

Course Outcomes: At the end of the course the student will be able to

CO1: Acquire knowledge about the basic aspects of tumors, distinguish normal and transformed cells and describe the role of oncogenes and tumor suppressor genes in causing cancers.

CO2: Understand the role and mechanism of carcinogens in inducing carcinogenesis and molecular viral mechanisms of transformation and tumorigenesis.

CO3: Describe the types of RNA and DNA viruses that are causing tumors and viral mechanisms for cell transformation.

CO4: Learn the concepts and mechanisms of transformation, tumor response to tumors and prophylactic and therapeutic interventions used for management of tumors.

Learning resources and suggested books:

1) Devita, Cancer, Principles and Practice of Oncology: (2019) Review 4 by Govindan.
2) Textbook of Medical Virology (2018)**,** by B. Mishra (Author), details, 256 pages, Publisher: CBS Publishers & Distributors Pvt Ltd, India.
3) Practical clinical oncology, 2nd edition, Edited by Louise Hanna, Tom Crosby and Fergus Macbeth, (2015) 2 edition, Cambridge University Press.
4) Field's Virology (Knipe, Fields Virology) (2013), 2 Volume Set. by David M. Knipe and Peter Howley.
5) The Cell – A molecular approach. Fourth edition (2007). G. M. Cooper & R.E. Hausman. ASM Press.
6) Cell signaling. Second edition (2005). John T. Hancock. Oxford University press.
7) Principle of Virology: Molecular Biology, pathogenesis and control of animal viruses. (2004). By S.J. Flint et al., ASM press
8) Culture of Animal Cells: A Manual of Basic Technique. (1987). R.I. Freshney. Alan R. Liss. Inc.
9) Oncogenes. 1995. 2nd Edition. By G.M. Cooper. Jones and Bartlett publishers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**3**	**3**	**3**	**3**	**1**	**2**	**1**	**1**	**-**

PRACTICAL: VIR-304A: PLANT VIROLOGY &VIRUS DISEASES AND MOLECULAR VIROLOGY

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Textbooks, E-learning resources, study materials	
Semester: III	**Credits: 4 Credits**

Course Educational Objectives:

1. To acquire practical knowledge on identification of symptoms of major viruses on economically important local crop plants, weeds and to determine effect of viruses on plant metabolism and health. To develop practical skills in identification of plant viruses using serological and molecular tests, to learn modes of plant virus transmission, and to explore local field survey for estimation of plant virus disease incidence and progress.

2. To acquire skills and technologies related to purification of viruses such as culture of viruses on propagation harvesting virus infected leaves, homogenization, clarification, concentration, further purification, final pelleting and to check the quality and quantity of the viruses. To isolate and analyze virus nucleic acids and proteins using agarose gel and polyacrylamide gel electrophoresis, respectively and to determine the effect of physical and chemical agents on inactivation of viruses.

List of Practicals:

1. Study of symptoms of local virus diseased plants through field v slides/photographs
2. Determination of virus effect on chloroplast number.
3. Determination of virus effect on cell size.
4. Observation of inclusions by light microscopy
5. Effect of virus on total carbohydrates in healthy and virus infected seeds
6. Effect of virus on total proteins in healthy and virus infected seeds
7. Effect of virus on total lipids in healthy and virus infected seeds.

8. Identification of unknown plant virus by ELISA.
9. Local field surveys and visit to local research stations.
10. Diagnosis of virus diseases (theoretical exercise).
11. Collection and identification of local insect vectors.
12. Determination of disease progress curves (field study).
13. Study of seed transmission of viruses
14. Demonstration of transmission of viruses through vegetative propagules.
15. Visiting local fields and agricultural research stations.
16. Purification of viruses by differential centrifugation.
17. Analysis of virus proteins (SDS-PAGE molecular weight determination)
18. Analysis of viral nucleic acids (AGE-molecular weight determination)
19. Isolation and analysis of dsRNA from virus infected tissues
20. Study of inactivation of viruses by various physical and chemical agents

Course Outcomes: At the end of the course the student will be able to

CO1: Identify major virus diseases of local economically important crop plants and weeds through theory exercises, local field surveys, agricultural research station visits. Determine and compare the effect of virus on cell size, chloroplast number, total carbohydrates, proteins, and lipids with healthy counterparts.

CO2: Detect unknown viruses through ELISA and PCR (theory exercise and practical) and demonstrate plant virus transmission by seed and vegetative propagules. Identify local plant virus vectors, determine virus disease incidence and progress curves through local field visits.

CO2: Acquire the skills to use the techniques involving purification of viruses such as maintenance of virus cultures on propagation hosts, check the quality and quantity of viruses using spectroscopy or transmission electron microscopy. Isolate virus coat proteins and determine its size and molecular weight through SDS-PAGE.

CO4: Isolate virus nucleic acids (dsRNA, RNA and DNA) and determine its size

and molecular weight through agarose gel electrophoresis. Determine the stability of virus by studying effect of physical and chemical agents on virus inactivation.

Recommended books / Manuals:

1. Methods in Virology, (1998) K. Marmorosch and H. Koprowski. Vol. I and II. Academic Press.
2. Diagnosis of Plant Virus Diseases, (1993). R.E.F. Matthews (ed.) CRC Press.
3. Serological Methods for detection and identification of viral and bacterial plant pathogens: A Laboratory Manual. (1990). R. Hampton et al., APS Press.
4. Methods in Plant Virology, (1984). S.A. Hill. Blackwell Publications.
5. Virology Methods Manual, 1996. B.W. J. Mahy and H.O. Kangro. Academic Press.
6. Molecular Virology: A Practical Approach. 1993. Davison and R.M. Elliot. Oxford University Press.
7. Virology - A Laboratory Manual, 1992. By Burleson, et al., Academic Press.
8. Virology Lab Fax. 1993. D.R. Harper. Bioscientific Publication. Academic PresS.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**-**	**1**

(OR)

PRACTICAL: VIR-304B: PLANT VIROLOGY & VIRUS DISEASES AND TUMOR VIROLOGY

Course Educational Objectives:

1. To acquire practical knowledge on identification of symptoms of major viruses on economically important local crop plants, weeds and to determine effect of viruses on plant metabolism and health. To develop practical skills in identification of plant viruses using serological and molecular tests, to learn modes of plant virus transmission, and to explore local field survey for estimation of plant virus disease incidence and progress.

2. To detect carcinogens and mutagens using standard tests, to observe histopathology of animal viruses associated with tumors and to detect tumor viruses by PCR. To cultivate poultry tumor viruses in cell cultures, to determine the effect of antiviral compounds on transformed cell lines, cell viability assays and to diagnose HCV and HPV using commercial point-of care kit-based tests.

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Textbooks, E-learning resources, study materials	
Semester: III	**Credits: 4 Credits**

List of practicals:

1. Study of symptoms of local virus diseased plants and through field v slides/photographs
2. Determination of virus effect on chloroplast number.
3. Determination of virus effect on cell size.
4. Observation of inclusions by light microscopy
5. Effect of virus on total carbohydrates in healthy and virus infected seeds
6. Effect of virus on total proteins in healthy and virus infected seeds
7. Effect of virus on total lipids in healthy and virus infected seeds.
8. Identification of unknown plant virus by ELISA.
9. Local field surveys and visit to local research stations.
10. Diagnosis of virus diseases (theoretical exercise).
11. Collection and identification of local insect vectors.

12. Determination of disease progress curves (field study).
13. Study of seed transmission of viruses
14. Demonstration of transmission of viruses through vegetative propagules.
15. Detection of carcinogens and mutagens using Ames test.
16. Histopathology of animal tumor viruses (specimens and slides)
17. Detection of tumor viruses using PCR
18. Observation of specimens (visiting Veterinary University and SVIMS).
19. Cell viability test
20. Cell culture and cultivation of Chicken/bird tumor viruses
21. MTT assay
22. Preventive and control measures of tumor viruses (theory exercises)

Course Outcomes: At the end of the course the student will be able to

CO1: Identify major virus diseases of local economically important crop plants and weeds through theoryexercises, local field surveys, agricultural research station visits. Determine and compare the effect of virus on cell size, chloroplast number, total carbohydrates, proteins, and lipids with healthy counterparts.

CO2:Detect unknown viruses through ELISA and PCR (theory exercise and practical) and demonstrate plant virus transmission by seed and vegetative propagules. Identify local plant virus vectors, determine virus disease incidence and progress curves through local field visits.

CO3: Acquire skills to detect carcinogens and mutagens using standard tests such as Ames test. Distinguish transformed and normal cell lines and determine the anticancer property of biologically active compounds.

CO4: Design and execute PCR and other point of care methods using commercial kits for detection of tumor viruses (HCV, HIV). Perform cultivation of poultry tumor viruses in cell cultures and acquiring the knowledge on histopathology of animal tumor viruses.

Learning resources and suggested books:

1) Methods in Virology, (1998) K. Marmorosch and H. Koprowski. Vol. I and II. Academic Press.

2) Diagnosis of Plant Virus Diseases, (1993). R.E.F. Matthews (ed.) CRC Press.
3) Serological Methods for detection and identification of viral and bacterial plant pathogens: A Laboratory Manual. (1990). R. Hampton et al., APS Press.
4) Methods in Plant Virology, (1984). S.A. Hill. Blackwell Publications.
5) Virology Methods Manual, 1996. B.W. J. Mahy and H.O. Kangro. Academic Press
6) Modern Techniques in Cytopathology (Monographs in Clinical Cytology, Vol. 25) (2020) 1st Edition, by Marilyn M. Bui (Editor), LironPantanowitz (Editor), Philippe Vielh (Series Editor), Series: Monographs in Clinical Cytology, Vol. 25, pages: 110, Publisher: S. Karger; 1 edition.
7) Medical Biochemistry, John W Baynes PhD (2018), Marek H. Dominiczak Dr Hab Med FRCPath (Author), 5th Edition, 712 pages, Publisher: Elsevier.
8) Manual of Clinical Oncology Paperback – Dec 2017, by Chmielowski (Author), 900 pges, Publisher: Wolters Kluwer India Private Limited; Eighth edition (2017), price
9) Devita et al (2011), Cancer, Principles and Practice of Oncology: Review 4 by Govindan
10) CBS Oncology entrance examination (PB 2017) by BHATIA M.S. P.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**3**	**1**	**2**
CO4	**1**	**3**	**3**	**2**	**2**	**3**	**3**	**1**	**2**	**1**	**-**	**1**

THEORY-VIR-305A: MOLECULAR TECHNIQUES (Mandatory)

(Skill Development Course)

Lecture: 3 hours/week	**Internal Marks; 10 Marks**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Theory Examination : 40 Marks**
Semester: III	**Credits: 2 Credits**

Course Educational Objectives:

1.To learn the scope, importance of virology laboratory, lab equipment and laboratory biosafety

2.To learn basic and advanced tools and techniques, approaches and strategies used in virology.

3. To learnthe advanced moleculartools used in virology and to learn the concepts and applications of genomics, proteomics, transcriptomics, and introduction to metagenomics,viromics.

4. To understand the strategies used for drug design, artificial intelegence and modern vaccinology and applications in medicine.

UNIT-I

Requirements of Virology Laboratory: GCP, GLP GCLP and GDP; Knowledge of lab organization, reporting and recording procedures; Ethics of laboratory practice, confidentiality of reports, Maintenance &Equipments of Virology Lab; Preparation of Reagents; Concept of universal precautions, biohazard, disinfection, sanitation, waste management (Handling of waste, waste segregation and management including disposal).

Laboratory bio-safety: Risk assessment and risk management, laboratory accidents, prevention, first aid; principles and methods of ensuring of quality assistance in the

laboratory; types of specimens, method of specimen collection, transport, packing and storing of samples (Blood, serum, urine and others); health education and health communication.

UNIT –II

Basic tools used in Virology: Principles and applications of microscopy, ultrafiltration, dialysis, spectroscopy, electrophoresis, ultracentrifugation, chromatography, autoradiography, western blotting, northern blotting and southern blotting and hybridization, DNA sequencing and PCR; Serological techniques -Principles and applications of virus neutralization, HA and HI tests, Dot immunobinding assay, ISEM,immunofluorescence, immunohistochemistry and ELISA.

UNIT –III

Advanced Molecular tools used in Virology: Principles and applications of real time PCR, IC-RT-PCR (Immunocapture reverse transcription PCR), LAMP (Loop-mediated isothermal amplification), fluorescence and confocal microscopy, FACS, NMR, CD, 2D and mass spectroscopy, DNA bar coding, microarrays, proteomics,Viromics; Generation of infectious clones using novel methods (e.g., potyvirus-Gibson assembly), Next generation sequencing (NGS); point of care immunodiagnostics; IoT; Artificial Intelligence; biosensors, drug design; modern vaccinology and therapeutics (drugs, interferons, antibody-based therapy); Antivirals-metal nanoparticles and antiviral compounds.

Course Outcomes: At the end of the course the student will be able to

CO1: Explain the scope, importance of virology laboratory, lab equipment and laboratory biosafety health education and health communication.

CO2: Describe the basic methods and advanced tools and techniques, approaches and strategies used in virology, and their principles and applications.

CO3: Describe the advanced molecular tools used in virology and to learn the concepts and applications of genomics, proteomics, transcriptomics, and introduction to metagenomics, viromics.

CO4: Understand the strategies used for drug design, artificial intelegence and modern vaccinology and applications in medicin

Learning resources and suggested books:

1. Virology Methods Manual. Brian W.J. Mahy (Editor), Hillar O. Kangro (Editor). Latest edition / Pub. Date: January 1996. Publisher: Elsevier Science & Technology Books.

2. Methods and Techniques in Virology. Pierre Payment, Trudel (Editor).Latest edition / Pub. Date: July 1993. Publisher: Marcel Dekker.

3. Diagnostic Virology Protocols: Methods in Molecular Medicine. John R. Stephenson (Editor), Alan Warnes Latest edition / Pub. Date: August 1998. Publisher: Humana Press.

4. Diagnostic Procedures for Viral, Rickettsial, and Chlamydial Infections. Edwin H. Lennette (Editor), David A. Lennette, Evelyne T. (Eds.) Lennette, Evelyne T. Lennette (Editor).Latest edition / Pub. Date: January 1995. Publisher: American Public Health Association Publications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**-**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**3**	**3**	**-**	**2**	**1**	**2**	**1**

PRACTICAL: VIR-305B: MOLECULAR TECHNIQUES

(Skill Development Course)

Practicals: 6 hours/week	**Semester End Examination: 50 Marks**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	
Semester: III	**Credits: 2 Credits**

Course Educational Objectives:

1. To classify laboratories based on biosafety levels, to understand biosafety, biosecurity, and ethical guidelines to handle viruses in the laboratory and to develop skills to maintain, isolate and quantitate viruses in cell lines and to study their cytopathic effects.

2. To acquire the knowledge on detection ofanimal, human and plant viruses using kit-based point of care tests, preparation, and characterization of virus-based nanoparticles

List of Practicals:

1. Good laboratory practice (GLP), Good clinical practice (GCP), good clinical laboratory practice (GCLP) and good document practices (GDP) (Theory exercises).
2. Universal safety precaution, importance of personal hygiene, disposal of organic waste, washing and cleaning of glass ware, sterilization of glassware and lab ware (Theory exercises).
3. Methods of collection of clinical material for culture-urine, blood, throat swab, faeces, body fluids.
4. Preparation of virus sample for coating onto TEM grids(demo).
5. Transmission electron microscopy (theory exercise, slides, photographs).
6. Diagnosis of SARS-CoV-2 using physical, serological and molecular tests (Theory exercise).
7. Isolation of genomic DNA/RNA from virus infected leaf sample or purified virus

8. PCR amplification of coat protein gene and analysis by agarose gel electrophoresis.
9. Preparation of plasmid, pRSET-A from *E. coli* DH5α and gel analysis.
10. Restriction digestion of vector (gel analysis) and insert with appropriate restriction enzymes
11. Vector and insert ligation.
12. Transformation in *E. coli* DH5α.
13. Plasmid isolation and confirming recombinant by PCR and RE digestion.
14. Transformation of recombinant plasmid in *E.coli* BL21 (DE3)pLys strain.
15. Induction of coat protein with IPTG and analysis on SDS-PAGE.
16. Purification of coat protein on Ni-NTA column and analysis by SDS-PAGE
17. Immunochromatographic tests (ICT) based point-of-care (PoC) tests
18. Immunoblotting/ Western blot assay.
19. Isolation of metal nanoparticles and antiviral compounds from a plant.
20. Purification and characterization of nanoparticles using ultracentrifugation, chromatography, FTIR, SEM, XRD and NMR.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the biosafety, biosecurity, and ethical guidelines to be followed in the Molecular Virology laboratory.

CO2: Learn the Methods related to collection of clinical material for culture-urine, blood, throat swab, faeces, body fluids

CO3:Acquire practical skills to isolate plasmids from bacteria, restriction enzyme digestion of recombinant plasmid DNA, recovery of DNA from gels, transformation of bacteria and demonstrate the preparation of southern and dot blots for hybridization.

CO4: PCR amplification of coat protein gene and analysis by agarose gel electrophoresis Isolation of metal nanoparticles and antiviral compounds from a plant. Purification and characterization of nanoparticles using ultracentrifugation, chromatography, FTIR, SEM, XRD and NMR.

Reference books/Manuals:

1. Concise Book On Medical Laboratory Technology, 2005 reprint, 1st Edn., C. R. Maiti, New Central Book Agency (p) Ltd, Kolkata, India.
2. Introduction of Medical Laboratory Technique,1998, 7th Edn., Baker F. J., Silverton R. E., Pallister C. J., Butterworth-Heinemann, UK.
3. Concise Book On Medical Laboratory Technology, 2005 reprint, 1st Edn., C. R. Maiti, New Central Book Agency (p) Ltd, Kolkata, India.
4. Introduction of Medical Laboratory Technique,1998, 7th Edn., Baker F. J., Silverton R. E., Pallister C. J., Butterworth-Heinemann, UK.
5. Molecular Diagnostics: For the Clinical Laboratorian / Edition 2 William B. Coleman (Editor), Gregory J. Tsongalis (Editor) Publisher: Springer-Verlag New York, LLC.
6. Buckingham and Flaw's, "Molecular Diagnostics: Fundamentals, Methods and Clinical Applications", F.A. Davis Company; First edition, 2007

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**-**	**1**

VIR-306A: BAISC VIROLOGY (Optional)

(Open Elective-Theory- Offered to students of other disciplines)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: III	**Credits: 4 Credits**

Course Educational Objectives:

1.To understand the history, properties, nomenclature and classification of viruses and development of virology and

2. To learn about methods used for isolation, cultivation, and purification of viruses.

3.To acquire knowledge about the methods used for quantitation of viruses and sub viral agents

4. To acquire knowledge about Laboratory Biosafety Management of plant, animal and human viruses

UNIT-I

Introduction to Virology: Origin, evolution and classification of viruses.

Morphology and properties of viruses: Physical- morphology and structure, Biochemical- chemical composition, nucleic acids, proteins, enzymes, lipids, carbohydrates, polyamines, cations.

Cultivation of viruses: Experimental plants and experimental animals, embryonated eggs and cell cultures.

Transmission of viruses: Vector and non-vector transmission.

UNIT-II

Replication: introduction to virus replication, steps involved in replication and general strategies.

Isolation, cultivation and maintenance of viruses: Isolation and cultivation of plant and animal viruses (experimental plants and tissue culture, experimental animals, embryonated eggs, primary and continuous cell cultures, transformed cell lines,suspension cell cultures, organ cultures).

Purification of viruses: Extraction of viruses from tissues, clarification, and concentration of viruses in clarified extracts by physical and chemical methods, further purification of viruses by rate zonal / equilibrium density gradient centrifugation, Criteria of virus purity, Quantitation and preservation of purified virus preparations.

UNIT-III

Characterization of viruses: Biological, physical, serological and molecular criteria

Virological laboratory methods: Principles and applications of electrophoresis, spectroscopy, ultracentrifugation, chromatography, microscopy, hybridization, DNA Sequencing and PCR.

Subviral agents: Biology of bacteriophages, satellite viruses, sat-RNAs, viroids and prions.

UNIT-IV

Laboratory Biosafety: Principles of laboratory bio-safety, differentiation of pathogens and containment facilities (BSL), Equipment and requirements of virological laboratory.

Virus detection methods: Biological, physical, serological and molecular methods.

Management of plant viruses: Cultural practices, control of vectors, production of virus free plants, production of transgenic plants, plant quarantine.

Management of animal and human viruses: Sanitation, vector control, vaccines, antiviral drugs and chemotherapy.

Course Outcomes: At the end of the course the student will be able to

CO1: Learn the discovery, nature, origin and evolution of viruses and the physical, biochemical, and biological properties of viruses, criteria used for nomenclature and classification of bacteria, plant and animal viruses.

CO2:Describe the methods used for isolation, cultivation, and purification of viruses and criteria of purity.

CO3: Define biological, physical, biochemical, and serological methods used for quantitation of viruses, major characteristics bacteriophages, algal and fungal viruses, subviral agents.

CO4: Understand the **Laboratory Biosafety Management of plant animal and human viruses**.

Learning resources and suggested books:

1) Devita, Cancer, Principles and Practice of Oncology: (2019) Review 4 by Govindan.
2) Textbook of Medical Virology (2018), by B.Mishra (Author), details, 256 pages, Publisher: CBS Publishers & Distributors Pvt Ltd, India.
3) Practical clinical oncology, 2nd edition, Edited by Louise Hanna, Tom Crosby and Fergus Macbeth, (2015) 2 edition, Cambridge University Press.
4) Field's Virology (Knipe, Fields Virology) (2013), 2 Volume Set. by David M. Knipe and Peter Howley.
5) The Cell – A molecular approach. Fourth edition (2007). G. M. Cooper & R.E. Hausman. ASM Press.
6) Cell signaling. Second edition (2005). John T. Hancock. Oxford University press.

7) Principle of Virology: Molecular Biology, pathogenesis and control of animal viruses. (2004). By S.J. Flint et al.. ASM press
8) Culture of Animal Cells: A Manual of Basic Technique. (1987). R.I. Freshney. Alan R. Liss. Inc.
9) Oncogenes. 1995. 2nd Edition. By G.M. Cooper. Jones and Bartlett publishers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**3**	**1**	**1**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**2**	**1**

(OR)

VIR-306B: AGRICULTURAL, ANIMAL AND HUMAN VIRUSES

(Open Elective-Theory-Offered to students of other disciplines)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: IV	**Credits: 4 Credits**

Course Educational Objectives:

1. To acquire knowledge about the origin and evolution of the viruses and properties and cultivation of viruses
2. To learn about important animal viruses and veterinary epidemiology.
3. To learn about important plant and human viruses

To learn about important plant and human virus diagnostic and management methods

UNIT-I

Introduction to Virology: Introduction to Virology, characteristics, taxonomy of animal and human viruses, morphology of viruses, transmission of viruses, replication of viruses, isolation and cultivation of viruses, CPE, virus characterization by various methods.

UNIT-II

Important plant viruses: Tobacco mosaic virus, peanut bud necrosis virus, Tomato spotted wilt virus, Tomato yellow leaf curl virus, Cucumber mosaic virus, Potato virus Y, Cauliflower mosaic virus, African cassava mosaic virus, Plum pox virus, Brome mosaic virus, Potato virus X, Chilli leaf curl virus, rice tungrovirus, Banana bunchytop virus, sugarcane mosaic virus.

UNIT-III

Veterinary epidemiology: Significance of epidemiology and risk factors, clinical presentation and diagnosis, Pathogenesis, importance of zoonosis.

Important animal viruses: Foot and Mouth Disease virus, Bluetongue virus, sheep pox virus, Peste des Petits virus of ruminants, swine fever virus, Infectious Canine distemper virus, infectious bursal disease virus, Sheep pox virus, Newcastle disease virus, Avian influenza virus.

UNIT-III

Important human viruses: Emerging and Zoonotic infections – Zika virus, Chikungunya virus, Nipah virus, Kyasanur forest disease virus, Marburg virus, Ebola virus; Gastrointestinal infections – Rotavirus, Noravirus; Respiratory infections – Influenza virus, coronaviruses, Respiratory syncytial virus; Blood borne viruses – Human Immunodeficiency virus, Hepatitis C virus; Neurological infections – Herpes Simplex virus, Japanese encephalitis virus.

UNIT-IV

Virus detection methods: Biological, physical, serological and molecular methods.

Management of plant viruses: Cultural practices, control of vectors, production of virus free plants, plant quarantine, production of transgenic plants.

Management of animal and human viruses: Sanitation, vector control, vaccines, antiviral drugs and chemotherapy.

Course Outcomes: At the end of the course the student will be able to

CO1: Describe the origin, evolution, morphology and properties of viruses, cultivation, and transmission of viruses.

CO2: Understand the history, structure, transmission, epidemiology, detection and control of important animal viruses and concepts of veterinary epidemiology.

CO3: Learn about history, structure, transmission, epidemiology, detection, and control of major viruses infecting plants and humans.

CO4: Acquire knowledge about biological, physical, serological, and molecular methodsused for detection of viruses and describe strategies followed for management of plant and animal viruses.

Learning resources and suggested books:

1. Fields Virology, 4th Ed., Vol 2 Ed by David M Knipe, and Peter M Howley Chapters: 24, 28,34, 54, 55, 67 and 68.
2. Gastroenteritis Viruses, Vol. 238. Novartis Foundation Symposium, Mary Estes, Latestedition(2001).
3. Viral Infections of the Gastrointestinal Tract, Vol. 10. Albert Z. Kapikian, Z. Kapikian A. 2nded., rev. and expanded. Latest edition / Pub.(1994).
4. Human Enterovirus Infections, Harley A. Rotbart (Editor), American Society Microbiology, (1995).
5. Viral Gastroenteritis, Edited By U. Desselberger, J. Gray. Elsevier Perspectives InMedicalVirology. Series Editor: Arie J. Zuckerman, Uk Isa K. Mushahwar. (2003).
6. Viruses and Liver Cancer. Edited by E. Tabor. Elsevier Perspectives In Medical Virology.Series Editor: Arie J. Zuckerman, Uk Isa K. Mushahwar. (2002).
7. Viruses, Cell Transformation, and Cancer. Edited by J.A. Grand. Elsevier Perspectives I
10. Medical Virology. Series Editor: Arie J. Zuckerman, Uk Isa K. Mushahwar. (2001).
11. Fields Virology, Volume 2, 4th edition, (2001).
12. Clinical Virology, Second Edition (Richmans Hayden).
13. Hepatitis Viruses (Japan medical research forum).
14. Viral Hepatitis and Liver disease, A.J. Zuckerman.
15. Viral Hepatitis Molecular Biology Diagnosis and Control, By Isa Mushahwar. Elsevier
16. Perspectives In Medical Virology. Series Editor:Arie J. Zuckerman, Isa K. Mushahwar.(2003).

    Krugman's Infectious Diseases of children By Saul Krugman.
18. Zuckerman AJ. ed. Principles and Practice of Clinical Virology.Chichester: John Wiley andSons, (1990). p. ix + 643 p.
19. World Health Organization. Global Measles and Rubella Strategic Plan: 2012-2020.--
20. Geneva: World Health Organization, (2012). p. 42 p.

21.HIV and Aids by Michael A. Palladino, David Wessner. Latest edition / 2005, Benjamin Cummings.

22.HIV Libman, Harvey J. Makadon. Royal Society of Medicine Press Ltd. (2006).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**1**	**2**
CO3	**2**	**2**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**1**	**3**	**3**	**1**	**2**	**1**	**1**	**1**

VIR-307: COMMUNICATIVE ENGLISH AND FUNDAMENTALS OF COMPUTERS

(Skill Enhancement Add-on Theory Course-Self Study)

Self-Study	**Internal Assessment: 100 Marks** **Seminars, quizzes and assignments**
Tutorial: Textbooks, E-learning resources, study materials, guest lectures by experts.	**Semester: IV** **Non-credited course**

Course Educational Objectives:

1. To learn **Oral and Aural Skills**,**Writing Skills**,**Job Skills**and **Soft Skills**
2. To enable the students to understand the **Basics of personal computer and its componentsWindows Operating System-2010 Microsoft Office-**
3. To Learn to practice **MS-Word, MS-Excel, MS-PowerPoint**
4. To increase the awareness **Introduction to InternetE-mailNetworking of Computers and overview of International and Indian networksInformation Networks**

UNIT I

Oral and Aural Skills: Sounds of English -vowels sounds and constant sounds; Word Accent and connected speech- contractions, questions tags; Listening for information; taking notes while listening to lectures (use of Dictionary, CD- ROM, audio, video for phonetics sounds, pronunciation and listening practice).

Writing Skills: Sentence writing and paragraph writing; use of linkers and appropriate vocabulary; Businessletters and E-mail (writing & etiquette); Descriptive writing (describing a person, product and process).

Job Skills: Group discussions and debates; Presentation skills –kinesis. 3. Interview skills.

Soft Skills: Interpersonal communication-verbal and nonverbal etiquette; Critical thinking; Teamwork.

UNIT II

Basics of personal computer and its components: Components of computer, Concept of programming languages; Hardware and software; Operating systems.

Windows Operating System-2010: System configuration, Simple commands to create directories and handle files.

Microsoft Office- 2017: Introduction and facilities available, shortcut bar, customizing toolbars; using common office techniques- starting an office application, Microsoft Word, Microsoft Excel, Microsoft PowerPoint; Conversion of word file to PDF, merging PDFs and editing PDF

UNIT III

MS-Word: Features of MS-Word - MS-Word Window Components - Creating, Editing, Formatting and Printing of Documents – Headers and Footers – Insert/Draw Tables, Table Auto format – Page Borders and Shading – Inserting Symbols, Shapes, Word Art, Page Numbers, Mail Merge.

MS-Excel: Overview of Excel features – Creating a new worksheet, Selecting cells, Entering and editing Text, Numbers, Inserting Rows/Columns –Changing column widths and row heights, Formulae, Referencing cells , Changing font sizes and colors, Insertion of Charts, Auto fill, Sort.

MS-PowerPoint: Features of PowerPoint – Creating a Presentation - Inserting and Deleting Slides in a Presentation – Adding Clip Art/Pictures -Inserting Other Objects, Audio, Video - Resizing and scaling of an Object – Slide Transition – Custom Animation.

UNIT IV

Introduction to Internet: Internet basics, getting onto the internet, e-mail, google drive management (Google documents, Google spread sheets, Google Slides and Google forms), drop box, file transfer protocols, gopher, the world-wide web, types of browsers (Google Chrome, Internet Explorer, Mozilla Firefox), browsing and down loading from sites; Introduction to Social Networking: Twitter, Tumblr, LinkedIn, Facebook, flickr, Skype, yahoo, YouTube, WhatsApp;Learning management systems (Microsoft teams, zoom, webEx, G-meet).

E-mail: Definition of E-mail -advantages and disadvantages –User Ids, passwords,Email addresses, domain names, mailers, message components, message composition, mail Management.

Networking of Computers and overview of International and Indian networks: Virtual Library-I: Searching MEDLINE; NCBI/PubMed; Virtual Library II: Science Citation Index, h-index, impact factor and current awareness services; Virtual Library III: Electronic Journal; International and Indian Networks- NICNET, INFLIBNET, AGRIS.

Information Networks: WWW, HTTP, HTML, URLs, EMB net, NCBI net, Virtual tourism.

Course Outcomes: At the end of the course the student will be able to

CO1: Acquire the **Oral and Aural Skills**, **Writing Skills**, **Job Skills** and **Soft Skills**
CO2: Understand the **Basics of personal computer and its components Windows Operating System-2010 Microsoft Office-**.

CO3: Learn to practice **MS-Word, MS-Excel, MS-PowerPoint**

CO4: Increase the awareness **Introduction to Internet E-mail Networking of Computers and overview of International and Indian networks Information Networks** WWW, HTTP, HTML, URLs, EMB net, NCBI net, Virtual tourism

Learning resources and suggested books:

1. English for Success Suresh Kumar, Cambridge University Press IndiaPvt.Ltd.2010.
2. Communication Skills & Soft Skills - An Integrated Approach, Dorling Kindersley, India Pvt. Ltd. 2013.
3. A. Goel, Computer Fundamentals, Pearson Education, 2010.
4. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
5. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007.
6. Elements of Computer Science, 1998. S.K. Sarkar, A.K. Gupta. S. Chand & Company (Chapters- 1,2,9,12,14).
7. Microsoft Office. 1997. Stultz. Office 2000 -The Basics and Beyond, 2000. A Lan Neibauer. Tata Mc Graw-Hill Publishing Comp. Part I, II, III, IV, V.

8. Bioinformatics : Methods and Protocols, Edited by Stephem Misener and Stephen A. Krawetz. 2000. Methods in Molecular Biology Series. Humana Press.
9. Bioinformatics : A Practical guide to the analysis of genes and proteins. 1998. Edited by A.D. Baxevanis and B.F.
10. Francis Ouellette. Wiley -Interscience. Computational Methods in Molecular Biology by S.L. Saizberg.
11. Computer Applications in Biotechnology. 1998. by T. Yosida. Introduction to Bioinformatics by Atwood.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**-**	**2**
CO3	**2**	**1**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**-**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**3**	**3**	**1**	**2**	**1**	**1**	**1**

SEMESTER-IV

VIR-401: ANIMAL AND HUMAN VIROLOGY (Mandatory)

(Core Theory-I)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: IV	**Credits: 4 Credits**

Course Educational Objectives:

1. To acquire knowledge on virus-host interactions, host innate and adaptive immune response to viruses, molecular mechanisms of viral pathogenesis,
2. To acquire knowledge on transmission of viruses, mechanism of virus, persistence, infection and spread in the body.
3. To learn the epidemiological concepts and methods of virus diseases, measures of disease occurrence, disease determinants, ecology, epidemiology
4. To learn the surveillance of virus diseases, strategies of virus maintenance in communities, basic concepts, types and patterns of disease survey, prevention, and control methods of viruses.

UNIT-I

Virus-host interactions: Definition and structure of viral receptors (polio, HIV); Cellular interactions—clathrin coated pits, lipid rafts, caveolae, endocytosis and virus uncoating mechanisms; Nuclear localization signals and nuclear pore transit, virus –cytoskeletal interactions, chaperons; Replication sites and their characterization, IRES, replicons, transport of viral proteins; Host cell 'shut off', apoptosis, necrosis, stress response, alteration of signaling pathways, cellular basis of transformation.

Influence of virus on host cells: Host specificity, resistance, interference, cytopathic effects, inclusion bodies, cellular injury associated markers, mechanism of viral persistence and latency—*in vivo* and *in vitro* models (JE, measles and HIV).

UNIT-II

Mechanism of infection and viral spread in the body (Pathogenesis): Routes of entry- skin, respiratory tract, oro-pharynx and intestinal tract, conjunctiva, genital; host specificity and tissue tropism- receptors and viral enhancers; Mechanism of virus spread in the body- epithelial, subepithelial, lymphatic, blood stream, central nervous system, respiratory and intestinal tracts, other organs.

Virus offense meets host defense: Host defense against viral infections, innate and adaptive immune response to viruses.

UNIT-III

Transmission of viruses: Vertical (Direct) transmission- contact, transplacental, transovarial, sexual, fecal-oral, respiratory; Horizontal (Indirect) transmission- aerosols, fomites, water, food; Vector- arthropod, non-arthropods; Multiple host infections- viral zoonosis.

Epidemiological concepts of Virus diseases: Definition of terms, types of epidemiological investigations; Disease occurrence **-** Measures of disease occurrence, prevalence, incidence and mapping; disease determinants; host, virus and environmental interactions; Factors affecting virus ecology and epidemiology**.**

UNIT-IV

Virus disease surveillance: Types and methods of public health and infectious virus disease surveillance, establishing surveillance system; Quarantine of viral diseases- International and national; **Surveys:** Basic concepts, types of sampling, vector monitoring.

Detection of animal and human viruses: Biological, serological and molecular approaches.

Prevention and Control of viruses: The infection control policy- aseptic techniques, cleaning and disinfection, protective clothing, isolation; Prevention- sanitation, vector control-Various control

strategies and environmental management. Control in urban settings, control at aquatic stages, adult population, personal protection, insecticide resistance mechanism and control dynamics;vaccines and immunization; Control- chemoprophylaxis, chemotherapy (antiviral drugs, Interferon therapy), efficacy of infection control.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the virus host interactions, host defense mechanisms against viruses and innate and adaptive immune responses to viruses, molecular mechanisms of viral pathogenesis with respect to polio, rotavirus, and cytomegalovirus.

CO2: Describe the various modes of vertical and horizontal transmission of animal and human viruses, zoonotic virus infections, mechanism of virus persistence, routes of entry and mechanism of virus spread in the body.

CO3: Learn about the epidemiological concepts of virus diseases, measures of disease occurrence, prevalence, and mapping, determinants of disease, factors affecting virus ecology and epidemiology of animal and human viruses.

CO4: Acquire knowledge on virus disease surveillance, strategies of virus maintenance in communities, principles of virus disease survey, methods of prevention and control of animal and human viruses.

Learning resources and suggested books:

1. Epidemiology, diagnosis and Management of Zoonoses. (2004). K.G. Narayana Sri Kuldeep Sharma Pub.
2. Medical Mirobiology.(1997). Fifteenth edition. Edited by D.Green wood, R.C.Slack and J.F.Peutherer. Churchill Lingstone.
3. Veterinary Virology. F.A. Murphy *et al.* (1999). 3rd Edition. Academic Press.
4. Medical Virology. (1994). 4th ed. D.O. White and F.Fenner. Academic Press. (chapters– 12,13 to 29).

5. Veterinary Virology. (1993). 4th ed. F. Fenner. Academic Press (Part-II).
6. Textbook of Human Virology, 2nd Edition. (1991). R.W. Belshe. Mosby yearbook.
7. Viruses of vertebrates. (1989). J.S. Porter field, Bailliere Tindals.
8.Veterinary Epidemiology. (1986). M. Thrusfield. Butter Worth Publications.
9.Methods in Environmental Virology. (1982). C.P. Gerba and S.M. Goyal. Marcel Dekker Inc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**2**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**3**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**1**	**3**	**3**	**-**	**3**	**1**	**1**	**1**

VIR-402: ANIMAL AND HUMAN VIRUS DISEASES (Mandatory)

(Core Theory-II)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: IV	**Credits: 4 Credits**

Course Educational Objectives:

1. To describe the etiology, transmission, clinical manifestations, diagnosis, prevention and control of important (+) sense ssRNA viruses infecting animals and humans.
2. To describe the etiology, transmission, clinical manifestations, diagnosis, prevention and control of important (-) sense ssRNA viruses infecting animals and humans
3. To understand the etiology, transmission, clinical manifestations, diagnosis, prevention, and control of important DNA viruses infecting animals and human
4. To learn about the prion diseases, biology, prevention, and management of major viruses of silkworm, poultry, fish and prawn, emerging and reemerging virus diseases.

Note: Emphasis should be on etiology, transmission, clinical manifestations, diagnosis, prevention and control.Virus Diseases based on genome and family.

UNIT-I

RNA Viruses:

Picornaviridae*-**Human Polio, Foot and Mouth disease;Caliciviridae*-** Norwalk virus, Swine Vesicular exanthema; ***Coronaviridae*-**Human corona virus, Avian infectious bronchitis viruses; ***Astroviridae*-**Human astroviruses; ***Matonaviridae*-**Rubella; ***Togaviridae*-** chikungunya ;***Flaviviridae*-**Yellow fever, Hepatitis C virus, Kyasanur forest disease, Dengue and Japanese

encephalitis, Bovine viral diarrhea, Hog cholera;***Reoviridae-*** Human rotavirus, Blue tongue virus, Orthoreovirus; ***Birnaviridae***-Infectious bursal disease virus.

UNIT-II

RNA Viruses:

Orthomyxoviridae-Human influenza, birdflu; ***Paramyxoviridae-*** Measles, Mumps, Canine distemper, rinderpest, peste des petits ruminants virus and Newcastle disease; ***Rhabdoviridae-*** Rabies, Vesicular stomatitis viruses; ***Filoviridae-***Marburg, Zaire and Ebola viruses; ***Bunyaviridae-*** Hantaan, Riftvalley fever; ***Arenaviridae-***Lymphocytic choriomeningitis virus; ***Retroviridae*** –Rous sarcoma virus, HIV.

UNIT-III

DNA Viruses:

Circoviridae-Chicken anemia virus; ***Parvoviridae-***Human B19 virus, Feline panleukopenia, Canine and Porcine parvoviruses; ***Poxviridae-*** Smallpox, Vaccinia, Sheeppox and Fowlpox viruses; ***Herpesviridae-*** Human herpes viruses, Varicella-Zoster, Cytomegalo, Epstein-Barr and herpes simplex viruses, Infectious Bovine rhinotrachitis; ***Papillomaviridae-***Bovine and Human papilloma viruses; ***Adenoviridae-*** Human adenoviruses causing respiratory, ocular, genitourinary and enteric infections, infectious canine hepatitis virus.

UNIT-IV

DNA Viruses:

Hepadnaviridae **-** Hepatitis-B virus; ***Asfaviridae-*** African swine fever virus; ***Iridoviridae-*** Invertebrate iridescent, Frog iridoviruses; ***Polydnaviridae-***Ichnovirus, Bracovirus; ***Polyomaviridae-*** Simian virus 40.

Prion diseases: Scrapie of sheep and goat, Bovine spongiform encephalopathy (Mad cow disease), Kuru and CJD of humans.

Major viruses of insects: Biology, prevention and management.

Major viruses of silkworm, poultry, fish and prawn: Biology, prevention and management.

Emerging and Re-emerging virus diseases: Zika, Nipha, Chikungunya, SARS Coronaviruses, Swineflu, Kyasanur forest disease virus, Marburg virus, WestNilevirus.

Course Outcomes: At the end of the course the student will be able to

CO1: Acquire the knowledge about etiology, transmission, clinical manifestations, diagnosis, prevention, and control of major RNA viruses of *Picornaviridae, Caliciviridae, Coronaviridae, Astroviridae, Matonaviridae, Togaviridae, Flaviridae, Reoviridae*and*Birnaviridae*.

CO2: Learn the etiology, transmission, clinical manifestations, diagnosis, prevention, and control of important RNA viruses of *Orthomyxoviridae, Paramyxoviridae, Rhabdoviridae, Filoviridae, Bunyaviridae, Arenaviridae* and *Retroviridae.*

CO3: Describe the etiology, transmission, clinical manifestations, diagnosis, prevention, and control of important DNA viruses of *Circoviridae, Parvoviridae, Poxviridae, Herpesviridae, Papillomaviridae* and *Adenoviridae*.

CO4: Develop the knowledge about etiology, transmission, clinical manifestations, diagnosis, prevention, and control of important DNA viruses belonging to *Hepadnaviridae, Asfaviridae, Iridoviridae, Polydnaviridae and polyomaviridae* and understand the prion diseases, biology, prevention, and management of major viruses of silkworm, poultry, fish and prawn, emerging and reemerging virus diseases.

Learning resources and suggested books:

1. Emerging and Reemerging Viral Pathogens Volume 2: Applied Virology Approaches Relatedto Human, Animal and Environmental Pathogens, Moulay Mustapha Ennaji, (2019). AcademicPress.
2. Environmental Virology and Virus Ecology, Carolyn M. Malmstrom, (2018), Academic Press.
3. Infectious Diseases, Microbiology and Virology, Luke S. P. Moore, James C. Hatcher, Cambridge Medicine, (2019).
4. Clinical Veterinary Microbiology, 2e 2nd Edition, Markey, Bryan, Leonard, Bryan Markey, Finola Leonard, Marie Archambault, Ann Cullinane, Mosby publication, (2019).

5. Veterinary Virology, Frederick A. Murphy, E. Paul J. Gibbs, Marian C. Horzinek, Michael J.Studdert, (2019),Academic Press.
6. Textbook of Medical Virology, December 14, (20180, by B. Mishra (Author), details, 256pages, Publisher: CBS Publishers & Distributors Pvt Ltd, India (2018).
7. Recent Advances in Animal Virology 1st ed. (2019) Edition, Kindle Edition, by Yashpal SinghMalik (Editor), Raj Kumar Singh (Editor), Mahendra Pal Yadav (Editor), 471 pages, Publisher: Springer; 1st ed. 2019 edition (November 14, 2019).
8. Clinical Virology. D.D. Richman *et al.,* 2nd Edition. (2002). ASM Press.
9. Bluetongue. (2007). Gaya Prasad and Meenakshi Yashpal Singh Mallik. Sri Kuldeep Sharma Pub.
10. Epidemiology, diagnosis and Management of Zoonses. (2004). K.G. Narayana Sri Kuldeep Sharma Pub.
11. Foot and mouth disease –A monograph.(2003). S.C. Adhakha Sri Kuldeep Sharma Pub.
12. Veterinary Virology. F.A. Murphy *et al.* (1999). 3rd Edition.Academic Press.
13. Principles of Virology- Molecular biology, pathogenesis and control. (2000). S.J.Flint, L.W. Enquist, R.M.Krug, V.R.Racaniello and A.M.Skalka.ASM press.
14. Medical Virology. (1994). 4th ed. D.O. White and F.Fenner.Academic Press. (chapters – 12,13 to 29).
15. Viral diseases of animal in India, (1994). S.N,Sharma and S.C. Adlakha, V.S. Bhatt Pub.
16. Textbook of Human Virology, 2nd Edition. (1991). R.W. Belshe.Mosby yearbook.
17. Viral Infections of Humans: Epidemiology and control. (1989). 3rd Edition.
18. A.S.Evans (ed). Plenum Medical Book Company.
19. Medical mirobiology.(1997). Fifteenth edition.Edited by D.Green wood, R.C.Slack and J.F.Peutherer. Churchill Lingstone
20. Medical microbiology. (1995). 22ndEdition.G.F.Brooks, J.S.Butel and S.A. Morse.Lange Medical Broks/Mc Graw-Hill.
21. Viruses of vertebrates. (1989). J.S. Porter field, Bailliere Tindals.
22. Encyclopedia of Virology. (1994). R.G. Webster and Allan Granoff. 9eds.) Vol.I, II, Academic Press.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**3**	**1**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**3**	**3**	**1**	**2**	**1**	**-**	**-**

VIR-403A: APPLIED VIROLOGY (Optional)

(Generic Elective-Theory)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: IV	**Credits: 4 Credits**

Course Educational Objectives:

1. To learn about the basic concepts, requirements and methods of plant and animal cell and tissuecultures

2.To acquire knowledge about the production and applications of recombinant DNA technology-based antibodies and vaccines to viruses, production of virus-resistant crops and virus-based biopesticides.

2. To acquire knowledge about common virus infections caused to human beings through vector and non-vector borne modes and basic principles of biosafety, biosecurity, and ethical/regulatory issues in Virology

4.To understand the concepts of using virus based genetic resources and model systems in molecular biology, phage display and therapy technologies and viruses as biological weapons.

UNIT – I

Viruses as model systems in Molecular Biology: Exploitation of viruses as model systems in understanding the replication of nucleic acids and regulation of gene expression strategies and cancer biology (SV-40, adenoviruses).

Viruses as unique genetic resources: Exploitation of viral genes / sequences in the construction of varied types of gene vectors (cloning, shuttle, expression and transcription) and their applications; virus genes as a source of novel enzymes, gene expression activators and silencers.

Exploitation of viruses as functional gene delivery/therapy systems: Retro-, adeno- and parvoviruses; Display of foreign peptides on virion surface and applications.

Viruses as biocontrol agents (viral biopesticides): Bacterial, algal, fungal and insect viruses – mass production and their application as biocontrol agents against bacterial and fungal pathogens of plants, algae and insect pests.

UNIT-II

Phage display and phage therapy: Exploitation of bacteriophages for peptide display and therapy.

Recombinant antibodies: *In vitro*production of rDNA technology-based antibodies (monoclonal antibodies and scFv) to viruses and their applications.

Modern vaccines to viruses: Designing of modern vaccines, modern vaccines—recombinant proteins, subunit vaccines, mRNA-based vaccines, VLP vaccines, DNA vaccines, peptides, immune modulators (cytokines), vaccine delivery & adjuvants, large scale manufacturing-QA/QC issues, Animal models and vaccine potency testing;extraction ofantiviral compounds from natural resources and their characterization.

UNIT-III

Public health Virology: Biology, prevention and control of common nosocomial, enteric (food and water-borne, hepatitis A & E, polio, rotaviruses), blood-borne (hepatitis B & C, HIV), contact transmitted (common cold, flu, corona) and insect-borne (Japanese encephalitis, dengue, chikungunya) viruses.

Virus resistant crops: Production of virus resistant/tolerant crops through transgenic technology by exploiting genes derived from viruses, guidelines for testing and releasing the transgenic lines in India.

Virus-based nanotechnology: Viral nanoparticles (VNPs), virus-like particles (VLPs), plant virus-derived nanoparticles (PVNs), biodistribution and pharmacokinetics, application of plant viruses as biotechnological tools in medicine, industry and agriculture.

UNIT-IV

Viruses as biological warfare, bio-crime and bioterrorism agents: Small poxvirus (variola), viral encephalitis and viral hemorrhagic fevers; HIV, viral hemorrhagic fevers (Ebola), corona virus and yellow fever virus.

Biosafety and Biosecurity: Laboratory bio-safety, Classification of bio-safety levels and risk groups, containment, Good microbiological practices, Good Laboratory practices (GLP), Disinfection, Decontamination and Sterilization procedures, solid versus liquid waste, safety rules, preparedness and response for the emergency conditions in the laboratory.

Ethics in Virology: Ethics in Virus-related research, ethical and regulatory issues in animal experiments, issues related to Good Manufacturing Practices (GMP), Importance of Intellectual Property Rights and Indian patent system.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the basic concepts, types, requirements and methodologies of plant/animal cell and tissue cultures used for cultivation of plant and animal viruses.

CO2: Learn the production of recombinant DNA technology-based antibodies and vaccines to viruses and the concepts and methods of production of virus resistant/tolerant crops and virus-based biopesticides.

CO3: Acquire knowledge about common virus infections caused to human beings through vector and non-vector borne modes and basic principles of biosafety, biosecurity, and ethical/regulatory issues in Virology and basics in Intellectual Property Rights (IPR).

CO4: Understand the utilization of viruses as viral genes/sequences as unique genetic resources, novel enzymes, gene expression activators and silencers, gene delivery systems, epitope display platforms and model systems in understanding the replication of nucleic acids and regulation of gene expression strategies and cancer biology, phage display and therapy technologies and viruses as biological weapons.

Learning resources and suggested books:

1. Techniques in diagnoses of Plant Viruses (Plant Pathogens -6)-(2008). Govind.Rao, Rodrigo A. Valverde & C.I. Dovas, Stadium Press.
2. Epidemiology, diagnosis and Management of Zoonses. (2004). K.G. Narayana Sri Kuldeep Sharma Pub.
3. Field's Virology. (2002). Vol. I, II.
4. Bailey and Scotts' Diagnostic Microbiology. 11th Edition. (2002). By B.A. Forbes et al., Mosby publisher.
5. Clinical Virology. (2002). 2nd edition. D.D.Richmanet al., ASM
6. Principles of gene manipulation. 6th edition. (2002). By S. Primrose, R. Twyman and B. Old. Blackwell Science.
7. Matthews' Plant Virology. (2001). By R. Hull. Academic Press.
8. Principles of Virology- Molecular biology, pathogenesis and control. (2000). S.J.Flint, L.W.Enquist, R.M.Krug, V.R.Racaniello and A.M. Skalka. ASM press.
9. Control of Plant Virus Diseases. By Hadidi*et al.*(Eds). APS. USA.
10. Medical Virology. (1994). 4th ed. D.O. White and F. Fenner. Academic Press.
11. Veterinary Virology. (1993). 4th ed. F. Fenner*et al.,* Academic Press (Part-II).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**1**	**2**	**3**	**2**	**1**	**2**
CO4	**1**	**1**	**2**	**-**	**1**	**3**	**3**	**1**	**2**	**1**	**2**	**1**

(OR)

VIR-403B:VIRUS-BASED BIOTECHNOLOGY (Optional)

(Generic Elective-Theory)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: IV	**Credits: 4 Credits**

Course Educational Objectives:

1. To understand the concepts and methods of plant and animal cell and tissue cultures, virus based genetic resources and model systems in molecular biology,
2. To learn about phage display and phage therapy technologies, virus-based biopesticides and viruses as biological weapons.
3. To describe the production and applications of recombinant DNA technology-based antibodies to viruses, modern vaccines to viruses, concepts, and applications of virus-based nanotechnologies

4.To acquire knowledge about the principles and methodologies of virus resistant cropsand basic principles of biosafety, biosecurity and ethics in Virology

UNIT-I

Viruses as model systems in Molecular Biology: Exploitation of viruses as model systems in understanding the replication of nucleic acids and regulation of gene expression strategies and cancer biology (SV-40, adenoviruses).

Viruses as unique genetic resources: Exploitation of viral genes / sequences in the construction of varied types of gene vectors (cloning, shuttle, expression and transcription) and their applications; virus genes as a source of novel enzymes, gene expression activators and silencers.

Exploitation of viruses as functional gene delivery/therapy systems: Retro-, adeno- and parvoviruses for gene delivery and gene therapy; Display of foreign peptides on virion surface and applications.

UNIT-II

Phage display and phage therapy: Exploitation of bacteriophages for peptide display and therapy.

Viral biopesticides: Mass production and applications of bacterial, fungal and insect viruses and their application as biocontrol agents.

Virus resistant crops: Production of virus resistant/tolerant crops through transgenic technology by exploiting virus or non-viral genes, guidelines for testing and releasing the transgenic lines in India.

Recombinant antibodies: *In vitro*production of rDNA technology-based antibodies (monoclonal antibodies, scFv) to viruses and their applications.

UNIT-III

Public health Virology: Biology, prevention and control of common nosocomial, enteric (food and water-borne, hepatitis A & E, polio, rotaviruses), blood-borne (hepatitis B & HIV), contact transmitted (common cold & corona) and insect-borne (dengue & chikungunya) viruses.

Modern vaccines to viruses: Designing of modern vaccines, modern vaccines—recombinant proteins, subunit vaccines, mRNA-based vaccines, VLP vaccines, DNA vaccines, peptides, immunomodulators (cytokines), vaccine delivery & adjuvants, large scale manufacturing-QA/QC issues, Animal models and vaccine potency testing.

Virus-based nanotechnology: Viral nanoparticles (VNPs), virus-like particles (VLPs), plant virus-derived nanoparticles (PVNs), biodistribution and pharmacokinetics, application of plant viruses as biotechnological tools in medicine, industry and agriculture.

UNIT-IV

Viruses as biological warfare, bio-crime and bioterrorism agents:Small poxvirus (Variola), viral encephalitis and viral hemorrhagic fevers, HIV, viral hemorrhagic fevers, corona, Ebola and yellow fever virus.

Biosafety and Biosecurity: Laboratory bio-safety, Classification of bio-safety levels and risk groups, containment, Good microbiological practices, Good Laboratory practices (GLP), Disinfection, Decontamination and Sterilization procedures, solid versus liquid waste, safety rules, preparedness and response for the emergency conditions in the laboratory.

Ethics in Virology: Ethics in virus-related research, ethical and regulatory issues in animal experiments, issues related to good manufacturing practices (GMP), basics in Intellectual Property Rights, Indian patenting system.

Course Outcomes: At the end of the course the student will be able

CO1: Understand the basic concepts, types and methodologies of plant / animalcell and tissue cultures and exploitation of viruses as viral genes/sequences as unique genetic resources, novel enzymes, gene expression activators and silencers, gene delivery systems, epitope display platforms and model systems in understanding the replication of nucleic acids and regulation of gene expression strategies and cancer biology.

CO2: Describe the exploitation of bacteriophages for peptide display and therapy, discuss the virus-based biopesticides and viruses as biological warfare, bio-crime and bioterrorism agents.

CO3:Learn the concepts and methods of production of recombinant DNA technology-based antibodies and vaccines to viruses and understand the principles and applications of virus-based nanoparticles (virus nanoparticles and virus-like particles, VNPs and VLPs) in biotechnology.

CO4: Describe the concepts and methods of production of virus resistant/tolerant crops and guidelines of testing and releasing the transgenic lines in India and learn about biosafety, biosecurity guidelines to be followed to conduct virus-related research and discuss the ethical and regulatory issues in virus-related research and basic concepts of IPR and Indian patenting system.

Learning resources and suggested books:

1. Zoonoses: Infectious diseases transmissible from animals to humans. 3rd Edition. (2003). H. Krauss *et al.* ASM Press.
2. Clinical Virology. (2002). 2nd edition. D.D.Richman*et al.,* ASM
3. Matthews' Plant Virology. (2001). By R. Hull. Academic Press.
4. Control of Plant Virus Diseases. By Hadidi*et al.*(Eds). APS. USA.
5. Field's Virology. (2002). Vol. I, II.
6. Bailey and Scotts' Diagnostic Microbiology. 11th Edition. (2002). By B.A. Forbes et al., Mosby publisher.
7. Principles of gene manipulation. 6th edition. (2002). By S. Primrose, R. Twyman and B. Old. Blackwell Science. .
8. Principles of Virology- Molecular biology, pathogenesis and control. (2000). S.J.Flint, L.W.Enquist, R.M.Krug, V.R.Racaniello and A.M. Skalka. ASM press.
9. Medical Virology. (1994). 4th ed. D.O. White and F. Fenner. Academic Press.
10. Veterinary Virology. (1993). 4th ed. F. Fenner*et al.,* Academic Press (Part-II).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**2**	**3**	**2**	**1**	**-**
CO4	**1**	**1**	**1**	**-**	**1**	**3**	**3**	**1**	**3**	**1**	**1**	**1**

PRACTICAL:VIR-404A: ANIMAL AND HUMAN VIROLOGY & VIRUS DISEASES AND APPLIED VIROLOGY

Practical: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Textbooks, E-learning resources, study materials	
Semester: IV	**Credits: 4 Credits**

Course Educational Objectives:

1. To understand biosafety, biosecurity and ethical guidelines to handle viruses in the laboratory and to develop skills to maintain, isolate and quantitate viruses in cell lines and to study their cytopathic effects. To acquire the knowledge on detection of animal, human and plant viruses using kit-based point of care tests, preparation and characterization of virus-based nanoparticles and to participate in extension activities and field, poultry, agriculture research station and aqua form visits.

2.To acquire skills in cultivation of plant, animal and human viruses in plant/animal cell/tissue cultures/embryonated eggs, their isolation, quantification and to understand the role of NPV as biopesticide, purification of virus-based nanoparticles using differential centrifugation. To develop skills to detect the plant, animal and human viruses using serological and molecular detection tests and to participate in extension and field activities to understand the virus epidemiology.

List of Experiments:

1. Classification of laboratories
2. Preparation of glassware for cell cultures
3. Preparation of buffers and media
4. Collection, filtration and preservation of calf serum.
5. Culturing of Sheep kidney cells
6. Culturing of Chicken embryo fibroblast cells.
7. Sub-culturing of Sheep kidney cells.
8. Inoculation of virus into sheep kidney cell cultures.
9. Chicken embryo inoculation techniques.
10. Study of pathogenic lesions of animal virus diseases through slides.

11. Serodiagnosis of virus infections (HBV and HCV)of humans using kits.
12. Participation in vaccination programs (extension activity).
13. Application of NPV and its role as biopesticide.
14. Isolation and analysis of human rotavirus genome
15. Participation in vaccination programs (extension activity).
16. Diagnosis of PRSV using ELISA.
17. Visits to local sericulture, poultry, fish and prawn farms.
18. Biosafety guidelines (Theory exercise)

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the biosafety, biosecurity and ethical guidelines to be followed in the molecular virology laboratory.

CO2: Learn the technologies related to preparation of media for cell/tissue cultures, preparation of cell cultures/embryonated eggs for virus cultivation and isolation and quantitation of viruses using differential centrifugation and symptomatology/spectroscopy, respectively.

CO3: Develop skills to test the animal, human and plant viruses using serological and molecular tests and kit-based methods.

CO4:Acquire knowledge on virus-based nanotechnology protocols, virus epidemiology by doing extension activities and visiting field, poultry, agriculture research station and aqua forms.

Course Outcomes: At the end of the course the student will be able to

CO1: Acquire the skills to prepare the cell cultures and embryonated eggs for cultivation of plant, animal and human viruses and to isolate and quantitate viruses.

CO2: Learn the methods to detect plant and animal viruses and able toanalyze various types of results obtained from serological and molecular viral diagnostic methods.

CO3: Apply the skills acquired to prepare NPV as biopesticides and virus-based nanoparticles and their isolation using analytical methods.

CO4: Participate in extension activities and field, poultry, agriculture research station and aqua form visits.

Suggested books / Manuals:

1. Diagnostic Microbiology. 11th Edition. (2002). By B.A. Forbes et al., Mosby publisher.
2. Culture of Animal Cells: A Manual of Basic Technique. (1987). R.I. Freshney. Alan R. Liss. Inc.
3. Virology - A Practical Approach. (1985). D.W.J. Mahy. IRL Press.
4. Virology - A Laboratory Manual. (1992). F.G. Gurleson et al., Academic Press, Inc.
5. Molecular: A Practical Approach. (1993). Edited by A. J. Davson and R.M. Elliott. IRL Press.
6. Evidence-Based Diagnosis: An Introduction to Clinical Epidemiology 2nd Edition,by Thomas B. Newman (Author), Michael A. Kohn (Author), 405 pages,Publisher: Cambridge University Press; 2 edition (June 30, 2020).
7. Guide to Clinical and Diagnostic Virology (ASM Books) 1st Edition, by ReetiKhare (Author), Publisher: ASM Press; 1 edition (March 19, 2019), 460 pages,Publisher: ASM Press; 1 edition (March 19, 2019).
8. Viruses: Molecular biology, host interactions, and applications to biotechnology. 2018. Paula Tennant, Gustavo Femin and Jerome E Foster. Academic Press.
9. Molecular and Cellular biology of viruses. 2019. Phoebe Lostroh, ISBN 9780815345237.
10. Techniques in diagnoses of Plant Viruses (Plant Pathogens -6)-(2008). Govind.Rao, Rodrigo A. Valverde & C.I. Dovas, Stadium Press.
11. Epidemiology, diagnosis and Management of Zoonses. (2004). K.G. Narayana Sri Kuldeep Sharma Pub.
12. Field's Virology. (2002). Vol. I, II.
13. Bailey and Scotts' Diagnostic Microbiology. 11th Edition. (2002). By B.A. Forbes et al., Mosby publisher.
14. Clinical Virology. (2002). 2nd edition. D.D. Richman et al., ASM
15. Principles of gene manipulation. 6th edition. (2002). By S. Primrose, R. Twyman and B. Old. Blackwell Science.
16. Matthews' Plant Virology. (2001). By R. Hull. Academic Press.
17. Principles of Virology- Molecular biology, pathogenesis, and control. (2000). S.J.Flint, L.W. Enquist, R.M. Krug, V.R. Racaniello and A.M. Skalka. ASM press.

18. Control of Plant Virus Diseases. By Hadidi*et al.* (Eds). APS. USA.

19. Medical Virology. (1994). 4th ed. D.O. White and F. Fenner. Academic Press.

20. Veterinary Virology. (1993). 4th ed. F. Fenner*et al.,* Academic Press (Part-II).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**1**	**-**

(OR)

PRACTICAL: VIR-404B: ANIMAL AND HUMAN VIROLOGY &VIRUS DISEASES AND VIRUS BASED BIOTECHNOLOGY

Practicals: 9 hours/week	**Semester End Examination: 100 Marks**
Tutorial: Textbooks, E-learning resources, study materials	
Semester: IV	**Credits: 4 Credits**

Course Educational Objectives:

1. To understand biosafety, biosecurity and ethical guidelines to handle viruses in the laboratory and to develop skills to maintain, isolate and quantitate viruses in cell lines and to study their cytopathic effects. To acquire the knowledge on detection of animal, human and plant viruses using kit-based point of care tests, preparation and characterization of virus-based nanoparticles and to participate in extension activities and field, poultry, agriculture research station and aqua form visits.

2.To acquire skills in cultivation of plant, animal and human viruses and their isolation and quantification and to isolate and characterize virus-based nanoparticles for the virus-based nanobiotechnology applications. To develop skills to detect the plant, animal and human viruses using serological and molecular detection tests and to participate in extension and field activities to understand the virus epidemiology.

List of Experiments:

1. Classification of laboratories
2. Preparation of glassware for cell cultures
3. Preparation of buffers and media
4. Collection, filtration and preservation of calf serum.
5. Culturing of Sheep kidney cells
6. Culturing of Chicken embryo fibroblast cells.
7. Sub-culturing of Sheep kidney cells.
8. Inoculation of virus into sheep kidney cell cultures.
9. Chicken embryo inoculation techniques.

10. Study of pathogenic lesions of animal virus diseases through slides.
11. Serodiagnosis of virus infections (HBV and HCV) of humans using kits.
12. Participation in vaccination programs (extension activity).
13. Application of NPV and its role as biopesticide.
14. Purification of virus-based nanoparticles using differential centrifugation.
15. Characterization of virus-based nanoparticles.
16. Diagnosis of a plant virus using ELISA.
17. Visits to local sericulture, poultry, fish and prawn farms.
18. Biosafety guidelines (Theory exercise)

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the biosafety, biosecurity and ethical guidelines to be followed in the molecular virology laboratory.

CO2: Learn the technologies related to preparation of media for cell/tissue cultures, preparation of cell cultures/embryonated eggs for virus cultivation and isolation and quantitation of viruses using differential centrifugation and symptomatology/spectroscopy, respectively.

CO3: Develop skills to test the animal, human and plant viruses using serological and molecular tests and kit-based methods.

CO4:Acquire knowledge on virus-based nanotechnology protocols, virus epidemiology by doing extension activities and visiting field, poultry, agriculture research station and aqua forms.

Suggested Books / Manuals:

21. Diagnostic Microbiology. 11th Edition. (2002). By B.A. Forbes et al., Mosby publisher.
22. Culture of Animal Cells: A Manual of Basic Technique. (1987). R.I. Freshney. Alan R. Liss. Inc.
23. Virology - A Practical Approach. (1985). D.W.J. Mahy. IRL Press.
24. Virology - A Laboratory Manual. (1992). F.G. Gurleson et al., Academic Press, Inc.

25. Molecular: A Practical Approach. (1993). Edited by A. J. Davson and R.M. Elliott. IRL Press.
26. Evidence-Based Diagnosis: An Introduction to Clinical Epidemiology 2nd Edition,by Thomas B. Newman (Author), Michael A. Kohn (Author), 405 pages,Publisher: Cambridge University Press; 2 edition (June 30, 2020).
27. Guide to Clinical and Diagnostic Virology (ASM Books) 1st Edition, by ReetiKhare (Author), Publisher: ASM Press; 1 edition (March 19, 2019), 460 pages,Publisher: ASM Press; 1 edition (March 19, 2019).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**2**	**2**	**3**	**1**	**-**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**1**	**1**

THEORY-VIR-405A: INDUSTRIAL BIOTECHNOLOGY

(Multidisciplinary Course)

Lecture: 6 hours/week	**Internal Assessment: 10 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint presentations by guest lecturers.	**Semester End Examination: 40 Marks**
Semester: IV	**Credits: 2 Credits**

Course Educational Objectives:

1. To acquire the knowledge on cultivation of industrially important organisms **Strain improvement methods**and bioreactors
2. To learn the types of fermentation processes and to learn about important **Bioprocess control measurements**
3. To understand the Downstream processing and its industrial applications
4. To learn industrial production of enzymes, beverages, alchol and single cell proteins

Unit-I

Selection of Microorganisms: Isolation, screening, Preservation and maintenance of industrially important microorganisms; types and source of media for industrial fermentation; buffers-precursors and metabolic regulators and oxygen requirement; Air and Media Sterilization.

Strain improvement methods: Conventional and rDNA methods**.**

Bioreactors: Basic principles of design and construction of Bioreactor; Types and working principles of specialized bioreactors.

Unit-II

Fermentation and its types: Solid state and submerged fermentations; Analysis of batch, fed-batch and continuous fermentations, aerobic and anaerobic fermentation, chemostat fermentation.

Bioprocess control measurements: Physical and chemical measurements and control of bioprocess parameters; Methods for off-line and on-line monitoring of bioreactors; Bioprocess modeling and simulation.

UNIT – III

Down Stream Processing: Cell disruption methods; biomass separation, extraction and purification methods; Quality assurance techniques and its importance in marketing.

UNIT – IV

Applications of Industrial Biotechnology: Industrial production of alcohol (ethanol), alcohol beverages (beer), acids (citric acid), solvents (glycerol), antibiotics (penicillin,), amino acids (lysine), enzymes (amylases), vitamins($B_{12.}$) and their applications; Role of enzymes; Single cell protein.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the cultivation of industrially important organisms **Strain improvement methods** and bioreactors

CO2: Learn the basic concepts of the types of fermentation processes and to learn about important **Bioprocess control measurements**

CO3: Describe the Downstream processing and its industrial applications, Quality assurance techniques and its importance in marketing.

CO4: Learn the industrial production of enzymes, beverages, alchol and single cell proteins

Learning resources and suggested Books:

1. Crueger & Crueger Biotechnology: A Text Book of Industrial microbiology 2nd edition
2. Demain, A.L Biology of Industrial Microorganisms
3. Hobbs, B.C. and Rioberts, D 1993 Food Poisoning and Food Hygiene Edward Anold, London.
4. Hui Y H 2006 Food Biochemistry and Food Processing Blackwell
5. Joshi, V.K. Ashok Pondey 1999 Biotechnology and Food fermentation Vol. I & II.
6. Patel, A.H. Industrial microbiology
7. Prescott and Dunn's, Industrial Microbiology 4th edution.
8. Reed, G. Industrial Microbiology, CBS Publishers.
9. Microbial Technology Vol. I & II. Pepplelr & Perllman (EDS).
10. Microbial Ecology – Fundamentals and applications. Atlas and Bartha.
11. Stanbury and Whittaker – Principles of Sterilization techniques, First Indian reprint Edition (1997). Aditya Book (P) Ltd. New Delhi
12. Michael J. Waites - Industrial microbiology: an introduction 7th Edition; Wiley-Blackwell 2008.
13. Damien and Devies – Microbial Technology Edition (1994).
14. LE Casida – Industrial Microbiology Edition (1994)
15. H Patel – Industrial Microbiology 4th Edition (2003). 7. KS Bilgrami and AK Pandey – Introduction to Biotechnology Edition 2nd (1998).
16. U Satayanarayan – Biotechnology, First Edition (2005) Books and Allied (P) Ltd. Kolkata.

17. Baily JE and Ollis DF., Biochemical Engineering fundamentals, 2nd Edition, McGraw-Hill Book Co., New York, 1986.
18. Mansi EMTEL, Bryle CFA. Fermentation Microbiology and Biotechnology, 2nd Edition, Taylor & Francis Ltd, UK, 2007.
19. Shara L. Aranoff, Daniel R. Pearson, Deanna Tanner Okun, Irving A. Williamson, Dean A. Pinkert – Industrial Biotechnology; Nova Science 2009.
20. Comprehensive Biotechnology. Volumes 1, 2, 3 & 4.Moo-Young M., Pergamon Press, 2011.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**3**	**2**	**1**	**1**
CO3	**2**	**2**	**2**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**1**	**1**

PRACTICAL-VIR-405B: INDUSTRIAL BIOTECHNOLOGY

(Multidisciplinary course)

Practical: 6 hours/week	**Semester End Theory Examination : 40 Marks**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	
Semester: IV	**Credits: 2 Credits**

Course Educational Objectives:

1. To learn and to practice variousmethods used for isolation, cultivation, and screening of the industrially important microorganisms from different sources for the production of enzymes and organic acids.

2. To demonstrate the practical skills in Quality testing of milk, qualntitative analysis of lactic acid and visit to small scale industries

List of Practicals

1. Isolation of microorganism from soil and industrial effluents

2. Screening of industrially important Microorganisms (Bacteria and fungi)

3. Production of Citric acid from *Aspergillus niger*

4. Screening of amylase producing microorganisms

5. Screening of cellulase producing fungi from soil

6. Cellulase production from fungi through submerged fermentation

7. Assay of Cellulase (FPase) by DNS method

8. Production of wine from grapes

9. Production of alcohol by fermentation and Estimation by colorimetry method

10. Quality testing of milk by methyline Blue Reduction Test (MBRT)

11. Effect of heavy metals on bacteria

12. Estimation of lactic acid from curd

13. Visit to small scale Bioprocessing industries

Course Outcomes: At the end of the course the student will be able to

CO1: Acquire the practical skills to use in cultivation, and screening of the industrially important microorganisms from different sources for the production of enzymes and organic acids.

CO2: Acquire the practical skills to use cultivation, and screening of the industrially important microorganisms from different sources for the production of wine and alcohol.

CO3: the Quality testing of milk, qualntitative analysis of lactic acid and Effect of heavy metals on bacteria.

CO4: visit to small scale industries to learn the processes in in the production of industrially important products

Learning resources and suggested Books:

1.Christson, J.Harst (1997) Manual of Environmental Microbiology, ASM Press, Washington. DC.

2. De, A.K. (1987) Environmental Chemistry –Wiley Eastern Limited, New Delhi Foster C.F. John Ware D.A. Environmental Biotechnology, Ellis Horwood Limited.

3. Ericksson Ed. (1998) Biotechnology in the pulp and paper industry, Springer.

4.Geetha Bali et al eds (2001) Environmental Biotechnology, ApS Pub.

5. Maheshwari, D. K. et. al., Biotechnological applications of microorganisms, IK . International, New Delhi, 2006

6. Waites, M. J. et. al., Industrial Biotechnology: An Introduction, Blackwell publishing, UK, 2007.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**1**	**-**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**3**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**1**	**3**	**3**	**-**	**2**	**1**	**1**	**1**

(OR)

VIR-405C: PROJECT WORK

Project:6 hours/week	**Dissertation: 60 Marks** **Presentation: 20 Marks** **Viva:20 marks**
Tutorial: Textbooks, E-learning resources, study materials	
Semester: IV	**Credits: 4 Credits**

- Students intended to do project; they need to undertake a project work related to Virology. The project report will be submitted in the form of dissertation duly certified by the supervisor and Head of the Dept. The project will be presented by the student for evaluation at the end of the semester by external expert.

VIR-406A: CLINICAL VIRIOLOGY

(Open Elective-Theory- Offered to students of other disciplines)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: IV	**Credits: 4 Credits**

Course Educational Objectives:

1. To learn about basic concepts of taxonomy, morphology, transmission, cultivation and replication of viruses and methods used for characterization of viruses,
2. To understand methods used for sample collection, preservation, and detection of viruses and GMP and biosafety practices used in the clinical laboratories.
3. To acquire knowledge about clinically important food-borne, blood borne, vector borne and contact borne and zoonotic diseases and

To learn about the strategies used for their prevention and control

UNIT-I

Introduction to Virology: Introduction to Virology, characteristics, taxonomy of animal and human viruses, morphology of viruses, mode of transmission of viruses, replication of viruses, isolation and cultivation of viruses, CPE, virus characterization by various methods.

UNIT-II

Collection and diagnosis: Viral specimen collection, transport and processing, methods used for preservation of virus samples, diagnosis and detection of viruses by using biological, immunological and molecular methods; biosafety levels and risk groups, containment, good microbiological practices, good laboratory practices (GLP), disinfection, decontamination and sterilization procedures, safety rules.

UNIT-III

Clinically important viral diseases: Importance of common nosocomial, enteric (food and water-borne, hepatitis A & E, polio, rotaviruses), blood-borne (hepatitis B & C, HIV), contact transmitted (common cold, flu, corona) and insect-borne (Japanese encephalitis, dengue, chikungunya) viruses; Zoonotic diseases and their role in the society.

UNIT-IV

Prevention and Control of viruses: The infection control policy- aseptic techniques, cleaning and disinfection, protective clothing, isolation; Prevention- sanitation, vector control, vaccines and immunization; Control- chemoprophylaxis, chemotherapy (antiviral drugs, Interferon therapy), efficacy of infection control.

Course Outcomes: At the end of the course the student will be able to

CO1: Acquire basic understanding of virus taxonomy and virus properties and learn the concept of transmission, replication, cultivation andcharacterization of viruses.

CO2: Learn to collect, preserve the virus samples and detect the viruses by using biological, serological and molecular methods, good microbiological and laboratory practices used in the clinical laboratories.

CO3: Understand the properties, transmission, pathogenesis, epidemiology, diagnosis and detection of clinically important virus diseases.

CO4: Learn about the approaches used for prevention and control of clinically important infectious virus diseases.

Learning resources and suggested books:

1. Principles and Practice of Clinical Virology, Carol Shoshkes Reiss, (2009).Editor:**,** 6th ed. ISBN: 9780470517994. $450 p. 968.
2. Clinical Virology. D.D. Richman *et al.,* 2nd Edition. (2002), ASM Press.
3. Principles of Virology- Molecular biology, pathogenesis and control. (2000). S.J.Flint, L.W.Enquist, R.M.Krug, V.R.Racaniello and A.M.Skalka. ASM press.
4. Fields Virology. (2001). 3rd Edition. Vol. 1, 2. B.N. Fields, D.M. Knipe, P.M. Howley.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**1**	**-**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**2**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**2**	**1**	**-**	**1**

(OR)

VIR-406B: EMERGING AND REEMERGING VIRUSES(Optional)

(Open Elective-Theory- Offered to students of other disciplines)

Lecture: 6 hours/week	**Internal Assessment: 20 Marks** **Seminars and assignments**
Tutorial: Textbooks, E-learning resources, study materials, PowerPoint lectures	**Semester End Examination: 80 Marks**
Semester: III	**Credits: 4 Credits**

Course Educational Objectives:

1. To understand the evolution, epidemiology, emergence of infectious and emerging virus diseases, viral zoonotic infections
2. To learn about HIV, SARS, and host defence mechanisms against infectious diseases.
3. To learn about the biology, diagnosis and management of vector-borne emerging infectious viral diseases
4. To understand the impact of environment on virus emergence, control strategies followed for emerging virus diseases and bioterrorism.

Note:With respect to emerging infectious virus diseases, emphasis should be on etiology, transmission, clinical manifestations, diagnosis, prevention and control.

UNIT-I

Introduction to Virology: Origin, evolution and classification of viruses.

Morphology and properties of viruses: Physical- morphology and structure, Biochemical- chemical composition, nucleic acids, proteins, enzymes, lipids, carbohydrates, polyamines, cations.

Cultivation of viruses: Experimental plants and experimental animals, embryonated eggs and cell cultures.

Transmission of viruses: vector and non-vector transmission.

UNIT-II

Epidemiology and emergence of infectious viral diseases: Significance and terminology of virus epidemiology, Biology of emerging infectious diseases, factors influencing for virus epidemics, host defence against infectious diseases, zoonotic infections, Impact of social and environmental change on emergence, Controversies.

Emerging virus disease surveillance: Surveillance methods, evaluation and application of virus surveillance; Quarantine of viral diseases- International and national.

UNIT-III

Emerging and Re-emerging Infectious Viruses: Non-vector borne emerging virus diseases; Human Immunodeficiency virus, SARS, and Influenza.

Vector-borne emerging infectious virus diseases- Dengue & Haemorrhagic fever viruses, Japanese encephalitis virus, Chikungunya virus, West Nile virus, Ebola virus, Nipah, Marburg, Kyasanur forest disease virus, Zika virus.

UNIT-IV

Strategies of virus maintenance in communities: Wild and domestic animals, rural and urban populations.

Surveys: Basic concepts, types of sampling, surveys, collecting information, monitoring vectors, Patterns of disease progress.

Prevention and control of emerging viruses: The infection control policy- aseptic techniques, cleaning and disinfection, protective clothing, isolation; Prevention- sanitation, vector control, vaccines and immunization; Control- chemoprophylaxis, chemotherapy (antiviral drugs, Interferon therapy), efficacy of infection control, vector control, and anti-virulence therapies, vaccines, public health measures, Bioterrorism.

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the evolution, biology, epidemiology, and emergence of infectious virus diseases, biology of emerging infectious diseases, zoonotic infections

CO2: Learn about the biology, clinical symptoms, epidemiology, diagnosis, and control of viruses causing AIDS and SARS and host defense mechanisms against infectious virus diseases.

CO3:Describe the biology, clinical symptoms, epidemiology, diagnosis, and control of vector borne emerging infectious viral diseases.

CO4:Acquire knowledge on impact of social and environmental change on emergence of viruses, vector control and antiviral therapies, vaccines, public health measures and bioterrorism.

Learning resources and suggested books:

1. Epidemiology, diagnosis and Management of Zoonoses. (2004). K.G. Narayana Sri Kuldeep Sharma Pub.
2. Clinical Virology. D.D. Richman *et al.,* 2nd Edition. (2002). ASM Press.
3. Principles of Virology- Molecular biology, pathogenesis and control. (2000). S.J. Flint, L.W. Enquist, R.M. Krug, V.R. Racaniello and A.M. Skalka. ASM press.
4. Veterinary Virology. F.A. Murphy *et al. (*1999). 3rd Edition. Academic Press.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**3**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**3**	**1**	**-**	**1**

VIR-407: RESEARCH APRTITUDE AND ENTERPRENUERSHIP

(Skill Enhancement Add-onTheoryCourse-Self-Study)

Self-Study	**Internal Assessment: 100 Marks** **Seminars, quizzes and assignments**
Tutorial: Textbooks, E-learning resources, study materials	**Semester: IV** **Non-credited course**

Course Educational Objectives:

1.To enable the students to imbibeSteps of Research; Methods of Research and communication skills .

2. To learn the **Data Interpretation**Ethical Issues of Data Reporting and for Authenticity.Preparation of research proposal

3.To learn **Information and Communication Technology** (ICT) and Role of Entrepreneurship in Economic Development; Start-ups.

4.To aquireknowledge about the **Idea Generation and Project FormulationInstitutions Supporting and Taxation Benefits**

UNIT-I

Research Aptitude: Research - Meaning, Motivation in Research; Characteristics and Types; Steps of Research; Methods of Research; Identifying research problem, framing objectives, setting hypothesis& research design, testing hypothesis, reviewing literature; Importance of reasoning in research;Thesis and article writing, their characteristics and format; Workshop, Seminar, Conference and Symposium; Research Ethics; Ethics of Scientific Writing.

Comprehension and communication: Communication, effective communication; Barriers to effective communication.

UNIT-II

Data Interpretation: Sources, Acquisition and Interpretation of Data; Quantitative and Qualitative Data; Representing and Interpreting Data; Data and governance; Graphical Representation and Mapping of Data; Locating ethics in scientific data; Conflict of interest; Ethical Issues of Data Reporting and for Authenticity.

Report Writing: Components, Types of reports, Layout of research report, Principles of writing, References, Appendices, Format of publication in research, Journals, Paper Presentations- Planning, Preparation, Visual aids; Preparation of research proposalUNIT-III

UNIT-III

Information and Communication Technology (ICT): ICT-Meaning, Advantages, Disadvantages and Uses; General Abbreviation and Terminology; Basics of Internet, intranet, and E-mail, audio and video conferencing; Digital initiatives in higher education; ICT and governance.

Entrepreneurship: Definition and Concept of entrepreneurship; Entrepreneur Characteristics; Classification of Entrepreneurs; Role of Entrepreneurship in Economic Development; Start-ups.

UNIT-IV

Idea Generation and Project Formulation: Ideas in Entrepreneurships; Sources of New Ideas; Techniques for Generating Ideas; Preparation of Project Report; Contents; Guidelines for Report preparation; Project Appraisal Techniques; Economic Analysis-Financial Analysis; Market Analysis.

Institutions Supporting and Taxation Benefits: Central level Institutions: NABARD; SIDBI, State Level Institutions; DICs; SFC; Government Policy for MSMEs; Tax Incentives and Concessions.

Course Outcomes: At the end of the course the student will be able

CO1: Aware of the Steps of Research; Methods of Research and communication skills .

CO2: Learn the **Data Interpretation** Ethical Issues of Data Reporting and for Authenticity. Preparation of research proposal

CO3: Acquire the knowledge about the importance **Information and Communication Technology** (ICT) and Role of Entrepreneurship in Economic Development; Start-ups.

CO4: Acquire knowledge about the **Idea Generation and Project Formulation, Institutions Supporting and Taxation Benefits**

Learning resources and suggested books:

1. Cattell, R. (Ed.). (2012). The scientific use of factor analysis in behavioral and life sciences. Springer Science & Business Media.
2. Chandel, K. S., & Dhiman, R. J. (2014). Teaching aptitude among prospective teachers. Academic Discourse: An International Journal, 7(1), 1-16.
3. Llano, A. (2000). Medical ethics education in Colombia. Med. & L., 19, 415.
4. Mintzes, J. J. (2006). Handbook of college science teaching. NSTA Press.
5. Ogiela, L., &Ogiela, M. R. (2009). Cognitive techniques in visual data interpretation (Vol. 228). Heidelberg: Springer.
6. Reddy, N. K., & Ajmera, S. (2015). Ethics, Integrity and Aptitude. McGraw-Hill Education.
7. Vaishnavi, V. K. (2007). Design science research methods and patterns: innovating information and communication technology. Auerbach Publications.
8. Watson, J. T., & Sparkman, O. D. (2007). Introduction to mass spectrometry: instrumentation, applications, and strategies for data interpretation. John Wiley & Sons.
9. Weyrich, L. S., & Harvill, E. T. (2013). Teaching ethical aptitude to graduate student researchers. Accountability in research, 20(1), 5-12.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**2**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**1**	**-**
CO3	**2**	**2**	**2**	**2**	**1**	**3**	**1**	**2**	**3**	**2**	**1**	**2**
CO4	**1**	**1**	**1**	**-**	**-**	**3**	**3**	**1**	**3**	**1**	**-**	**1**

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF ZOOLOGY



Course

M.Sc. ZOOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

Department of Zoology was established in 1954 from the inception of the University to produce high quality Zoologists to cater the needs of the newly Independent India. Since the Institute is a State University, the Department has increasingly focused on post graduate education and research with a vision to promote the discovery and broad communication of knowledge about the physiology of animals.

Zoology Department has been recognized at National and International levels for its outstanding contributions in various disciplines of Animal Physiology. The University Grants Commission has recognized this Department as a Research Centre for the thrust areas “Environmental Biology” and “Ethnopharmacology”.

All the faculty have received advanced overseas training in their respective research areas and established active research collaborations across the Globe. In due recognition of the research potential and academic accomplishments of the faculty, the Department is being constantly supported with huge grants by several funding agencies namely UGC (DRS, COSIST, BSR), DST-FIST with a total outlay of Rs.280 lakhs. In addition to the above, the faculty members have received individual major research projects to the tune of Rs.196 lakhs from various funding agencies such as UGC, CSIR, DST and ICMR during the last five year period.

Since its inception, 520 Ph.D., and 393 M.Phil Degrees were awarded and 2200 research papers were published in journals of national and international repute with high impact factor.

The Department is the Head-quarters for “Indian Society for Comparative Animal Physiology” and publishing a biannual journal “Indian Journal of Comparative Animal Physiology”. Recently, the department has established “District Environmental Center (DEC)” under the auspices of “National Environmental Science Academy, New Delhi” to create awareness on Management strategies of environment among the public and ‘Research Centre for Neurological Disorders’ to promote research related to neurological disorders and to take up community out-reach welfare programmes. The Department has also a “Forum for Research Scholars” and “Zoological Society” to organize invited lectures, debates, competitions, quiz programmes etc. to enrich the academic environment in the

Department besides participating in community activities such as ‘Swachabharath’, Blood donation camps and Tree plantation activities etc.

The M.Sc. degree in Zoology being offered by this University provides its students with a course of study that integrates a range of learning and teaching techniques relevant to their educational development and career ambitions. This Masters programme covers the latest developments in Zoology and its specializations, viz., Applied Parasitology, Animal Physiology, Fishery Science and Entomology. It provides theoretical knowledge as well as training in the practical and intellectual skills to enable students to better understand and then solve some of the problems in this subject. Graduates in this programme will be induced into critical thinking, and would be able to solve complex problems in Zoology. The students would also be inculcated with personal and problem-solving skills that will enhance their employability prospects. Enhanced competence of students has been the key concern in designing and developing this syllabus. Careful thought has gone into selection of topics and setting their scope. Major areas of Zoology like Genetics, Evolution, Physiology, Biochemistry, Ecology, Immunology, Cytology, Developmental Biology, and Taxonomy have been included in the syllabus only after multiple rounds of thorough discussions and intensive study. Special attention has been paid to subjects like Bioinformatics, Molecular Biology and Genetics to incorporate the latest developments in these fields.

Vision

- Provide a sound education in basic science
- Transform society through the empowerment of women
- Provide inexpensive educational services to the weaker sections of society
- Inculcate respect for nature and concern for ethical values among students through good and scientific educational practices.
- Recognizing the essential roles of science and biology in the lives of citizens today and tomorrow, we emphasize biological literacy in our teaching and outreach programs.

Mission

- To impart to the students the contemporary advancements in life sciences.
- To impart a global perspective and such skills among students that benefit humanity.
- To promote the discovery and broad communication of knowledge about the biology of animals including their Taxonomy, Evolution, Physiology, Cell, Molecular and Biochemical make up, interaction with their environments and its Zoogeographical realms.
- To develop research aptitude and a scientific advancement.
- Reinvent ourselves in response to the changing demands of society with high moral values as a good citizen

CHOICE BASED CREDIT SYSTEM (CBCS):

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed.

Students of this course would be expected to :

- Be able to play leading role in industry, research and the public services;
- Understand and appreciate major public concerns and issues associated with Zoology
- Have an understanding and grasp of international research environment where the frontiers of knowledge in Zoology are under research
- Be able to adapt and respond positively and flexibly to changing circumstances
- Develop the professional skills and personal attributes to deal with complex issues, both systematically and creatively
- Have the capacity for individual work and teamwork;
- Be lifelong learners with intellectual and practical skills.

➢ Department Objectives

- The Department is having the following objectives:
- To expose students to updated curricula and to recent advances in the subject and enable the students to face NET, SET and other competitive examinations successfully.
- To create awareness among students about the latest streams of Zoology including advanced subjects like Biotechnology, Tissue culture, Genetic Engineering and Bioinformatics.
- To improve the quality of laboratory and field work for which zoological study tours and excursions have been made compulsory so that the students can become familiar with field status of ecosystem and surrounding study.
- To prepare students to attract and develop interest in applied Parasitology, Animal Physiology, Genetics, Cell Biology, Fisheries science, Toxicology so that the students can select Zoology as their career.
- The BOS in Zoology expects that this new framework of curriculum caters the need of enabling students of subject to accept new challenges of dynamically changing modern era.

Programme Specific Outcomes (PSOs)

The zoology subject helps students to know the animal behavior, the way they live, their needs, the environment of the animals, how they adapt to the changing environment and their needs like nutrition, genetics, characteristics, evolution, physiology, reproduction etc.

Zoology is a recognized field today and is regarded as the top career choice in India. With the imbalance in the ecosystem today, acute need has been felt to preserve nature and even animals that are on the brink of extinction. Zoologists are in great demand today as many countries feel the need to preserve the wildlife and the nature.

- Develop deeper understanding of key concepts of zoology at molecular, cellular level, physiology and reproduction at organism level.
- Describe the role of taxonomy and systematics in animal studies and gain in-depth knowledge of animals including invertebrates and vertebrates.
- Learn the skills of handling various scientific equipment, designing and performing the laboratory experiments.
- Communicate the importance of ecological factors, biodiversity, environmental conservation processes, pollution control and protection of threatened species to the society
- Enhance their scientific temper and scientific thinking and exhibit creativity in designing, planning, problem solving, model making for various scientific concepts

Programme Objectives

The primary objective of the program is to impart quality education in the subject of Zoology as a basic science and its applied branches to the students

- To meet the academic to applied aspects in Zoology suited to real problems of regional and National needs
- To expose learners to frontier and thrust areas of Zoology
- To train learners for better performance in various competitive examination and in research careers.
- To enable the learners to acquire and develop self- study habits

- To facilitate Higher education & research in Zoology.
- To provide quality education offering skill based programs and motivate the students for self employment in applied branches of Zoology.
- To Inculcate the spirit of resource conservation and love for nature
- To conduct field studies and different projects of local and global interests.
- To provides opportunities for professional and personal development through curricular and co- curricular activities.
- Provide consultancy and organize extension activities.
- To shape the learners to become worthy citizens of the Nation in the field of Zoology and interrelated fields.

Programme Outcomes

- The student should acquired the knowledge with facts and figures related to various aspects in life sciences
- When you graduate with a Master of Science (Zoology) you will have learned how to work at a high level of academic achievement.
- The student to understanding the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life and the applications of Zoology in Aquaculture, Vermiculture, Sericulture, Poultry Science and Fundamentals of Clinical Science and Immunology and to create new industry in their relevant area.
- The student could apply the skills to handling scientific instruments, planning and performing in laboratory experiments and also drawing logical inferences from the scientific experiments.
- The students analyzed and realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.
- Understand the applications of Biological techniques to various fields of biology.
- Attained the knowledge relating to invertebrate & chordate, developmental biology, animal physiology, Cell & Molecular biology, genetics and clinical

science, Progression to PG education in Zoology, Aquaculture, Environmental science, Biotechnology, Bioinformatics, Biochemistry, Microbiology and Human genetics, The Students get employment by industries/self employment in Poultry, Veterinary and Aquaculture industries.

- Perform, Assess and implement practical techniques and procedure to solve biological problems and analyse and quantify data collected during any project.

Program Educational Objectives

- Exposure of students to animal diversity and to provide them systematic tools of traditional and modern types to acquire this knowledge and skill.
- To update the syllabus essential for appearing in NET, SET, GATE, ASRB and other competitive exams of UPSC and APPSC.
- To make aware the students to know the natural resources of country, to utilize by sustainable methods and conservation of living resources.
- To develop trained and knowledgeable human resource for educational and research institutions and industries; to use this human resource for self reliant India.
- To develop self employable ability and to apply knowledge for several agro-based industries like Sericulture, Goat farming and Apiculture; it will also provide employment to other dependents.

Semester - I

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	ZOO-101	Mandatory	Invertebrata & Chordata	6	4	20	80	100
2		ZOO-102	Mandatory	Metabolic Regulation & Cell Function	6	4	20	80	100
3	Compulsory Foundation	ZOO-103A	Optional -1	Genetics & Evolution	6	4	20	80	100
		ZOO-103B		Endocrinology					
4	Elective Foundation	ZOO-104A	Optional -1	Tools & Techniques	6	4	20	80	100
		ZOO-104B		Genetic Engineering					
5	Practical - I	ZOO-105P	Paper 1 & 3	Lab-1	6	4		100	100
6	Practical - II	ZOO-106P	Paper 2 & 4	Lab-2	6	4		100	100
	Total				36	24	80	520	600
7	Audit Course-I				0	0	100	0	0

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one paper**
- **Elective Foundation - Choose one paper**
- **Audit Course – 100 marks (Internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**.

Semester - II

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	ZOO-201	Mandatory	Molecular Biology	6	4	20	80	100
2		ZOO-202	Mandatory	Cell Biology & Immunology	6	4	20	80	100
3	Compulsory Foundation	ZOO-203A	Optional -1	Neurobiology & Animal Behavior	6	4	20	80	100
		ZOO-203B		Bioinformatics & Biostatistics					
4	Elective Foundation	ZOO-204A	Optional -1	Enzymology	6	4	20	80	100
		ZOO-204B		Pathobiology					
5	Practical - I	ZOO-205P	Paper 1 & 3	Lab-1	6	4		100	100
6	Practical - II	ZOO-206P	Paper 2 & 4	Lab-2	6	4		100	100
	Total				36	24	80	520	600
7	Audit Course-II				0	0	100	0	0

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one paper**
- **Elective Foundation - Choose one paper**
- **Audit Course – 100 marks (internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.**

Semester - III

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	ZOO-301	Mandatory	Developmental Biology	6	4	20	80	100
2		ZOO-302	Mandatory	Environmental Biology	6	4	20	80	100
3	Generic Elective	ZOO-303A	Optional -1	Animal Biotechnology	6	4	20	80	100
		ZOO-303B		Microbiology					
4	Practical - I	ZOO-304P	Core & Generic Electives	Lab-1	6	4		100	100
5	Skill Oriented Course	ZOO-305	Mandatory (Theory + Practical)	Economic Zoology	6 (3+3)	4	10	90 (40 + 50)	100
6	Open Elective	ZOO-306A	Optional - 1	Environmental Impact Assessment & Green Auditing	6	4	20	80	100
		ZOO-306B		Human Health and Infectious diseases					
	Total				36	24	90	510	600

***All CORE Papers are Mandatory**

- **Generic Elective - Choose two**
- **Core papers and Generic electives opted paper held Practical-I**
- **Skill Oriented Course is Mandatory. Relevant to Society along with practical (10 marks Internal, 40 final theory & 50 for practical's)**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**

Semester - IV

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	ZOO-401	Mandatory	Toxicology	6	4	20	80	100
2		ZOO-402	Mandatory	Comparative Animal Physiology	6	4	20	80	100
3	Generic Elective	ZOO-403A	Optional -1	Biodiversity and Conservation	6	4	20	80	100
		ZOO-403B		Endocrinology					
4	Practical - II	ZOO-404P	Core & Generic Electives	Lab-1	6	4		100	100
5	Multi Disciplinary Course / Project Work	ZOO-405	Mandatory (Theory + Practical)	Principles and Practices of Aquaculture	6 (3+3)	4	10	90 (40 + 50)	100
6	Open Elective	ZOO-406A	Optional - 1	Environmental Microbiology	6	4	20	80	100
		ZOO-406B		Medical Biotechnology, IPR, Biosafety and Bioethics					
	Total				36	24	120	480	600

***All CORE Papers are Mandatory**

- **Generic Elective - Choose two**
- **Core papers and Generic elective opted paper held Practical-II**
- **Project Work – Collaboration with various firms/companies/societies.**
- **Multi-disciplinary course is Mandatory. Circle formation with other subjects/Dept. of Arts/Commerce**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC**

CORE ZOO-101: INVERTEBRATA & CHORDATA

General Course Objectives:

While studying the Comparative anatomy of Invertebrates and Chordates i.e. Vertebrata Course, the Student shall be able to:

1. This Course develops concepts in animal Taxonomy and systematic modern methods of Taxonomy and systematics and their application General organization, affinities and systematic position of Minor phyla and molecular basis of animal taxonomy.
2. Develops concepts regarding various Invertebrate and vertebrate morphology.
3. Describe the relationships among animals with their internal developments.
4. Analysis the relationships among animals with internal structure.
5. Learners gain Knowledge and develop skill over the comparative anatomy of Chordates and Vertebrata.
6. Enumerate the origin and classification of Vertebrates.

Invertebrates:

Course Objectives:

1. To describe and explain the basic principles of Animal classification, from and function among Invertebrate Phyla
2. Make students to understand how life evolved from simple to complex organization by division of labor & enhancing efficiency in Invertebrates.
3. To understand the importance of biodiversity, habitat, adaptations, body organization and taxonomic status of non-chordates.
4. To study the fundamental knowledge about pattern of feeding and digestion among Invertebrates.
5. To describe the larval forms of Invertebrates and their Phylogenetic significance.

Vertebrates:

Course Objectives :

1. To describe the Comparative and Evolutionary trends in structure and functions of organ systems among vertebrate Phyla.
2. To study the basic structure and function of Chordates. To determine the progress and complexity in the development and evolution of different chordate groups for their habitat selection, adaptation and regulation of the life processes.

3. Imparts conceptual knowledge of Vertebrates, their adaptations and associations in relation to their environment.
4. To describe the characteristic features of larval forms of Crustaceans and Echinodermata relationship among Invertebrates.

UNIT-1.

1.1. Evolutionary time scale, Eras, Periods & Epoch - major events.

1.2. Species concept, International code of Zoological nomenclature, Taxonomical procedures, New Trends in taxonomy.

1.3. Patterns of feeding and digestion in lower metazoans: Holozoic nutrition, Pinocytosis, Saprozoic Nutrition, Myxotrophic nutrition, Nutrition of parasites.

1.4. Feeding in Polychaeta, Mollusca,Echinodermata.

UNIT-2.

2.1 Acoelomata, Pseudocoelomata, Coelomata,Proterostomia and Dueterostomia.

2.2. Structure of Gill, lungs, trachea and Mechanism of Respiration.Circulatory system in Annelids, Arthropods & Molluscs.

2.3. Advanced nervous system- Annelida, Arthropoda and Mollusca.

2.4. Larval forms of Crustaceans: Larval forms: Nauplius, Metanauplius, Protozoea, Zoaea, Cypris, Mysis, Megalopa, Phyllosoma, Alima, Significance of larval forms; Larval forms of Echinodermata: Asteroidea Bipinnaria Larva, Ophiuroidea, Echinoidea, Holothuroidea, Crinoidea Doliolaria Larva, Significance of Echinoderm larval forms.

UNIT- 3.

3.1 Vertebrate integument and derivatives: - Skin structure and functions - glands, scales, horns, claws, nails, hoofs, feathers and hair.

3.2 Comparative anatomy of heart: - Types - structure- blood circulation-aortic arches and portal system.

3.3 Comparative anatomy of reproductive system: - Organs of male reproductive system – organs of female reproductive system –functions.

3.4 Comparative account of excretory system.

UNIT- 4.

4.1 Comparative anatomy of respiratory organs: - Gills, trachea and lungs – types Structure-mechanism of respiration.

4.2. Comparative anatomy of brain and spinal cord: - structure, composition and functions

4.3. Organs of vision: structure of eye in different phyla - mechanism of vision, Photoreceptors-fishes, Amphibians, Reptiles, Birds and Mammals.

4.4. Organs of Gustatory hearing and tactile responses: - Structure of hearing organs in different Phyla - mechanism of hearing - tactile organs.

Invertebrates

Course Outcomes:

1. Understanding the General Characteristics, Principles of classification, general biology of Invertebrate Communities.
2. To understand the various biological functions, the evolutions of life from most primitive to most advanced form with respective to their habit and habitat.
3. To understand the various physiological mechanisms among Invertebrates and their significance among Invertebrate Phyla.

Vertebrates

Course Outcomes:

1. Understanding the comparative aspects of different organs systems among chordate Phyla.
2. Explain the similarity and differences in structure and function of organs in different groups of Chordates.
3. In depth understanding of Anatomical features of Integumentary, Circulatory, Reproductive, Respiratory, Receptor, Nervous systems among Chordate groups.
4. The students may apply this knowledge in taxonomy related research and job opportunities.

SUGGESTED READING MATERIAL:

1. Alexander, R.M. The Chordata. Cambridge University Press, London.
2. Barnes, R.D. Invertebrate Zoology, III edition. W.b. Saunders Co., Philadelphia,1980.
3. Barrington, EJ. W. Invertebrate structure and function. Thomas Nelson and Sons Ltd., London.1969.
4. Barrington, EJ. W. The Biology of Hernichordata and Protochordata. Oliver and Boyd, Edinbourgh.

5. Bourne, GH. The structure and functions of nervous tissue. Academic Press, New York.
6. Carter, GS. Structure and habit invertebrate evolution Sedwick and Jackson, London.
7. Eecles, J. C. The understanding of the brain. McGraw Hill Co., New York and London.
8. Hyman, L.B. The Invertebrates smaller coelomate groups, Vol. V. Mc.GrawHill, Co., New York.
9. Hyman, L.B. The Invertebrates. Vol.2 Mc Graw Hill Co., New York and London.
10. Hyman, L.B. The invertebrates. Vol.l. Protozoa through Ctenophora, Mc Graw Hill Co., New York.
11. Hyman, L.H. The Invertebrates. Vol. 8. Mc Graw Hill Co., New York and London.
12. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London.
13. Kingsley, J.S.Outlines of Comparative Anatomy of Vertebrates. Central Book Depot, Allahabad.
14. Parker, TJ., Haswell, W.A. Text Book of Zoology, Mc Millan Co., London.
15. Read, C.P.Animal Parasitism. Prentice Hall Inc., New Jersey.
16. Russel-Hunter, W.D. Biology of higher invertebrates, the Mc Millan Co. Ltd., London.1969.
17. Sedwick, A. A student text book of Zoology, Vol.I1 and III. Central Book Depot, Allahabad.1972.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	-	1	2	1	1	1	-	1
CO2	3	3	2	2	2	2	2	2	1	2	-	2
CO3	3	3	3	2	2	3	1	2	2	1	2	2
CO4	1	-	-	-	-	-	1	3	-	1	-	2

3-High, 2- Medium, 1- Low

CORE ZOO-102: METABOLIC REGULATION AND CELL FUNCTION

Course Objectives:

While studying the **Metabolic Regulation & Cell Function** (MRCF) course, the student shall be able to:

1. This course is designed to introduce the organic structure of living systems mainly dealing with biomolecules like carbohydrates, lipids, proteins and nucleic acids laying foundation for other advanced courses like Physiology, Cell Biology, Molecular Biology and Immunology.
2. To develop understanding of chemistry used in biological processes and to perform wide range of analytical techniques to explore biological activities.
3. Physiological and biochemical understanding through scientific enquiry into the nature of mechanical, physical, and biochemical functions of humans, their organs, and the cells of which they are composed
4. To understand the Interactions and interdependence of physiological and biochemical processes and thus to help the student to navigate the discipline of Biochemistry that explains how the collection of inanimate molecules.
5. Provide a concise and unifying approach of knowledge-sharing of the structure, function and interaction of biomolecules & bioprocesses at molecular and metabolic levels thus pave way for understanding the biochemical integrity of various life processes and the metabolic Pathways
6. The Intermediary Metabolism: Concept and Regulation is designed as an advance course for understanding the interaction, network and regulation of certain important metabolic pathways and their roles in health and diseases.
7. The course also explains the interplay and energetics, catalysis and design of living systems. It is designed for students who have already taken up the courses and elementary biochemistry and macromolecular structures at the undergraduate level.

UNIT-1.

1.1 Chemical Bonds (Covalent, Ionic and Hydrogen Bonds) and Thermodynamic principles in Biology (Enthalpy, Entropy, Free energy, First law and Second law of thermo-dynamics in relation to Biological system).

1.2 Carbohydrates: Definition and Classification- Structure and function of important Mono, Oligo and Polysaccharides.

1.3 Intermediary Metabolism-I: Glycolysis, TCA Cycle and their Bio-medical importance.

1.4 Intermediary Metabolism-II: Gluconeogenesis, HMP Shunt, Metabolism of Galactose and Fructose and their Bio-medical importance.

UNIT-2.

2.1 Proteins: Definition and Classification- Structure (Primary, Secondary and Tertiary structures, Protein folding and denaturation) and function of important Proteins-Haemoglobin, Myosin and Actin.

2.2 Bio-synthesis of nutritionally non-essential amino acids and their Bio-medical importance.

2.3 Catabolism of Proteins and Amino acids-I: Biosynthesis of Urea- Detoxification of Ammonia-Metabolic disorders of Urea cycle.

2.4 Catabolism of Proteins and Amino acids-II: Phenylalanine, Tryptophan, Biosynthesis and degradation of Polyamines and their Bio-medical importance.

UNIT-3.

3.1 Chemistry of purines, pyrimidines, Nucleosides, Nucleotides, Synthetic derivatives.

3.2 Biosynthesis of purine nucleotides, Catabolism of purines.

3.3 Biosynthesis of pyrimidine nucleotides, Catabolism of Pyrimidines,

3.4 Clinical disorders of purine and pyrimidine metabolism; Hyperurecemia or gout; Hypo- urocemia, Orotic aciduria.

UNIT-4.

4.1 Biomedical importance, Classification of lipids; Saturated and unsaturated fatty acids; Triacylglycerols (tri-glycerides), Phospholipids, Glycolipids, Steroids, Lipid peroxidation.

4.2 β- oxidation of fatty acids, Oxidation of unsaturated fatty acids, Ketogenesis.

4.3 Biosynthesis of long chain fatty acids (Palmitic acid), Clinical aspects.

4.4 Overview of Metabolism (Carbohydrate, Protein and Lipid): Integrated metabolism at tissue and organ level(Kidney, Liver, Muscle, Adipose tissue and Small intestine);Metabolic interrelationships among Adipose tissue, Liver and Extra hepatic tissues

Course Outcomes :

After the completion of the course, a student will be able to achieve these outcomes:

1. The students will learn about chemical bonding patterns, chemical structures and classification of carbohydrates and their structural and metabolic role in cellular system i.e. different pathways associated with carbohydrate metabolism.
2. The students will learn about definition and classification of Proteins, Carbohydrates, Lipids etc and their importance in metabolism
3. Students would gain expertise to develop understanding of biological processes at chemical, biochemical and molecular level to perform vide range of analytical techniques to explore biological activities.
4. The student will be able to learn carbohydrate metabolism i.e. catabolism and its association with cellular energy production and carbohydrate anabolism in animal cells.
5. The student will learn and understand about the Biosynthesis of Purines and Pyrimidine Nucleotides, degradation of Nucleotides, salvage pathways, biosynthesis and biodegradation of Amino acids, inborn errors of metabolism.

SUGGESTED READING MATERIAL:

1. D. Voet and J.G Voet, Biochemistry, 1. Wiley & Sons.
2. David L. Nelson and Michael M. Cox, Lehninger; Principles of Biochemistry, McMillan Lange Medical
3. Robert K.Murrey, D.K. Granner, P.A. Mayes and V.W. Rodwell; Harper's Biochemistry, Worth Publishers.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	2	2	2	1	2	2	1	2	2
CO2	3	2	1	2	1	3	1	1	1	1	2	2
CO3	3	1	2	1	2	2	2	2	2	1	2	2
CO4	3	2	3	2	2	3	1	2	2	1	2	2
CO5	3	2	1	2	1	3	2	-	2	-	-	3

CF ZOO-103A: GENETICS AND EVOLUTION

Course Objectives :

While studying the **Genetics** course, the student shall be able to understand :

1. To provide fundamental knowledge about different concepts of Genetics includes Concepts of Gene, Mendelian Principles, Gene mapping methods and Mutation types etc.
2. To study the basic tools and techniques involved in Cytogenetics, Microbial Genetics, Human Genetics and Quantitative Genetics etc.
3. To provide strong foundation in Genetics, Cytogenetics and Molecular biology enables the students to familiarize themselves with Genetic Engineering concepts.
4. To provide and introduce some of the most incisive analytical across the spectrum of the biological applications.
5. Analysis of structure and functions of human chromosomes and to provide insight in to the human metabolic disorders and diseases

Course Objectives :

While studying the **Evolution** course, the student shall be able to:

1. This course aim to provide scientific foundation to support the sustainable management of diverse ecosystem services and a deep understanding of interaction of different ecosystem. It will also in depth understanding of inorganic and organic evolution.
2. Imparts knowledge to the learner regarding various concepts of evolution i.e Molecular and Gene evolution, fundamentals of Micro & Macro evolution.
3. Understand the concepts of Darwinism, Neo-Darwinism, Mechanisms of Isolation, Speciation model, Factors of evolution and their role.
4. Acquiring knowledge on Molecular events of Evolution at cellular level.
5. Gaining of knowledge about Theories of Evolution and its implications.

UNIT-1.

1.1. Concept of gene: Alleles, Multiple alleles and Pseudoallelesn(ABO blood grouping, Bombay phenotype and Rh factor).

1.2. Extensions of Mendelian Principles: Pleiotropy, genomic imprinting, Penetrance and expressivity, phenocopy, sex linked (color blindness; Haemophilia), sex limited and sex influenced characters.

1.3. Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping with somatic cell hybrids.

1.4. Mutation: Types (Spontaneous, Induced, lethal, conditional, biochemical) causes, loss of function, gain of function, Frame shift mutations, insertional mutagenesis.

UNIT-2.

2.1 Microbial genetics: Methods of genetic transfers -Conjugation, Transduction and sexduction, mapping genes by interrupted mating,

2.2 Recombination: homologous and non homologous recombination including Transposition.

2.3 Human genetics: Pedigree analysis, genetic disorders (Brachydactyly, Huntington's chorea).

2.4 Quantitative genetics: Polygenic inheritance, Types of quantitative traits (continous, meristic and threshold); examples (skin color and height in humans), Mapping of Quantitative trait loci (QTL mapping).

UNIT-3.

3.1 Critical reviews of Darwinism.

3.2 Neo-Darwinism.

3.3 Isolation and role of isolating mechanisms in evolution.

3.4 Speciation and models of speciation (Allopatric, sympatric and parapatric).

UNIT- 4.

4.1. Factors of evolution (i) Mutations (ii) Natural Selection (iii) Genetic Drift.

4.2. Basic patterns of evolution; Micro and Macro evolution.

4.3.Species categories: (i) Morphological species (ii) Biological species (iii) Sibling species (iv) Sub species

4.4.Evolution of Proteins- Examples of protein evolution (Hb, insulin, growth hormone).

Course Outcomes :

After the completion of the **Genetics** course, the student will be able to :

1. Students will learn how genetic information is passed on in eukaryotes and prokaryotes, how genes work together in a complex manner in biological system and any alteration can lead to major phenotypic change
2. Students will appreciate the concept of epigenetics as a key mechanism of regulation of gene expression steering development and cell fate that can ultimately be affected in disease condition
3. Explain the ideas about Mendelian, non-Mendelian inheritance, genetic disorder, gene mutations and sex determination.
4. Understood about several concepts pertaining to Microbial, Human and Quantitative genetics, Gene mapping, methods and their applications.

Course Outcomes :

After completion of the **Evolution**, the student will be able to:

1. Understood that the four propositions underlying Darwin's theory of evolution through natural selection are:
   (1) more individuals are produced than can survive;
   (2) There is therefore, a struggle for existence
   (3) Individuals within a species show variation
   (4) Offspring tend to inherit their parental characters
2. Gained knowledge on the factors influencing the pattern of Evolution including Mutations, Natural Selection, genetic drift.
3. Acquired information on the Isolating, Speciation mechanisms and their impact on Speciation.
4. Understood the concepts of Micro, Macro evolution speciation categories, Protein evolution etc. to fortify the existing knowledge on Evolutionary patterns.

SUGGESTED READING MATERIAL:

1. An introduction to Modern genetics by Ch. Waddinsgton
2. Basic Human Genetics- EJ. Mange, Arthur P. Mange. Indian Print, 1997.
3. Genetic disorders of Man by M.R. Goodman.
4. Genetics - Monrve W. Strickberger. 3rd Ed., May, 2000.

5. Genetics-K.B.Allluwallia-1985.
6. Molecular Biology of genes- Watson, J.D., N.H. Hopkins, J.W. Roberts, J.A. Steitz &A.M. Weiner. The Benjamin Cummings publishing company. Inc. Tokyo.
7. Principles of Genetics - EJ. Gardner. MJ. Simmons & D.P. Snustad.
8. Genetics-P.S.Verma and V.K.Agarwal-2009, S.Chand Publication.
9. An introduction to genetic analysis. Griffiths, A.J .F., J.B. Miller, D.T. Suzuki, R.C. Lewontin & W.M. Gelbark, W.H. Freeman and Company, New York.
10. Dobzhansky, Th. Genetics and origin of species, Columbia University press.
11. Dobzhansky, Th., F.J. Ayala, GL. Stebbins and J .M. Valentine Evolution: Surjeet publications, New Delhi latest edition.
12. Gould, J.L. The mechanisms and evolution of behavior.
13. Hartl, D.L. A primer of population genetics, sinauer Associatesm Inc., Massachusetts.
14. P.A. Moody Introduction to Evolution II ed/latest: Kalyani publishers, New Delhi.
15. Peter Volpe E. Understanding Evolution, University Book stall, New Delhi.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	2	2	1	2	-	2
CO2	3	3	2	2	2	2	2	2	1	2	-	2
CO3	3	3	2	2	2	2	2	2	1	2	-	2
CO4	3	3	2	2	2	2	2	2	1	2	-	2
CO5	2	3	3	3	-	-	2	-	3	-	-	2

CF ZOO-103B - ENDOCRINOLOGY

Course Objectives :

1. To study the concepts of Classification of Hormones, Structural features of Endocrine Glands
2. Compare the structure, functions and regulation of the endocrine organs of vertebrates
3. Identification of Endocrines glands of the body and their secretions
4. To study the Steroid and Peptide hormones and their role
5. To study the evolution of Pancreatic and Adrenal gland hormones
6. To study the evolution of Thyroid and Parathyroid hormones and their role in the regulation of metabolism
7. To study the role of hormones in the growth, development and reproduction.
8. To study the aspects concerning Hormones – Human health

Unit 1:

1.1 Classification of hormones. Brief account of structural features of endocrine glands. Hormonal effects and regulation – basic concepts and methods

1.2 Biosynthesis and secretion of pituitary. Factors influencing secretion. Endocrine disorders - brief description

1.3 Biosynthesis and secretion of pancreas, adrenal, and thyroid hormones. Factors influencing secretion.

1.4 Biosynthesis and secretion of sex steroid hormones. Factors influencing secretion.

Unit 2:

2.1 Peptide hormones, Steroid hormones. Hormones as messengers. Cell surface receptors. Cascade of reaction linked to signal transduction.

2.2 Evolution of pituitary gland; Physiological actions of pituitary hormones. Urophysis and action of its hormone(s). Pancreatic hormones and glucose homeostasis.

2.3 Evolution of discrete adrenal gland; Synthesis of corticosteroid, structural diversity of glucocorticoids among vertebrates.

2.4 Sex steroids. Cytoplasmic and nuclear receptors. Mechanism of action of steroid hormones. Prostaglandins. Calcium-magnesium-protein Kinase. Hormones and eukaryotic metabolic regulation

Unit 3:

3.1 Evolution of thyroid gland.

3.2 Thyroid hormone synthesis and its regulation, paradigms of thyroid hormone action in poikilotherms and homeotherms.

3.3 A comparative account of parathyroid gland and ultimobranchial body/C cells, synthesis of parathyroid hormone, calcitonin and of vitamin D3;

3.4 Hormonal regulation of calcium and phosphate homeostasis.

Unit 4:

4.1 Hormones, growth and development and reproduction

4.2 Hormones regulating reproduction

4.3 Hormones and human health

4.4 Production of hormones as Pharmaceuticals-Insulin, GH and Prolactin.

Course Outcomes :

1. Understand the structure, function and regulation of endocrine & neuroendocrine glands,
2. Develop a deep knowledge of the role of endocrine secretion in regulation of reproductive Cycle
3. Understand the pathways associated with Biosynthesis and secretion of Endocrine hormones and their role in the control of metabolism
4. Acquring the knowledge of signal transduction mechanisms
5. Through understanding of several endocrines including Peptide hormones, Steroid hormones, Pituitary hormones, Sex hormones, Thyroid hormones etc in the control of metabolic pathways
6. Understanding the influence of hormones on Growth, Development and Reproduction and their regulatory pattern

SUGGESTED READING MATERIAL:

1. Barrington. EJ.W. General and comparative Endocrinology Cambridge Press, Oxford.
2. Bentley, PJ. Comparative Vertebrate Endocrinology, Cambridge Press, Oxford.
3. Martin, C.R. Endocrine Physiology. Oxford Univ. Press, Oxford.
4. Prakash S. Lohar. Endocrionology-Hormones and human health-2005. MJP Publishers-Chennai.
5. Williams, R.H. Text Book of Endocrinology, W.B. Saunders Co., Philadelphia.

CO-PO mapping

Course	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2
CO5	3	1	2	-	-	1	-	1	-	2	2	2

EF ZOO-104A : TOOLS & TECHNIQUES

Course Objectives:

While studying the **Tools & Techniques**, the student shall be able to:

1. To study the different tools used in biology and research.
2. To learn about the operational handling and maintenance of laboratory instruments and glassware.
3. To study different types of microscopy used in biology.
4. To learn about different molecular and cellular separation techniques and their application in biological research.
5. To study principles and methods of microtechnique.

UNIT-1.

1.1 Chromatography: Molecular sieve chromatography: Principle, Determination of void volume and molecular mass of native molecules. Ion exchange chromatography: Ion exchange materials – Cation and anion exchange materials. Principle and separation of charged molecules. Principle and application of TLC and HPLC.

1.2 Centrifugation. Techniques-Density gradient., ultra centrifugation.

1.3. Electrophoresis: principle, Matrices used in electrophoresis – PAGE for separation of proteins, molecular mass determination. Separation of nucleic acids using agarose gel- electrophoresis. Pulse field electrophoresis and isoelectric focusing.

1.4. Blotting techniques: western, southern and northern blotting techniques.

UNIT-2.

2.1 Introduction to cell and tissue culture: Preparatory techniques – cleaning, sterilization, sterile handling tissue culture laboratory requirements, Design of tissue culture laboratory: Equipments and purpose.

2.2 Cell types (Primary and secondary) and cell lines, Cell proliferation measurements, Cell viability testing: Dye inclusion and dye exclusion tests.

2.3 Culture media: composition, preparation and sterilization, macro and micro nutrients, Importance of serum and limitation with serum media, cell harvesting methods.

2.4 The biology of stem cell: overview; different types of stem cells – embryonic stem cells, fetal tissue stem cells, adult stem cells, stem cell nuclear transfer; somatic cell nuclear transfer, Animal cloning.

UNIT-3.

3.1. Electromagnetic spectrum of light- Simple theories of absorption of light by molecules. Beer-Lambert law.

3.2. Types of detectors: UV-Visible spectrophotometry, Infra red spectrophotometry, Fluorescent spectroscopy. Flame photometry, AAS.

3.3. Electrophysiological methods: Single neuron recording, patch-clamp recording, ECG

3.4. Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI, CAT.

UNIT-4.

4.1 Microscopic techniques: Principles of microscopy Scanning and transmission microscopes. Image processing methods in microscopy.

4.2 Different fixation and staining techniques for Light microscope and Electron microscope.

4.3 Microtomy and processing of tissues for Light microscope and Electron microscope. Cryopreservation and cryotechniques for microscopy

4.4 Freeze-etch and freeze-fracture methods for EM.

Course Outcomes:

1. Students would be trained in various tools and techniques used to gain insight into biological processes.
2. Students would be expertise techniques used for imaging, isolation, purification and characterization of various biological substances.
3. Students would gain basic knowledge of the underlying principles and practical strategy of the analytical and preparative techniques that are fundamental to study and understanding of life processes.
4. Identify and describe the different equipment and tools used in a biology laboratory.
5. Correctly operate different laboratory instruments.
6. Correctly operate different types of microscopes.
7. Prepare tissue for section cutting and correctly operate a microtome.

8. Choose and perform correct staining technique for any given tissue sections.
9. Describe cellular separation techniques.
10. Properly handle and maintain glassware.
11. Properly operate laboratory equipment.

SUGGESTED READING MATERIAL:

1. A Biologists Guide to Principles and Techniques of Practical Biochemistry, K. Wilson & K.W. Goulding, ELBS Edn.
2. Animal Cell Culture – A practical approach, Ed.John. R. W.Masters IRL Press.
3. General Zoological Microtechniques - P.M. Weesner.
4. Principles and techniques of Biochemistry and molecular biology by Kein Wilson and John Walker, VII volume, Cambridge press Edition.
5. Neuro anatomical Techniques, N.J. Stransfed and T.A. Miller Springer Verlag, New York Heidelberg, Berlin.
6. Principles of Neuro Phychopharmacology- Robert S. Feldman, Jerrold S. Meyer and Lind F. Quenzer. Sinauer Associates, Inc. Publishers. Sunderland. Massachusetts.
7. Biophysical chemisty by Upadhyay – Upadhyay - Nath.
8. Analytical Biochemistry (Biochemical techniques) by Dr P. Asokan. Chinnaa publications.
9. Introduction to Instrumental analysis, Robert Braun. McGraw Hill International Edition.
10. Vogel's Qantitative Chemical Analysis by Vogel, ArthurI.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	-	-	2	-	-	-	-	-	2
CO2	3	2	-	1	-	2	1	3	2	2	1	1
CO3	3	2	-	1	-	2	-	-	1	-	2	2
CO4	3	-	1	2	1	2	-	1	-	2	1	2
CO5	3	1	2	-	-	1	-	1	-	2	2	2

EF ZOO-104B : GENETIC ENGINEERING

Course Objectives :

1. To demonstrate the innovative utilization of manipulating enzymes, various cloning and expression vectors and analysis of genomic sequences.
2. To interpret the applications of genetic engineering in biotechnological research.
3. To educate the students in strategizing research methodologies employing recombinant DNA techniques

UNIT-1.

1.1 Enzymes used for the synthesis of DNA: DNA Polymerase I, Klenow fragment, Sequenase, Taq Polymerase, Reverse transcriptase, Terminal Transferase

1.2 Enzymes used for the synthesis of RNA: T3 and T7 RNA polymerases, SP6 RNA polymerase

1.3 Restriction enzymes - Outlines of bacterial restriction and modification systems – Classification of restriction enzymes - Type II restriction enzyme: Nomenclature, Production of DNA fragments with 3' protruding ends and blunt ends and their significance in molecular cloning - RFLP and its significance.

1.4 Enzymes used for ligation and modification of DNA: DNA ligase, Methylases, Kinase, Phosphatase

UNIT-2.

2.1 Vectors for construction of genomic libraries - cosmids, bacterial artificial chromosomes (BACs), yeast artificial chromosomes (YACs) - vectors for construction of cDNA libraries - lamda ZAP. Multipurpose vectors - pUC 18/19, Blue script vectors

2.2 Expression vectors – structure - promoters used in expression vectors - lac, tac, λpL, T7 promoters and their significance in constructing expression vectors.

2.3 Promoter-probe vectors – Structure promoter probe vector - Reporter genes (lacZ, gfp, gus, luciferase) and strategies used to assay promoter activity.

2.4 Vectors used for cloning in to mammalian cells - SV40 Vectors

UNIT-3.

3.1 Isolation of gene/DNA fragments. Mechanical shearing, restriction digestion, cDNA synthesis, PCR amplification and chemical synthesis of gene.

3.2 cDNA synthesis - Mechanism of cDNA synthesis, Strategies used to obtain full length cDNA. 5' and 3' RACE.

3.3 PCR - Concept and technology- Properties of primers - Inverse, multiplex PCR, RAPD and its significance. Real time PCR.

3.4 Chemical synthesis - Designing gene from amino acid sequence, solid phase synthesis of oligonulceotides - In vitro synthesis of gene.

UNIT-4.

4.1 Ligation between cohesive and blunt end DNA fragments - T4 DNA ligase - Conversion of blunt end DNA fragment into cohesive ended DNA - linkers, adapters, homopolymer tailing.

4.2 Introduction of cloned genes into host - Transformation, conjugation, transduction, electroporation, particle bombardment, microinjection, liposome mediated DNA delivery.

4.3 Identification and characterization of cloned genes - Screening of genomic/cDNA libraries - genetic, molecular hybridization - immunochemical techniques

4.4 Expression of cloned genes – detection of expressed proteins – biological and molecular methods

Course Outcomes :

1.Students will become familiar with the tools and techniques of genetic engineering DNA manipulation enzymes, genome and transcriptome analysis and manipulation tools, gene expression regulation, production and characterization of recombinant proteins.

2. This course exposes students to the applications of genetic engineering in biological research.

3. Students will be able to perform basic genetic engineering experiments at the end of course.

4. Students will acquire knowledge of advances in biotechnology- healthcare, agriculture and environment cleanup via recombinant DNA technology.

SUGGESTED READING MATERIAL:

1. Biotech's Dictionary of Genetic Engineering by Dinesh Arora.
2. D. Green; Philip Hilter Richard M. Myers Sue. Klapholz; Harold Riethman Jane Roskams.
3. DNA cloning: Mammalian systems - A Practical Approach by D.M. Glover, B. D. Hames.
4. From Genes to clones Introduction to Gene technology by Ernst-L- Winnacker.

5. Genetic disorders of Man by M.R. Goodman.
6. Genetic Engineering and its Applications by P. Joshi
7. Genetics - Monrve W. Strickberger. 3rd Ed., May, 2000.
8. Genetics-K.B.Allluwallia-1985.
9. Genome Alalysis - A laboratory Manual Volume-2 Detecting Genes by Bruce. Birren; Eric D.
10. Genome analysis - A laboratory manual volume-3 cloning systems by Bruce. Birren; Eric D. Green; Sue. Klapholz; Richard M. Myers & Harold Riethman Jane Roskams.
11. Genome Analysis - A laoboratory manual Voulume-4 Mapping Genomes by Bruce. Birren; Eric.
12. Green; Sue. Klapholz; Richard M. Myers Jane Roskam.
13. Molecular Biology of genes- Watson, J.D., N.H. Hopkins, J.W. Roberts, J.A. Steitz &A.M. Weiner. The Benjamin Cummings publishing company. Inc. Tokyo.
14. Molecular cloning by Sambrook.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2
CO5	3	1	2	-	-	1	-	1	-	2	2	2

ZOO 105P : ZOO-101 (Core) & ZOO-103A or ZOO-103B (CF)

ZOO 106P : ZOO-102 (Core) & ZOO-104A or ZOO-104B (EF)

AUDIT COURSE

ZOO-107: HUMAN VALUES AND PROFESSIONAL ETHICS – I

Course Objectives :

1. To provide fundamentals on Human values and professional Ethics on varied aspects.
2. To probe into proving definition and Nature Ethics in depth through suitable illustrations and examples.
3. To provide suitable interactive phenomenon of individuals with society in relation to Ahimsa, Satya, Brahmacharya, Purusharthas etc.
4. Providing sum and substance of Bhagavad Gita and its application to Human lives for better living.

I. Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics- Goals – Ethical Values in various Professions.

II. Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders, Character and Conduct.

III. Individual and society:

Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).

IV. Bhagavad Gita – (a) Niskama karma. (b) Buddhism – The Four Noble Truths – Arya astanga marga, (c) Jainism – mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhian Ethics.

V. Crime and Theories of punishment – (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Course Outcomes :

1. The student will be enriched with several aspects pertaining to Human values and performing of Professional Ethics in day today life.
2. Introduction of several Nature of values to be performed by Humans to lead a good and Peaceful life by extending and imparting good behavior, character and conduct towards people of the society.
3. Introducing different concepts of Bhagavad Gita and its applications in uplifting of Religious values in the present society.

SUGGESTED READING MATERIAL:

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics – integrity at work" by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol. I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I,II,III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H. Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C. Sharma Ethical Philosophy of India. Nagin & co Julundhar.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	1	3	-	1	-	2
CO2	2	-	-	2	-	-	-	-	-	1	1	2
CO3	1	1	-	1	1	1	1	2	2	-	-	2
CO4	1	1	1	-	-	-	1	1	1	1	-	-

CORE ZOO-201: MOLECULAR BIOLOGY

Course Objectives:

While studying the **Molecular Biology** Course, the student shall be able to:

1. This course provides concept in molecular understanding of structural and functional properties of cell and various processes associated which have potential applications in Molecular, Biochemical and Biomedical research.
2. To provide Knowledge about the complex organization in the Eukaryotics Cell and the molecular mechanisms of the cellular processes that exist in all the cell types.
3. To gain knowledge on DNA models, structure and functions of mitochondrial DNA, DNA repair mechanisms, Transcription, translation, Replication, Gene regulation mechanisms with emphasis on Eukaryotics.

UNIT-1.

1.1 Watson and Crick Model: Types of DNA; Properties of DNA(C-value paradox, Cot value)

1.2 Nuclear and mitochondrial genome, mitochondrial and maternal Inheritance

1.3 Structure of gene (Cistron, Muton, Recon, Cis-trans test)

1.4 DNA damage and repair: Biological indication of repair, photo reactivation, Excision repair, Recombination repair, SOS repair, and Mismatch repair.

UNIT-2.

2.1 Replication in Prokaryotes: Geometry of DNA replication, semi conservative replication.

2.2 Enzymology of DNA replication: DNA polymerase I, II and III; Replication of Eukaryotic Chromosomes; Eukaryotic DNA polymerases; Multiple fork; Replication of Chromatin.

2.3 Discontinuous Replication: Fragments in Replication fork and detection of fragments; Events in the Replication fork; De novo initiation and covalent extension.

2.4 Bidirectional replication, Termination of replication.

UNIT-3. Transcription and Translation:

3.1 Synthesis of RNA:- RNA Polymerase, Promoter, Auxiliary Proteins, RNA chain initiation, elongation, termination and Splicing mechanism

3.2 Types of RNA, Processing of mRNA, rRNA and tRNA, Ribozyme.

3.3 Genetic code, Identification of start and stop codon, Universality of genetic code Degeneracy, Wobbles Hypothesis. Codon usage, Genetic code of Mitochondria.

3.4 Ribosome structure (Prokaryotic and Eukaryotic), Protein synthesis: Initiation, Elongation and Termination of polypeptide chain, Signal peptide hypothesis, Post translational modification, Polyproteins, Inhibitors of translation.

UNIT-4.

4.1 Temporal response, Induction, Repression, Lac Operon, Galactose Operon

4.2 Lambda Operon, Tryptophan Operon

4.3 Gene regulation in Eukaryotes- I: Gene families, Gene alteration (Gene loss, Gene amplification, gene rearrangement), Regulation of synthesis of primary transcripts (gene organization that affects regulation-Activator gene; Transcriptional control by hormones, Methylation).

4.4 Gene regulation in Eukaryotes-II: Brief description of Chromatin remodeling, Enhanceosome, Reporter or Chimeric genes, Role of binding motifs in gene expression (Helix-Turn-Helix motif, Zinc finger and Leucine Zipper), miRNA.

Course Outcomes:

After Completion of the **Molecular Biology** course the student will be able to:

1. The study of molecular biology provides the necessary information about the Chemistry of life to allow the students to understand the basis of life.
2. The study of Molecular Biology stands as a tribute to human curiosity for seeking to discover, and to human creative intelligence for devising the complex instruments and elaborate techniques by which these discoveries can be made.
3. Comparative analysis of Prokaryotic and Eukaryotic cells.
4. Gain insight into the most significant Molecular and cell- based methods used today to expand our understanding of Biology.
5. Students world gain expertise in understanding the complex molecular mechanisms occurring in cell and the applications of molecular technologies for betterment of life.
6. Understand and our apply the Principles and techniques of Molecular Biology which prepares students for further education employment in teaching, basic research or the health Professions.
7. Students will acquire knowledge about replication, transcription, translation, post transcriptional and post translational modifications, gene regulation, DNA repair mechanisms and various molecular tools and techniques like PCR, southern and western blotting, recombinant DNA

technology etc. they will also know the various tools and techniques related to bacterial microbiology.

SUGGESTED READING MATERIAL:

1. Biochemistry by A.L. Lehniger
2. Cell and Molecular Biology-E.D.P. De Robertis and E.M.F.
3. Concepts in Molecular Biology-S.C. Rastogi, VN. Sharma and Ananda Tandon (1993) Genes VII by Benjamin Lewin.
4. Harper's review of Biochemistry by D.W. Martin et al1990
5. Molecular Biology by David Freifelder, 1993

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	2	-	1	2	-	-	1	1	2
CO2	2	2	2	2	1	2	2	1	1	2	1	2
CO3	3	3	3	1	1	1	1	1	2	-	-	2
CO4	3	2	1	1	2	1	1	1	1	1	1	2
CO5	3	-	1	-	1	2	1	3	1	-	2	

CORE ZOO-202: CELL BIOLOGY AND IMMUNOLOGY

While studying the **Cell Biology and Immunology** course, the student shall be able to:

Cell Biology Objectives :

While studying the **Cell Biology** course, the student shall be able to:

1. Develop deeper understanding of what life is and how it functions at cellular level.
2. To study the structure and function of the basic unit of living organisms
3. Describe cellular membrane structure and function, fine structure and function of cell organelles.
4. To study stages in cell cycle (including cell death and cancer), cell differentiation, and organelles and other cellular structures in the growth and functioning of the cell (including membrane transport and signaling).
5. Perform a variety of molecular and cellular biology techniques Students will understand the structures, positions and functions of plasma membrane and all cellular organelles in details. Examine the structure and functions of cellular organelles.
6. Gather basic concepts of Cell Biology along with various cellular functions. Comparative analysis of cellular organelles.

Immunology Course Objectives :

While studying the **Immunology** course, the student shall be able to:

1. The students will have to understand how the immune system can fight with infection and other diseases, the strategies to improve existing vaccines and how to approach these, Cellular and molecular basis of inflammatory response, mechanisms involved in control of immune response
2. The objective of the course is to apprise the students about components associated with immune system and molecular mechanism of their working.
3. The course also deals with implications of deregulation of basic regulatory networks that lead to immune system related disorders.
4. The students will be able to describe the roles of the immune system in both maintaining health and contributing to disease.
5. To provide knowledge of fundamentals of immune system and immunological basis for treatment of some common diseases.
6. Study the organs of immune system and the innate and adaptive immunity

7. To gain knowledge on antigens, antibodies and their production mechanism
8. To study the antigen antibody reactions and immunological disorders

CELL BIOLOGY

UNIT-1.

1.1.Organization of Prokaryotic and Eukaryotic cell.

1.2.Membrane structure – Lipid bi layer and two dimensional structure – Fluidity of lipid bilayer – Assembly of lipid bi layer – Membrane proteins.

1.3. Membrane transport: Active transport – Passive transport – Diffusion – Osmosis – Ion channels - Membrane pumps.

1.4.Vesicular traffic and Protein sorting: Translocation of proteins in to mitochondria – Endoplasmic reticulum and Golgi - Endocytosis – exocytosis.

UNIT-2.

2.1 Models of cell-cell signaling (steroid receptors, Nitric oxide and Carbon monoxide).

2.2 Functions of cell surface receptors (G-protein coupled receptors, Tyrosine kinases, cytokine receptors, receptors liked to other enzymatic activities).

2.3 Pathways of intracellular signaling transduction (c-AMP pathways, cyclic c-GMP, phospholipids and Ca2+, Ras, Raf and MAP kinases).

2.4 Signaling in development and differentiation (the receptors tyrosine kinase, Ras, MAP kinase pathway in Drosophila, notch signaling).

IMMUNOLOGY

UNIT-3.

3.1. Cells of the immune system: Lymphoid cells, Mononuclear cells, granulocytic cells, Mast Cells

3.2.Organs of the immune system- primary and secondary lymphoid organs, lymphatic system

3.3.Antigens: Antigenic determinants or Epitopes, Immunogenicity, Haptens, Adjuvants

3.4.Innate (Non-specific): Anatomical barriers, Phagocytosis, Physiological barriers, inflammatory barriers.

UNIT-4.

4.1 Humoral immunity: Immunoglobulins (fine structure of immunoglobulins and Classes); the complement system, Classical and alternate pathway, Inflammation.

4.2 Cell mediated immunity: Mechanism of cell mediated immunity; brief account on Antigen Presentation, Major Histocompatability complex

4.3 Antigen-antibody interactions: Affinity, Avidity, Cross-reactivity, precipitation reactions and Agglutination reactions and ELISA.

4.4 Brief account on immunological disorders:

a) Tolerance to autoimmunity

b) Transplantation

c) Immunodeficiency diseases

d) Immunization (active and passive immunity)

Cell Biology - Course Outcomes :

1. This course develops concepts in molecular understanding of structural and functional properties of cells and various processes associated which have potential applications in molecular and biochemical research
2. Students will understand the structures, positions and functions of plasma membrane and all cellular organelles in details. They will acquire knowledge about chromosomes and cell divisions, both mitosis and meiosis. They will also know about cell signaling and cancers. They will know how to measure and stain different cell types.
3. Students would gain expertise in the ultra structural information of animal cell besides the detailed views of the cell interior revealing the various events and actions of cell at the molecular level.
4. The study will help the students to understand the new discoveries about the structure and internal functioning of the cell due to technological improvements.
5. The study will help the students to increase powerful means of visualization in the field of cell biology.

Immunology - Outcomes :

After completion of the course, a student will be able to achieve these outcomes.

1. Learn the fundamental principles of immune response including molecular, biochemical and cellular basis of immune homeostasis.
2. The course will aid in understanding various aspects of immunological response and how its triggered and regulated.

3. The student will learn and understand the rationale behind various assays used in immunodiagnosis of diseases and will be able to transfer knowledge of immunology in clinical perspective.
4. The course will aid in understanding the principles of Graft rejection, Auto immunity and Antibody based therapy.

SUGGESTED READING MATERIAL:

1. An introduction to Immunology by C.Y. Rao, Narosa publishing house, 2002.
2. Cell and Molecular Biology by EDR De Robertis and EMR De Robertis Jr, Indian Edition, B.I. Publicaitons, Pvt. Ltd.
3. Cell Biology (Fundamentals and Applications) By Gupta/ Jangir, 2001; Agrobios, India.
4. Harpers Review of Biochemistry, Murray, Granier, Mayes and Rodwell, Lange Medical Publications, 25th Ed.
5. Human Physiology by Stuart Era Fox, W.M.C. Brown Publishers, USA 1984 or Recent Edition.
6. Immunology introductory textbook by Nandini Shetty, Wiley Eastern Ltd.
7. Kuby, J. (1998) Immunology, W.H. Freeman and Company, New York.
8. Roitt, I.,Brostoff, J. Male, D. (1999/2000) Immunology, 4th Edition. Harcourt Brace and Company Asia, Pvt. Ltd., Singapore.
9. The Cell (A Molecular Approach) by Geoffrey M. Cooper, 2nd Edn. 2000, ISBN.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	1	1	-	1	-	2	2	-	2
CO2	3	2	1	3	2	2	2	1	-	3	1	2
CO3	3	3	3	1	1	3	2	2	2	-	2	2
CO4	2	-	2	-	3	-	1	3	1	1	1	2

CF : ZOO-203A : NEUROBIOLOGY AND ANIMAL BEHAVIOUR

Neurobiology :

Course Objectives :

While studying the **Neurobiology** course, the student shall be able to:

1. To study the microanatomical structure of neuron
2. To describe the different types of Neurons and their organization
3. To understand the Molecular mechanism of transmission
4. To study the chemical composition of Nervous system
5. To understand the principles of different types of neurotransmitters

Animal Behavior:

Course Objectives :

While studying the **Animal Behavior** course, the student shall be able to:

1. To study the types of perception in animal behaviour
2. To study the patterns of social organization of Primates and Insects
3. To know about the Animal aggressive behaviour and homing teritoriality
4. To study in depth the patterns of Learning and Memory

UNIT-1.

1.1 Micro anatomy of neurons and types of nerve cells.

1.2 Autonomic nervous system – Sympathetic Division, Parasympathetic Division.

1.3 Bioelectrical properties of neurons (Resting membrane potential- Nearnst equation; Sodium and potassium pump; Propagation of nerve impulse.

1.4 Synapses: Structure and Integration (Types of synapses; Ultra structure of synapse Chemical transmission; Electrical transmission)

UNIT-2.

2.1 Chemical composition of the nervous system-cerebrospinal fluid-CNS barriers

2.2 Synthesis –storage-release and inactivation mechanisms and functions of the following neurotransmitters; Acetylcholine & Catecholamines (Norepinephrine,Epinephrine, Dopamine)

2.3 Amino acid Neurotransmitters-Glutamate and GABA

2.4 Neuropeptides (Oxytocin and Vasopressin)

UNIT-3.

3.1 General introduction: An over view of concept of Animal behaviour

3.2 Visual Perception, Auditory perceptionand Olfactory Perception

3.3 Animal aggression and Homing territoriality

3.4 Social organization, Advantages, Social organization in insects, primates

UNIT-4.

4.1 Conditioning Learning (Classical and Operant conditioning and, Multiple-responselearning)

4.2 Cognitive Learning (Insight Learning, Sign Learning, Latent Learning)

4.3 Kinds of remembering (Redintegrative memory –Recall – Recognition-Relearning- Retrieval process-Theories of Memory).

4.4 The nature of forgetting (Decay through disuse- Interference effects, motivated forgetting, improving memory)

Neurobiology :

Course Outcomes :

1. Learnt about structure, function and organization of Neurons in the Central nervous system
2. Understanding Electrophysiological techniques and Molecular mechanisms associated with action potentials
3. Students leant and gain knowledge on structure and function of different types of Synapses
4. Gained information on different types of Neurotransmitters i.e. Amino acids and Peptides.

Animal Behavior:

Course Outcomes :

1. Acquired knowledge on types of perception in different Animals and their importance
2. Understand the overview of Animal Behavior and prominence of social organization in insects and primates
3. Gained lot of information on different types of Learning phenomenon and their mechanisms.

SUGGESTED READING MATERIAL:

1. Basic Neurochemistry-G.J. Siegal, RW. Albers, B.W. Agranoff, R Katzman (1981) Little, Brown and company. Boston.
2. Introduction to Nervous system- T.H. Bullock, R Cork, A. Granner (1977); W.H Free-man&Co.
3. Mechanism of Drug Action on the Nervous SystemM.A.B. Brazil, RW. Ryall. (1979), Cambridge University Press. Cambridge, London and New York.
4. Neuro anatomical Techniques, N.J. Stransfed and T.A. Miller Springer Verlag, New
5. Neurobiology. Shepherd, G.M. Oxford University press, London.
6. Principles of Neural Science -E.R Kandel and J.H. Schwertz. (1981); Elsevierl North Holland. NY. Oxford.
7. Principles of Neuro Phychopharmacology- Robert S. Feldman, Jerrold S. Meyer and Lind F. Quenzer. Sinauer Associates, Inc. Publishers. Sunderland. Massachusetts.
8. The Bio Chemical basis of Neuropharmacology-J.R Cooper, F.E. Bloom, &RH. Roth. (1982); Oxford University Press, NY and London. York Heidelberg, Berlin, 1980.
9. Alcock, J. Animal behaviour: An evolutionary approach. Sinauer Assoc., Sunderland, Mass. USA.
10. An introduction to genetic analysis. Griffiths, A.J .F., J.B. Miller, D.T. Suzuki, R.C. Lewontin & W.M. Gelbark, W.H. Freeman and Company, New York.
11. Bradbury, lW. and S.L.Vehrencamp. Principles of animal communication. Sinauer Assoc. Sunderland, Mass. USA.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2
CO5	3	1	2	-	-	1	-	1	-	2	2	2

CF : ZOO-203B : BIOINFORMATICS AND BIO STATISTICS

Bioinformatics:

Course objectives:

While studying the **Bioinformatics** course, the student shall be able to:

1. The main objective of the course is learning and understanding the detailed developments and applications of the field of Bioinformatics in varied area of biological research.
2. This course generally focuses on Genomics, Proteomics and Computational biology studies and their relevance on research platform.
3. To learn the fundamentals of Computational Biology.
4. The course is designed in such a way that the students get the confidence to use computer programs for the daily design of experiments, data collection and analysis of results.
5. It involves the integration of Computers, Software tools and Databases in an effort to address biological questions. It involves different tools to unwrap different biological functions arise during study.
6. To study different methods of data processing.
7. To develop skills of data handling using computer.
8. To study the different outline databases of biological information.
9. To learn about different data representation methods.
10. To study the different DNA and Protein analysis software.

Biostatistics:

Course objectives:

1. This course will be helpful in the learning and understanding the applications of various biostatistical methods and tools in research.
2. Students studying this course will be able to perform the data analysis using Statistical tools available on any computer such as Excel as well as the programmes for big and complex data.
3. Students gain knowledge on scope and importance of biostatistics.
4. Students learn and practice various statistical methods used in Zoological studies and research.

UNIT-1.

1.1 Scope, importance and status of Bioinformatics.

1.2 Internet basics, Tools for web search, Data retrieval tools,.

1.3 Sources of websites.

1.4 Data base types-primary, secondary and specific annotation databases

UNIT-2.

2.1 Database types, Prediction of protein structure and protein folding, Protein sequence databases.

2.2 Prediction of gene structure, Functional genomics, Genomic databases

2.3 Submission of sequence to the database, Homology, BLAST- Types of BLAST

2.4 Phylogenetic analysis, Human genome project

UNIT-3.

3.1 Definition of statistics: Biostatistics, classification, variables and attributes, Diagramatic distribution of biological data.

3.2 Measures of location and dispersion: Arithmetic mean, median and mode. Mean deviation, quartile deviation, Standard deviation and co-efficient of variation.

3.3 Curve fitting: Fitting strait line, parabola exponential curve and geometric curve to the data. Fitting of straight line using Ms-Excel.

3.4 Correlation and regression: Scatter diagram, types of relationship. Positive and negative correlation, computation of correlation coefficient, Interpretation of correlation coefficient. Simple regression lines and its interpretation.

UNIT-4.

4.1 Normal probability distribution & its applications.

4.2 Tests of significance: level of significance, null and alternative hypothesis, power of test and p-value of a test.

4.3 Student t- test for one a sample and two samples means-paired t-tests.

4.4 F-test, chi square test and their application, concept of ANOVA.

Bioinformatics :

Course Outcomes:

1. It provides information to the students about database and Computer science into the area of Biology for the purpose of studying and processing genomic information as well as other forms of biological information.
2. Familiar with various Applications of Bioinformatics by exploring the fundamentals of computer applications in Biology.
3. Describe different methods of data handling using computers.
4. Feed and tabulate raw data using computer.
5. Explain and perform data representation using digital methods.
6. Access and download relevant information from different online databases of biological information.
7. Perform basic operations of gene sequence retrieval and compare them using different software.
8. Perform basic operations of protein structure retrieval and comparison using different software.
9. The student will learn about the Computer basics like Operating systems, Programming, Data Access, Internet and Nucleic acid Sequence and Protein Data Banks.
10. The course will help to understand the Database similarity searches like BLAST, FASTA etc. Multiple sequencing alignments, Primer designing, Homology modeling, Phylogenetic analysis & Drug designing and Determination of Secondary and Tertiary structure of proteins.

Biostatistics :

Course Outcomes:

1. Came to know the data collection, tabulation and presentation.
2. Described the mean, median, mode and SD.
3. Understood the Analysis of Variance.
4. Described student ‘t’ test and probability.
5. Understood the Correlation and Regression.
6. The student will learn the basics of handling of data, measures of Central tendency like Mean, Median and Mode, Measures of dispersion like Mean deviation and Standard deviation and Co-efficient of Variation.
7. The course will aid in learning Test of significance like Null hypothesis and Alternative hypothesis, t-test, F-test, Chi-square test, Correlation and Regression analysis.

SUGGESTED READING MATERIAL:

1. Basic Bioinformatics by S. Ignacimuthu, s. j. Narosa publications, 2005.
2. Bioinformatics by Andreas D. Baxevanis and B.P. Francis Ouellette, 2nd Ed., 2002.
3. Bioinformatics, Methods and Applications, Genomics proteomics and drug discovery, S.C. Rastogi, N. Mendiratla and P. Rastogi, prentice-Hall ofIndia, 2004.
4. Bioinformatics. Murthy, C.S.V. Himalaya Publishing House, Hyderabad.
5. Computers to-day by Suresh K.Basandra (1999), Published by Galagotia publications, Pvt.Ltd., New Delhi.
6. Database processing by D.M. Kroenke, Galgotia publications, 1990.
7. Introduction to Bioinformatics, S. Sundara Rajan and R. Balaji, Himalaya Publishing House, 2003.
8. Microsoft Office, by Setultz, 1997.
9. Bio-Statistics- An introductory text-Goldstein, A The Macmillan Co., New York, 1971.
10. Biostatistics by Lewis Alvin (1971) Affiliated East West Press pvt., Ltd., New Delhi.
11. Bio-Statistics- By Lewis Alvin E. Affiliated East-West press (P) Ltd., 1971.
12. Interpretation and uses of Medical Statistics – G.J. Bourke & J.Mc.Gilvaray, Blovkwell Science Publication,London, 1969.
13. Introduction to Biostatistics – By Sokal – Rohlf (2nd Edn) Freeman International Editor (1973).
14. Introduction to Biostatistics by Holdan Bancroft (1962) Pual B.Hoebar Inc., New York.
15. Introduction to Instrumental analysis, Ronert Braun. McGraw Hill Intemational edition.
16. Principles and techniques of Biochemistry and molecular biology by Kein Wilson and John Walker, VII volume, Cambridge press Edition.
17. Probit Analysis by Finney, D.J.S. Chand & Co., Ltd., New Delhi.
18. Statistical analysis in Biology by Mather, K Chapman and Hall, London, 1972.
19. Statistical methods in Biology by Bailey Norman T.J.(1965) The English Language Book Society & The English University press Ltd.,

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	1	-	-	-	1	1	-	-
CO2	3	3	2	-	-	-	1	1	2	2	1	1
CO3	3	2	-	1	2	1	-	-	1	-	-	1
CO4	3	1	1	1	1	1	-	1	-	2	-	1

EF ZOO-204A: ENZYMOLOGY

Course Objectives:

While studying the **Enzymology**, the student shall be able to:

1. To study the Nomenclature and Classification, Enzyme specificity, Enzyme Catalysis and Enzyme purification mechanisms
2. To study the Enzyme Kinetics mechanisms and impact of several parameters
3. To study the different mechanisms of Inhibitions and their implications at cellular level
4. To study the Enzyme Regulatory mechanisms
5. To study the Clinical aspects of Enzymology and diagnosis
6. To study the Enzyme Engineering Principles
7. To understand the Enzymes in industrial use – Biotechnological implications

UNIT-1.

1.1 Historical Background, overview and specific examples, nomenclature and classification of enzymes–IUB system, chemical nature and properties of enzymes.

1.2 Enzyme specificity (Absolute specificity, Group specificity, Broad specificity).

1.3 Enzyme catalysis, Quantitative measurement of enzyme activity, Assay of enzyme activity-units of enzyme activity.

1.4 Isolation and purification of enzymes, intracellular distribution of enzymes.

UNIT-2.

2.1 Theories of enzyme kinetics - kinetic theory and collision theory.

2.2 Enzyme kinetics and its importance, derivation of Michaelis-Menton equation, Methods of Vmax and Km determination, construction of Line weaver burk plots.

2.3 Effect of reactant concentrations (Rate constant, First order, Second order and Zero order kinetic reactions, Ramachandran plot, determination of slope).

2.4 Effect of Temperature, pH and enzyme concentration on reaction rate.

UNIT-3.

3.1 Inhibition of enzyme activity (competitive, non-competitive, uncompetitive and mixed inhibition).

3.2 Kinetics of allosteric enzymes.

3.3 Regulation of enzyme activity (Metabolic regulation), Catalytic efficiency of enzymes (feed back inhibition, covalent modification).

3.4 Mechanism of enzyme action (Lock and Key, Induced fit model), catalytic site, role of metal ions.

UNIT-4.

4.1 Clinical Aspects of enzymology, Medical and Therapeutic applications of enzymes; Enzymes-Clinical diagnosis.

4.2 Immobilized enzymes, various methods of immobilization-ionic bonding, absorption, covalent bonding (based on R groups of amino acids).

4.3 Iso enzymes and multiple forms of enzymes.

4.4 Enzyme engineering–economic importance of enzyme production. Enzymes in industries- food, biotechnology and other industries.

Enzymology:

Course Outcomes :

1. Students learn about enzymes. Their classification and nomenclature
2. Students learn about specificity of enzymes
3. Students learn about measurement of enzymatic activity
4. Students learn about isolation, purification of enzymes and intercellular distribution enzymes
5. Students learn about kinetic and collision theories
6. Students learn about mechanisms of enzyme action
7. Students learn about effect of reactant concentration
8. Students learn about effect of enzyme concentration, pH and temperature
9. Students learn about kinetic constant and determination of kinetic constants
10. Students learn about types of inhibitory mechanisms of enzymes
11. Students learn about kinetics of Allosteric enzymes
12. Students gain knowledge about regulation of enzyme activity with respective mechanisms
13. Students learn about mechanism of enzymes in clinical diagnosis and their applications

14. Students gain knowledge about immobilization of enzymes, applications of immobilized enzymes
15. Students gain knowledge about isoenzymes and their applications
16. Students learn about enzyme engineering, process of enzyme engineering and their applications

SUGGESTED READING MATERIAL:

1. Biochemical calculations. I.H. Segel, 2nd Ed., John Wiley & Sons.
2. Biochemistry. D. Voet & J.G. Voet, J.Wiley & Sons.
3. Enzyme Kinetics. I.W. Segil.
4. Enzyme Kinetics. D.V. Roberties, Cambridge University Press.
5. Harper's Biochemistry. Robert K. Murrey, Peter A. Mayer, D.K. Granner, V.W. Rodwell, Lange Medical.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2
CO5	3	1	2	-	-	1	-	1	-	2	2	2

EF ZOO-204 B: PATHOBIOLOGY

Course Objectives:

While studying the **Pathobiology** course, the student shall be able to:

1. To learn about communicable and non-communicable diseases in humans.
2. To learn about pathological agents causing disease in man.
3. To study parasitic diseases in man and farm animals.
4. To understand biology of disease carrying vectors and their mode of transmission of pathogens.
5. To learn about changes taking place in human body upon infection by pathogens.
6. To study the major types of parasites of medical & veterinary importance.
7. To understand the basics of identification of common parasites of humans and animals.
8. To design and evaluate an intervention to control food and waterborne diseases.
9. To understand and evaluate epidemiological studies in different disease.

UNIT-1.

1.1 Disease and injury (communicable and non-communicable)

1.2 Local and systematic reactions of injury

1.3 Cellular reactions to injury

1.4 Inflammation and Immunological reactions

UNIT-2.

2.1 Important human and veterinary parasites (Protozoan and helminthes)

2.2 Life cycle and biology of plasmodium, Trypanosoma, Ascaris, Schistosoma and Leishmania

2.3 Symptoms of the disease caused parasites

2.4 Host - Parasite interactions

UNIT-3.

3.1 Biology of house flies (Musca domastica) and mosquitoes (Culex, Anaphiles)

3.2 Arthropods as vectors of human diseases (Mosquitoes, Lice, Flies and Ticks)

3.3 Mode of transmission of pathogens by vectors

3.4 Vector Control methods- Chemical-, Physical-, Biological and Environmental control.

UNIT-4.

4.1 Biochemical and micro chemicals studies.

4.2 Changes in the blood during infection & disease

4.3 Types of anaemia, Biochemical and Microscopic changes.

4.4 Molecular basis of Hemophilia.

Course Outcomes:

1. Explain about the different pathogens causing disease in man.
2. Describe the different parasites causing disease and disability in man and animals.
3. Ability to elaborate about the life cycle and biology of disease carrying vectors; suggest preventive and control measures for the said diseases.
4. An understanding of the relationship between changes in physiology of host and Progress of pathogenesis in human beings and animals.
5. The students after completion of the course based on the Expertise he/she may join as Parasitological Scientist.
6. May join as Parasitologist in the State and Central Government Public Health Programmes as Officer

SUGGESTED READING MATERIAL:

1. Animal parasites, their life cycles and ecology - O. W. Oslsen.
2. Clinical Haematology - Dy. L. Aksencu &A. Dranaikota, 1972.
3. Principles of Pathobiology - Lavia, Mariano F.Hill, Rolla B. Oxford University Press, London, 1975.
4. Text book of Pathology - an introduction to medicine 6th edition Philadelphia. Lea & Febiger, 1953.
5. Veterinary clinical pathology, E.H. Coles D 1967.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2

ZOO- 205P : ZOO-201 (Core) & ZOO-203A or ZOO-203B (CF)

ZOO- 206P: ZOO-202 (Core) & ZOO-204A or ZOO-204B (EF)

AUDIT COURSE

ZOO-207: HUMAN VALUES AND PROFESSIONAL ETHICS – II

Course Objectives :

1. To afford fundamentals on Human values and professional Ethics in day to day life.
2. To know the Value Education and concept of human values in depth through suitable examples.
3. To provide knowledge on the Medical and Business ethics
4. Application of Human values and professional Ethics in lives for better living.
5. To know the role of ethical values in Environment.

I Value Education- Definition – relevance to present day - Concept of Human Values – Self introspection – Self esteem. Family values - Components, structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

II. Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

III. Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions. Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

IV. Environmental ethics- Ethical theory, man and nature – Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

V. Social ethics- Organ trade, Human trafficking, Human rights violation and social disparities Feminist ethics, surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television Movies and Internet.

Course Outcomes :

1. Student will know the values of ethics in various fields including medical, social and business ethics.
2. The student will be enriched with several aspects pertaining to Human values and performing of Professional Ethics in day today life.
3. Introduction of several Natural values to be performed by Humans to lead a good and Peaceful life.

SUGGESTED READING MATERIAL:

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics – integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. "Ethics in management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian system of Duties: Religious and Civil(ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol. I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr. Dr. Ram Kraran Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I,II,III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H. Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad. I.C. Sharma Ethical Philosophy of India. Nagin & co Julundhar

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	1	3	-	1	-	2
CO2	2	-	-	2	-	-	-	-	-	1	1	2
CO3	1	1	-	1	1	1	1	2	2	-	-	2
CO4	1	1	1	-	-	-	1	1	1	1	-	-

CORE ZOO-301: DEVELOPMENTAL BIOLOGY

Course Objectives:

While studying the **Developmental Biology** course, the student shall be able to:

1. The main objective of Developmental Biology course is to provide four-dimensional thinking of students to truly understand the patterns and process of embryonic development, body plan, fate map, induction, competence, regulative and mosaic development, molecular and genetic approach for the study of developing embryo which is not necessarily shared with any other disciplines in the biological sciences. The relevance of Developmental Biology to the study of human disease will be exemplified throughout using different model organisms.
2. Acquire knowledge on the fertilization and morphogenetic movements in the developing embryo.
3. To understand the embryo organizer, inductions and differentiation.
4. To study gametogenesis, fertilization, cleavage and gastrulation, stages in developing embryo.
5. To acquaint students with basic knowledge of experimental embryology.

UNIT-1.

1.1 Potency, commitment, specification, Induction, Competence, Determination and differentiation of embryonic cells.

1.2 Embryonic stem cells, origin and mechanism of Cell lineage, Fate maps.

1.3 Imprinting; Mutants and transgenics in analysis of development.

1.4 Genomic equivalence, cytoplasmic determinants and Nuclear transplantation experiments.

UNIT-2.

2.1 Origin and migration of germ cells; production of gametes and establishment of polarity.

2.2 Fertilization; Cell surface molecules in sperm egg recognition in animals; Molecular events of post fertilization.

2.3 Cleavage types, Blastula formation, Gastrulation and Molecular mechanism in germ layers formation.

2.4 Environmental regulation of normal development.

UNIT-3.

3.1 Axis and pattern formation in Drosophila, Amphibia and Chick.

3.2 Cell aggeregation and differentiation in dictyostelium.

3.3 Organogenesis- vulva formation in caenorhabditis elegans, eye lens induction.

3.4 Development in tetrapod Limb (Amphibians) and Neural fold formation.

UNIT-4.

4.1 Sex determination in animals (mechanism of primary and secondary sex determination) Hormonal regulation of sexual phenotypes.

4.2 Regeneration - types of Regeneration; Axial patterning during Regeneration. Metamorphosis-hormonal regulation of metamorphosis in insects and amphibians.

4.3 Ageing and senescence- Reactive oxygen species and cell senescence; dietary restriction and anti aging action: genetic control of longevity; Age related diseases.

4.4 Programmed cell death- Incidence of Apoptosis; Apoptosis during animal development; Apoptosis in metamorphosis and morphogenesis; Apoptosis during limb development: Biochemical and molecular mechanisms involved in Apoptosis.

Course Outcomes:

1. Developmental Biology displays a rich array of material and conceptual practices that can be analyzed to better understand the scientific reasoning exhibited in experimental life sciences. Based on learning contents of embryology, students can have a systematic and organized learning about the knowledge and concepts of growth and development.
2. Students would gain expertise in explaining how a variety of interacting processes generate an organism's heterogenous shapes, size and structural features that arise on the trajectory from embryo to adult or more generally throughout a life cycle.
3. Gains knowledge about gametogenesis, cleavage mechanisms, gastrulation and role of hormones in metamorphosis and regeneration.
4. After learning the development of life from cell to multicellularity complex and coordinated systems in organisms the students can apply this knowledge for research, and education, to solve the problems related to development in animals through research.

5. Developmental Biology enquires about the fundamental processes that underpin the fertilization of an egg cell and its step-by-step transformation into the fascinating complexity of a whole organism.
6. Students will also understand that cells only express a proportion of their genome, and that differential gene expression underlies cell differentiation and any alteration in the entire process of development leads to devastating diseases.
7. Students would have a systematic and organized learning about the knowledge and concepts of growth and development of organisms. Developmental Biology displays a rich array of material and conceptual practices that could be analysed to better understand the scientific reasoning exhibited in experimental life sciences.
8. To understand the overall chronology of the development and the role of various morphogens (protein/mRNA) in specification and determination of various organs and body axis formation.

SUGGESTED READING MATERIAL:

1. Austen, C.R. and Short, R.V. Reproduction in Animals
2. Ethan Bier The Coiled Spring Harlsor Laboratory Press, NewYork
3. F.T. Longo, Fertilization, Chapman & Hall
4. Molecular Developmental Biology – 2008, T. Subramonian, Narosa Publishing House
5. R.G. Edwards, Human Reproduction
6. S.F. Gillbert, Developmental Biology, Sinauer Associates Inc., Massachusetts
7. Schatten and Schatten. Molecular Biology of Fertilization.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	-	-	2	1	-	-	-	-	1
CO2	3	1	1	-	-	1	-	2	-	1	1	1
CO3	3	1	-	-	-	2	1	-	1	-	-	2
CO4	3	1	1	1	1	2	-	2	-	1	1	2

CORE ZOO-302: ENVIRONMENTAL BIOLOGY

Course Objectives:

While studying the **Environmental Biology**, the student shall be able to:

1. The objectives of the course are to develop the ability to solve the problems related to the environment, to make them aware of various eco-friendly techniques and modern techniques to solve various environment-related problems.
2. The objective of this course is to make awareness among the young students about the surrounding environment, the impact of climate change and its mitigation and biodiversity.
3. The aim of the contents of this course is to introduce and explain about various conservation issues of the ecosystem and animals.
4. Man himself is a part of ecosystem. The ecosystems in the world are continuously under the pressure of anthropogenic activities and human mediated ecological changes. Several animal species are under the survival threats. To introduce the students about wildlife and wild habitats, about depleting wild life and human wildlife conflict.
5. Generate an interest in Ethology in order to understand the complexities of both animal and human behavior.
6. To understand the basic theories and Principles of Ecology.
7. To learn about current environmental issues based on Ecological principles.
8. To study Environmental pollution and their management.

UNIT-1.

1.1 A general account on Biomes and their environments.

1.2 Fresh Water: Classification and Characteristics, eutrophication, seasonal changes.

1.3 Marine: Classification and Characteristics.

1.4 Terrestrial: Forests – Grass lands – Tundra – Desert.

UNIT-2.

2.1 Trophic dynamic view of ecosystem and energy flow.

2.2 Ecological Energetics and productivity of ecosystems.

2.3 Impact of environmental factors on Energy flow.

2.4 Bioaccumulation and Biological magnification.

UNIT-3.

3.1 Air Pollution: Criteria and standards in India, health hazards and Toxicology – Green house gases and Green House Effect.

3.2 Water Pollution: Criteria and standards in India, health hazards and toxicology.

3.3 Role of environmental epidemiological studies and health indices in evaluation of environmental health hazards: environmental epidemiological episodes in India and Abroad.

3.4 Environmental Laws; Environmental Laws in India – legislation and Execution.

UNIT-4.

4.1 Biomonitoring,.

4.2 Bio indicators and environmental monitoring, Environmental impact assessment.

4.3 Bioremediation: Need and scope of bioremediation, Environmental applications of bioremediation. Future outlook of Bioremediation: Phytoremediation, Biotechnological cleaning up of the environment by plants.

4.4 Natural calamities and disaster management.

Course Outcomes:

1. The student will get idea about the ecological process in its surrounding and at National and Global level and the use of student knowledge on Ecology, Behaviour can be applied to Education, Research and Extension programmes in his further career.
2. Students will be understanding the various features and aspects of population ecology, community ecology and ecosystem ecology. They might have the knowledge about environmental biology in details. They will acquire knowledge about various tools and techniques of field ecology.
3. Students will be able to apply the scientific method and quantitative techniques to describe, monitor and understand environmental systems.
4. Students will be able to use interdisciplinary approaches such as ecology, economics, ethics and policy to devise solutions to environmental problems.
5. Students will be able to be proficient in ecological field methods such as wildlife survey, biodiversity assessment, mathematical modeling and monitoring of ecological systems.

6. Students will be able to use technology, such as geographical information systems and computer programming, to assist in problem solving.
7. This paper will help in creating skilled personnel in the field of environment protection and research.
8. Demonstrated an understanding of Ecological relationships between organisms and their environment.

SUGGESTED READING MATERIAL:

1. Animal Physiology - Adaptation & Environment. 4th EditionKnut Schmidt - Nielsen - Cambridge University Press.
2. Biochemical ecology and water pollution - PR Dugan, plenum press, London, 1972.
3. Biodegradation & Bioremediation - 2nd editon, Martein Alexander - Academic Press, 1999 USA.
4. Chemical and biological methods for water pollution studiesR.K. Trivedy and P.K. Goel, 1984.
5. Current pollution researches in India - RK. Trivedy and P.K. Goel. Karad.
6. Ecology & Environment - P.D. Sharma, 1991.
7. Ecotechnology for pollution control and environmental management, enviromedia, Karad, RK. Trivedi.
8. Encyclopedia of environmental pollution and control, enviromedia, Karad, Vol. 1 &2, R.K Trivedi.
9. Environmental Biology and Toxicology-P.D. Sharma, Rastogi Publications, Meerut (India), 1998.
10. Environmental Physiology of desert organism. Ed.by N.F. Hadley - Dowden Huchinson and Ross, Inc.Penn.USA.
11. Environmental Science Research Volumes: Vol.1. Indicators of environmental quality - W.A. Thomas, 1972. Vol.3. Environmental pollution by pesticides - C.A. Edwards, 1974.
12. Field Biology & Ecology - Allen H Benton & E. Werner, JR, 1980.
13. Health hazards and human environment, World Health Organization (WHO) 1972.
14. Industrial Pollution - VP. Kudesia, 1990.
15. Methods in Environmental Analysis - Water soil and air by P.K. Gupta - Agrobios (India), Jodhpur, 2001
16. Pesticides in the environment - R White Stevenns, MarcelDekker Inc. New York, 1971.
17. Practical methods in Ecology & Environmental Science, RK. Trivedy, Goel, Trisal, 1997.
18. The Ecology of waste water treatment - H.A. Hawkes pergoman press, 1963a. Vol.5 Environmental dynamics of pesticides - R. Hague and V.H. Preed, 1975.
19. Water Treatment and purification technology - W.J. Ryan, Agrobios (India), Jodhpur, 2002.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	-	-	2	-	-	-	-	-	2
CO2	3	2	-	1	-	2	1	3	2	2	1	1
CO3	3	2	-	1	-	2	-	-	1	-	2	2
CO4	3	-	1	2	1	2	-	1	-	2	1	2
CO5	3	-	1	-	-	1	2	1	-	2	2	2

GENERIC ELECTIVE ZOO-303A ANIMAL BIOTECHNOLOGY

Course objectives:

While studying the **Animal Biotechnology** course, the student shall be able to:

1. To introduce a detailed achievements of Biotechnology, Genetic Engineering and r-DNA technology principles.
2. To gain knowledge on cloning vectors and their uses in gene cloning technologies.
3. Principles of Cloning strategies and screening analysis of Re-combinations.
4. To apply principles of Biotechnology concepts in veterinary sciences i.e. production of Transgenic animals, Artificial insemination, Invitro fertilization, Embryo transfer technology.
5. Application of Biotechnological principles in Medicine and Gene transfer techniques.
6. To understand the uses of Fresh and marine pearl culture technology, IPR, Patents and Copyrights.

UNIT-1.

1.1 General Introduction and Achievements of Biotechnology

1.2 Enzymes used in gene cloning - Restriction endonucleases, DNA ligases, Kinase, Phosphatase, Nucleases, Polymerases, Reverse transciptase

1.3 Cloning vectors (Plasmids, Phages, cosmids, yeasts Shuttle vectors), viral vectors (SV40, Adenovirus and Baculovirus) used in Gene cloning.

1.4 Cloning and selection strategies of recombinants (antibiotic selection, blue white screening, colony hybridization, Fluorescence in-Situ Hybridization (FISH) and immunological test.

UNIT-2.

2.1 Preparation of cell lines, types of cell lines. Types of Stem Cells, Stem Cell Therapy

2.2 Applications of cell culture in Veterinary– Disease diagnosis, virus vaccines,hormones

2.3 Application of Biotechnology in Medicine- Production of monoclonal antibodies (Hybridoma technology), Production of vaccines and Production of Growth Hormone

2.4 Gene therapy: Introduction, principle of gene transfer and examples (Adenosine deaminase deficiency disease, Duchenne Muscular dystrophy disease and Cystic fibrosis)

UNIT-3.

3.1 Livestock improvement: Manipulation of reproduction in animals (Artificial insemination, multiple ovulations, *in vitro* fertilization, Embryo transfer technology)

3.2 Methods of gene transfer – Microinjection, electroporation, lipofection and viral mediated gene transfer techniques

3.3 Generation of chimeric, transgenic and knockout mice and other animals and their characterization. Gene editing- Gene silencing-CRISPR-associated protein-9 nuclease (Cas9) technology

3.4 Potential application of transgenic animals: models for various diseases/disorders, production of peptides and proteins of biopharmaceutical interest (molecular farming)

UNIT-4.

4.1 Growth hormone transgenics and stem cell technology for betterment of aquaculture. Sex reversal in fishes and their applications, Production of monosex populations. Aquaculture and fish seed production: Hypophysiation, hCG injections

4.2 Marine bio/fish resources and its applications in pharmaceutical and Nutraceutical Industries

4.3 Fresh water and marine (oyster) pearl culture technology, pearl culture in India, uses of pearl culture

4.4 Intellectual Property Rights: Introduction; Types of IP; Patents and its types, Trademark Copyright & Related Rights, Protection of GMOs; ethical and legalissues in biotechnology.

Course Outcomes:

1. Imparts the knowledge to cells lines and stem cells in culture media.
2. It gives insight into various cell/ tissues culture techniques and their applications
3. Understanding of in vitro culturing of organisms and production of transgenic animals.
4. Understanding of cloning of mammals, large scale culture and production from recombinant microorganisms and cloning vectors.
5. This insight allows students to take into consideration about ethical issues involved in production of transgenic animals and BT products.
6. Use in gene transfer technology, genetic manipulations and in a variety of Industrial processes and prominence of IVF, Artificial insemination and embryo transfer techniques.

7. Gives knowledge to culture of animal cells and its culture medium.
8. Learn basic concepts and principles of recombinant DNA technology, Gene manipulation for transgenic animal production and therapeutics/ vaccine production.
9. Provides knowledge on Livestock, improvement aquaculture and pearl culture
10. Provides knowledge on Intellectual property rights and genetically modified organisms

SUGGESTED READING MATERIAL:

1. A text book of Biotechnology-RC. Dubey.S.Chand & Company Ltd., New Delhi -1996.
2. A text book on Biotechnology-(n Ed.) H.D. Kumar. EWP - Private Ltd., New Delhi -1998.
3. Animal Biotechnology-M.M. Ranga, Agrobios (India), 2000.
4. Biotechnology-Fundamentals & Applications-S.S .Purohit & S.K. Mathur, Agro Botonics-1999.
5. Biotechnology-V. Kumaresan. Saras Publication-1994.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2
CO5	3	1	2	-	-	1	-	1	-	2	2	2

GENERIC ELECTIVE ZOO-303B: MICROBIOLOGY

Course Objectives:

This course enables the students to:

1. Establish an understanding of the basic techniques (concept of aseptic work, cultivation and identification) in microbiology
2. Describe different aspects of microbial nutrition and growth
3. Describe microbial interactions and their significance in environment
4. Describe microbial interactions and their significance in agriculture, food and pharmaceuticals
5. Describe nonspecific body defenses and the immune responses and apply this understanding to the infectious disease process as well as the prevention and control of infectious diseases
6. Develop and execute oral and writing skills necessary for effective communication of the course, the ability to think critically regarding a topic and the delivery of scientific principles to both scientists and non-scientists community

UNIT-1.

Techniques in Microbiology & Microbial Diversity: Microscopy, Staining in Microbiology, sterilization, Pure culture Methods, Culture Media and its types, Micrometry, Air Sampling, Waste water analysis, Measurement of Microbial Growth, Types of microorganisms, Methods of identification of microorganisms

UNIT-2.

Microbial Nutrition and Growth: Nutritional and Growth Factors requirement of microorganisms, Nutritional Types of Microorganisms, Uptake of Nutrition, Microbial Growth, Influence of Environmental Factors of Growth, Batch Culture, Continuous Culture, Synchronous Growth, Fed-batch Culture. Control of microbial growth by physical and chemical agents

UNIT-3.

Environmental Microbiology: Distribution of Microbes in Air and water, Allergic disorders by air microflora, air sampling, Water treatment, Bacteriological analysis of water, Bioleaching, Bioremediation, Agricultural Microbiology and Industrial Microbiology: Plant-microbes interactions,

Microbial Biodeterioration of agricultural products, control of microbes and safe storage of agricultural products, Biofertilizers, industrially important micro-organisms, secondary metabolites from micro-organisms, Microbiology of foods, Single cell Protein

UNIT-4.

Medical Microbiology: Diseases caused bacteria, virus, fungi, and protozoans; Fungal diseases, Host parasite interaction-recognition and entry process of different pathogens in plants and animals, Toxins produced, Vaccines, Anti-microbial agents, Antibiotics and disinfectants, National Immunization Programme.

Course Outcomes: At the end of the course, a student should be able to:

1. Identify microbiological techniques, the defining characteristics of the major groups of microorganisms and apply to study microbial phylogeny
2. Classify the nutritional types of microorganisms and measure microbial growth
3. Evaluate how microorganisms interact with the environment in beneficial or detrimental ways
4. Assess impact of plant- microbe interaction on agriculture in both beneficial and detrimental ways. Identify industrially important microbes
5. Determine ways in which microorganisms play an integral role in disease, and the microbial and immunological methodologies are used in disease treatment and prevention
6. Apply the scientific method by stating a question; researching the topic; determining appropriate tests; performing tests; collecting, analyzing, and presenting data and effective communicate with both specialist and non-specialist audiences/community

SUGGESTED READING MATERIAL:

1. Willey, Sherwood, Woolvertan, Prescott/Harley/Klein's Microbiology, 7th Ed., TMH, 2007
2. Tortora, Microbiology: an Introduction, 12th Ed., Pearson, 2016
3. Frazier and Westhoff, Food Microbiology, 4th Ed., TMH, 1995
4. Pelczar, Chan and Krieg, Microbiology, 5th Ed., McGraw Hill, 1985
5. Stanier, General Microbiology, 1st Ed., MacMillan, 1958
6. Alexander, M. (1977). Introduction to Soil Microbiology .New York: John Wiley & Sons. Atlas, R. M. (1984).

7. Microbiology, Fundamentals and Applications. Macmillan. Atlas, R. M. & Bartha, R. (1997). Microbial Ecology: Fundamentals and Applications, 4 th ed. Benjamin/ Cummings. Black, J. G. (2001).

8. Microbiology: Principles and Explorations, 5th ed. John Wiley & Sons, New York. Campbell, R. (1983). Microbial Ecology. 2nd ed. Oxford, Blackwell.

CO-PO mapping

Course	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2
CO5	3	1	2	-	-	1	-	1	-	2	2	2

SKILL ORIENTED COURSE ZOO-305: ECONOMIC ZOOLOGY

Course objectives:

While studying the **Economic Zoology** course, the student shall be able to:

1. To identify various Methodologies and Perspectives of applied branches of Zoology for the possibilities of Self-employment.
2. To study the economic importance of Animal husbandries, Vermicompost technology, Sericulture, Apiculture etc.
3. To know the technical practices of Aquaculture, Sericulture, Apiculture, Animal husbandries, Vermicompost technologies.
4. To gain disease management technologies their adaptation in the Fisheries, Apiculture, Sericulture, Poultry etc.

UNIT-1.

1.1. Introduction to Aquarium Fish Keeping The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes

1.2. Biology of Aquarium Fishes Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish, Use of live fish feed organisms. Preparation and composition of formulated fish feeds

1.3. Fish Transportation and Aquarium Maintenance Live fish transport - Fish handling, packing and forwarding techniques.

1.4. General Aquarium maintenance–budget for setting up an Aquarium Fish Farm as a Cottage Industry

UNIT-2.

2.1 History, scope and status of Sericulture Industry in India.

2.2 Species of silkworm, life history of mulberry silkworm and tasar silkworm(Eri0.

2.3 Silk worm diseases-.

2.4 Brief idea of cocoon processing for silk fabric - cocoon boiling, reeling, rereeling, winding, doubling, twisting and weaving

UNIT-3.

3.1 Types of honey bees.

3.2 Life cycle, culture of honey bees using movable frame hive.

3.3 Methods of bee keeping, enemies of bees.

3.4 Bye products of Honey bees and its economic importance.

UNIT-4.

4.1 Lac culture – Lac insect, Laccifera lacca - Life cycle, Lac processing, Lac products and Economic Importance.

4.2 Pearl culture and Pearl Industry. Vermiculture and Composting technologies

4.3 Economics of Poultry keeping: Morphology of different breeds of Chicken-Brooding and Rearing of Chicks-Processing of Egg, Meat and By-Products of Poultry.

4.4 Dairy farm management, Milch breeds. Draught breeds, Dual purpose breeds and New Cross breeds of Cows and Buffaloes in India.

Course Outcomes:

After the completion of the **Economic Zoology**, the student will be able to:

1. Exploring of various concepts and the importance of Economic Zoology.
2. Creating the self-employment opportunities to rural students through Animal husbandry, Aquaculture, Vermiculture and Sericulture.
3. To understand the significance of Economically important animals including cultivable Fishes, Prawns and their culture practices.
4. Identification of Animal pathogenic diseases in Fisheries, Sericulture, Apiculture, Aquaculture and their management strategies.
5. Introducing technologies pertaining to Pearl culture, Vermicomposting, Poultry keeping, Dairy farm management.

SUGGESTED READING MATERIAL:

1. Sukla, G.S. and Upadhyay, V.B., 2000 Economic Zoology – ISBN – 81-7133-137-8 Rastogi Publications, Meerut, India.
2. Jawaid Ahsan and Subhas Prasad Sinha, 2000 A Handbook on Economic Zoology-ISBN-81-219-0876-O S. Chand & Co., Ltd., New Delhi.

3. Ashok Kumar and Prem mohan Nigam, 1991 Economic and Applied Entomology Emkay Publications, New Delhi.
4. Shammi, Q.J. and Bhatnagar, S., 2002 Applied Fisheries: ISBN-81-7754-114-5 Agrobios (India), Jodhpur – India.
5. Major Hall, C.B. 2005 Ponds and Fish culture - ISBN-81-7754-146-3 Agrobios (India), Jodhpur – India.
6. Keith Wilson, N.D.P., 2005 A Handbook of Poultry Practice – ISBN-81-7754-O-69-6 Agrobios (India), Jodhpur – India.
7. Banerjee, G.C. 1992 Poultry – III- Edition – ISBN-81-204-008-4 Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. B.Sc. Zoology: Syllabus (CBCS) 45
8. Banerjee, 1988 A Text Book of Animal husbandry-VIII-Edition-ISBN-81-204-1260-5 Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
9. Kaushish, S.K., 2001 Trends in Livestock Research – ISBN-81-7754-112-9 Agrobios (India), Jodhpur – India.
10. Ismail, S.A. 1997. Vermicology the Biology of Earth worm Orient Longman, India 11. A. Mary violet Christy 2008 vermy technology MJP Publ. Chennai

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	2	1	1	1	-	1	-	2
CO2	3	1	1	-	-	2	1	3	1	2	2	2
CO3	3	2	-	1	-	-	1	-	1	-	2	2
CO4	3	-	1	2	2	2	-	2	2	1	-	2

OPEN ELECTIVE ZOO-306A ENVIRONMENTAL IMPACT ASSESSMENT AND GREEN AUDITING

Course Objectives:

While studying the **Environmental Impact Assessment and Green Auditing** course, the student shall be able to:

1. Introduce students to the concept of Environmental Management
2. Develop skills in identifying and solving environmental problems
3. Teach the principles and practices of effective environmental management system audits

Unit-1.

EIA Objectives: Basis for Environmental Impact Assessment– Screening of Projects – Environmental Assessment Procedures –Significant Impact–Project Alternatives. Environmental Impact Statement Process – Environmental Management Plan (EMP).Guidelines for environmental audit, EIA Notification – 2006 and amendments. Public Participation, Regional and Sectoral Impact Assessment, Major limitations of Environmental Impact Assessment. Status of EIA in India -Current trends and strategies.

Unit-2.

EIA Methodologies: Adhoc Method – Checklist Methods – Matrix Methods – Network Methods, Uniqueness ratio, habitat evaluation system. Prediction and Assessment of Impacts on Natural Resources – Biota,Surface Waters, Ground Water, Air, Noise, Hazards, Historic and Cultural Resources, Transportation, Socio-economic relationships.

Unit-3.

EIA Case Studies: Land Clearing Projects – Dam sites –Aquaculture– Mines–Steel–Hydel–Thermal–Nuclear–Oil and Gas based Power Plants – Highways projects – Industrial Projects. Inter linking of Rivers and River Basin Management.

Unit-4.

Green Auditing: Introduction, Necessity, Procedure for Environmental Auditing, Case Study. Environmental Management System- ISO 14000 series of standards. Green Entrepreneurship- Green

Consumerism, Green Technology. Certification Process – Different Phases of Audit, Certification Audit. Various Certifying Agencies in Operation. **Carbon Sequestration:** Sources and Sinks, Biological Processes, Physical Processes, Chemical Processes. Greenhouse Gas Emissions, Kyoto Protocol, Carbon Footprint, Carbon Trading, Carbon Diet, Carbon Credits, Role of Trees and Forest in Reducing Atmospheric Carbon.

Course Outcomes:

1. Explain the concepts about Environmental Impact Assessment, develop skills in identifying and solving problems
2. Locate, analyse and evaluate informations from various environmental matrices Systematically
3. Be able to access and analyse different case studies/examples of EIA in practice for evaluation/assessment
4. Explain the importance of environmental audits and other management tools in business for social benefit by improving environmental performance
5. Calculate the carbon footprint of any organization and identify suitable mitigation strategies for carbon reduction solutions.

SUGGESTED READING MATERIAL:

1. Environmental Impact Statements, Bregman, J. I. (1999), Lewis Publishers, London
2. Environmental Assessment, Singleton R, Castle, P and Sort, D. (1999), Thomas Telford Publishing, London.
3. Effective Environmental Assessment, Eccleston, C. H. (2000), Lewis Publishers, London.
4. Environmental Auditing, Humphery, N. and Hadley. M. (2000), Boca Raton, USA.
5. Green Accounting, Bartelmus, P. and Seifert, E. K. (2017), Taylor & Francis Limited.
6. Perspectives in Environmental Studies, Kaushik, A. and Kaushik C. P. (2014). 4th Edition, New Age International Publishers, New Delhi.
7. Carbon Sequestration for Climate Change Mitigation and Adaptation, Ussiri, D. A. N. Lal, R. (2017), Springer International Publishing.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2

OPEN ELECTIVE: ZOO-306B: HUMAN HEALTH AND INFECTIOUS DISEASES

Course objectives:

While studying the **Human Health and Infectious Diseases** course, the student shall be able to:

1. To introduce the basic concepts of pathophysiology of infectious diseases
2. To study the major infectious diseases transmission to humans and response of immunity
3. To understand the Pathogenesis, mechanisms of pathogenesis; transmission and epidemiology of various bacterial, viral, fungal and protozoan diseases.
4. To study the Sexually transmitted diseases.
5. To study the prevention and control measures of infectious diseases

Unit-1.

Introduction to Infectious Diseases: Basic concepts in pathophysiology of infectious diseases, Outline of physiological mechanisms leading to diseased state, Infectious disease transmission, Infection and immunity, Acute and Chronic Infections, Major infectious diseases of humans.

Unit-2.

Bacterial Infections: Pathogenesis, mechanisms of pathogenesis; transmission, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major human infections (Tuberculosis, Cholera, Typhoid).

Unit-3.

Viral Diseases: Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and anti-retroviral therapy of Human immunodeficiency virus (HIV/AIDS); Sexually transmitted diseases.

Unit-4.

Fungal and Protozoan Diseases: Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major Fungal human pathogens: (Dermatophytes, Candida, Aspergillus); Protozoal human pathogens (Plasmodia and Trypanosoma).

Course Outcomes:

1. Learn the basic concepts of Infectious diseases and the role of immunity to control infections
2. Provides knowledge on the physiological mechanisms leading to diseased conditions.
3. Students gains knowledge on the pathogenesis and transmission of infectious diseases.
4. This insight allows the students to learn the treatment methods to control the growth and control of microbes.

SUGGESTED READING MATERIAL:

1. A text book of Biotechnology-RC. Dubey.S.Chand & Company Ltd., New Delhi -1996.
2. A text book on Biotechnology-(n Ed.) H.D. Kumar. EWP - Private Ltd., New Delhi -1998.
3. Biotechnology-V. Kumaresan. Saras Publication-1994.
4. Environmental Microbiology, Pepper, I. L., Gerba, C. P. and Gentry, T. J. (2015), 3rd edition, Academia Press, Elsevier
5. Textbook of Environmental Microbiology, Mohapatra, P. K. (2008), I.K. International (P)Ltd.
6. Basic Biotechnology, Ratledge, C. and Kristiansen, B. (2003), 2nd edition, Cambridge University Press
7. Pocket Guide to Bacterial Infections – K. Balamurugan and Prithika Udayakumar (2019). CRC Press.
8. Infections and Infectious diseases (2001). WHO & International Federation of Red Cross and Red Crescent Societies

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2

ZOO 304 P : ZOO-301 (Core), ZOO-302 (Core) & ZOO-303 A& B (GE)

ZOO Lab 2: ZOO-305 (Skill Oriented course)

CORE ZOO-401: TOXICOLOGY

Course objectives:

While studying the **Toxicology** course, the student shall be able to:

1. Provides broad theoretical knowledge within toxicology and development of a general working knowledge of the principles and practice of clinical toxicology.
2. Basic toxicology concepts including: mechanisms of toxicology, absorption, distribution and excretion of toxicants, xenobiotic metabolism, toxicokinetics, chemical carcinogenesis, hepatotoxicology. Based on student interest some of the following areas may be included: genetic toxicology, developmental toxicology, renal toxicology, toxic effects of pesticides, toxic effects of metals, toxic effects of radiation, venoms and animal poisons, air pollution, ecotoxicology, food toxicology, forensic toxicology, occupational toxicology, regulatory toxicology, other.
3. This course includes the study of Pesticides that are agrochemicals and used for preventing, repelling, mitigating or destroying any pests. It includes insecticides, fungicides, rodenticides and herbicides etc. These insecticides are of chemical or biological origin that control the insect. The course indicates the mechanism of Pest control that may result in the form of killing the insects or otherwise preventing it from its destructive behaviors. Insecticides are either natural or man-made synthesized and are applied to target pests in a myriad of formulations (EC, WP, SP, FP, G etc.) and delivery systems (sprays, baits, slow-release diffusion, dust, etc.). In recent years, the bacterial genes coding for insecticidal proteins have been incorporated into various crops that deal with the mortality of the pests feeding on them.
4. The course highlights various categories of insecticides and their relative efficacy in relation to other control methods in a particular ecosystem. Use of bio-pesticides and other plant derived pesticides form an important part of IPM (Integrated Pest Management).
5. The course indicates the biodiversity of insects in different ecosystems and the impact of global climatic changes on insects diversity and their behaviour. Insects are important for the survival of different biota on the earth. Effect of various anthropogenic activities and pollutants on insects is correlated with maintenance of different ecosystems.
6. To apprise the students about the toxicants along with their application and their effects on biosphere as well as human health.

Unit-1.

1.1 Introduction and scope of toxicology and classification of xenobiotics.

1.2 Principles of toxicology- Dose response relationship- Toxicity tests {acute (LD_{50}, LC_{50}, ED_{50}) and chronic toxicity tests on aquatic and terrestrial animals}, Variations in toxic response.

1.3 Mechanism of toxic action of pesticides (Receptor concept, nature of receptors, Theory of toxicants- receptors interactions and mechanism of action of some pesticides)

1.4. Toxicokinetics-

i) Classic toxicokinetics

ii) Physiologic toxicokinetics

Unit-2.

2.1 Translocation of toxicants; Absorption of Toxicants, Distribution of Toxicants, Excretion of Toxicants

2.2 Biotransformation of Xenobiotics; Biotransformation sites, Biotransformation enzymes, Biotransformation reaction and bioactivation

2.3 Bioaccumulation of Xenobiotics; Bioconcentration, Bioaccumulation and Biomagnification; Biomagnification of lipophilic and recalcitrant substances

2.4 Toxic effect of metals - Mercury, Lead, Cadmium and Arsenic

Unit-3.

3.1 Toxic Response of Blood: Toxicology of erythron, leukon, platelets and homeostasis

3.2 Toxic Response of Liver; Mechanism and types of toxin – induced liver injury; critical factors in toxicant induced liver injury; detoxification mechanisms by liver.

3.3 Toxic Response of Kidney; Susceptibility of the kidney to toxic injury; Biochemical mechanisms / mediators of renal cell injury.

3.4 Toxic Response of Reproductive system; Endocrine disruption (including screening and puberty) in humans and mammals. Testicular and ovarian dysfunction. Deterioration in fertility by toxicants.

Unit-4.

4.1 Xenobiotic effect on basic metabolism (Carbohydrates, Proteins, Lipids)

4.2 Teratogens and Teratology (Relationships between maternal and developmental

toxicity)

4.3 Antidotal therapy; Types of antidotes and antidotal procedures.

4.4 Risk assessment-Hazard identification; Risk characterization and Safety evaluation of Chemicals.

Course outcomes:

1. The awareness about toxic agents, their effects and knowledge about mode of transformation of toxicants will help in creating skilled personnel in the field of environment protection and research.
2. It is a discipline overlapping with biology, chemistry, medicine that involves the study of toxicants, their mechanism of action.
3. It involves the study of the adverse effects of chemical substances on living organisms.
4. Skill development in environmental and occupational Toxicology.
5. It provides opportunities for students research projects, internships in assessing the effects of toxic pollutants on the environment and in the food chain.
6. Identification of different routes of exposure of environmental toxins.
7. Understanding of the physiological and genotoxic effects of drugs and environmental toxins.
8. Knowledge of various techniques for Toxicity evaluation.
9. The students having this course will study various types of insecticides and understand their mode of action to kill/control the insects. Also, the students will learn about novel categories of insecticides that may be compatible with other control strategies.
10. The students will learn handling of the pesticides in crop protection and understand the therapy and antidotes at the time of poisoning.
11. Further, Insects being the important component of various food chains/ food webs, the students will be understand their crucial role in homeostatic maintenance of ecosystems and their biota.
12. The students will learn about the impact of anthropogenic pollutants and climatic changes on the survival and propagation of insects, and may appreciate the insects as bio-indicators of ecological changes/disturbances.

SUGGESTED READING MATERIAL

1. Casarett & Doul's- Toxicology- The basic science of poisons- C.D. Klassen, Mary, O.D & John Doull.
2. Concepts of Toxicology Dr. Omkar, Vishal Publishing C.2003.
3. Environmental toxicology of pesticides- F. Mastimura, G.M.Boush and T.Misato.

4. Introduction of Biochemical Toxicology- E.Hodgson & F.E.Gutherie.
5. Pesticides action and metabolism- O'Brrien.
6. Pesticides and Human Welfare- D.L. Gunn and J.G.R.Stevens. Oxford University Press-1978.
7. The Encyclopedia of Americana- Vol.15.

CO-PO mapping

Course	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2
CO5	3	1	2	-	-	1	-	1	-	2	2	2

CORE ZOO-402: COMPARATIVE ANIMAL PHYSIOLOGY

Course Objectives :

While studying the **Comparative Animal Physiology** course, the student shall be able to:

1. Comparative Animal Physiology is a comprehensive subject that gives in depth knowledge of various physiological processes in the animal kingdom.
2. This course provides knowledge of animal body system functions across levels of organization, from subcellular through organismal, in order to reveal physiological homologies, patterns of physiological adaptation to various environments and general physiological principles in a wide range of organisms to understand how organisms evolved their functional characteristics and how they stay alive in the face of constantly changing internal and external environments.
3. Course provides students comprehensive understanding of about Feeding mechanisms & Nutrition, Digestion in comparative basis, Respiration & Metabolism, Circulation of Body fluids, Patterns of Nitrogen excretion, Osmoregulation, Thermoregulation etc.
4. To provide Structure and Functional components of Muscle
5. To provide Physiological and Biochemical basis of Bioluminiscence in animal world.
6. To provide information on Biological Rhythms and their occurrence in Animals.

UNIT-1.

1.1. Aim and scope of physiology; General physiological functions and principles. Validity of comparative approach of physiology.

1.2. Feeding mechanisms and regulation: Nutrition, Autotrophs, Heterotrophs, Feeding Mechanisms, Digestion, Digestion in mouth, swallowing, Peristalsis, Digestion in the Stomach, Gastric secretion, Gastric juice, Regulation of Gastric secretion, Activities of Gastric Secretion, Digestion in small intestine.

1.3. Comparative physiology of digestion: Mechanical treatment, Movement of gut contents, Chemical Action: intracellular digestion, extracellular digestion, The digestive tract and its Enzyme chain; Digestive enzymes: Carbohydrases, Lipases and Esterases, Proteinases, Other Digestive enzymes, Absorption.

1.4. Coordination of Digestive activities: Visceral Autonomic system, Gastro intestinal Hormones.

UNIT-2.

2.1 Respiration and Metabolism: Types of respiration, Respiratory organs, Mechanism of Respiration.

2.2 Circulation of body fluids: Major types of body fluids, Blood, General properties of blood, Composition of blood, Blood groups and Transfusions.

2.3 Patterns on nitrogen excretion among different animal groups: Introduction, Nitrogenous Waste Products, Morphology of the excretory system in different groups of animals, Mechanism of urine formation.

2.4 Osmoregulation in different animal groups: Biological significance of water, Body compartmentation, Nature of the problem of osmoregulations in different environments, Invertebrate body fluid regulation, Vertebrate body fluid regulation.

UNIT-3.

3.1 Thermoregulation: Temperature as an environmental factor, Thermoregulation in Invertebrates, Thermoregulation in vertebrates.

3.2 Poikilothermic animals: Temperature relation in poikilotherms, Aquatic poikilotherms, Terrestrial poikilotherms, Homoeothermic animals: Temperature relations of homeotherms, Physical heat regulation, Chemical heat regulation.

3.3 Hibernation & Aestivation.

3.4 Biological Rhythms.

UNIT-4.

4.1 Bioluminescence: Occurrence of bioluminescence among different animals, Mechanism of light production, Control of bioluminescence, Functions of luminescence.

4.2 Chromatophores and regulation of their function: Colour production, Chromatophore pigments, Mechanism of action of chromatophore, Movement of pigment, Control of Chromatophores, Factors influencing on chromatophore system.

4.3 Contractile elements in animals.

4.4 Muscle structure and function-correlation.

Course Outcomes:

After going through this course of **Comparative Animal Physiology**, the students have a good understanding of:

1. How Invertebrates and Vertebrate animals work and how these animals biology is influenced by the different environments of their niches.
2. The students will be able to explore an original query in Animal Physiology. The students will appreciate evolutionary changes and environmental adaptations in different taxa of Invertebrates and Vertebrates.
3. An appropriate understanding of functioning of each system of different groups of animals with their comparison will be acquainted.
4. Understanding of the basic concepts of Physiological regulation, from cellular to organ to organismal.
5. Understanding of how different groups of animals have different Physiological adaptations appropriate to carry out the required function to the fullet.
6. Appreciation of the gorgeous diversity of Physiological possibilities that animals have developed through natural selection.

SUGGESTED READING MATERIAL:

1. C.L. Prosser. Comparative Animal Physiology. W.B. Saunders & Company.
2. C.L. Prosser. Environment and Metabolic Physiology. Wiley-Liss, New York.
3. R. Eckert. Animal physiology, Mechanism and Adaptation. W.H. Freeman & Company.
4. Schiemdt-Nielsen. Animal Physiology, Adaptation and Environment. Cambrdge.

W.S. Hoar. General Comparative Animal Physiology.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	2	-	-	-	-	-	-	-	2
CO2	3	-	2	1	2	2	2	1	1	1	1	2
CO3	3	2	1	1	1	1	1	1	1	-	-	2
CO4	3	-	-	1	1	2	2	1	1	1	1	2
CO5	3	1	1	-	1	1	1	2	1	-	1	2

GENERIC ELECTIVE ZOO: 403A - BIODIVERSITY AND CONSERVATION

Course Objectives :

The main objectives of this course are to: To impart understanding on the occurrence and distribution of various flora and fauna, their existence, interaction, Importance of biodiversity conservation and understand about Legislation related to conservation.

UNIT-1.

Scope and Constraints of Biodiversity Science

1.1 Biological Diversity: Species – Origin of new species, Description of new species, Community and ecosystem diversity, Genetic diversity- The Hardy-Weinberg law; genetically effective populations size, Gene flow-Genetic pollution and gene erosion, Systematics in Diversity – Environment and Genetic Variations – Biological Classification – Phylogenetic Relationship – Ecological Biodiversity

1.2 Species Concept – Biological and Phylogenic Concepts; Species Inventory – Biodiversity hot spots. IUCN categories– Red data book. Case Studies – Deciduous Forests - Desert Lizard communities – Marine and Coral Reef - Fish Communities -Island species — Western and Eastern Ghats – Himalayas.

1.3 Species Diversity: Global Distribution of Species - Tropical species diversity – Diversity in terrestrial, marine and freshwater –Micro-organisms-lower and higher plants – lower and higher invertebrates and vertebrates; Species extinction and Endangered species;

1.4 Monitoring indicator species and habitats; Threats to biodiversity: Extinction – Past rate of Extinction – Human Caused Extinctions – Endemic species - Extinction rates - Man and animal conflicts.

UNIT-2.

2.1 Habitats and Ecosystem:

History of ecosystem ecology, Human induced Ecosystem change, Urban Ecosystem Classification – Ecosystem mapping, tropical forests, grasslands, wetlands, coral reefs, mangroves

2.2 Habitat lass: Habitat destruction – Fragmentation and degradation – desertification – Habitat restoration;

2.3 Invasive Species: their introduction pathways, biological impacts of invasive species on terrestrial and aquatic systems;

2.4 Pollution: Impacts of Pesticide pollution, Water pollution and Air Pollution on biodiversity; Overexploitation: Impacts of Exploitation on Target and Non-target Terrestrial and Aquatic species and Ecosystems.

UNIT-3.

3.1 Values of Biodiversity: Instrumental/Utilitarian value and their categories, Direct use value; Indirect/ Non-consumptive use value

3.2 Introduction to Ecological Economics; Monetizing the value of Biodiversity

3.3 Intrinsic Value; Ethical and aesthetic values, Anthropocentrism, Biocentrism, Ecocentrism and Religions; Intellectual Value

3.4 Economics of Ecosystem, Green Revolution, Food Plants, medicinal and ornamental plants, animal uses – livestock and fisheries

UNIT-4.

4.1 Conservation and Management: National Legislation – Protection of Wild flora and Fauna - Protection of National Habitats - National and International Protected Areas

4.2 Current Practices in Conservation - in situ Conservation and ex situ Conservation of Threatened Species

4.3 Biodiversity Act 2002 – Patent Act – Agenda 21 – Forest protection Act-Forest conservation Act 1980-Multilateral Treaties – Biodiversity Conventions.

4.4 Environmental ethics – Biodiversity – a Socio – Political Perspective; Community conserved Areas (CCAs) - Range sand significance of CCAs.

Course Outcomes:

1. Student will gain knowledge about the diversity distribution pattern of the enormous number of species and different kind of ecosystems in the natural world.
2. The interaction between the various species and environment and the impact of social development on biodiversity
3. The importance of conservation of biodiversity which serving to the mankind and the ecosystem, and the major threats to biodiversity due to human developmental activities. The loss of biodiversity and the impact to the humankind.

4. Will gain knowledge about legislations regarding the conservation of biodiversity.
5. Will gain knowledge on Conservation and Management of biodiversity.

SUGGESTED READING MATERIAL:

1. Global Biodiversity – Status of the Earths Living Resources, Groombridge, B. (1992), Chapman & Hall, London.

2. Ecology of Natural Resources, Ramade, F. (1991), John Wiley and Sons Ltd.

3. Global Biodiversity and Strategy, WRI, IUCN, UNEP (1992).

4. Biodiversity, Science and Development, Younes, T and Castri, F. (1996), CAB International, UK.

5. The Biology of Biodiversity, Kato, M. (1999), Springer Verlag, Tokyo.

6. Biodiversity Conservation – In Managed forest and Protected areas, Kotwal, P.C. and Banerjee, S. (2002), Agrobios, India.

7. Global Biodiversity, Sinha, R. K. (1997), INA Shree Publishers, Jaipur.

8. Mega diversity Conservation, flora, Fauna and Medicinal Plants of India's hot spots, Chaudhuri, A. B. and Sarkar, D. D. (2003), Daya Publishing House, New Delhi.

9. Conservation of Biodiversity and Natural Resources. Singh, M.P., Singh B.S. and Dey, S.S. (2004), Daya Publishing House, New Delhi.

10. Biodiversity –Strategies for Conservation, Dadhich L. K. and Sharma, A.P. (2002), APH Publishing Corporation, New Delhi

11. Global Biodiversity – Conservation Measure, Khan, T. I and Al-Ajmi, D. N. (1999), Pointer Publishers, Jaipur.

12. An Advanced Textbook on Biodiversity – Principles and Practice, Krishnamurthy, K.V. (2003), Oxford and IBH Publishing, New Delhi.

13. An advanced Text book on biodiversity, Krishnamurthy, K. V.(2003), Oxford and IBH Book Publishing Co Pvt Ltd., New Delhi.

14. Evolution, Hall, B. K. and Hallgrimsson, B. (2014), 5th Edition, Johnes and Bartlett India Pvt. Ltd. New Delhi.

15. Ridley, M.(2004), Evolution, 3rd Edition, Blackwell Science Ltd a Blackwell Publishing company, USA.

16. Curry, G.B. and. Humphries C. J. (2007), Biodiversity Databases Techniques, Politics, and Applications, CRC Press, Taylor & Francis Group.

17. The conservation of Plant Biodiversity, Frankel, O. H., Brown, A.H.D.and Burdon, J.J. (1995), 1st edition, Cambridge University Press.

18. Encyclopedia of Biodiversity, Levin, S.A. (2000), Volume 1, Academic Press.
19. Manual of patent Practice and procedure Patent office, India, 2005.
20. Evolution Understanding Evolution http:// evolution. berkeley.edu /evolibrary/ article/ evo_01 accessed on 28.12.2014.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2

GENERIC ELECTIVE: ZOO-403B: ANIMAL HUSBANDRY AND POULTRY FARMING

Course Objectives :

1. To acquire the knowledge related to animal husbandry importance and applications to the farmers and industries
2. To learn primary construction of dairy and poultry form establishment.
3. To gain knowledge in how to maintain the cattle and poultry forms.
4. To become proficient in disease management strategies and control measures of cattle and poultry forms.

Unit-1.

1.1. Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification of Indian Cattle breeds, exotic breeds and Indian buffalo breeds. Systems of inbreeding and crossbreeding.

1.2. Housing of dairy animals – Selection of site for dairy farm; systems of housing – loose, housing system.

1.3. Conventional dairy barn. Cleaning and sanitation of dairy farm. Weaning of calf. Castration and dehorning.

1.4. Deworming and Vaccination programme. Records to be maintained in a dairy farm.

Unit-2.

2.1. Livestock census; Breeds of Dairy cattle, Buffaloes and Goats. Indigenous, Exotic and Crossbred Cattle breeds.

2.2. Anatomy of Udder; Development of udder; Lacto genesis and Galactopoises; Letdown of milk.

2.3. Artificial insemination; Oestrous cycle; Symptoms of heat in cows and buffaloes. Conception, Pregnancy diagnosis in cattle. Multi ovulation and embryo transfer technique. Cloning. Economic traits of Dairy cattle. Methods of selection of dairy animals.

2.4. Systems of Dairy cattle breeding. Inbreeding, out breeding, Cross breeding, Grading up. Breeding systems (Cross breeding of cattle and Grading up of buffaloes).

Unit-3.

3.1. General introduction to poultry farming. Principles of poultry housing. Poultry houses. Systems of poultry farming.

3.2. Management of chicks, growers and layers. Management of Broilers. Poultry feed management – Principles of feeding.

3.3. Nutrient requirements for different stages of layers and broilers. Methods of feeding.

3.4. Egg testing. Methods of hatching. Brooding and rearing. Sexing of chicks.

Unit-4.

4.1. Poultry diseases- Viral, Bacterial, Fungal and Protozoan- their prevention and control.

4.2. Management of egg layers and Broilers in large scale farms.

4.3. Poultry feed. Importance and adverse effects on excessive use of Antibiotics and Growth promoters.

4.4. Progressive plans to promote poultry as a self-employment venture.

Course Outcomes :

1. Students at the successful completion of the course will be able to
2. Select the suitable breeds of livestock for rearing
3. Relate the anatomy of udder with letdown of milk
4. Identify and manipulate the reproductive behavior of cattle
5. Inspect the economics of dairy farming
6. Apprise the various breeding techniques employed in live stock

SUGGESTED READING MATERIAL:

1. Banerjee, G.C. A text book of Animal Husbandry.
2. Jagdish Prasad, Animal Husbandry & dairy science.
3. Panda, A. K. Rural Poultry production.
4. Ibne Ali & Singh, D. K. Handbook of poultry husbandry.
5. Anand, B. Handbook of poultry disease diagnosis & treatment.
6. Viyas, M. K. Glimpse of Indian Poultry Industry

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2

MULTI DISCIPLINARY COURSE / PROJECT WORK

ZOO: 405 PRINCIPLES AND PRACTICES OF AQUACULTURE

Course Objectives:

The course explains the basic concepts about the principles and practices of aquaculture. The objective of this course is to impart knowledge among the students about the culture practices of various aquatic organisms from different aquatic habitats such as freshwater, brackish water and marine water, and to help develop skills in students necessary for contemporary advanced culture techniques for higher and profitable yields in aquaculture. This course will open up several avenues for students in terms of research and employability in hatcheries, culture farms and marketing in aquaculture.

UNIT -1.

1. Basics of Aquaculture: Definition, significance and classification; History of aquaculture; Cultivable species – freshwater, brackish water and marine; A knowledge of inland water bodies suitable for culture in India.
2. Criteria for the selection of a species for culture.
3. Culture practices of fish and shrimp: Traditional, extensive, modified extensive, semi-intensive and intensive cultures.
4. Concept of monoculture, polyculture and integrated fish farming.

UNIT-2.

1. Bundh breeding and Induced breeding of carp by hypophysation and use of synthetic hormones.
2. Culture of Indian major carps – nursery, rearing and production ponds.
3. Culture of air-breathing fishes in India.
4. Culture of giant fresh water prawn, *Macrobrachium rosenbergii*

UNIT-3.

1. Culture of milk fish, *Chanos chanos*.
2. Culture of Asian sea bass, *Lates calcarifer*.
3. Culture of shrimp, *Penaeus monodon.*
4. Culture of crab, *Scylla serrata.*

UNIT-4.

1. Sewage-fed fish culture.
2. Culture of ornamental fishes.
3. Culture of pearl oysters.
4. Culture of sea weeds: Major seaweed species of commercial importance; methods of culture.

Course outcomes:

Students would acquire the knowledge and understanding of the

1. Significance, classification, history and cultivable species of aquaculture, and the inland water bodies suitable for culture in India
2. Criteria for the selection of species for culture
3. Various practices followed for the culture of fish and shrimp, and
4. Concepts of different types of culture.
5. Feasibility of using sewage water for aquaculture
6. Maintenance of aquaria and breeding of ornamental fishes
7. Culture of marine organisms like pearl oysters and sea weeds.
8. Culture of brackish water species such as milk fish, seas bass, shrimp and crab.
9. conceptualize the induced breeding techniques of carp in bundhs and in hatcheries
10. get acquainted with the management of nursery, rearing and production ponds.
11. appreciate the culture of air-breathing fishes and freshwater prawn.

SUGGESTED READING MATERIAL:

1. Bardach, JE *et al*. 1972. *Aquaculture – The farming and husbandry of freshwater and marine organisms*, John Wiley & Sons, New York.
2. Chakraborty C & Sadhu AK. 2000. *Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn.* Daya Publ. House.
3. FAO. 2007. *Manual on Freshwater Prawn Farming*.
4. Huet J. 1986. *A text Book of Fish Culture*. Fishing News Books Ltd.
5. ICAR. 2006. *Hand Book of Fisheries and Aquaculture*. ICAR.
6. Jhingran V.G. 1991. *Fish and Fisheries of India*. Hindustan Publ. Corporation, India.
7. Landau M. 1992. *Introduction to Aquaculture*. John Wiley & Sons.
8. Mcvey JP. 1983. *Handbook of Mariculture*. CRC Press.

9. MPEDA: *Handbooks on culture of carp, shrimp, etc*.
10. New MB. 2000. *Freshwater Prawn Farming*. CRC Publ.
11. Pillay TVR. 1990. *Aquaculture- Principles and Practices*, Fishing News Books Ltd., London.
12. Pillay TVR & Kutty MN. 2005. *Aquaculture- Principles and Practices*. 2nd Ed. Blackwell
13. Rath RK. 2000. *Freshwater Aquaculture*. Scientific Publ.
14. Stickney RR. 1979. *Principles of Warmwater Fish Culture*, John Wiley & Sons.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2
CO5	3	1	2	-	-	1	-	1	-	2	2	2

OE: ZOO-406A ENVIRONMENTAL MICROBIOLOGY

Course Objectives:

The main objective of this course are to:

1. Impart knowledge on microbial diversity and recent advancement methods in the analysis of microbial diversity.
2. Provide in-depth knowledge of role of beneficial and pathogenic microorganisms in environment.
3. Understand the application of microbes for production of different eco-friendly products
4. Impart knowledge in molecular biotechnology and its applications in Environmental management and conservation of biodiversity
5. Make students aware about Bioethics, Biosafety and IPR

UNIT-1.

Distribution / Diversity of Microorganisms: Microflora in different aquatic and terrestrial environment; Adaptation of microorganisms to the air environment; Extreme Environment – archae bacteria, acidophilic, alkalophilic, thermophilic, barophilic, osmophilic and radiodurant microbes. Role of Microorganism in Biogeochemical cycles - Nitrogen, Carbon, Phosphorus, Sulphur Cycle, Microbial corrosions.

UNIT-2.

Ecological Relationships Among the Microorganisms: Relationship among microbial population, microbial interactions in a biofilm, Host - Microbe interaction (Beneficial and pathogenic), Microbial pathogens and Parasites and their effects on Human, Animal and Plant health, Transmission of pathogens – Bacterial, Viral, Protozoan, and Helminths, Control of microorganisms. Indicator microorganisms in air, water and soil EnvironmentStandard criteria of indication; Bio-indication of water quality.

UNIT-3.

Microbes-Molecular Approaches and Applications: Understanding microbial diversity in the environment by culture-dependent approaches and their limitations, and by culture-independent molecular approaches (BIOLOG microtitre plates, analysis of FAME profiles, quantitative PCR (qPCR), and fluorescent in situ hybridization, pyro sequencing). Role of microbes in production of Biofuel, Biosurfactants, enzymes, biopolymers and biodegradable plastics.

UNIT-4.

Role of Biotechnology in Environmental Protection: Development of genetically engineered microorganisms (GEMs), Role of GMOs in bioremediation, Advantages of Genetically engineered plants; Bt insecticide; Conservation of bio-diversity by gene banks, Reforestation through micro-propagation. Microbial enhanced oil recovery (MEOR), Biomining, biosensors, Nano technology in pollution control.

Course Outcomes:

1. Understand and describe the type of microorganisms in the environment and the role of microorganisms in the cycling of nutrients in an ecosystem.
2. Relate the role of microorganisms in spread of human diseases and select the type of physical and chemical agents for microbial control.
3. Understand the importance of plants and microbs in environmental remediation
4. Know the ethical guidelines in the use of GMOs, different biosafety levels an IPR
5. Know the importance of microbs and biotechnology for the synthesis of eco-friendly products.

SUGGESTED READING MATERIAL:

1. Textbook of Environmental Microbiology, Mohapatra, P. K. (2008), I.K. International (P)Ltd.
2. Environmental Microbiology, Pepper, I. L., Gerba, C. P. and Gentry, T. J. (2015), 3rd edition, Academia Press, Elsevier
3. Basic Biotechnology, Ratledge, C. and Kristiansen, B. (2003), 2nd edition, Cambridge University Press
4. Bioethics and Biosafety in Biotechnology, Sree Krishna.V. (2007), New Age International Publishers.
5. Topics in Ecological and Environmental Microbiology, Schmidt, T. M. and Schaechter, M.(2012), 3rdedition, Academia Press, Elsevier.
6. Environmental Microbiology: Fundamentals and Applications: Microbial Ecology, Bertrand, J. C., Caumette, P. and Lebaron, P. (2015), Springer
7. Environmental Microbiology – Theory and Application, Jjemba, P.K. (2004), Science Pub. Inc., USA
8. Environmental Biotechnology-Theory and Application, Evano, G.H. and Furlong, J.C. (2004), John Wiley and Sons, USA

9. Environmental Biotechnology and Cleaner Bioprocesses, Olguin, C. J., Sanchez, G., Hernandez. E. (2000), Taylor & Francis.

CO-PO mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2

OE: ZOO-406B MEDICAL BIOTECHNOLOGY, IPR, BIO-SAFETY AND BIO-ETHICS

Course objectives:

While studying the **Medical Biotechnology, IPR, Bio-safety and Bio-ethics** course, the student shall be able to:

1. Study the types of Gene therapy and its uses in Medical Biotechnology
2. This course is designed to develop the knowledge on PCR, Immunological assays, cloning and animal cell culture techniques.
3. To study the fertilization, organogenesis, potency and differentiation, Morphogenesis in the developmental biology.
4. To gain knowledge on bacterial, plant and animal viruses.
5. This course helps to adhere to the ethical practices appropriate to the discipline at all times.
6. Adopt to the safe working practices, relevant to the bioindustries and research field.

UNIT-1.

Disease diagnosis-probe: PCR,LCR immunologicalassay. Detection of genetic, Neurogenetic disorders involving Metabolic and Movement disorders. Treatmentproducts from recombinant and non-recombinant organisms, Interferons, Antisense therapy, cell penetrating peptides, Gene therapy, Types of gene therapy, somatic virus germline gene therapy, mechanism of gene therapy, Immunotherapy, Detection of mutations in neoplastic diseases MCC, SSCP, DGGE, PTTC.

UNIT-2.

Animal Biotechnology: Development Biology; fertilization and organogenesis, Stem cells; potency and differentiation, different signaling for development, Morphogenesis in different model systems, Cloning; Transgenic and knockout systems. Animal cell Culture methods.

UNIT-3.

Virology: Classification and modes of propagation; bacterial, plant and animal viruses: morphology and ultrastructure; assay of viral particles, cell culture;viral enzymes, nucliec acids, DNA viruses: Herpes, Hepatitis B, Adeno virus; RNA viruses: Polio, VSV, Influenza, Retroviruses: Structure, life

cycle, transformation; TMV, Baculoviruses,; Response to viral infections: slow and persistent infections, Antiviral agents, Interferons.

Economics, Biosafety. Patent rights and Special Topics Biotechnology R & D and industry: Business aspects of biotechnology, research and market place, Finance and human resources: Intellectual property right: patents, R & D partnership, license agreement and joint venture.

UNIT-4.

Innovation Management: Technology transfer tools, Industry-Academia collaborations, Bio-incubators, Bio-accelerators, Finishing school; Bioethics: Role of bioethics in research. Prevention and management of plagiarism, fabrication/manipulation of data, conflict of interest, socio-cultural and behavioral conflicts during the conduct of research. Authorship & patenting/commercial rights and conflicts. Bioethical norms governing research related to animals and humans.

Biosafety: Prevention and management of chemical and biological hazards associated with research. Evaluation and interpretation of data sheets, labels etc. for pre-assessment of biological and chemical hazard.

Course Outcomes:

1. Student comes familiar with the Application of Biotechnological techniques in control of neurogenetic diseases and neoplastic diseases.
2. Students will gain awareness about Intellectual Property Rights (IPR) to take measures for protecting their ideas.
3. Gains knowledge on the Developmental stages of organism in Animal Biotechnology.
4. They will be able to devise business strategies by taking account of IPRs.
5. Students will develop awareness about bioethics and biosafety, Authorship and patenting / commercial rights and conflicts.
6. Students will develop the knowledge on bacterial, plant and animal viruses.

SUGGESTED READING MATERIAL:

1. Sasson A, Biotechnologies and Development, UNESCO Publications, 1988.

2. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, Mc Graw-Hill, Newyork, 1996.

3. Sasson A. Biotechnologies in developing Countries present and future, UNESCO Publishers, 1993.

4. Biosafety: Principles and Practices (Biological safety: Principles and Practices) by Diane O., Ph.D. Fleming and Dbra Long Hunt (Aug 30, 2006).

5. S.F. Gillbert, Developmental Biology, Sinauer Associates Inc., Massachusetts

6. Schatten and Schatten. Molecular Biology of Fertilization.

7. Bioethics and Biosafety in Biotechnology, Sree Krishna.V. (2007), New Age International Publishers.

CO-PO mapping

Course	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	-	1	2	-	-	-	-	-	2
CO2	3	1	1	-	-	2	1	3	2	2	1	1
CO3	3	2	-	2	2	2	-	-	1	-	2	2
CO4	3	1	2	2	1	2	-	1	-	2	1	2

ZOO 404 P : ZOO-401 (Core), ZOO-402 (Core) & ZOO-403 A& B (GE)

ZOO Lab 2: ZOO-405 (Multi-Disciplinary Course / Project Work)

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF ZOOLOGY



Course

M.Sc. ANIMAL BIOTECHNOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

The M.Sc. degree in Animal Biotechnology being offered by this University provides its students with a course of study that integrates a range of learning and teaching techniques relevant to their educational development and career ambitions. This Masters programme covers the latest developments in Animal Biotechnology and Drug Design. It provides theoretical knowledge as well as training in the practical and intellectual skills to enable students to better understand and then solve some of the problems in this subject. Graduates in this programme will be induced into critical thinking, and would be able to solve complex problems in Animal Biotechnology. The students would also be inculcated with personal and problem-solving skills that will enhance their employability prospects. Enhanced competence of students has been the key concern in designing and developing this syllabus. Careful thought has gone into selection of topics and setting their scope. Major areas of Animal Biotechnology like Molecular Biology, Animal Cell culture & Stem Cell Biology, Toxicology, Animal Reproduction, Breeding and Transgenic Technology, Genetic Engineering, Animal Biotechnology and Industrial Applications and Cancer Biology have been included in the syllabus only after multiple rounds of thorough discussions and intensive study. Special attention has been paid to subjects like Bioinformatics, Molecular Biology and Genetics to incorporate the latest developments in these fields.

Vision

- Provide a sound knowledge in development of biological therapeutic agents through stem cells, recombinant technology and monoclonal antibody production etc.,
- Provide inexpensive educational services to the weaker sections of society
- Inculcate respect for nature and concern for ethical values among students through good and scientific educational practices.
- Recognizing the essential roles of science and biology in the lives of citizens today and tomorrow, we emphasize biological literacy in our teaching and outreach programs.

Mission

- To promote knowledge about the Animal biotechnology including cell culture, gene transfer technology, use of stem cell in therapies and guidelines to conduct experiment on animals.
- To impart to the students the contemporary advancements in life sciences.
- To impart a global perspective and such skills among students that benefit humanity.
- To develop research aptitude and a scientific advancement.

- Reinvent ourselves in response to the changing demands of society with high moral values as a good citizen

Choice Based Credit System (CBCS)

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed.

Program Specific Outcomes

- To develop self-employable ability and to apply knowledge for pharmaceutical and Biotechnology industries; it will also provide employment to other dependents.

Programme Objectives

The programme is having the following objectives:

- To create awareness on advanced streams like Stem Cell Biology, Animal Cell Culture, Genomics and Proteomics, Drug Design, Genetic Engineering and Bioinformatics.
- To expose students to updated curricula and to recent advances in the subject and enable the students to face NET, SET and other competitive examinations successfully.
- To provide hands on experience related to Animal Cell Culture, Molecular Techniques, Drug Design and Instruments handling so that the students can become familiar with practical works which would help to get bright future in the field of Pharmaceuticals and Biotechnology industries.

- To prepare students to attract and develop interest in Drug Design, Cancer Biology, Animal breeding techniques, Fermentation technology and Downstream process so that the students can select Animal Biotechnology as their career.
- The BOS in Animal Biotechnology expects that this new framework of curriculum caters the need of enabling students of subject to accept new challenges of dynamically changing modern era.

Programme Outcomes

- Be able to play leading role in industry, research and the public services
- Understand and appreciate major public concerns and issues associated with Animal Biotechnology
- Have an understanding and grasp of international research environment where the frontiers of knowledge in Animal Biotechnology are under research
- Be able to adapt and respond positively and flexibly to changing circumstances
- Develop the professional skills and personal attributes to deal with complex issues, both systematically and creatively
- Have the capacity for individual work and teamwork
- Be lifelong learners with intellectual and practical skills.

Program Educational Objectives:

- Exposure of students to Animal Biotechnology and to provide them systematic tools of traditional and modern types to acquire this knowledge and skill.
- To update the syllabus essential for appearing in NET, SET, GATE, ASRB and other competitive exams of UPSC and APPSC.
- To make aware the students to know the natural resources of country, to utilize by sustainable methods and conservation of living resources.
- To develop trained and knowledgeable human resource for educational and research institutions and industries; to use this human resource for self reliant India.

Semester - I

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	ABT-101	Mandatory	Metabolic Regulation & Cell Function (MRCF)	6	4	20	80	100
2		ABT-102	Mandatory	Tools & Techniques (TT)	6	4	20	80	100
3	Compulsory Foundation	ABT-103A	Optional - 1	Microbiology and Diseases	6	4	20	80	100
		ABT-103B		Environmental Biology					
4	Elective Foundation	ABT-104A	Optional - 1	Environmental Biotechnology	6	4	20	80	100
		ABT-104B		Human Health and Infectious Diseases					
5	Practical - I	ABT-105P	Paper 1 & 3	Lab-1	6	4		100	100
6	Practical - II	ABT-106P	Paper 2 & 4	Lab-2	6	4		100	100
	Total				36	24	80	520	600
7	Audit Course-I				0	0	100	0	0

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one paper**
- **Elective Foundation - Choose one paper**
- **Audit Course – 100 marks (Internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits**.

Semester - II

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	ABT-201	Mandatory	Molecular Biology (MB)	6	4	20	80	100
2		ABT-202	Mandatory	Animal Cell culture & Stem Cell Biology (ACC-SCB)	6	4	20	80	100
3	Compulsory Foundation	ABT-203A	Optional - 1	Cell Biology & Immunology (CB&IM)	6	4	20	80	100
		ABT-203B		Animal Biotechnology					
4	Elective Foundation	ABT-204A	Optional - 1	Toxicology	6	4	20	80	100
		ABT-204B		Endocrinology					
5	Practical - I	ABT-205P	Paper 1 & 3	Lab-1	6	4		100	100
6	Practical - II	ABT-206P	Paper 2 & 4	Lab-2	6	4		100	100
	Total				36	24	80	520	600
7	Audit Course-II				0	0	100	0	0

***All CORE Papers are Mandatory**

- **Compulsory Foundation - Choose one paper**
- **Elective Foundation - Choose one paper**
- **Audit Course – 100 marks (internal) – Zero Credits under self study**
- **Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra credits.**

Semester - III

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	ABT-301	Mandatory	Enzymology (ENZ)	6	4	20	80	100
2		ABT-302	Mandatory	Animal Reproduction, Breeding & Transgenic Technology (ARBTT)	6	4	20	80	100
3	Generic Elective	ABT-303A	Optional - 1	Bioinformatics & Biostatistics	6	4	20	80	100
		ABT-303B		Genetic Engineering (GE)					
4	Practical - I	ABT-304P	Core & Generic Electives	Lab-I	6	4		100	100
5	Skill Oriented Course	ABT-305	Mandatory (Theory + Practical)	Bio resource Technology (Apiculture, Sericulture, Aquaculture, Vermiculture)	6 (3+3)	4	10	90 (40 + 50)	100
6	Open Elective	ABT-306A	Optional - 1	Animal Biotechnology & Industrial Applications	6	4	20	80	100
		ABT-306B		Cancer Biology					
	Total				36	24	90	510	600

***All CORE Papers are Mandatory**

- **Generic Elective - Choose two**
- **Core papers and Generic electives opted paper held Practical-I**
- **Skill Oriented Course is Mandatory. Relevant to Society along with practical (10 marks Internal, 40 final theory & 50 for practical's)**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**

Semester - IV

S.No	Components of Study	Title of the Course	Status of Paper	Title of the Paper	Credit Hrs / Week	Number of Credits	IA Marks	Semester End Marks	Total
1	Core*	ABT-401	Mandatory	Medical Biotechnology (MBT)	6	4	20	80	100
2		ABT-402	Mandatory	Fermentation Technology and Downstreaming Process(FTDSP)	6	4	20	80	100
3	Generic Elective	ABT-403A	Optional-1	Drug design and Development	6	4	20	80	100
		ABT-403B		Biosafety, Bio Ethics & Intellectual Property rights					
4	Practical - II (Project)	ABT-404	Mandatory	Project (Dissertation preparation & Submission)	6	4		100	100
5	Project Work	ABT-405	Mandatory	Viva-Voce	6	4	10	100	100
6	Open Elective	ABT-406A	Optional-1	Advanced Genomics and Proteomics	6	4	20	80	100
		ABT-406B		Animal Cell Culture Techniques					
	Total				36	24	120	480	600

***All CORE Papers are Mandatory**

- **Generic Elective - Choose two**
- **Core papers and Generic elective opted paper held Practical-II**
- **Project Work – Collaboration with various firms/companies/societies.**
- **Multi-disciplinary course is Mandatory. Circle formation with other subjects/Dept. of Arts/Commerce**
- **Open Electives are for the Students of other Departments. Minimum One paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**

CORE ABT-101:METABOLICREGULATIONAND CELLFUNCTION

Course Objectives:

1. To gain knowledge on chemicals bonds, thermodynamics principles and metabolisms of Glycolysis, TCA Cycle and their biomedical importance.
2. To understand metabolic discords of urea cycle and importance of proteins structure and functions.
3. To learn biosynthesis of purine and pyrimidine nucleotide and Clinical disorders of purine and pyrimidine metabolism
4. To become proficient in Biomedical importance of lipids and over view metabolism of carbohydrate, protein and lipids

UNIT-1.

1.1 Chemical Bonds (Covalent, Ionic and Hydrogen Bonds) and Thermodynamic principles in Biology (Enthalpy, Entropy, Free energy, First law and Second law of thermo-dynamics in relation to Biological system).

1.2 Carbohydrates: Definition and Classification- Structure and function of important Mono, Oligo and Polysaccharides.

1.3 Intermediary Metabolism-I: Glycolysis, TCA Cycle and their Bio-medical importance.

1.4 Intermediary Metabolism-II: Gluconeogenesis, HMP Shunt, Metabolism of Galactose andFructose and their Bio-medical importance.

UNIT-2.

2.1 Proteins: Definition and Classification- Structure (Primary, Secondary and Tertiary structures, Protein folding and denaturation) and function of important Proteins- Haemoglobin, Myosin and Actin.

2.2 Bio-synthesis of nutritionally non-essential amino acids and their Bio-medical importance.

2.3 Catabolism of Proteins and Amino acids-I: Biosynthesis of Urea- Detoxification ofAmmonia-Metabolic disorders of Urea cycle.

2.4 Catabolism of Proteins and Amino acids-II: Phenylalanine, Tryptophan, Biosynthesis and degradation of Polyamines and their Bio-medical importance.

UNIT-3.

3.1 Chemistry of purines, pyrimidines, Nucleosides, Nucleotides, Synthetic derivatives.

3.2 Biosynthesis of purine nucleotides, Catabolism of purines.

3.3 Biosynthesis of pyrimidine nucleotides, Catabolism of Pyrimidines,

3.4 Clinical disorders of purine and pyrimidine metabolism; Hyperurecemia or gout; Hypo-urocemia, Oroticaciduria.

UNIT-4.

4.1 Biomedical importance, Classification of lipids; Saturated and unsaturated fatty acids; Triacylglycerols (tri-glycerides), Phospholipids, Glycolipids, Steroids, Lipid peroxidation.

4.2β- oxidation of fatty acids, Oxidation of unsaturated fatty acids, Ketogenesis.

4.3 Biosynthesis of long chain fatty acids (Palmitic acid), Clinical aspects.

4.4 Overview of Metabolism(Carbohydrate, Protein and Lipid): Integrated metabolism at tissue and organ level(Kidney, Liver, Muscle, Adipose tissue and Small intestine);Metabolic interrelationships among Adipose tissue, Liver and Extra hepatic tissues

Course Output:

1. Thermodynamics principles and metabolisms of Glycolysis, TCA Cycle and their biomedical importance can be leant
2. Students can understand metabolic discords of urea cycle and importance of proteins structure and functions
3. Biosynthesis of purine and pyrimidine nucleotide and Clinical disorders of purine and pyrimidine metabolism; Biomedical importance of lipids and over view metabolism of carbohydrate, protein and lipids can be understood

SUGGESTEDREADINGMATERIAL:

1. D.Voet andJ.G Voet,Biochemistry, 1. Wiley&Sons.
2. DavidL.NelsonandMichaelM.Cox,Lehninger;PrinciplesofBiochemistry,McMillanLan geMedical
3. RobertK.Murrey,D.K.Granner,P.A.MayesandV.W.Rodwell;Harper'sBiochemistry,W orth Publishers.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	1	3	1				1	1		
CO2	2	1	2	2	2				1	1		
CO3	3	2	2	1	3				1	1		
CO4	1	1	1	3	3				1	1		

CORE ABT-102:TOOLS&TECHNIQUES

Course Objectives:

1. To acquire skills in chromatography, centrifugation, electrophoresis and blotting techniques
2. To get knowledge on cell and tissue culture, cell types, culture media and overview of stem cell biology
3. To acquire skill on electrganetic spectrum, type of detectors, electophysiological methods and brain activity recording techniques
4. To learn microscopic techniques, different fixation and staining techniques, tissue processing for microtomy, cryotechiques

UNIT-1.

1.1 Chromatography: Molecular sieve chromatography: Principle, Determination of void volume and molecular mass of native molecules. Ion exchange chromatography: Ion exchange materials – Cation and anion exchange materials. Principle and separation of charged molecules.Principle and application of TLC and HPLC.

1.2 Centrifugation.Techniques-Density gradient, ultra centrifugation.

1.3 Electrophoresis: principle, Matrices used in electrophoresis – PAGE for separation of proteins, molecular mass determination. Separation of nucleic acids using agarosegel- electrophoresis. Pulse field electrophoresis and isoelectric focusing.

1.4 Blotting techniques: western, southern and northern blotting techniques.

UNIT-2.

2.1 Introduction to cell and tissue culture: Preparatory techniques – cleaning, sterilization, sterile handling tissue culture laboratory requirements, Design of tissue culture laboratory: Equipments and purpose.

3.1 Cell types (Primary and secondary) and cell lines, Cell proliferation measurements, Cell viability testing: Dye inclusion and dye exclusion tests.

2.2 Culture media: composition, preparation and sterilization, macro and micro nutrients, Importance of serum and limitation with serum media, cell harvesting methods.

2.3 The biology of stem cell: overview; different types of stem cells – embryonic stem cells, fetal tissue stem cells, adult stem cells, stem cell nuclear transfer; somatic cell nuclear transfer, Animal cloning.

UNIT-3.

3.1 Electromagnetic spectrum of light- Simple theories of absorption of light by molecules. Beer-Lambert law.

3.2 Types of detectors: UV-Visible spectrophotometry, Infra-red spectrophotometry, Fluorescent spectroscopy. Flame photometry, AAS.

3.3 Electrophysiological methods: Single neuron recording, patch-clamp recording, ECG

3.4 Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI,CAT.

UNIT-4.

4.1Microscopictechniques:PrinciplesofmicroscopyScanningandtransmissionmicroscopes.Imageprocessingmethods in microscopy.

4.2 Differentfixationandstainingtechniques forLightmicroscopeandElectronmicroscope.

4.3MicrotomyandprocessingoftissuesforLightmicroscopeandElectronmicroscope.Cryopreservationand cryotechniques formicroscopy

4.4 Freeze-etchandfreeze-fracturemethodsforEM.

Course Output:

1. Technical skill can be gained on chromatography, centrifugation, and electrophoresis and blotting
2. Cell and tissue culture techniques can be learnt, knowledge on cell types can be gained
3. Skills can be acquired on electrganetic spectrum, type of detectors, electophysiological methods and brain activity recording techniques.
4. Microscopic techniques, different fixation and staining techniques, tissue processing for microtomy, cryotechiques can be understood

SUGGESTEDREADINGMATERIAL:

1. ABiologistsGuide toPrinciplesandTechniquesof PracticalBiochemistry,K.Wilson&K.W. Goulding, ELBSEdn.
2. AnimalCellCulture–Apracticalapproach,Ed.John.R.W.Masters IRLPress.
3. General ZoologicalMicrotechniques -P.M.Weesner.
4. PrinciplesandtechniquesofBiochemistryandmolecularbiologybyKeinWilsonandJohn Walker,VIIvolume, Cambridgepress Edition.
5. NeuroanatomicalTechniques,N.J.StransfedandT.A.MillerSpringerVerlag,NewYorkHeidelberg,Berlin.
6. PrinciplesofNeuroPhychopharmacology-RobertS.Feldman,JerroldS.MeyerandLind F.Quenzer.Sinauer Associates,Inc. Publishers. Sunderland.Massachusetts.
7. Biophysical chemistybyUpadhyay– Upadhyay-Nath.

CO/PO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	2	1	2	3	1				1	1		
CO2	2	3	1	3	2				1	1		
CO3	2	2	2	2	1				1	1		
CO4	1	1	1	3	2				1	1		

CF ABT-103A:MICROBIOLOGYAND DISEASES

Course Objectives:

1. To understand microorganisms classification and structure of prokaryotic and eukaryotic micoorganism
2. To get knowledge on Nutritional requirements to microorganisms, growth of microorganism, control of microorganism and microbes of biotechnological importance
3. To become proficient in chemical nature of gene, plasmids incompatibility, horizontal transfer of genome among the microbial community and Benzer's classical studied on II locus
4. To learn diseases caused by micoorganisms

UNIT-1.IntroductiontoMicrobiology

1.1 Discoveringthemicrobialworld.Classificationofmicroorganismsuptoorderlevel-bacteria, algae,fungi, protozoa.

1.2 Structureofprokaryoticandeukaryoticmicroorganisms.Generalanddistinctivecharacteristics of the major groups of microorganism bacteria, mycoplasma, chalmidae,rickettsias,actinomycetes, fungi,algae, protozoa Prions and viruses.

1.3 Isolation, cultivation and enumeration of microorganisms - direct and indirect methods,Maintenanceof culture.

1.4 Outlinesofcharacterizationandidentificationofcommonbacteria,fungi,algaeandprotozoa.

UNIT–2.Microbialnutrition,growthandregulation

2.1 Nutritional requirements to microorganisms - Mode of nutrition - phototrophy, chemotrophy - methylotrophyorganotrophy, mixotrophy, saprophytic, symbiotic and parasitic, Interaction of microbes.

2.2 Growth of microorganism (bacteria) - normal and biphasic growth curve, batch and continuous cultures, chemostats, shift up and shift down. Growth determination, Microbial metabolism - energy yielding and energy requiring processes.

2.3 Control of microorganisms - principles, physical and chemical agents, Assay of antimicrobial action. Batch and continuous sterilization of media and air. Viruses - nature, cultivation and assay methods, structure, physico-chemical properties, classification, pathogenicity, Replication of viruses.

2.4 Microbes of biotechnological importance - examples of bacteria, yeast, algae and viruses.

UNIT-3.

MicrobialGenetics

3.1 Chemicalnatureof gene,Conceptofgene,operon,mosaicgenes/splitgenes.

3.2 Plasmids incompatibility. Classification: copy number, control and its significance.Structureandfunctionsofinsertionelements(IS)-transposableelements.Mechanismoftransposition.Catabolic transposons and theirsignificance.

3.3 Horizontal transfer of genome among the microbial community - transformation,conjugation transduction - generalized transduction, specialized transduction –cotransduction.

3.4 Benzer‟sclassicalstudiesonIIlocus.Cistroncomplementation-Elucidationofco-linearity between DNA and protein sequence. Genetics of viruses – bacteriophage,lambda,SV40,retroviralgenome(HIV),replication,lyticandlysogeniccascades.

Unit4.Diseasescausedbymicroorganisms

4.1 Viral diseases: Flu, Dengue fever, Hepatitis,

4.2 Bacterial diseases: Cholera, tuberculosis, anthrax,

4.3 Fungal diseases: Athlets foot, Dutch Elm disease, ergotism

4.4 Protozoadiseases(Protista):Malaria,Sleepingsickness,dysenteryAndPlantPathogens:TMV, Rust

Course Output:

1. Microorganisms classification and structure of prokaryotic and eukaryotic microorganism can be learnt
2. Nutritional requirements to microorganisms, growth of microorganism, control of microorganism and microbes of biotechnological importance can be understood
3. Chemical nature of gene, plasmids incompatibility, horizontal transfer of genome among the microbial community and Benzer's classical studied on II locus can be proficient
4. Diseases caused by microorganisms can be understood

SUGGESTEDREADINGMATERIAL:

1. Microbiology-M.J.Pelczar,E.C.S.Chan,NoelR.Krieg.TataMcGraw-HillEdition.
2. Prescott's Microbiology-Christopher J. Woolverton, Linda Sherwood, Joanne Willey. TataMcGraw-HillEdition.
3. TextbookofMicrobiology- AnanthanarayanandCJPaniker,7th Edition

CO/PO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	2	1	2	1	1				1	1		
CO2	1	3	1	3	2				1	1		
CO3	2	2	2	2	3				1	1		
CO4	2	1	1	3	2				1	1		

CF ABT-103B: ENVIRONMENTAL BIOLOGY

Course Objectives:

While studying the **Environmental Biology**, the student shall be able to:

1. The objectives of the course are to develop the ability to solve the problems related to the environment, to make them aware of various eco-friendly techniques and modern techniques to solve various environment-related problems.
2. The objective of this course is to make awareness among the young students about the surrounding environment, the impact of climate change and its mitigation and biodiversity.
3. The aim of the contents of this course is to introduce and explain about various conservation issues of the ecosystem and animals.
4. Man himself is a part of ecosystem. The ecosystems in the world are continuously under the pressure of anthropogenic activities and human mediated ecological changes. Several animal species are under the survival threats. To introduce the students about wildlife and wild habitats, about depleting wild life and human wildlife conflict.
5. Generate an interest in Ethology in order to understand the complexities of both animal and human behavior.
6. To understand the basic theories and Principles of Ecology.
7. To learn about current environmental issues based on Ecological principles.
8. To study Environmental pollution and their management.

UNIT-1.

1.1 A general account on Biomes and their environments.

1.2 Fresh Water: Classification and Characteristics, eutrophication, seasonal changes.

1.3 Marine: Classification and Characteristics.

1.4 Terrestrial: Forests – Grass lands – Tundra – Desert.

UNIT-2.

2.1 Trophic dynamic view of ecosystem and energy flow.

2.2 Ecological Energetics and productivity of ecosystems.

2.3 Impact of environmental factors on Energy flow.

2.4 Bioaccumulation and Biological magnification.

UNIT-3.

3.1 Air Pollution: Criteria and standards in India, health hazards and Toxicology – Green house gases and Green House Effect.

3.2 Water Pollution: Criteria and standards in India, health hazards and toxicology.

3.3 Role of environmental epidemiological studies and health indices in evaluation of environmental health hazards: environmental epidemiological episodes in India and Abroad.

3.4 Environmental Laws; Environmental Laws in India – legislation and Execution.

UNIT-4.

4.1 Biomonitoring

4.2 Bio indicators and environmental monitoring, Environmental impact assessment.

4.3 Bioremediation: Need and scope of bioremediation, Environmental applications of bioremediation. Future outlook of Bioremediation: Phytoremediation, Biotechnological cleaning up of the environment by plants.

4.4 Natural calamities and disaster management.

Course Outcomes:

1. The student will get idea about the ecological process in its surrounding and at National and Global level and the use of student knowledge on Ecology, Behaviour can be applied to Education, Research and Extension programmes in his further career.
2. Students will be understanding the various features and aspects of population ecology, community ecology and ecosystem ecology. They might have the knowledge about environmental biology in details. They will acquire knowledge about various tools and techniques of field ecology.
3. Students will be able to apply the scientific method and quantitative techniques to describe, monitor and understand environmental systems.
4. Students will be able to use interdisciplinary approaches such as ecology, economics, ethics and policy to devise solutions to environmental problems.
5. Students will be able to be proficient in ecological field methods such as wildlife survey, biodiversity assessment, mathematical modeling and monitoring of ecological systems.
6. Students will be able to use technology, such as geographical information systems and computer programming, to assist in problem solving.
7. This paper will help in creating skilled personnel in the field of environment protection and research.

8. Demonstrated an understanding of Ecological relationships between organisms and their environment.

SUGGESTED READING MATERIAL:

1. Animal Physiology - Adaptation &Environment. 4thEditionKnut Schmidt - Nielsen - Cambridge University Press.
2. Biochemical ecology and water pollution - PR Dugan, plenum press, London, 1972.
3. Biodegradation &Bioremediation - 2nd editon, Martein Alexander - Academic Press, 1999 USA.
4. Chemical and biological methods for water pollution studiesR.K. Trivedy and P.K. Goel, 1984.
5. Current pollution researches in India - RK. Trivedy and P.K. Goel. Karad.
6. Ecology & Environment - P.D. Sharma, 1991.
7. Ecotechnology for pollution control and environmental management, enviromedia, Karad, RK. Trivedi.
8. Encyclopedia of environmental pollution and control, enviromedia, Karad, Vol. 1 &2, R.K Trivedi.
9. Environmental Biology and Toxicology-P.D. Sharma, Rastogi Publications, Meerut (India), 1998.
10. Environmental Physiology of desert organism. Ed.by N.F. Hadley - Dowden Huchinson and Ross, Inc.Penn.USA.
11. Environmental Science Research Volumes: Vol.1. Indicators of environmental quality - W.A. Thomas, 1972. Vol.3. Environmental pollution by pesticides - C.A. Edwards, 1974.
12. Field Biology & Ecology - Allen H Benton & E. Werner, JR, 1980.
13. Health hazards and human environment, World Health Organization (WHO) 1972.
14. Industrial Pollution - VP. Kudesia, 1990.
15. Methods in Environmental Analysis - Water soil and air by P.K. Gupta - Agrobios (India), Jodhpur, 2001
16. Pesticides in the environment - R White Stevenns, MarcelDekker Inc. New York, 1971.
17. Practical methods in Ecology & Environmental Science, RK. Trivedy, Goel, Trisal, 1997.
18. The Ecology of waste water treatment - H.A. Hawkes pergoman press, 1963a. Vol.5 Environmental dynamics of pesticides - R. Hague and V.H. Preed, 1975.
19. Water Treatment and purification technology - W.J. Ryan, Agrobios (India), Jodhpur, 2002.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	1	1	3				1	1		
CO2	1	2	1	3	2				1	1		
CO3	3	2	3	2	1				1	1		
CO4	2	1	1	1	2				1	1		

EF ABT-104A:ENVIRONMENTALBIOTECHNOLOGY

Course Objectives:

1. To gain knowledge on waste and pollutants, hazards from wastes and pollutants and hazards from chemicals in wastes
2. To understand waste treatment, treatment of liquid wastes, treatment of solid waste and contributions of biotechnology to waste treatment
3. To become proficient in aerobic waste water treatment and measurement of pollution levels
4. To learn anaerobic treatment of waste water, biodegradation of xenobiotics compounds, hazards from xenobiotics and bioremediation

UNIT-1.

1.1 Introduction,

1.2 WasteandPollutants:Manufacturing,energyproduction,agricultureanddairy,transport,HouseBuildingand Domesticactivities.

1.3 Hazardsfromwastesandpollutants;biologicalagentspresentinwastes.

1.4 Hazardsfromchemicals inwastes,Hazardsfromphysicalpollutants.

UNIT-2.

2.1 Wastetreatment:Biofilters.

2.2 TreatmentofLiquidwastes

2.3 Treatmentofsolidwaste.

2.4 ContributionsofBiotechnologytowastetreatment.

UNIT-3.

3.1 Aerobicwastewatertreatment

3.2 Measurementsof thelevelof pollution.

3.3 Theprocessofwaste watertreatment.Aerobicreactorsordigesters,Microorganisms.

3.4 Anaerobictreatmentofwastewater:Microorganisms,SludgeTreatment

UNIT-4.

4.1 BiodegradationofXenobioticcompounds:Types ofRecalcitrantXenobioticcompounds.

4.2 HazardsfromXenobiotics,Generalfeaturesof BiodegradationofXenobiotics.

4.3 Biodegradationofhalogenatedcompounds.TheoriginofcapacitytodegradeXenobiotics.

4.4 Bioremediation:MicrobialBioremediation.

Course Output:

1. Knowledge will be gained on waste and pollutants, hazards from wastes and pollutants and hazards from chemicals in wastes
2. Waste treatment, treatment of liquid wastes, treatment of solid waste and contributions of biotechnology to waste treatment can be understood
3. Aerobic waste water treatment and measurement of pollution levels will be proficient
4. Anaerobic treatment of waste water, biodegradation of xenobiotics compounds, hazards from xenobiotics and bioremediation will be learnt

SUGGESTEDREADINGMATERIAL:

1. ATextBook ofBiotechnology, HDKumar (WEPub.)
2. BiodegradationandDetoxificationofEnvironmentalPollutants–Chakrabarthy
3. BiotechnologybyB. D. Singh. Kalyani Publishers, 2007.
4. ConceptsinBiotechnology– Balasubramanian,Bryce,Dharmalingam,GreenandJayaraman.
5. EnvironmentalBiotechnologybyAlanScragg.PearsonEducationLimited,England.
6. EnvironmentalbiotechnologybyS.N. Jogdand. Himalaya PublishingHouse. Bombay.
7. EnvironmentalchemistrybyA.K.DeWileyEasternLtd. NewDelhi.
8. EnvironmentalMicrobiology–Grant andLong.
9. EnvironmentalMicrobiology–Mitchall.
10. IntroductiontoBiodeteriorationbyD.Allsoppandk.J.Seal,ELBS/EdwardArnold.
11. MicrobialEcology– Fundamentalsand Applications –Atlas andBartha.
12. PrescottandDcenn,S IndustrialMicrobiology– Reed(Ed).

CO/PO	PO											
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CO1	3	3	1	2	2				1	1		
CO2	1	2	2	2	1				1	1		
CO3	3	1	2	2	2				1	1		
CO4	2	1	3	1	2				1	1		

EF ABT-104B: HUMAN HEALTH AND INFECTIOUS DISEASES

Course objectives:

While studying the **Human Health and Infectious Diseases** course, the student shall be able to:

1. To introduce the basic concepts of pathophysiology of infectious diseases
2. To study the major infectious diseases transmission to humans and response of immunity
3. To understand the Pathogenesis, mechanisms of pathogenesis; transmission and epidemiology of various bacterial, viral, fungal and protozoan diseases.
4. To study the Sexually transmitted diseases.
5. To study the prevention and control measures of infectious diseases

Unit-1.

Introduction to Infectious Diseases: Basic concepts in pathophysiology of infectious diseases, Outline of physiological mechanisms leading to diseased state, Infectious disease transmission, Infection and immunity, Acute and Chronic Infections, Major infectious diseases of humans.

Unit-2.

Bacterial Infections: Pathogenesis, mechanisms of pathogenesis; transmission, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major human infections (Tuberculosis, Cholera, Typhoid).

Unit-3.

Viral Diseases: Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and anti-retroviral therapy of Human immunodeficiency virus (HIV/AIDS); Sexually transmitted diseases.

Unit-4.

Fungal and Protozoan Diseases: Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major Fungal human pathogens: (Dermatophytes, Candida, Aspergillus); Protozoal human pathogens (Plasmodia and Trypanosoma).

Course Outcomes:

1. Learn the basic concepts of Infectious diseases and the role of immunity to control infections
2. Provides knowledge on the physiological mechanisms leading to diseased conditions.
3. Students gains knowledge on the pathogenesis and transmission of infectious diseases.
4. This insight allows the students to learn the treatment methods to control the growth and control of microbes.

SUGGESTED READING MATERIAL:

1. A text book of Biotechnology-RC. Dubey.S.Chand& Company Ltd., New Delhi -1996.
2. A text book on Biotechnology-(n Ed.) H.D. Kumar. EWP - Private Ltd., New Delhi -1998.
3. Biotechnology-V.Kumaresan.Saras Publication-1994.
4. Environmental Microbiology, Pepper, I. L., Gerba, C. P. and Gentry, T. J. (2015), 3rd edition, Academia Press, Elsevier
5. Textbook of Environmental Microbiology, Mohapatra, P. K. (2008), I.K. International (P)Ltd.
6. Basic Biotechnology, Ratledge, C. and Kristiansen, B. (2003), 2nd edition, Cambridge University Press
7. Pocket Guide to Bacterial Infections – K. Balamurugan and PrithikaUdayakumar (2019). CRC Press.
8. Infections and Infectious diseases (2001). WHO &International Federation of Red Cross and Red Crescent Societies

CO/PO	PO											
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CO1	3	3	1	2	2				1	1		
CO2	1	2	2	2	2				1	1		
CO3	2	2	3	2	2				1	1		
CO4	2	1	2	1	1				1	1		

ABT 105P : ABT -101 (Core) & ABT -103A or ABT -103B (CF)

ABT 106P : ABT -102 (Core) & ABT -104A or ABT -104B (EF)

AUDIT COURSE

ABT-107:HUMAN VALUESANDPROFESSIONALETHICS–I

Course Objectives:

1. To gain knowledge on nature of ethics its relation to religion. Politics, Business
2. To understand nature of values Good and Bad, end and means, analysis of basic moral concepts, good behavior and respect for elders, character and conduct
3. To become proficient on Bhagavad Githa
4. To learn crime and theories of punishment

I. DefinitionandNatureofEthics-ItsrelationtoReligion,Politics,Business,Law,MedicineandEnvironment.NeedandImportanceofProfessionalEthics-Goals–EthicalValues invariousProfessions.

II. NatureofValues-GoodandBad,EndsandMeans,ActualandpotentialValues,Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty,obligation, justice, responsibility and freedom, Good behavior and respect for elders,Characterand Conduct.

III. Individualand society:Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha (Non-stealing).Purusharthas (Cardinal virtues) Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).

IV. BhagavadGita–(a)Niskamakarma.(b)Buddhism–TheFourNobleTruths–Aryaastangamarga,(c)Jainism–mahavratasandanuvratas.ValuesEmbeddedinVariousReligions, Relirious Tolerance, GandhianEthics.

V. Crime and Theories of punishment – (a) Reformative, Retributive and Deterrent. (b)Viewson manu and Yajnavalkya.

Course Output:

1. Knowledge on nature of ethics its relation to religion. Politics, Business will be gained
2. Nature of values Good and Bad, end and means, analysis of basic moral concepts, good behavior and respect for elders, character and conduct can be understood
3. Will be proficient on Bhagavad Githa
4. Crime and theories of punishment can be learnt

SUGGESTEDREADINGMATERIAL:

1. JohnSMackenjie:A manualofethics.
2. “TheEthicsofManagement”byLarueToneHosmer,RichardD.Irwin Inc.
3. “ManagementEthics–integrity atwork”by JosephA.PetrickandJohnF.Quinn,ResponseBooks: New Delhi.
4. “EthicsinManagement”byS.A.Sherlekar,HimalayaPublishingHouse.
5. Harold H. Titus: Ethics forToday
6. Maitra,S.K:HinduEthics
7. WilliamLilly: IntroductiontoEthics
8. Sinha:AManual ofEthics
9. Manu: Manu DharmaSastra ortheInstitute of Manu: Comprisingthe IndianSystemofDuties:Religious and Civil(ed.) G.C. Haughton.
10. SusrutaSamhita:Tr.KavirajKunjanlal,KunjalalBrishagratha,ChowkambaSanskritseries, Vol.I,IIandIII,Varnasi,VolIOO, 16-20, 21-32and 74-77only.
11. CarakaSamhita:Tr.Dr.RamKaranSarmaandVaidyaBhagavanDash,ChowkambhaSanskrit Series office,VaranasiI,II,IIIVolIPP 183-191.
12. Ethics,TheoryandContemporaryIssues,BarbaraMackinnon,Wadsworth/ThomsonLearni ng,2001.

CORE ABT-201:MOLECULARBIOLOGY

Course Objectives:

1. To gain knowledge on DNA structure, genome of Nuclear and mitochondrial and maternal Inheritance
2. To understand replication in prokaryotes, Enzymology of DNA replication, Discontinuous replication and Bidirectional replication
3. To understand synthesis of RNA, Types of RNA, Genetic code and Ribosome structure
4. To learn gene regulation I and II and Operon concepts

UNIT-1.

1.1 Watson and Crick Model: Types of DNA; Properties of DNA(C-value paradox, Cot value)

1.2 Nuclear and mitochondrialgenome, mitochondrialand maternalInheritance

1.3 Structureof gene(Cistron,Muton,Recon,Cis-transtest)

1.4 DNAdamageandrepair:Biologicalindicationofrepair,photoreactivation,Excisionrepair,Recombinationrepair, SOS repair, and Mismatchrepair.

UNIT-2.

2.1 Replication in Prokaryotes: Geometry of DNA replication, semi conservative replication.

2.2 EnzymologyofDNAreplication:DNApolymeraseI,IIandIII;ReplicationofEukaryotic Chromosomes;EukaryoticDNApolymerases;Multiplefork;ReplicationofChromatin.

2.3 .Discontinuous Replication: Fragments in Replication fork anddetection offragments; EventsintheReplication fork; Denovo initiation and covalentextension.

2.4 Bidirectionalreplication, Terminationofreplication.

UNIT-3.

3.1 Synthesis of RNA:- RNA Polymerase, Promoter, Auxiliary Proteins, RNA chain initiation,elongation,termination and Splicingmechanism

3.2 TypesofRNA,ProcessingofmRNA, rRNAandtRNA,Ribozyme.

3.3 Geneticcode,Identificationofstartandstopcodon,UniversalityofgeneticcodeDegeneracy,Wobbles Hypothesis. Codonusage, Geneticcodeof Mitochondria.

3.4 Ribosome structure (Prokaryotic and Eukaryotic), Protein synthesis: Initiation, Elongation and Termination of polypeptide chain, Signal peptide hypothesis, Post translational modification, Polyproteins, Inhibitors of translation.

UNIT-4:

4.1 Temporalresponse,Induction,Repression,LacOperon,GalactoseOperon.

4.2 LambdaOperon, Tryptophan Operon.

4.3 GeneregulationinEukaryotes-I:Genefamilies,Genealteration(Geneloss,Geneamplification, generearrangement), Regulation of synthesis of primary transcripts (geneorganization that affectsregulation-Activatorgene; Transcriptional control by hormones,Methylation).

4.4 GeneregulationinEukaryotes-II:BriefdescriptionoffundamentalsofChromatinremodeling, Enhanceosome, Reporter or Chimeric genes, Role of binding motifs in geneexpression(Helix-Turn-Helixmotif, ZincfingerandLeucine Zipper),miRNA.

Course Output:

1. DNA structure, genome of Nuclear and mitochondrial and maternal Inheritance will be understood
2. Knowledge will be gained on replication in prokaryotes, Enzymology of DNA replication, Discontinuous replication and Bidirectional replication
3. Synthesis of RNA, Types of RNA, Genetic code and Ribosome structure can be understood
4. Gene regulation I and II and Operon concepts can be learnt

SUGGESTEDREADINGMATERIAL:

1. BiochemistrybyA.L.Lehniger
2. CellandMolecularBiology-E.D.P.DeRobertisandE.M.F.
3. ConceptsinMolecularBiology-S.C.Rastogi,VN.SharmaandAnandaTandon(1993)GenesVIIbyBenjaminLewin.
4. Harper'sreview ofBiochemistrybyD.W. Martinet al1990
5. MolecularBiologybyDavid Freifelder, 1993

CO/PO	PO											
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CO1	3	3	2	1	2				1	1		
CO2	1	2	1	2	1				1	1		
CO3	2	1	3	2	2				1	1		
CO4	2	1	1	2	3				1	1		

CORE ABT-202:ANIMALCELLCULTURE&STEMCELLBIOLOGY

Course Objectives:

1. To understand animal cell culture, biology of stemcells and embryonic stem cell
2. To learn propagation of embryonic stem cells, nuclear transfer technology, animal cloning and stem cell differentiation
3. To gain knowledge on stem cell plasticity, stem cell assay and protocols, stem cell separations and stem cell therapies
4. To learn stem cells and tissue engineering, human embryonic stem cells and society, intellectual property results

UNIT-1.

1.1 Introduction to animal cell and tissue culture: Components of cell culture, cell types and cell lines, different substrates, types of culture.

1.2 Animal cell culture: experimental works – Technological uses of Animal cell cultures - Prospects.

1.3 The biology of stem cells: Overview; different types of stem cells- embryonic Stem cells, fetal tissue stem cells, adult stem cells; nuclear transfer of stem cells; human & animal cloning. Animal stem cell protocols & research.

1.4 Embryonic stem cells: the blastocyst and inner cell mass cells primitive endoderm implantation; blastocyst development in vitro.

UNIT-2.

2.1 Isolation and propagation of embryonic stem cells; chimeras; generation of knockout mice.

2.2 Nuclear transfer technology: Transfer of nuclei into eggs; development potential of transplanted nuclei; reprogramming a nucleus.

2.3 Animal cloning: Overview; challenges in human therapeutic cloning; somatic cell nuclear transfer in humans: pronuclear early embryonic development.

2.4 Stem cell differentiation: Overview; adult stem cells; fetal stem cells; human embryonic stem cells; human parthenote stem cells.

UNIT-3.

3.1 Stem cell plasticity: Overview; self-renewal potential; differentiation versus stem cellrenewal; transdifferentiation; cellcycledynamicsofdifferentstem cells.

3.2 Stem cell assays and protocols: Isolation of defined stem cell populations; progenitor cellassays,sourcesofprogenitorcells,cytokineandchemotherapyapproachestomobilization of progenitor cells; flow cytometric techniques; methods of cell selectionusingmonoclonal antibodies.

3.3 Magnetic approaches to cell separation, Dyna beads, nano particle preparations; growthfactors and ex-vivo expansion of hematopoietic stem / progenitor cells bioreactors forexpansion.

3.4 Stemcelltherapies:Clinicalapplicationsofstemcelltherapy;neurodegenerativediseases- Parkinson's disease, Alzheimers, spinal cord injury, other brain syndromes;tissuesystemsfailures-diabetes,cardiomyopathy,kidneyfailure,liverfailurehemophilia,lymphomaand leukemicmalignancies requiringstem celltherapy.

UNIT-4.

4.1 Stem cells & tissue engineering: Role of nanoparticles; organ development; nanoparticles as scaffolds.

4.2 Human Embryonic Stem Cells and Society: The religious, legal, ethical and scientific debate; the future of the debate; the regulatory aspects of therapeutical use of stem cells.

4.3 Bioethical, Environmental and Health issues related to Biotechnology.

4.4 Intellectual property results – patents and protection of ideas – Risk and Reward.

Course Output:

1. Knowledge will be gained animal cell culture, biology of stemcells and embryonic stem cell
2. Propagation of embryonic stem cells, nuclear transfer technology, animal cloning and stem cell differentiation can be learnt
3. Stem cell plasticity, stem cell assay and protocols, stem cell separations and stem cell therapies can be understood
4. Stem cells and tissue engineering, human embryonic stem cells and society, intellectual property results can be proficient

SUGGESTEDREADINGMATERIAL:

1. HandbookofStemCellsVolume1and2EdsRobertLanzaandothersElsevierAcademic Press.
2. AustenC.R.andShort. R.V.Reproductioninanimals.
3. SchattenandSchatten.MolecularBiologyofFertilization.
4. R.G.Edwards.HumanReproduction.

5. S.F.Gillbert.DevelopmentalBiology.SinauerAssociation Inc.,Massachusetts.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	1	2	2				1	1		
CO2	1	2	2	3	2				1	1		
CO3	3	2	3	1	3				1	1		
CO4	2	1	2	2	1				1	1		

CF-ABT-203A:CELLBIOLOGYANDIMMUNOLOGY

Course Objectives:

1. Able to learn organization of prokaryotic and eukaryotic cell, Nucleus structure, Eukaryotic chromosome and polytene and lamp brush chromosomes
2. To learn mechanism of cell division, regulation of eukaryotic cellcycle, chromosomal abnormalities and tumor biology
3. To understand types of immunity, types of cell involved in immune response, structure and function of antibody and complimentarily cascade
4. To gain knowledge on Antigen presentation, hypersensitivity reactions, immune tolerance and immunopathology

UNIT-1.

1.1 Organization of prokaryotic and eukaryotic cell.Structure and function of Plasmamembrane, mitochondria endoplasmic reticulum, Golgi apparatus, lysosomes,peroxisomes.

1.2 Nucleus-structureandfunctionofnuclearmembrane,nucleolus.

1.3 Eukaryoticchromosomeanditshighresolutionorganization.

1.4 Polyteneandlampbrushchromosomes.

UNIT–2.

2.1 Mechanism of cell division - mitiotic apparatus, cytokinesis, chromosome movement - presentconcept.

2.2 Regulation of eukaryotic cell cycle - Over view of cell cycle.Mutation causing cellcyclecontrol.Meiotic process - stages, chromosome pairing, chiasma formationMolecularmechanismsofrecombination,synaptonemalcomplex.Nondysjunction,

2.3 Chromosomalabnormalities-euploidy,haploidy-theirfundamentalandpracticalsignificance.Polypliody-induction -Aneuploidy-typeandgeneticsignificance.

2.4 Tumor biology - cell to cell interaction, cell adhesion, cell transformation mechanism andoncogenesis.

UNIT–3.

3.1 Immunity- innate and acquired, innate immune mechanisms, Immunogens and antigens –Properties, factors governing immunogenicity, haptens, epitopes-size and identification.Adjuvants-properties andmechanism of action.

3.2Cellsinvolvedintheimmuneresponse Tcells,Bcells,CDantigens,neutrophils,eosinophilsandnaturalkiller cells.Macrophages,dendrites,Phagocytosis,Lymphoidtissues.

3.3 Fuctions of antibody in relation to structure. Antigen-antibody interactions- affinity ofantibody,avidity,bonuseffect,classicalprecipitinreaction,antigen-bindingsiteofantibody,forcesinvolvedinantigen-antibodycomplexformation,Generationofantibodies,Theories ofantibodyformation. Monoclonaland polyclonal antibodies.

3.4 Complement-nature,physicochemicalproperties,complementcascadepathway,complementfixation.

UNIT–4.

4.1 AntigenPresentation-pathwaysofantigenprocessingandpresentationofintracellularandextracellularantigens. Cell mediatedimmunity(CMI):Inductionand mechanism

4.2 Hypersensitivityreactions–Classification,TypeI–IVreactions.Immunitytobacterial,fungal,viral andparasiticdiseases. Allergy:classification anddetails.

4.3 Immunetolerance,immunesuppression.TransplantationandG.V.H.reactions.

4.4 Immunopathology-Autoimmunediseases;immunecomplexdiseases;immunodeficiencydiseases;immunityto infection.

Course Output:

1. Organization of prokaryotic and eukaryotic cell, Nucleus structure, Eukaryotic chromosome and polytene and lamp brush chromosomes will be understood
2. Mechanism of cell division, regulation of eukaryotic cellcycle, chromosomal abnormalities and tumor biology can be learnt
3. Types of immunity, types of cell involved in immune response, structure and function of antibody and complimentarily cascade will be proficient

4. Knowledge will be gained on Antigen presentation, hypersensitivity reactions, immune tolerance and immunopathology

SUGGESTEDREADINGMATERIAL:

1. CellandMolecularbiologybyEDRDeRobertisandEMRDeRobertisJr,Indianedition, 3.1 B.I.Publications,Pvt. Ltd.
2. TheCell (A Molecular Approach)byGeoffreyM.Cooper,7th Edition.
3. Kuby,J.Immunology,7th edition,W.H.Freeman andCompany, NewYork.
4. Janeway‟sImmunobiology,9thedition,GarlandScience.

CO/PO	PO											
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CO1	2	2	1	3	1				1	1		
CO2	3	3	2	2	2				1	1		
CO3	2	1	3	1	2				1	1		
CO4	1	2	1	3	1				1	1		

CF ABT-203B ANIMAL BIOTECHNOLOGY

Course objectives:

While studying the **Animal Biotechnology** course, the student shall be able to:

1. To introduce a detailed achievements of Biotechnology, Genetic Engineering and r-DNA technology principles.
2. To gain knowledge on cloning vectors and their uses in gene cloning technologies.
3. Principles of Cloning strategies and screening analysis of Re-combinations.
4. To apply principles of Biotechnology concepts in veterinary sciences i.e. production of Transgenic animals, Artificial insemination, Invitro fertilization, Embryo transfer technology.
5. Application of Biotechnological principles in Medicine and Gene transfer techniques.
6. To understand the uses of Fresh and marine pearl culture technology, IPR, Patents and Copyrights.

UNIT-1.

1.1 General IntroductionandAchievementsofBiotechnology

1.2 Enzymesusedingenecloning-Restrictionendonucleases,DNAligases,Kinase,Phosphatase,Nucleases, Polymerases, Reversetransciptase

1.3 Cloningvectors(Plasmids,Phages,cosmids,yeastsShuttlevectors),viralvectors(SV40,Adenovirus andBaculovirus) usedin Genecloning.

1.4 Cloningandselectionstrategiesofrecombinants(antibioticselection,bluewhitescreening,colonyhybridization,Fluorescencein-SituHybridization(FISH)andimmunologicaltest.

UNIT-2.

2.1 Preparationof celllines,typesofcelllines. TypesofStemCells,StemCellTherapy

2.2 ApplicationsofcellcultureinVeterinary–Diseasediagnosis,virusvaccines,hormones

2.3 Application of Biotechnology in Medicine- Production of monoclonal antibodies(Hybridomatechnology),ProductionofvaccinesandProductionofGrowthHormone

2.4 Genetherapy:Introduction,principleofgenetransferandexamples(Adenosinedeaminasedeficiencydisease,DuchenneMusculardystrophydiseaseandCysticfibrosis)

UNIT-3.

3.1 Livestockimprovement:Manipulationofreproductioninanimals(Artificialinsemination,multiple ovulations, *invitro*fertilization,Embryotransfertechnology)

3.2 Methodsofgenetransfer–Microinjection,electroporation,lipofectionandviralmediated genetransfer techniques

3.3 Generation of chimeric, transgenic and knockout mice and other animals and theircharacterization. Gene editing- Gene silencing-CRISPR-associated protein-9 nuclease(Cas9)technology

3.4 Potential application of transgenic animals: models for various diseases/disorders,productionofpeptidesandproteinsofbiopharmaceuticalinterest(molecularfar ming)

UNIT-4.

4.1 Growth hormone transgenics and sf.Sex reversal in fishes and their applications, Production of monosex populations.Aquaculture and fishseed production: Hypophysiation,hCG injections

4.2 Marinebio/fishresourcesanditsapplicationsinpharmaceuticalandNutraceuticalIndustries

4.3 Freshwaterandmarine(oyster)pearlculturetechnology,pearlculturein India,usesofpearlculture

4.4 Intellectual Property Rights: Introduction; Types of IP; Patents and its types,Trademark Copyright&RelatedRights,ProtectionofGMOs;ethicalandlegalissuesin biotechnology.

Course Outcomes:

1. Imparts the knowledge to cells lines and stem cells in culture media.
2. It gives insight into various cell/ tissues culture techniques and their applications
3. Understanding of in vitro culturing of organisms and production of transgenic animals.
4. Understanding of cloning of mammals, large scale culture and production from recombinant microorganisms and cloning vectors.
5. This insight allows students to take into consideration about ethical issues involved in production of transgenic animals and BT products.

6. Use in gene transfer technology, genetic manipulations and in a variety of Industrial processes and prominence of IVF, Artificial insemination and embryo transfer techniques.
7. Gives knowledge to culture of animal cells and its culture medium.
8. Learn basic concepts and principles of recombinant DNA technology, Gene manipulation for transgenic animal production and therapeutics/ vaccine production.
9. Provides knowledge on Livestock, improvement aquaculture and pearl culture
10. Provides knowledge on Intellectual property rights and genetically modified organisms

SUGGESTED READING MATERIAL:

1. A text book of Biotechnology-RC. Dubey.S.Chand& Company Ltd., New Delhi -1996.
2. A text book on Biotechnology-(n Ed.) H.D. Kumar. EWP - Private Ltd., New Delhi -1998.
3. Animal Biotechnology-M.M. Ranga, Agrobios (India), 2000.
4. Biotechnology-Fundamentals & Applications-S.S .Purohit& S.K. Mathur, Agro Botonics-1999.
5. Biotechnology-V. Kumaresan. Saras Publication-1994.

CO/PO	PO											
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CO1	2	3	1	3	1				1	1		
CO2	1	2	2	1	2				1	1		
CO3	3	2	3	2	2				1	1		
CO4	2	1	2	3	2				1	1		

EF ABT-204A: TOXICOLOGY

Course objectives:

While studying the **Toxicology** course, the student shall be able to:

1. Provides broad theoretical knowledge within toxicology and development of a general working knowledge of the principles and practice of clinical toxicology.
2. Basic toxicology concepts including: mechanisms of toxicology, absorption, distribution and excretion of toxicants, xenobiotic metabolism, toxicokinetics, chemical carcinogenesis, hepatotoxicology. Based on student interest some of the following areas may be included: genetic toxicology, developmental toxicology, renal toxicology, toxic effects of pesticides, toxic effects of metals, toxic effects of radiation, venoms and animal poisons, air pollution, ecotoxicology, food toxicology, forensic toxicology, occupational toxicology, regulatory toxicology, other.
3. This course includes the study of Pesticides that are agrochemicals and used for preventing, repelling, mitigating or destroying any pests. It includes insecticides, fungicides, rodenticides and herbicides etc. These insecticides are of chemical or biological origin that control the insect. The course indicates the mechanism of Pest control that may result in the form of killing the insects or otherwise preventing it from its destructive behaviors. Insecticides are either natural or man-made synthesized and are applied to target pests in a myriad of formulations (EC, WP, SP, FP, G etc.) and delivery systems (sprays, baits, slow-release diffusion, dust, etc.). In recent years, the bacterial genes coding for insecticidal proteins have been incorporated into various crops that deal with the mortality of the pests feeding on them.
4. The course highlights various categories of insecticides and their relative efficacy in relation to other control methods in a particular ecosystem. Use of bio-pesticides and other plant derived pesticides form an important part of IPM (Integrated Pest Management).
5. The course indicates the biodiversity of insects in different ecosystems and the impact of global climatic changes on insects diversity and their behaviour. Insects are important for the survival of different biota on the earth. Effect of various anthropogenic activities and pollutants on insects is correlated with maintenance of different ecosystems.
6. To apprise the students about the toxicants along with their application and their effects on biosphere as well as human health.

Unit-1.

1.1 Introduction and scope of toxicology and classification of xenobiotics.

1.2 Principles of toxicology- Dose response relationship- Toxicity tests {acute (LD_{50}, LC_{50}, ED_{50}) and chronic toxicity tests on aquatic and terrestrial animals}, Variations in toxic response.

1.3 Mechanism of toxic action of pesticides (Receptor concept, nature of receptors, Theory of toxicants-receptors interactions and mechanism of action of some pesticides)

1.4. Toxicokinetics-

i) Classic toxicokinetics

ii) Physiologic toxicokinetics

Unit-2.

2.1 Translocation of toxicants; Absorption of Toxicants, Distribution of Toxicants, Excretion of Toxicants

2.2 Biotransformation of Xenobiotics; Biotransformation sites, Biotransformation enzymes, Biotransformation reaction and bioactivation

2.3 Bioaccumulation of Xenobiotics; Bioconcentration, Bioaccumulation and Biomagnification; Biomagnification of lipophilic and recalcitrant substances

2.4 Toxic effect of metals - Mercury, Lead, Cadmium and Arsenic

Unit-3.

3.1 Toxic Response of Blood: Toxicology of erythron, leukon, platelets and homeostasis

3.2 Toxic Response of Liver; Mechanism and types of toxin – induced liver injury; critical factors in toxicant induced liver injury; detoxification mechanisms by liver.

3.3 Toxic Response of Kidney; Susceptibility of the kidney to toxic injury; Biochemical mechanisms / mediators of renal cell injury.

3.4 Toxic Response of Reproductive system; Endocrine disruption (including screening and puberty) in humans and mammals. Testicular and ovarian dysfunction.Deterioration in fertility by toxicants.

Unit-4.

4.1 Xenobiotic effect on basic metabolism (Carbohydrates, Proteins, Lipids)

4.2 Teratogens and Teratology (Relationships between maternal and developmental toxicity)

4.3 Antidotal therapy; Types of antidotes and antidotal procedures.

4.4 Risk assessment – Hazard identification; Risk characterization and Safety evaluation of Chemicals.

Course outcomes:

1. The awareness about toxic agents, their effects and knowledge about mode of transformation of toxicants will help in creating skilled personnel in the field of environment protection and research.
2. It is a discipline overlapping with biology, chemistry, medicine that involves the study of toxicants, their mechanism of action.
3. It involves the study of the adverse effects of chemical substances on living organisms.
4. Skill development in environmental and occupational Toxicology.
5. It provides opportunities for students research projects, internships in assessing the effects of toxic pollutants on the environment and in the food chain.
6. Identification of different routes of exposure of environmental toxins.
7. Understanding of the physiological and genotoxic effects of drugs and environmental toxins.
8. Knowledge of various techniques for Toxicity evaluation.
9. The students having this course will study various types of insecticides and understand their mode of action to kill/control the insects. Also, the students will learn about novel categories of insecticides that may be compatible with other control strategies.
10. The students will learn handling of the pesticides in crop protection and understand the therapy and antidotes at the time of poisoning.
11. Further, Insects being the important component of various food chains/ food webs, the students will be understand their crucial role in homeostatic maintenance of ecosystems and their biota.
12. The students will learn about the impact of anthropogenic pollutants and climatic changes on the survival and propagation of insects, and may appreciate the insects as bio-indicators of ecological changes/disturbances.

SUGGESTED READING MATERIAL

1. Casarett&Doul's- Toxicology- The basic science of poisons- C.D. Klassen, Mary, O.D & John Doull.
2. Concepts of Toxicology Dr. Omkar, Vishal Publishing C.2003.
3. Environmental toxicology of pesticides- F. Mastimura, G.M.Boush and T.Misato.
4. Introduction of Biochemical Toxicology- E.Hodgson&F.E.Gutherie.
5. Pesticides action and metabolism- O'Brrien.
6. Pesticides and Human Welfare- D.L. Gunn and J.G.R.Stevens. Oxford University Press-1978.
7. The Encyclopedia of Americana- Vol.15

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	1	3	1				1	1		
CO2	1	2	2	1	2				1	1		
CO3	3	2	3	2	2				1	1		
CO4	2	1	2	3	2				1	1		

EF ABT: 204B ENDOCRINOLOGY

Course Objectives :

1. To study the concepts of Classification of Hormones, Structural features of Endocrine Glands
2. Compare the structure, functions and regulation of the endocrine organs of vertebrates
3. Identification of Endocrines glands of the body and their secretions
4. To study the Steroid and Peptide hormones and their role
5. To study the evolution of Pancreatic and Adrenal gland hormones
6. To study the evolution of Thyroid and Parathyroid hormones and their role in the regulation of metabolism
7. To study the role of hormones in the growth, development and reproduction.
8. to study the aspects concerning Hormones – Human health

Unit-1.

1.1 Classification of hormones. Brief account of structural features of endocrine glands. Hormonal effects and regulation – basic concepts and methods

1.2 Biosynthesis and secretion of pituitary. Factors influencing secretion. Endocrine disorders - brief description

1.3 Biosynthesis and secretion of pancreas, adrenal, and thyroid hormones. Factors influencing secretion.

1.4 Biosynthesis and secretion of sex steroid hormones. Factors influencing secretion.

Unit-2.

2.1 Peptide hormones, Steroid hormones. Hormones as messengers.Cell surface receptors. Cascade of reaction linked to signal transduction.

2.2 Evolution of pituitary gland; Physiological actions of pituitary hormones. Urophysis and action of its hormone(s).Pancreatic hormones and glucose homeostasis.

2.3 Evolution of discrete adrenal gland; Synthesis of corticosteroid, structural diversity of glucocorticoids among vertebrates.

2.4 Sex steroids. Cytoplasmic and nuclear receptors.Mechanism of action of steroid hormones.Prostaglandins.Calcium-magnesium-protein Kinase.Hormones and eukaryotic metabolic regulation.

Unit-3.

3.1 Evolution of thyroid gland.

3.2 Thyroid hormone synthesis and its regulation, paradigms of thyroid hormone action in poikilotherms and homeotherms.

3.3 A comparative account of parathyroid gland and ultimobranchial body/C cells, synthesis of parathyroid hormone, calcitonin and of vitamin D3;

3.4 Hormonal regulation of calcium and phosphate homeostasis.

Unit-4.

4.1 Hormones, growth and development and reproduction

4.2 Hormones regulating reproduction

4.3 Hormones and human health

4.4 Production of hormones as Pharmaceuticals-Insulin, GH and Prolactin.

Course Outcomes :

1.Understand the structure, function and regulation of endocrine & neuroendocrine glands,

2. Develop a deep knowledge of the role of endocrine secretion in regulation of reproductive Cycle

3.Understand the pathways associated with Biosynthesis and secretion of Endocrine hormones and their role in the control of metabolism

4.Acquring the knowledge of signal transduction mechanisms

5.Through understanding of several endocrines including Peptide hormones, Steroid hormones, Pituitary hormones, Sex hormones, Thyroid hormones etc in the control of metabolic pathways

6.Understanding the influence of hormones on Growth, Development and Reproduction and their regulatory pattern

SUGGESTED READING MATERIAL:

1. Barrington. EJ.W. General and comparative Endocrinology Cambridge Press, Oxford.
2. Bentley, PJ. Comparative Vertebrate Endocrinology, Cambridge Press, Oxford.
3. Martin, C.R. Endocrine Physiology. Oxford Univ. Press, Oxford.
4. Prakash S. Lohar. Endocrionology-Hormones and human health-2005.MJP Publishers-Chennai.
5. Williams, R.H. Text Book of Endocrinology, W.B. Saunders Co., Philadelphia.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	3	1	2	1				1	1		
CO2	2	2	2	3	2				1	1		
CO3	2	2	2	1	3				1	1		
CO4	2	1	1	3	2				1	1		

ABT 205P : ABT -201 (Core) & ABT -203A or ABT -203B (CF)

ABT 206P : ABT -202 (Core) & ABT -204A or ABT -204B (EF)

AUDIT COURSE

ABT-207:HUMAN VALUESANDPROFESSIONALETHICS–II

Course Objectives:

1. To get knowledge on value education
2. To learn medical ethics
3. To become proficient on business ethics
4. To understand environmental ethics and social ethics

I. Value Education- Definition – relevance to present day -Concept of HumanValues –Selfintrospection–Self-esteem.Familyvalues-Components,structureandresponsibilitiesoffamilyNeutralizationofanger–Adjustability–Threatsoffamilylife
– Status of women in family and society – Caring for needy and elderly – Time allotmentforsharingideas andconcerns.

II. Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility ofmedicalpractitioners.Codeofethicsformedicalandhealthcareprofessionals.Euthanasia,Ethicalobligationtoanimals,Ethicalissuesinrelationtohealthcareprofessionals and patients. Social justice in health care, human cloning, problems ofabortion.EthicalissuesingeneticengineeringandEthicalissuesraisedbynewbiologicaltechnologyorknowledge.

III. Business ethics- Ethical standards of business-Immoral and illegal practices and theirsolutions. Characterics of ethical problems in management, ethical theories, causes ofunethicalbehavior,ethical abuses andwork ethics.

IV. Environmental ethics- Ethical theory, man and nature – Ecological crisis, Pest control,Pollution and waste, Climate change, Energy and population, Justice and environmentalhealth.

V. Socialethics-

Organtrade,Humantrafficking,Humanrightsviolationandsocialdisparities Feminist ethics,surrogacy/pregnancy.Ethicsofmedia-

ImpactofNewspapers,TelevisionMovies andInternet.

Course Output:

1. Value education can be understood
2. Medical ethics can be learnt
3. Knowledge will be gained on business ethics
4. Environmental ethics and social ethics can be learnt

SUGGESTEDREADINGMATERIAL:

1. JohnSMackenjie:A manualofethics.
2. "TheEthicsofManagement"byLarueToneHosmer,RichardD.IrwinInc.
3. "ManagementEthics– integrityatwork"byJosephA.PetrickandJohnF.Quinn,ResponseBooks: New Delhi.
4. "Ethicsinmanagement"byS.A.Sherlekar,HimalayaPublishingHouse.
5. Harold H. Titus: Ethics forToday
6. Maitra,S.K:HinduEthics
7. WilliamLilly: IntroductiontoEthics
8. Sinha:AManual ofEthics
9. Manu:ManuDharmaSastraortheInstituteofManu:ComprisingtheIndiansystem ofDuties:Religious and Civil(ed.) G.C. Haughton.
10. SusrutaSamhita:Tr.KavirajKunjanlal,KunjalalBrishagratha,ChowkambaSanskritse ries,Vol.I,IIandIII,Varnasi,VolIOO, 16-20, 21-32and 74-77only.
11. CarakaSamhita:Tr.Dr.RamKraranSarmaandVaidyaBhagavanDash,ChowkambhaS anskritSeries office,VaranasiI,II,IIIVolIPP 183-191.
12. Ethics,TheoryandContemporaryIssues,BarbaraMackinnon,Wadsworth/ThomsonL earning,2001.

CORE ABT-301:ENZYMOLOGY

Course Objectives:

1. To understand enzyme specificity, enzyme catalysis and isolation and purification of enzymes
2. To gain knowledge on theories of enzymes kinetics, enzyme kinetics and its importance, effect of reactant concentrations and effect of temperature of pH and enzyme concentration reaction rate
3. To learn inhibition of enzyme activity, kinetics of allosteric enzymes, regulation of enzyme activity and mechanism of enzyme action
4. To become proficient on clinical aspects of enzymology, immobilized enzymes, isoenzymes and enzyme enginnering

UNIT-1.

1.1 Historical Background, overview and specific examples, nomenclature and classification of enzymes–IUB system, chemical nature and properties of enzymes.

1.2 Enzyme specificity (Absolute specificity, Group specificity, Broad specificity).

1.3 Enzyme catalysis, Quantitative measurement of enzyme activity, Assay of enzyme activity-units of enzyme activity.

1.4 Isolation and purification of enzymes, intracellular distribution of enzymes.

UNIT-2.

2.1 Theoriesof enzymekinetics -kinetictheoryandcollisiontheory.

2.2 Enzymekineticsanditsimportance,derivationofMichaelis-Mentonequation,MethodsofVmaxand Km determination,construction ofLine weaver burk plots.

2.3 Effectofreactantconcentrations(Rateconstant,Firstorder,SecondorderandZeroorderkineticreactions, Ramachandran plot, determination ofslope).

2.4 EffectofTemperature,pHandenzymeconcentrationonreactionrate.

UNIT-3.

3.1 Inhibitionofenzymeactivity(competitive,non-competitive,uncompetitiveandmixedinhibition).

3.2 Kineticsofallostericenzymes.

3.3 Regulationofenzymeactivity(Metabolicregulation),Catalyticefficiencyofenzymes(feedbackinhibition, covalent modification).

3.4 Mechanismofenzymeaction(LockandKey,Inducedfitmodel),catalyticsite,roleofmetalions.

UNIT-4.

4.1 ClinicalAspectsofenzymology,MedicalandTherapeuticapplicationsofenzymes;Enzymes-Clinicaldiagnosis.

4.2 Immobilizedenzymes,variousmethodsofimmobilization-ionicbonding,absorption,covalentbonding(basedon R groups of amino acids).

4.3 Iso enzymesandmultipleformsofenzymes.

4.4 Enzymeengineering–economicimportanceofenzymeproduction.Enzymesinindustries-food,biotechnologyandotherindustries.

Course Output:

1. Enzyme specificity, enzyme catalysis and isolation and purification of enzymes can be understood
2. Knowledge will be gained on theories of enzymes kinetics, enzyme kinetics and its importance, effect of reactant concentrations and effect of temperature of pH and enzyme concentration reaction rate
3. Inhibition of enzyme activity, kinetics of allosteric enzymes, regulation of enzyme activity and mechanism of enzyme action will be learnt
4. Clinical aspects of enzymology, immobilized enzymes, isoenzymes and enzyme enginnering will be proficient

SUGGESTEDREADINGMATERIAL:

1. Biochemicalcalculations.I.H.Segel, 2nd Ed.,JohnWiley&Sons.
2. Biochemistry.D.Voet&J.G.Voet,J.Wiley&Sons.
3. EnzymeKinetics.I.W.Segil.
4. EnzymeKinetics.D.V.Roberties,CambridgeUniversityPress.
5. Harper"sBiochemistry.RobertK.Murrey,PeterA.Mayer,D.K.Granner,V.W.Rodwell,LangeMedical.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	1	3	1				1	1		
CO2	3	3	2	3	2				1	1		
CO3	2	2	3	2	3				1	1		
CO4	1	1	2	3	2				1	1		

CORE ABT-302:ANIMALREPRODUCTION,BREEDINGANDTRANSGENICTECHNOLOGY

Course Objectives:

1. To become proficient on structure and function of male and female reproductive system; reproductive cycles and contraception in male and females
2. To gain skill on sex determination, selection for qualitative inherited characters, parental determination and verification and progeny testing
3. To understand artificial insemination techniques, in vitro fertilization, embryo transfer technology, microinjection and macroinjection
4. To learn transgenic technology development, generation of chimeric, transgenic and knockout mice

UNIT-1.

1.1 Structureandfunctionofmalereproductivesystem-hormonalregulationofspermatogenesisandspermeiogenesis;inhibinandandrogenbindingproteins;capacitationofspermatozoa.

1.2 Structureandfunctionoffemalereproductivesystem-influenceofhormonesondevelopmentof ovarian follicles andoogenesis;

1.3 Reproductive cycles: estrous and menstrual cycle; ovulation, atresia and corpus luteumformation;pregnancyand lactation; implantation and placentation.

1.4 Contraceptioninmalesandfemales:Hormonalandchemical;recentadvancesincontraceptionresearch .

UNIT-2.

2.1 Introduction - Sex determination; principles of animal breeding; structure of the livestockbreedingindustry: dairycattle, beef cattle, swine, sheep and poultry

2.2 Selectionforqualitatively inheritedcharacters-genefrequency andselectingagainstrecessive genes; detectingheterozygotesforrecessives.

2.3 Parental determination and verification; the use of markers and/or molecular probes,selectioncriteria: multiplerecords,pedigreeselection, familyselection.

2.4 Progenytesting:breedingvalue,transmittingabilityandheritability;correlatedcharacters; selection for maternal ability; factors affecting selection response; genotype-environmentinteractions

UNIT-3.

3.1 Artificialinsemination(AI)techniquesandtheirdevelopment:estrussynchronization;semencollection, evaluation, storage.

3.2 I*nvitro*fertilization, ICSIandpreservationofendangeredspecies.

3.3 Embryotransfertechnology,Superovulation,cryopreservationofembryos,Hormonesinvolvedin embryo transfer technology.

3.4 MicroinjectionandMacroinjection–introduction–procedure–applicationsadvantagesand limitations.

UNIT-4.

4.1 An overview of transgenic technology Development of transgenic mice and other animal models: by injection of foreign DNA/gene into zygote; optimization of construct for in vivo expression

4.2 Generation of chimeric, transgenic and knockout mice and other animals and their characterization.

4.3 Transgenic fishes, transgenic poultry and transgenic insects as bioreactors.

4.4 Potential application of transgenic animals: models for various diseases/disorders, production of peptides and proteins of biopharmaceutical interest (molecular farming).

Course Output:

1. Knowledge will be gained on structure and function of male and female reproductive system; reproductive cycles and contraception in male and females
2. Sex determination, selection for qualitative inherited characters, parental determination and verification and progeny testing will be understood
3. Artificial insemination techniques, in vitro fertilization, embryo transfer technology, microinjection and macroinjection can be learnt
4. Transgenic technology development, generation of chimeric, transgenic and knockout mice will be learnt

SUGGESTEDREADINGMATERIAL:

1. ComparativeReproductiveBiology.EditedbyH.SchattenandG.M.Constanitinescu.BlackwellPublishers, UK.

2. ComparativeEndocrinologyandReproduction.EditedbyK.P.Joy,A.Krishna,C.Halda r,NarosaPublishers,Delhi.
3. DaltonsIntroductiontoPracticalAnimalBreeding.EditedbyMalcolmB.Willis,Black wellScience,UK..
4. WilliamsTextBookofEndocrinology,EditedbyJ.D.Wilsonandothers,Saunders,USA .
5. AnimalTransgenisisand Cloning.EditedbyL.M.Houdebine,Wiley,USA.

CO/PO	PO											
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CO1	2	3	1	3	1				1	1		
CO2	1	2	2	1	2				1	1		
CO3	3	2	3	2	2				1	1		
CO4	2	1	2	3	2				1	1		

GE ABT-303A: BIOINFORMATICSANDBIOSTATISTICS

Course Objectives:

1. To know the importance of bioinformatics, internet basics, sources of websites and data base types
2. To understand prediction of protein structure and protein sequence database, prediction of gene structure, submission of sequence to database, phylogenetic analysis
3. To learn biostatistics, measures of location and dispersion, curve fitting and correlation and regression
4. To understand probability distribution, tests of significance, student t-test and F-test, chi square test and their application

UNIT-1.

1.1 Scope, importance and status of Bioinformatics.

1.2 Internetbasics,Toolsfor websearch,Dataretrievaltools.

1.3 Sourcesofwebsites.

1.4 Databasetypes-primary,secondaryandspecific annotationdatabases.

UNIT-2.

2.1 Database types, Prediction of protein structure and protein folding, Protein sequence databases.

2.2 Prediction of gene structure, Functional genomics, Genomic databases**.**

2.3 Submission of sequence to the database, Homology, BLAST- Types of BLAST

2.4 Phylogenetic analysis, Human genome project.

UNIT-3.

3.1 Definitionofstatistics:Biostatistics,classification,variablesandattributes,Diagramaticdistributionofbiological data.

3.2 Measures of location and dispersion: Arithmetic mean, median and mode.Mean deviation,quartiledeviation, Standard deviation andco-efficient ofvariation.

3.3 Curve fitting: Fitting strait line, parabola exponential curve and geometric curve to the data.Fittingof straight line usingMs-Excel.

3.4 Correlation andregression: Scatter diagram, types of relationship. Positive and negativecorrelation, computation of correlation coefficient, Interpretation of correlation coefficient.Simpleregression lines and its interpretation.

UNIT-4.

4.1 Normalprobabilitydistribution&itsapplications.

4.2 Testsofsignificance:levelofsignificance,nullandalternativehypothesis,poweroftestandp-valueof atest.

4.3 Studentt-testforoneasampleand two samplesmeans-paired t-tests.

4.4 F-test,chisquaretestandtheirapplication,conceptofANOVA.

Course Output:

1. Importance of bioinformatics, internet basics, sources of websites and data base types can be understood
2. Prediction of protein structure and protein sequence database, prediction of gene structure, submission of sequence to database, phylogenetic analysis can be learnt
3. Knowledge will be gained biostatistics, measures of location and dispersion, curve fitting and correlation and regression
4. Probability distribution, tests of significance, student t-test and F-test, chi square test and their application can be understood

SUGGESTEDREADINGMATERIAL:

1. BasicBioinformaticsbyS. Ignacimuthu,s.j.Narosapublications,2005.
2. BioinformaticsbyAndreas D. Baxevanisand B.P.Francis Ouellette, 2nd Ed., 2002.
3. Bioinformatics,MethodsandApplications,Genomicsproteomicsanddrugdiscovery,S. C.Rastogi,N. Mendiratlaand P. Rastogi,prentice-Hall ofIndia, 2004.
4. Microsoft Office, bySetultz, 1997.
5. Bio-Statistics-Anintroductorytext-Goldstein,ATheMacmillan Co.,New York,1971.
6. BiostatisticsbyLewisAlvin(1971)AffiliatedEastWestPresspvt.,Ltd.,NewDelhi.
7. Bio-Statistics-ByLewisAlvinE.AffiliatedEast-Westpress(P)Ltd.,1971.
8. InterpretationandusesofMedicalStatistics– G.J.Bourke&J.Mc.Gilvaray,BlovkwellSciencePublication,London, 1969.
9. IntroductiontoBiostatistics–BySokal– Rohlf(2ndEdn)FreemanInternationalEditor(1973).
10. IntroductiontoBiostatisticsbyHoldanBancroft(1962)PualB.HoebarInc.,NewYork.
11. Introductionto Instrumentalanalysis,RonertBraun.McGrawHill Intemationaledition.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	1	2	2				1	1		
CO2	1	2	2	2	1				1	1		
CO3	3	1	2	2	2				1	1		
CO4	2	1	3	1	2				1	1		

GE ABT-303B:GENETIC ENGINEERING

Course Objectives:

1. To understand use of enzymes in DNA and RNA synthesis, restriction enzymes and ligation and modification o DNA
2. To learn vectors for constructions of genomic libraries, expression vectors, promoters and vectors used for cloning
3. To gain knowledge on DNA fragments, cDNA synthesis, PCR
4. To become proficient on ligation between cohesive and blunt end DNA fragments, introduction of cloned genes into host and expression of cloned genes

UNIT-1.

1.1 Enzymes used for the synthesis of DNA: DNA Polymerase I, Klenow fragment, Sequenase, Taq Polymerase, Reverse transcriptase, Terminal Transferase

1.2 Enzymes used for the synthesis of RNA: T3 and T7 RNA polymerases, SP6 RNA polymerase

1.3 Restriction enzymes - Outlines of bacterial restriction and modification systems – Classification of restriction enzymes - Type II restriction enzyme: Nomenclature, Production of DNA fragments with 3‟ protruding ends and blunt ends and their significance in molecular cloning - RFLP and its significance.

1.4 Enzymes used for ligation and modification of DNA: DNA ligase, Methylases, Kinase, Phosphatase.

UNIT-2.

2.1 Vectors for construction of genomic libraries - cosmids, bacterial artificial chromosomes(BACs),yeastartificialchromosomes(YACs)-vectorsforconstructionofcDNAlibraries-lamda ZAP. Multipurposevectors -pUC 18/19,Blue script vectors

2.2 Expression vectors – structure - promoters used in expression vectors - lac, tac, λpL, T7promotersand theirsignificancein constructingexpression vectors.

2.3 Promoter-probe vectors – Structure promoter probe vector - Reporter genes (lacZ, gfp,gus,luciferase) and strategies used toassaypromoteractivity.

2.4 Vectorsusedforcloninginto mammaliancells-SV40Vectors.

UNIT-3.

3.1 Isolationofgene/DNAfragments.Mechanicalshearing,restrictiondigestion,cDNAsynthesis,PCR amplification and chemicalsynthesis of gene.

3.2 cDNA synthesis - Mechanism of cDNA synthesis, Strategies used to obtain full lengthcDNA.5‟and 3‟RACE.

3.3 PCR - Concept and technology- Properties of primers - Inverse, multiplex PCR, RAPDandits significance. Real timePCR.

3.4 Chemical synthesis - Designing gene from amino acid sequence, solid phase synthesis ofoligonulceotides -In vitro synthesis of gene

UNIT-4.

4.1 Ligation between cohesive and blunt end DNA fragments - T4 DNA ligase - Conversionof blunt end DNA fragment into cohesive ended DNA - linkers, adapters, homopolymertailing.

4.2 Introductionofclonedgenesintohost-Transformation,conjugation,transduction,electroporation,particlebombardment,microinjection,liposomemediatedDNAdelivery.

4.3 Identificationandcharacterizationofclonedgenes-Screeningofgenomic/cDNAlibraries-genetic,molecularhybridization-immunochemical techniques

4.4 Expression of cloned genes – detection of expressed proteins – biological and molecularmethods.

Course Output:

1. Use of enzymes in DNA and RNA synthesis, restriction enzymes and ligation and modification o DNA can be understood
2. Vectors for constructions of genomic libraries, expression vectors, promoters and vectors used for cloning can be learnt
3. Knowledge will be gained on DNA fragments, cDNA synthesis, PCR
4. Will become proficient on ligation between cohesive and blunt end DNA fragments, introduction of cloned genes into host and expression of cloned genes

SUGGESTEDREADINGMATERIAL:

1. Biotech‟sDictionaryofGeneticEngineeringbyDineshArora.
2. D.Green;PhilipHilterRichardM.Myers Sue. Klapholz;HaroldRiethman JaneRoskams.
3. DNAcloning:Mammaliansystems - APracticalApproachbyD.M.Glover,B.D.Hames.
4. FromGenes to clonesIntroduction to GenetechnologybyErnst-L-Winnacker.
5. Geneticdisorders ofManbyM.R. Goodman.

6. GeneticEngineeringandits ApplicationsbyP.Joshi
7. Genetics-MonrveW.Strickberger.3rdEd.,May,2000.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	1	3	1				1	1		
CO2	3	3	2	3	2				1	1		
CO3	2	2	3	2	3				1	1		
CO4	1	1	2	3	2				1	1		

SKILL ORIENTED COURSE ABT-305: BIO RESOURCE TECHNOLOGY (APICULTURE,SERICULTURE,AQUACULTURE,VERMICULTURE)

Course Objectives:

1. To understand Types of honey bees, life history of honey bees, management of apiculture and by products of honey bees and economic importance disease and their control
2. To learn historical back ground of sericulture, economic importance of silk
3. To become proficient on fresh water fin fish culture, shell fish (prawn and Pearls) culture
4. To understand historical background of vermicompost, methods of vermiculture and problems involved in vermicompost

UNIT-1. APICULTURE

1.1 Typesof Honeybees.

1.2 LifeHistoryof Honeybees.

1.3 ManagementofApiculture.

1.4 Byproducts of honeybees andeconomic importanceDiseaseandtheircontrol.

UNIT-2.SERICULTURE

2.1 Historicalback groundofSericulture

2.2 TypesofSilkworms.Lifehistoryofmulberrysilkworm.

2.3 EconomicimportanceofSilk.

2.4 DiseasesofSilkworms.

UNIT-3.AQUACULTURE

3.1 Freshwaterfinfishculture.

3.2 Shellfish(Prawn&Pearls)culture.

3.3 Fishbreeding(Bund&induced breeding).

3.4 IntegratedfishfarmingandEconomicimportanceofAquaculture.

UNIT-4.VERMICULTURE

4.1 HistoricalbackgroundofVermicompost.

4.2 DifferentmethodsofVermiculture.

4.3 Advantages andeconomicimportanceof VermicultureVermicompost.

4.4 ProblemsinvolvedinVermicompost.

Course Output:

1. Types of honey bees, life history of honey bees, management of apiculture and by products of honey bees and economic importance disease and their control can be understood
2. Historical back ground of sericulture, economic importance of silk can be learnt
3. Fresh water fin fish culture, shell fish (prawn and Pearls) culture can be proficeint
4. Knowledge can be gained on historical background of vermicompost, methods of vermiculture and problems involved in vermicompost

SUGGESTEDREADINGMATERIAL:

1. ManualoffreshwaterAquaculture.R.Santhanan.Oxford,IBHPublicatons-1987.
2. Aquacultureprinciples.T.V.R.Pillay. Backwell scientificpublications-1993.
3. BiologyCultureandProductionofIndianMajorCarps,“Chakaraburthy”,N.M.Narendr apublishinghouse, NewDelhi-1999.
4. Silkwormrearing,Oxford&IBHPublishingCo.Pvt.Ltd.NewDelhi-1997.
5. SilkDying andFinishing,Oxford&IBHPublishingCo.Pvt.Ltd.NewDelhi-1997.
6. EconomicZoology, G.S.Shukla&V.B.Upadyay.Rastoogipublications,1994.

OE ABT-306A:ANIMALBIOTECHNOLOGYANDINDUSTRIAL APPLICATIONS

Course Objectives:

1. To gain knowledge on preservation animals engineered bacteria/yeast/ cell lines, metabolic engineering, fermentative production and glycolytic pathway
2. To understand monoclonal antibodies, DNA biotechnology and genetically engineered products
3. To learn transgenic, poultry, piggery, diary sciences and aquaculture applications
4. To know the DBT guidelines, Global scenario of transgenic micro organisms and ethical issues related to biotechnology products.

UNIT-1.

1.1 Preservation animal engineered bacteria/ yeast/ cell lines – reversal strategies – optimizesofexpression ofrestrictionprimer– mechanismof restriction, isolationdigestion.

1.2 Metabolicengineering:enzymaticcultivationofdomesticandagriculturalwastes–saccharification – large scale purification of cellulases – and their use in conservation ofagriculturewaste in to sugars.

1.3 FermentativeproductionofbioEthanol,PropanolandButanol.

1.4 Glycolyticpathway,manipulatingincreasedflux towardsalcohols.

UNIT-2.

2.1 Products from animal and plant cells, monoclonal antibodies, hormones etc. Geneticallyengineeredproducts,DNAbiotechnology,Modernmethodsforthedetectionofpathogens.

2.2 Bioinformatics and Biotechnology, Disease Processes, Extremophiles and the search fornewbiocatalysts.

2.3 Transgenics:Transgenicanimal:productionandapplication;transgenicanimalsasmodelsforhuman diseases.

2.4 Transgenicanimalsinlive-stockimprovement;expressionofthebovinegrowthhormone;transgenicsinindustry;chimeraproduction;Ethicalissuesinanimalbiotechnology.

UNIT-3.

3.1 Poultry.

3.2 Piggery.

3.3 DiarySciences.

3.4 Aquacultureapplications.

UNIT-4.

4.1 Safetyinthecontaineduseandreleaseoftransgenicanimals-Mechanismofimplementationofbiosafetyguidelines-atInstitutional,nationaland Internationallevel.

4.2 DBTGuidelines-ActusandtreatiesrelatedtobiosafetyofGMMandGMP"s-Publicawarenessperception and acceptanceof productsofbiotechnology.

4.3 Globalscenariooftransgenicmicroorganismsandplants-Intellectualpropertyrights-Patentlaws at national and international level.

4.4 Ethicalissuesrelatedtobiotechnologyproducts-Ecologicalrisksofengineeredmicroorganismsremedies.

Course Output:

1. Knowledge will be gained on preservation animals engineered bacteria/yeast/ cell lines, metabolic engineering, fermentative production and glycolytic pathway
2. Monoclonal antibodies, DNA biotechnology and genetically engineered products can be understood
3. Transgenic, poultry, piggery, diary sciences and aquaculture applications can be undertood
4. DBT guidelines, Global scenario of transgenic micro organisms and ethical issues related to biotechnology products can be learnt

SUGGESTEDREADINGMATERIAL:

1. Tzotzos,G.T.1995.Geneticallymodifiedorganisms-Aguidetobiosafety,CABInternational,Wallingford, U.K. 213p.
2. DBT1998Backgrounddocumentforworkshoponbiosafetyissuesemanatingfromuseofgen eticallymodified organisms(GMOs).Bangalore. September1998.289p.
3. Subbaram,N.R.1998.HandbookofIndianpatentlawandpractice.S.Viswanathan(Printers &Publishers) Pvt.Ltd. Chennai 628p.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	2	1	2				1	1		
CO2	1	3	1	3	2				1	1		
CO3	2	2	3	2	1				1	1		
CO4	2	1	1	3	2				1	1		

OE ABT-306B:CANCERBIOLOGY

Course Objectives:

1. To gain knowledge on cancer types and tumor development
2. To learn oncogenes, mechanisms of onogene activation and chromosomal translocation
3. To understand cell cycle regulation and cancer, DNA Damage and repair
4. To learn tumor immunology, Vaccine development, tumor cell evasion of immune defenses

UNIT-1.

1.1 Introduction:Cancertypes,Characteristicsofcancercells.

1.2 Carcinogenesis:cancerinitiation, promotionandprogression,termination.

1.3 Factorsresponsibleforcarcinogenesis:Physical, chemicalandbiological.

1.4 TumorDevelopment:Models,Tumorangiogenesis.Overviewofinvasionandmetastasis.Cell-cell interactions in cancer.Invasion and the extracellular matrix.Specific cases ofProstate,Breast,Intestinal cancers.

UNIT-2.

2.1 Oncogenes andtheirroleinCancer:Introductiontooncogenes.

2.2 Mechanismsofoncogeneactivation(geneamplification.

2.3 Mechanismsofoncogene activation(chromosomaltranslocations).

2.4 Chromosomaltranslocationswithdominantnegativeeffects.Introductiontotumorsuppressor genes.

UNIT-3.

3.1 Cell-CycleRegulationandCancer:Mutationsaffectingmitogenicsignaltransductionpathways. Cell Cycle Regulation - Mutations affecting the cell cycle. Loss of checkpointcontrolandgeneticinstability. Replicativesenescence

3.2 DNA Damage, Repair failure and Carcinogen Mechanisms:Carcinogens, DNA damageandrepair.

3.3 Carcinogenesis:Chemicalandphysicalagents.

3.4 Carcinogenesis:Repairmechanisms.Aberrantrepairandgeneticinstability.Geneticpredispositionto cancer.

UNIT-4.

4.1 TumorImmunology:Tumorimmunology[tumorantigens, cytokines,

4.2 Vaccinedevelopment,Immunotherapyanditslimitations.

4.3 Tumorcellevasionofimmunedefenses.

4.4 Principles of chemotherapy and chemoprevention. Drug screens: High throughputScreening(HTS) approaches.

Course Output:

1. Cancer types and tumor development can be understood
2. Oncogenes, mechanisms of onogene activation and chromosomal translocation can be learnt
3. Cell cycle regulation and cancer, DNA Damage and repair can be understood
4. Tumor immunology, Vaccine development, tumor cell evasion of immune defenses can be leant

SUGGESTEDREADINGMATERIAL:

1. OxidativeStressandInflammatoryMechanismsinObesity,Diabetes,andtheMetabolic Syndrome,EditedbyLesterPacker andHelmut Sies,CRC PressLLC(2007).
2. Oxidativestressandneurodegenerativedisorders.G.AliQureshiandS.HasanParvez,El sevier,St.Louis, MO63146 USA(2007).
3. OxidativeStressDiseaseandCancer.EditedbySingh,WorldScientificPublishing(2006).
4. FattyAcidsandOxidativeStressinNeuropsychiatricDisorders.EditedbyRavinder,M.D.Reddy andJeffreyK.Yao,NovaSciencePubInc(2007).
5. OxidativeStress,Inflammation,andHealth.EditedbyYoung-JoonSurhandLesterPacker,CRC PressLLC(2005).
6. CriticalReviewsofOxidativeStress&Aging.EditedbyCutler,WorldScientificPublish ing(2002).
7. FreeRadicals,OxidativeStress,andAntioxidants:PathologicalandPhysiologicalSigni ficance”Edited bybyTomrisÖzbenm,Springer(1998).

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	2	1	2				1	1		
CO2	1	3	1	3	2				1	1		
CO3	2	2	3	2	1				1	1		
CO4	2	1	1	3	2				1	1		

ABT 304 P : ABT-301 (Core), ABT-302 (Core) & ABT-303 A& B (GE)

ABT Lab 2: ABT-305 (Skill Oriented course)

CORE ABT-401:MEDICALBIOTECHNOLOGY

Course Objectives:

1. To understand disease diagnosis, monoclonal antibodies and detection of genetic disease
2. To learn Disease treatment, interferons, growth factor, and antisense nucleotide as therapeutic agent
3. To gain knowledge on gene therapy, types of gene therapy, augmentation therapy and targeted transfer
4. To become proficient on forensic medicine, preparation of DNA sample. Approaches for DNA analysis and applications of forensic medicine

UNIT-1.

1.1 Introduction,Diseaseprevention(Vaccines),Anidealvaccines.

1.2 Diseasediagnosis:Probes.

1.3 Monoclonalantibodies.

1.4 DetectionofGeneticDisease.

UNIT-2.

2.1 Diseasetreatment.

2.2 Interferons.

2.3 Growthfactor.

2.4 Antisensenucleotideastherapeuticagent.

UNIT-3.

3.1 GeneTherapy.

3.2 Typesofgenetherapy.

3.3 Augmentationtherapy.

3.4 Targetedtransfer.

UNIT-4.

4.1 Forensicmedicine.

4.2 Preparationofthe DNASample.

4.3 ApproachesforDNAAnalysis.

4.4 ApplicationsofForensic medicine.

Course Output:

1. Disease diagnosis, monoclonal antibodies and detection of genetic disease can be understood
2. Disease treatment, interferons, growth factor, and antisense nucleotide as therapeutic agent can be learnt
3. Knowledge will be gained on gene therapy, types of gene therapy, augmentation therapy and targeted transfer
4. Forensic medicine, preparation of DNA sample. Approaches for DNA analysis and applications of forensic medicine will be proficient

SUGGESTEDREADINGMATERIAL:

1. BiotechnologybyB. D. Singh. Kalyani Publishers, 2007.
2. TextBook ofBiotechnologyByH.K. Das (WileyPublications).
3. Strategies in Transgenic Animal Sciences - By Glemn M.M. and James M. Robl ASM.2000.
4. Essentialsof Biotechnologyfor StudentsBySatyaN. Das.2001.
5. GeneseriesByBenjaminLewin,OxfordUniversityPress
6. Molecular Biologyof Cell ByBruceAlberts
7. MolecularBiologyDavidFreifelder,NarosaPublishingHouse
8. E.coliandSalmonellatyphimurium-CellularandMolecularBiologyByNeidhardt,AmericanSocietyforMicrobiology,USA.
9. Molecular Biologyof theGenebyWatson.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	1	3	2				1	1		
CO2	1	3	1	3	2				1	1		
CO3	2	1	3	2	1				1	1		
CO4	3	1	2	2	2				1	1		

CORE ABT-402:FERMENTATIONTECHNOLOGYANDDOWNSTREAMING,PROCESS

Course Objectives:

1. To understand cell distribution methods, separation techniques, purification by chromatographic techniques and isolation and screening and maintenance of industrially importance microbs
2. To learn bioreactor design, fermentation economics, upstream processing, membrane based separations
3. To gain knowledge on importance of downstream processing economics of downstream processing
4. To become proficient in adsorptive chromatographic separations, electrophoretic process, hybrid separations technologies and gel permeation chromatography dialysis and crystallization

UNIT-1.

1.1 Cell distribution methods: Sonicatron – frush press – freeze than methods. Cell distribution for intracellular products, removal of insolubles, biomass (and particulate debris).

1.2 Separation techniques, flocculation and sedimentation, centrifugation and filtration methods.

1.3 Purification by chromatographic techniques; Reverse osmosis and ultra-filtration; Drying; Crystallization; Storage and packaging; Treatment of effluent and its disposal.

1.4 Isolation, screening and maintenance of industrially important microbes; Microbial growth and death kinetics (an example from each group, particularly with reference to industrially useful microorganisms).

UNIT-2.

2.1 Bioreactor designs; Types of fermentation and fermenters; Concepts of basic modes offermentation-Batch,fedbatchandcontinuous;Conventionalfermentationv/sbiotransformation;Solid substrate,surfaceand submergedfermentation.

2.2 Fermentation economics; Fermentation media; Fermenter design-mechanically agitated;Pneumatic and hydrodynamic fermenters;Large scale animal and plant cell cultivationandair sterilization.

2.3 Upstreamprocessing:Mediaformulation;Sterilization;Aerationandagitationinbioprocess; Measurement and control of bioprocess parameters; Scale up and scale downprocess.

2.4 Membrane-based separations(micro and ultrafiltration theory, design and configuration ofmembrane separation equipment, applications, precipitation methods(with salts, organicsolvents, and polymers, extactive separations, aqueous two phase extraction, supercriticalextraction)insitu product removal, integratedbioprocessing.

UNIT-3.

3.1 RoleandImportanceofdownstreamprocessinginbiotechnologicalprocesses.

3.2 Problemsandrequirementsofbioproductpurification.

3.3 EconomicsofdownstreamprocessinginBiotechnology,cost-cuttingstrategies.

3.4 Characteristicsofbiologicalmixtures,processdesigncriteriaforvariousclassesofbioproducts(high volume, low value products and low volume, high value products),physico-chemicalbasis of bioseparation processes.

UNIT-4.

4.1 Adsorptivechromatographicseparationsprocesses.

4.2 Electrophoreticprocesses (allelectrophoresistechniquesincludingcapillaryelectrophoresis)

4.3 Hybridseparationtechnologies(membranechromatography,electrochromatographyetc).

4.4 GelPermeationChromatography, dialysis,Crystallisation.

Course Output:

1. Cell distribution methods, separation techniques, purification by chromatographic techniques and isolation and screening and maintenance of industrially importance microbs can be understood
2. Bioreactor design, fermentation economics, upstream processing, membrane based separations can be learnt
3. Knowledge will be gainedon importance of downstream processing economics of downstream processing
4. Adsorptive chromatographic separations, electrophoretic process, hybrid separations technologies and gel permeation chromatography dialysis and crystallization will be proficient

SUGGESTEDREADINGMATERIAL:

1. WankatP.C,“RateControlledSeparations",Elsevier,1990.
2. BelterPAandCusslerE, “Bioseparations",Wiley, 1985.
3. “ProductRecoveryinBioprocessTechnology",BIOTOLSeries,VCH,1990.

4. AsenjoJ.M,“SeparationprocessesinBiotechnology",1993,MarcelDekkerInc.

CO/PO	PO											
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CO1	2	2	2	1	2				1	1		
CO2	1	3	1	3	2				1	1		
CO3	2	2	3	2	1				1	1		
CO4	2	1	1	3	2				1	1		

GE ABT-403A: DRUGDESIGNANDDEVELOPMENT

Course Objectives:

1. To learn drug design, analog approach of drug designing
2. To understand SAR Vs QSAR, Partition coefficient, Hammets substituent constant and Tafts steric constant, Free Wilson mode, 3D-QSAR approach like COMFA and COMIA
3. To gain knowledge on pharmacological screening and assays, pharmacological screening models for therapeutic areas, cell based assay, biochemical assay, radiological binding assay, small molecule manufacturing
4. To learn Drug Laws, FDA, OECD, ICH, Schedule Y, drug registration, Regulations of human pharmaceuticals and biological products, and clinical trial design

UNIT-1.

1.1 Historyofdrugdesign,Current approachesandchallengesin drugdesign.

1.2 ConventionalMethods:Lead,Discoveryoflead,Leadoptimisation,Objectiveofleadoptimization.

1.3 Analogapproachofdrugdesigning:Bioisostericreplacement,rigidanalogs.

1.4 Alteration ofchain branching,changes in ring size, ring position isomers, design ofstereo isomers and geometric isomers, fragments of a lead molecule, variation in interatomicdistance.

UNIT-2.

2.1 SARversusQSAR, Historyand developmentofQSAR, ObjectivesofQSAR.

2.2 Types of physicochemical parameters, experimental and theoretical approaches for thedeterminationofphysicochemicalparameterssuchasPartitioncoefficient,Hammetssubstituentconstant and Tafts stericconstant.

2.3 Hansch approach, Free-Wilson model, statistical methods, Non-computer-assisted searchoperationslikeToplissdecisiontree,Simplexmethod,Fibonaccisearchtechnique.

2.4 3D-QSARapproacheslikeCOMFAandCOMSIA.

UNIT-3.

3.1 PharmacologicalScreeningandAssays:Generalprinciplesofscreening,correlationsbetweenvarious animalmodels and human situations.

3.2 Pharmacologicalscreening modelsfor therapeutic areas.Correlationbetweenin-vitroandin-vivoscreens.

3.3 Special emphasis on cell-based assay, biochemical assay, radiological binding assay, highthroughputscreening, specificuseofreferencedrugsandinterpretation of results.

3.4 Manufacturing&processdevelopment;smallmoleculemanufacturing;developmentofproteintherapeutics andvaccines.

UNIT-4.

4.1 Drug Laws, FDA, OECD, ICH, Schedule Y, Design non clinical toxicity studies andclinicaldevelopment, clinical risk/benefit analysis.

4.2 Drugregistration:Regulatoryaffairs,WTO,Patentregime,Accreditationandharmonizationprocess.

4.3 Regulations of human pharmaceuticals and biological products. Clinical Trials: Mainfeatures of clinical trials, including methodological and organizational considerations andtheprinciples oftrial conduct and reporting.

4.4 Keydesigns surrounding design, samplesize,deliveryand assessment of clinicaltrials.

Course Output:

1. Drug design, analog approach of drug designing can be understood
2. SAR Vs QSAR, Partition coefficient, Hammets substituent constant and Tafts steric constant, Free Wilson mode, 3D-QSAR approach like COMFA and COMIA can be learnt
3. Knowledge will be gained on pharmacological screening and assays, pharmacological screening models for therapeutic areas, cell based assay, biochemical assay, radiological binding assay, small molecule manufacturing
4. Drug Laws, FDA, OECD, ICH, Schedule Y, drug registration, Regulations of human pharmaceuticals and biological products, and clinical trial design can be learnt

SUGGESTEDREADINGMATERIAL:

1. ComprehensiveMedicinalChemistry,Vol.IV,QuantitativeDrugDesign,C.Hansch,Ed.
2. Burger‟sMedicinalChemistryandDrugDiscovery,Vol.I,Vedition,M.E.Wolff.Ed.
3. QuantitativeDrugDesign,ACriticalIntroduction,Y.C.Martin,MarcellDekker.
4. TheoreticalDrugDesignMethods,Vol. 7,R.Franke,Elsevier,1988.
5. TheOrganicChemistryof DrugDesignandAction, R.B. Silverman,AcademicPress.
6. TheOrganicChemistryofDrugDesignandDrugAction, byR.B. Silverman.
7. An Introduction toMedicinal ChemistrybyG. L.Patrick.
8. MartinYC.“QuantitativeDrugDesign”Dekker,NewYork.
9. LienEJ.SAR“SideeffectsandDrugDesign”Dekker,NewYork.
10. WilliamH,MalickJB“DrugDiscoveryandDevelopment”HumanaPressClifton.
11. FoyeWO“PrinciplesofMedicinalchemistry,,Lea&Febiger.
12. KorolkovasA,BurckhalterJH.“EssentialsofMedicinalChemistry”WileyInterscience.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3	3	2	3				1	1		
CO2	2	2	1	1	2				1	1		
CO3	1	2	3	2	1				1	1		
CO4	2	1	1	2	2				1	1		

GE ABT-403B:BIOSAFETY,BIOETHICS&INTELLECTUALPROPERTYRIGHTS

Course Objectives:

1. To understand socio-economic and legal impact of biotechnology, use of genetically modified organisms, moral and ethical issues in biotechnology and safety issues with GMO
2. To learn intellectual property right, evaluation of patenting, application of GATT and IPR and WTO Act and global and Indian biodiversity
3. To gain knowledge on Indian Patent Act 1970, role of country patent office, U.S. Patent trademark office and U.S. Paten system Vs Indian Patent system
4. To gain knowledge on Ethics and genetic engineering, patent of genes, human cloning, stem cel, regulatory requirements for drugs and biologics, GLP and GMP

UNIT-1.

1.1 Socio–economicandlegalimpactsofbiotechnology,rDNA guidelines,nationalandinternationalguidelines,experimentalprotocols approval,levelsof containment.

1.2 Useofgeneticallymodifiedorganisms, their releasein theenvironment.

1.3 Moralandethicalissuesinbiotechnology.

1.4 Safetyissues with GMO.

UNIT-2.

2.1 IntellectualpropertyRights:Definitionof IPR,Typesof IPR,PatentstoTradesecrets,copyrights,trademarks– legalImplications.
2.2 Evaluationofpatenting,IPrelevanceto Biotechnologyandfewcasestudies.
2.3 ApplicationGATT &IPR,WTOAct.

2.4 Global&Indian biodiversityact.

UNIT-3.

3.1 Indian Patent Act 1970, Recent Amendments filing of a patent application – Precautionsbeforepatenting-disclosure/non-disclosure.

3.2 Role ofacountrypatent office.

3.3 U.S.PatentTrademark Office.

3.4 U.S.PatentsystemVsIndianPatentSystem.

UNIT-4.

4.1 EthicsandGeneticEngineering,PatentofGenes.

4.2 Humancloning,Stemcells,

4.3 Regulatoryrequirements fordrugs andbiologics.

4.4 GLP,GMP.

Course Output:

1. Socio-economic and legal impact of biotechnology, use of genetically modified organisms, moral and ethical issues in biotechnology and safety issues with GMO can be understood
2. Intellectual property right, evaluation of patenting, application of GATT and IPR and WTO Act and global and Indian biodiversity can be leant
3. Knowledge will be gained on Indian Patent Act 1970, role of country patent office, U.S. Patent trademark office and U.S. Patent system Vs Indian Patent system
4. Ethics and genetic engineering, patent of genes, human cloning, stem cell, regulatory requirements for drugs and biologics, GLP and GMP can be proficient

SUGGESTEDREADINGMATERIAL:

1. SassonA,BiotechnologiesandDevelopment,UNESCOPublications,1988
2. SassonA,Biotechnologiesindevelopingcountriespresentandfuture,UNESC Opublishers,1993.
3. SinghK.IntellectualPropertyRightsonBiotechnology,BCIL,NewDelhi.
4. Understandingbiotechnology,aluizioborem,fabricior.Santos.Davide. Bowen.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	2	1	2				1	1		
CO2	2	1	1	2	2				1	1		
CO3	3	2	3	2	3				1	1		
CO4	1	2	1	2	2				1	1		

OE ABT-406A:ADVANCEDGENOMICSANDPROTEOMICS

Course Objectives:

1. To learn structure of Prokaryotic and Eukaryotic genomes, Isolation and purification of genomic DNA, Construction of Physical maps and Whole genome sequence alignment
2. To understand genome annotation, methods for gene identification, functional genomics, transcript profiling
3. To learn protein structure, sample preparation and separation 2D-analysis, Multidimensional liquid chromatography, protein-protein interactions analysis
4. To gain knowledge on DNA /protein sequence homologies, Gene duplication and divergence, and evolution of novel genes and proteins, DNA quantities and non-coding sequences (transposons) in genome evolution

UNIT-1.

1.1 ThestructureofProkaryoticand Eukaryoticgenomes

1.2 Isolationand purificationofgenomicDNA.GenerationofBACandYAClibraries.

1.3 ConstructionofPhysicalmaps–Restrictionmaps,FISHandSTSmaps.Maxim&Gilbert,Sangerand Next generation DNAsequencingmethods.

1.4 Wholegenomesequencealignment;ClonebycloneandShotgumsequencing.Finishedsequencesand DNAsequencedata bases.

UNIT-2.

2.1 Genome annotation, methods for gene identification (location)

2.2 Assigning gene function by experimental analysis: gene inactivation by homologous recombination, RNA interference (RNAi) and gene knockout.

2.3 Functional genomics: Array fabrication, types, method and application of DNA Micro arrays.

2.4 Transcript profiling: Serial analysis of gene expression (SAGE) and Massively parallel signature sequencing (MPSS)

UNIT-3.

3.1 Proteinstructure:secondarystructures,domains,motifandfolds

3.2 Samplepreparationandseparation–2D-analysis,Multidimensionalliquidchromatography.

3.3 CharacterizationofproteinsbyMassspectrometryandproteinsequencing.Proteinmicroarrays.

3.4 Protein-proteininteractionanalysis;yeasthybridsystems,phagedisplayandproteincomplexes.

UNIT-4.

4.1 DNA/proteinsequencehomologies–Analogy, OrthologyandParalogy.

4.2 Geneduplicationanddivergence,andevolutionofnovelgenes andproteins

4.3 DNAquantities and non-codingsequences(transposons)in genomeevolution.

4.4 Molecularclocks,MolecularPhylogenetics andconstructionofphylogenetictrees.Applicationsofgenomicsinmedicine,agriculture and industry.

Course Output:

1. Structure of Prokaryotic and Eukaryotic genomes, Isolation and purification of genomic DNA, Construction of Physical maps and Whole genome sequence alignment can be learnt
2. Genome annotation, methods for gene identification, functional genomics, transcript profiling can be understood
3. Protein structure, sample preparation and separation 2D-analysis, Multidimensional liquid chromatography, protein-protein interactions analysis can be proficient.
4. Knowledge will be gained on DNA /protein sequence homologies, Gene duplication and divergence, and evolution of novel genes and proteins, DNA quantities and non-coding sequences (transposons) in genome evolution

SUGGESTEDREADINGMATERIAL:

1. Griffiths,A.J.F.,Miller,J.H.,Suzuki,D.T.,Lewontin,R.C.,andGalbert,W.M.2000.A nintroduction toGenetic Analysis, W.H.Freeman Publishers, NewYork.
2. DouglasJ.Futuyma,1998.EvolutionaryBiology(3rd.Ed).SinauerAssociates,Inc.Pub lishers.
3. Brown,T.A. 1999. Genomes 3.JohnWiley&Sons, NewYork,USA.
4. Primrose,S.B.&Twyman,R.M.2003.PrinciplesofGenomicAnalysisandGenomics. (7th Ed.). Blackwell Science.
5. Brown,T.A.2001.GenecloningandDNAAnalysis- Anintroduction(5thEd.),BlackwellScientificPublications, Oxford, U.K.
6. RobertF.Weaver.2008. MolecularBiology(4th Ed.).McGrawHillHigherEducation.
7. Gustafson,J.P.2000.Genomes,KluwerAcademicplenumpublishers,NewYork,US A.
8. Jolls,O.andJornvall,H.(eds.)2000.ProteomicsinFunctionalGenomics.BirkhauserV erlag,Basel,Switzerland.
9. BiochemistrybyLubertStryer(5th Ed.) (Freeman-Toppan).

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	1	3	2				1	1		
CO2	1	3	2	3	2				1	1		
CO3	3	2	2	2	1				1	1		
CO4	2	1	2	1	2				1	1		

OE ABT-406B: ANIMALCELL CULTURETECHNIQUES

Course Objectives:

1. To understand Animal cell culture, culture medium, characteristics of cell in culture
2. To learn primary culture, established cell line culture, Measurement of viability and cytotoxicity , cell types and apoptosis
3. To gain knowledge in scaling up of animal cell culture, cell transformation, tissue engineering, transgenic animals, animal cloning
4. To become proficient in improvement of biomass, pharming products, plasminogen activator and ethical issues related to biotechnology products

UNIT-1.

1.1 AnimalCellCulture:Equipmentandmaterialsfor animalcellculture technology.Varioussystemsoftissue culture,theirdistinguishingfeatures,advantages andlimitations.

1.2 Culturemedium:naturalmedia,syntheticmedia,sera.Introductiontobalancedsaltsolutionsandsimple growth medium.

1.3 Briefaccountonthechemical,physicalandmetabolicfunctionsofdifferentconstituentsofculturemedium, roleof carbondi oxide, serumand supplements.

1.4 Characteristicsofcellsinculture:Contactinhibition,anchoragedependence,cell-cellcommunicationetc.;Cell senescence;cell andtissue responseto trophic factors.

UNIT-2.

2.1 PrimaryCulture:Behaviourofcells,properties,utility.Explantculture;suspensionculture.

2.2 Established cell line cultures: Definition of cell lines, maintenance and management; celladaptation.

2.3 Measurement of viability and cytotoxicity: Cell cloning, cell synchronization and cellmanipulation.

2.4 Cell types and Apoptosis: Various methods of separation of cell types, advantages andlimitations; flow cytometry.Measurement of cell death, Apoptosis (death domain, role ofcytochromeC)

UNIT-3.

3.1 Stem cells:Scaling up of animal cell culture. Cell transformation. Scope, embryonic andadultstemcells,properties,identification,stemcellsculture,techniquesandtheirapplicationsin modern clinical sciences.

3.2 TissueEngineering:biomaterialsusedintissueengineering,threedimensionalcultureandtransplantation ofengineeredcells.-Skin, boneand neuronaltissues.

3.3 TransgenicAnimals:Methodsinvolvedintheproductionoftransgenicanimals,importance and applications of transgenic animals. Gene knock out and mice models fortacklinghuman diseases.

3.4 Animal cloning: methods of cloning and their importance with reference to domesticanimals.IVF-
technologyforlivestock and humans.

UNIT-4.

4.1 Improvementofbiomass,diseaseresistant,recombinantvaccines forpoultry,livestock.

4.2 Pharmingproducts. Pharmaceutical products producedbymammalian cells.

4.3 Plasminogenactivator,erythropoietin,bloodclottingfactors,Glycoproteinhormones,interleukins,interferons,Cell culturebased vaccines.

4.4 Ethicalissuesrelatedtobiotechnologyproducts-
Ecologicalrisksofengineeredmicroorganismsremedies.

Course Output:

1. Animal cell culture, culture medium, characteristics of cell in culture can be understood
2. Primary culture, established cell line culture, Measurement of viability and cytotoxicity , cell types and apoptosis can be learnt
3. Knowledge will be gained in scaling up of animal cell culture, cell transformation, tissue engineering, transgenic animals, animal cloning
4. Improvement of biomass, pharming products, plasminogen activator and ethical issues related to biotechnology products will be proficeint

SUGGESTEDREADINGMATERIAL:

1. BallinicC.A.,PhilipsJ.Pand MooYoungM.AnimalBiotechnology. Pergamonpress,NewYork. 1989.
2. BergerS.L.andA.R. Kimmel.Methodsinenzymologyguidetomolecular cloningtechniques(Vol 152).AcademicPressInc. San Diego.1996.
3. JanFreshney.R.Culture ofAnimalCells:AManual ofBasicTechniqueandSpecialized Applications (6thEd.)Wiley&Sons. 2010.
4. John Davis., Animal Cell Culture: Essential Methods (1st Ed.) Wiley-Blackwell andSons publisher. 2011.
5. Ernst-LWinnacker, FromGenestoClones:IntroductiontoGeneTechnology. WILEY-VCH Verlag GmbH,Weinheim, Germany Reprinted by PanimaPublishingCorporation,New Delhi. 2003.
6. AnimalcellBiotechnology, R.E.SpierandJ.BGriffiths.AcademicPress.(1998).
7. LivingresourcesforBiotechnology,Animalcells;a.Doyle,R.HayandB.E.Kirsop(1990) ,Cambridge UniversityPress, Cambridge.
8. Genetherapy– FromLaboratorytotheClinic,Hui,K.M.WorldScientificPublishingCo.Pvt.Ltd. Singapore, 1994.

CO/PO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	2	1	2				1	1		
CO2	3	1	1	3	2				1	1		
CO3	2	3	3	1	1				1	1		
CO4	1	2	2	3	2				1	1		

ABT 404 : Project and Viva-Voce (Dissertation preparation and Submission).

ABT Lab 2: ABT-405 (Project Work)

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF CM & CS

DEPARTMENT OF MANAGEMENT STUDIES



Course

MASTER OF BUSINESS ADMINISTRATION (M.B.A)

Choice Based Credit System (CBCS)

Academic Year 2023 –24

Amended as per NEP-202

About the Department

Department of Management Studies which was started in 1983 has made its Vision, Mission and Objectives clear to primarily produce competent management professionals continuously over the years. These are:

Vision

To be a centre of excellence in the field of management education.

Mission

To produce globally competent and socially responsible managers, entrepreneurs, teachers and researchers.

MBA Program:

The MBA program is a student centric program with an objective of developing a career in diverse sectors of the industry domestically and globally. The MBA program not only facilitates learning in theory and practice of different functional areas of management but also equips the students with an integrated approach to various functions of management.

The curriculum is designed in a way that Faculty and Students will shift their focus from traditional methodology which excessively focuses on industry towards a broad based learning, encompassing the end to end processes involved in developing entrepreneurial skills looking at needs and demands of broader sections of the society.

Department Objectives

- To provide best learning experience in management education by extensive use of information and communication technology tools.
- To create management knowledge through path breaking research and disseminate it.
- To encourage entrepreneurial spirit and foster entrepreneurship.
- To infuse the basic values and transform people as good human beings.

CHOICE BASED CREDIT SYSTEM (CBCS)
REVISED REGULATIONS -2021-23

This new curriculum is based on the NEP, designed to prepare students for lifelong learning in both offline and online modes. This curriculum incorporates audit courses, functional courses, interdisciplinary electives, general electives, project works and skill oriented papers. The major aim of this programme is to prepare students as entrepreneurs and intrapreneurs, with startup culture.

1. GENERAL INFORMATION

- 'Credit' is concerned with the quantum of syllabus and workload assigned to a Particular course
- one credit = one lecture hour / week

Choice based credit system provides an opportunity to students to learn subject at their own pace registering for more or less than the desired number of courses to secure post graduation degree. It allows to experience inter disciplinary approach in learning.

(i) Programme – Course

- A programme consists of a number of courses
- A course is a paper of the programme
- A course may involve, Lectures / Tutorials / Lab Work / Seminars / Case Studies / Group Discussions / Role Playing / Project / Practical Training etc.
- The effort in the form of tutorials, lab work, seminar, case studies, group discussion, role playing, project and practical training, covering 100 marks is assigned with 4 credits.
- A course length is usually 15 lecture weeks
- Each course is given a code

(ii) Classification of courses:

The various courses offered to students are of three types:

(a) Core Course:

Core courses are those, knowledge of which is essential for students registered.
These courses are mandatory.
A core course may be a theory or practical paper.

(b) **Audit Course:**

The purpose of the audit course is to create awareness among students about some of the important topics which will enhance their life skills. The evaluation will only be internal without any external examination, and therefore no credits shall be awarded

for these courses. However, the students have to obtain pass marks (40%) in the internal evaluation. The grade sheet will show only pass / fail against these courses.

(c) **Online Course:**

The concerned department allows students to choose one or two online courses, during each semester, to acquire more knowledge. These credits are to be taken into account for awarding grades or class. Such courses should be in advanced areas of the subject, as specified in the course structure. The grading will be as per the procedure approved for the CBCS. For online courses only semester end examinations will be conducted, without any internal assessment. The courses marked as online in the course structure, shall be completed by the students by enrolling in approved online courses, and they shall submit the pass certificate(s) to forward them to the controller of examinations of the University. If the college / department with the competent teaching faculty, decides to offer the courses marked as "online" in offline mode, the students can opt to attend those classes. Such students should put in the minimum attendance, and need not enrol for online courses. However, the final exam will be for 100 marks, without internal assessment.

(d) **Elective**:

An elective allows students to gain knowledge in areas where the concerned subject has practical applications.

Internal Electives:

The department declares electives for its own students, out of which the desired electives are chosen by the students of parent department. These are called Internal Electives(IE).

External Electives / Open Electives:

A department declares electives for the students of other departments. These electives are taught out of college normal working hours. These are called External Electives / Open Electives.

The credits obtained are mandatory

Inter Disciplinary Electives:

The department declares some of the electives as Inter Disciplinary Electives which are offered to its own students together with students of other departments. This is in the light of NEP which envisages inter disciplinary learning from the students coming from different streams / programmes.

(iii) Semesters:

An academic year is constituted by two semesters.

- Odd semester covers the period August to December, fifteen weeks of which are lecture weeks.
- Even semester covers the period December to April, with fifteen lecture weeks.
- In each semester there are no preparatory holidays for semester end examinations, next semester follows immediately at the end of previous semester end examinations. Semester end examinations are on each working day without gap between two examinations.

2. Eligibility for admission into Two Year Degree of Master of Business Administration (M.B.A)

The candidates seeking admission into the MBA Programme should have Passed the Bachelor Degree Examination of a minimum of Three Years duration of this University or an examination recognized by this University as equivalent there to and besides to have passed in the prescribed entrance examination, and fulfil any other conditions as in vogue for admission into the M.B.A Degree programme.

3. For passing the MBA Degree examination, the candidate has to fulfill the conditions prescribed hereunder:

a) The Candidate has to undergo a course of study in the University College extending over a period of two academic years, each academic year consisting of two semesters and each semester consisting of 16 weeks duration including semester-end examinations.

b) The First Year comprises of two semesters and each semester contains eight common courses. The Second Year also has two semesters and each semester contains four common courses and four electives. Details of course structure and evaluation, are given in Annexure – I

4. Industrial Training and Project Work:

(i) Each student must undergo internship in any one of the reputed corporate industrial establishments for a period, not less than eight weeks but not more than 10 weeks in between II and III semesters.

(ii) Each student shall do the project work under the supervision of a faculty guide allotted to him/her. In the Organisation where the candidate undertakes project work, the student must have a supervising guide to look after the progress of work in the company. The student must maintain a diary during his/her stay in the company which will be submitted to the Head of the Department, after completion of the project.

(iii) The candidate must give joining report in the organization by producing a letter issued by the Head of the Department. On completion of the training, the candidate must take relieving certificate and a certificate for bona fide work, which are to be submitted to the Head of the Department.

(iv) The internship envisages submission of dissertation (Code No. 303 of III semester) which carries a maximum of 100 marks including 30 marks for sessionals. The dissertation shall be valued for 70 marks by an internal examiner and an external examiner separately. In the III semester, the candidate has to present one seminar on the topic for evaluation by the faculty.
(v) At the end of the third semester, Project VIVA-VOCE for 100 marks will be conducted by a panel of examiners consisting of an internal and external examiner respectively.

5. Medium of instruction is English Only.

6. Scheme of Examination:

There shall be four semester-end examinations spread over two academic years. Each course carries a maximum of 100 marks including 30 marks for sessionals. Duration of the semester-end examination is 3 hours for each paper of 70 or 100 marks. The sessional marks will be assigned on the basis of tests, quizzes, seminars, carry home assignments, etc., by the concerned teacher.

7. Attendance:

7.1 Regular course of study, in a semester, means a minimum average attendance of 75% in all the papers computed by totaling the number of periods of lectures, tutorials, practical and project as the case may be, held in every paper as the denominator and the total number of periods attended by the student in all papers, as the numerator.
7.2 However, a student has to put in a minimum attendance of 50% in each subject, in addition to the condition laid down in clause 7.1.
7.3 No consideration whatsoever in attendance will be shown to any student for late admission due to any reason.
7.4 Condonation of shortage of attendance may be recommended provided a student puts in at least 62.5% attendance, in all the papers put together as calculated in clause 7.1 above, along with a minimum of 50% attendance in each subject as stated in clause 7.2, and provided the Principal is satisfied with the reason for shortage of attendance.
7.5 A student who could not satisfy these requirements of attendance as given in clauses above, in any semester, shall have to repeat that semester.
7.6 A certificate of satisfactory attendance must be submitted by the student from the organization where he/she undertakes Project Work.
7.7 Further, a student is required to complete the course of study satisfying the attendance requirements in all the four Semesters, within a period of first Eight Semesters from the time of admission, failing which he/she shall forfeit his /her seat.
7.8 A student, who has satisfied the minimum attendance requirements in any semester, may repeat that semester after obtaining written permission from the Principal and cancelling the previous record of attendance and sessional marks of that semester. However, this facility may be availed by any student not more than twice during the entire course of study and the entire course of study shall be within the first Eight Semesters as stipulated in clause 7.7.

8. Promotion:

A candidate who has put in the required minimum attendance as stipulated in Clause No.7 and has registered for the semester-end University examination by paying the required examination fee is eligible for promotion to next semester. There shall be no detention of failed candidates or candidates who are absent for the semester-end University examination.

9. Evaluation:

There shall be both Internal and External evaluation for the semester-end examinations, including Project Report.

10. Qualifying Marks for Pass

a) i) A candidate appearing for the first time for the Examination of any Semester, has to register for the whole examinations of that Semester. A candidate shall be declared to have passed the whole or a part of the whole examination if he/she secures not less than 40% of marks in each theory paper/practical/project report in Semester-end University Examination and not less than 40% marks in Internal Assessment and Semester-end Examination put together.

ii) To pass, the candidate has to obtain a minimum of 40 marks out of 100 marks in Project VIVA-VOCE examination.

b) A candidate who fails to get pass marks for the Project report should submit the revised report along with the next batch of students.

c) A candidate, who fails and wish to appear for whole of theory examination of any semester may do so after cancelling the previous results of the theory examination of that semester. It is applicable only for semester -end examination.

(d) There shall be no supplementary examinations. The failed candidate shall be required to appear again for the examinations along with the regular candidates of next batch.

11. Classification of successful candidates:

The classification will be on the basis of the total grade points obtained by the candidate in all the semesters put together and will be classified as follows:

Marks and Grading:

(1) Weighted Average Marks:

$$WAM = \frac{\sum n_i m_i}{\sum n_i}$$

n_i : Number of credits for i^{th} course
m_i : Marks obtained in the ith course.

(2) Grade point average: GPA = 10^{-1} WAM
The percentage of marks obtained by a student in a course will be indicated by a grade point and a letter grade.

Marks	Grade Point	Letter	Class
70-100	7.0 – 10.0	O	Outstanding
65-69	6.5 – 6.9	A+	First
60-64	6.0 - 6.4	A	First
55-59	5.5 - 5.9	B+	Second
50-54	5.0 - 5.4	B	Second
40-49	4.0 - 4.9	C	Third
00-39	0.0 - 3.9	F	Fail

3) **Overall weighted percentage of Marks (OWPM):**

$$OWPM = \frac{\sum_i \sum_k n_{ik} m_{ik}}{\sum_i \sum_k n_{ik}}$$; m_{ik} = marks obtained in i^{th} course of kth semester

4) **Cumulative grade point average (CGPA) :CGPA = 10^{-1} OWPM**

i) A candidate who secures 70% and above in the total aggregate marks, will be placed in OUTSTANDING (O).

ii) A candidate who secures 65% and above but less than 70% of marks in the total aggregate, will be placed in FIRST (A^+).

iii) A candidate who secures 60% and above but less than 65% of total aggregate will be placed in FIRST (A).

iv) A candidate who secures 55% and above but less than 60% of total aggregate will be placed in SECOND (B^+).

v) A candidate who secures 50% and above but less than 55% of total aggregate will be placed in SECOND (B).

vi) A candidate who secures 40% of marks in each Course with an overall aggregate of 40% or above and above but less than 50% of total aggregate will be placed in THIRD (C).

NOTE: Marks and Gradation Certificates shall be issued by the Controller of Examinations as prescribed in this Regulations for each Semester.

12. Award of Ranks:

Candidates who passed the examinations of all the Four Semesters for the degree at the first appearance in all Four Semesters shall be ranked in order of merit. The candidates who have taken supplementary examinations shall also be eligible for classification but they shall not be considered for the award of rank. Ranks shall be awarded for the top three students or 10% of the total strength of the students appeared for the Four Semester end examinations.

13. Improvement:

The candidates are permitted to improve their marks/class by taking Semester-end examinations in one or more papers after two years of their regular study as per the existing regulations and syllabi.

Note: The candidates shall be permitted to improve their marks within a period of **four years** from the date of admission into First Semester.

14. Transitory Provision:

a). For candidates who studied the M.B.A. Degree Course under previous regulations and syllabus, and who could not pass some or all the courses (papers) shall be permitted to take examinations under old regulations and syllabus for three more times after the last regular examinations of the concerned subject (s).

b) Candidates who satisfied the minimum attendance requirements in any semester under Old Regulations, but who are yet to pass some papers even after three chances as stated in 14.(a), shall appear for the equivalent papers under Revised Regulations, as specified by the Chairman of the Board of Studies.

15. The university shall have the right to amend or modify or revise any of the above regulations whenever necessary.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- To imbibe the students with requisite domain knowledge, skills & right attitude necessary to provide effective leadership in a global environment.
- To develop competent management professionals with strong ethical values, capable of assuming a pivotal role in various sectors of the Economy & Society.
- To inculcate proactive thinking to ensure effective performance in the dynamic socio-economic and business ecosystem.

PROGRAM OBJECTIVES (POs)

- To equip the students with requisite knowledge, skills & right attitude necessary to provide effective leadership in a global environment.
- To analyze and synthesize information across disciplines/functions in order to evaluate business opportunities and make sound business decisions.
- To evaluate business environment and opportunities and devise strategies for responding effectively to problems, threats, and opportunities.
- To summarize and apply theories of team composition, process, and motivation (including inclusivity and diversity) to effectively manage work teams.
- To lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment.
- To foster analytical and critical thinking abilities for data-based decision making.
- To harness entrepreneurial approach and skill sets.
- To make them utilize qualitative and quantitative methods to investigate and solve critical business problems.
- To integrate tools and concepts from multiple functional areas (i.e. finance, marketing, operations, etc.) to solve business problems.
- To develop competent management professionals with strong ethical values, capable of assuming a pivotal role in various sectors of the Indian Economy & Society, aligned with the national priorities.
- To recognize the need and adopt the knowledge of contemporary issues, and also to engage in life-long learning.
- To help organizations adapt in the emerging business landscape.
- Ability to develop value based leadership approach

PROGRAMME OUTCOMES:

After successful completion of the two year Post –Graduate Programme in Management, the student would be able to:

- **PO.1 : Experiential Learning**

  Bring in the experiential learning acquired through Role Play, Business Games, Industrial Visits, Internships etc., to analyse a given situation and take right decisions.

- **PO.2 : Innovative Thinking**

  Use out of the box thinking to figure out different kind of solutions to either address problems or capitalise on the opportunities that exist from time to time.

- **PO.3 : Strategic Planning**

  Evaluate both macro and micro environment using different tools and techniques to make different strategic plans to achieve the organisational goals and objectives.

- **PO.4 : Professionalism**

  Display a great deal of professionalism in all their dealings with wide variety of stakeholders and also exhibit the same in their work planning and execution.

- **PO.5 : Research Competence**

  Carry out research in different situations to unearth the causes and solutions to pressing issues and challenges quite effectively.

- **PO.6 : Social Responsibility**

  Analyse the impact of the business decisions on various stakeholders and go for the right choices to protect the interests of each one of them.

- **PO.7 : Moral Responsibility**

  Demonstrate ethical and moral values acquired during the course of the study to good effect.

- **PO.8 : Soft Skills**

  Use different soft skills quite appropriately to strengthen the relations with people they interact with and build effective networks.

- **PO. 9 : Cross Cultural Outlook**

Blend well with people from different regions of the world by understanding their culture and acting accordingly to foster meaningful relationships.

- **PO.10: Leadership**

  Display the right leadership based on the situation to maximise the benefits for the organisations they work for.

- **PO.11: Teamwork**

  Mingle well with the other members of the team and work effectively for the accomplishment of the team goals.

- **PO.12: Management Knowledge**

  Use all the concepts learned in an appropriate manner in different situations to function well and create an impact.

PROGRAMME EDUCATIONAL OBJECTIVES:

The following are the basic educational objectives of the two year management programme.

- **PEO 01:** To prepare the students well with all the management related conceptual learning to have a good career.

- **PEO 02:** To provide the required exposure to understand different tools and techniques of management to find need based solutions.

- **PEO 03:** To allow them to organize both co-curricular and extracurricular activities to develop the holistic personality.

- **PEO 04:** To provide good number of opportunities to inculcate creativity and innovation in the work place.

- **PEO 05:** To produce graduates who are industry ready to serve the needs of the business from the beginning of their career.

- **PEO 06:** To ensure that the students have professional, personal and institutional integrity and set themselves as the shining examples.

- **PEO 07:** To make them good at social responsibility and continuous learning.

- **PEO 08:** To foster collaborations with industry, academic institutions and other organizations for the all round development of students.

- **PEO 09:** To develop an entrepreneurial mindset and hone the skills accordingly to come out with start ups and become an employer.

ANNEXURE – I
Semester – I

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
101	Management and Organizational Behaviour	Core: Life Skills	4	30	70	3 Hrs	100
102	Managerial Communication	Core: Life Skills	4	30	70	3 Hrs	100
103	Managerial Economics	Core	4	30	70	3 Hrs	100
104	Accounting for Managers	Core: Skill Development	4	30	70	3 Hrs	100
105	Quantitative Analysis for Management Decisions	Core	4	30	70	3 Hrs	100
106	Business Statistics	Core: Practical	4	30	70	3 Hrs	100
107	Modelling with Excel	Core- Online	4	--	100	3 Hrs	100
108	Human Values and Professional Ethics	Audit: Life Skills		100			

Semester – II

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
201	Marketing Management	Core: Life Skills	4	30	70	3 Hrs	100
202	Human Resources Management	Core	4	30	70	3 Hrs	100
203	Financial Management	Core	4	30	70	3 Hrs	100
204	Production Management	Core: Skill Development	4	30	70	3 Hrs	100
205	Business Research Methods	Core: Practical	4	30	70	3 Hrs	100
206	Operations Research	Core	4	30	70	3 Hrs	100
207	Management Information Systems	Core- Online	4	--	100	3 Hrs	100
208	Leadership Values, and Styles	Audit: Life Skills		100			

Semester – III

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
301	Business Environment	Core	4	30	70	3 Hrs	100
302	Entrepreneurship	Core: Skill Enhancement	4	30	70	3 Hrs	100
303	Industrial Project Course	Core: Job Specialisation Internship	4	30	70	3 Hrs	100
304	Project VIVA VOCE	Core	4	--	100	--	100
	Elective I	General Elective	4	30	70	3 Hrs	100
	Elective II	General Elective	4	30	70	3 Hrs	100
	Elective III	General Elective	4	30	70	3 Hrs	100
	Elective	Open Elective	4	30	70	3 Hrs	100

ELECTIVES

Marketing Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
311	Consumer Behaviour	Elective Skill Enhancement	4	30	70	3 Hrs	100
312	Customer Relationship Management	Open Elective	4	30	70	3 Hrs	100
313	Marketing Research	Elective Life Skills	4	30	70	3 Hrs	100
314	Advertising and Sales Promotion Management	Elective Practical	4	30	70	3 Hrs	100
315	Product and Brand Management	Elective Practical	4	30	70	3 Hrs	100
316	Digital Marketing	Elective Online	4	--	100	3 Hrs	100

Finance Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
321	Financial Services	Elective Skill Enhancement	4	30	70	3 Hrs	100
322	Investment Management	Elective Life Skills	4	30	70	3 Hrs	100
323	Personal Finance	Elective Value added Course	4	30	70	3 Hrs	100
324	Corporate Restructuring	Elective Practical	4	30	70	3 Hrs	100
325	Banking Management	Elective Life Skills	4	30	70	3 Hrs	100
326	Financial Markets and Institutions	Open Elective	4	30	70	3 Hrs	100

HRM Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
331	Training and Development	Elective Skill Enhancement	4	30	70	3 Hrs	100
332	HR Audit	Elective Skill Development	4	30	70	3 Hrs	100
333	Human Resource Planning	Elective Life Skills	4	30	70	3 Hrs	100
334	Labour Laws and Industrial Relations	Elective Life Skills	4	30	70	3 Hrs	100
335	Leadership Development	Elective Value added Course	4	30	70	3 Hrs	100
336	Counselling Skills for Managers	Open Elective	4	30	70	3 Hrs	100

Systems Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
341	System Analysis and Design	Open Elective	4	30	70	3 Hrs	100
342	Database Management Systems	Elective Skill Enhancement	4	30	70	3 Hrs	100
343	Data Mining and Data Warehousing	Elective Value added Course	4	30	70	3 Hrs	100
344	Logistics Management	Elective Practical	4	30	70	3 Hrs	100
345	Data Analytics with R	Elective Online	4	--	100	3 Hrs	100
346	Distributed Computing Systems	Elective Online	4	--	100	3 Hrs	100

Entrepreneurship Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
351	Personal Discovery Through Entrepreneurship	Elective Life Skills	4	30	70	3 Hrs	100
352	Creativity, Innovation and Entrepreneurship	Elective Skill Enhancement	4	30	70	3 Hrs	100
353	Startups Management	Elective Value added Course	4	30	70	3 Hrs	100
354	Private Equity and Venture Capital	Elective Online	4	--	100	3 Hrs	100
355	Family Business Management	Elective Practical	4	30	70	3 Hrs	100
356	Women Entrepreneurs	Open Elective	4	30	70	3 Hrs	100

Semester – IV

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
401	Digital Business Models	Core Value added Course	4	30	70	3 Hrs	100
402	Strategic Management	Core Skill Development	4	30	70	3 Hrs	100
403	Business Laws	Core Practical	4	30	70	3 Hrs	100
404	Organisation Development	Core: Life Skills	4	30	70	3 Hrs	100
	Elective I	General Elective	4	30	70	3 Hrs	100
	Elective II	General Elective	4	30	70	3 Hrs	100
	Elective III	General Elective	4	30	70	3 Hrs	100
	Elective	Open Elective	4	30	70	3 Hrs	100

ELECTIVES

Marketing Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
411	Marketing of Services	Elective Skill Enhancement	4	30	70	3 Hrs	100
412	Industrial Marketing	Open Elective	4	30	70	3 Hrs	100
413	International Marketing	Elective Skill Enhancement	4	30	70	3 Hrs	100
414	Retail Management	Elective Value added Course	4	30	70	3 Hrs	100
415	Supply Chain Management	Elective Practical	4	30	70	3 Hrs	100
416	Sales Management	Elective Life Skills	4	30	70	3 Hrs	100

Finance Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
421	International Financial Management	Elective Skill Development	4	30	70	3 Hrs	100
422	Financial Derivatives	Elective Practical	4	30	70	3 Hrs	100
423	Risk Management and Insurance	Elective Value added Course	4	30	70	3 Hrs	100
424	Management Control Systems	Elective	4	30	70	3 Hrs	100
425	Managing Fintechs	Elective Online	4	--	100	3 Hrs	100
426	Financial Engineering	Open Elective	4	30	70	3 Hrs	100

HRM Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
431	Strategic Human Resource Development	Elective Skill Development	4	30	70	3 Hrs	100
432	Reward Management	Elective Practical	4	30	70	3 Hrs	100
433	Labour Legislations	Elective Value added Course	4	30	70	3 Hrs	100
434	Management of Change	Elective Skill Development	4	30	70	3 Hrs	100
435	Stress Management	Open Elective	4	30	70	3 Hrs	100
436	Global Human Resource Management	Elective	4	30	70	3 Hrs	100

Systems Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
441	Enterprise Resource Planning	Elective Value added Course	4	30	70	3 Hrs	100
442	Decision Support Systems	Elective Skill Development	4	30	70	3 Hrs	100
443	AI Applications in Business	Elective Online	4	--	100	3 Hrs	100
444	Systems Control and Auditing	Open Elective	4	30	70	3 Hrs	100
445	E – Business	Elective Practical	4	30	70	3 Hrs	100
446	Software Project Management	Elective	4	30	70	3 Hrs	100

Entrepreneurship Area

Code No.	Title of the Paper	Components of Study Core/ Elective	No of credits	Sessional Marks	Semester End Marks	Exam Duration	Maximum Marks
451	Social Entrepreneurship	Elective Community Service	4	30	70	3 Hrs	100
452	Negotiation	Open Elective	4	30	70	3 Hrs	100
453	Design Thinking and Innovation	Elective Skill Development	4	30	70	3 Hrs	100
454	Business Planning And Ethics	Elective Practical	4	30	70	3 Hrs	100
455	SaaS for Entrepreneurs	Elective Value added Course	4	30	70	3 Hrs	100
456	Statistics for Business Analytics	Elective Online	4	--	100	3 Hrs	100

Semester – I

101 – Management and Organizational Behaviour

Objectives:

1. Provide conceptual understanding of management concepts
2. Familiarize the students with the contemporary issues in Organization Behaviour
3. Enable them to apply the concepts in the management organizations

Unit – I

Introduction to Management – Principles of Management – Functions of management – Decision making process - Social responsibility of Management – Fundamentals of Planning, Organising, Staffing, Leading, and Controlling.

Unit – II

Introduction to OB – Learning – Personality Theories– Perception – Learning Process, and Theories – Values & Attitudes.

Unit – III

Motivation Theories – Managing Motivation in Small and large organizations – Effective Groups & Teams – Leadership Theories, Styles – Group Dynamics – Power, Politics, and Conflict – Resolving Conflicts.

Unit – IV

Organization Culture & Climate– Organizational Ethos – Functionality of Culture – Process and implementation of Change – Managing Resistance to Change - Organization Structure and Communication

Unit – V

Organizational Development – Phases and Interventions of OD – Johari Window – Transactional Analysis- Managerial Interpersonal Styles - Managing Stress & Burnout.

Course Outcomes: The Student is able to

CO1 : Examine the Management concepts and functions.
CO2 : Apply the concepts of delegation of authority, decentralisation and departmentation in real life situations.
CO3 : Discuss the organizational behaviour and climate.
CO4 : Evaluate the basic concepts of organizational conflicts and climate

References:

1. Fred Luthans**: Organization Behaviour (**McGraw Hill)

2. Stephen P Robbins**: Organization Behaviour** (Pearson)
3. Weihrich, Cannice & Koontz**: Management** (Tata McGraw Hill)
4. Robin Finchan and Peter Rhodes**: Organizational Behaviour** (Oxford)
5. Nelson, Quick. **ORGB with MindTap** (Cengage MindTap)

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

102 – Managerial Communication

Objectives:
1. To make the students aware of their communication skills and gaps.
2. To help students acquire needed skills to handle corporate communication.

Unit – I

Communication – Meaning – Communication cycle – Process – Theories and Models of communication – Characteristics of Successful Communication – Barriers to communication**.**

Unit – II

Oral communication, Importance – Business Presentations, and Public Speaking – Conducting Meetings – Group Discussions & team Presentations - Types of Interviews – Preparing for Interviews – Telephone Talks -.

Unit – III

Written Comunication – Importance – Reading & Writing Skills – Speed Reading- Business Letters, Reports, and Proposals – Circulars, Minutes, Memos & Notices – Email - – Memory – Resume Building – Employment Messages
.

Unit – IV

Non-Verbal Communication – Significance, Types – Effective Listening -Transactional Analysis - Time Management

Unit – V

Corporate communication – Ethics in Communication - Intercultural Communication -– Group communication – Business Etiquette – Communication styles - Communication technology

Course Outcomes: The Student is able to
CO1 : Apply the basic concepts of communication for business correspondence.
CO2 : Distinguish different forms of communication.
CO3: Adapt report writing skills of different types.
CO4: Acquire presentation skills along with the interview techniques.

References:
1. Shirley Taylor **:Communication for Business** (Pearson)
2. Piyush Dhar Chaturvedi and Mukesh Chaturvedi **: Business Communication** (Pearson)
3. Lehman, Dufrene. BCOM with MindTap (Cengage MindTap)
4. M. Ashraf Rizvi **: Effective Technical Communication** (McGraw Hill)

5. Courtland L. Bovee, John V. Hill, Roshan Lal Raina: **Business Communication Today** (Pearson)

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

103 – Managerial Economics

Objectives:
1. Provide a basic foundation on concepts and principles of Macro Economics, Micro Economics and managerial economics.
2. Demonstrate the application of economic theory to business decision-making.

Unit – I

Nature and scope of Managerial economics-Objectives of the firm - profit maximisation - sales maximisation - satisfying and optimising firms.

Unit – II

Demand analysis: Theory of demand- demand function- Price, income, promotion, and cross elasticity of demand - Forecasting- sources of data-survey methods-statistical methods.

Unit – III

Cost analysis: Production function - returns to scale-cost concepts cost curves - break even analysis - profit forecasting-make or buy decisions. Cost behaviour in short and long terms. Learning curve. Supply function

Unit – IV

Pricing decisions: Objectives- Basic factors in Pricing-pricing under perfect, monopoly, oligopoly, and monopolistic competition-discriminatory pricing-multiple product pricing-price control by government - pricing of new products – pricing practices.

Unit – V

National Income – Estimation and projection of GDP – Sectors in Indian Economy - Business cycles – Response of firms to business cycles – Economic Policy of Government of India

Course Outcomes: The Student is able to
CO1 : Describe the importance of managerial economics and its contribution to decision making in different types of business organizations.
CO2 : Apply the basic principles of managerial economics.
CO3: Apply demand analysis concept in the real life business situations.
CO4: Discuss the meaning and usefulness of the production function and cost function in analysing the firm's production activity.

References:
1. H.Criag Peterson,W.Cris Lewis **:Managerial Economics** (Pearson)
2. Paul G.Keat and Philit Y.Yound**: Managerial Economics** (Pearson)
3. D.M.Mithani**: Managerial Economics** (Himalaya)

4. Suma Damodaran**: Managerial Economics** (Oxford)
5. D.N. Dwivedi**: Managerial Economics** (Vikas)
6. P.L.Mehta**: Managerial Economics** (Sultan Chand)
7. Samuel C. Wabb**: Managerial Economics** (Cengage)

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

104 – Accounting for Managers

Objectives:
1. To acquaint the students with the fundamental principles of financial, cost and management accounting.
2. To enable the students to prepare, analyse and interpret financial statements.
3. To enable the students to take decisions using management accounting tools.

Unit – I

Accounting principles: Concepts functions, book keeping, Double entry system, accounting standards, functions of accounting standards, journal, ledger, posting, rules regarding posting, trail balance, final accounts – Trading accounts, profit and loss accounts, balance sheet, adjustments. (Problems & Cases)

Unit – II

Depreciation Accounting: concept of depreciation, causes of depreciation, depreciation accounting, fixation of depreciation amount, methods of depreciation – depletion method, machine hour-rate method, written down value method, accelerated method, sinking fund method. (Problems & Cases)

Unit – III

Budgets and Budgeting control: Objectives, characteristics and essentials of budgetary control, classification of budgets – production budget, sales budget, cash budget, flexible budget, and master budget. (Problems & Cases)

Unit – IV

Computer applications in business: Role of computer in accounting, accounting information systems, software package for accounting, tally. (Theory and Lab) (No Problem)

Unit – V

Emerging concepts in accounting: Human resource accounting, inflation accounting, responsibility accounting and government accounting. IFRS. (No Problem)

Course Outcomes: The Student is able to
CO1 : Outline the basic knowledge of accounting, book keeping and accounting Principles.
CO2 : Identify the nature of expenditure and revenue for preparation of financial statements of business.
CO3 : Examine the role of accounting policies like depreciation.
CO4 : Apply financial analysis techniques for the assessment of financial performance of companies.

References:
1. R. Narayanaswamy "**Financial Accounting: A Managerial Perspective**" (PHI Learning)

2. P.C.Tulsian "**Financial Accounting**" (Pearson)
3. S.N. Maheswari: **"Financial Accounting"** (Vikas)
4. T. Horngren Charles, L. Sundern Gary, A. Elliott John, R. Philbrick Danna "**Introduction to Financial Accounting**" (Pearson)
5. N Ramachandran, Ram Kumar Kakani "**Financial Accounting For Management**" (McGrawHill)
6. Jelsy Joseph Kuppapally, **"Accounting for Managers"** (PHI)

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

105 – Quantitative Analysis for Management Decisions

Objectives:
1. To acquaint the students with important quantitative tools for business decisions.
2. To expose students to the concepts like game theory.

Unit – I

Introduction to Quantitative Techniques. Functions and its applications to business, limits of function and continuity.

Unit – II

Concept of derivative, Techniques of Differentiation, Maxima and Minima, Integration and its applications in managerial decisions.

Unit – III

Progressions: Arithmetic and Geometric progressions and their applications. Annuities and Present values.

Unit – IV

Vectors and Matrices,: Geometrical and physical interpretation of vectors, Introduction to Matrices Multiplication of Matrices, Inverse of a Matrix, Rank of a Matrix and Matrix applications in management.

Unit – V

Gamification: Games- Characteristics, theory and Rules, Game Elements- Two-person zero-sum games, Methods with and without saddle point, Dominance rule and mixed strategies.

Course Outcomes: The Student is able to
CO1 : decide using game theory
CO2 : understand the payoffs of available annuity products
CO3 : use Matrices for Managerial Decisions.

References:

1. C.R.kothari **: Quantitative Techniques,** (Vikas)
2. David R. Anderson **: Quantitative Methods for Business,** (Thomson learning)
3. N D Vohra **: Quantitative Techniques for Management,** (McGraw Hill)
4. Werbach : For the Win (Wharton Digital Press) E- Book
5. P K Gupata, D S Hira**, Operation research, S. Chand publishing.**

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

106 – Business Statistics

Objective:
To expose students to basic statistics and probability for effective decisions

Unit – I

Introduction to Statistics – Meaning, Application of Statistics in Business and Limitations of Statistics. Data – Data Sources, Data Classification and Data Presentation (Tables and Graphs). Data Analysis – Measures of Central Tendency, Measures of Dispersion.

Unit – II

Correlation analysis – Meaning, Types of Correlation, Scatter Diagram, Karl Pearson and Spearman Rank Correlation., Coefficient of Determination. Regression analysis – Meaning, Regression Coefficients and properties, Simple and Multiple Regression.

Unit – III

Time Series Analysis – Introduction to time series, Components of time series, Methods of Trend Analysis. Index Numbers - Meaning, Types of Index Numbers, Construction of price, quantity and volume index, consumer price index.

Unit – IV

Probability – Meaning and concept, Addition theorem, Multiplication theorem, Bayes' theorem. Probability theoretical distributions – Binomial, Poisson and Normal. Sampling Theory – Complete enumeration vs Sample survey, Determination of Sample size, Sampling techniques, Sampling distributions of statistics.

Unit – V

Testing of Hypothesis – Basic concepts, testing procedure. Parametric tests – z test, ttest, one way and two way ANOVA. Non Parametric tests – Chi square analysis, Sign test, Median test, Wilcoxon test, Kolmogorov Smirnov test, Mann – Whitney U test and Kruskal Wallis test.

Course Outcomes: The Student is able to
CO1 : understand the business problems.
CO2 : decide on appropriate statistical tools.
CO3 : interpret the statistical tests.

References:
1. Richard I. Levin & David S. Rubin: **STATISTICS FOR MANAGEMENT,**
(Pearson Education)

2. David R. Anderson, Dennis J. Sweeney, Thomas A. Williams, Jeffrey D. Camm, James J. Cochran "**Statistics for Business & Economics**" (Cengage)
3. S.P. Gupta & M.P. Gupta: **BUSINESS STATISTICS,** (Sultan Chand)
4. Beri, G.C: **BUSINESS STATISTICS, (**Tata McGraw Hill)

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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107 – Modelling with Excel (Online)

Objectives:
1. Understand the basics of modelling for business decisions
2. Learn financial functions using Excel
3. Acquaint with Excel for business decisions

Unit – I

Introduction to Modelling – Types and purposes of business models – Rules for model design –Model layout flow charting – Steps to building a model – Best practice principles of modelling – Documentation – Preparing and presentation of Model results – Model review – Auditing a Model

Unit – II

Excel functions – Importing and exporting data – Financial functions (PV, FV Rate, NPER, IRR, NPV, MIRR, XNPV, XIRR, effect, nominal, Price) – Lookup and reference functions (Choose, Offset, Match, Indirect, Look up) – Statistical functions – Date and Time functions – Whatif functions Goal Seek, Solver - Pivot Table – Data Analysis – Conditional formatting – Array Formulas - Dynamic named ranges - Working with Charts – Creating dynamic charts

Unit – III

Financial Analysis Techniques - Ratio analysis, Du point Analysis – Cash budgeting – Master budgeting - Break-even analysis – Profit planning - Loan amortization - Capital Budgeting Decisions – Sensitivity analysis – Scenario Analysis with Scenario Manager – Computing rates of returns, averages and variances of financial data.

Unit – IV

Estimating demand curves – revenue management – Computing marketing metrics – Take rate, Churn, Customer satisfaction – customer life time value – cost per click – Transaction conversion rate – bounce rate

Unit – V

Forecasting – time series and exponential smoothing – purchase order processing – production order quantity model – acceptance sampling – material requirement planning – Quality control charts – Lot sizing methods – Project management

Course Outcomes: The Student is able to
CO1 : use excel for financial modelling.
CO2 : apply excel financial functions for analysis and decisions.
CO3 : use excel for production and marketing decisions.

References:
1. **Data-Driven Marketing: The 15 Metrics Everyone in Marketing Should Know** by Mark Jeffery
2. **Excel Models for Business and Operations Management** by John Barlow

3. **Using Excel for Business Analysis: A Guide to Financial Modelling Fundamentals** by Danielle Stein Fairhurst
4. **Analyzing Business Data with Excel: Forecasting, Statistics, and Data Management** by Gerald Knight
5. **Mastering Financial Modelling in Microsoft Excel: A Practitioner's Guide to Applied Corporate Finance** by Alistar Day

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

108 – Human Values and Professional Ethics

Objectives:
1. To provide a comprehensive understanding of the Nature and Importance of Ethical principles.
2. To enable the student in applying these Ethical principles in the Business practices.

Unit – I

Definition and Nature of Ethics- Its relation to Business, and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions-Ethical theories about right action

Unit – II

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders- moral development theories

Unit – III

Value education-definition and its relevance to present days- Concept of human values- self introspection-self esteem–family values-components-structure-and responsibilities of family-neutralization of anger- adjustability-threats of family life-Time allotment for sharing ideas and concerns.

Unit – IV

Business ethics- Ethical standards of business- Immoral and illegal practices and their solutions- characteristics of ethical problems in management- causes of unethical behavior-ethical abuses and work ethics

Unit – V

Environmental and social ethics: ethical theory, man and nature, ecological crisis issues related pollution, waste, climate change, energy and population, social issues –human rights violation and social disparities

Course Outcomes: The Student is able to
CO1: find the need for Ethical practices in building a healthy Socio-economic Environment.
CO2: apply the Ethical principles in the Business practices.

References:
1. R. S. Naagarazan -**A TEXT BOOK ON PROFESSIONAL ETHICS AND HUMAN VALUES**- -New age International (p) Ltd.
2. M. Govindarajan, S. Natarajan, V.S. Senthil kumar- **PROFESSIONAL ETHICS & HUMAN VALUES.**

3. R. R. Gran, R. Sangal, G. P. Bagania -**FOUNDATION COURSE IN HUMAN VALUES & PROFESSIONAL ETHICS**
4. Jayshree Suresh, B.S. Raghavan- **HUMAN VALUES AND PROFESSIONAL ETHICS**

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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Semester – II

201 – Marketing Management

Objectives:
1. To provide a basic understanding of the Marketing Concepts.
2. To understand the Marketing concepts and the Marketing Strategies.

Unit – I

Definition, importance and scope of Marketing - Company orientation towards Marketing - Core Concepts of marketing – Marketing Management Tasks – Indian Marketing Environment: Demographic, Economic, Socio-Cultural, Politico-Legal and Technological Environment – Marketing and Customer Value - Corporate Strategic Planning – Marketing Research Process – Forecasting and Demand Measurement – Consumer Behavior – Market Segmentation – Market Targeting – Brand Positioning.

Unit – II

Product strategy: - product concept – product characteristics and classifications – differentiation – Product and brand relationships – packaging, labelling, warranties and guarantees.- product life cycle and marketing strategies- new product development process– branding- brand equity - trademark.-significance of marketing of services.

Unit – III

Pricing strategy: - setting the price –adapting the price - initiating and responding to price changes. Distribution strategy: - designing and managing channels- managing retailing, wholesaling and logistics.

Unit – IV

Promotional strategy – designing and managing integrated marketing communications - managing mass communications and personal communications.

Unit – V

Introducing New Market Offerings - Managing a holistic marketing organization – marketing implementation, evaluation and control- marketing audit.

Course Outcomes: The Student is able to
CO1 : Create the segmentation, targeting and positioning in marketing.
CO2: Analyse various phases of product life cycle.
CO3: Evaluate various methods of pricing and identify the best pricing strategy.
CO4: Evaluate marketing communication strategies.

References:
1. Philip kotler, Kevin Lane Keller"**Marketing Management"** (Pearson Education)
2. Rajan Saxena "**Marketing Management**" (McGrawHill)

3. Dhruv Grewal, Michael Levy "Marketing" (McGrawHill)
4. Mohr Slater "**Marketing of High-Technology Products and Innovations**" (Pearson)
5. Philip Kotler, Hermawan Kartajaya, Iwan Setiawan "**Marketing 4.0: Moving from Traditional to Digital**" (Wiley)

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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202 – Human Resources Management

Objectives:
1. This subject provides the platform to the students of management to appreciate the critical managerial functions, processes and tasks of HRM in an organization.
2. To become sensitive to the HR Management Processes and to adopt conceptual learning to real-life situations.
3. To appreciate the methods and mechanics to bring out the best in people.

Unit – I

Human Resource Management – Significance and Scope – Objectives and Functions – Labour Codes – Employment Laws

Unit – II

Job Analysis: Job Description – Job Specification – Job Evaluation- Human Resource Planning - Human Resource Information System

Unit – III

Recruitment: Objectives – Sources - Selection: Objectives – Selection Procedure – Selection Tests -Induction and Placement – Performance Appraisal: Objectives – Methods – Constraints – Compensation & Retention Plans - Employee Benefits

Unit – IV

Training and Development: Objectives – Training Needs Assessment – Types of Training – Designing Training Programmes - Evaluation of Training - Career Planning and Development

Unit – V
Contemporary Issues in HRM: Knowledge Management – Work life balance – Ethics in HRM - Technology and HRM – Human Resource Audit – Quality Management and HRM

Course Outcomes: The Student is able to
CO1 : Apply different concepts of HR Planning, Recruitment, Selection, Training, Interviewing Techniques and Executive Development Programs.
CO2 : Apply job analysis, job description, job specification, ergonomics in industry and the methods of job evaluation.
CO3 : Utilize the various methods of performance appraisal.
CO4 : Develop a good compensation policy.
CO5 : Address Grievance Handling Procedures, Industrial Disputes Resolution Mechanisms and stress management at work place.

References:
1. Aswathappa. K – “Human Resource Management” (Tata McGraw Hill)

2. David A. Decenzo and Stephen P. Robbins – "Personnel: Human Resource Management" (Prentice Hall of India)
3. Garry Dessler – "Human Resource Management" (Pearson Education)
4. Uday Pareek, T.V. Rao – "Designing And Managing Human Resource Systems" (Oxford & IBH)

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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203 – Financial Management

Objectives:
1. To know the various sources of finance.
2. To understand the objectives of firms and their influence on decisions.
3. To familiarize oneself with the techniques used in financial management.

Unit – I

Goal of Financial Management – Fundamental Principles – Time value of money – Discounting, compounding - Risk-return trade off- Finance Function-Financial Decisions. Financial markets -intermediaries.

Unit – II

Financial Statement Analysis: Analysis of Balance Sheet; Profit & Loss Account, Ratio analysis, common size analysis, cash flow statement, operating, financial, and combined leverage.

Unit – III

Cost of Capital - Cost of debt, cost of equity– dividend capitalization, CAPM - cost of preference shares -weighted average and multiple costs of capital – valuation of bonds and shares. Capital structure planning – EBIT – EPS analysis (Numerical Problems), risks of financial leverage – margin of safety, interest and debt service. Long term sources of Finance - venture capital.

Unit – IV

Capital Budgeting - Cash flows - traditional methods, discounted cash flow methods, risk analysis, real options – leasing – Hire Purchase

Unit – V
Dividend Decisions, influencing factors, forms and special dividends. Walter, Gordon and MM models (Numerical Problems) Linter's model dividend practices in India. Buy back of shares, taxation of dividends and capital gains. Working capital Management: Operating cycle estimation , cash, inventory and receivables management

Course Outcomes: The Student is able to
CO1 : apply various methods of Investment Analysis and techniques of capital budgeting.
CO2 : adapt the concepts of leverage, capital structure and its effect on the long term survival of the firm.
CO3 : appraise various methods to compute cost of capital.
CO4 : able to take dividend decisions.
CO5 : assess the working capital requirement of a firm.

References:

1. Srivastava R, Anil A: **Financial Management (Oxford)**
2. I.M.pandey**: Financial Management** (Vikas)
3. Prasanna Chandra**: Financial Management – Theory and Practice** (Tata McGraw Hill)
4. Pandey & Bhat**: Cases in Financial Management** (Tata McGraw Hill)
5. Khan & Jain**: Financial Management** (Tata McGraw Hill)
6. Brealey Myers**: Principles of Corporate Finance** (Tata McGraw Hill)
7. Berk – "Financial Management" (Pearson)

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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204 – Production Management

Objective:

To acquaint the students with the steps and working of production planning and control in manufacturing and service organisations.

Unit – I

Role and Relevance of Production Management – Concepts of Productivity – Production Systems – Work Study: Method study and Work Measurement.

Unit – II

Plant location. Plant layout- Classification and merits. Plant Maintenance methods – Break Down, Preventive and Predictive maintenance. Replacement Policies – Unit and Group replacement policies.

Unit – III

Production planning and control: Processes in PPC. Job shop and Flow shop scheduling- Johnson's Rule- Line Balancing. Quality Control: Control Charts and Acceptance Sampling.

Unit – IV

Materials Management – Concepts – Classification of Inventory, Inventory Control Methods, Stores Management and Deterministic Inventory Models.

Unit – V

Project Management: Concepts of project Management, CPM, PERT and Project Network Crashing and Cost analysis, Applications of Network techniques.

Course Outcomes: The Student is able to
CO1 : Apply the basic concepts of production and operations management and identify types of manufacturing processes.
CO2 : Define and explain concept of production planning and control.
CO3 : Evaluate purchasing function and inventory management function.
CO4 : Develop the quality control system and quality control strategies.

References:

1. Muheleman and Sudhir B**: Production/ Operations Management**, Pearson Education
2. S.N.Chary **: Production and Operations Management**, Tata McGraw Hill
3. R. Panneer Selvam**: Production and Operations Management,** Prentice Hall of India
4. Adam Ebert**: Production & Operetions Management,** Prentice Hall of India

5. K. Aswathappa K. Sriddhan Bhat**: Production and Operations Management** (Himalaya)
6. Kanishka Bedi: **Production and Operations Management (OXFORD)**
7. P K Gupata, D S Hira**, Operation research, S. Chand publishing.**

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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205 – Business Research Methods

Objectives:
1. To enable the students to know about the information needs of Management.
2. To introduce the concept of Scientific Research and the methods of conducting Scientific Enquiry.
3. To introduce the Statistical Tools of Data Analysis

Unit – I

Nature and Scope of business research- Research process- Defining the research Problem and setting the objectives- Preparing research proposal-Review of literature.

Unit – II

Research Designs: Exploratory Research Design and Qualitative Studies-Focus groups - Descriptive Research Design- Panel Research –Experimental Research Designs.

Unit – III

Data sources: Secondary Vs Primary – Secondary data collection procedures- Primary Data Collection methods: Survey methods-Observational Studies.

Unit – IV

Sampling Designs: Probability and Non-probability sampling methods and Sample Size determination-Attitude Measurement and Measurement Scales.

Unit – V
Preliminary steps of data analysis: editing, coding and tabulation- Hypothesis testing – Tests of Significance for small and large samples- t-test, z-test, chi-square test, ANOVA: one-way, two-way - Presenting Results: Written and Oral Reports

Course Outcomes: The Student is able to
CO1 : Adapt the fundamentals of Business research methodology.
CO2 : Identify research problem and design data collection techniques.
CO3: Apply sample and census survey and measuring techniques.
CO4: Develop data processing procedures, apply tools and draft report.

References:
1. Donald R.Cooper and Pamela S.Schindler**: Business Research Methods** (Tata McGraw Hill)
2. Zikmund, Babin, Carr, Griffin**: Business Research Methods .** (Cengage).
3. Naval Bajpai: **Business Research Methods** (Pearson).

NOTE TO THE PAPER SETTER:

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206 – Operations Research

Objectives:
1. Learn Linear Programming for optimisation problems.
2. Understand techniques for optimum transportation and queuing solution.

Unit – I

Introduction to OR: linear Programming – Model formulation, Graphical method, and Simplex method. Linear programming using the Excel Solver

Unit – II

Transportation problem Degeneracy – Transhipment model – Assignment model – Hungarian method, Salesmanship method, Maximization of Profit, Cost minimization.

Unit – III

Dynamic programming – Features, Structure and Applications. Dynamic programming approach, LPP by Dynamic programming.

UNIT –IV

Goal Programming: Concept, Application areas, model formulation. Modified simplex method.

Unit – V

Queuing model (M / M / I ONLY): Components, basic Structure Assumptions, waiting line decision problem – Simulation – Its application.

Course Outcomes: The Student is able to
1. use the methods to solve Linear Programming Problems
2. solve transportation problem with minimum cost of transportation of commodities
3. develop a realistic schedule and monitor the progress of the project.

References:

1. A.M. Natarajan, Balasubramani,tamilarasi, **Operations Research**, Pearson
2. Richard B. Chase**, Operations and supply chain management,** McGrawHill
3. S.D. Sharma **: Operations Research**
4. Taha H.A**: Operations Research** (Pearson)
5. Anand Sharma **: Operations Research** (Himalaya)
6. P K Gupata, D S Hira**, Operation research, S. Chand publishing.**

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207 – Management Information Systems (Online)

Objectives:
1. To introduce the concepts of different business systems.
2. To focus on different components of information systems and to plan, design and develop such systems.
3. To understand the various functional information systems.

Unit – I

Information and systems concepts. Types of Information systems on organizations. Decision making process – Individual vs. Organizational models. Managing Hardware, Software and Data Resources. I.T. Infrastructure for the organization and Digital Firm.

Unit – II

MIS Design: Importance of MIS Design, Approaches for the MIS design: Traditional and Modern Approaches. MIS Growth Model.

Unit – III

Management support systems: Decision support systems, Concepts of Data mining, Data warehousing and OLAP. Types, components - Data mining, Data warehousing and OLAP, Expert systems- components.

Unit – IV

Functional Information Systems: Marketing, Manufacturing, Financial and Human resource Information Systems- Characteristics, benefits and applications

Unit – V

Information Systems Security and Control: Vulnerability and Abuse, Security and Systems Audit. Cyber security.

Course Outcomes: The Student is able to
1. distinguish various types of information systems.
2. analyse functional information needs and systems.

References:
1. Kenneth C. Lauadon and Jane. P. Lauadon **: Management Information Systems** (Pearson Education)
2. James A O 'Brien **: Management Information Systems** (Tata McGraw Hill)
3. Murthy CSV **: Management Information Systems** (Himalaya)
   Giridhar Joshi**: Management Information Systems** (Oxford)

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

208 – Leadership Values and Styles

Objectives:

1. To provide an understanding of the concepts of Leadership Values.
2. To apply these principles in Team building and Customer/Supplier Relationships Management.

Unit – I

Concept and Significance of Value based Leadership –Shared Vision – Value based Culture – Right and Wrong Values – Terminal and Instrumental Values.

Unit – II

The four principles of Value Based Leadership: i) Self Reflection- Understanding Self Reflection, ii) Balance and Perspective –Doing the Right Things Rather Than Being Right, iii) True Self Confidence – Building Confidence and Competence, iv) Genuine Humility – Recognizing the Value of Everyone.

Unit – III

Creating a Best Team from Scratch – Turning around at team – Making a right investment in the Talent – Communicating Clearly and Broadly – Motivation and Team Engagement.

Unit – IV

Leading Change – The Corporate Rushmoreans – Leading Change Effectively and Morally – The Fallacy of Tough Leadership – Democratic Leadership – Transformational Leadership.

Unit – V

Building a Holistic Relationship with Suppliers – Building Best Partner Relationship with Customers –Creating Value to Shareholders – Socially Responsible Leadership –Leaving the Global Footprint.

Course Outcomes: The Student is able to

CO1 : Identify the leadership qualities to run an organization successfully.
CO2 : Develop the organisational structures in decision making.
CO3 : Analyse the interpersonal behaviour and barriers of communication in leadership styles.
CO4 : identify team building resources.

References:

1. Peter G. Northhouse – “Leadership: Theory and Practice” (Sage)
2. Harvard Business Review - “HBR's 10 Must Reads: On Leadership”
3. John C. Maxwell – “The 21 Irrefutable Laws of Leadership” (Harper Collins)
4. Jocko Willink – “The Dichotomy of Leadership” (St. Martin’s Press)

NOTE TO THE PAPER SETTER:
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Semester – III

301 – Business Environment

Objectives:
1. To enable students understand the opportunities and challenges of prevailing and desirable global business environment in which business has to operate.
2. Provide an understanding of the role of business in society.
3. To enable students read, research and discuss the issues through written papers, presentations, industrial visits and role plays in class seminars.

Unit – I

Theoretical Framework of Business Environment: Concept, significance and nature of business environment. Elements of environment- Internal and External; Changing dimensions of business environment, Techniques of environmental scanning and monitoring.

Unit – II

Planning in India: Emergence of Planning, NITI Ayog, National Development Council. Economic Environment of Business: Significance and elements of economic environment, Economic Trends: Savings and Investment, Industry, Growth of Infrastructure Balance of Payment. Incentives for Make in India, PLI Scheme, Ease of doing business.

Unit – III

Problems of Growth: Unemployment, Inflation, Regional imbalances and Social Injustice. Government Policies- Industrial policy, Fiscal and Monetary policies, EXIM policy; SEZ policy, LPG 1991, Direct and Indirect Taxes with special reference to GST and VAT.

Unit – IV

Political and Legal Environment of Business: Changing dimensions of legal environment in India, Brief introduction to Competition Act, 2005, FEMA, Corporate Governance and Social Responsibility of Business

Unit – V

Foreign Investment: FDI, FII, Determinants of Foreign Investment, Multinational Corporations: Favourable and Harmful effect of the operations of MNCs on Indian economy, Liberalization and MNC's.International Business Environment: World bank, IMF, General agreement on Tariff and trade. : the WTO agreement, TRIPS, TRIMS, Non-tariff barriers and Dispute settlement mechanism, Kyoto Protocol, FTAs

Course Outcomes: The Student is able to
CO1 : analyze the structure of Indian economy.

CO2 : discuss the components of fiscal policy and balance of payments.
CO3 : evaluate different trade related policies.
CO4 : comply with acts like Competition Act, RTP and RTI.
CO5 : plan for ESG

References:

1. Strategic Management – Azhar Kazmi, Tata McGraw Hill, 2020
2. Essentials of Strategic Management – Wheelen & Hunger, Pearson, 2018
3. Strategic Management and Business Policy: Globalization, Innovation and Sustainability. Wheelan, Hunger, Hoffman, Bamford. Pearson.

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302 – Entrepreneurship

Objectives:
1. Providing Entrepreneurial knowledge base
2. Sensitise about the basic functional knowledge needs for entrepreneurs.
3. Encourage and prepare the students to be entrepreneurs.

Unit – I

Entrepreneurship: meaning, importance of entrepreneurship, concepts, Characteristics, classifications of entrepreneurship, problems faced by entrepreneurs in India. Entrepreneur v/s intrapreneur, entrepreneurial models, Legal issues for Entrepreneur: Intellectual property rights: Copyrights, Trademarks, Trade secrets, Patents.

Unit – II

Women Entrepreneurs, working environment, challenges in the path of women entrepreneurs, empowerment, Grassroots entrepreneurs through self help groups (SHG). Building the business plan- Feasibility study: Setting up of Small business enterprises,

Unit – III

Financial Considerations: Basic financial statements, Managing Cash Flows, Preparation of projected financial statements, Applications of Business ratios, Sources of finance: Debt and Equity. Marketing: Marketing considerations- selecting the target market, market strategy. Pricing strategies and marketing of services, export marketing.

Unit – IV

Production management in Small business: production and material management, Break even analysis. HRM in Small business: Importance of HRM, HRD, Industrial relations, labour laws, pollution control laws.

Unit – V

Institutions supporting small business enterprises: Introduction, Central level institutions, state level institutions, other agencies. Sickness in small business enterprises: Definition and status of Sickness of SSI's in India, causes of sickness, Symptoms and cure of sickness. Business incubators. Social Entrepreneurship.

Course Outcomes: The Student is able to
CO1 : Appreciate the concept of entrepreneurship.
CO2 : Analyse entrepreneurship development programs in India and training for entrepreneurial competencies.
CO3 : Design the project reports, evaluate them and pitch for funding.
CO4 : Create awareness about the institutional support to small and medium enterprises.

References:

1. Hisrich Peters shepherd**: Entrepreneurship (**Tata McGraw Hill), 2020
2. Prasanna Chandra**: Projects Planning Analysis, Reductions implementation & Review** (Tata McGraw Hill), 2019
3. Harvard Business Review, Entrepreneur's Handbook: Everything you need to launch and grow your new business. (HBR Handbook)
4. Dhruv Nath, Sushanto Mitra: Funding your Startup and other Nightmares.

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303 – Industrial Project Course

Objectives:
1. To observe decisions in different functional areas of a firm.
2. To take up a decision area to conduct a detailed study in a standardised way.

Each candidate is expected to carry out project work in a particular organisation/industry for a period of 8/10 weeks. Candidate has to carry the project work under the guidance of a faculty member in the department and an executive guide in the concerned organisation. The candidate has to maintain a field dairy and present synopsis and IPC Seminars during the course of third semester. The project report should be submitted to the department before the commencement of the third semester – end examinations.

Course Outcomes: The Student is able to
1. gain comprehensive knowledge of decisions made in the firms.
2. study a decision area in a detailed way to come up with appropriate suggestions.

304 – Project Viva Voce

Objective:
A comprehensive Viva Voce Examination shall be conducted by a panel of internal and external experts as part of the semester end examinations covering all the courses with emphasis on project work completed by the students.

311 - Consumer Behaviour

Objectives:
1. To understand the conceptual foundations of consumer buying behavior.
2. To equip the learner to apply the principles and prepare for a career in Product and Brand Management in the FMCG, consumer durables, industry and services industry.

Unit – I

Consumer Behaviour and Marketing Action - An overview - Consumer involvement - Decision-making processes - Purchase Behaviour and Marketing Implications – Consumer Behaviour Models

Unit – II

Environmental influences on Consumer Behaviour - Cultural influences - Social class - Reference groups and family influences - Opinion leadership and the diffusion of innovations - Marketing implications of the above influences.

Unit – III

Consumer buying behaviour - Marketing implications - Consumer perceptions – Learning and attitudes - Motivation and personality – Psychographics - Values and Lifestyles, Click-o-graphic.

Unit – IV

Strategic marketing applications - Market segmentation strategies - Positioning strategies for existing and new products, Re-positioning, Perceptual Mapping - Marketing communication - Store choice and shopping behaviour - In-Store stimuli, store image and loyalty – Consumerism - Consumer rights and Marketers' responsibilities.

Unit – V

The Global Consumer Behaviour and Online buying behaviour - Consumer buying habits and perceptions of emerging non-store choices - Research and applications of consumer responses to direct marketing approaches - Issues of privacy and ethics.

Course Outcomes: The Student is able to
CO1 : Evaluate the consumer behaviour and business strategies.
CO2 : Apply the various consumer behaviour models for effective marketing strategies.
CO3 : Build the psychological process and develop the effective strategy in terms of impact on consumer behaviour.

References:
1. Schiffman, Wisenblit, Kumar. Consumer Behaviour. Pearson.
2. Sangeeta Sahney. Consumer Behaviour. OUP

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312 - Customer Relationship Management

Objectives:
To understand the concepts and principles of CRM and appreciate the role and changing face of CRM as an IT enabled function.

Unit – I

CRM concepts - Acquiring customers, - Customer loyalty and optimizing customer relationships - CRM defined - success factors, the three levels of Service/ Sales Profiling - Service Level Agreements (SLAs), creating and managing effective SLAs.

Unit – II

CRM in Marketing - One-to-one Relationship Marketing - Cross Selling & Up Selling - Customer Retention, Behaviour Prediction - Customer Profitability & Value Modeling, - Channel Optimization - Event-based marketing. - CRM and Customer Service - The Call Centre, Call Scripting - Customer Satisfaction Measurement.

Unit – III

Sales Force Automation - Sales Process, Activity, Contact- Lead and Knowledge Management - Field Force Automation. - CRM links in e-Business - E-Commerce and Customer Relationships on the Internet - Enterprise Resource Planning (ERP), - Supply Chain Management (SCM), - Supplier Relationship Management (SRM), - Partner relationship Management (PRM).

Unit – IV

Analytical CRM - Managing and sharing customer data - Customer information databases - Ethics and legalities of data use - Data Warehousing and Data Mining concepts - Data analysis - Market Basket Analysis (MBA), Click stream Analysis, Personalization and Collaborative Filtering.

Unit – V

CRM Implementation - Defining success factors - Preparing business plan requirements, justification and processes. - Choosing CRM tools - Defining functionalities – Home grown versus out-sourced approaches - Managing customer relationships - conflict, complacency, Resetting the CRM strategy. Selling CRM. internally - CRM development Team - Scoping and prioritizing - Development and delivery - Measurement.

Course Outcomes: The Student is able to
CO1 : Develop the concepts of CRM and strategies in business.
CO2 : Appraise the customer profile and perception of customer behaviour in relationship perspectives.

CO3: Analyse strategies for customer loyalty.

References:

1. Jagdish Seth, et al, Customer Relationship Management, 2020
2. Mullick, Customer Relationship Managment, OUP

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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313 - Marketing Research

Objectives:
1. To introduce the basic concepts of research and methodology of conducting researches in marketing domain.
2. To provide a foundation to pursue a career in Marketing Research domain.

Unit – I

The Marketing Research System - Definition of MR - Basic and Applied Research – The Marketing Research Process - Types of Research - Steps in Marketing Research Process - Research Design - Data Sources - Marketing Information System – International Market Research.

Unit – II

Sampling Process in Marketing Research– Sampling Design and Procedure – Sampling Methods – Non probabilistic sampling Techniques – Probabilitic sampling Techniques - Sample Size determination - Sampling Errors.

Unit – III

Measurement & Scaling in Marketing Research: Measurement concept – Sources of variation in Measurement, Validity & reliability of Measurement - Attitude measurement – Scaling Procedure

Unit – IV

Data Instruments - Data Collection- Online data collection - Collection of Secondary Data – Collection of Primary Data Methods - Field Operations - Errors and Difficulties in Data Processing, Coding and Editing. Data Analysis - -Hypothesis Testing - Report Writing - Presentation of Data.

Unit – V

Application of Marketing Research: Product Research – Motivation research – Advertising Research – Sales Control Research –Rural Marketing research - Export Marketing research.

Course Outcomes: The Student is able to
CO1 : Apply the Research Methods to understand and analyse Marketing Problems.
CO2 : To use the appropriate Measurement scales for Customer Attitudes and Preferences.
CO3: Organize the Marketing Field Research to help in Marketing Decision-making.

References:
1. Naresh K. Malhotra and Satyabhusan Das, MARKETING RESEARCH: AN APPLIED ORIENTATION, Pearson Education, Asia. 2019

2. Beri, Kaushik, Rahman. Marketing Research. Mc Graw Hill

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314 - Advertising & Sales Promotion Management

Objectives:
1. To equip students for a career in Sales Promotion Management and Advertising.
2. To understand the various types of advertising and their effectiveness.

Unit – I

Advertising - an introduction- Origin and Development - Definition and Classification – Planning Framework - Organising Framework - the Advertiser and the Advertising Agency interface - Strategic Advertising Decisions - Setting Advertising Objectives - The Budget Decision - Preparing the Product and Media Brief

Unit – II

Copy Decisions - Visualization of Ad Layout - Elements of Ad Copy and Creation Principles of verbal versus visual thinkers - Styles and Stages in advertising copy creation- Copy (Pre-) Testing methods and measurements.

Unit – III

Media Decisions - Media Planning and Selection - Concepts of Reach, Frequency, Continuity, and Selectivity - Measures of Media Cost Efficiency – Media (Readership / Viewership) Research - The Internet as an Advertising Medium - Tracking Website visits, page views, hits, and click-stream analysis - permission marketing and privacy - ethical concerns.

Unit – IV

Measuring Advertising Effectiveness - Control of Advertising by practitioners, media and the market - Advertising in the International Market-place - Advertising and Principles of Integrated Marketing Communication and Image Building.

Unit – V

Sales Promotion - Rationale, Types - Consumer and Trade Promotions - Sales Promotion Strategies and Practices, Cross Promotions, Surrogate Selling, Bait and Switch advertising issues. Brand Equity - Concepts and Criteria, Building, Measuring and Managing Brand Equity, Linking Advertising and sales promotion to achieve 'brand-standing' - Leveraging Brand Values for business and non-business contexts.

Course Outcomes: The Student is able to
CO1 : Discuss the basic concepts of advertising for better understanding the challenges and opportunities in advertising .
CO2 : Analyse the relations of advertising with segmentation and budget decision .
CO3 : Design better advertising strategies for the company .
CO4 : Identify media options which are suitable for the company for better promotion .

CO5 : Develop an effective advertising campaign for the company .
CO6 : Evaluate the role of AD agencies for the successful advertising management

References:

1. Belch, Purani. Advertising and Promotion. Mc Graw Hill
2. Kruti Shah. Advertising and Integrated Marketing Communications. Mc Graw Hill

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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315 – Product and Brand Management

Objectives:
1. To equip students for a career in Product and Brand Management,
2. To understand the various concepts of Brand creation, Brand building and Brand Value enhancement.

Objectives:
The objective of this course is to familiarise the students with the concepts and strategies involved in product management and branding for effective brand building.

Unit – I

Product Management - Product – Definition, Levels of Product; Definition of Product Management, Scope and Importance; Role of Product Manager; Product Mix and Product Line Strategies; Challenges in Product Management

Unit – II

Product Life Cycle and Marketing Strategies; Product Portfolio Models; Positioning & Perceptual Mapping; Product Management Audit; Future of Product Management

Unit – III

New Product – Categories of New Product; Adoption Process; Diffusion of Innovation; Stages in New Product Development; New Product Demand Forecasting Models; New Product Launch Strategies; New Product Success & Failures- Indian cases

Unit – IV

Brand Management - Concept & Significance of Brands, Types of Brands; Strategic Brand Management Process & Branding Strategies; Financial and Social Value of Brands; Brand Equity- Components of Brand Equity, Brand Equity Models, Measurement of Brand Equity; Developing and Managing Brands; Brand Extension Strategies; Brand Personality; Brand Essence; Brand Identity, Brand Identity Prism

Unit – V

Brand Elements; Sensory Branding; Emotional Branding, Brand Positioning- Brand Architecture, Brand Portfolio, Brand Communication; Brand Valuation Methods; Brand Revitalisation; Brand Audit; Global Brands; Successful Indian Brands

Course Outcomes: The Student is able to
CO1 : Discuss the importance of brand image in marketing .
CO2 : Formulate brand vision to communicate Brand Essence.
CO3 : Analyse brand promotion methods in brand communication .
CO4 : Analyse factors influencing brand extension decisions .

CO5 : Design brand marketing programmes.
CO6 : Evaluate emerging trends in brand management .

Reference:
Kevin Lane Keller, Strategic Brand Management, Pearson Education, India. 2020

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316 - Digital Marketing (Online)

Objectives:
1. To rethink marketing in an Internet-enabled marketing environment.
2. To conceptualize marketing strategy formulation in the context of the Internet.
3. To understand the Online Marketing Mix.
4. To address the emerging issues of e-commerce.

Unit – I

Principles and Drivers of New Marketing Environment – Web 2.0- Digital Media Industry - Reaching Audience Through Digital Channels- Traditional and Digital Marketing - Introduction to Online Marketing Environment - Dotcom Evolution - Internet Relationships - Business in Modern Economy - Integrating E-Business to an Existing Business Model - Online Marketing Mix – SoLoMo (Social-Local- Mobile)- Social Media Sites & Monetisation- Careers in Social Media Marketing, Online content development & key word optimisation.

Unit – II

Purchase Behaviour of Consumers in Digital Marketing Format - Online Customer Expectations - Online B2C Buying Process - Online B2B Buying Behaviour –Social Media Marketing Segments- Forms of Search Engines – Working of Search Engines - Revenue Models in Search Engine Positioning – SEO - Display Advertising – Trends, Web Analytics.

Unit – III

Product Attributes and Web Marketing Implications - Augmented Product Concept - Customizing the Offering - Dimensions of Branding Online - Internet Pricing Influences - Price and Customer Value - Online Pricing Strategies and Tactics – Time-based Online Pricing - Personalized Pricing - Bundle Pricing- Internet Enabled Retailing - Turning Experience Goods into Search Goods

Unit – IV

Personalization through Mass Customization - Choice Assistance - Personalized Messaging - Selling through Online Intermediaries - Direct to Customer Interaction - Online Channel Design for B2C and B2B Marketing- Integrating Online Communication into IMC Process - Online Advertising – Email Marketing - Viral Marketing - Affiliate Marketing - Participatory Communication Networks – Social Media Communities - Consumer Engagement - Co-Created Content Management-Interactive Digital Networks - Customer Led Marketing Campaigns.

Unit – V

Role of Social Media- Social Community (Facebook, Linkedin, Twitter etc.)- Social Publishing (Blog, Tumblr, Instagram, Pinterest, Wikipedia, Stumble Upon etc.)- Social

Entertainment (YouTube, MySpace, Flickr etc.)- Social Commerce (Trip Advisor, 4 Squares, Banjo etc.) Social Media Measurement & Metrics- Data Mining and Social Media- Role of Social Media in Marketing Research- Big Data and Social Media- Crowd Sourcing- Legal and Ethical aspects related to Digital Marketing. Marketing in Metaverse.

Course Outcomes: The Student is able to
CO1 : Get knowledge regarding basic concepts of Digital Marketing.
CO2 : Analyse and Choose different channels of digital marketing according to the changing requirements of the markets.
CO3 : Construct different digital marketing plans on situational basis.
CO4 : Market different products through different avenues of social media.

References:

1. Philip Kotler, Hermawan Kartajaya, Iwan Setiawan. Marketing 4.0 : Moving from Traditional to Digital. Wiley 2017
2. Bharat Anand. The Content Trap : A Strategist's guide to Digital Change, Penguin Random House, India. 2016
3. Guy Kawasaki, Art and Social Media: Power Tips. Portfolio, 2015
4. Jonah Berger. Contagious : How to build Word of Mouth in the Digital Age. Simon & Schuster Publications, 2014.

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321 - Financial Services

Objectives:
1. To know about the Indian financial system and its players
2. To understand the security market regulations
3. To keep abreast of recent financial services

Unit – I

Overview of Financial Services: nature, scope and importance Financial System and Markets: Types, Constituents and functioning, SEBI Role and functions, Overview of Foreign Markets, Financial Sector Reforms in India.

Unit – II

Introduction to Banking and Insurance services; RBI – Role and functions. Primary and secondary markets and their intermediaries: Introduction of Primary & Secondary Markets (BSE, NSE & OTCEI), Money market, Merchant banking services - new issue management, Prospectus of Public Offering, Book Building, IPO and FPO. Green shoe Option, Underwriter, Registrar and Share Transfer Agent. Stock broking, Depositories, Custodial services, short selling. Securities lending and borrowing services

Unit – III

Lease financing, Different types of leases – Evaluating a financial lease. Hire purchase, Consumer credit, Credit card, debit card – Factoring, Bill discounting, Forfaiting, Reverse Mortgage, BNPL.

Unit – IV

Mutual Fund organization - Meaning, status, types. Venture capital financing. Credit Rating Services. Portfolio Management Services, Wealth Management.

Unit – V

Consumer Finance, Housing finance, Securitization in India: concept, nature, scope and their implications, Management of Non-Banking Financial Companies and Microfinance

Course Outcomes: The Student is able to
CO1 : comprehend the broad Financial Framework and its inter-relationships along with the awareness about the different financial services.
CO2 : acquire the knowledge of the techniques in Evaluation of Financing Alternatives.
CO3 : equip themselves with knowledge for Wealth Managment

References:
1. M Y Khan. Financial Services, McGraw Hill, 2017
2. L M Bhole, Jitendra Mahakud. Financial Institutions and Markets. McGraw Hill

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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322 - Investment Management

Objectives:
1) To have understanding on different investments.
2) To have exposure on functioning of capital market
3) To understand various theories of portfolio management and evaluation.

Unit – I

Investment: Meaning, Features, Alternative Investments, Speculation and Gambling. Indian Capital Market – Primary Market and Secondary Markets – Processes of Buying and Selling Securities– Secondary Markets – Types – Stock Exchanges – Depository – Role of SEBI in security markets.

Unit – II

Fixed Income Securities: Real and Nominal Rates of Return – Components of Risk – Bond Characteristics, Prices, Yields, Ratings, Rating Procedure. Yield Curve – Determinants of interest Rates, Interest Rate Risk, Duration, and Bond Portfolio Immunisation.

Unit – III

Fundamental Analysis: Meaning, Importance, Objectives. Analysis of Economy, Industry, and Company, Financial and Non-Financial Parameters. Technical Analysis: Meaning – Difference between fundamental analysis and Technical analysis, The Dow Theory ,Technical indicators, Charting Techniques. Stock market indicators. Market Efficiency: Weak form, Semi-strong form, Strong form. Equity Valuation models.

Unit – IV

Portfolio Analysis: Risk – Return Framework - Security Returns, Measurement of Returns, Systematic and Unsystematic Risk. Index Models – Efficient Frontier, Dominance Principle, Optimum Portfolio, Utility Theory, Markowitz Portfolio Selection, Single Index Model,

Unit – V

Asset Pricing Model –Capital Market Theory, Capital Asset Pricing Model (CAPM), Assumptions, Inputs, Capital Market Line, Security Market Line, CAPM Anomalies. Evaluation of Portfolios – M2, Sharpe, Treynor, Jensen Measures, Morning Star Ratings, Style Analysis. Mutual Funds – Types, Fund of Funds, ETFs, Inverse Funds, Global Diversification. GDR, ADR, IDR

Course Outcomes: The Student is able to
CO1 : analyse various investment alternatives for effective investment decisions
CO2 : Discuss the importance of security analysis in investment decision process.
CO3 : Design bond management strategies.
CO4 : Apply different equity valuation methods for the valuation of securities.

CO5 : Construct optimal portfolio for optimum return.
CO6 : Analyse different schemes of mutual funds for better investment decision

References:

1. Bodie, Kane, Marcus, Mohanty. Investments. McGraw Hill, 2019
2. Kannadhasan. Fixed Income Securities, Valuation and Risk Management. 2022. Cengage.

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323 - Personal Finance

Objectives:
1. This course aims at enabling the student to comprehend the key issues governing the effective Planning of Personal Finance and Investment decisions.
2. To acquire the Competence to provide judicious Advice on these matters.

Unit – I

Personal Finance Environment: Nature and Goals of Personal Finance, Financial Planning Process - Time Value of Money, Macroeconomic Factors and Personal Finance, Preparation of Cash Budget, Annual Income Statement and Statement of Net-worth/Balance Sheet, Principles of Income Tax, Filing of Income Tax Returns and Basic Tax-planning.

Unit – II

Credit Planning and Management: Consumer Credit and Credit Cards, Financial Evaluation of Major Personal Purchase Decisions and the Alternative Credit Sources. Housing Loans, Repayment Schedules and Loan Amortisation Schedule, Personal Credit Rating.

Unit – III

Investment Planning Strategies: Diversification and Asset Allocation, Identifying the Individual's optimal Risk-Return trade-off, Fixed Income Securities and Equity Stocks, Buy-Sell Timings and optimal Holding period, Hedging Strategies using Futures and Options, Evaluation of Mutual Funds' Portfolios, Alternate Investment options – Art, Gold, Antiques, Commodities, REITS, Charity, Crypto Currencies, NFTs.

Unit – IV

Income and Asset Protection: Personal Risk Management Strategies – Risk Mitigation through Insurance, Types of Insurance, Elements of Life insurance, Health Insurance, Property Insurance and Liability Insurance, Selection of optimal Insurance Policies based on the Individual's circumstances and preferences, Settlement of Insurance Claims.

Unit – V

Retirement Planning: Steps in retirement planning, Types of Annuities, Identifying Optimal Annuities matching the post-retirement Income Goals, Reverse Mortgage as a post-retirement option. Estate Planning: Meaning, Objectives and Types, Will – Trust – Estate Tax Planning.

Course Outcomes: The Student is able to
CO1 : apply the Financial principles in Advising on Personal Finance decisions about investment alternatives and wealth management.
CO2 : provide professional advice on Personal Investment decisions, Risk Management and Retirement Planning.

References:

1. Jack R. Kapoor, Les R. Dlabay, Robert J. Hughes,& Melissa M. Hart (2020). **Personal Finance,** 12th Edition, McGraw Hill, India
2. Arthur J. Keown (2019). **Personal Finance.**8th Edition, Pearson, India
3. Gitman, Joehnk , Billingsley (2014). **Personal Financial Planning.** Cengage,India.
4. Rajni (2020). **Personal Finance and Planning.** JSR Publishing House, India
5. Steward Doss, and K. C. Mishra (2009). **Basics of Personal Financial Planning.** National Insurance Academy.

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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324 - Corporate Restructuring

Objectives:
1. To provide concrete understanding of Mergers & Acquisitions
2. To familiarize the concepts to the students with the current issues in M&A
3. To expose the students about the process and methods of M&A, measures to evaluate the performance of M&A

Unit – I

Meaning of corporate restructuring, need, scope and modes of restructuring, global scenario, national scenario. Value Drivers, Due Diligence Process. Motivations.

Unit – II

Mergers and Amalgamations, Concept, need and reasons, legal aspects, procedural aspects, economic aspects. Interest of small investors, accounting aspects, valuation of shares, stamp duty, filing of various forms.

Unit – III

Meaning and concept of takeover, types of takeovers, legal aspects - SEBI takeover regulations, Financing, bail out takeovers. Defensive Tactics. Employee Stock Ownership Plans, Creeping Acquisitions. Takeover of sick units. Revival and restructuring of sick companies.

Unit – IV

Funding of Mergers and Takeovers, Corporate Demergers/Splits and Divisions, Difference between demerger and reconstruction, modes of demerger.

Unit – V

Tax aspects, tax reliefs, Indian scenario, reverse mergers, Post Merger, Re-organization Financial Restructuring, Alliances, Legal Documentation and Due Diligence.

Course Outcomes: The Student is able to
CO1 : plan and execute the Corporate Restructuring strategies in accordance with the Laws governing them.
CO2 : handle the technical aspects of Mergers, Cross-border Acquisitions and their Valuation including the Tax implications.

References:
1. Weston, et al **: Takeovers Restructuring and Corporate Governance,** Prentice Hall
2. Patrick A Gaughan : Mergers, Acquisions and Corporate Restructuring. Wiley

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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325 - Banking Management

Objectives:
1. To know the scope of bank financial management
2. To understand the various types of risks faced by banks
3. To evaluate the services offered by banks.

Unit – I

Introduction to Banking: Structure of Indian Banking System – Scheduled Commercial banks, foreign banks, commercial banks, payment banks, Small Finance Banks. Types of banking – Universal banking, wholesale banking, private banking, retail banking; RBI-Monetary Policy. Different types of accounts, Various services offered by banks, Sources of risk in banks, Analyzing bank's financial statements.

Unit – II

Uses of Bank Funds: Features of bank credit, Assessment of Credit Worthiness of borrowers, Different types of Loans, Priority Sector Lending, Sectoral Limits. Loan Pricing - Pricing of fixed & floating rate loans, cost – benefits. Securitisation, Syndication. NPAs: - Concept of gross and net NPAs, causes, recovery of NPAs. Asset Recovery Companies, Bad Bank.

Unit – III

Regulation and Innovations in Banking System: Regulation of Banks, Basel Accords I, II, and III. Banking Innovations - Core Banking Solution, Digital Banks, Plastic Money, NEFT, RTGS, Mobile Banking, M Wallets, Net Banking, E-Rupee, Central Bank Digital Currency.

Unit – IV

Non- Banking Finance Companies – Types, Operations, Microfinance Companies, Regulation.

Unit – V

Credit Information Bureaus, Credit Scores, Credit Repository of Large Clients. Account Aggregator. Credit Guarantee Options. Deposit Insurance. Supervisory College.

Course Outcomes: The Student is able to
CO1 : analyse the Indian financial system and role of commercial banks
CO2 : develop better understanding on different types of deposits and loans.
CO3 : understand the regulations in banking system.

References:
1. Management of Banking & Financial Services, Padmalatha Suresh & Justin Paul, Pearson.
2. Bank Financial Management, IIBF, Macmillan 2010.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

326 - Financial Markets and Institutions

Objectives:
1. To know about the Indian financial system and its players
2. To understand the security market regulations
3. To keep abreast of recent financial services of institutions.

Unit – I

Financial system: Introduction, functions of financial system and its components. Financial markets. Types-Capital market - Primary and secondary, money market - introduction, types of money market instruments, money at call, treasury bill, certificates of deposits, commercial papers. Bond market.

Unit – II

Financial institutions: Definition, types, role in economic development. Commercial banks – Public & private sector banks, financial innovation in commercial banks. Types of Stock Exchanges – National, Regional & Local. Financial Institutions in GIFT City. Financial Regulation - MCA, RBI, SEBI, IRDAI - introduction, and guidelines.

Unit – III

Development Financial Institutions- NABARD, SFCs, IRBI, SIDC, SIDBI– Introduction and operational policies, Role and functions. NBFCs - Concept, Services, growth, and Regulation.. Special Purpose Vehicles.

Unit – IV

Asset Management Companies. Mutual Funds - Introduction, types of mutual funds, significance, growth. Alternative Investment Funds. G-Sec market. Private and public sector insurance Companies (life and general). Leasing, Hire purchasing, Factoring and forfaiting, Bills discounting.

Unit – V

Management of Non-Performing Assets: Credit Rating - Introduction, Growth. Foreign Exchange Market, Forex Policy, Participants, Services. Fintechs.

Course Outcomes: The Student is able to
CO1 : explain overview of financial system.
CO2 : discuss about various financial institutions.
CO3 : gain knowledge of the commercial banks and their roles.
CO4 : appraise the activities of various non-banking financial institutions.

References:
1. Nalini Prava Tripathy : Financial Services, Prentice Hall

2. MY Khan **: Indian Financial System** (Tata McGraw-Hill)
3. Bhole Mahakud: **Financial Institutions and Markets** (McGraw Hill)

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

331 - Training and Developmenmt

Objectives:
1. To appreciate the significances of training and development
2. To introduce the basic concepts in training and development
3. To understand the methods of training and development and
4. To study the HRD practices in organizations.

Unit – I

Training & Development: Scope, objectives, beneficiaries, forces influencing working and learning, training practices, future trends. Strategic Training, and Development - Evolution of training role, training needs, models of organising training & department, outsourcing training.

Unit – II

Needs Assessment: Importance, scope, methods and techniques of training need assessment(TNA), organizational and operational analysis. Training Design - Factors affecting training design, budgeting for training, costs involved in training programs, design theory, outcomes of design, identification of alternative methods of instructions, considerations in designing effective training programs, implementation, Output of TNA

Unit – III

Learning: learning theories, learning process, instructional emphasis for learning outcomes, designing effective training programs, feedback. Training Methods & Trainer's Style- types of training, training methods, choosing a training method, competence of trainer, trainer's skills, trainer's styles, trainer grid, trainer's roles, do's and don'ts for trainers.

Unit – IV

Training Evaluation: Factors influencing transfer of learning, reasons for evaluating training, evaluation process, determining outcomes, evaluation techniques, models of training evaluation, training audit, Resistance to Evaluation. E-Learning and use of Technology in Training - Technology and multimedia, computer-based training, developing effective online learning, blended learning, simulations, mobile technology and training methods, intelligent tutoring systems, technologies for training administration, learning management systems

Unit – V

Management Development: Need, importance, Training for executive level management, approaches, development planning process, company strategies for providing development. Coaching – Need, types, Benefits. Mentoring – Purpose, types, Benefits. Contemporary Issues in Training and Development - dual career paths, career plateau, coping with career breaks, balancing work and life.

Course Outcomes: The Student is able to
CO1 : understand the Concepts of Training and Development and its Practical relevance to Organization.
CO2 : assess the training needs of business firms.
CO3 : apply the Training methods in the organizational context.

Reference:
Employee Training and Development, 4th Edition by Noe, Raymond A., Irwin/McGraw Hill

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

332 - HR Audit

Objectives:
1. Aims to provide a conceptual understanding of HR Audit.
2. To learn the methodology and issues connected with HR Audit.
3. Understand workforce issues, HR Audit Reports.

Unit – I

Human Resource Audit: Introduction, Objectives, Concepts, Components, Need, Benefits. Components of Human Resource Development Audit, Human Resource Audit Goal, Defining the Audit Team, Approaches to Human Resource Audit, Benefits of Human Resource Audit

Unit – II

HR Audit Methodology and Issues: Introduction, Conducting Human Resource Audit, Preliminary Steps, Goals of the Audit, Areas of the Audit, Issues in HR Audit, Strategies, Alignment of HR Audit. HR Audit Process - Introduction, Audit of Human Resource Function, Planning Questions, Collecting Data, Analysing the Audit Data, Interpretation, Assessing the Ability for Change.

Unit – III

HR Audit and Workforce Issues: Introduction, Workforce Communication and Employee Relations, Performance Management, Compensation System, Team building System. Challenges in HR Audit **-** Assessing the Ability for Change, Post Audit Steps, Preventive and Corrective Actions, Role in Business Improvement, Methodology and Limitations

Unit – IV

Human Resource Audit Report: HR Audit Report – purpose, Report Design – Preparation of report, Use of HR Audit report for business improvement. HR Audit for Legal Compliance and Safe Business Practices. Scope of Human Resource Audit, Pre-employment Requirements, Hiring Process, New-hire Orientation Process, Workplace Policies and Practices

Unit – V

Human Resource Auditing as a Tool of Human Resource Valuation: Introduction, Rationale of Human Resource Valuation and Auditing, Valuation of Human Resources, Issues in Human Capital Measurement and Reporting.

Course Outcomes: The Student is able to
CO1 : gain a comprehensive knowledge of the HR Audit concepts, Methodology, Workforce Issues and HR Valuation.

CO2 : apply these concepts in the organizations for employee development and reporting.

Reference:

T. V. Rao HRD Audit: Evaluating the Human Resource Function for Business Improvement, Sage Publications 2014 / 2nd

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

333 - Human Resource Planning

Objectives:
1. To provide an exposure of theories, techniques and approaches to HR Planning.
2. To create a practical orientation towards the Emerging trends in the HR field.

Unit – I

INTRODUCTION: Concepts of Human resource planning (HRP) – objectives, and factors affecting HRP, significance. Macro level scenario of HRP – Process, benefits, problems and limitations of HRP, Planning job requirements and descriptions – Job Information, Job description, Job evaluation, Skills Analysis.

Unit – II

MANPOWER PLANNING - Anticipating Man power needs – Man power Inventory, Expected Loss and Extra needs, Existing post or new post to be created, demand and supply forecasting, career planning and succession planning, wastage analysis, retention, redeployment and exit strategies. Recruitment - Introduction to recruitment, nature and need of recruitment, workers' expectations, proactive recruitment and reactive recruitment, electronic recruitment, innovative recruitment sources - electronic resumes, career websites, international electronic recruitment, electronic web sources.

Unit – III

SELECTION PROCESS: Job analysis to man specification, Selecting sources of recruitment, Internal & External recruitment sources, interviewing, job descriptions, Review in the applications and resumes. Planning basic questions, competency-based questions, key competency category, competency-based lead-ins, generic competence questions, additional types of questions, probing questions, questioning techniques to avoid, Types of Interviews. Hiring Methods - Nature of hiring, Methods of hiring, External Hiring, meaning and definition of external recruitment, sources of external hiring. Performance Appraisal and Development.

Unit – IV

PRE-EMPLOYMENT TESTING - Testing advantages and disadvantages, test validation, testing categories, Computer based testing, background check policy, reference check, guidelines for releasing and obtaining Information Performance Tests - Mental ability, Group discussion, mechanical ability test, role plays, Personality assessment, assessment centres, personal interview, integrity testing, Drug testing, graphology.

Unit – V

REFERENCE CHECKING AND APPOINTMENT ORDERS: Meaning, definition and purpose; Verification of character, criminal antecedents, previous work behaviour and educational qualifications. Verification of community certificates in public sector companies.

Statutory requirements (under the shops and commercial establishments act), Contents of appointment letter, hardcopy (or softcopy), method of delivery and retrieving the acknowledgement copy, medical examination & acceptance of offer for joining.

Course Outcomes: The Student is able to
CO1 : explain the basic concepts and importance of Human Resource Planning.
CO2 : identify the importance of Career Planning.
CO3 : evaluate the need for improving the HR Information Systems.

References:

1. Stephen Robbins. Essentials of Organizational Behaviour. Pearson.
2. Dhamija, Hasan, Singh. Talent Management in India. Atlantic Publication.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

334 - Labour Laws and Industrial Relations

Objectives:
1. Create awareness of existing labour laws
2. Expose the students to causes of Industrial disputes and settlement procedures.

Unit – I

Industrial Relations – concepts, Significance, trends in India. Trade Unionism – theory, policy, their influence on HRM, objectives and functions, structure, types, Indian trade union movement, their strength and weakness.

Unit – II

Industrial relations industrial disputes, causes, handling and settling disputes, employee grievances, steps in grievance handling, causes for poor industrial relations, remedies.

Unit – III

Concept, function and Importance, principles and forms of collective bargaining procedure conditions for effective bargaining. workers' participation in management, Role and methods of workers' participation – Joint Management Councils, Works Committees.

Unit – IV

Industrial Conflicts – Causes, Types, Consequences, Prevention, Settlement, Conciliation, Arbitration, Adjudication. Causes of Grievances & Disputes. Role IR Officer. Government Machinery for Industrial Relations.

Unit – V

Factories Act 1948 – the Workman's Compensation Act, 1923. the Employees State Insurance Act 1948. the Employees Provident Funds and Miscellaneous Provisions Act, 1952. The Payment of Wages Act, 1936. the Minimum Wages Act, 1948. the Industrial Disputes Act 1987. the Industrial Employment (standing orders) Act, 1946. the Trade Union Act, 1926 and latest legislations.

Course Outcomes: The Student is able to
CO1 : understand labour laws
CO2 : acquire skills for conflict resolution

References:
1. P.R.N. Sinha. Industrial Relations, Trade Unions and Labour Legislation. Pearson, 2017
2. The Industrial Relations Code - 2020. Commercial Law Publishers, 2021.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

335 - Leadership Development

Objectives:
1. To introduce the concepts of Leadership, Communication and Motivation.
2. To enable the students to appreciate the nuances of Leader's Personality and its impact on building a strong Team.

Unit – I

Introduction to Leadership: Leadership - Definition, the nature of Leadership, Manager vs Leaders, Traits of good leaders and followers, Effective leadership behaviours, level of conceptualization Participative Leadership and Empowerment. Participative Nature, Normative decisions framework, Delegation, Motivation and Empowerment, Consequences of empowerment, Facilitating conditions for empowerment.

Unit – II

Transformational Leadership and Adaptive Leadership : Concepts of power and authority, Influence processes, Power types and sources, Power acquisition – Social exchange theory, Strategic contingency theory. Consequences of Position and Personal power, Influence tactics and its usage and effectiveness.
Leader as change and Transformation agent: Leading change – coaching and mentoring. Transactional, transformational, level five leaders and servant leadership. Charismatic Leadership
Early contingency theories of effective leadership: Contingency approaches - Fiedler's contingency model, Hersey and Blanchard's theory, Path goal theory and Blake and Mouton managerial grid.

Unit – III

Leadership in Teams and strategic Leadership in Organization : Nature of teams and determinants of team performance. Leadership in teams, procedures for facilitating team learning, Leadership training programs, Ethical leadership, gender and leadership, leadership in different cultures, managing diversity, Women Leadership

Unit – IV

Personality Traits : Personality And Leadership – Values, Attitudes, Charisma, Leader's Mind, Emotional Intelligence, Leading with Heart and Mind, Love and Fear, Moral Leadership, Courage, Building Followers, Empowerment, Motivation. Communication in Crisis.

Unit – V

Blue Ocean Shift : Red Ocean Strategy vs. Blue Ocean Strategy, Blue Ocean Strategy: Aligning Value, Profit and People in Pursuit of Differentiation and Low Cost. Vision,

Mission, Strategic Formulation, Shaping Culture and Values, Leading Change and Innovation.

Course Outcomes: The Student is able to
CO1 : identify the leadership qualities to run an organization successfully.
CO2 : understand the various behavioural concepts.
CO3 : develop the organisational structures for effective decision making.
CO6 : discuss team building resources of inspirational leaders in business.

References:

1. Peter G. Northouse. Leadership – Theory and Practice. SAGE, 2018.
2. Conger, Riggio. Practice of Leadership – Developing the Next Generation Leaders. Wiley.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

336 – Counselling Skills for Managers

Objectives:
1. Aims to provide a comprehensive knowledge of the counselling concepts, counselling process, counselling skills.
2. Understand performance management and organizational change along with their Organizational applications.

Unit – I

Introduction to counselling – approaches – Psycho analytic approaches – behaviourist approaches – humanistic approach – Goals of counselling – role of counsellor – values in counselling.

Unit – II

The process of counseling – 5-D model of the counseling process – counseling procedure – referral procedure. – Guidelines for effective counseling – advanced skills in counseling – action strategies

Unit – III

Counselling skills – counselling relationship – Non verbal communication – verbal communication – listening barriers – counsellor's Qualities – core conditions of counselling – role conflicts in counselling – change behavior through counselling – general principal and techniques

Unit – IV

Organizational application – change management- Downsizing - managing diversity – mentoring – Team management / Conflict. Resolution crisis/ Trauma – consulting – upward feedback – the leaning organization – organizational development – Dealing with problem subordinates

Unit – V

Performance management – career counselling – performance counselling – pre disciplinary action – Grievance interview – alcoholism and other substance abuse – concepts of alcoholism – alcohol abuse and industry- the counsellors role – ethics in counselling – ethics principals

Course Outcomes: The Student is able to
CO1 : gain a comprehensive knowledge of all the essentials concepts of Counselling.
CO2 : apply the counselling concepts in the real-life organizational applications.

Reference:
Narayana Rao S. Counselling and Guidance. Tata McGraw Hill Publishing.

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

341 – System Analysis and Design

Objectives:
1. To introduce the concepts of System analysis and design
2. To focus on different components of System analysis and design.
3. To plan, design and develop such information systems.

Unit – I

System Analysis Fundamentals: Introduction to System, System Analysis and Design, Need for System Analysis and Design, Role of the System Analyst, System Development Strategies: SDLC, Structured Analysis Development Method, System Prototype Method.

Unit – II

Case Tools: Benefits of Computer-Assisted Tools, Categories of Automated Tools, Case Components Organizations as System: Interrelatedness and Interdependence of System, System Process, Boundaries, System Feedback, Managing Project

Unit – III

Review and Selection Fact-Finding Techniques: Interview, Questionnaire, Record Review, Observation Data Flow Diagram: Advantages, Notations, Rules, Levelling, Logical and Physical DFD. Data Dictionary: Importance, Data Elements, Describing Process Specification Structured Decisions: Decision Tree, Decision Tables, Structured English.

Unit – IV

The Essentials of Design Designing Effective Output: Objectives, Types of Output, Method, Factors to consider - Designing Effective Input: Objectives, Guideline for Form design, Screen and Web Forms, Designing User Interface: Objectives, Types of user interface, Designing Accurate Data – Entry Procedures: Objectives, Effective coding, Data-Entry Method, Ensuring data quality through input validation

Unit – V

Quality Assurance through Software Engineering - Design of Software, Software design and documentation: Structured Flowcharts, HIPO, Warnier / Orr Diagrams Managing Quality Assurance: Level of Assurance, Level of Test Implementation of Information System: Training Strategies, Conversion, Post Implementation Review - Case Studies - Financial Accounting System - Payroll System - Library System – Inventory System - Online Banking System - Railway Reservation system (Input, Output, DFD)

Course Outcomes: The Student is able to
CO1 : Comprehend the basic concepts of System Development.
CO2 : To prepare object-oriented Analysis, Design and System Implementation.

CO3 : Apply SAD principles in organizational context.

Reference:
Hoffer, J., Modern System Analysis and Design. Pearson.

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

342 - Database Management Systems

Objectives:
1. To introduce the concepts of Database Systems, Relational Models and Data Storage.
2. To provide insights into the various Hierarchical Models and the operation of Indexing and Hashing.

Unit – I

Introduction – Data Models, Database languages, Transaction, Storage management. Database administrator – Users, overall system structure, Entity – Relationship Model – Basic concepts, Mapping constraints, keys, E - R Diagram, Weak Entity Sets, reduction of E-R Diagram to tables.

Unit – II

Relational Model – structure, relational algebra, extended operations, Modifications on a Database, views. SQL – basic structure, set operations, aggregate functions. Nested Sub queries – derived relations, views.

Unit – III

Integrity constraints, Domain constraints, referential integrity, assertion, triggers, functional dependencies. relational database design, decomposition, normalization using functional, multivalued, Join dependencies. Domain – Key Normal form – alternative approaches.

Unit – IV

Object Oriented Data Model – Languages. Object Relational databases - Nested Relations. Complex types and object Orientation - Querying with complex types, creation of complex values and objects, comparison.

Unit – V

Database System Architectures- Centralized Systems, Client server systems, Distributed Systems. Parallel databases – introduction, inter query, intra query, intra-operation, interoperation parallelism. distributed databases –distributed data storage, network transparency, Query processing. Transaction model–Commit protocols, coordinator selection, concurrency control, deadlock handling. multi database systems.

Course Outcomes: The Student is able to
CO1 : develop the appropriate Database Models as per the needs of the organization.
CO2 : build the Network Models and map the network to the Files.

Reference:
Thomas Connolly, Database Systems: A practical approach to Design, Implementation and Management. Pearson.

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

343 – Data Mining and Data Warehousing

Objectives:
1. To introduce the concepts of Data Warehousing and Data Mining.
2. To focus on the technical aspects of Data warehousing and mining for effective decisions.

Unit – I

Data Warehousing Introduction – Definition. Architecture-Warehouse Schema Warehouse server-OLAP operations. Data Warehouse technology – Hardware and operating system, Data Mining – Definition. DM Techniques – current trends in data mining. Different forms of Knowledge – Data selection, cleaning, Integration, Transformation, Reduction and Enrichment. Data mining v/s Statistical Analysis, Tasks solved by Data Mining Methods

Unit – II

Data: Types of data, Data Quality, Data Pre-processing, Measures of similarity and dissimilarity. Exploration - Summary statistics, Visualization. Association rules-Introduction, Methods to discover association rule, Apriori algorithm Partition Algorithm. Data warehouse Architecture - Types, benefits, methods and approaches. Data Modelling - Data Analysis Techniques, Conceptual Modelling, Logical Modelling, Physical Modelling. Overview of Modelling Techniques, Dimensional Modelling, Facts, dimensions, Hierarchies, Aggregates, Measures, Cubes, Star Schema, Snowflake Schema.

Unit – III

AR Algorithms: Pincher search algorithm – Dynamic Item set algorithm – FP Tree growth algorithm. Classification: Decision Tree classification, Bayesian Classification, Classification by Back Propagation.

Unit – IV

Clustering: Introduction, Clustering Paradigms, Partitioning Algorithms. K means & K Mediod algorithms, CLARA, CLARANS, Hierarchical clustering, DBSCAN, BIRCH, Categorical Clustering algorithms, STIRR, ROCK, CACTUS.

Unit – V

Introduction to machine learning – Supervised learning, Unsupervised learning. Machine learning and data mining - Introduction –Web content mining – Web structure mining –Web usage mining –Text mining –Text clustering, Temporal mining -Spatial mining, Visual data mining – Knowledge mining. Various tools and techniques for implementation using weka, RapidMiner and Matlab.

Course Outcomes: The Student is able to
CO1 : Organize raw data to make it suitable for various data mining algorithms.
CO2 : Measure interesting patterns from different kinds of databases.

CO3 : Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.

Reference:

Acharya, Chellappan. Big Data and Analytics. Wiley.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

344 – Logistics Management

Objectives:
1. To introduce the concepts of Logistics, Marketing interface, customer service and Competitive Strategy.
2. To focus on the Application of Optimization models for building an efficient and integrated Supply chain and its maintenance

Unit – I

Logistics – The Logistics of Business, The Logistical Value Proposition, The Work of Logistics, Logistical Operating Arrangements, Flexible Structure. Customer Accommodation – Customer Focused Marketing, Customer Services, Customer Satisfaction, Customer Success, Forecasting. Supply Chain Process.

Unit – II

Procurement and Manufacturing – The Quality Imperative-Procurement, Manufacturing, Logistical Interfaces, Lead Time, Pipe Line Management, Information Technology Framework – Information System Functionality, Comprehensive Information System Integration, Communication Technology, Rationale for ERP Implementation, ERP System Design.

Unit – III

Inventory – Inventory Functionality and Definitions, Inventory Carrying Cost, Planning Inventory, Managing Uncertainty, Inventory Management Policies, Inventory Management Practices. Transportation – Transport Functionality, Principles and Participants, Transportation Service, Transportation Economics and Pricing, Transport Administration, Documentation.

Unit – IV

Warehousing – Strategic Warehousing, Warehousing Operations, Warehousing Ownership, Arrangements, Warehouse Decisions. Packaging And Materials Handling – Packaging Perspectives, Packaging for Materials, Handling Efficiency, Materials Handling.

Unit – V

Operational Integration – Value created by Integration, Systems Concept and Analysis, Logistical Integration. Objectives, Enterprise Integration. Network Integration – Enterprise Facility, Network. Warehouse Requirements, Total Cost Integration, Formulating Logistical Strategy. Relationship Development and Management – Development and Management of Internal Logistics Relationships.

Course Outcomes: The Student is able to

CO1 : Get knowledge regarding basic concepts of Logistics and Supply Chain.
CO2 : Analyse different logistics strategies to get competitive advantage.
CO3 : Assess the profitability by measuring the logistics performance and maintaining supply chain relationships.

References:

1. Ganapathi, Nandi. Logistics Management. Oxford University Press.
2. Bowersox, Closs & Cooper. Supply Chain Logistics Management. McGraw Hill.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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345 – Data Analytics with R (Online)

Objectives:
1. To introduce the concepts of Software Engineering, System Design and Maintenance.
2. To focus on Planning , Cost Estimation and Quality aspects of System Implementation with R.

Unit – I

Introduction to R – Installing R and R-Studio, downloading additional packages in R, using the R-Studio interface. Importing data into R – text files, Excel, from other statistical software packages, from databases, and from the web, viewing data. Arithmetic with R, Variable assignment, basic data types in R. Vectors, Matrices, Data frames and Lists. Categorical data – factors, discretizing variables.

Unit – II

Data Preparation – Exploring raw data, basic data visualization through graphs, cleaning data, preparing data for analysis – missing and special values, outliers and obvious values. The dplyr package and the tbl class, Selecting and mutating data – joining data with dplyr, filtering and arranging data, Filtering based on factors, Summarizing data and the pipe operator, and working with databases.

Unit – III

Data Visualization – Frequency tables and Cross-tabulation. Introduction to base graphics in R, different plot types, adding details to plots, managing visual complexity, creating plot arrays. plot customization, other graphics systems in R. The ggplot2 package, Grammar of Graphics, aesthetics, geometries, the qplot( ) function, statistics in graphs.

Unit – IV

Data Exploration – Exploring categorical data, exploring numerical data, Descriptive Statistics – measures of central tendency and variability. Exploratory Data Analysis using graphs.

Unit – V

Statistical Analysis – Testing of Hypothesis – t-test, Chi-Square test, ANOVA, Correlation. Simple Linear Regression, multiple regression – assumption checking, model estimation and validation.

Course Outcomes: The Student is able to
CO1 : outline the issues and challenges faced while managing data.
CO2 : do the Project Scheduling, tracking, Risk analysis and Quality management.
CO3 : do Statistical Analysis using R

References:

1. Andy Field, Discovering Statistics Using R. SAGE
2. Kiran Pandya, Statistical Analysis in Simple Steps using R. SAGE

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(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

346 – Distributed Computing Systems (Online)

Objectives:
1. To introduce the concepts of Data communication, Network Protocols and Transmission.
2. To focus on technical aspects of ISDN, OSI preference Model and Digital Data Transmission.

Unit – I

Basics concepts: Computer architecture: CICS, RISC, Multi-core. Computer networking - ISO/OSI Model. Evolution of operating systems. Introduction to distributed computing systems (DCS)

Unit – II

DCS design goals, Transparencies, Fundamental issues. Distributed Coordination: Temporal ordering of events, Lamport's logical clocks, Vector clocks; Ordering of messages, Physical clocks, Global state detection

Unit – III

Process synchronization: Distributed mutual exclusion algorithms, Performance matrix.

Unit – IV

Inter-process communication Message passing communication, Remote procedure call, Transaction communication; Group communication; Broadcast atomic protocols

Unit – V

Deadlocks in distributed systems, Load scheduling and balancing techniques, Distributed database system. Case studies

Course Outcomes: The Student is able to

CO1 : comprehend the concepts of Data communication, Network Protocols and Data Transmission.
CO2 : build the Data Networks that would facilitate Distributed computing.

Reference:
Distributed Systems Concepts and Design, G. Coulouris, J. Dollimore, Pearson.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.

(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

351 – Personal Discovery through Entrepreneurship

Objectives:
1. This course aims to enable the student to identify his strengths and limitations.
2. To provide the necessary skills to evaluate appropriate business opportunities.
3. To choose the best business model to ensure Entrepreneurial success.

Unit – I

Personal Discovery – Match a student's problem-solving interests with their personal capabilities and fundamental core values. Personal Values, Arenas of Excellence, Team Building, Defining Purpose, Developing a Mission Statement.

Unit – II

Solution Discovery I (Problem Identification) – Develop the ability to Identify and Solve problems based on an understanding of the opportunity space, new or recombined technologies, and empathy with people and their challenges. Ideation and Impact, User Insights, Concept Design, Validation.

Unit – III

Solution Discovery II (Solution Design) – Design new products and services and understanding when to apply Low, Medium, and High Fidelity prototyping concepts when testing solutions. Product Line Strategy, Prototyping, Validation.

Unit – IV

Business Model Discovery – Understand how to commercialize innovations to create sustainable companies. Industry Analysis, Types of Business Models, Building Revenue Models, Designing Operating Models, Defining Customer Decision Journey, Validation.

Unit – V

Discovery Integration – Achieve a balance between business and societal goals and communicate the vision about the plan. Determining Company Impact, Value Creation, Story Telling, Pitching to Stakeholders.

Course Outcomes: The Student is able to
CO1 : Identify strengths and to search for the most suitable business opportunities.
CO2 : Logically proceed through the stages of Problem Identification, Solution Design, Business model decisions and integration to become a successful Entrepreneur.

Reference:

Meyer and Lee (2020), Personal Discovery through Entrepreneurship, The Institute for Enterprise Growth, LLC. Boston, MA., USA

NOTE TO THE PAPER SETTER:
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(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

352 – Creativity, Innovation and Entrepreneurship

Objectives:
1. To understand the creativity and innovations management aspects in an enterprise.
2. To impart Creative problem solving, Creative intelligence and Innovation Management.

Unit – I

The Creativity Phenomenon: Creative Cerebration, Creative Personality and Motivation, Creative Environment, Creative Technology, Creativity Training. Puzzles of Creativity. Spiritual and social roots of creativity. Essence, Elaborative and Expressive Creativities. Quality of Creativity, Existential, Entrepreneurial and Empowerment Creativities. Criteria for evaluating Creativity- Credible Evaluation. Improving the quality of our creativity.

Unit – II

Mastering Creative Problem Solving: Structuring of ill-defined problems, Creative Problem solving. Models of Creative problem solving. Mechanisms of Divergent thinking, Useful mechanisms of convergent thinking, Techniques of Creativity Problem solving

Unit – III

Creative Intelligence: Creative Intelligence abilities - model of Creative Intelligence, Convergent thinking ability, Traits Congenial to creativity, Creative Personality and forms of creativity. Motivation and Creativity- Blocks to creativity, fears and Disabilities. Strategies for Unblocking, Energy for creativity, Designing Creative Environment.

Unit – IV

Innovation Management: Concept of Innovation, Levels of Innovation, Incremental Vs Radical Innovation. Inbound and Outbound Ideation, Open and Other Innovative Ideation Methods. Theories of outsourcing New Product Development: Transaction Cost, Resource Based, Resource Dependence, Knowledge Based Theories.

Unit – V

Micro and Macro Perspectives of Innovation: Systems Approach to Innovation. Innovation in the context of Emerging Economies. Organizational factors affecting innovation. Leadership and Innovations- Open Innovation, Innovation Framework, Innovations developed by Open Technology Communities.

Course Outcomes: The Student is able to
CO1 : Comprehend the concepts associated with Creativity
CO2 : Acquire the skills for Creative problem solving.
CO3 : Understand the idea of Creative Intelligence and Innovation
CO4 : Apply Creativity and Innovation ideas in Organizational context.

References:

1. Maital, Seshadri. Innovation Management, Strategies, Concepts and texts for Growth and Profit. SAGE.
2. David Robertson. The Power of Little Ideas, HBR Press.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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353 – Startups Management

Objectives:
1. To understand New venture creation opportunities, Startup Capital requirements and legal formalities.
2. To Manage the Venture through the stages of Introduction, Growth, Harvest and Decline.

Unit – I

Startups opportunities – The New Industrial Revolution, The Big Idea, Generate Ideas with Brainstorming, Business Startups, Ideation, Venture Choices, The Rise of Startups Economy, The Six Forces of Change, The Startups Equation, The Entrepreneurial Ecosystem, Entrepreneurship in India. Government Initiatives.

Unit – II

Startups Capital Requirements and Legal Environment – Identifying Startups Capital Resource requirements, estimating Startups cash requirements, Develop financial assumptions, Constructing a Process Map, Positioning the venture in the value chain, Launch strategy to reduce risks, Startups financing metrics, The Legal Environment, Approval for New Ventures, Taxes or duties payable for new ventures.

Unit – III

Startups Financial Issues – Feasibility Analysis, The cost and process of raising capital, Unique funding issues of a high-tech ventures, Funding with Equity, Financing with Debt, Funding startups with bootstrapping, crowd funding, strategic alliances.

Unit – IV

Startups Survival and Growth – Stages of growth in a new venture, Growing with the market, Growing within the industry, Venture life patterns, Reasons for new venture failures, Scaling Ventures, preparing for change, Leadership succession. Support for growth and sustainability of the venture.

Unit – V

Planning for Harvest and Exit – Dealing with Failure, Bankruptcy, Exit Strategies, Selling the business, Cashing out but staying in, being acquired, Going Public (IPO), Liquidation.

Course Outcomes: The Student is able to
CO1 : acquire the skills needed for identifying the right business opportunities and initiating the process of establishing the new Venture.
CO2 : gain the necessary managerial competencies for leading the Venture through its stages of Growth, Maturity and Decline.

References:

1. Mahoney, Markham. Management Consultancy, Oxford University Press.
2. Rajeev Roy, Entrepreneurship, Oxford University Press.

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354 – Private Equity and Venture Capital (Online)

Objectives:
1. To understand the evolution of venture capital financing over the years.
2. To identify various legal structures of venture capital firms.
3. To evaluate potential business ideas and prepare a successful business plan.
4. To understand different stages of business life cycles.
5. To know how venture capitalists exit from the business.

Unit – I

Introduction to Private Equity – Concept of PE and its characteristics, Definition, Difference between PE, VC and Hedge Funds, Nature of PE Firm, Players in the PE market, benefits of PE finance, Venture Capital, Over view to Venture Capital, definition, features, types, roles.

Unit – II

Legal Structure - PE Fund, Legal structure and terms, Private equity investments and financing, Private equity funds and private equity firms, Investment features and considerations.

Unit – III

Valuation Approaches – Structure and regulation of Venture Capital and Private Equity, Business Cycle of PE, Structure of VCPE firms, Limited liability partnerships, Routes of VCPE investments in India, Regulatory aspects of VCPE investments, Valuation approaches, risk and return, analysis of funds, conventional method, revenue multiplier method.

Unit – IV

Strategies adopted during the Business Life Cycles – Strategies of PE, leverage Buyout, growth capital, mezzanine capital, distressed debt, other Strategies. Size, performance and economic environment of PE global context. PEPI and Fund Indices, PE in India an overview, Due Diligence, Procedure and challenges, Due diligence in emerging PE Market, investing in developing market, past performance and strategy.

Unit – V

Exit Strategy – Modes of Exits in Indian Context and Challenges involved, IPO, Promoter Buyback, Sale to other PE Funds, Sale to other strategic Investors, Stake Swaps, M&As, open market, Secondary Market, Buyback of shares

Course Outcomes: The Student is able to
CO1 : comprehend the concept of Private Equity, Venture Capital and the Legal framework related to the PE/Venture Capital funds.

CO2 : gain the professional competence to formulate appropriate Strategies for PE/Venture capital Funds.
CO3 : devise exit strategies.

Reference:
Raj Kumar. Venture Capital Investments. SAGE.

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355 – Family Business Management

Objectives:
1. To understand the importance of family-owned businesses.
2. To identify the needs of Family Business Owners.
3. To protect family wealth and prepare succession plans.

Unit – I

Introduction to Family Business – Family Business as a unique synthesis, wealth management, Succession and Continuity – The three generation rule, Building Family business that last, The systems theory model of Family Business, Agency Theory of Family business, The stewardship perspective of family business, Competitive Challenges and Competitive advantages of family businesses, The role of Genograms and family messages to understand the family system. Family emotional intelligence, The ECI-U Model.

Unit – II

Ownership Challenges and Family Governance – Shareholder Priorities, Managers vs Owners, Responsibilities of shareholders to the company, Effective Governance of the shareholder, firm relationship, Family Governance – Structure, Challenges to family governance, Managing the challenges of succession. Enterprise Sustainability – Twelve elements of strategic fit and its implications on family firms.

Unit – III

Successor Development – Characteristics of next-generation leaders, Next-generation attributes interests and abilities for responsible leadership, Next-generation personalities, managing interdependence, CEO as an architect of succession and continuity, Types of CEOs and the transfer of power. Importance and functions of family office.

Unit – IV

Strategic Planning and Transgenerational Entrepreneurship – Life cycle stages influencing family business strategy, Turning core competencies into competitive advantage, The unique vision of family-controlled businesses, Strategic regeneration, The Business Rejuvenation matrix, Intrapreneurship.

Unit – V

The Future of Family Business – New Leaders of the Evolution, Three states of evolution Continuity and culture, changing the culture, The change formula, Organization Development approaches to change, Commitment planning, Organic competencies and business's future, Thriving through competition, Institutionalizing the change.

Course Outcomes: The Student is able to

CO1 : comprehend all the concepts related to the Family Business organization including Family Governance, Successor Development and Strategic Planning.
CO2 : apply these concepts in building the competitive strength of the Family business units.
CO3 : manage Family Wealth.

References:

1. Rajiv G. Agarwal, Family Business Management. SAGE
2. Baron, Lachenauer. Family Business Handbook – How to build and sustain a successful, enduring enterprise.

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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356 - Women Entrepreneurs

Objectives:
1. Understand the role of women entrepreneurship in different facets of society.
2. Know the various livelihood supports for women Employment opportunities.
3: Elucidate the role of various developmental schemes supporting women entrepreneurship.

Unit – I

Women Entrepreneurship, Significance of women entrepreneurship, Factors contributing to women Entrepreneurship, Characteristics, Challenges faced by Women Entrepreneurs

Unit – II

Growth of women Entrepreneurship, Entrepreneurship in Sectors like Agriculture, Tourism, Health care, Transport and allied services, Relationship between Entrepreneurship and empowerment, Achievements of Woman Entrepreneurs, Role Models of Woman Entrepreneur.

Unit – III

Women Employment Opportunities, Livelihood support for women Employment, Supporting agencies, Income Generating Programme, IRDP, Rural Credit & women's Self-help Groups, Skill Development and Technology Transfer, Technologies for Women, Impact on Women's Development Programs and policy measures at International, National and State Levels.

Unit – IV

Strategies of Women Entrepreneurship Development, EDP, Objectives, Evolution of women entrepreneur development programme, Special Women and EDPs, Micro Enterprises and Self-employment, Opportunities.

Unit – V

Trends and Patterns of Women Entrepreneurship, Non-Stereotyping Women, Institution and Schemes supporting Women Entrepreneurs – SIDO, DIC, EDI, NIESBUD, /SEWA, ALEAP - Institutional infrastructure.

Course Outcomes: The Student is able to
CO1 : comprehend the Role of Women entrepreneurs in the different facets of society and the Livelihood opportunities for women employment.
CO2 : gain practical insights into the various Government Schemes available for promoting Women Entrepreneurs.
CO3 : understand the prospects and challenges of women entrepreneurs.

Reference:

Hisrich, Robert D., Michael Peters and Dean Shepherd Entrepreneurship, Tata McGraw Hill

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Semester – IV

401 – Digital Business Models

Objectives:
1. This course aims to provide an overview of the business opportunities created by Digital Technologies.
2. To understand risks of Digital Business models, impact on Jobs and Employee relations.
3. To explore the options for Platforms, Digital design and Customer Satisfaction.

Unit – I

Digital Technologies, Digital disruptions, organisations' functioning in Digital age, common traps, Transition into Digital era. Aligning firms' strategy and culture, Digital Matrix Framework, Transformation phases to re-invent. Micro economic policies in Digital business. Game Theory.

Unit – II

Areas to digitalise, Biggest pay out or risk, current business model or invent in new digital business. First mover advantage, Risk of late to move, effect of digital attracters. Network and scale effects. Own Vs shared platforms. SaaS – software as a service. Digital, Physical, and Physital options.

Unit – III

Digital business – Effect on jobs, employment, freelancing, fixed or flexible times and days, office work, remote work, non-employment work arrangements, labour automation with AI and Robotics. Reskilling. Employment quality, need to review rights and obligations related to employment reationships. Safety net for employees affected by Digitalisation.

Unit – IV

Platforms – Role of CIO,CTO, Hosting on cloud – Life and shift, IaaS - Infrastructure as a Service, PaaS - Platform as a Service, and FaaS – Function as a Service. Cloud by domain – Supply chain, commercial, and Enterprise. Selection of technology, sourcing, Migration, Migration of existing application. Economic feasibility, and risks. Cloud security, zero-trust applications.. Shift of IT Projects to products, Integration with Business. Benefits & rights of platforms. Parent and host country regulations, and restrictions.

Unit – V

Customer preferences, customer centric, Digital Marketing – aligned to firm's culture and products. Design thinking, value innovation, blue ocean thinking, strategy canvas, four action frameworks. Minimum viable product, product life cycle, portfolio of products for digital

customers. Business model, revenue model, lean and agile business model. Supply chain, social media management.

Course Outcomes: The Student is able to
CO1 : comprehend the concepts associated with Digital Business Models.
CO2 : understand Digital Tech platforms as well as their impact on Employment.
CO3 : apply these concepts in building successful Digital Business Models.

References:

1. Digital Business and E-Commerce Management. Chaffey, Hemphill. Pearson 2019
2. *The Digital Mindset: What It Really Takes to Thrive in the Age of Data, Algorithms, and AI* (Harvard Business Review Press, May 2022), Tsedal Neeley & Paul Leonardi.
3. Digital Age with Data. Suman Guha. Notion Press; 1st edition (1 May 2022)
4. DIGITAL LEAPFROGS: How technology is reshaping consumer markets in India. Vijay Mahajan. HarperCollins India (7 April 2022)

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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402 - Strategic Management

Objectives:
1. To understand basic issues and concepts related to strategic management.
2. To help students devise strategies for competitive advantage.

Unit – I

Nature of Strategic Management, Dimensions, benefits and risks. The strategic management process. Strategy formulation. Business vision and mission, Importance, Characteristics and components. Evaluating mission statements.

Unit – II

The External Assessment, Porter's five force analysis. Industry and competitive analysis. The Global Environment, competitive strategies for firms in global markets. The Internal Assessment: SWOT Analysis, BCG, McKinsey's 7s frame work, strategy and culture. Value Chain Analysis. Resource based view of the firm. Benchmarking.

Unit – III

Strategies in Action: The balanced scorecard, types of strategies, Integrative, Intensive, Diversification strategies, defensive strategies, Porter's Generic Strategies. Strategy analysis and choice: Business level strategies. Cost leadership, Differentiation, Speed and market focus. Multi business strategy: BCG matrix, GE Nine Cell matrix. Limitations of portfolio approaches. The Parenting framework.

Unit – IV

Strategy Implementation: Short term objectives, functional tactics. Empowering Operating personnel, Allocation of recourses, managing resource conflict. Structure and strategy: Improving effectiveness of traditional organisational structures. Creating Agile Virtual Organisations, Modular organisation. Towards boundary less structures.

Unit – V

Leadership and culture: Strategic intent, Shaping organisational culture. Role of leader in organisational culture. Strategy evaluation, Strategy evaluation process. Corporate Governance.

Course Outcomes: The Student is able to
CO1 : Develop vision, mission and objectives of the organization.
CO2 :Analyse industry and develop techniques of competitive analysis.
CO3: Appraise strategic leadership styles and actions.
CO4: Formulate effective strategies in business.
CO5: Develop a frame work for the implementation of strategies in business.

References:

1. Hill, Jones. Strategic Management – An Integrated Approach. Cengage.
2. HBR's 10 Must Reads on Strategy, 2020
3. Henry. Understanding Strategic Management.OUP
4. Frynas, Mellahi. Global Strategic Management. OUP
5. Lynch. Strategic Management. SAGE 2021
6. Wheelen, Hunger, Concepts in Strategic Management and Business Policy, Pearson 2018

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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403 - Business Laws

Objectives:
1. To introduce the statutory provisions that affect the business decisions.
2. To give an exposure to important commercial laws, to understand the legal implications of a modern business organisation.
3. To understand the legal regulations related to the companies.

Unit – I

Contract Act: Offer and Acceptance, Consideration and Capacity of the Parties, Free Consent, Indemnity and Guarantee, Bailment and Agency. The Negotiable Instruments Act: Definition, Types of Negotiable Instruments, Negotiation, Endorsement and Crossing of Cheque, Dishonour of Cheques, Parties to Negotiable Instruments.

Unit – II

Contract of Sale of Goods: Sale, and Agreement to Sale, Conditions and Warranties, Performance of Contract of Sale, Unpaid Seller and his Rights, Caveat Emptor, Partnership Act, and Limited Liability Act.

Unit – III

Concept of Company and its Characteristics. Formation of a company. Memorandum and Articles of Association. Board of Directors, Role, Functions. Arbitration.

Unit – IV

Social Responsibility of Business. Consumer Protection Act, Consumer Councils, Redressals. Right to Information Act.

Unit – V

Meeting of Directors and Shareholders. Winding up and Dissolution of a company. Ethics, and Morals, Ethical Practices.

Course Outcomes: The Student is able to
CO1 : Analyze the Indian Contract Act.
CO2 : Evaluate Sales of Goods Act and the machinery for redressal of consumer grievances.
CO3: Elaborate rights and duties of agent and principal.
CO4: Examine the rights and duties of partners, dissolution of partnership firm.
CO5: Explain the kinds of Negotiable Instruments and Goods and Services Act.
CO6: Evaluate the global issues with respect to business ethics.

References:
1. Marson, Ferris. Business Law. OUP
2. Albuquerque. Legal Aspects of Business, OUP

3. Banerjee. Legal Aspects of Business, SAGE
4. Ravinder Kumar. Legal Aspects of Business. Cengage

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404 - Organisation Development

Objectives:
1. To understand the forces that stimulate change
2. To understand the necessity, resistance and strategies for change.
3. To enable the skills for the application of OD in organizations.

Unit – I

General Introduction to OD – Overview of the field of OD, Definitions of OD, A short history of OD and its evolution, Growth and relevance of OD, characteristics of OD, Values, assumptions, and beliefs in OD. Ethical Issues in OD.

Unit – II

Foundations of OD – Models and Theories of planned Change – (a) Lewin's Change Model (b) Burke – Litwin Model (c) General Model of planned Change, systems theory, participation and Empowerment. Teams and Team work, parallel learning Structures – A 'normative-reductive' strategy of changing, Applied behavioral Science, Action Research as a process and as an approach.

Unit – III

Managing the OD process – Diagnosis – The six-box Model – The action component – OD interventions and their nature – An overview of classification of OD interventions – Planning, choosing, and implementing of an intervention strategy. Evaluation and institutionalizing OD interventions – The program management component – Conditions for optimal success of OD – Issues in Consultations – Client Relationship.

Unit – IV

Human Process Interventions – Human Process approaches – T-groups, Process-consultation, Third party intervention, Team Interventions, Techniques and exercises used in Team interventions. Role Analysis Technique, Role Negotiation Technique, Responsibility Changing, Force Field Analysis. Broad Team Building interventions. Organizational Process approaches – Organization Confrontation, Inter-Group Relations interventions, Grid OD. Training Experiences.

Unit – V

Techno-Structural and Strategic Interventions – Techno-structural interventions: Structural design – (i) Restructuring Organizations, Downsizing, Reengineering (ii) Employee involvement: Quality Circles, Total Quality Management (iii) Work Design: R. Engineering approach, System approach. Strategic Interventions: Organizational Transformation and its Characteristics, Cultural change, Self – designing organizations, organizational Learning.

Course Outcomes: The Student is able to
CO1 : apply the Diagonistic processes for OD.
CO2 : facilitate Team interventions and Structural interventions.
CO3 : contribute towards the Other Interventions that lead to Organization Development.

References:

1. Wendell French, Cicil, H. Bell, Jr, Veena Vohra, "Organization Development", 2017, pearson Education.
2. Haldar. Leadership and Team Building, OUP
3. Anderson. Organisational Development, SAGE

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411 – Marketing of Services

Objectives:
1. To differentiate between product and service businesses
2. To equip for a career in marketing in the service industry.

Unit – I

Marketing of Services, Introduction, Growth of the Service Sector, The Concept of Service, Characteristics of Services, Classification of Services, Designing the Service Blueprint, Using Technology, Developing Human Resources, Building Service Aspirations.

Unit – II

Marketing mix in services marketing, The Seven Ps, Product Decisions, Pricing Strategies and Tactics, Promotion of Services and Placing or Distribution Methods for Services, Additional Dimensions in Services Marketing, People, Physical Evidence and Process, Internet, and Social Media as a service channel.

Unit – III

Strategic Marketing Management for Services, Matching Demand and Supply through Capacity Planning and Segmentation, Internal Marketing of a Service, External versus Internal Orientation of Service Strategy.

Unit – IV

Delivering Quality Services, Causes of Service-Quality Gaps: The Customer Expectations versus Perceived Service Gap, Factors and Techniques to Resolve this Gaps in Service. Quality Standards, Factors and Solutions, The Service Performance Gap Key Factors and Strategies for Closing the Gap. Developing Appropriate and Effective Communication about Service Quality. Measuring Customer Satisfaction, Customer Feedback.

Unit – V

Marketing of Services with special reference to Financial Services, Health Services, Hospitality Services including Travel, Hotels and Tourism, Professional Services, Public Utility Services, Communication Services, Educational Services.

Course Outcomes: The Student is able to
CO1 : Analyse the basic concepts of services marketing.
CO2 : Understand customer needs and expectations.
CO3 : Develop market segmentation process in services marketing.
CO4 : Discuss the pricing strategies of services marketing.
CO5 : Importance of marketing communication in services promotion.

References:

1. Zeithaml, Bitner, Gremler, Pandit. Services Marketing. 2018, McGraw Hill
2. Jauhari, Dutta. Services Marketing. OUP

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412 – Industrial Marketing

Objectives:
1. To help the learner distinguish between consumer marketing and industrial marketing
2. To learn to formulate industrial marketing strategies and to design industrial marketing mix elements

Unit – I

Introduction to Industrial Markets - Industrial Marketing System, Concepts and Characteristics. Types of Industrial Markets, Industrial Buyer Behaviour. Consumer Marketing Vs. Industrial Marketing.

Unit – II

Strategic Industrial Marketing - Marketing Information Systems and Marketing Research, B2B Commerce. Value, and Vendor Analysis.

Unit – III

Classification of Industrial Products and Services - New Product Development and Introduction, Industrial Product Management, Pricing Decisions in Industrial Markets.

Unit – IV

Formulating Channel Strategies and Physical Distribution decisions – Channel Management - Promotional Strategies for Industrial Goods/ Services. Personal Selling

Unit – V

Developing Marketing Strategies and Programs for Industrial Goods / Services. Formulating channel strategy , Channel Conflicts, Logistics. Pricing strategy, Promotional strategy, Industrial Advertising, Exhibitions, Brochures, Marketing in Social Media. Sales force automation.

Course Outcomes: The Student is able to
CO1 : Outline fundamentals of Industrial Marketing.
CO2 : Identify the general strategies for Industrial Marketing.
CO3 : Market industrial products using social media.

References:
1. Hawaldar, K. Krishna, INDUSTRIAL MARKETING, TATA McGraw-Hill Publishing Company Limited, New Delhi. 2008
2. Milind T. Phadtare, INDUSTRIAL MARKETING, Prentice Hall of India Pvt. Ltd, New delhi,2008
3. Michael D Hautt and Thomas W Speh, INDUSTRIAL MARKETING MANAGEMENT, The Dyden Press.

4. Peter M. Chisnall, STRATEGIC INDUSTRIAL MARKETING; Prentice-Hall International
5. Robert R. Reeder, Briety & Betty H. reeder, INDUSTRIAL MARKETING, Prentice Hall of India Pvt. Ltd, New delhi,2008

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413 – International Marketing

Objectives:
1. To gain knowledge of marketing management in the international scenario.
2. Appreciate the nuances of international marketing environment and develop marketing strategies for the dynamic global markets.

Unit – I

The international marketing environment, Political and legal systems, Multilateral and Geographical Groupings, International Marketing Environment, Cultural, political, Legal. Business Customs, Economic and Financial dimensions.

Unit – II

Understanding the global consumer market, Scope and challenges of international marketing, Assessing international market opportunities, Marketing Research. Export and Import Policies. Incentives for Exports. Trade Barriers.

Unit – III

International marketing management, Planning and organization, Market entry strategies, Export, joint ventures and direct investments.

Unit – IV

Global product management, standardization vs. Differentiation, Product planning and development, Marketing industrial products and services globally, Pricing for international markets.

Unit – V

Global logistics management, International distribution systems, Global advertising and promotional strategies, Sales management, Developing marketing strategies and programs for international markets. Export & Import Procedures, and Documentation.

Course Outcomes: The Student is able to
CO1 : gain a conceptual understanding of International Marketing.
CO2 : develop Marketing Strategies for Global markets.

References:
1. Cateora, Money, Gilly, Graham. International Marketing. McGraw Hill, 2019
2. Joshi. International Marketing, OUP

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414 – Retail Management

Objectives:
1. This course is designed to provide the learner a good understanding of the concepts, strategies,and trends associated with the retail operations.
2. To help the learner to explore the current retail environment, key retail management strategies ,and trends in retailing.

Unit – I

An overview of Retailing - Types of stores, Product Retailing vs. Service Retailing, Non store Retailing, Retail strategy, Achieving competitive advantage and positioning Retailing environment, Legal, Social, Economic, Technological issues. Trends in the Indian Retailing Industry.

Unit – II

Retail store location and layout - Country/Region analysis, Trade area analysis, Site evaluation and selection, Store design and layout, Comprehensive store planning, Exterior design and layout, Interior store design and layout, Interior design elements.

Unit – III

Planning merchandise needs and merchandise budgets - Methods for determining inventory evaluation, Assortment planning, buying and vendor relations. Merchandise pricing – Price strategies, Psychological pricing, Mark-up and markdown strategies.

Unit – IV

Communicating with the retail customer - Retail promotion mix, Advertising, Sales promotion, Publicity, Retail selling process, Retail database, In-store customer service. Customer Experience Management.

Unit – V

Globalization and changing retail formats – Online retailing, International Retailing, Impact of Global Brands. Opportunities and Challenges - Market entry formulas, New customized formats, customized stores, portable stores, merchandise depots, retail theatre, service malls, customer-made stores, interactive kiosk 'shopping arcades. Franchising. Ethics

Course Outcomes: The Student is able to

CO1 : Outline fundamentals of Retailing.
CO2 : Formulate location and layout strategies of retailing.
CO3 : Analyse various pricing strategies.
CO4 : Design and develop franchising models.

References:

1. Prashant Chaudhary. Retail Marketing in the Modern Age. SAGE
2. Sinha, Uniyal. Managing Retailing, OUP
3. Bajaj, Tuli, Srivastava. Retail Management, OUP

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415 – Supply Chain Management

Objectives:
1. Acquaint the students with supply chain management system elements, structure, organisation and process.
2. To understand the role of supply chain and logistics in corporate strategy.

Unit – I

Physical distribution: Participation in the physical distribution functions, The environment of physical distribution, Channel design strategies and structures, selecting channel members, Setting distribution objectives and tasks. Target markets and channel design strategies.

Unit – II

Managing the marketing channel - Product, Pricing and Promotion issues in channel Management and Physical Distribution. Motivating channel members, Evaluating channel member performance, Vertical marketing systems, Retail co-operatives, Franchise systems and corporate marketing systems.

Unit – III

Supply Chain: Building Blocks of a Supply Chain Network. Performance Measures in Supply Chain World, Models for Supply Chain Decision Making.

Unit – IV

Supply Chain Inventory Management: Economic Order Quantity Models, Recorder Point Models, Multichannel Inventory systems, Supply chain Facilities Layout, Capacity Planning, Inventory optimization, Dynamic Routing and Scheduling.

Unit – V

Relation to ERP: E-procurement, E-Logistics, Internet Auctions, E-markets, Electronic Business Process, Optimization SCM. Managing International Supply Chain.

Course Outcomes: The Student is able to
CO1 : Get knowledge regarding basic concepts of Distribution and Supply Chain.
CO2 :Analyse different logistics strategies to get competitive advantage.
CO3: Assess the profitability by measuring the logistics performance and maintaining supply chain relationships.

References:
1. Sunil Chopra, Meindl & Kalra. SUPPLY CHAIN MANAGEMENT, Pearson
2. Harvard Business Review. Managing Supply Chains. HBR Press
3. Baisya. Integrated Supply Chain and Logistics Management. SAGE
4. Prashant Chaudhary. Retail Marketing in the Modern Age. SAGE

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

416 – Sales Management

Objectives:
1. To understand and apply concepts and techniques of Personal Selling and Sales Management.
2. To understand and apply the dynamics of channel management and sales force management.

Unit – I

Selling and Marketing concept – theories of selling. Classification of sales people – Characteristics of sales people. Personal selling - Selling Process. Prospecting: Steps – Pre approach: Objectives, Sources – The Approach: objectives, methods. The presentation: strategies, developing, situational selling. Handling objections: Attitude, strategy, Methods, Types of objections, Specific situations. Closing – tactics, methods, follow up.

Unit – II

Sales organization: Types sales potential – Determining the sales force profile. Product market analysis – Determining the sales force size. Territory management: Accounts and sales potential salesperson workload, designing territories, reasons and procedures and assigning to sales persons, routing, time management.

Unit – III

Sales force management: Recruitment and Selection: Job analysis, Manpower Planning, Job specification and Job description, sources of sales recruits, Problems in screening and selecting the applicants. Sales targets: Quantitative & Qualitative methods. Planning sales force training methods, content, execution, training the dealer salespersons and evaluating the training programmes. Leadership and supervision. Compensation: Objectives, remuneration methods, incentives. Motivating the sales force – Sales meetings and Sales Contests.

Unit – IV

Evaluation and control: Performance Appraisal, Sales budget, Sales Quotas, Systems approach, Sales Management audit. Sales analysis: sales related, cost related, activity related. Determinants of sales person performance. Financial, and Non-Financial Rewards.

Unit – V

Distribution Objective/Strategy - Interface between Sales force and Channel, Channel Design, Implementing Channel Design, Managing the Channel Members, Channel Power and Conflict. Channel Evaluation; Distribution planning, costs and control. Functions of intermediaries (wholesaler & retailers), Selection and motivation of intermediaries, Need, criterion and establishing objectives for intermediaries; Control issues- Major cost centres in distribution, establishing standards for control, Controlling channel members and tools for control

Course Outcomes: The Student is able to

CO1 : Devise personal selling and sales management strategies.
CO2 : Select appropriate channels for sales management.
CO3 : Implement sales force techniques and reward management.

References:

1. Pradip Mallik, Sales Management. OUP
2. Panda, Sahadev. Sales and Distribution Management. OUP
3. Hutt, Sharma, Speh. B2B Marketing: A South Asian Perspective. Cengage.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

421 – International Financial Management

Objectives:
1. To have exposure on International aspects of Financial Management
2. To understand the Foreign Exchange Management
3. To introduce derivatives aspect of International Finance

Unit – I

Introduction to International Financial management: Domestic vs international finance, International financial market integration, currency crisis, and global recession and risk spill over.

Unit – II

Balance of Payments - Structure - Contents of Current, Capital, and Reserve Accounts. Linkages and Impact on Exchange Rates, Capital Markets & Economy. Understanding BOP structure of a country for Investment and Raising Finance. Foreign Currency – Options, Futures, Forwards, Swaps.

Unit – III

Foreign Exchange Markets: Nature, Functions, Transactions, Participants, Forex Markets in India, Forex dealing, Foreign exchange regimes, Foreign exchange rate determination, factors affecting foreign exchange and Foreign Exchange Rate Mathematics. Foreign Exchange Exposure: Risk, Measurement and Management. Global Firms Foreign exchange exposure - Transaction, economic, and translation exposures, potential currency exposure impact on global firms and investor performance. Foreign exchange risk management strategies through Forward contracts, future contracts, money market hedges, and options contracts.

Unit – IV

Fundamental Parity Relationships and Exchange Rate Forecasting– Purchasing Power Parity, Covered and Uncovered Interest Rate Parity, International Fisher's Effect, Forward Rate Parity. Influence of these parity relationships on Exchange Rates. Methods of Forecasting foreign exchange rates and foreign exchange volatility.

Unit – V

International Capital Markets - Sources of International Finance, Debt and Equity Markets, International Equity Diversification. Short-term Vs Long-term Finance. Export Import Finance. ADRs, GDRs, IDRs - benefits and costs of holdings for investors, benefits and costs of issuance for corporations. International Capital Structure – Parent Vs Subsidiary Norms. Global Capital Structure –Factors affecting the choice of markets and structure. International Cost of Capital – Calculation, Cost of Foreign Debt, Cost of Foreign Equity, Use of International CAPM. RBI Guidelines.

Course Outcomes: The Student is able to

CO1 : Evaluate the functioning of international financial system and monetary system .
CO2 : Analyse the international financial markets and the various international financial instruments .
CO3 : Discuss the advantages of foreign exchange market .
CO4 : Identify and evaluate foreign direct investments .
CO5 : Design strategies to deal with international tax environment .

References:

1. Bekaerk, Hodrick. International Financial Management, Prentice Hall.
2. Rajiv Srivastava. International Finance. OUP
3. Thummuluri Siddhaiah. International Financial Management. Pearson
4. Eun, Resnick. International Financial Management. McGraw Hill

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

422 – Financial Derivatives

Objectives:
1) To know the basic concepts of Derivatives and Derivative markets.
2) To understand the Valuation Models and Trading Strategies.
3) To apply the Derivative products for effective Financial Risk Management.

Unit – I

Introduction: Futures and Options Market in India – Futures, Forwards, Options, Margins, Types of Orders. Tax Treatment of Gains and Losses. Arbitrage, Hedging, Speculation. Pricing, Usage, Valuation.

Unit – II

Futures: Markets, Basis Risk, Cross Hedging, Optimal Hedge Ratio, Liquidity and Other Risks, Index Futures. Interest rates – Types of rates, Zero rates, Bond Pricing, Duration. Term structure. Interest Rate Futures: Quotation, Pricing, Usage.

Unit – III

Swaps: Quotation, Pricing, and Usage. Interest rate swaps. Foreign currency swaps. Credit risk, valuation of swap contracts.

Unit – IV

Trading Strategies with Options and Futures – Spreads, Straddles, strangles, Butterflies, Others. Put Call Parity.

Unit – V

Options – Option Basics, Option Pricing Bounds, Binomial Option Pricing Models, Risk Neutral Valuation, Delta Hedging, Modelling Stochastic Processes, Ito Processes, Ito's Lemma, Black Scholes, Value at Risk, Option Greeks and Implied Volatilities, Exotic Options, Credit Derivatives.

Course Outcomes: The Student is able to
CO1 : Appraise the role and importance of derivatives.
CO2 : Analyzing the forward and future contracts and their pricing.
CO3 : Mitigating the risk of financial institutions by using Swaps.
CO4 : Develop trading strategies using options and futures.

References:

1. John C. Hull, Sankarshan Basu: Options, Futures and Other Derivatives.
2. Rajiv Srivastava. Derivatives and Risk Management. OUP
3. Chance, Brooks, Dhamija. An introduction to derivatives and Risk Management. Cengage

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

423 – Risk Management and Insurance

Objectives:
1. To introduce the concept of risk management and insurance
2. To familiarize the conceptual frame work of risk management and insurance decisions

Unit – I

Risk: Definitions, Types of Risk, Risk Management Process and Methods. Objectives of Risk Management, Risk Pooling and Insurance, Probability Concepts. Role of IRDA. Growth and Scope for Insurance Industry. Principles and Legal aspects of Insurance.

Unit – II

Institutions for Insurance and Reinsurance - Economic Rationale and requirements, Insurance Laws and Regulation, Insurance Pricing, Asymmetric Information / Moral Hazard / Adverse Selection, Deductibles/ Co-insurance. Risk Identification, Perception of Risk, Threat Analysis, Event Analysis, Statistical Methods of Risk Evaluation, Value at Risk. Risk Management Methods.

Unit – III

Risk reduction: Pooling – Risk reduction through pooling. Independent losses – Pooling arrangements with correlated losses. Insurers as managers of risk pooling arrangements. Risk diversification. Hedging with options, Forwards / futures. Comparison of derivative and insurance contracts.

Unit – IV

Life Insurance – Features, LIC of India, Products, Calculation of Premiums, Surrender Value, Mathematics of life Insurance, Mortality Tables, Risk premium, interest table, Premium Calculations - Factors determining premium, Extra premium, Actuarial aspects, Term assurance, annuities. Group insurance, Non-Life Insurance – Fire insurance – Standard fire policy, Marine, Cargo and Hull Insurance. Types – Auto Insurance, Home Insurance, Worker Compensation / ESIC, Health Insurance. Commercial Insurance - Transport, Marine, Catastrophe, Liability etc. Claims Settlement.

Unit – V

Pension Plans. Corporates Risk Management and Insurance, Actuarial Mathematics. Captive Insurance. Reinsurance. Impact of Technology on Insurance Industry.

Course Outcomes: The Student is able to
CO1 : understand the concept of risk management and various types of risk.
CO2 : select insurance products based on risks and legal aspects.
CO3 : devise insurance products based on needs and legal frameworks.

References:

1. John C. Hull. Risk Management and Financial Institutions. Wiley 2018
2. Scott E. Harrington and Gregory R. Niehaus. Risk Management and Insurance. McGraw Hill 2017

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

424 - Management Control Systems

Objectives:
1. The main aim of the course is to appraise the students about the concept of Management Control Systems.
2. To offer knowledge of responsibility centers.

Unit – I

Fundamentals of Management Control: Nature of Management Control Systems, Basic concepts, Boundaries of Management Control, Impact of the Internet on Management Control, Management control environment, Goal congruence, Informal factors that influence goal congruence. Formal control systems- types of organizations, Functions of the controller.

Unit – II

Performance measurement – Difficulties in implementing performance measurement systems, interactive control. Strategic Planning and Management Control.

Unit – III

Responsibility centres – Revenue centres, Expenses centres, Administrative and support centres, Research and Development centres, Marketing centres, Profit centres, General considerations. Business units as profit centres – Other profit centres, Measuring profitability. Transfer pricing – Objectives of transfer prices, Transfer pricing methods. Pricing corporate services. Administration of transfer prices.

Unit – IV

Management control process – Strategic planning, Nature of strategic planning, Analysing proposed new programs, Analysing ongoing programs. strategic planning process – Understanding strategies, Concept of strategies, Corporate level strategies, Business unit strategies. Budget preparation – Nature of a budget, Other budgets, Budget preparation process.

Unit – V

Service organizations – Service organizations in general, professional service organizations, Financial service organizations, Health care organizations, Non-profit organizations. Multinational organizations, Cultural differences.

Course Outcomes: The Student is able to
CO1 : comprehend the basic concepts in designing effective Management Control Systems..
CO2 : apply these concepts in Budgeting and Responsibility Centre Accounting.
CO3: understand the concepts related to Transfer Pricing

Reference:

Robert N Anthony and Vijay Govindarajan, Management Control Systems, McGraw-Hill 2017

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

425 - Managing Fintechs (Online)

Objectives:
1. To learn about the major areas in FinTech, Digital Finance and Alternative Finance.
2. To know about major technological trends, including cryptocurrencies, AI and Big Data.
3. To understand FinTech Regulation, RegTech and technological innovation in Finance.

Unit – I

FinTech: Introduction, Transformation. FinTech Evolution: Infrastructure, Banks Startups and Emerging Markets. Collaboration between Financial Institutions and Startups. FinTech Typology. Emerging Economics: Opportunities and Challenges. From too-Small-To-Care to Too-Big-To-Fail. Introduction to Regulation Industry - The Future of RegTech and other Technologies Impacting it.

Unit – II

Payments, Crypto currencies and Blockchain – Introduction, Individual Payments, Digital Financial Services, Mobile Money. Regulation of Mobile Money – SFMS, RTGS, NEFT, NDS Systems, Crypto currencies. Legal and Regulatory Implications of Crypto currencies. Blockchain. The Benefits from New Payment Stacks.

Unit – III

Digital Finance and Alternative Finance – Introduction, Brief History of Financial Innovation. Digitization of Financial Services. FinTech & Funds, Crowd funding, Charity and Equity, P2P and Marketplace Lending, New Models and New Products, ICO.

Unit – IV

FinTech Regulation and RegTech. Introduction - FinTech Regulations Evolution of RegTech. RegTech Ecosystem: Financial Institutions – RegTech Ecosystem Ensuring Compliance from the Start: Suitability and Funds – RegTech Startups: Challenges –RegTech Ecosystem: Regulators Industry – Use

Unit – V

Data & Tech – Introduction, History of Data Regulation, Data in Financial Services, Application of Data Analytics in Finance - Methods of Data Protection: GDPR Compliance and Personal Privacy. AI Transforming the Future of FinTech – Digital Identity. Change in mindset: Regulation 1.0 to 2.0 (KYC to KYD). AI & Governance – New Challenges of AI and Machine Learning - Challenges of Data

Course Outcomes: The Student is able to
CO1 : comprehend the concepts underlying the Digital models supporting the Fintech Innovation, the Security issues involved and the Regulation of Fintech.

CO2 : apply these concepts in developing the Fintech products that would meet the Customer expectations.

Reference:

Sanjay Phadke. Fintech Future. SAGE

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

426 – Financial Engineering

Objectives:
1. To introduce the concept of Financial Engineering and its evolution
2. To acquaint the students with the conceptual tools of Financial Engineering
3. To make the student understand the physical tools of Financial Engineering, its processes and strategies.
4. To appraise the students with the recent developments and future trends in Financial Engineering

Unit – I

Meaning and Scope of Financial Engineering, Tools of Financial Engineering, Factors contributing to the Growth of Financial Engineering. Cash Instruments – T-Bills, Bonds, Repo & Reverse Repo Rates, Key Rates,

Unit – II

Return and Risk – Measurement, Interest Rates, Exchange Rates, Inflation. Yield Curve Construction. Generic Discount Factors. Interest Rate Risk, Swaps, Swap Valuation, Swap Spreads, Duration based Hedging. Market Risk, Credit Risk, Operational Risk, Liquidity Risk, Systemic Risk.

Unit – III

Asset - Liability Management, Hedging, Arbitrage. Synthetic Instruments. Dynamic Portfolio Allocation, Portfolio allocation with volatility targets. VaR and CVaR.

Unit – IV

Product Development: Futures, Forwards, and Options. Fixed Income Securities, Equity, Differential voting rights, Hybrid securities. GARCH.

Unit – V

Teaser loans, Credit default swaps, Collateralised mortgage obligations, Syndication, Securitisation, Enhancing credit ratings. Tax driven deals, Treaty shopping.

Course Outcomes: The Student is able to
CO1 : comprehend the concepts of Financial Engineering and Derivative products.
CO2 : apply these concepts to identify the right derivative products for solving Finance problems.
CO3 : gain a working knowledge of Asset-Liability Management and Innovative Financial Products.

Reference:

Marshall, Bansal. Financial Engineering. Pearson.

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

431 - Strategic Human Resource Development

Objectives:
1. This course is designed to provide a comprehensive understanding of the concepts, strategies,and trends associated with HRD.
2. It aims to educate the students regarding HRD functions, HRD programmes, Career Development and Employee Socialisation.

Unit – I

Introduction: The changing economic, business, technological, socio-cultural and political environment and its implications for managing organisations and human resources; Business and organizational restructuring and its implications for human resource management; Corporate strategy and human resource management; The HRM and approaches to HRM; HRM in personnel management; work organisation and systems; social organisation of the work place and its strategic importance; Human resource policies; Integrating HR Strategies with corporate strategies; Human Resource Management as an approach to organisation design and the role of HRM in organisation management;

Unit – II

Human Resource Management in other countries; Human Resource Planning and its linkage to corporate planning; HR planning process, techniques/methods; HR planning in an on-going organisation; integrating HR plans with other plans and management functions; Future directions of HR planning; Developing HR information system

Unit – III

Managing Human Resources Inflow-Resourcing plans; Recruitment and selection strategies; alternative to recruitment; selection methods and techniques; role of consultants and assessment centres in recruitment and selection and retention policies. Developing Human Resources - Concept of HRD; HRD as a strategic approach to employee performance: HRD and TQM; HRD experience in different industries; corporate training and development strategies.

Unit – IV

Performance management - Concept, Philosophy, process. performance appraisal: team performance management and evaluation, Counselling, Coaching. Compensation and Rewards management - Reward strategies and philosophy; HRM approach to rewards management

Unit – V

Strategic management of employee relations -HRM approach to employee relations: HRM values and employee relations, change management, HRM and culture management, employees' involvement and participation in decision making and management of organization, negotiating employee relations, HRM and trade unions.

Course Outcomes: The Student is able to

CO1 : Analyze the fundamental concepts of HRM and functions of HRD.
CO2 : Develop sub-systems of HRD.
CO3 : Apply training and development practices.
CO4 : Identify the issues in employee counseling and wellness.

References:

1. Tanuja Agarwala. Strategic Human Resource Management, OUP
2. Gary Rees. Strategic Human Resource Management. SAGE

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

432 – Reward Management

Objectives:
1. To understand the various dimensions of Compensation Management
2. To know how the compensation options are determined
3. To gain awareness of the role of various bodies involved in Compensation Management

Unit – I

Reward system – compensation & non compensation dimension, system for non-Compensation. Job analysis – Planning a Job analysis program, Collection and description of job data, designing of custom-made job analysis questionnaire, Guidelines for conducting a job analysis interview. Concept of Equity, Gender Equity.

Unit – II

Job Description – Broad, generic job (class descriptions versus Narrow, specific job (Position) descriptions, A job contract, Planning, operations and control, elements of the job description, Job summary, other ways of describing job facts of evaluation, Job requirements and pay, whole job ranking, position classification, Predetermined grading Approach, market pricing approach, a maturity curve method, Development and use of compensable factors.

Unit – III

Pay structure architecture, Determining pay policy line, the need for more than one pay structure, displaying job data, identifying lowest and highest rate of pay, developing pay grades, single rate pay grade, two tire wage plan, multiple point pay structure, range or spread dimension, pay grade width, determining pay grade minimum and maximum rates of pay, internal design consideration, spread of range and steps, pay grade overlap, broad banding.

Unit – IV

Short term incentives – Premium and differentials, pay for unit produced, individual based bonus and rewards, organization wide short term incentives, Scanlon plan, lincon's incentive system. Productivity Gain Sharing Schemes.

Unit – V

Long term incentives – Designing a long term incentive and deferred compensation plan, Qualified deferred compensation arrangement, Social security, retirement plan, pension plans, profit sharing plan, stock bonus plan, ESOP, employer benefits and employer costs for ESOP, Individual retirement account, Savings incentive match plan for employees.

Course Outcomes: The Student is able to
CO1 : Contrast different types of incentive plans and determine plan suitable to organization.
CO2 : Implement different types of employee benefits.
CO3 : Design different methods of wage determination applicable to different cadres of employees.
CO4 : Evaluate the mechanism of wage boards and its role in fixation of wage

References:

1. Tapomoy Deb. Compensation Management Text and Cases. Excel 2008
2. Dipak Kumar Bhattacharyya. Compensation Management. OUP
3. Sharma. Compensation Management. SAGE

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
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433 – Labour Legislations

Objectives:
1. This course is aimed at developing an understanding of the interaction pattern among labour, management and the State.
2. To impart basic knowledge of the Indian Labour Laws and their distinctive features.
3. To impart knowledge of the various enactments with focus on practice.

Unit – I

Introduction to Labour Legislation: Social legislation and Labour Legislation, Forces influencing Labour Legislation in India, Principals of modern Labour Legislation, types of Labour Legislation. International Labour Organisation: Preamble to the constitution, Organisation structure, Major Activities of ILO, International standards of Labour and their influence on Indian Labour Legislation

Unit – II

The Factories Act, 1948: objective, coverage, welfare measures, administrative machinery, Industrial Employment (standing order) Act, 1946: Objective, Coverage, Benefits and main provisions of the act. Trade Union Act, 1926: Objective, Registration Process and miscellaneous provisions Industrial Disputes Act, 1947: Objective, Coverage, Benefits, strikes and lockout, Conciliation Officers, Board, Court of enquiry, Labour Court, tribunals, National tribunals, Amendments

Unit – III

Collective Bargaining: Importance, Levels, Collective agreements, Hurdles to Collective Bargaining in India. The Workmen's Compensation Act, 1923: Objective, Coverage, Benefits, Main provisions. Employee's State Insurance Act, 1948: objective, scope, coverage, benefits, The role of ESI Corporation and ESI Hospitals, critical appraisal of the Act

Unit – IV

The Employee's Provident Fund and Miscellaneous Provision Act, 1952: objective, coverage, employers' obligations, benefits, penalties, critical appraisal of the Act. The Payment of Gratuity Act, 1972: Objective, Coverage, Employers' obligations, benefits, critical appraisal of the Act. The Maternity Benefit Act, 1961, Child Labour (Prohibition and Regulation Act, 1986).

Unit – V

Contract Labour (Regulation and Abolition Act, 1986). Designing Social Security Programmes. Labour Codes. Counselling & Education Programmes. Social Contract.

Course Outcomes: The Student is able to
CO1 : comprehend the Employee Legislation concerning Employee Payments, Collective Bargaining, Workmen Compensation and Welfare.
CO2 : apply these concepts in the HR management by ensuring all the Legislative provisions are complied with.

References:

1. A.M. Sarma. Industrial Relations. Himalaya Publishing House.
2. Daniel Albuquerque. Legal Aspects of Business. OUP

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(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

434 – Management of Change

Objectives:
1. To understand the forces that stimulate the change, necessity and resistance to it.
2. To manage the change process with the understanding of OD skills.

Unit – I

Change – Concept, Forms, Need, and Problems of Change. Stimulating forces – Planned change, Methods, Techniques. change agents, unplanned change, Model of organisational change, Lewin's three Step Model.

Unit – II

Resistance to change – individual factors, organisational factors, techniques to overcome resistance to change.

Unit – III

Change programs – effectiveness of change programs, change process, job redesign, socio-technical systems. Consultation Process, Controlling, and Regulation of Change. Social and Ethical Challenges in Organisational Change.

Unit – IV

OD – basic values, phases of OD, entry, contracting, diagnosis, feedback, change plan, intervention, evaluation, termination.

Unit – V

OD intervention – human process interventions, structure and technological interventions. Preparing Organisation for Change, Assessing Readiness for Change. Strategy interventions – sensitivity training, survey feedback, process consultation, team building, inter-group development, innovations, learning organizations.

Course Outcomes: The Student is able to
CO1 : understand the need for change and prepare the organization for change.
CO2 : implement various OD interventions for change.

References:
1. Ratan Raina. Change Management and Organizational Development
2. HBR's 10 Must Reads on Change Management, HBR

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

435 – Stress Management

Objectives:
1. To understand the concept of stress and its impact on mental and physical wellbeing.
2. To understand the importance of using effective coping skills to resolve stress.

Unit – I

Stress: Meaning, discovery of stress, General Adaptation. Syndrome, inevitability of stress. Classification of stressors, Physical and emotional stressors – Impact in the human being, bodily changes, the nervous mechanism and hormones release. Sources of Stress. Nature of stress- Constructs and Problems.

Unit – II

Stress in colleges – Students challenges, opportunities, coping, life script formation, Myths, Assumptions of Stress Management. Stress severity, rating of stressors, and assessment of individual stress, Short term, and long term effects. Behaviour disorders – medical disorders, emotional disorders, cognitive disorders. Personality and stress, type A, B, C and E personalities.

Unit – III

Stress in occupation, stress and job performance, Managerial activities and Executive stress. stress and management change, Decision making under stress, Burnout, Coping with Resources and Processes, Assertiveness Training

Unit – IV

Managing stress – coping responses, Relaxation techniques, Breathing techniques, Mediation, Muscular Relaxation, Bio feedback system, Visualization and imagery, Self Talk, Positive self-control, Sleep Management, Exercise and body tune up, Aerobic exercise, Benefit of exercise.

Unit – V

Stress and Motivation, Verbal and Non-verbal indicators of stress, assessment of stress. Assertive Management – Time Management, Professional counselling, Development of B behavior and hardiness, Social Networking, Organizational coping strategies, Healthy mind and life activity, Spiritual outlook and wellness.

Course Outcomes: The Student is able to
CO1 : comprehend the concepts of Stress, Stress Management and Stress Relieving Techniques.
CO2 : apply these concepts in building Assertive Management, Social Networking and improving the Mental and Spiritual Health of the Employees.

Reference:
Jerrold S. Green Berg: Comprehensive Stress Management. McGraw Hill

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

436 – Global Human Resource Management

Objectives:
1. This course is designed to provide a comprehensive understanding of the concepts and strategies associated with Global HRM, its Social and Cultural context.
2. Aims to educate about the International HRM functions and Industrial Relations.

Unit – I

Human and Cultural Variables in Global Organisations, Cross-cultural differences and managerial implications. Cross Cultural Research Methodologies and Hofstede Hermes Study. Structure in International Firms. Global Issues and Challenges.

Unit – II

Structural Evolution of Global Organisations -- Cross cultural leadership and decision making, Cross-cultural communication and negotiation. Managing across Cultures. Religious and Economic Implications.

Unit – III

Human Resource Management in Global Organisations – Recruitment, Selection, Training, and Development. Career and Family Balancing Issues.

Unit – IV

Compensation and Appraisal in Global Perspective. International Industrial Relations.

Unit – V

MNCs and Compensation System across Countries. People Management in USA, Asia, Europe, and Africa. Trends, and Future Challenges. Diversity – Norms, Benefits, and Challenges.

Course Outcomes: The Student is able to
CO1 : Identify the challenges of global HRM and the strategic role of Global HRM.
CO2 : Analyze the cross-cultural management problems and the necessary skill building methods.
CO3 : Develop the global labour relations and international standards in organizations.

Reference:
Anne-Wil Harzing, International Human Resource Management. SAGE

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

441 – Enterprise Resource Planning

Objectives:
1. This course is designed to provide a comprehensive understanding of the concepts associated with ERP Modules, Applications and Implementation.
2. To learn post implementation issues and maintenance of ERP.

Unit – I

Introduction – Overview, Need, Advantages, and Growth of ERP. Evolution - Risks and benefits, planning design and implementation of cross functional integrated ERP systems. Management Information System (MIS), Decision Support Systems (DSS), Executive Support Systems (ESS), Data Warehousing, Data Mining, Online Analytical Processing (OLTP), Supply Chain Management (SCM), Customer Relationship Management (CRM). ERP in Small and Medium Firms.

Unit – II

ERP Solutions and functional units - Overview of ERP software solutions. Small, medium, and large enterprise vendor solutions. Business Engineering and best Business practices - Business Process Management. Overview of ERP UNITs – Sales, Marketing, Accounting, Finance, Materials and Production management etc.

Unit – III

ERP Implementation life cycle - ERP implementation strategies, Risks. People issues, technology risk, process risk, operation and maintenance risks, and managing such risks in ERP. Projects - Planning Evaluation and selection of ERP Systems. Implementation life cycle - Evaluation and selection of ERP Package, Project planning, Implementation team training and testing, End user training & Going Live. Post Evaluation & Maintenance- ERP implementation, Methodology and Frame work. Training & Data Migration. Consultants, Vendors and Employees. Role of BPR in ERP

Unit – IV

Post implementation – Maintenance of ERP, Organizational and Industrial impact, Success and Failure. Factors of ERP Implementation.

Unit – V

Emerging trends on ERP - ERP II, ERP and Internet, Extended ERP systems and ERP, bolt – on -CRM, SCM, Business analytics etc. Security & Privacy issues. Future trends in ERP systems, web enabled, Wireless technologies. Case studies.

Course Outcomes: The Student is able to
CO1 : Make basic use of Enterprise software, and its role in integrating business functions
CO2 : Analyse the strategic options for ERP identification and adoption.

CO3 : Design the ERP implementation strategies.
CO4 : Create reengineered business processes for successful ERP implementation.

Reference:
Leon. Enterprise Resource Planning. McGraw Hill

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

442 – Decision Support Systems

Objectives:
1. To acquaint with the information needs and decision process for effective decisions.
2. To introduce the basic concepts in Decision Support Systems, illustrating, how they facilitate efficient executive decision making.

Unit – I

Introduction – Decision concept, Steps, Decision Support System, Components, Characteristics, Classifications and Applications.

Unit – II

Model Management – Model, Modeling Process, Types of Models, Optimization, Simulation. Heuristic – Descriptive, Predictive. Model Base – Modeling Languages, Model Directory, Model Base Management System, Model Execution, Integration and Command Processing, Model Packages.

Unit – III

Data Management System – Data Base, Sources of Data, Data Directory, Data Structure and Data Base Languages, Query Facility, Data Management System, DBMS as DSS Development Tool.

Unit – IV

Dialog Management – User Interface, Graphics, Multimedia, Visual Interactive Modelling. Natural language processing – Speech Recognition and Understanding, Issues in User interface.

Unit – V

Development of Decision Support Systems – Development Process, Software and Hardware, Data Acquisition, Model Acquisition, Dialog development, Integration, Testing and Validation, Training and Implementation.

Course Outcomes: The Student is able to
CO1 : Define the role of information systems in DSSs.
CO2 : Design and formulate management problems using DSS models.
CO3 : Apply linear and integer programming techniques for scheduling and optimization.

Reference:
Turban, E., Delen, E. and Sharda, R., Decision Support and Business Intelligence Systems, Pearson

NOTE TO THE PAPER SETTER:

(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

443 - AI Applications in Business (Online)

Objectives:
1. The course exposes the students to the various business applications of artificial intelligence and how it can be used to address business related problems.
2. To update them with the latest AI use cases.

Unit – I

Introduction - Management Support Systems, Decision making Models, TPS, MIS, DSS, ESS Overview, Data Model. Tacit, Explicit Knowledge, Knowledge Management system.

Unit – II

Data and Model Management Systems – Data knowledge, Data Collection, Data Warehousing, Data Mining, Data visualization, Modelling, Static and dynamic, Optimization, Heuristic, Simulation, Multidimensional modelling OLAP.

Unit – III

Evolution of ERP II - Evolution MRP, MRP II, ERP, ERPII, SCM, Group Decision support system, Technologies, Enterprise DSS, ERP Knowledge management methods, Technologies, Tools.

Unit – IV

Knowledge Based Systems - Artificial Intelligence (AI), Expert System, Knowledge Acquisition and validation, Knowledge representation, Inference techniques.

Unit – V

Advanced Intelligent Systems - Neural Computing, Fuzzy Logic, Intelligent Agents in Client Server Architecture, Implementation, Integration, Intelligent DSS.

Course Outcomes: The Student is able to
CO1 : comprehend the various Business Applications of AI and use them appropriately to solve the business problems.
CO2 : gain a fairly in-depth understanding of Data and Model Management Systems, ERP II, Knowledge-based Systems and Advanced Intelligent Systems.

References:
1. Russell, Norvig. Artificial Intelligence. Pearson
2. Goel. Artificial Intelligence. Wiley

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units

of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

444 - Systems Control and Auditing

Objectives:
1. This course is designed to provide a comprehensive understanding of the concepts of Information Systems Auditing.
2. To learn Management Controls, Data Resource Management controls, Asset Safeguarding and Integrity issues.

Unit – I

Introduction to Information Security – Definition, Secrecy and Confidentiality, Accuracy, Integrity and Authenticity, Security Threats, Vulnerabilities. Threats and Countermeasures, Firewall, Planning and Administration, Log analysis, Logging states, When to look at the logs, Information Security Management.

Unit – II

Ethical Hacking of Computer network, system and application, Malicious Code, Mobile Code & Denial Of Service attack, Information Security Assessment Process – Network Stalking and Fingerprinting, Cracking the Shadow and Administrator, Privilege Escalation. Wireless Security and Review, RFID Hacking and Security Review, Spyware and Phishing.

Unit – III

Security Policy and Awareness – Security policy guidelines, Security awareness, People, Process and Technology. Physical Threats to the Information System, Information Infrastructure, Operating system fundamentals and security.

Unit – IV

Access Control Systems and Methodology – Access Control Overview, Identification and Authentication Techniques, Access Control Techniques, Access Control Methodologies and Implementation, Access Control Administration, Access Control Working Process. Attacks and Monitoring – Monitoring, Intrusion Detection, Penetration Testing, Methods of Attacks, Access Control Compensations, Security Testing Working Process.

Unit – V

Auditing and Monitoring – Auditing, Monitoring, Monitoring Tools and Techniques, Penetration Testing Techniques, Inappropriate Activities, Indistinct Threats and Countermeasures, IT Act, The Cyber Regulations Appellate. ISO 27000 – Impact of ISO 27000 on Information Security Management Systems.

Course Outcomes: The Student is able to
CO1 : gain a comprehensive understanding of Information Systems Audit.

CO2 : devise Management Controls, Data Resource Management Controls, Evidence collection and Asset Safeguarding.
CO3 : Implement Information Security Management Systems.

Reference:
Hoffer, George, Valacich. Modern Systems Analysis and Design. Pearson

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

445 – E-Business

Objectives:
1. Understand the factors for the growth of E – Business.
2. Learn about online promotion and CRM.

Unit – I

Introduction - Origin, need and factors affecting Electronic Business, Features of Electronic Business, Electronic business Framework, Internet as an Electronic business Enabler, Economic and social impacts of e-business.

Unit – II

Electronic Business Models: Value Proposition, Revenue Model, Market Opportunity, Competitive Environment, Competitive Advantage, Market Strategy, Organizational Development, Management Team. Electronic Data Interchange. Electronic Payment Systems (Cash, Check, Credit Card, Stored Value, Accumulating Balance), Working of Online Credit Card, Transaction Security.

Unit – III

Business Models: Business to consumer (B2C) Business Models, Types of B2C, Business to Business (B2B) Business Models, Types of B2B, Consumer to Consumer (C2C) Business Models, Types of C2C, Peer to Peer Business Models, M-commerce Business Models.

Unit – IV

Online Retailing: Segmentation of e-markets, marketing mix in internet marketing, online auctions. Online retail industry dynamics, Online mercantile model for customer perspective, Management Challenges in online retailing, electronic publishing. Online market research, Online marketing communications, Online advertising, Online branding, Online customer relationship, Online pricing strategies.

Unit – V

E-business: Search engine optimization, web research, web advertising, security of online transactions, cyber laws. Online banking implementation, changing dynamics in banking industry, Management issues in online banking, Introduction to Mobile commerce Challenges emerging in Mobile Commerce, Application areas of Mobile Commerce.

Course Outcomes: The Student is able to
CO1 : grasp the process and challenges of E-Business.
CO2 : select appropriate business models for different products.
CO3 : conduct online market research.

References:

1. Joseph. E-Commerce: An Indian Perspective. Prentice Hall
2. Laudon, Traver. E-Commerce, Business, Technology, Society. Pearson

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

446 – Software Project Management

Objectives:
1. This course intends to equip the students with the tools and techniques of Software Project Management.
2. Design and implement information system with effectiveness and efficiency.

Unit – I

Introduction to Software Project Management: Software as an Evolving product, characteristics and components of software products, Software engineering process: various models like linear, sequential, prototype, RAD, incremental, Spiral, Component, Assembly, Concurrent developmental and formal methods model, etc.

Unit – II

Planning a software project - Objectives, Effort, time, staffing and cost estimation. Make or - buy decisions. Software project scheduling: defining tasks, Activity Network, Gantt Charts, scheduling using PERT/CPM, PERT Charts, Project planning and Analysis.

Unit – III

Software Configuration and Design - Components of configuration, versions control and configuration audit. Software Design Process: Concepts, functional and object-oriented design, structured analysis, structured design, modular design, and design documentation.

Unit – IV

Software Testing: Objectives, Methods of testing, Mc Cabe's cyclomatic complexity metric, testing GUI's, testing Clients/Server architectures, testing real systems. Strategies for testing, Unit testing, Integration Testing, System testing and debugging.

Unit – V

Software implementation process and problems/issues: Emerging trends in Software Project Management, Case studies. Software quality assurance and standards, quality policy, quality controls, Software Risks, Reactive and Pro-active Risk Strategies, Risk Identification, Risk Projection, Risk Mitigation, Risk Monitoring and Management.

Course Outcomes: The Student is able to
CO1 : acquire the knowledge of the Tools and techniques used in Software Project Management.
CO2 : apply this knowledge in the effective Management of Software Project Management.

Reference:
Software Project Management - Bob Hughes & Mike Cotterell. McGraw Hill

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

451 – Social Entrepreneurship

Objectives:
1. To familiarize the students with the concept and overview of new trends in entrepreneurship with a view to enhance entrepreneurial talent.
2. The paper aims to create an understanding of the concept of Social Entrepreneurship.
3. It seeks to prepare the minds with skills, structures and process associated with Social Entrepreneurship and management of Social Enterprises.

Unit – I

Understanding Social Entrepreneurship and Organizational form – Defining Social Entrepreneurship, Difference between Social and Business Entrepreneurship, Evolution of Social Entrepreneurship in India, Process and Types of Social Entrepreneurship, Challenges, Strategies and future of social entrepreneurship.

Unit – II

Building blocks of social enterprise – Social enterprise as a business model, types of Business Models, Understanding the Pricing Models, Creating the Delivery Channels, Financing the social enterprise, Making social enterprise competitive, Communication strategies for social enterprises. Social Entrepreneurships and its Linkage with NGOs, Microfinance, etc., Role of ICT, SHGs, Case Studies.

Unit – III

New Directions for Social Entrepreneurship: Managing startup social enterprises, Measuring performance of social enterprises, Governance of Social Enterprises, Corporate Social Entrepreneurship, Contemporary Issues in Social Entrepreneurship, Case Studies.

Unit – IV

Understanding Women Entrepreneurship: Concept, Evaluation, Importance and functions of women entrepreneurship, Topologies and categories of women entrepreneurs, Entrepreneurial Process among Women Entrepreneurs, Financial Structure of Enterprises Owned by Women Entrepreneurs, Challenges of Women entrepreneurs.

Unit – V

Growth & Strategies: Women entrepreneurs in India and aboard, Government policy on Women Entrepreneurship, Organizations Promoting Women Entrepreneurs in India, Profile of Enterprise, Socio –Economic Origins, Motivating & Facilitating Factors of Women Entrepreneurs; Work-Home role Conflict, Entrepreneurial Performance, Problem & prospects. Case Studies.

Course Outcomes: The Student is able to

CO1 : to comprehend the Process of Social Entrepreneurship, the building blocks of Social Enterprise and Women Entrepreneurship.
CO2 : apply these ideas for promoting Social Entrepreneurs and also gain insights into the New directions for Social Entrepreneurship.

References:

1. Bornstein, Davis. Social Entrepreneurship. OUP
2. Bornstein. How to Change the World. OUP

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

452 – Negotiation

Objectives:
1. To enhance and improve the techniques of Negotiation.
2. To understand interpersonal disputes and necessary negotiation skills.

Unit – I

Conflict: Different thoughts on conflict, Constructive and Destructive Conflict, Conflict, Chaos and complexity theories, Systems approach to conflict Diagnosis. Managing, using, resolving conflict through negotiation. Personality: Facets of Personality and its impact on Negotiation, Approach and Temperament. Self- monitoring, competitiveness and type A and type B personality, Jungian personality preferences, Four main alternative Preferences and Temperaments. Mental Mechanisms: Major and Minor mental mechanisms

Unit – II

Negotiation: All Human Interaction is Negotiation, Negotiation and its components, Personal nature of Negotiation, Conscious and Unconscious determinants of Negotiation performance, Rules of Negotiation, Negotiation process and preparation, Team negotiation. Negotiation Style: Four major Negotiation Styles (Avoidance, Competitive, Compromising and Collaborative), choosing the appropriate style, Alternative styles, strategies and techniques of negotiation

Unit – III

Understanding the importance of perception, power, communication, leadership and public relations in negotiation. Principles of persuasion, Third party intervention. Distributive Bargaining: Classical distributive bargaining, Opening offers, Role of norms, Counteroffers.

Unit – IV

Integrative Bargaining: Integrative versus Distributive Bargaining, The Categorization Method, Interest based Bargaining. Gaining leverage through power and persuasion: leveraging power from your BATNA (Best Alternative To a Negotiated Agreement), leveraging the sources of power, leveraging power through persuasion, leverage power through pressure tactics.

Unit – V

Ethics, fairness, and trust in negotiation: Ethics - values and behaviours in negotiations, Fairness - substantive and procedural fairness in negotiation, appropriate or inappropriate negotiating tactics, Trust – bases and relationship in negotiating trust, trust and distrust, establishing trust. Closing the Deal and Post Negotiation. Evaluation – agreement template, closing stage, moving past statement and building a relationship.

Course Outcomes: The Student is able to
CO1 : acquire the conceptual knowledge about Conflicts, Negotiation, Integrative Bargaining and Ethical issues.
CO2 : apply this knowledge in organizational context for Conflict Resolution, Negotiation and Settlement of Disputes.

References:
1. Prashant Chaudhary. Selling and Negotiation Skills. SAGE
2. HBR's 10 Must Reads – On Negotiation. HBR Publications

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

453 - Design Thinking and Innovation

Objectives:
1. To transform creative thinking into design thinking in every stage of problem.
2. To apply design thinking to real-life problems / situations in order to evolve innovative and workable solutions

Unit – I

Innovation & Creativity: Meaning of Innovation and creativity. Difference between innovation and creativity, role in Industry and organizations, dynamics of creative thinking, Process of Design Thinking, implementing the process in driving innovation, design thinking skills to improve an existing product or design a new product.

Unit – II

Identification of customer needs, customer needs statements, user innovations. Develop user needs into product specifications, establish product metrics to define those specifications.

Unit – III

Applied Creativity - brainstorming, and concept generation process in designing needs solutions. Prototyping - prototyping methods, strategies, to represent customer needs and product specifications.

Unit – IV

Design for Services - Understand design of services, potential for innovations within them, application of product development frameworks to the service context. Product Architecture - modular and integral product architectures building blocks of a product.

Unit – V

Financial analysis, Business rationale. Design Thinking in Various Sectors (Health sector, Finance, Education, Infrastructure). Product Development Processes - staged, spiral, and agile, aligned to project needs.

Course Outcomes: The Student is able to
CO1 : use Creative Thinking and transform it into Design Thinking.
CO2 : apply innovatively to evolve solutions to practical problems.

Reference:
Devyani M. Lal, Design Thinking. SAGE

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five

questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

454 – Business Planning and Ethics

Objective:
To disseminate the knowledge regarding Business Plans and the relevance of Ethics while taking business decisions.

Unit – I

Business Plan – Meaning, The why of business plan, Basic parameters, Timing of decisions. Project parameters – the common considerations, Factors of successful business, capital management, financial control, anticipating change and adaptability.

Unit – II

Business plan process – sources of information, Internet, government sources and statistics. Offline research resources – library, SBDC's, Trade and Industries Associations. Sources of market research – evaluating data, benefits of market study, coverage of market study, information sources.

Unit – III

Business Plan components – The Executive Summary, company description, Industry analysis and trends, Target market, Competition, strategic position and risk assessment, Marketing plan and sales strategy, operations, Technology plan, management and organization

Unit – IV

Business ethics - Definition and importance, Benefits of business ethics, Emerging ethical issues in business, Ethics as a dimension of social responsibility.

Unit – V

The ethical decision-making process – understanding ethical decision making and corporate governance, Individual factors, organizational factors. Implementing and auditing ethics programs. Business ethics in global economy.

Course Outcomes: The Student is able to
CO1 : understand the concepts underlying the Business Plan and the Ethical issues related to it.
CO2 : apply this knowledge to develop Business Plans that are Ethically acceptable.

References:

1. Crane, Matten. Business Ethics. OUP
2. Andrew Ghillyer. Business Ethics Now. McGraw Hill
3. Cullen. Business, Ethics and Society. SAGE

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

455 - SaaS for Enterpreneurs

Objectives:
1. Acquaint with softwares necessary to run businesses.
2. Understand the issues related to developing, purchasing or leasing the softwares.

Unit – I

Web 2.0 and other consumer technologies, tools, techniques, Blogging, Wikis and social networks. Online business promotions and content going viral. Cost of online infrastructure, from web 2.0 to Enterprise 2.0.; SaaS – Software as a service

Unit – II

Uses of online software and services, loss of control, integration challenged, security and threats, SaaS Applications – Adoption, adaptability, features performance.

Unit – III

Evaluating the SaaS company, Hosting the data and SaaS applications, reliability of the vendor, customer service, protection of data, pricing options. Free vs Paid Software, virtual office, CRM, Support and Customer Service, Online service and Back-up, Online invoicing.

Unit – IV

SaaS to build market and measure online presence, web based apps, location based services, real-time web and information overload.

Unit – V

From Niche to growth, Niche matrix, Customer success predictability, corporate marketing vs demand generations, pipe line creation, early adaptors vs main stream buyers, customer lifetime value, employee ownership, functional ownership, financial ownership.

Course Outcomes: The Student is able to
CO1 : select required softwares for business.
CO2 : decide on whether to develop, buy or use by paying for the softwares needed.
CO3 : decide on hosting data on site or on-cloud.

Reference:
Sahil Parikh, The SAAS EDGE. McGraw Hill

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.

(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

456 – Statistics for Business Analytics (Online)

Objectives:
1. This course helps the students to understand and analyze statistical problems in a business framework.
2. They shall be exposed to fundamental statistical techniques to solve real life problems and enable them to take better decisions

Unit – I

Introduction: History, Subdivisions within Statistics, Data collection, Editing, Classification, Tabulation, Diagrammatic and Graphical representation of data.

Unit – II

Measures of Central tendency and Dispersion: Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Mean Deviation, Quartile Deviation, Standard Deviation, Skewness, Kurtosis and Moments.

Unit – III

Probability and Probability Distributions: Introduction to Probability, Probability Rules, Probabilities under Conditions of Statistical Independence, Probabilities under Conditions of Statistical Dependence, Revising Prior Estimates of Probabilities, Bayes' Theorem, Random Variables, Use of Expected Value in Decision Making, Binomial Distribution, Poisson Distribution, Normal Distribution.

Unit – IV

Sampling and Estimation: Random Sampling, Introduction to Sampling Distributions, Relationship Between Sample Size and Standard Error, Point Estimates, Interval Estimates, Confidence Intervals, Calculating Interval Estimates of the Mean from Large Samples.

Unit – V

Testing of Hypotheses: Hypothesis, Steps in Hypothesis Testing, Measuring the Power of a Hypothesis Test, Hypothesis Testing of Means and Proportions, Hypothesis Testing for Differences between Means and Proportions, Analysis of Variance, One way ANOVA and Two way ANOVA, Non-parametric tests: Chi-Square Test, The Sign Test for Paired Data, The Mann Whitney U Test, Kruskal-Wallis Test, The Kolmogorov-Smirnov test. Correlation, Regression and Time Series: Correlation, Product moment correlation, Rank correlation, Bi-variate correlation, Regression, Simple linear Regression, Line of best fit, Time Series, Trend Analysis, Cyclical Variation, Seasonal Variation, Irregular Variation, Time Series Analysis in Forecasting.

Course Outcomes: The Student is able to

CO1 : comprehend the basis concepts of Statistics and their applications in Business decisions.
CO2 : apply the Statistical concepts in arriving at the right Inferential decisions.

References:

1. Bowerman, O'Connell, Murphree. Business Statistics in Practice, using Data, Modelling and Analytics
2. Panneerselvam, Nagesh, Kumar. Business Statistics and Analytics. Cengage

NOTE TO THE PAPER SETTER:
(i) With regard to Part A of the question paper, ten questions shall be set covering all units of the syllabus with equal weightage (two questions from each unit), out of which five questions (one question from each unit) will be answered by the students.
(ii) For Part - B of the question paper, the CASE shall be not less than 500 words.

ANNEXURE – II

QUESTION PAPER STRUCTURE FOR MBA SEMESTER END – EXAMINATIONS

- **Each Course examination shall have a maximum of 70 Marks and the examination shall be of 3 Hrs duration.**
- **The question paper shall have two parts viz. Part- A and Part-B.**

PART-A (5X10=50 Marks)

Descriptive / Numerical Type questions, each question carries 10 Marks.
Answer **FIVE** questions (one question from each unit).

Unit – I

1.

(OR)

2.

Unit – II

3.

(OR)

4.

Unit – III

5.

(OR)

6.

Unit – IV

7.

(OR)

8.

Unit – V

9.

(OR)

10.

PART-B (20 Marks)

Case Analysis
11.

ANNEXURE – III

QUESTION PAPER STRUCTURE FOR MBA SEMESTER END – EXAMINATIONS OF ONLINE COURSES

- **Each Course examination shall have a maximum of 100 Marks and the examination shall be of 3 Hrs duration.**
- **The question paper shall have two parts viz. Part- A and Part-B.**

PART-A (5X14=70 Marks)

Descriptive / Numerical Type questions, each question carries 14 Marks.
Answer **FIVE** questions (one question from each unit).

Unit – I

1.

(OR)

2.

Unit – II

3.

(OR)

4.

Unit – III

5.

(OR)

6.

Unit – IV

7.

(OR)

8.

Unit – V

9.

(OR)

10.

PART-B (30 Marks)

Case Analysis
11.

SRI VENKATESWARA UNIVERSITY: TIRUPATI
S.V.U COLLEGE OF CM & CS
DEPARTMENT OF COMPUTER SCIENCE



Course
MCA Degree Programme

Choice Based Credit System (CBCS)
Academic Year 2023 – 24

Amended asper NEP2020

About the Department

The Department was established in 1985 and ever since its inception; the department has been a pioneering academic centre for higher education, research, and innovation in core and key areas of computer science and applications.

The Department of Computer Science was given the status of the separate department in 2003 after bifurcation from College of Engineering. It has grown in stature to be ranked amongst the best in the university offering world class pedagogical and research experience to its students.

The Department is recognized under Special Assistance Programme (SAP) by the University Grants Commission and has been awarded (NO: F.3-49/2011 (SAP-II)) for a period of 5 years with an amount of Rs.47,00,000 and SAP DRS–II with an amount of Rs.88,00,000 & with DST – FIST with an amount of Rs.60,00,000 CS researchers contribute to cutting-edge research in topical areas of computer science and applications and are active researchers in their respective domains of expertise enhancing publication profile and citations accumulated by the publications

The department's alumni include renowned academicians, leaders in computer and IT industry, distinguished scientists, and trendsetting entrepreneurs (UGC SAP DRS-II & DST –FIST)

The department currently offers two PG level professional programmes following Choice Based Credit System and two research-oriented programmes. Both M.Sc. (CS) & MCA are interdisciplinary programmes offering Computer Science subjects along with Mathematics, Statistics, Management and Commerce are also having as one of the core /elective subjects.

The courses offered in the department meet the requirements of both the industry and research. The curriculum is designed to train the students in developing application programmes (software) and also designing and developing computing systems (hardware). Faculty members taking classes, involving in curriculum development and implementation in the departments having computer subjects like Zoology, Biotechnology, Geography, Microbiology, Bioinformatics etc.

Vision

Uncompromising and unflinching efforts to turn a student into a consummate individual to stand up to changes and surge ahead against any backdrop

Mission

Sublime education, through which the student develops himself equips and soars to the cherished and lofty goals with ease and élan

MCA Degree Programme (CBCS) Regulations 2016-2017

CHOICE-BASED CREDIT SYSTEM (CBCS)

1. Duration of the Program:

The professional postgraduate programme leading to the degree of Master of Computer Applications will extend 3 academic years/over a period of six semesters each semester will normally have duration of 90 working days.

2. Minimum Qualifications for Admission :

Candidates for admission into the first semester of the M.C.A. degree programme must have a B.Tech / B.C.A / B.Sc / B.Com / B.A degree or any equivalent graduation program with Mathematics as one of the subject at 10+2 level or at graduation.

3. Admission Procedure

3.1. Admission into MCA Program will be only through ICET Examination for Indian Students conducted by Andhra Pradesh State Council of Higher Education(APSCHE).

3.2. Admission of Foreign / NRI Students for MCA Program:

- Students should have earned their qualifying degree from a University / Institute recognized by the Association of Indian Universities / similar Indian body.
- Students nominated by Foreign Governments may be accepted to MCA programmes, without any further test / interview, if their request for admission is routed through MHRD / any agency of the Government of India.

4. Structure of the Programme:

The M.C.A. programme has a curriculum, with syllabus consisting of:

- Core courses, which give a broad base in the main field of study in the academic programme concerned
- Elective courses chosen by the student in consultation with the faculty adviser
- Elective Course: Elective course is a course which can be chosen from a pool of papers. It may be:
  - Supportive to the discipline of study
  - Providing an expanded scope
  - Enabling an exposure to some other discipline/domain
  - Nurturing student's proficiency/skill.

  An elective may be "Generic Elective" focusing on those courses which add generic proficiency to the students. These electives shall be "Discipline centric".

- Second type elective may be open elective and shall be offered for other disciplines.
- The Foundation Courses may be of two kinds: Compulsory Foundation and Elective foundation. "Compulsory Foundation" courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines. Elective Foundation courses are value-based and are aimed at man-making education.
- Laboratory, project work and software design courses where special emphasis is laid on the

application of knowledge to real-life problems.

- The program will also include seminars, Technical Seminars, Group discussions and practical Industry exposure training, as prescribed by the Board of Studies in the curriculum & syllabus and approved by the Academic Council.
- In addition, the students may audit courses, in consultation with the faculty adviser.

5. The Credit System:

- Each course has a certain number of credits assigned to it, depending upon whether it is a lecture or tutorial or practical work and the number of periods assigned per week. The practical courses shall include laboratory work and project work.
- **The credits are assigned according to the following pattern:**
  - 1 credit for each lecture period/week,
  - 1 credit for each tutorial period/week,
  - 1 credit for each practical session of 2 periods/week &
  - 2 credits for each project session of 3 periods / week.

6. Minimum Instruction Days:

- The normal duration of MCA Course is six semesters.
- Semesters, I, II, III, IV, and V shall consist of a minimum of 90 instruction days (based on six instruction days per week) excluding the days allotted for tests, examinations and preparation holidays.
- Sixth semester shall consist of a minimum of 15 weeks for undertaking major project work either in the College or any of the recognized Public Service Sectors/ Government Sectors, National Laboratories and Industrial Houses or any other organizations approved by the Department.

7. Course Registration:

Every student has to register for the set of courses offered by the Department in that semester including those of Open Elective courses and MOOCS courses with the total number of their Credits being limited by considering the permissible weekly contact hours.

8. Credits Required for Award of MCA Degree:

A student earns credits by passing courses every semester. A student, who has registered the M.C.A. degree programme, has to acquire 162 credits to be come eligible for the award of the degree.

9. Evaluation of Academic Performance:

The performance of the students in each semester shall be evaluated paper wise. The Scheme of instruction and Examinations shown in Annexure -I shall be followed. The distribution of marks between sessional work (based on internal assessment) and University Examination is as follows:

Paper Category	Sessional Marks	University Examination Marks
Theory	**20**	**80**
Practical	**20** **Designing of the Program (05) + Program Execution (10) + Viva-Voce(05)**	**80** **Record (20) + Designing of the Program (20) + Program Execution(30) + Viva Voce(10)**
Seminar / Technical Seminars / Group discussion	**50** **Content Preparation (12) + Communication Skills (12) +** **Presentation Skills (12) + Attempting Queries (14)**	-
Minor Project Work	**20** **Presentation(10) + Viva Voce (10)**	**80** **Documentation (10) + Presentation(20) + Execution(30) + Viva Voce (20)**
	100 **Project Documentation (50)** **Presentation(30) + Viva Voce (20)**	**200** **paper based on project should be submitted to the National / International Conference and Published in the Proceedings** **Or** **paper based on project Should be published in National / International Journal (50 Marks)** **1. Project Documentation : 50 Marks** **2. Presentation : 50 Marks** **Viva Voce : 50 Marks**

- For both Theory and Laboratory papers two Internal Assessments will be conducted and best of two Assessments considered for award of Sessional marks. The duration of the these tests will be 2 hours. These sessional marks are to be communicated to the Controller of Examinations Office on or before the commencement of the end Semester examination.

10. University Examinations:

10.1. For each theory subject, there shall be a comprehensive University Examination of three hours duration. Setting of Question papers shall be done by external examiners from the panels recommended by the Board of Studies.

10.2. (a) For each practical subject, the University Examination shall be conducted by one Internal examiner and one external examiner/two examiners.

(b) Viva -Voce examination in practical subject shall be conducted by Examiners (One Internal and One External Examiner/Two Examiners)

10.3. Viva-Voce Examination in Minor Project Work shall be conducted by One Internal Examiner and One External Examiner / Two Examiners

10.4. Viva-voce examination in Major Project Work shall be conducted by a committee consisting of Two External Examiners and One Internal Examiner / Three Examiners

10.5. (a) The Examiners for Practical examinations and Viva-voce examinations (Stated in 10.2) shall be appointed from among the panels submitted by the Chairperson/Chairman of the Board of Studies.

(b) The Examiners for Project report evaluation for Minor/Major Project Works and Viva Voce examination for Minor/Major Project Works (Stated in 10.3, 10.4) shall be appointed from among the panels submitted by the Chairperson/Chairman of the Board of Studies.

10.6. The internal examiners for theory/practical/minor project work shall have at least three years of teaching experience at PG level in ratified position.

10.7. The internal examiners for major project work shall have at least five years of teaching experience at PG level in ratified position.

11.Attendance Requirements:

11.1. Regular course of study, in a semester, means a minimum average attendance of 75% in all the papers computed by totaling the number of periods of lectures, tutorials, and practical's and project as the case may be, held in every paper as the denominator and the total number of periods attended by the student in all papers, as the numerator.

11.2. However, a student has to put in a minimum attendance of 50% in each subject, in addition to the condition laid down in clause 11.1.

11.3. No consideration whatsoever in attendance will be shown to any student for late admission due to any reason.

11.4. Condonation of shortage of attendance may be recommended provided a student puts in at least 62.5% attendance, in all the papers put together as calculated in clause 11.1 above, along with a minimum of 50% attendance in each subject as stated in clause 11.2, and provided the Principal is satisfied with the reason for shortage of attendance.

11.5. A student, who could not satisfy these requirements of attendance as given in clauses above, in any semester, shall have to repeat that semester.

11.6. A student shall not be permitted to study any semester for more than three times during the course of study.

11.7. A certificate of satisfactory attendance must be submitted by the student from the organization where he/she undertakes Project Work. For the above purpose, the candidate is not expected to avail more than 12 working days of leave of absence.

11.8. Further, a student is required to complete the course of study satisfying the attendance requirements in all the six semesters, within a period of first twelve semesters from the time of admission, failing which he/she shall forfeit his /her seat.

11.9. A student, who has not satisfied the minimum attendance requirements in any semester, may repeat that semester after obtaining written permission from the Principal, canceling the previous record of attendance and sessional marks of that semester. However, this facility may be availed by any student not more than twice during the entire course of study and the entire course of study shall be within the first twelve semesters as stipulated in clause 11.8.

12. Academic Requirements:

12.1. A candidate shall be declared to have passed whole examination of a semester if he/she secures a minimum aggregate of 50% along with minimum marks of 40% in the University Examination in each theory and practical paper, including project work. Aggregate for this purpose shall mean the total marks obtained in the University Examination and sessionals put together in all the papers of that semester.

12.2. A candidate who secures a minimum aggregate of 50% in any semester as specified in clause 12.1, but fails to secure the paper minimum of 40% in the University Examination in any paper, shall be declared to have failed in that paper. The candidate may appear for the University Examination in such papers as and when conducted and pass by securing the subject minimum of 40% in each of such papers.

12.3. A candidate, who could not secure the minimum aggregate of 50% in any semester, as given in clause 12.1, shall be declared to have exempted in such theory papers in which he/she secured a minimum of 50% of the marks in the University Examination.

12.4. A candidate who could not secure the minimum aggregate of 50% in any semester, as given in clause 12.1, shall be declared to have exempted in such practical papers in which he/she secured a minimum of 40% in the University Examination and a minimum of 50% of the marks in the University Examination and sessionals put together in each of such papers.

12.5. A candidate has to appear for all the other papers in which he/she has not satisfied the stipulations of clauses 12.3 and 12.4, and pass compartmentally by satisfying the stipulations stated in clauses 12.3 and 12.4. Rechecking of the aggregate shall not arise when a candidate opts for compartmental passing.

12.6. Candidates who would not like to avail themselves of the facility of compartmental pass given in clauses 10.3, 10.4 and 10.5 may reappear for the whole examination of that semester, after canceling the previous result. In such a case, clauses 12.1 to 12.5 shall apply in that order.

12.7. Candidates shall register for improvement in one or more theory papers of a semester indicating the same in the application form. However, improvement facility is not extended to practical and project work papers.

NOTE: The question of checking the aggregate shall arise only when the candidate registers for the whole examinations for the first time or when he/she registers for the whole examinations at a subsequent attempt after having canceled the previous result.

13.Condition of Promotion:

A candidate shall be promoted to the next semester, if he/she satisfies the minimum attendance requirements of that semester of MCA as stipulated in clause 12.

14.Award of Degree:

The degree of MCA shall be conferred on a candidate who has satisfied the following conditions:

14.1. The candidate, after admission to the MCA program of the University, must have studied each of the six semesters of MCA program at least once in any college to which affiliation is accorded by S.V.University to offer MCA Programme.

14.2. The candidate must have satisfied minimum attendance requirements as stipulated in clause 11, and minimum academic requirements as prescribed in clause 12, in each of the six semesters of the MCA program.

14.3. The Programme of Study for the M.C.A. Degree shall cover normally a period of Three academic years, comprising of Six semesters and No student shall be permitted to complete the course of study of M.C.A. Degree earlier than six semesters or to take not more than twelve consecutive semesters, failing which he / she shall forfeits his / her seat.

15. Award Grades and Grade Points:

15.1. After a candidate has satisfied all requirements for the award of the degree as specified in clause 14, he/she shall be placed in one of the following three classifications, irrespective of whether the candidate passed compartmentally or otherwise, even after the regular period of study of six semesters.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.

Semester Grade Point Average (SGPA): It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various

courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places

SGPA (Si) = $\sum(C_i \times G_i) / \sum C_i$

where C_i is the number of credits of the ith course and G_i is the grade point scored by the student in the ith course.

The **CGPA** is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places

CGPA = $\sum(Ci \times Si) / \sum Ci$

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts

Letter Grades and Grade Points

A 10 point grading system with the following letter grades is to be followed:

Letter Grade	Grade Point
O (Outstanding)	10
A+(Excellent)	9
A(Very Good)	8
B+(Good)	7
B(Above Average)	6
C(Average)	5
P (Pass)	4
F(Fail)	0
Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

For non credit courses 'Satisfactory' or "Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA

For this purpose, aggregate shall mean the aggregate of the marks in the University Examinations and sessionals put together at all six semester of MCA.

15.2. A Candidate, before and even after becoming eligible for the award of the Degree, may reappear for the University Examination, as and when conducted, in any of the theory subjects, which he/she has already passed, for the purpose of improving the aggregate. However, this facility cannot be availed by a candidate who has taken the Provisional pass Certificate. Candidates shall not be permitted to appear for University examination in Practical papers including project work for the purpose of improvement.

16.Award of Rank:

The rank shall be awarded based on the following:

16.1. Ranks shall be awarded for the top ten students appearing for the regular MCA examination.

16.2. Only such candidates, who satisfy the minimum academic requirements as stipulated in clause 12, by the end of their sixth semester, and become eligible for the award of the degree, are eligible for the award of rank. Candidates, who lose one or more semesters for any reason whatever, are not eligible for the award of rank.

16.3. For the purpose of awarding rank, aggregate of marks in University Examination and Sessionals put together at all the semesters of MCA, secured at the first attempt only, shall be taken into account.

16.4. Award of Prizes, scholarships and other honors shall be according to the rank secured by a candidate, consistent with the desire of the Donor.

17. Transitory Regulations:

17.1. Candidates who studied the MCA Course under the Regulations (Semester Pattern) 2006 and revised syllabus from 2007-08 & 2010-2011 but who could not satisfy the minimum attendance requirements in any semester may join the appropriate semester in the Regulations (For the full time, regular course) – 2015-16 for the remaining part of the course and be governed by the Regulations of that batch from then on. Any candidate admitted under the Regulations who wished to join under the Regulations, 2015-2016 under any other circumstances may also join the appropriate semester and be governed by the Regulations-2015-16 from that semester onwards.

17.2. University Examinations shall be conducted three more times, after the last regular examination, in all those papers prescribed under the Regulations, 2006 and revised syllabus from 2007-2008 & 2010-2011

17.3. Candidates, who satisfied the minimum attendance requirements in any semester under the Regulations, 2006 and revised syllabus from 2007-08 & 2010-2011 but who are yet to pass some papers of that semester even after Three chances shall appear for the equivalent papers under Regulations-2015-2016, specified by the Chairman / Chairperson of the Board of Studies.

18. Amendments of Regulation:

The University may, from time to time, revise, amend, or change the Regulations, Scheme of Examinations and Syllabi, whenever necessary.

Programme Specific Outcomes(PSO's)

- **PSO1**

  Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.

- **PSO2**

  Ability to understand the structure and development methodologies of software systems. Possess professional skills and knowledge of software design process. Familiarity and practical competence with a broad range of programming language and open-source platforms.

- **PSO3**

  Be acquainted with the contemporary issues, latest trends in technological Development and there by innovate new ideas and solutions to existing problems.

Programme Objectives

The objective of the MCA curriculum is to equip the students with the ability to analyze varieties of real-life problems and develop computer based solutions for effectiveness and efficiency. Keeping in view the requirements of the evolving software industry and also to provide a foundation for higher studies in Computer Science, effort has been made in the choice of subjects to balance between theory and practical aspects of Computer Science. On successful completion of this course a student can find a career in software industries, corporate sectors, or Government Organizations as a technical professional or pursue research in the core areas of Computer Science and Applications. MCA graduates will demonstrate analytical and design skills including the ability to generate creative solutions and foster team-oriented, professionalism through effective communication in their careers.

Programme Outcomes

Sno	Program Outcomes
PO1	**Computational Knowledge:** Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
PO2	**Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
PO3	**Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex Computing problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
PO6	**Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.
PO7	**Life-long Learning:** Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO8	**Project management and finance:** Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member

	and leader in a team, to manage projects and in multidisciplinary environments.
PO9	**Communication Efficiency:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
PO10	**Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.
PO11	**Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO12	**Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

Programme Educational Objectives(PEO's)

- To enhance foundation of mathematics, computer application and problem-solving methodology for effective implementation in the area of s/w development.
- To effectively design, implement, improve, and manage the integrated socio-technical systems.
- To inculcate effective communication skills combined with professional & ethical attitude.
- To gain multidisciplinary knowledge through real time projects and industry internship training and providing a sustainable competitive edge in R&D and meeting industry needs.

1. SYLLABUS SCHEMES

SRI VENKATESWARA UNIVERSITY: TIRUPATI

DEPARTMENT OF COMPUTER SCIENCE

ADOPTION OF CBCS SYSTEM FOR TWO YEAR MCA PROGRAMME WITH EFFECT FROM 2020-21

Semester	Course Course Title Number	Core/Generic Elective /Open Elective/ Compul Foundation	No Of Credits	L	T	P	Total	Maximum marks		Total Marks
								Session	univ	
I SEM	MCA 101 Discrete Mathematical Structures		4	3	1		4	30	**70**	100
	MCA 102 Object Oriented Programming with Java	Core	4	3	1		4	30	70	100
	MCA 103 Computer Organization	Core	4	3	1		4	30	70	100
	MCA 104 Operating Systems	Core	4	3	1		4	30	70	100
	MCA 105 105A.Accounting and Financial management 105B.Accounting Essentials for Computer Applications	Generic Elective	4	3	1		4	30	70	100
	MCA 106 P Software Lab I (based on 101 & 103)	----	4	---	---	4	4	30	70	100
	MCA 107 P Object Oriented Programming Lab	----	4	---	---	4	4	30	70	100
	MCA 108P Operating Systems Lab	----	4	---	---	4	4	30	70	100

II SEM	MCA 201	Computer Oriented Operations Research	Compulsory Foundation	4	3	1		4	30	70	100
	MCA 202	Data Structures using Java	Core	4	3	1		4	30	70	100
	MCA 203	Data Communication and Computer Networks	Core	4	3	1		4	30	70	100
	MCA 204	Advanced Database Management Systems	Core	4	3	1		4	30	70	100
	MCA 205	205A. E-Commerce 205B. Cyber Security 205C. Neural Networks	Generic Elective	4	3	1		4	30	70	100
	MCA 206	Group Discussion		2				2			50
	MCA 207P	Software Lab II (Based on 201 & 203)	----	4	--	--		4	30	70	100
	MCA 208P	Data Structures Lab	----	4	--	--		4	30	70	100
	MCA 209P	Advanced Database Management Systems Lab	----	4	--	--		4	30	70	100
III SEM	MCA 301	Software Engineering	Compul Foundation	4	3	1		4	30	70	100
	MCA 302	Computer Graphics	Core	4	3	1		4	30	70	100
	MCA 303	Web Technologies	Core	4	3	1		4	30	70	100
	MCA 304	304A.Data warehousing and Data mining 304B.Big Data Analytics 304C System	Generic Elective	4	3	1		4	30	70	100

		Programming									
	MCA 305	305A. Cryptography and Network Security 305B.Artificial Intelligence 305C.Mobile Application Development	Generic Elective	4	3	1		4	30	70	100
	MCA 306	The courses offered by Other departments	Open Elective	4	3	1		4	30	70	100
	MCA 307	Technical Seminar		2				2			50
	MCA 308P	Software Lab III (301&302)	----	4	--	--		4	30	70	100
	MCA 309P	Web Technologies Lab	----	4	--	--		4	30	70	100
	MCA 310P	Minor Project work	----	4	--	--		4	30	70	100
IV SEM	MCA 401	401A.Cloud Computing 401B. Dot Net Technologies 401C. Software Testing	Generic Elective	4	3	1		4	30	70	100
	MCA 402	402A. Essentials of Data Science 402B.Deep Learning 402C.Internet of Things	Generic Elective	4	3	1		4	30	70	100
	403	Major Project work (One Month Course work &3 Months **on site** project)		12				12	100	200	300

The following are the Open Elective Courses offered by the Department Of Computer Science for theStudents other Disciplines:

MCA III Semester:

Programming in C

Open-Source Tools

Internet Fundamentals

EFFECT FROM 2020-21

FIRST SEMESTER

MCA 101: DISCRETE MATHEMATICAL STRUCTURE

Department	Master of Computer Applications	Course Type	Dscc
Course Title	Discrete Mathematical Structures	Course Code	MCA 101
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course objectives: They course will discuss fundamental. This course concepts and tools in discrete mathematics with emphasis on their applications to computer science. understanding the Topics include logic and Boolean. C&cuits, sets, Functions, relations, detereministic algorithms. and randomized algorithms, analysis techniques based on counting methods and recurrence relations, trees and graphs.

Course Outcomes:

Co 1. Understand the concept of Mathematical logic and Solve problem, Rules of Inference and to uselogical notations quantifiers

Co 2. understand the concept of Mathematical inductions Such as sets relations and functions andable to Formulate problems and solve recurrence relations.

Co 3. understands the basic concept of counting (or) enumerating different configurations and fundamentals and explains the permutation notion, calculates the number of subsets of given size via bionomial coffiencient, and finds number of subsets. List combinational tools and solve related problems to use mathematical Induction methods in proofs, we Inclusion-exclusion principle and solves problems. via pigeon hole principle. how to prove and explain the binomial theorem and solves various distribution problems using Express multinomial theorem and its proofs. how to designs Fibonacci numbers and gives for the nth Fibonacci number

Co 4. understand the basic concepts of Advanced Counting techniques as explains basic

notations about cobber Combinational probability and express the law of large numbers and law of small numbers. And understands the integers, divisors and primes. to express the divisibility of integers and explains the primes and their history To demonstrate the factorization into primes calely Eulalian algorithm, and explaining how to test whether a number is a prime.

Co 5. understanding the basic concepts of Graphs and tree notations. Defines the graphs such as vertex, edge and degree of a vertex are. solving everyday. problems via graphs, express Cayleytheorem Explains Eulalian and Hamilton graphs.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	2	3	3	3	-	1	-	-	-	2	-	2	1	3
CO_2	3	2	3	3	3	-	1	-	-	-	2	-	2	1	3
CO_3	3	2	3	3	3	-	1	-	-	-	2	-	2	1	3
CO_4	3	2	3	3	3	-	1	-	-	-	2	-	2	1	3
CO_5	3	2	3	3	3	-	1	-	-	-	2	-	2	1	3

COURCE LEARNING OUT COMES [CLO'S]

- Learn the foundation of mathematics to be able to perform basic computations in higher mathematics
- Learn able to read the understand middle –level proofs
- Learn to write and understand basic proofs
- Learn to develop and maintain problem solving skills
- Learn to use mathematical ideas to model real-world problems
- Learn and understands to able communicate mathematical ideas with others
- Have experience using technology to address mathematical ideas
- Learn and describing objects and problems in computer algorithms, programming languages cryptography, automated theorem proving and software development.

UNIT-I

Logic and Proof: Propositional Logic, Propositional, Predicators and Quantifiers, Nested Quantifiers, Rules of Inference, Induction to Proofs, Proof Methods and Strategies.

UNIT-II

Induction and Recursion: Mathematical Induction, Strong Induction and Well Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.

UNIT-III

Counting: The basics of counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized permutations and Combination, Generating Permutations and Combinations.

UNIT-IV

Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide and Conquer algorithms and Recurrence Relations, Inclusion – Exclusion, Applications of Inclusion – Exclusion.

UNIT – V

Graphs: Graphs And Graph Methods, Graph Terminology And Special Types of Graphs, Representing Graphs and Graphs Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring,

Text books

1. Discrete Mathematics and Its Applications, By Kenneth n, McGraw Hill, Sept.2002.

Reference Books

1. Discrete Mathematical Structures with Applications to Compute Science, By J.P.Tremblay,R.Manohar, McGraw Hill Pub, 1975.
2. Discrete Mathematics by N. Chandrasekaran and M. Umaparvathi, Prentice-Hall of India.

MCA 102: Object Oriented Programming with Java

Department	Master of Computer Applications	Course Type	Dscc
Course Title	OOPs with java	Course Code	MCA 102
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

COURSE OBJECTIVES:

The course should enable the students to:

Co 1. Understand the basic object oriented programming concepts and apply them in problem solving.

Co 2. Illustrate inheritance concepts for reusing the program.

Co 3. Demonstrate on the multi-tasking by using multiple threads.

Co 4. Develop data-centric applications using JDBC.

Co 5. Understand the basics of java console and GUI based programming.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_2	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_3	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_4	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_5	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3

COURSE LEARNING OUTCOMES (CLOs):

1. Use object oriented programming concepts to solve real world problems.
2. Explain the concept of class and objects with access control to represent real world entities.
3. Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
4. Use overloading methodology on methods and constructors to develop application programs.
5. Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.
6. Describe the concept of interface and abstract classes to define generic classes.
7. Use dynamic and static polymorphism to process objects depending on their class.
8. Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).
9. Understand the impact of exception handling to avoid abnormal termination of program using checked and unchecked exceptions.
10. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
11. Use multithreading concepts to develop inter process communication.
12. Understand and implement concepts on file streams and operations in java programming for a given application programs.
13. Describe the backend connectivity process in java program by using JDBC drivers.
14. Develop java application to interact with database by using relevant software component (JDBC Driver).
15. Understand the process of graphical user interface design and implementation using AWT or swings.
16. Use different layouts (Flow Layout, Boarder Layout, Grid Layout, Card Layout) to position the controls for developing graphical user interface.
17. Build the internet-based dynamic applications using the concept of applets.
18. Develop applets that interact abundantly with client environment and deploy on the server.
19. Knowledge on usage of graphical IDE for design and implementation of real time applications in java.

Posses the knowledge and skills for employability and to succeed in national and international level competitive exams.

UNIT-I

Introduction: Object Oriented Programming Concepts, Features of Java Language, Architecture, Data Types, Variables, Operators, Control Structures, Arrays. Class : Classes, Wrapper Classes, Constructors, Overloading of methods, Access control, Nested and Inner classes, Abstract classes. Inheritance: Inheritance basics, Using Super, Multilevel hierarchy, Method overriding, Dynamic method dispatch, Final with inheritance.

UNIT-II

Math Class and Methods, Packages and Interfaces, Exception Handling: fundamentals, exception types, uncaught exceptions, using try, nested try statements, throw, throws, Java built-in exceptions, user defined exceptions. Multithreading: Thread model, main thread, creating a thread, Multiple threads, Thread priorities, synchronization, Inter thread communication, String handling.

UNIT-III

Wrapper Classes: Number class, Character class, Boolean class. More utility classes: Vector, Stack, Dictionary, Hash table. String Tokenizer, Bit set, Data Calendar. Input/output: File, Stream classes, Byte Streams, Character Streams. GUI Programming,

UNIT-IV

Features Applets: Applet basics, Applet architecture, an applet skeleton, Applet display method, Repainting, Using Status window, HTML APPLET tag, passing parameters to applet, Audio Clip interface. Even Handling; two event handling mechanisms, Event model, Event classes, sources of events, Event Listener interfaces, Adapter classes. Introduction to SWING: Window Fundamentals, working with frame windows, creating window programs, working with color, fonts, SWING Controls, Layout Managers and Menus: Control fundamentals, Labels, Using buttons, check box s, checkbox group, choice controls, lists, scroll bars, Text field, layout managers, menu bars, and menus.

UNIT-V

Network Programming with Java: Networking classes and Interfaces, Internet Address, Factory method, Instance Methods, Sockets, Knowing IP address URL-URL Connection class. Creating a server that sends data, creating a client that receives data, two way communications between server and client, Stages in a JDBC program, registering the driver, connecting to a abase, Preparing SQL statements, improving the performance of a JDBC program.

Text Book

1. Herbert Scheldt: “The Complete Reference Java ”(Eighth Edition),TMH.

Reference Books

Dietel & Dietel : “Java2 How to Program”, Prentice Hall.

Thamus Wu: “ An Introduction to Object Oriented Programming With Java.” TMH

Balagurusamy:”Programming With Java”: TMH.

MCA 103: COMPUTER ORGANIZATION

Department	Master of Computer Applications	Course Type	DSCC
Course Title	Computer Organization	Course Code	MCA 103
L-T-P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives:

CO1. Understand the basic concepts and structure of computers.

CO2. Understand concepts of register transfer logic and arithmetic operations.

CO3. Learn the concepts addressing modes and memory organization.

CO4. Learn the different types of serial communication techniques.

CO5. Summarize the Instruction execution stages.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	2	3	3	3	-	2	-	-	-	2	3	2	1	3
CO_2	3	2	3	3	3	-	2	-	-	-	2	3	2	1	3
CO_3	3	2	3	3	3	-	2	-	-	-	2	3	2	1	3
CO_4	3	2	3	3	3	-	2	-	-	-	2	3	2	1	3
CO_5	3	2	3	3	3	-	2	-	-	-	2	3	2	1	3

Course Learning Outcomes:

1. Understand the theory and architecture of central processing unit.
2. Analyze some of the design issues in terms of speed, technology, cost,
   a. performance.
3. Design a simple CPU with applying the theory concepts.
4. Use appropriate tools to design verify and test the CPU architecture.
5. Learn the concepts of parallel processing, pipelining and interprocessor
   a. communication.
6. Understand the architecture and functionality of central processing unit.
7. Exemplify in a better way the I/O and memory organization.
8. Define different number systems, binary addition and subtraction, 2's
9. complement Representation and operations with this representations

UNIT I

Flip-flops – Registers and shift registers – counters – decoders – Multiplexers – PLDs – sequential circuits. Basic Structure of Computers. Functional UNITs – Basic operational concepts – Bus structures – performance

– Multiprocessors and Multi computers – Historical Perspective.

UNIT II

Addressing Methods and Machine Program Sequencing: 1. sic Concepts: –Memory locations and address, Main Memory operations, Instructions and Instruction Sequencing –Addressing Modes.

UNIT III

Input / Output organization: Accessing I/O Devices – Interrupts – Direct Memory Access-I/O Hardware- Standard I/O Interface.

UNIT IV

Memory System Concepts: – Semiconductor RAM Memories - Read only memories – Cache Memories – Performance Considerations –Virtual Memories: - Memory Management Requirements, Arithmetic: - Addition and subtraction of sign members – Design of fast adders –

Multiplication of positive members – Signed operand multiplication – Fast multiplication – Integer division – Floating point numbers and operations.

UNIT V

Basic Processing UNIT: Concepts – execution of a complete instruction – Multiple – Bus organization – Hardware control – Micro Programmed Control. Pipelining: Concepts – Data hazards – Instruction hazards – Influence on Instruction sets - data path and control constructions.

Text Book:

1. Hamacher C, Vranesic Z, and Zaky S. Computer Organization, 5th edition, Mc Graw – Hill,2002.
2. 1. Stallings W, Computer Organization and Architectur 6th edition. Parson Education, 2003.

Reference Books:

1. Yarbrough JM, Digital Logic – Applications and Design, Thomas Learning, 1997.

MCA 104: OPERATING SYSTEMS

DEPARTMENT	MASTER OF COMPUTER APPLICATIONS (MCA)	COURSE TYPE	DSC
COURSE TITLE	OPERATING SYSTEMS	COURSE CODE	MCA 104
L-T-P	3-1-0	CREDITS	4
CONTACT HOURS	60 Hrs	DURATION OF SEE	3 Hrs
SEE MARKS	70	CIE MARKS	30

COURSE DESCRIPTION:

This course examines the important problems in operating system design and implementation. The operating system provides an established, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. The operating system is responsible for sharing resources (e.g., disks, networks, and processors), providing common services needed by many different programs (e.g., file service, the ability to start or stop processes, and access to the printer), and protecting individual programs from interfering with one another. The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years and then cover the major components of most operating systems. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems; and on operating system support for distributed systems.

Course Objectives:

At the end of the course, the students will be able to:

Co 1. Use the features of types of operating systems, functions, structure, and operations on the processes executing in the system to solve the problems.
Co 2. Employ the knowledge scheduling algorithms to solve the real life problems.
Co 3. Examine the deadlocks occurred in the real world applications and will be able to provide the remedial measures to avoid the deadlock situation.

Co 4. Employ the concepts of memory management including virtual memory and resource sharing among the user application processes.

Co 5. Solve the problems related to file system interface and implementation, disk management and protect the system and Use UNIX tools using features such as filters pipes, redirection, and regular expressions. Customize their UNIX working environment.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO_1	PSO_2	PSO_3
CO_1	3	2	3	3	-	-	3	1	-	-	2	3	2	1	3
CO_2	3	2	3	3	-	-	3	1	-	-	2	3	2	1	3
CO_3	3	2	3	3	-	-	3	1	-	-	2	3	2	1	3
CO_4	3	2	3	3	-	-	3	1	-	-	2	3	2	1	3
CO_5	3	2	3	3	-	-	3	1	-	-	2	3	2	1	3

Course Learning Outcomes: Through the study of this course, students will gain a comprehensive understanding on the concepts and functions of a modern operating system. Students will be able to:

1. Explain the role of the operating system as a high level interface to the hardware.
2. Use OS as a resource manager that supports multiprogramming.
3. Explain the low level implementation of CPU dispatch.
4. Explain the low level implementation of memory management.
5. Explain the performance trade-offs inherent in OS implementation.

SYLLABUS

UNIT I

Computer System Structures: Computer System operation, I/O Structure, storage structures, Storage hierarchy, Hardware protection, Network structure. Operating system structures: System components, Operating System services, System calls, System programs, System structure, Virtual

machines, System Design and Implementation, System Generation. Processes: Processes Concept, Processes Scheduling, Operations in processes, Inter-processes communication, Communication in Client server ems, Threads: overview, multithreading models, Threading issues, Threads.

UNIT II

CPU Scheduling: Scheduling criteria, Scheduling Algorithms, Multiple processor Scheduling, Real-time scheduling. Process Synchronization: - The critical-section problem, Synchronization hardware, Semaphores, Classic problems of Synchronization, Critical regions, Monitors. Dead Locks: Deadlock characterization, Deadlock handling, Deadlock prevention, Deadlock avoidance, Deadlock detection, and Recovery.

UNIT III

Memory Management: Swapping, Contiguous memory allocation Paging, Segmentation with paging Concept of Virtual memory Demand paging Page replacement, Allocation of frames, Thrashing. File System Interface & Implementation: File concept, Access methods, Directory structure, File System Mounting File Sharing Protection, File system structure, and implementation, Directory implementation, Allocation methods. Free space management, Efficiency and performance, Recovery.

UNIT IV

I/O Systems: overview, I/O hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O to Hard ware operations, streams, Performance of I/O. Mass Storage Structure:- Disk Structure Disk Scheduling, Disk management, Swap-space Management,

RAID Structure.

UNIT V

Security: User authentication, program threats, system threats, security systems Facilities, Linux system: History, Design principles, Kernel modules, process management, Scheduling Memory Management, File Systems.

Text Books:

1. Silberschatz A, Galvin P.B, and Gaghe G. Operating System Concepts, 8th edition, John Wiley, 2002.
2. Tenenbaum A.S., Modern Operating Systems, 2nd edition, arson Education, 2001.

Reference Books:

1. Dhamdhere D.M., Operating Systems – A concept based Approach, Tata McGraw-Hill, 2002.
2. Bhatt P.C.P., An Introduction to Operating Systems – Concepts and Practice, PHI, 2003.

105A ACCOUNTING AND FINANCIAL MANAGEMENT

DEPARTMENT	MASTER OF COMPUTER APPLICATIONS (MCA)	COURSE TYPE	DSC
COURSE TITLE	ACCOUNTING AND FINANCIAL MANAGEMENT	COURSE CODE	MCA 105A
L-T-P	3-1-0	CREDITS	4
CONTACT HOURS	60 Hrs	DURATION OF SEE	3 Hrs
SEE MARKS	70	CIE MARKS	30

Course description:

The course provides a broad introduction to all aspects of the accounting function. The language of accounting and financial management is exacting. Our aim is to increase your familiarity with key components of this language and allow you to more effectively communicate with all organisational stakeholders. Users of accounting information may be typically classified as either external users (such as investors) or internal users (such as operational managers). Different users have different information needs. This course deals with the needs of these two main user groups and how the senior management of organisations can more effectively use accounting data to connect with them.

Course Objectives:

Co 1. Provide an in-depth view of the process in financial management of the firm.

Co 2. Develop knowledge on the allocation, management and funding of financial resources.

Co 3. Improving students' understanding of the time value of money concept and the role of a financial manager in the current competitive business scenario.

Co 4. Enhancing student's ability in dealing short-term dealing with day-to-day working capital decision; and also longer-term dealing, which involves major capital investment decisions and raising long-term finance.

Co 5. Providing action plan, estimation of income and expenditure, guiding the management in forecasting and decision making etc. are some notable objectives of budget.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO_1	PSO_2	PSO_3
CO_1	3	3	2	-	-	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	-	-	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	-	-	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	-	-	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	-	-	-	3	3	-	-	2	1	2	1	3

Course Learning Outcomes: After completing this course the student must demonstrate the knowledge and ability to:

1. Ability to maintain full and systematic records of business transactions, ability to ascertain profit or loss of the business, to depict financial position of the business and provide accounting information to the interested parties.
2. Ascertainment of cost, Determination of selling price, Cost control & Cost reduction, Ascertaining the profit of each activity Assisting management in decision making, Matching cost with revenue and Preparation of financial statements P& L A/c and Balance Sheet.
3. Attempting to reduce the cost of finance., Ensuring sufficient availability of funds, Also, dealing with the planning, organizing, and controlling of financial activities like the procurement and utilization of funds.
4. The objectives of working capital include managing the liquidity position of a business, smoothening and shortening of its operating cycle, managing the working capital investment policies of the business and helping seasonal businesses with working capital.
5. Providing action plan, estimation of income and expenditure, guiding the management in forecasting and decision making etc. are some notable objectives of budget. A budget provides a realistic estimate of income and expenses for a period and of the financial position at the close of the period.

SYLABUS

UNIT I

Introduction to Financial Accounting Concepts: Definition and concepts, Significance, Branches of Accounting, Accounting Cycle-Journal – Ledger – Trial Balance – Final accounts.

UNIT II

Cost Accounting: Elements of Cost, Nature and significance – Cost classification and Allocation, Cost Sheet

– Method of Inventory Valuation.

UNIT III

Financial Management: Meaning, scope and role. Financial Analysis through Ratios: Types of Ratios, Liquidity, Activity, Capital Structure and profitability ratio, Limitations of Ratios.

UNIT IV

Working Capital Management: Nature, Elements and Importance of working capital, types of working capital,Determinants of working capital.

UNIT V

Budgeting: Budgets, Purpose, Budgetary control, preparation of budgets, Types of budgeting methods,difference between Master Budget, fixed and flexible budgeting.

Text Books:

Rajeswara Rao K and Prasad G, Accounting & Finance (MCA), Jai Bharat Publishers, Guntur

Jain and Narang, *Cost Accounting*, Kalyani Publishers.

Reference Books:

Sharma R K, and Gupta S K, *Management Accounting*, Kalyani Publishers.

Financial Management Text and Problems: M.Y.Khan, P.K.Jain.

Financial Management Theory and Practices, Prasanna Chandra tata McGraw Hills.

MCA II SEMESTER

MCA 201: Computer Oriented Operations Research

Department	Master of Computer Applications	Course Type	Dscc
Course Title	COOR	Course Code	MCA 201
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

COURSE OBJECTIVES:

The objective of the course is to present an introduction to Operations Research is a discipline that deals with the Application of Advanced Analytical Methods to help make better decisions. Further, the term operational analysis is used in the British Military as an intrinsic part of capability development, management and assurance. OR was introduced as a subject for academic study in American University. They were generally Schools of Engineering, Public Administration, Business Applied Mathematics, Economics, Statics, Commerce, Management and Computer Science etc. Research Society of America (ORSA) in 1950.

The course should enable the students to:

Co 1. An Operating system may be defined a set of arts required for achievement of a desired outcome. Such complex, integrated arts can be performed by four types of systems.

Co 2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles ofmathematics, natural sciences, and engineering sciences. Design solutions for complex engineering problems and design system componentsor processes that meet the specified needs environmental considerations and apply OR Techniques, resources, and modern engineering and OR tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Co 3. A computer assisted mathematical representation of Real-Life problem under certain assumptions using Monte-Carlo Simulation, Use of Random Numbers, Forecasting models.

Co 4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Co 5. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and needfor sustainable development.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	2	3	-	3	3	3	-	-	-	2	3	2	1	3
CO_2	3	2	3	-	3	3	3	-	-	-	2	3	2	1	3
CO_3	3	2	3	-	3	3	3	-	-	-	2	3	2	1	3
CO_4	3	2	3	-	3	3	3	-	-	-	2	3	2	1	3
CO_5	3	2	3	-	3	3	3	-	-	-	2	3	2	1	3

COURSE LEARNING OBJECTIVES:

The objective of the course is to present an introduction to Operations Research is a discipline that deals with the Application of Advanced Analytical Methods to help make better decisions. Further, the term operational analysis is used in the British Military as an intrinsic part of capability development, management and assurance.

OR was introduced as a subject for academic study in American University. They were generally Schools of Engineering, Public Administration, Business Applied Mathematics, Economics, Stastics, Commerce, Management and Computer Science etc. Research Society of America (ORSA) in 1950.

The course should enable the students to:

CLO 1: An Operation may be defined a set of arts required for achievement of a desired outcome. Such complex, integrated arts can be performed by four types of systems. (1) Man (11) Machine (iii) Man-Machine unit and (iv) Organization of men, machines, and man-machine units. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems (Engineering Knowledge).

CLO 2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences (Problem Analysis).

CLO 3: A computer assisted mathematical representation of Real-Life problem under certain assumptions using Monte-Carlo Simulation, Use of Random Numbers Forecasting models.

CLO 4: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change (Life-long learning). Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development (Environment and Sustainability).

Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

UNIT - I

Linear Programming: Concept of Linear Programming Model, Development of LP Model, Graphical Method, Simplex Method, Duality, Formulation of Dual Problem, Application of Duality,(Text Book 1).

UNIT-II

Transportation Problem: mathematical Model for Transportation Problem, Types of transportation problem, Finding the Initial Basic Solution, Optimal Solution by U-V method, Assignment problem, Formulation of Assignment problem-Hungerian Method, Method of Solution, Branch and Bound Technique for Assignment Problem,(Text Book 1).

UNIT-III

Network Techniques: Shortest-Path Model, Systematic Method- Dijkstra's Algorithm, Floyid's Algorithm,Minimum Spanning Tree Problem, Prime Algorithm, Krusakal algorithm, Maximal Flow Problem, Linear Programming Modeling for Maximal Flow Problem, Maximal Flow Problem Algorithm, (Text Book 1).

UNIT-IV

Games and Strategies : Two –Person Zero- Sum Games, Maxmin- Minimax Principle, Games Without Saddle Points- Mixed Strategies, Graphic Solution Of 2 x n, And m x 2 Games , Dominance Property, Arithmetic Model For n x n Games, General Solution For m x n Rectangular Games(Text Book 2).

UNIT – V

Queueing Theory: Queueing System, Elements of Queueing System, Operating Characteristics of Queueing System, Probability Distributions In Queueing System, Classification Of Queueing Models, Poisson Queueing Systems, Non Poisson Queueing Systems. Network Scheduling by PERT / CPM: Rules o f Network Construction, Critical Path Analysis, Probability Considerations in PERT (Text Book 2).

Text Books:

R.Pannerselvam., "Operations Research" 2nd Edition, Prentice-Hall of India

Kanti Swarup., P.K.Gupta and Man Mohan, ., "Operations Research" 12th Edition Sultan chand & Sons

Reference Books:

Taha H.A., Operations Research: An Introduction, Prentice-Hall of India

S.D.Sharma., Operations Research, Kedar Nath Ram Nath, Delhi

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MCA 202: Data Structures Using Java

Department	Master of Computer Applications	Course Type	Dscc
Course Title	DS USING JAVA	Course Code	MCA 202
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Couse Objectives:

Co 1. Apply the Laplace Transform technique to evaluate integrals , differential equations and their applications to engineering problems.

Co 2. Demonstrate the concept of Partial Differential Equation and their applications to engineering problems.

Co 3. Apply the Fourier Transform technique to evaluate improper integral and their applications to engineering problems

Co 4. Identify the analytic function and their applications to solve complex integrals

Co 5. Discuss the complex transformations and their applications to rotate, translate and magnify the images.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_1**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3
CO_2	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3
CO_3	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3
CO_4	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3
CO_5	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3

Couse Learning Outcomes:

Upon Completing the Course, Students will able to:

1. Learn the basic types for data structure, implementation and application.

2. Know the strength and weakness of different data structures.

3. Use the appropriate data structure in context of solution of given problem..

4. Develop programming skills which require to solve given problem

UNIT I

Linear Data Structures: Abstract Data Types - Asymptotic Notations: Big-Oh, Omega and Theta – Best, Worst and Average case Analysis: Definition and an exae – Arrays and its representations – Stacks and Queues – Linked lists – Linked list based implementation of Stacks and Queues – Evaluation of Expressions – Linked list based polynomial addition.

UNIT II

Non-Linear Data Structures; Trees – Binary Trees – Binary tree representation and traversals – Threaded binary trees – Binary tree representation of trees – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals DFS and BFS – Connected components, Applications of Graphs-Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path Problem.

UNIT III

Search Structures and Priority Queues: AVL Trees – Red-Black Trees – Splay Trees – Binary Heap – Leftist Heap-Implementation of priority Queue ADT with Heap

UNIT IV

Sorting: Insertion sort – Merge sort – Quick sort – Heap sort – Radix Sort- Comparison of sorting algorithms in terms of Complexity - Sorting with disks – k-way merging – Sorting with tapes – Poly-phase merge.

UNIT V

Searching and Indexing: Linear Search – Binary Search - Hash tables – Overflow handling – CylinderSurface Indexing – Hash Index – B-Tree Indexing, B+ Trees.

Text Book:

Sartaj Sahni, Data Structures, Algorithms and Applications in Java, Second Edition, University Press.Gregory L. Heilman, Data Structures, Algorithms and Object Oriented Programming, Tata Mcgraw-Hill,New Delhi, 2002.

References:

1. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Second Edition, Tata McGraw-Hill, New Delhi, 1991.
2. Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures and Algorithms, Pearson Education, New Delhi, 2006.

203: DATA COMMUNICATION AND COMPUTER NETWORKS

DEPARTMENT	MASTER OF COMPUTER APPLICATIONS (MCA)	COURSE TYPE	DSC
COURSE TITLE	DATA COMMUNICATION AND COMPUTER NETWORKS	COURSE CODE	MCA 203
L-T-P	3-1-0	CREDITS	4
CONTACT HOURS	60 Hrs	DURATION OF SEE	3 Hrs
SEE MARKS	70	CIE MARKS	30

Course Objectives: At the end of the course, the students will be able to:

- Build an understanding of the fundamental concepts of data communication and computer networking.
- Understand how errors detected and corrected that occur in transmission
- How collisions to be handled when many stations share a single channel
- Know about routing mechanisms and different routing protocols
- Understand transport layer functions and know about different application layer protocols.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_2	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_3	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_4	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3

CO_5	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3

Learning Outcomes: After completing this course the student must demonstrate the knowledge and ability to:

1. Describe the basis and structure of an abstract layered protocol model

2. Independently understand basic computer network technology and Identify the different types of network topologies and protocols.

3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

4. Identify the different types of network devices and their functions within a network and Understand and building the skills of subnet and routing mechanisms.

5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation and Understand how the Internet works today.

UNIT I

Introduction, Network models – Internet model, OSI model Physical Layer: Signals – Analog, Digital, Digital Transmission – Coding, Sampling, Analog Transmission – Modulation of digital and analog signal, Multiplexing – FDM, WDM, TDM, Transmission Media – cable, wireless, Circuit switching and Telephone network, DSL Technology, Cable modern, SONET.

UNIT II

Data Link Layer: Error detection and correction, Data link control and Protocols – Stop and wait, Go-back-n, Selective repeat, HDLC, Point to point access, LANS – Traditional Ethernet, Fast Ethernet, Wireless LAN's – IEEE 802.11, Blue tooth, Connecting LANs – Connecting devices, Backbone networks, Virtual LANS, 2G,3G,4G,5G wireless technologies, Satellite networks, Virtual circuit switching, Frame relay, ATM.

UNIT III

Network Layer: Inter-networks, Addressing, Routing, Network layer Protocols, Types of Internet protocols – ARP, IPV4, ICMP, IPV6, Routing – Introduction, Unicast routing, Protocols – RIP, OSPF, BGP, Multicast Routing.

UNIT IV

Transport Layer: Process-to-Process Delivery, UDP, TCP, Data traffic, Congestion a d Control, Quality of service (QOS) and techniques to improve QOS, Integrated services, QOS in Switched Networks Security: Introduction. Symmetric-key and Asymmetric cryptography, Key Management and Kerberos, Message security, Digital signature, User authentication, E-mail Security, Web security, Social Issues.

UNIT V

Application Layer: Design issues, file transfer, accessed management. Client-Server model, Socket interface Introduction to DNS, Distribution of name space, DNS IP the Internet. Electronic mail, SMTP, File Transfer,FTP, HTTP, World Wide web, Video-conferencing.

Text Books:

Forouzan B A, Data Communications and Networking, 4th edition, Tata McGraw-Hill, 2007.

1. Tanenbaum A S, Computer Networks, 4th edition, Pears n Education, 2003.
2. Ajay R. Mishra, Fundamentals of network planning and optimization, Willey,2nd edition,2018

Reference Books:

1. Stallings W, Data and Computer Communications, 7th edition, Pearson Education, 2004.
2. Gallo M A, and Hancock W M, Computer Communications and Networking Technologies, ThomsonBrooks/Cole, 2002.

MCA 204: Advanced Database Management Systems

Department	Master of Computer Application	Course Type	DSCC
Corse Title	ADBMS	Course Code	MCA 204
L-T-P	3-1-0	Credits	4
Contact Hours	60Hrs	Duration of SEE	3Hrs
SEE Marks	70	CIE Marks	30

Course Objective:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a ADBMS, and Analyze and Implement the concept of Object- Relational database, XML Data. Practice SQL, PL/SQL concepts required for developing Data base programs.

Course Outcomes (Cos):

Co 1. To provide a strong foundation in advanced database concepts. To Understand the basic concepts and the applications of database systems, Database Languages, Data Dictionary, Database Administrators and Database Users, DBMS Architecture, Structure of Relational Databases.

Co 2. To Provide the basics of SQL and construct queries using SQL. To understand the relational database design principles. To Practice SQL, PL/SQL concepts required for maintaining database.

Co 3. To Impart the concepts of object-based data type to deal with large data and to Implement O-R Features. To Implement the concept of XML for developing the Application Programming Interfaces through XML.

Co 4. Basic concepts of query processing; converting SQL queries into Relational Algebra, based on cost-based query optimization. To Provide Basic Algorithms for executing query operations And Query Optimization.

Co 5. To learn Transaction management and Concurrency Control Concepts. To learn different protocols to handle the concurrency control and deadlock situation.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**

CO_1	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_2	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_3	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_4	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3
CO_5	3	3	3	3	3	3	3	-	2	2	3	3	2	1	3

Course Learning Outcomes (CLOs):

1. Describe the fundamental elements of Relational database management systems.
2. Explain the basic concepts of relational data model, entity-relationship model, relational database design.
3. Design ER-models to represent simple database application scenarios.
4. Design Relational database and formulate SQL queries on data. And to implement PL/SQL Programs.
5. Implement the database design for Object based Data bases and Structure of XML with Applications.
6. Design Query Processing: Measures of Query Cost and Algorithms to implement Selection Operation- Sorting-Joint Operation- Evaluation of Expressions-Query Optimization.
7. Learn Transaction concept, Transaction State-Implementation of Atomicity and Durability- Concurrent Executions- Serializability- Deadlock handling.

UNIT-I

Introduction: Database- System Application – Purpose of Database Systems – View of Data – Database Languages– Relational Databases – Database Design–Object– based and Analysis – Database Architecture. Entity Relationship Model-Constraints-Entity-Relationship Diagrams, Design Issue-Weak Entity Sets- Database Design for Banking Enterprise and Unified Mod ling language. Structure of Relational Databases - Relational Algebra Operation– Modification of the Database.

UNIT-II

SQL : Data Definition- Structure of SQL Queries- Set Operations- Aggregate Functions- Nested Sub queries- Complex Queries – SQL Data Types and Schemas- Integrity Constraints-Authorization-Embedded SQL- Dynamic SQL- -Authorization in SQL.;PL/SQL Programming: Introduction, Control structures, functions, Exception handling, Cursors, Triggers, Package.

UNIT-III

Object- Databases and XML: Object-based databases – Complex data types, structured types and inheritance in SQL, table inheritance, array and Multiset types in SQL, object identity and reference types in SQL, implementing O-R features, Persistent programming languages, OO vs OR. XML – Structure of XML, Document Schema, Querying and Transformation, API in XML, XML applications.

UNIT-IV

Query Processing: Measures of Query Cost-Selection Operation-Sorting-Joint Operation-Evaluation of Expressions-Query Optimization: Transformation of Relational Expressions-Estimating Statistics of Expression Results-Choice of Evaluation Plans.

UNIT-V

Transactions: Transaction concept, Transaction State-Implementation of Atomicity and Durability-Concurrent Executions- Serializability- Recoverability-Implementation of Isolation-Testing for Serializability, Concurrency Control: Lock Based Protocols-Timestamp-Based Protocols-Validation-Based Protocols- Multiple Granularity-Multiversion Schemes. Deadlock handling-Insert and Delete Operations-Weak Levels of Consistency-Concurrency in Index Structures

Text Book:

Silberschatz A. Korth H F, and Sudarsan S, *Database System Concepts*, 5th edition, McGraw-

Hill 2002.

Chapters 1to 4, 6 to 10 and 13 to 17)

SQL, PL/SQL: The Programming Language of Oracle by Ivan Bayross, BPB Publications, 2nd Revised Edition.

Reference Books:

Date C J,An Introduction to Database Systems, 7th edition, Pear on Education, 2000.

Elmasri R, and Navathe S B, Fundamentals of Database Systems, 4th edition, Pearson Education, 2004.

Mannino M V, Database Application Development and Design, McGraw-Hill, 2001.

MCA 205A: E-Commerce

Department	Master of Computer Applications	Course Type	Dscc
Course Title	ECOM	Course Code	MCA 205A
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course Description and Objectives:

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems

Course Outcomes: After Completion of the subject student should able to

Co 1. Understand the basic concepts and technologies used in the field of management information systems;
Co 2. Have the knowledge of the different types of management information systems;
Co 3. Understand the processes of developing and implementing information systems;
Co 4. Be aware of the ethical, social, and security issues of information systems;

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	2	-	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	2	-	3	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	2	-	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	2	-	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	2	-	3	3	-	3	3	-	-	2	1	2	1	3

UNIT I

Electronic Commerce: Electronic Commerce Framework; Electronic Commerce and Media Convergence; The Anatomy of E-Commerce Application; Electronic Commerce Organization Applications- The Network Infrastructure for Electronic Commerce: Market Forces Influencing the I- Way; Components of the I Way; Network Access Equipment; the Last Mlle: Local Roads a d Access Ramps; Global Information Distribution: Networks: Public Policy Issues Shaping the I-Way. Case study: B2B ecommerce

UNIT II

The Internet as a Network Infrastructure: The Internet Terminology; Chronological History of the Internet NSFNET: Architecture and Components: Globalization of the Academic Internet; Internet Governance: The Internet Society –An Overview of Internet: Applications –Electronic Commerce; World Wide Web(WWW) as the Architecture: Web Background: Hypertext Publish ng; Technology behind the Web: Security and the Web-Consumer-Oriented Electronic Commerce: Oriented Applications; Mercantile Process, Models Mercantile Models from the Consumer's Perspective; Mercantile Models from the Merchant's Perspective. Case study: E-Commerce/High Security (Pci).

UNIT III

Electronic Payment Systems: Types of Electronic Payment Systems; Smart Cards and Electronic Payment Systems; Credit Card-Based Electronic Payment systems: Risk and Electronic payment Systems Designing Electronic Payment systems – Inter organizational Commerce and EDI: Legal, security, and Privacy Issues: EDI and Electronic Commerce – EDI Implementation, MIME, and Value- Added Networks : Standardization and EDI;EDI Software Implementation: EDI Envelope for Message Transport: Value- Added Networks (VANs); Internet – Based EDI. Case study: Social Media Marketing.

UNIT IV

Intra organization Electronic Commerce: Internal Information System: Macro forces and Internal Commerce; Work-Flow Automation and Coordination; Customization and Internal Commerce; Supply Chain Management (SCM) – The Corporate Digital Library: Dimensions of Internal Electronic Commerce Systems; Making a Business Case for a Document Library; Types o Digital Document Library; Types of Digital Documents; Issues behind Document Infrastructure; Corp e Data Warehouses. Case study: Email Marketing, Email Personalization

UNIT V

M-Commerce: Introduction to Mobile Commerce, Limitations, history, applications, architecture, transaction models, payment methods, advantages, disadvantages Case study: Mobile app marketing case study: O2 Priority Moments gets small businesses on side.

Text Book:

1. Ravi Kalakota and Andrew B.Whinston. Frontiers of Elec ronic commerce, Pearson Education.

Reference Books:

1. Henry Chan, Raymond Lee. Tharan Dillan and E.Chany,E-Commerce, Wiley,2003.
2. Danjel Minoli and Emuna Mimoli, Web Commrece Technology, Tata MicGraw Hill, 1999.
3. Marilyn Greenstein and Todd M Feinman, aElectronic Commerce, TaraMcGraw Hill Edition.

MCA 205B: Cyber Security

Department	Master of Computer Applications	Course Type	Dscc
Course Title	CYBER SECURITY	Course Code	MCA 205B
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course Outcomes:

Co 1. Understand the various tools and methods used in cybercrime.

Co 2. Identify risk management processes, risk treatment methods, organization of information security.

Co 3. Classify cyber security solutions and information assurance.

Co 4. Examine software vulnerabilities and security solutions to reduce the risk of exploitation.

Co 5. Analyze the cyber security needs of an organization.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	3	-	3	3	-	-	2	-	2	1	3
CO2	3	3	2	3	3	-	3	3	-	-	2	-	2	1	3
CO3	3	3	2	3	3	-	3	3	-	-	2	-	2	1	3
CO4	3	3	2	3	3	-	3	3	-	-	2	-	2	1	3
CO5	3	3	2	3	3	-	3	3	-	-	2	-	2	1	3

UNIT I

History of Cyber Security-Introduction to Cyber Security-Definition-Key terms-cyber Attacks and Security tools-Security Threats-Vulnerability assessments-roles in Security-Cyber Security-today-Critical Thinking in Cyber Security

UNIT II

Cyber Threat Actors and their Motives-Security Attacks, Actors and their Motive-A brief overview of types of actors and their motives-Hacking organizations-Major different types of cyber-attack-Security Attack Definition-Security services-Security Mechanisms-Network Security Model-Organizational Threats-Attacks- Security Architecture Attacks-Security Architecture -Attack models-Malware and Ransomware-Threat Examples-Threat Protection Defined-Internet Security Threats – Mapping-Internet Security Threats - Packet Sniffing-Security Threat - IP Spoofing-Security Threats - Denial of service-Security Attacks - Host insertions- What is Social Engineering, Phishing and Vishing- Cyber warfare

UNIT III

Overview of Cyber Security Concepts-CIA Triad – Confidentiality-CIA Triad – Integrity-CIA Triad – Availability-Non - Repudiation - How does it apply to CIA?-Access Management-Incidence Response-Key Concepts - Incident Response-Incident Response Process-Introduction to Frameworks and Best Practices-IT Governance Process-Cybersecurity Compliance and Audit Overview-Pentest Process and Mile 2 CPTE Training-OWASP framework

UNIT IV

Introduction to Key Security Tools -Introduction to Firewall-Firewalls - Packet Filtering-Firewalls - Application Gateway-Firewalls - XML Gateway-Firewalls - Stateless and Stateful- Firewall Administration – Firewall Selection-Firewall Administration – Firewall Configuration-IDPS Administration-VPN Administration-Antivirus/Antimalware-Penetration Testing Introduction-Penetration test Methodologies- Vulnerability Tests

UNIT V

Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing Security and privacy Implications-Digital Forensic- Protecting people privacy in the organizations Forensic best practices for organizations. Case Studies.

Text Books

1. Nina Godbole & Sunit Belapure “Cyber Security”, Wiley ndia, 2012.

2. Cyber Security by Paul Augustine, Crescent Publication Information Security Policies, Procedures, and Standar Guidelines for EffectiveInformation Security Management, Thomas Peltier, Auerbach Publication

References:

1. Harish Chander, “cyber laws & IT protection”, PHI learning pvt.ltd, 2012.
2. MS.M.K.Geetha & Ms.Swapne Raman”Cyber Crimes and Fraud Management, ”MACMILLAN,2012.
3. Pankaj Agarwal : Information Security& Cyber Laws (Acm Learning), Excel, 2013.

MCA 205C: Neural Networks

Department	Master of Computer Applications	Course Type	Dscc
Course Title	NN	Course Code	MCA 205C
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course objectives:

Co 1. In this course, we will study the following topics:

Co 2. Basic neuron models: McCulloch-Pitts model and the generalized one, distance or similarity based neuron model, radial basis function model, etc.

Co 3. Basic neural network models: multilayer perceptron, distance or similarity based neural networks, associative memory and self-organizing feature map, radial basis function based multilayer perceptron, neural network decision trees, etc.

Co 4. Basic learning algorithms: the delta learning rule, the back propagation algorithm, self-organization learning, the r4-rule, etc.

Co 5. Applications: pattern recognition, function approximation, information visualization, etc.

	PO	**PO_2**	**PO**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_1**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	2	-	3	-	3	1	-	-	2	-	2	1	3
CO_2	3	3	2	-	3	-	3	1	-	-	2	-	2	1	3
CO_3	3	3	2	-	3	-	3	1	-	-	2	-	2	1	3
CO_4	3	3	2	-	3	-	3	1	-	-	2	-	2	1	3

CO_5	3	3	2	-	3	-	3	1	-	-	2	-	2	1	3

UNIT I

Introduction: What is Neural network, Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks, Learning Process: Error Correction learning, Memory based learning, Hebb an learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT II

Single Layer PERCEPTRONS: Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception – convergence theorem, Relation between perception and Bayes classifier for a Gaussian Environment.

UNIT III

Multilayer Perceptron: Back propagation algorithm XOR problem, Heuristics, Output representation an d decision rule, Computer experiment, feature detection, BACK PROPAGATION - back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated vergence, supervised learning.

UNIT IV

Self-Organization Maps: Two basic feature mapping models, Self-organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification, Hierarchal Vector quantifier, context Maps.

UNIT V

Neuro Dynamics: Dynamical systems, stability of equilibrium states, Attractors, Neuro dynamical models, manipulation of attractors' as a recurrent network paradigm HOPFIELD MODELS – Hopfield models.

Text Book:

1. Neural networks A comprehensive foundation, Simon Hhaykin, Pearson Education 2nd Edition 2004

Reference Books:

1. Artificial neural networks - B.Vegnanarayana Prentice Halll of India P Ltd 2005
2. Neural networks in Computer intelligence, Li Min Fu TMH 2003
3. Neural networks James A Freeman David M S kapura Pearson Education 2004

MCA III SEMESTER

301: SOFTWARE ENGINEERING

Department	Master of Computer Applications	Course Type	Dscc
Course Title	SE	Course Code	MCA 301
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

COURSE DESCRIPTION:

Software Engineering (SE) comprises the core principles consistent in software construction and maintenance: fundamental software processes and life-cycles, mathematical foundations of software engineering, requirements analysis, software engineering methodologies and standard notations, principles of software architecture and re-use, software quality frameworks and validation, software development, and maintenance environments and tools. An introduction to object-oriented software development process and design. Topics include: iterative development, interpretation of requirements and use case documents into code; application of design notation in UML and use of commonly-used design patterns.

Course Objectives:

Co 1. 1. Knowledge of basic SW engineering methods and practices, and their appropriate application and Describe software engineering layered technology and Process frame work and A general understanding of software process models such as the waterfall and evolutionary models.

Co 2. Understanding of software requirements and the SRS documents, Understanding of the role of project management including planning, scheduling, risk management, etc. and Describe data models, object models, context models and behavioural models.

Co 3. 3.Understanding of different software architectural styles, Understanding of implementation issues such as modularity and coding standards and Understanding of approaches to verification and validation including static analysis, and reviews.

Co 4. Understanding of software testing approaches such as unit testing and integration testing and Describe software measurement and software risks, Understanding of software

evolution and related issues such as version management.

Co 5. Understanding on quality control and how to ensure good quality software and Demonstrate the software project management skills through case studies.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO_1	PSO_2	PSO_3
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

Course Learning Outcomes:

1. Basic knowledge and understanding of the analysis and design of complex systems and Ability to apply software engineering principles and techniques.
2. Ability to develop, maintain and evaluate large-scale software systems to produce efficient, reliable, robust and cost-effective software solutions.
3. Ability to perform independent research and analysis.
4. Ability to work as an effective member or leader of software engineering teams and to manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals Identify and analyzes the common threats in each domain.
5. Ability to understand and meet ethical standards and legal responsibilities.

UNIT I

Software and Software Engineering: Introduction, Software, Software Myths, Software Engineering- Process:- Software Engineering, Software Processes models; Evolutionary process Models, Component based development; Formal Methods Model, Fourth generation Techniques.

An Agile view of processes and Development: Software Engineering practice – Software Engineering, communication, planning, modeling construction practices and deployment.

UNIT II

System Engineering: Computer-based systems, the system engineering Hierarchy, business process engineering, product engineering and system modeling. Building the analysis model, Requirement analysis, modeling approaches, data modeling. Behavioral model.

UNIT –III

Design Engineering: Design process and quality, design concepts the design model, and pattern-used software design. Architectural design: Software architecture, data design, architectural styles and patterns, architectural design mapping data flow into software architecture. Component-based software engineering, Critical systems development, Software reuse, User interface design, web apps design issues and architecture design.

UNIT –IV

Testing strategies: Strategies and issues, testing strategies for and object-oriented software. Validation testing and system testing. Software testing tactics: Fundamentals, black-box and white-box testing white-box testing basis path testing. Control structure testing, Black-box testing, Object-oriented testing methods. Testing methods applicable at the class level inter class testing case design.

UNIT V

Product Metrics: Software quality, framework, metrics for analysis model design model, source case and testing. Managing Software Projects: The management spectrum, the W^5 HH principle, metrics in process, software measurement, Estimation: Observations, Decomposition Techniques, Empirical Models, Estimation For Object-Oriented Projects Other Estimation Techniques, Project Scheduling, Risk Management, Reengineering.

Text Books:

1. Roger, S, Pressman, Software Engineering, A Practitioner's Approach, Six Edition, McGraw-Hill, International Edition, 2005.

2. Ian Sommerville, Software Engineering, Pearson Educati , 8th Edition.

Reference Books:

1. James F Peters, Software Engineering, John Wiley
2. Waruan S Jawadekar, Software Engineering, Tata McGraw ll, 2004.
3. Carlo Ghezzi, Mehdi Jazayeri, Dino Manrioli, Fundamentals of Software Engineering, PHI, 2001 PankajJalote, An Integrated approach to Software Engineering Narosa

MCA 302: COMPUTER GRAPHICS

Department	Master of Computer Applications	**Course Type**	DSCC
Course Title	Computer Graphics	**Course Code**	MCA 302
L-T-P	3-1-0	**Credits**	4
Contact Hours	60 Hours	**Duration of SEE**	3 Hours
SEE Marks	80	**CIE Marks**	20

COURSE OBJECTIVES:

The objective of the course is to present an introduction to the basic concepts of Computer Graphics. It provides the necessary theoretical background and demonstrates the application of computer science to graphics. The course further allows students to develop programming skills in Computer Graphics through programming assignments. It presents the most important drawing algorithms, 2-Dimensional and 3-Dimensional transformations, clipping, filling and interactive Computer Graphics.

The course should enable the students to:

Co 1. Introduction to Computer Graphics and its Applications. To understand various Video Display Devices and its working. To know various Input devices. To learn various line-drawing algorithms like Digital Differential Analyzer (DDA), Bresenhams line-drawing algorithm, Mid-point Circle and Mid-point Ellipse Algorithm.

Co 2. To understand the concept of Scan-line polygon filling algorithm, Boundary fill. flood-fill algorithms. To learn the concepts of basic Two-Dimensional Transformations like Translation, Rotation, Scaling, Reflection and Shearing.

Co 3. To learn the concepts of 2-Dimensional Viewing like The Viewing Pipeline, Window-to-Viewport Co-ordinate Transformation and Viewing functions. To understand the Cohen-Sutherland and Cyrus-beck line clipping algorithms and Sutherland-Hodgeman Polygon clipping algorithm.

Co 4. To provide a good understand of 3-Dimensional Object representations like polygon surfaces, Hermite curves, Quadric surfaces, Spline representation of Curves, Bezier and B-spline curves. To learn basic illumination models and various polygon rendering

methods.

Co 5. To understand the basic 3-Dimensional transformations like Translation, Rotation, Scaling, Reflection and Shearing. To learn the concept of Animation, Computer Animation languages, Animation functions, Raster animations and key frame systems.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO_1	PSO_2	PSO_3
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

COURSE LEARNING OUTCOMES (CLOs):

1. Have a knowledge and understand of the structure of an interactive computer graphics system, and the separation of system components.
2. able to create interactive graphics applications.
3. Perform simple 2D graphics with lines, curves and can implement algorithms to rasterizing simple shapes, fill and clip polygons and have a basic grasp of anti-aliasing techniques.
4. Understand the concepts of 3D object representations and also Spline representation of objects.
5. Learn the basic 3D transformations of an object.
6. Creating the computer animations.

UNIT I

Overview of Graphics systems, Application areas of Computer Graphics, video-display devices, Raster-scan systems, random scan systems, graphics monitors and workstations and input devices. Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms.

UNIT II

Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms. 2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates.

UNIT III

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm.

UNIT IV

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces. Basic illumination models, polygon rendering methods.

UNIT V

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping. Computer Animation: Design of animation sequence, gene al computer animation functions, Raster animations, Computer animation languages, Key frame systems

Text Books:

1. Donald Hearn and M.Pauline Baker, Computer Graphics C Version, Second Edition, Pearson Educations.2005.

Reference Books:

1. Steven Harrington (1987), Computer Graphics – A Programming Approach, Second Edition, Mc Graw –Hill International Editions.
2. William M. Newman and Robert F. Sprowli (1979), Princi les of Interactive Computer Graphics, second Edition, Mc Graw – Hill International Editions.

MCA 303: WEB TECHNOLOGIES

Department	Master of Computer Applications	Course Type	Dscc
Course Title	WEB TECH	Course Code	MCA 303
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course outcomes (cos):

Co 1. Understands the basis of internet, a web browser. Learns how to browse the web browsers, Search Engines Seeking the Net, HTTP, URL other inferred tools. and learns to create a webpage and web site HTML and advanced HTML & HTML Form with HTML-5 controls and used to describe a web page's appearance / presentation (css) or functionality behaviour (java Script)

Co 2. Understanding the de Java script based frame like J query and libraries already developed which can be used directly in software development to reduce the time to marketing also. "Javascript Is a light wait, interpreted programing language that allows user to build interactivity into otherwise Static HTML pages, Javascript supports both C-Style and C++ style comments. JQuery as a javascript toolkit designed to simplify various tasks by writing less code.

Co 3. An understanding the Rich Intanet Application Technology - AJAX is a web browser technology indepent of web server software. how to creating AJAX (Asynchis Javascript and XML) is a new technique for better, fast and more interactive web applications with the help of XML, HTML, CSS and Javascript. Web server can refer to hardware or software, of both of them working together." where as static and dynamic web server.

Co 4. Understanding the features of PHP, is a recursive acronym for ("PHP. Hypertext pre processor", to developing web based software application. PHP is MUST for students and working professionals to become a great Software Engineer specially when working in web development Domain and learns major protocols such as pop3, IMAP, and LDAP. they are PHP4 added support for Java and distribute objet architectures (COM) and CORBA), making development a possibility for the first time

Co 5. Understanding the Servlet technology is used to Create Dynamic web application and

as robust and Scalable. Servlet is java class which extends the functionality of web server by dynamically generating webpages. By default session management are not enabled the in servlet, the user has to enable at & explicitly. Java servlet page (JSP) & is compatible with HTTP request only and in Jsp Session management is automatically enabled. Java Data Base Connectivity (JDBC) which is Standard Java API for database-independent Connectivity between the java programing language and a wide range of databases

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

Course Learning (CLOS):

1. Learns all basics of Internet and browse data in webpage. Learns different internet tools.
2. Learns all the three main languages as HTML, advanced HTML, and CSS, and Java script.
3. Learns AJax is Rich Infernal Application Technology.
4. Learns the bare concepts of web server working with both static and dynamic web server
5. Learns iQuary and libraries as javascript base frame works,
6. Learns major protocols such as poP3, IMAP, and LDAP.
7. Learns Servlet Technology to create a dynamic web. application
8. Learns and gain the skills and project based expensive, essentials to develop a good webpage design and websites.

UNIT I

Introduction to Internet-Browser Architecture-IE: Chrome-Search Engines-Introduction to HTML-5-HTML-5 Tags-Audio, Video Tags – HTML-5 Forms-Controls-CSS Styling-CSS Tags-Attributes.

UNIT II

Java Script-JQuery: JavaScript Programming Scripts- Control structures- Functions-Document, Browser, Date, Math, String objects-Events- JQuery Libraries-JQuery Objects, Functions – JQuery Events-Animations.

UNIT III

AJAX Concepts: Simple AJAX objects-Ajax Libraries-Examples, Webservers IIS, Tomcat-Hosting Website

in a Web servers.

UNIT IV

Introduction to PHP: Control Structures-Arrays-Functions-Database connectivity-Introduction to ZEND Framework and applications

UNIT-V

Introduction to Java Servlets: Servlet classes and interfaces - Java Database Connectivity-Introduction toJSP-Java Server Page scriptlets -JSP Objects-JSP Web applications.

Text Books:

1. Deitel, Deitel and Goldberg Internet & World Wide Wide how to program"by End. Pearson Education
2. Ivan Bayross, Webenavled commercial Application Development in Java 2.0 BPB.
3. HTML 5 Black book, Kogent Learning Solutions Inc.

Reference Books:

1. Raj Kamal Internet and web Technologies, Tata Mc Graw Hill, 2002.
2. Chirs Bates, Web Programming, John Wiley, 2nd Edition

MCA 304A: DATA WAREHOUSING AND DATA MINING

Department	Master of Computer Applications	**Course Type**	DSCC
Course Title	Data Warehousing and Data Mining	**Course Code**	MCA 304A
L-T-P	3-1-0	**Credits**	4
Contact Hours	60 Hours	**Duration of SEE**	3 Hours
SEE Marks	80	**CIE Marks**	20

COURSE OBJECTIVES:

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts

The knowledge of following subject is essential to understand the subject:

Understand the concepts of Data Ware housing and Data Mining Concepts.

Explain the methodologies used for analysis of data

Describe various techniques which enhance the data modeling.

Discuss and Compare various approaches with other techniques in data mining and data ware housing

COURSE OUTCOMES (Cos):

Co 1. To Be familiar with mathematical foundations of data mining tools.

Co 2. Understand and implement classical models and algorithms in data warehouses and data

mining

Co 3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.

Co 4. Different data mining techniques in various applications like social, scientific and environmental context.

Co 5. Build up skill in selecting the appropriate data mining algorithm for solving practical problems.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

COURSE LEARNING OUTCOMES (CLOs):

1. Understand the functionality of the various data mining and data warehousing component
2. Appreciate the strengths and limitations of various data mining and data warehousing models
3. Simplifying the Data analyzing techniques to implement various Historical data Repositories
4. Describe different methodologies used in data mining and data ware housing.
5. Compare different approaches of data ware housing and data mining with various technologies

UNIT I

Data warehousing and OLAP**:** Data Warehouse basic concepts, Data Warehouse Modelling, Data Cube and OLAP: Characteristics of OLAP systems, Multidimensional view and Data cube, Data Cube Implementations, Data Cube operations, Implementation of OLAP and overview on OLAP Software.

UNIT II

Data Mining and its Applications **:** Introduction, What is Data Mining, Motivating Challenges, Data Mining Tasks, Which technologies are used for data mining, Kinds of pattern that can be mined, Data Mining Applications, Data Pre-processing, Data cleaning, data integration, data redu on and data transformation.

UNIT III

Association Analysis: Basic Concepts and Algorithms **:** Frequent Item set Generation, Rule Generation,

Compact Representation of Frequent Item sets, Alternative methods for generating Frequent Item sets, FPGrowth Algorithm, Evaluation of Association Patterns.

UNIT IV

Classification: Methods, Improving accuracy of classification: Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers, Nearest Neighbor Classifiers. Bayesian Classifiers, Estimating Predictive accuracy of classification methods, Improving accuracy of classification methods, Evaluation criteria for classification method Multiclass Problem.

UNIT V

Clustering Techniques: Overview: Features of cluster analysis, Types of Data and Computer Distance, Types of Cluster Analysis Methods, Partitioned Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis

Text Books:

1. Jiawei Han and MichelineKamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Addison-Wesley,2005.

Reference Books:

1. Arun K Pujari: Data Mining Techniques University Press 2nd Edition, 2009.
2. G. K. Gupta: Introduction to Data Mining with Case Studies, 3rd Edition, PHI, New Delhi, 2009.
3. Alex Berson and Stephen J.Smith: Data Warehousing, Dat ning, and OLAP ComputingMcGrawHill Publisher, 1997

MCA 304B: Big Data Analytics

Department	Master of Computer Applications	Course Type	Dscc
Course Title	BIG DATA ANALYTICS	Course Code	MCA 304B
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course Description and Objectives:

This course gives an overview of Big Data, i.e. storage, retrieval and processing of big data. In addition, it also focuses on the "technologies", i.e., the tools/algorithms that are available for storage, processing of Big Data. It also helps a student to perform a variety of "analytics" on different data sets and to arrive at positive conclusions.

Course outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand Big Data and its analytics in the real world	**1**
2	Analyze the Big Data framework like Hadoop and NOSQL to efficientlystore	**2**

	and process Big Data to generate analytics	
3	Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm	**3**
4	Design and Implementation of Big Data Analytics using pig and spark tosolve data intensive problems and to generate analytics	**4**
5	Implement Big Data Activities using Hive	**5**

Course Objectives

Co 1. Design classification models for various standard datasets and user datasets.

Co 2. Develop clustering techniques and association rules for large standard datasets and user datasets.

Co 3. Analyse large scale data using MAPREDUCE programming which includes JAVA and HADOOP frameworks.

Co 4. Analyse large scale data using PIG and HIVE.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

Course Learning Outcomes:

1. Logistic Regression using MENARCHE dataset.
2. Logistic Linear Regression using TITANIC dataset.
3. Decision Tree & Cross Validation using IRIS dataset.
4. Random Forest & Cross Validation using IRIS dataset.

UNIT I

What is Big Data : Varieties of Data – Unstructured data – Trends in Data Storage - Basically Available Soft State Eventual Consistency (BASE) - Industry Examples of Big Data.

UNIT - II

Big Data Technology: New and older approaches – Data Discovery –Terminologies used in Big Data Environments- Open Source technologies for Big Data Analytics – Cloud and Big Data – Big Data Foundation – Computation – Limitations – Big Data Emerging Technologies.

UNIT III

Business Analytics –Consumption of Analytics – Creation to Consumption of Analytics – Data visualization by Organizations – 90/10 rule of critical thinking – Decision sciences and analytics – Learning over knowledge – Agility – Scale and convergence – Privacy and security in Big Data.

UNIT IV

Predictive Analytics – Target Definition - Linear Regression – Logistic Regression - Decision trees – Neural Networks – Support Vector machines - Classification trees – Ensemble methods – Association Rules – Segmentation, Sequence Rules, Social Network analytics.

UNIT V

Hadoop – Why Hadoop? – Why not RDBMS? – RDBMS Versus Hadoop - Components of Hadoop – Hadoop File System – Hadoop Technologies Stack – Managing Resources and Applications with Hadoop YARN – Data warehousing Hadoop Concepts – Applications of Hadoop using PIG, YARN,HIVE.

Text Books

1. Big Data and Analytics, seema Acharya ,Subhashini chel an, Wiley publications
2. Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Itsapplications, Wiley India Private Limited

Reference Books

1. "Big Data Analytics: Systems, Algorithms, Applications" **Prabhu**, C.S.R., **Sreevallabh Chivukula**,A., **Mogadala**, A., **Ghosh**, R., **Livingston**, L.M.J.

MCA 304C: System Programming

Department	Master of Computer Applications	Course Type	Dscc
Course Title	SYSTEM PROGRAMMING	Course Code	MCA 304C
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course Objectives:

The aim of this course is to provide students with knowledge and abilities to design system programs such as assemblers, linkers, loaders, macro-processors, editors, interpreters, compilers and operating systems using modern methodologies and to implement their design using modern development tools.

Course Learning Outcomes

Co 1. Adequate knowledge in system programs (assemblers, loaders, linkers, macro-processors, text editors, debuggers, interpreters, compilers, operating systems).

Co 2. Ability to use theoretical and applied information in these areas to design system software with realistic constraints.

Co 3. Ability to conduct experiments, gather data, analyze and interpret results for investigating solutions to real life applications with assembly language programming and Unix shell programming.

Co 4. Ability to devise, select, and use modern techniques and tools needed for the design and implementation of system programs

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

SYLLABUS

UNIT I

Background introduction, system software and machine Accenture, SIC, RISC, and CISC architecture. Assembler: basic assembler functions, machine dependent and independent assembler features, assembler design options, and implementation examples.

UNIT II

Loading and linkers basic loader junction, machine dependent and independent loader features, loader design options and implementation examples. Macro processors, basic macro processor functions machines – independent macro processor features, macro processor design options, implementation examples.

UNIT III

Compilers: basic compiler functions, machine dependent and independent compiler features, compiler design options and implementation examples. Other system software: text editors and interactive debugging systems.

UNIT-IV

Introduction to Device Drivers, Design issues-Types of Drivers, Character driver-1 and Design issues, Character Driver-2- A/D converter and its design issues, Block driver-1 and its design issues.

UNIT-V

Introduction to Linux- Linux Architecture- X-windows- Linux administration tools - Commands to use LinuxOS- Executing Linux Shell scripts – Shell Programming concepts-Shell scripts.

Text Books:

1. Leland .Beck, System Software: An Introduction to systems programming :3/e, Pearson Educations Asia,2003. George pajari, Writing Unix Drivers, Addison – Wesley, 1991.

Reference Books:

1. Richard Petersen, Linux complete Reference, McGraw Hill Education (India) Private Limited; 6 edition(21 November 2007)
2. Dhamdhere, System programming and operation Systems Book 2/E, Tata Mc Graw, Hill, 1999

MCA 305A: Cryptography and Network Security

Department	Master of Computer Application	Course Type	DSCC
Corse Title	CNS	Course Code	MCA 305 A
L-T-P	3-1-0	Credits	4
Contact Hours	60Hrs	Duration of SEE	3Hrs
SEE Marks	80	CIE Marks	20

Course Objective:

To make the student learn different encryption techniques along with hash functions, MAC, digital signatures and their use in various protocols for network security and system security.

Course Outcomes (Cos):

Co 1. Analyze and design classical encryption techniques and block ciphers. Understand and analyze data encryption standard

Co 2. Understands the concepts of Conventional Encryption Algorithms, Characteristics of advanced symmetric Block Ciphers. Understands and analyze Confidentiality using Conventional Encryption.

Co 3. Understand and analyze public-key cryptography, RSA and other public-key cryptosystems. such as Diffie-Hellman Key Exchange, El Gamal Cryptosystem, hash functions etc.,

Co 4. Understand key management and distribution schemes and design User Authentication. Protocols, Analyze and design hash and MAC algorithms, and digital signatures. Design network application security schemes, such as PGP, S/ MIME, IPsec. Know about Intruders and Intruder Detection mechanisms, Types of Malicious software, Firewall Characteristics, Types of Firewalls, Firewall Location and Configurations.

Co 5. Understands and learns to provide security for Mobile and manage the Risks. Provides security for cloud-based applications. Learns to provide security for E- money like Crypto currency, Bit Coin Security and working

Co 6.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO_1	PSO_2	PSO_3
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

Course Learning Outcomes (CLOs):

1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
2. Apply the different cryptographic operations of symmetric cryptographic algorithms
3. Apply the different cryptographic operations of public key cryptography
4. Apply the various Authentication schemes to simulate different applications.
5. Understand various Security practices and security standards.

SYLLBUS

UNIT – 1

Cryptography – Terminology, Conventional Encryption Model, Steganography, Classical Encryption Techniques, DES Data Encryption Standard, Block Cipher Design principles and Modes of Operation.

UNIT II

Conventional Encryption Algorithms: Triples DES, International Data Encryption Algorithm, Blowfish, RC5, Characteristics of advanced symmetric Block Ciphers, Confidentiality using Conventional Encryption.

UNIT III:

Public-Key Cryptography, Introduction to Number Theory: Prime Numbers, Modular Arithmetic, Euler's Theorem, Primary and Factorization, discrete logarithm, D-H Key sharing technique, RSA and its variants-Homomorphic Encryption Techniques Message Authentication and Hash Functions – Hash and MAC algorithms..

UNIT IV

Digital, Signatures and authentication Protocols, Digital Signature Standard, Network Security Practice, Authentication Applications. Basic overview of Electronic Mail Security: pretty Good Privacy's/MIME: IP Security, Web Security – Intruders, Viruses and Worms – Firewalls.

UNIT V

Mobile Security, Risk Model, Eco-System, Service Risks, App Risks, Countermeasures- Cloud Computing Security- Threats-Security in Cloud. Security at service layers. Introduction to Block chain, Crypto currency,BitCoin Security and working, *Ethereum*.

Text Books

1. Cryptography and Network Security – by William Stallings, Principles and Practice, 7th Edition, Pearson
2. Cryptography and Network Security, by John Wiley, Edn, 001

Reference Books

1. Bruce Schneier, Applied Cryptography, John Wiley, Second Edn,2001.
2. Charke Kaufman, Rodia Perlman and Mike Speciner, Network Security

MCA 305B: ARTIFICIAL INTELLIGENCE

Department	Master of Computer Applications	**Course Type**	DSCC
Course Title	Artificial Intelligence	**Course Code**	MCA **305B**
L-T-P	3-1-0	**Credits**	4
Contact Hours	60 Hrs	**Duration of SEE**	3 Hrs
SEE Marks	70	**CIE Marks**	30

COURSE OBJECTIVES:

Co 1. To introduce the prominent methods for machine learning

Co 2. To study the basics of supervised and unsupervised learning

Co 3. To study the basics of connectionist and other architectures

Co 4. Illustrate the working of classifier models like SVM, Neural Networks and identify classifier model for typical machine learning applications

Co 5. Illustrate and apply clustering algorithms and identify its applicability in real life problems.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3
CO_2	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3
CO_3	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3
CO_4	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3
CO_5	3	2	3	3	-	-	3	2	-	-	2	3	2	1	3

COURSE LEARNING OUTCOMES

1. Differentiate various learning approaches, and to interpret the conceptsof supervised learning.
2. Compare the different dimensionality reduction techniques.
3. Apply theoretical foundations of decision trees to identify best split andBayesian classifier to label data points.
4. Illustrate the working of classifier models like SVM, Neural Networks and identify classifier model for typical machine learning applications.
5. Identify the state sequence and evaluate a sequence emission probabilityfrom a given HMM.
6. Illustrate and apply clustering algorithms and identify its applicability inreal life problems.

SYLLABUS

UNIT I

Introduction Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree

UNIT II

Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

UNIT III

Probability, conditional probability, Constraint Satisfaction, Propositional Logic & Satisfiability, Uncertainty in AI, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

UNIT IV

MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially Observable MDPs.

UNIT V

Passive reinforcement learning, direct utility estimate adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning. Introduction to Machine learning, Deep Learning.

Text Books

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, " Artificial Intelligence", Tata McGraw Hill

Reference Books

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011
2. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents",Cambridge University Press 2010.

MCA 305C: Mobile Application Development

Department	Master of Computer Applications	Course Type	Dscc
Course Title	MAD	Course Code	MCA 305C
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course Outcomes:

Co 1. Upon completion of the course students should be able to:

Co 2. Install and configure Android application development tools.

Co 3. Design and develop user Interfaces for the Android platform.

Co 4. Save state information across important operating system events.

Co 5. Apply Java programming concepts to Android application development.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	2	-	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	-	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	-	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	-	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	-	3	-	3	3	-	-	2	1	2	1	3

Course Learning Outcome:

1. Design and develop User Interfaces for the Android platform.
2. Content that supports this outcome:
3. Android Applications, Activities and Widgets
4. ActionBar Activities
5. Customizing Styles and Themes
6. Displaying images
7. Playing video and audio
8. UI Fragments and the Fragment Manager
9. Creating custom SurfaceViews and simple animation
10. Responding to touch events
11. Supporting different devices, localizations, orientations, API levels, and resolutions.
12. XML resources
13. Launching Activities and passing information between Activitie.

SYLLABUS

UNIT I

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT II

Basic Design: Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III

Advanced Design: Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing.

UNIT IV

Technology I - Android: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT V

Technology II – IOS: Introduction to Objective C – iOS features – UI implementation – Touch frameworks –Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application

Text Books

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
2. Charlie Collins, Michael Galpin and Matthias Kappler, Android in Practice", DreamTech, 2012

Reference Books

1. http://developer.android.com/develop/index.html
2. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS
3. Development: Exploring the iOS SDK", Apress, 2013.

MCA 401A CLOUD COMPUTING

Department	Master of Computer Application	Course Type	DSCC
Corse Title	Cloud Computing	Course Code	MCA 401A
L-T-P	3-1-0	Credits	4
Contact Hours	60Hrs	Duration of SEE	3Hrs
SEE Marks	80	CIE Marks	20

Course Objective:

Cloud computing could be a key distributed systems paradigm that has big in style within the previous few years. Cloud technologies square measure pervasive, touching our daily lives any time we have a tendency to access the globe wide net, use a mobile app, or build a retail purchase. Clouds also are the de facto infrastructure for "Big Data" applications. whereas innovative Cloud services square measure offered by data technology corporations, Cloud computing is additionally grounded in foundational distributed systems and ascendible software system systems principles, and is a vigorous space of analysis by the educational community.

Course Outcomes (Cos):

Co 1. To deliver a strong fundamental concept in cloud computing. Making to understand the cloud architectures like SaaS, PaaS, LaaS and public and private cloud. To understand the distributed system models and enabling technologies for network- based systems, performances and security measures.

Co 2. To implement the basics of virtualization types and levels of virtualization implementation.

Co 3. To understand the virtualization structures, tools and mechanisms. To learn the concepts of hardware and software support for virtualization. To become familiar about virtual clusters, resource management and data center automation in virtualization.

Co 4. To Impart the concepts of cloud infrastructure, the service models and the design for storage in cloud. To understand design for data center and interconnection network. To know how to provide the security for trust management in the cloud.

Co 5. To get the knowledge on cloud programming and software environment. To Provide basic programming support on google app engine, amazon AWS and Microsoft Azure. To know the emerging cloud software environment.

Co 6. To enable the knowledge on providing security, risk and challenges for cloud environment. To provide basic knowledge on security architecture design for data security, user identification security, and access control in cloud.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	-	2	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	-	2	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	-	2	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	-	2	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	-	2	3	-	3	3	-	-	2	1	2	1	3

Course Learning Outcomes (CLOs):

1. Explore the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for cloud computing.
2. Identification for different cloud architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
3. Identifying the appropriate technologies, tools, mechanisms, algorithms, and approaches for the related issues.
4. Figuring out the problems for providing the data security in the cloud, and their solutions.

5. Attempting to learn the new technologies like google app engine, amazon AWS.
6. New software environments like Eucalyptus, Open nebula, Aneka will be learnt.
7. Explain the core issues of Cloud Computing such as security challenges, risk, privacy, and interoperability.

SYLLABUS

UNIT I

Cloud Architecture and Model: Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture, Cloud Models: Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public Vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

UNIT II

Virtualization: Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation. VMWare, Virtual Box Virtualization software.

UNIT III

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources. Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

UNIT IV

Programming Model: Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support – Software environments for service development; Amazon, Azure, Google App Engine, AWS - Cloud Environments - Eucalyptus, Open Nebula, OpenStack, Aneka, Cloud Sim. Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT V

Security In The Cloud: Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design –Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control.

Text Books:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed a d Cloud Computing, From ParallelProcessing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Ritting house, John W., and James F. Ransome Cloud Co puting: Implementation, Management and Security?, CRC Press, 2017.

Reference Books:

1. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, andSecurity", CRC Press, 2010.
2. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011.

MCA 401C: SOFTWARE TESTING

Department	Master of Computer Applications	Course Type	Dscc
Course Title	SOFTWARE TESTING	Course Code	MCA 401C
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course Objectives:

Co 1. To study fundamental concepts in software testing

Co 2. To discuss various software testing issues and solutions in software unit test, integration and system testing.

Co 3. To expose the advanced software testing topics, such as object-oriented software testing methods.

Co 4. Understanding the functional and system testing methods.

Co 5. Student learns how to handle various issues for object oriented testing.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO_1	PSO_2	PSO_3
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

Course Learning Outcomes:

At the end of this course student will:

1. List a range of different software testing techniques and strategies and be able to apply specific(automated) unit testing method to the projects.
2. Distinguish characterstics of structural testing methods.
3. Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible.
4. Discuss about the functional and system testing methods.
5. Demonstrate various issues for object oriented testing.

SYLLABUS:

UNIT I

The role of process in software quality: Testing as a process - Overview of the Testing Maturity Model (TMM) - Basic definitions - Software testing principles - Origins of defects - Defect classes, Defect repository - Test design - Defect example: the coin problem

UNIT II

Test case design strategies: Black box approach - Random testing - Equivalence class partitioning - Boundary value analysis - Cause and Effect graphing - State transition testing - Error guessing - White box approach - Test adequacy criteria - Coverage and control flow graphs - Covering code logic - Data flow and white box test design - Loop testing - Mutation testing - Evaluating test adequacy criteria.

UNIT III

Levels of testing: Unit test: functions, procedures, classes and methods units - Unit test planning - Designing test units - The class as a testable unit - The test harness - Integration test: goal - Integration strategies for procedures and functions - Integration strategies for classes - Designing integration test - System test - The different types - Regression testing - Alpha, beta and acceptance test - Test planning - Test plan components - Test plan attachments - Reporting test results.

UNIT IV

Software quality: Defining Quality: importance of quality - Quality control v/s quality assurance - Quality assurance at each phase of SDLC - Quality assurance in software support projects - SQA function - Quality management system in an organization - Software quality assurance plans - Product quality.

UNIT V

Software metrics and models: Walkthroughs and Inspections - Software Configuration Management -ISO:9001 Model - CMM Model - CMM and ISO comparative analysis - CMM-I.

Text Books

1. IIene Burnstein, "Practical Software Testing", Springer International Edition, First Indian reprint, 2004.
2. Nina S Godbole, "Software Quality Assurance, Principles and Practice", Narosa Publishing House, 2004.

Reference Books

1. P.C. Jorgensen, "Software Testing - A Craftman's Approach", CRC press, 1995.
2. Boris Beizer, van Nostrand Reinhold, "Software Testing Techniques", 2nd Edition, 1990.

syllabus

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1. Boris Beizer, van Nostrand Reinhold, "Software Testing Techniques", 2nd Edition, 1990.

MCA 402A: Essentials of Data Science

Department	Master of Computer Applications	Course Type	Dscc
Course Title	EDS	Course Code	MCA 402A
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course Objectives:

The main objective of this program is to provide the best graduate education to students so that they can meet the growing national and international need for highly qualified personnel in the fields of data science and artificial intelligence. The overarching objectives of the Master of Data Science and Artificial Intelligence.

Develop a broad academic and practical literacy in computer science, statistics, and optimization, with relevance in data science and artificial intelligence, so that students are able to critically select and apply appropriate methods and techniques to extract relevant and important information from data.

1. Provide strong core training so that graduates can adapt easily to changes and new demands from industry.
2. Enable students to understand not only how to apply certain methods, but when and why they are appropriate.

3. Integrate fields within computer science, optimization, and statistics to create adept and well-rounded data scientists.
4. Expose students to real-world problems in the classroom and through experiential learning.

Course Outcomes:

Co 1. Students will develop relevant programming abilities.

Co 2. Students will demonstrate proficiency with statistical analysis of data.

Co 3. Students will develop the ability to build and assess data-based models.

Co 4. Students will execute statistical analyses with professional statistical software.

Co 5. Students will demonstrate skill in data management.

Co 6. Students will apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO_1	PSO_2	PSO_3
CO_1	3	-	2	3	3	-	3	-	-	-	2	1	2	1	3
CO_2	3	-	2	3	3	-	3	-	-	-	2	1	2	1	3
CO_3	3	-	2	3	3	-	3	-	-	-	2	1	2	1	3
CO_4	3	-	2	3	3	-	3	-	-	-	2	1	2	1	3
CO_5	3	-	2	3	3	-	3	-	-	-	2	1	2	1	3

UNIT I

Introduction: What is Data Science? - Big Data and Data Science, Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model - Intro to R Language.

UNIT II

Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA - Philosophy of EDA - The Data Science Process - Case Study: Real Direct (online real estate firm)

UNIT III

Feature Generation and Feature Selection (Extracting Meaning From Data) - Motivating application: user (customer) retention - Feature Generation (brainstorming, role of domain expertise, and place

for imagination) - Feature Selection algorithms – Filters; Wrappers; Decision Trees; Random Forests.

UNIT IV

Data Visualization: Basic principles, ideas and tools for data visualization 3 - Examples of inspiring (industry) projects - Exercise: create your own visualization of a complex dataset

UNIT V

Data Science and Ethical Issues - Discussions on privacy, security, ethics - A look back at Data Science - Next-generation data scientists

Text Books

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.

References Books

1. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. (free online)
2. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. ISBN 0262018020. 2013.

MCA 402B: Deep Learning

Department	Master of Computer Applications	Course Type	Dscc
Course Title	DL	Course Code	MCA 402B
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course Objectives

The main objective of this course is to make students comfortable with tools and techniques required in handling large amounts of datasets. They will also uncover various deep learning methods in NLP, Neural Networks etc. Several libraries and datasets publicly available will be used to illustrate the application of these algorithms. This will help students in developing skills required to gain experience of doing independent research and study.

Course Outcomes

Co 1. Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.

Co 2. Implement deep learning algorithms and solve real-world problems.

Co 3. Learns the fundamentals of neural networks.

Co 4. Studies about the architecures of LSTM, GRU and encoder-decoder architectures.

Co 5. analyses about different case studies.

	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{10}	PO_{11}	PO_{12}	PSO_1	PSO_2	PSO_3
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

UNIT I

Basics Of Neural Networks: Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks.

UNIT II

Introduction To Deep Learning:: Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout.

UNIT III

Convolutional Neural Networks: : CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

UNIT IV

More Deep Learning Architectures\:LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Autoencoders – Adversarial Generative Networks – Autoencoder and DBM

UNIT V

Applications Of Deep Learning: Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent

Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

Text Books:

1. Ian Good Fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
2. Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.

Reference Books

1. Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.
2. Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress , 2017.
3. Ragav Venkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press, 2018.

MCA 402C: Internet of Things

Department	Master of Computer Applications	Course Type	Dscc
Course Title	IoT	Course Code	MCA 402C
L-T-P	3-1-0	Credits	4
Contract Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	70	CIE Marks	30

Course description and objectives:

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

Course Outcomes:

Co 1. Able to understand the application areas of IOT

Co 2. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks

Co 3. Able to understand building blocks of Internet of Things and characteristics

Co 4. Understands about big data and its types, data analysis.

Co 5. Studies about different real time applications as case studies.

	PO_1	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**	**PO_9**	**PO_{10}**	**PO_{11}**	**PO_{12}**	**PSO_1**	**PSO_2**	**PSO_3**
CO_1	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_2	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

CO_3	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_4	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3
CO_5	3	3	2	3	3	-	3	3	-	-	2	1	2	1	3

UNIT I

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

UNIT II

Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

UNIT III

Wireless Technologies For Iot**:** WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet, Modbus. IP Based Protocols For IoT: IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT.

Edge connectivity and protocols

UNI IV

Data Handling& Analytics**:** Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications, Edge/Fog Computing

UNIT V

Applications of IoT**:** Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

Text Books:

1. Olivier Hersent, David Boswarthick, and Omar Elloumi, ― "The Internet of Things: Key Applications and Protocols", WileyPublications
2. Vijay Madisetti and ArshdeepBahga, ― "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.

Reference Books

1. Daniel Minoli, ― "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press

403 Major Project work (One Month Course work & 3 Months on site project)

1. Project Seminar &. Project Report 4 credits
2. National / International Conference Publication Proceedings (External): (paper based on project should be submitted to conference and published in the form of proceedings) 2 credits
3. National / International Journal Publication (External) (paper based on project should be submitted to the journal and should be published) 2 credits

Viva Voce (External) &. Project Execution (External): 4 credits

SRI VENKATESWARA UNIVERSITY: TIRUPATI
S.V.U COLLEGE OF CM & CS

DEPARTMENT OF COMPUTER SCIENCE



Course
Master of Computer Science (M.Sc. (CS))

Choice Based Credit System (CBCS)
Academic Year 2023 – 24

Amended as per NEP-2020

About the Department

The Department was established in 1985 and ever since its inception; the department has been a pioneering academic centre for higher education, research, and innovation in core and key areas of computer science and applications.

The Department of Computer Science was given the status of the separate department in 2003 after bifurcation from College of Engineering. It has grown in stature to be ranked amongst the best in the university offering world class pedagogical and research experience to its students.

The Department is recognized under Special Assistance Programme (SAP) by the University Grants Commission and has been awarded (NO: F.3-49/2011 (SAP-II)) for a period of 5 years with an amount of Rs.47,00,000 and SAP DRS–II with an amount of Rs.88,00,000 & with DST – FIST with an amount of Rs.60,00,000 CS researchers contribute to cutting-edge research in topical areas of computer science and applications and are active researchers in their respective domains of expertise enhancing publication profile and citations accumulated by the publications

The department's alumni include renowned academicians, leaders in computer and IT industry, distinguished scientists, and trendsetting entrepreneurs (UGC SAP DRS-II & DST –FIST)

The department currently offers two PG level professional programmes following Choice Based Credit System and two research-oriented programmes. Both M.Sc. (CS) & MCA are interdisciplinary programmes offering Computer Science subjects along with Mathematics, Statistics, Management and Commerce are also having as one of the core /elective subjects.

The courses offered in the department meet the requirements of both the industry and research. The curriculum is designed to train the students in developing application programmes (software) and also designing and developing computing systems (hardware). Faculty members taking classes, involving in curriculum development and implementation in the departments having computer subjects like Zoology, Biotechnology, Geography, Microbiology, Bioinformatics etc.

Vision

To be the source of bringing out globally competent pioneering computing professionals, researchers, innovators and entrepreneurs and thereby succeed and contribute value to the knowledge-based economy and society.

Mission

- To offer high-grade, value-based Post-graduate and Doctoral programmes in the field of Computer Applications.
- To provide conducive environment so as to achieve excellence in teaching-Learning and research and development activities.
- To bridge the gap between industry and academia by framing curricula and syllabi based on industrial and societal needs.
- To offer tasks for experiential technology- Intensive knowledge through collaborative and interdisciplinary activities.
- To provide appropriate forums to develop innovative talents, practice ethical values and inculcate as enduring learners.
- To facilitate students to nurture skills to practice their professions competently to meet thever-changing needs of society.
- Achieve academic excellence in Computer Applications through innovative teaching and learning processes.
- To prepare the students to be professionally competent to face the challenges in the industry.
- Promote inter-diciplinary research among the faculty and the students to create state of art research facilities.
- To promote quality and ethics among the students.
- Motivate the students to acquire entrepreneurial skills to become global leaders.

CHOICE BASED CREDIT SYSTEM(CBCS)

M.Sc(CS) Programme (CBCS) Regulations-2016

Amended as per NEP-2020

(with effect from the batch admitted in the academic year 2021-22)

CHOICE BASED CREDIT SYSTEM(CBCS)

1. Preamble:

M.Sc (CS) Programme is of two academic years with each academic year being divided into two consecutive (one odd + one even) semesters.

Choice-Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of lectures / tutorials / laboratory work / field work / project work /viva / seminars / assignments / presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:

i.	choose electives from a wide range of courses offered by the Departments of the College/University.
ii.	opt for additional courses of interest
iii.	adopt an inter-disciplinary approach in learning
iv.	make the best use of expertise of the available faculty
v.	Skill Oriented Course and Multidisciplinary Course/Project are introduced as per Action Plan of National Education Policy-NEP-2020

2. **MINIMUM QUALIFICATION:**

Minimum qualification for seeking admission into M.Sc(CS) Programme is any U.G.Degree with computer science as one of the major subject, with at least 40% marks for general and pass marks for SC/ST in aggregate.

3. **Branch of Study::** **M.Sc(CS)** Programme

4. **Programme Duration:**

4.1 Minimum duration of the full-time M.Sc(CS) Programme is two consecutive academic years i.e. four semesters and maximum period is four academic years.

4.2 **Semester:**

Generally, each semester shall consist of 90 actual instruction days including sessional test days. However, instructional days may be reduced up to 72, when necessary, with increased instructional hours per course per week.

5. **Credits:**

Credit defines the quantum of contents/syllabus prescribed for a course and determines the number of instruction hours per week. The norms for assigning credits to a course for a duration of one semester shall be as follows:

- One credit for every one hour of lecture/tutorial per week
- One credit for every two hours of practical work/seminar per week
- 4 credits in a semester for project work.

6. **Classification of Courses:**

The courses of each specialization of study are classified into Core Courses, Elective Courses and Foundation courses. It is mandatory for a student to complete successfully all the **Core and Elective courses** pertaining to his/her of specialization of study.

SEMISTER-I											
Category	**Course Code**	**Title of the Paper/Course**	**Core / Elective or Minor Or Soft Skill Courses**	**Teaching hours/week**			**University Exam Duration [Hrs]**	**Marks**			**Credits**
				L	**T**	**P**		**IE / IA**	**EE / EA**	**Total Marks**	
DSCC1	MSCS - 101C	Computer Organization	Core	3	1	0	3	20	80	100	4
DSCC2	MSCS - 102C	Programming in Java & Data Structures	Core	3	1	0	3	20	80	100	4
DSCC3	MSCS - 103C	Operating Systems	Core	3	1	0	3	20	80	100	4
DSEC1	MSCS - 104GE	1.Mathematical Foundations for Computer Science 2.Computer Oriented Operational Research	Generic Elective	3	1	0	3	20	80	100	4
AECC1	MSCS - 105CF	Environmental Studies	Compulsory Foundation	2	0	0	1.5	-	50	50	2
SEC1	MSCS - 106EF	1.PC Hardware Basics 2.Statistical Methods	Elective Foundation	2	0	0	1.5	-	50	50	2
	MSCS - 107P1		Practical I On Core	0	0	4	3	20	80	100	4
	MSCS - 108P2		Practical II On Core & Generic Elective	0	0	4	3	20	80	100	4
								120	580	700	28

SEMESTER-II											
Category	**Course Code**	**Title of the Paper/Course**	**Core / Elective or Minor or Soft Skill Courses**	**Teaching hours/week**			**University Exam Duration**	**Marks**			**Credits**
				L	**T**	**P**	**[Hrs]**	**IE / IA**	**EE / EA**	**Total Marks**	
DSCC4	MSCS - 201C	Advanced Data Base Management System	Core	3	1	0	3	20	80	100	4
DSCC5	MSCS - 202C	Computer Networks	Core	3	1	0	3	20	80	100	4
DSCC6	MSCS - 203C	Computer Graphics	Core	3	1	0	3	20	80	100	4
DSEC2	MSCS - 204GE	1.E- Commerce 2.Accounting and Financial Management	Generic Elective	3	1	0	3	20	80	100	4
AECC2	MSCS - 205CF	Human Rights and Value Education	Compulsory Foundation	2	0	0	1.5	-	50	50	2
SEC2	MSCS - 206EF	1.Principles of Management 2.Internet of Things	Elective Foundation	2	0	0	1.5	-	50	50	2
	MSCS - 207P1		Practical I on Core	0	0	4	3	20	80	100	4
	MSCS - 208P2		Practical II on Generic Elective	0	0	4	3	20	80	100	4
								120	580	700	28

SEMESTER-III											
Category	**Course Code**	**Title of the Paper/Course**	**Core / Elective or Minor or Soft Skill Courses**	**Teaching hours/week**			**University Exam Duration [Hrs]**	**Marks**			**Credits**
				L	**T**	**P**		**IE / IA**	**EE / EA**	**Total Marks**	
DSCC7	MSCS - 301C	Data Warehousing and Data Mining	Core	3	1	0	3	20	80	100	4
DSCC8	MSCS - 302C	Web Technologies	Core	3	1	0	3	20	80	100	4
DSCC9	MSCS - 303C	Software Engineering	Core	3	1	0	3	20	80	100	4
DSEC3	MSCS - 304-GE-A	1.Systems Programming 2.Computer Algorithms 3.UID Using .Net Technologies 4.IT in Forensic Science 5.Software Testing	Generic Elective-A	3	1	0	3	20	80	100	4

DSEC4	MSCS - 305 GE-B	1.Cloud Computing 2.Big Data Analytics 3.Artificial Neural Networks 4.Cyber Security 5.Mobile App Development	Generic Elective –B	3	1	0	3	20	80	100	4
AECC3	MSCS - 306CF	Soft Skills & Personality Development	Compulsory Foundation	2	0	0	1.5	-	50	50	2
SEC3	MSCS - 307EF	1. Multimedia	Elective Foundation	2	0	0	1.5	-	50	50	2
		2.Data Science Essentials									
	MSCS - 308P1		Practical I on Core	0	0	4	3	20	80	100	4
	MSCS - 309P2		Minor Project work	0	0	8	3	20	80	100	4
			Outreach Activity/Seminar	0	0	0	--	0	0	0	0
								140	660	800	30

SEMESTER-IV											
Category	**Course Code**	**Title of the Paper/Course**	**Core / Elective or Minor Or Soft Skill Courses**	**Teaching hours/week**			**University Exam Duration [Hrs]**	**Marks**			**Credits**
				L	**T**	**P**		**IE / IA**	**EE / EA**	**Total Marks**	
DSEC5	MSCS - 401MP	Major Project Work	Core	0	0	24	3	100	200	300	12
	All Semesters			**Total**						2500	100

ThefollowingaretheopenelectivecoursesofferedbytheDepartmentofComputerSciencetootherdepartments

1. ProgramminginC
2. OfficeAutomation
3. Open-SourceTools

6.1 **Core Course:-**

There may be a core course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

6.2 **Elective Course:-**

Elective course is a course which can be chosen from a pool of papers. It may be:

- Supportive to the discipline of study
- Provide a expanded scope
- Enable an exposure to some other discipline/domain
- Nurture students's proficiency/skill

6.2.1. An elective may be "Generic Elective" focusing on those courses which add generic proficiency to the students. These electives shall be "Discipline centric". Three or Four papers may be offered, of which Two may be choosen.

6.2.2 Skill Oriented Course and Multidisciplinary Course/Project are introduced as per Action Plan of National Education Policy-NEP-2020.

6.2.3 An elective may be "Open Elective" and shall be offered for other Discipline only. Atleast one paper must be chosen for study as mandatory. More than one paper may be studies through self study.

6.3 Foundation Courses:

The Foundation Courses may be of two kinds: Compulsory Foundation and Elective foundation, "Compulsory Foundation" courses are the courses based upon the content that leads to knowledge enchancement. They are mandatory for all discipline. Elective Foundation courses are value-based and are aimed at man-making education.

6.4 Audit Course (100 Marks Inernal – Zero Credits)

The main aim of Audit Course is to aware the Contemporary Societal issues. This course is under self study.

6.5 MOOCS and e-Learning:

Discipline centric elective course through MOOCS (Massive Open Online Course) platform. Students of I, II and/or III semesters can register for the course offered by authorized Institutions/Agencies through online with the approval of the DDC concerned. The certificate issued by the Institutions/Agencies after successful completion of the course will be considered for the award of the Grade to that course in open electives only. Further, 30-40% of the syllabus of any one course in I, II and III semesters may be taught through e-Learning.

7 Course Registration:

Every student has to register for the set of Courses offered by the Department in that Semester including those of Open Elective course of the other Departments and MOOCS courses with the total number of their Credits being limited by considering the permissible weekly contact hours (typically: 36/Week).

8 Credits Required for Award of Degree:

A student shall become eligible for the award of M.Sc(CS), if he/she earns a **minimum of 96** credits by passing all the core and electives along with practicals, seminars, comprehensive viva-voce prescribed for the programme.

- It is mandatory for a student to complete successfully all the core courses pertaining to his/her specialization of study.

- A student may choose Generic Electives from the list of elective courses offered from his/her specialization of study.

- Further, a student may select from a list of Elective courses from other Departments as Open Electives to "suit the required" number of credits, such that the total credits is atleast 96.
- There should be a register maintained by the Head of the Department indicating for each student, the course (s) registered by the student within the department, so that "Generic Electives" opted by the student are indicated.

- In the case of Open Elective, the Head of the Department should prepare a statement /register indicating the courses choosen / opted by the students of the department in other departments.
- The Head of the Department should send the list of registered papers (opted by the student) to the Principal with a copy to the controller of examinations immediately with in a week commencement of each semester.
- A copy of the courses registered by the students in each semester approved by the Principal shall be sent to the Academic Branch as well as Examination Branch.
- The list of students registered for Mooc's shall be furnished giving details of the programme with a copy to the Principal and Controller of Examinations.
- A model of Registers to be maintained by the Head of the Department is given in the Annexure. It is mandatory on the part of the Head of the Department to maintain Register for each Course separately.

9. **Scheme of Instruction :**

The Board of Studies (BOS) of each specialization shall formulate the scheme of instruction and detailed syllabi. For every course learning objectives and learning outcomes should be defined. While formulating the scheme of instruction, the BOS shall facilitate to offer the minimum number of credits for the entire Programme. The syllabi of theory courses shall be organized into four/five units of equal weight. The question paper for the semester end University Examination in theory course shall consist of four / five units, two questions from each unit of syllabus carrying a total of 60 marks. There shall be short answer questions

for a total of 20 marks.

Part A contains of 20 marks with two short question from each unit out of which the student has to answer five questions with each question carrying 4 marks with a total of 20 marks.

Examination in theory shall consists of five units in each paper, two questions from each unit of syllabus out of which a student shall answer one question carrying 12 marks for each question with a total of 60 marks.

10. EVALUATION:

10.1Evaluation shall be done on a continuous basis i.e. through Continuous Internal Evaluation (CIE) in the Semester and Semester End Examination (SEE). For each theory course, there shall be two internal tests of two hours duration carrying 20 marks each and one Semester end Examination of 3 hours duration carrying 80 marks. Internal marks for a maximum of 20 shall be awarded based on the average performance of the two internal tests.

10.2The first internal test shall be held immediately after the completion of 50% of the instruction days covering 50% of the syllabus. The second internal test shall be held immediately after the completion of 90 instruction days covering the remaining the 50% of the syllabus.

10.3 It is mandatory for a student to attend both the internal tests in each theory course. The weighted average of the marks secured in two tests is awarded as sessional marks. However, 0.8 shall be assigned as weight for the best performance of the two tests whereas for the other test it shall be 0.2. If a student is absent for any of the internal test for whatsoever reason, the marks for that test shall be zero.

10.4 The students shall be permitted to verify the valuation of answer scripts of sessional tests and signature same the verification.

10.5 The valuation and verification of answer scripts of Sessional Tests shall be completed within a week after the conduct of the internal Tests. The answer scripts shall be maintained in the department until the semester end results are announced.

10.6 The valuation of End-Semester Examination answer scripts shall be arranged by the Controller of Examinations as per the University procedures in vogue.

10.7 : Evaluation of Practicals:

For each practical course, the sessional marks for a maximum of 100 shall be awarded by the teacher based on continuous assessment of practical work. The Semester end University practical Examinations carrying 100 marks shall be conducted by i) Internal examiners and ii) external examiner permitted by the Board of Studies of the Department a panel submitted to the Controller of examiners.

11 : PROJECT WORK:

11.1 The work shall be carried out in the concerned department of the student or in any recognized Educational Institutions of Higher learning/Universities/Industry/Organization as approved by the DDC. The student shall submit the outcome of the project work in the form of a report.

11.2 The Project work shall be evaluated at the end of the IV semester with 300 marks in which 100 marks are Internal and 200 marks are External evaluation of the project work.

12. **Grading and Grade Points:**

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.

Semester Grade Point Average (SGPA): It is a measure of performance of work done in a semester. It is the ratio of total credit points secured by a student in the courses registered in a semester and a total course credits taken during that semester. It shall be given up to two decimal places.

SGPA (Si) = Σ(Ci x Gi) / ΣCi

where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in the courses in all semesters and the sum of the total credits of all courses in all the semesters. It is given up to two decimal places.

CGPA = Σ(Ci x Si) / Σ Ci

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to two decimal points and reported in the transcripts.

Letter Grades and Grade Points:

A 10-point grading system with the following letter grades is to be followed.

Grades and Grade Points

Marks	Grade Point	Letter Grade
75-100	7.5-10	O (Outstanding)
65-74	6.5-7.4	A+ (First)
60-64	6.0-6.4	A (First
55-59	5.5-5.9	B+ (Second)
50-54	5.0-5.4	B (Second)
40-49	4.0-4.9	C(Third)
00-39	0.0-3.9	F (Fail)

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

12.1 In each Semester, every student who satisfies the attendance requirements should register for examination, failing which he/she shall not be promoted to the next semester. Any such student who has not registered for examination in a semester shall repeat that semester in the next academic year after obtaining the proceedings of the Principal.

12.2 To pass a course in M.Sc(CS) Programme, a student has to secure the minimum grade of (P) in the PG Semester end Examination. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination as supplementary candidate.

12.3 A student is eligible to improve the marks in a paper in which he has already passed, within 4 years from the year of admission as and when it is conducted for the subsequent batches. This provision shall not be provided once the candidate is awarded Degree.

12.4 A student who has failed in a course can reappear for the Semester end Examination as and when it is held in the normal course. The Sessional Marks obtained by the student will be carried over for declaring the result.

12.5 Whenever the syllabus is revised for a course, the semester Examination shall be held in old syllabus three times. Thereafter, the students who failed in that course shall take the semester end Examination in the revised syllabus.

13. Award of Degree :

A student who has earned a minimum of 96 credits by passing in all the core courses and the minimum number of electives prescribed shall be declared to have passed the course work and shall be eligible for the award of degree.

13.1 A student who has earned extra credit shall be issued an separate certificate to that effect, mentioning the subject and grade.

14. Ranking and Award of Prizes / Medals:

14.1 Ranks shall be awarded in each branch of study on the basis of Cumulative Grade Point Average (CGPA) for top ten percent of the students or top three students whichever is higher.

14.2 The students who have become eligible for the award of PG degree by passing regularly without break, shall only be considered for the award of ranks.

14.3 Award of prizes, scholarships and other honours shall be according to the rank secured by the student as said above and in conformity with the desire of the Donor.

15. Attendance Requirements:

15.1 A student is required to complete the Programme of Study satisfying the attendance requirements in all the semesters within twice the prescribed period of study four academic years from the year of admission, failing which he/she forfeits his/her seat.

15.2 A student shall repeat the semester if he/she fails to satisfy the attendance requirements given below:

- A student shall attend at least 60 percent of the maximum hours of instruction taken by the teacher for each course.

- A student shall attend at least 75 percent of the maximum hours of instruction taken for all the courses put together in that semester.

15.3 The Principal shall condone the shortage of attendance of a student provided, the student satisfies the clause 15.2 and obtain atleast 60% of overall attendance in a semester on **medical grounds only.**

15.4 A student who fails to satisfy the attendance requirements specified in clause 15.2 shall **repeat that semester** in the subsequent academic years with the written permission of the Principal.

15.5 A student shall not be permitted to study any semester more than two times during the Programme of his/her study.

15.6 A student who satisfies the attendance requirements specified in clause 15.2 in any semester may be permitted to repeat that semester after canceling the previous attendance and sessional marks of that semester with the written permission of the Principal. However, this facility shall be extended to any student not exceeding twice during the entire Programme of study provided the stipulation in clause 15.1 is met.

16. **Conditions of Promotion:**

A student shall be eligible for promotion to the next semester provided, if he/she satisfies the attendance requirements in the immediately preceding semester as specified in clause 15. The Principal of the concerned college will furnish the promotion list to the HOD at the beginning of II,III& IV Semester.

17. Transitory Regulations:

17.1 A student who has been repeated in the previous regulations for not satisfying the attendance requirements shall be permitted to join in these regulations provided the clauses 15.1 and 15.4 hold good.

17.2 Semester end University Examinations under the regulations that immediately precede these regulations, shall be conducted two times after the conduct of last regular examination under those regulations.

17.3 The students who satisfy the attendance requirements under the regulations that immediately precede these regulations, but do not pass the courses shall appear for the Semester end University Examinations in equivalent courses under these regulations as specified by the BOS concerned.

Programme Specific Outcomes (PSO's)

PSO1

- Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.

PSO2

- Ability to understand the structure and development methodologies of software systems. Possess professional skills and knowledge of software design process. Familiarity and practical competence with a broad range of programming language and open source platforms.

Programme Objectives

The objective of the MCA curriculum is to equip the students with the ability to analyse varieties of real-life problems and develop computer based solutions for effectiveness and efficiency. Keeping in view the requirements of the evolving software industry and also to provide a foundation for higher studies in Computer Science, effort has been made in the choice of subjects to balance between theory and practical aspects of Computer Science. On successful completion of this course a student can find a career in software industries, corporate sectors, or Government Organizations as a technical professional or pursue research in the core areas of Computer Science and Applications. MCA graduates will demonstrate analytical and design skills including the ability to generate creative solutions and foster team-oriented, professionalism through effective communication in their careers.

Programme Out comes

PO1	**ComputationalKnowledge:**Applyknowledgeofcomputingfundamentals,computingspecialization, mathematics,anddomainknowledgeappropriateforthecomputingspecialization to theabstraction and conceptualizationofcomputingmodelsfromdefined problemsand requirements.
PO2	**ProblemAnalysis:**Identify,formulate,researchliterature,andsolvecomplexcomputingproblemsreach ingsubstantiatedconclusionsusingfundamentalprinciplesofmathematics,computingsciences, and relevant domaindisciplines.
PO3	**Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meetspecifiedneeds with appropriateconsideration for publichealth and safety,cultural,societal, andenvironmental considerations.
PO4	**ConductinvestigationsofcomplexComputingproblems:**Useresearch-basedknowledgeandresearchmethodsincludingdesignofexperiments,analysisandinterpretationofda ta, andsynthesis oftheinformationto providevalid conclusions.
PO5	**ModernToolUsage:**Create,select,adaptandapplyappropriatetechniques,resources,andmoderncomp utingtoolstocomplexcomputingactivities,withanunderstandingofthelimitations.
PO6	**ProfessionalEthics:**Understandandcommittoprofessionalethicsandcyberregulations,responsibilitie s,andnormsofprofessionalcomputingpractices.
PO7	**Life-longLearning:**Recognize theneed,andhavetheability,toengageinindependentlearningforcontinualdevelopmentasacomputingp rofessional.
PO8	**Projectmanagementandfinance:**Demonstrateknowledgeandunderstandingofthecomputingandman agementprinciplesandapplythesetoone'sownwork,asamemberandleader in a team, to manageprojectsandinmultidisciplinary environments.
PO9	**CommunicationEfficiency:**Communicateeffectivelywiththecomputingcommunity,andwithsociety atlarge,aboutcomplexcomputingactivitiesbybeingabletocomprehendand writeeffectivereports, designdocumentation, makeeffectivepresentations, andgiveand understandclearinstructions.
PO10	**SocietalandEnvironmentalConcern:**Understandandassesssocietal,environmental,health,safety,le gal,andculturalissueswithinlocalandglobalcontexts,andtheconsequentialresponsibilitiesrelevant to professional computingpractices.
PO11	**IndividualandTeamWork:** Functioneffectivelyasanindividualandasamemberorleaderindiverseteamsandinmultidisciplinaryenv ironments.
PO12	**InnovationandEntrepreneurship:**Identifyatimelyopportunityandusinginnovationtopursuethatop portunitytocreatevalueandwealthforthebettermentoftheindividualandsocietyat large.

Programme Educational Objectives(PEO's)

PEO1

- Domain Expertise: apply and continuously acquire knowledge, both theoretical and applied,relatedtocore areas ofcomputerscience;

PEO2

- Computing Skills and Ethics: Demonstrate the ability to work effectively as a team memberand/orleader inan ever-changingprofessionalenvironment;

PEO3

- LifelongLearningandResearch: workproductivelyascomputerprofessionalsdemonstratingeffective use of oral and written communication, working competently as a member of ateamunit,adheringtoethical standards intheprofession.

2. SYLLABUS SCHEMES

SEMISTER-I											
Category	**Course Code**	**Title of the Paper/Course**	**Core / Elective or Minor Or Soft Skill Courses**	**Teaching hours/week**			**University Exam Duration [Hrs]**	**Marks**			**Credits**
				L	**T**	**P**		**IE / IA**	**EE / EA**	**Total Marks**	
DSCC1	MSCS - 101C	Computer Organization	Core	3	1	0	3	20	80	100	4
DSCC2	MSCS - 102C	Programming in Java & Data Structures	Core	3	1	0	3	20	80	100	4
DSCC3	MSCS - 103C	Operating Systems	Core	3	1	0	3	20	80	100	4
DSEC1	MSCS - 104GE	1.Mathematical Foundations for Computer Science 2.Computer Oriented Operational	Generic Elective	3	1	0	3	20	80	100	4

		Research									
AECC1	MSCS - 105CF	Environmental Studies	Compulsory Foundation	2	0	0	1.5	-	50	50	2
SEC1	MSCS - 106EF	1.PC Hardware Basics 2.Statistical Methods	Elective Foundation	2	0	0	1.5	-	50	50	2
	MSCS - 107P1		Practical I On Core	0	0	4	3	20	80	100	4
	MSCS - 108P2		Practical II On Core & Generic Elective	0	0	4	3	20	80	100	4
								120	580	700	28

SEMESTER-II

Category	**Course Code**	**Title of the Paper/Course**	**Core / Elective or Minor or Soft Skill Courses**	**Teaching hours/week**			**University Exam Duration [Hrs]**	**Marks**			**Credits**
				L	**T**	**P**		**IE / IA**	**EE / EA**	**Total Marks**	
DSCC4	MSCS - 201C	Advanced Data Base Management System	Core	3	1	0	3	20	80	100	4
DSCC5	MSCS - 202C	Computer Networks	Core	3	1	0	3	20	80	100	4
DSCC6	MSCS - 203C	Computer Graphics	Core	3	1	0	3	20	80	100	4
DSEC2	MSCS - 204GE	1.E- Commerce 2.Accounting and Financial	Generic Elective	3	1	0	3	20	80	100	4

		Management									
AECC2	MSCS - 205CF	Human Rights and Value Education	Compulsory Foundation	2	0	0	1.5	-	50	50	2
SEC2	MSCS - 206EF	1.Principles of Management / 2.Internet of Things	Elective Foundation	2	0	0	1.5	-	50	50	2
	MSCS - 207P1		Practical I on Core	0	0	4	3	20	80	100	4
	MSCS - 208P2		Practical II on Generic Elective	0	0	4	3	20	80	100	4
								120	580	700	28

SEMESTER-III

Category	**Course Code**	**Title of the Paper/Course**	**Core / Elective or Minor or Soft Skill Courses**	**Teaching hours/week**			**University Exam Duration [Hrs]**	**Marks**			**Credits**
				L	**T**	**P**		**IE / IA**	**EE / EA**	**Total Marks**	
DSCC7	MSCS - 301C	Data Warehousing and Data Mining	Core	3	1	0	3	20	80	100	4
DSCC8	MSCS - 302C	Web Technologies	Core	3	1	0	3	20	80	100	4
DSCC9	MSCS - 303C	Software Engineering	Core	3	1	0	3	20	80	100	4
DSEC3	MSCS - 304-GE-A	1.Systems Programming / 2.Computer Algorithms / 3.UID Using .Net	Generic Elective-A	3	1	0	3	20	80	100	4

		Technologies 4.IT in Forensic Science 5.Software Testing									
DSEC4	MSCS - 305 GE-B	1.Cloud Computing 2.Big Data Analytics 3.Artificial Neural Networks 4.Cyber Security 5.Mobile App Development	Generic Elective –B	3	1	0	3	20	80	100	4
AECC3	MSCS - 306CF	Soft Skills & Personality Development	Compulsory Foundation	2	0	0	1.5	-	50	50	2
SEC3	MSCS - 307EF	1. Multimedia	Elective Foundation	2	0	0	1.5	-	50	50	2
		2.Data Science Essentials									
	MSCS - 308P1		Practical I on Core	0	0	4	3	20	80	100	4
	MSCS - 309P2		Minor Project work	0	0	8	3	20	80	100	4
			Outreach Activity/Seminar	0	0	0	--	0	0	0	0
								140	660	800	30

SEMESTER-IV

Category	**Course Code**	**Title of the Paper/Course**	**Core / Elective or Minor Or Soft Skill Courses**	**Teaching hours/week**			**University Exam Duration [Hrs]**	**Marks**			**Credits**
				L	**T**	**P**		**IE /**	**EE /**	**Total**	

								IA	EA	Marks	
DSEC5	MSCS - 401MP	Major Project Work	Core	0	0	24	3	100	200	300	12
	All Semesters			**Total**						2500	100

MSCS101C:COMPUTERORGANIZATION

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	ComputerOrganization	**Course Code**	MSCS101C
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

Course Objectives:

CO1:Conceptualizethebasicsoforganizationalandarchitecturalissuesofadigitalcomputerandclassifyandcomputetheperformanceofmachines,MachineInstructions.
CO2:Understand conceptsof registertransfer logicand arithmetic operations.
CO3:Explaindifferenttypesofaddressingmodesandmemoryorganization.
CO4:Learnthedifferenttypesofserialcommunicationtechniques.
CO5:SummarizetheInstructionexecutionstages.

Course Learning Outcomes:

CLO1:Understandthetheoryandarchitectureofcentralprocessingunit.
CLO2:Analyzesomeofthedesignissuesintermsofspeed,technology,cost,performance.
CLO3. Design asimpleCPUwith applyingthe theory concepts.
CLO4: UseappropriatetoolstodesignverifyandtesttheCPUarchitecture.
CLO5: Learntheconceptsofparallelprocessing,pipeliningandinterprocessorcommunication.
CLO6: Understandthearchitectureandfunctionalityofcentralprocessingunit.
CLO7: ExemplifyinabetterwaytheI/Oandmemoryorganization.

UNITI:

Logic Circuits:Logic functions–synthesis of logic functions–Minimizationsoflogic-SynthesiswithNANDandNORgatesImplementationofLogicgates-Flip-flops–Registersandshiftregisters – counters – decoders – Multiplexers – PLDs – sequential circuits. Basic Structure of Computers:FunctionalUnits-Basic operational concepts–Bus structures–performance–MultiprocessorsandMulti computers: Functional Units – Basic operational concepts – Bus structures – performance –MultiprocessorsandMulticomputers–HistoricalPerspective.

UNITII:

Machine Instructions and programs: Numbers, Arithmetic operations and characters – Memorylocationsandaddress,operations–instructionsandinstruction,sequencing–addressingmodes.

UNITIII:

Input / Output organization: accessing I/O Devices – Interrupts – direct memory access – buses 240-interfacecircuits–Standard I/O Interfaces.

UNITIV:

Memory System, Concepts – semiconductor RAM memories - Read only memories – cachememories–performanceconsiderations–virtualmemoriesmanagementrequirements–secondarystorageArithmetic:Additionandsubtractionofsignmembers–designoffastadders–multiplication of positive members – signed operand multiplication – fast multiplication – integer division – floatingpointnumbersandoperations.

UNITV:

BasicProcessingUnit:Concepts–executionofacompleteinstruction–Multiple–Busorganization –hardwarecontrol–microprogrammedcontrol.Pipelining:Concepts–Datahazards–instructionhazards–influenceonInstructionsets-datapathandcontrolconstructions–superscaloperation-ultraSPARCII–Performanceconsiderations.

TextBooks:

1.HamacherC,VranesicZ,andZakyS.ComputerOrganization,5thedition,McGraw–Hill,2002

ReferenceBooks:

1. StallingsW,ComputerOrganizationandArchitecture,6thedition.ParsonEducation,2003.
2. ManoM.M.ComputerSystemArchitecture,3rdedition.PHI,1993.
3. YarbroughJM,DigitalLogic–ApplicationsandDesign,ThomasLernig,1997.
4. HeuringVP,andJordanHF,ComputerSystemsDesignandArchitecture,PearsonEducation,1997.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS102C:PROGRAMMINGINJAVAANDDATASTRUCTURES

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	ProgrammingInJavaandData Structures	**Course Code**	MSCS102C
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives:

CO1:Use an integrateddevelopmentenvironmenttowrite, compile,runandtestsimpleobject-orientedJavaprograms
CO2: Identifyclasses, objects,members of a class and relationships among them
CO3:Usearraysandclassarray
CO4:CreateandaccesspackagesDescribefeaturesofclassesandinterfacesinJava
CO5:Demonstratetheconceptsofpolymorphismandinheritance

CourseLearningOutcomes:

CLO1:Abilitytochooseappropriatedatastructuressuchasstack,queues,linkedlist,treesandgraphsto representitemsinreal world
CLO2:
Abilitytoanalyzethetimeandspacecomplexitiesofalgorithms,andimplementvarioussearchingandsortingtechniques
CLO3:Implementlinearandnon-lineardata structures
CLO4:Abilitytodesignprogramsusingavarietyofdata structuressuchasstacks,queues,hashtables,binarytrees,searchtrees,heaps,graphs, andB-treesto solve specificproblems
CLO5:Evaluatealgorithmsanddatastructuresintermsoftimeandspacecomplexityofbasicoperations.

UNIT–I:

Object Oriented Programming Fundamentals & Java: Java Features, Object Oriented ProgrammingConcepts – Abstraction, Encapsulation, Inheritance, and Polymorphism. Java Fundamentals: DataTypes,variables,arrays,Inheritancetoclasses:classfundamentals,Objects,References,Constructors, Overloading of methods, Access control, Nested and Inner classes. Inheritance:Inheritancebasics,Usingsuper,multilevelhierarchy,methodoverriding,dynamicmethoddispatch,abstractclasses,finalwith inheritance.

UNIT-II:

Packages,ExceptionsandThreads:PackagesandInterfaces:Packages,Accessprotection,Importingpackages,interfaces,ExceptionHandling:fundamentals,exceptiontypes,uncaughtexceptions,usingtry,nestedtrystatements,throw,throws,Javabuilt-inexceptions,userdefinedexceptions. Multithreading: Thread model, main thread, creating a thread, multiple threads, thread priorities,synchronization,Interthreadcommunication,Stringhandling.

UNIT-III:

GUI Programming Features: Applets: Applet basics, Applet architecture, an applet skeleton, Appletdisplay method, Repainting, Using Status window, HTML APPLET tag, passing parameters toapplet, Audio Clip interface. Event Handling; two event handling mechanisms, Event model, Eventclasses,sourcesofevents,EventListenerinterfaces,Adapterclasses.

UNITIV:

Introduction: Concept of Data Structures - Overview of Data Structures Implementation of

DataStructures. Arrays: Definition - Terminology - One dimensional array – Multidimensional. Arrays - Pointerarrays.LinkedLists:SinglelinkedlistsCircularlinkedlist-Doublelinkedlists-CircularDouble linked lists - Applications of linked lists. Stacks: Definition - Representation of stack -Operations of stack Applications of stack. Queues: Definition - Representation of Queues – Variousqueuestructures-Application ofqueues.

UNIT-V:

Trees:Definitionandconcepts-RepresentationofBinarytree-OperationsonBinarytree-Typesofbinarytrees-Treesandforests-BTrees-B+TreeIndexing
Graphs:Terminology-Representationofgraphs-OperationsandgraphsApplicationofgraphstructures

TextBook

1. HerbertSchildt:"TheCompleteReferenceJava2"(FifthEdition),TMH.
2. CLASSICDATASTRUCTURES;byD.Samanta-PHI,2001

ReferenceBooks

1. Dietel&Dietel:"Java2HowtoProgram",PrenticeHall.
2. ThamusWu:"AnIntroductiontoObjectOrientedProgrammingWithJava."TMHBalagurusamy:"ProgrammingWithJava":TMH.
3. Aho,Hopcroft,Ullman,"DataStructuresandAlgorithms",AddisonWesleyPublishing
4. M.AWeiss,"DataStructuresandAlgorithmAnalysisinC++",BenjaminCummiys,1994.
5. AS.Tanenbaum,LangramY,AugesteinMJ,DataStructuresUsingC",PHI,1992.

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
3	3	2	2		2	3		2	1	2	3	3	2
3	3	2	2		3	3	3	2	1	2	3	2	3
2	2	2	2	2	2	3	2	2	1	2	3	1	1
3	2	3	2		2	3	2	2	1	2	3	2	2
3	3	2	2		3	3		2	3	2	3	3	2

MSCS103C:OPERATINGSYSTEMS

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	OperatingSystems	**Course Code**	MSCS103C
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives:

Studentswillbeableto

CO1:HaveathoroughunderstandingofthefundamentalsofOperatingSystems.
CO2:LearnthemechanismsofOStohandleprocessesandthreadsandtheircommunication
CO3:LearnthemechanismsinvolvedinmemorymanagementincontemporaryOS
CO4:GainknowledgeonMutualexclusionalgorithms,deadlockdetectionalgorithms
CO5:KnowthecomponentsandmanagementaspectsofconcurrencymanagementGainknowledgeon fileI/OperationsandprotectionofvariousOS.

CourseLearning Outcomes:

Afterthecoursethestudentsareexpected tobeableto

CLO1:Understanddifferentstructures,servicesoftheoperatingsystemandtheuseofschedulingandoperationsonproc ess.
CLO2:Understandtheuseofscheduling,operationsonprocess,theprocessschedulingalgorithmsandsynchronizatio nconcepts.
CLO3: Understandtheconceptsofdeadlock,memoryandvirtualmemorymanagementtechniques.
CLO4:UnderstandtheconceptsofFileSystem,Input/outputsystemsandsystemprotectionofvariousoperatingsy stems
CLO5: Understand the User authentication, program threats, system threats, security systems Facilities

UNITI:

Introduction to Operating Systems, Types of Operating Systems, Computing Environments,Computersystemoperation,I/Ostructure,andHierarchy,Hardwareprotection,Networkstructure,O perating system components and services – system calls, Systems programs, System Structure,Virtualmachines,System design and Implantation.

UNITII:

CPU Scheduling: Scheduling criteria, Scheduling Algorithms, Multiple processors Scheduling, Real-timescheduling.ProcessSynchronization:-Thecritical-sectionproblem,Synchronizationhardware,Semaphores,ClassicproblemsofSynchronization,Criticalregions, Monitors.DeadLocks:Deadlockcharacterization,Deadlockhandling,Deadlockprevention,Deadlockavoida nce,Deadlockdetection,andRecovery.

UNITIII:

Memory Management: Swapping, Contiguous memory allocation, Paging, Segmentation withparing Concept of Virtual memory Demand paging Page replacement, Allocation of frames,Thrashing. File System Interface & Implementation: File concept, Access methods, Directorystructure, FileSystemMountingFilesharingProtection,Filesystemstructure,andimplementation, Directoryimplementation, Allocationmethods. Freespacemanagement, Efficiencyandperformance, Recovery.

UNITIV:

I/OSystems:overview,I/Ohardware,ApplicationI/Ointerface,KernelI/Osubsystem,Transforming I/O to Hard ware operations, STREAMS, Performance of I/O. Mass StorageStructure:- Disk Structure Disk Scheduling, Disk management, Swap-space Management, RAIDStructure, Disk Attachment, Stable – Storage implementation, Tertiary – storage structure.Protection: Goals, Domain of protection, Access matrix and implementation, Access rights,capability –basedsystems,Language–basedprotection.

UNITV:

User authentication, program threats, system threats, security systems Facilities,. Linux system:History,Designprinciples,Kernelmodules,processmanagement,SchedulingMemoryManagement,FileSystems,Inputandoutput,IPC,Networkstructure,security.

TextBooks:

1.SilberschatzA,GalvinP.B,andGagheG.OperatingSystemConcepts,6thedition,JohnWiley,2002.2.TenenbaumA.S.,ModernOperatingSystems,2ndedition,PearsonEducation,2001.

ReferenceBooks:

1. DhamdhereD.M.,OperatingSystems–AconceptbasedApproach,TataMcGraw-Hill,2002.
2. FlymIM,andMcHoesA.M.,UnderstandingOperatingSystems,3rdedition,ThomsonBrooks/Cole,2001.
3. BhattP.C.P.,AnIntroductiontoOperatingSystems–ConceptsandPractice,PHI,2003.
4. HarrisJ.A.,OperatingSystems,TataMcGraw-Hill(Schaum"sOutlinesseries),2002.
5. RemyCard,EricDumas,LinuxKernalBook,Orielly

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	3		1	3		2	3	1		2	2
CO_2	3	3	2	3		3	3	3	2	3	1	3	2	3
CO_3	2	2	2	3	2	3	3		2	3	1		1	1
CO_4	3	2	3	2		3	3		2	3	1	1	3	2
CO5	3	3	2	2		2	3		2	3	2	3	3	2

MSCS104GE:MATHEMATICALFOUNDATIONOFCOMPUTERSCIENCE

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	MathematicalFoundationof ComputerScience	**Course Code**	MSCS104GE
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives:

Studentswillbeableto

CO1:Understandsettheory,relationsandfunctionstoread,understandMathematicalInductionand constructmathematical arguments.

CO2:Understandcombinatorics,logicandmathematicalreasoningtocounterenumerateobjectsinsystematicway.

CO3:Constructrecurrencerelationsforelementaryproblems,andapplygeneratingfunctionstosolverecurrencerelations.

CO4:UnderstandDefinition,composition,Inverse,Binaryandn-aryoperations,characteristicfunctionofaset,hashingfunction-Recursions,Functions,setsandpredicates

CO5:Understandtheconceptoflatticesandgraphtheory.

CourseLearningOutcomes:

Afterthecoursethestudents areexpected tobe ableto

CLO1:Verifythecorrectnessofanargumentusingpropositionalandpredicatelogicandtruthtables

CLO2: Demonstrate the ability to solve problems using counting techniques and combinatorics inthecontextofdiscreteprobability.

CLO3:Solveproblemsinvolvingrecurrencerelationsandgeneratingfunctions.

CLO4: Understand some basic properties of graphs and related discrete structures, and be able torelatethesetof practicalexamples.

UNITI

Mathematical Logic: Connectives Negation, Conjunction, disjunction, Statement Formulas and TT,Conditional and Biconditional, Well-formed formulas, tautologies, Equivalence of statementformulae, Duality law, Tautological implications, functionally complete set of connectives; NormalFormsDisjunctive,Conjunctive,Principaldisjunctiveandprincipalconjunctivenormalforms.

UNITII

The theory of inference for statement calculus, Validity using TT, rules of inference, consistency ofpremises and indirect method of proof, Automatic Theorem proving- Predicate Calculus, Predicates,the statement function, variablesandquantifiers.

UNITIII

Set Theory : Basic Concepts of Set theory, Notation, Inclusion and equality , Power set, Operationson sets, Set identities, Ordered pairs and n-tuples, Cartesian products - Relations and Ordering ,Relations,Propertiesofbinaryrelation-relationmatrixandgraphofarelation,partitionand covering of a set, equivalence relations, composition of binary relations, partial ordering, partiallyorderedset-Functions,Definition,composition,Inverse,Binaryandn-aryoperations,characteristicfunctionofaset,hashingfunction-Recursions,Functions,setsandpredicates.

UNITIV

Lattices and Boolean Algebra: Lattices as partially ordered sets, properties of lattices, Lattices asAlgebraicsystems,Somespeciallattices-Booleanalgebra,functions,representationandminimization.

UNITV

Graphtheory:Definition,Examples,PathsandCycles,Planarity,coloringgraphs

TextBooks:

1. J.P.TremblayandR.Manohar,DiscreteMathematicalstructureswithapplicationstoComputerScience,TataMc GrawHillpublishers,2008.
2. Robin.J.Wilson,IntroductiontoGraphtheory.(Fourthedition)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS104GE: COMPUTERORIENTEDOPERATIONSRESEARCH

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	ComputerOriented OperationsResearch	**Course Code**	MSCS104GE
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseOutcomes:

Afterthecoursethestudentsareexpected tobe ableto

CO1:Formulateagivensimplifieddescriptionofasuitablereal-worldproblemasalinearprogrammingmodel
CO2:Solvethetransportationproblem,andassignmentproblemstodrivetheiroptimalsolution.
CO3:Identifythebestageofreplacementand Usewaitinglinemodelstoestimatesystemperformance
CO4:Describethefunctionsandcostsofaninventorysystemanddeterminetheorderquantity.
CO5:Solvesimplegamesusingvarioustechniques.Identifytheresourcesrequiredforaprojectandgenerateaplan andworkschedule.

UNIT-I:

IntroductiontoOperationsResearch:OriginandDevelopmentofOR,DefinitionofOR,ApplicationsofOR,Models andtheirclassifications,AdvantagesandLimitationsofOR

UNIT-II:

Linear programming problem (LPP): Formulation of LPP, Solution of LPP using graphical methodandsimplexmethod(inequalityonly).

UNIT-III:

Transportation problem: Mathematical formulation, IBFS of transportation problem using north-westcornerrule,least-costruleandVogelsapproximationmethod,Simpleproblems.

UNIT-IV:

Assignmentproblem:definition,mathematicalformulationofassignmentproblem,solutionoftransportationproblemusingHungarianAlgorithm,simpleproblems

UNIT-V:

Job Sequencing Problem: Introduction – Definition – Terminology and Notations PrincipalAssumptions, Problems with n Jobs through Two Machines, Problems with n Jobs through ThreeMachines

TextBook:

1.OperationsResearch(2nd Edition)byS.Kalavathi,VikasPublicationsTowersPvt.Ltd.

ReferenceBooks:

1. OperationsResearchbyKanthiswaroop,P.K.Gupta,ManmohanbySultanChand&Sons
2. OperationsResearchbyPaneerselvambyPrenticeHallofIndia
3. OperationsResearchbyS.D.Sarma
4. OperationsResearchbyTaha,H.A.,NinthEdition

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2	3	3	1	2	2	2	1		3	2
CO_2	3	3	2	2		3	1	2	2	2	1		3	4
CO_3	2	2	2	2	3	3	1	2	2	2	1		3	3
CO_4	3	2	3	2		3	1	2	2	2	1	1	2	2
CO5	3	3	2	1		3	3	2	2	3	2	3	3	3

MSCS105CF:ENVIRONMENTALSTUDIES

Department	ComputerScience	**CourseType**	AECC
CourseTitle	EnvironmentalStudies	**Course Code**	MSCS105CF
L-T-P	2-0-0	**Credits**	2
ContactHours	60Hrs	**DurationofSEE**	1.5Hrs
SEEMarks	50	**CIEMarks**	00

CourseOutcomes:

Afterthecoursethestudentsareexpected tobe ableto

CO1: Measure environmental variables and interpretresults.
CO2: Evaluate local,regionalandglobalenvironmentaltopicsrelatedtoresourceuseandmanagement
CO3: Proposesolutionstoenvironmentalproblemsrelatedtoresource uses andmanagement.
CO4:Interprettheresultsofscientificstudiesofenvironmentalproblems.
CO5:Describethreatstoglobalbiodiversity,theirimplicationsandpotentialsolutions.

UnitI

Definition-Scopeandimportance.-Needforpublicawareness

UnitII

NaturalResources,Ecosystems

UnitIII

Environmentalpollution

UnitIV

Socialissuesandthe environment

UnitV

Humanpopulationandtheenvironment

TextBooks:

1. EnvironmentalStudies-S.N.Chary
2. AtextbookonEcologyandEnvironmentalScience–M.Prasanthrajan

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	3		3	3		2	1	2	2	3	2
CO_2	3	3	2	3		3	3	3	2	1	2	2	2	3
CO_3	2	2	2	3	2	3	3		2	1	2	2	3	2
CO_4	3	2	3	3		3	3		2	1	2	1	2	2
CO5	3	3	2	3		3	3		2	3	2	3	3	2

MSCS106EF:PCHARDWAREBASICS

Department	ComputerScience	**CourseType**	SEC
CourseTitle	PcHardwareBasics	**Course Code**	MSCS106EF
L-T-P	2-0-0	**Credits**	2
ContactHours	60Hrs	**DurationofSEE**	1.5Hrs
SEEMarks	50	**CIEMarks**	00

ObjectiveoftheCourse:

To train the officials to acquire basic knowledge in computer hardware and peripherals for installation, PCassembly,troubleshootingandmaintenanceincludingsystemmanagementanditsbackupandtoundertakedisasterprevention,abasicknowledgeofTCP/IPnetworksworkgroup,internetandintranet.

Course Outcomes

CO1: Identify the hardware components of a computer such as processor, memory, disk, mainboard,peripheraldevicesetc.

CO2: Identify Mother Board & its types and set up and configure Networking System using variousnetworkdevices.

CO3:InstalldifferentOperatingSystemandallotherapplicationsoftware.,Printer,Scannerandtroubleshoottheirfaults.

CO4:CustomizeOperatingSystemandmaintenanceofsystemapplicationsoftware.
AssembleandrepairDesktopComputerwithallitshardwarecomponents.

CO5:ImplementNetworkSecuritytoprotectfromvariousattacksonnetworking.

UNITI

Basic concepts and architecture, Microprocessor, System, Memory, Control unit, Arithmetic &Logic Unit.Interrupts, Operating system, Virtual memory, Cache memory. Peripheral Devices:Keyboard, CRT, Display, Monitor, Printer. Magnetic Storage Devices: Floppy disk drive, Hard diskdrive. PC Hardware overview: Hardware, BIOS-DOS Interaction, PC Hardware, Motherboardlogic,I/ODatatransfer, PCHardwarecomponents&ICs,Computermemories.

UNITII

Mother Board: Introduction to mother boards & its types, Ports, Slots, Connectors, Add on cards,Power supply units, Cabinet types, Mother boards Problem Diagnosis. Bus Standards andNetworking: ISA, PCI, SCSI, IDE, USB – comparative study and characteristics, Network InterfaceCards,Cablesandconnectors.

UNITIII

Maintenance&Troubleshooting:Systemconfiguration,Pre-Installationplanning,Installationpractice,Preventivemaintenancetools,Procedures,Plan/schedule.

UNITIV

Troubleshooting: Computer faults, Types of faults, Diagnostic programming & tools, Systematictroubleshooting, Symptom's observation & analysis, Fault diagnosis, Rectification, Troubleshootinglevels, Different troubleshooting techniques - Functional area approach, Split half method,Divergent, Convergentand feedbackpath Method.

UNITV

Installation and Troubleshooting: Hard drives, Operating system and software, Sound card, Videocard, HDD, FDD, CD-Rom drive, Key board and Mouse, Modem, Power supply, I/O ports, Printerinterface problems, Printer problems, Attaching Add-on cards. PC Assembling, up gradation andintegration,Basicdatarecovery&disaster recovery.

TextBooks:

1. B.Govindarajalu,"IBMPCClonesHardware,TroubleshootingandMaintenance",Tata McGraw-Hill.
2. CraigZacker,JohnRourke,"TheCompleteReference:PCHardware",TataMcGraw-Hill,NewDelhi.

ReferenceBooks:

1. ScottMueller"UpgradingandRepairingPCs",20th Edition,PearsonEducation,NewDelhi,2012.
2. RonGilster,"PCHardware–abeginner'sGuide",TataMcGraw-Hill.
3. MikeMeyers,"IntroductiontoPCHardwareandTroubleshooting",TataMcGraw-Hill,NewDelhi.
4. DanGookin,"TroubleshootingYourPCsforDummies",3rd Edition,WilleyPublishingInc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	3		3	2		2	1	2		3	3
CO_2	3	3	2	3		3	2	3	2	1	2		3	2
CO_3	2	2	2	3	2	3	2		2	1	2		3	1
CO_4	3	2	3	3		3	2		2	1	2	1	1	3
CO5	3	3	2	3		3	2		2	3	2	3	3	3

MSCS106EF:STATISTICALMETHODS

Department	ComputerScience	CourseType	SEC
CourseTitle	StatisticalMethods	Course Code	MSCS106EF
L-T-P	2-0-0	Credits	2
ContactHours	60Hrs	DurationofSEE	1.5Hrs
SEEMarks	50	CIEMarks	00

Course Outcomes

Uponsuccessfulcompletionofthiscourse,studentswillbeableto:

CO1:Calculate and interpret the correlation between two variables.

CO2:Calculatethesimplelinearregressionequationforasetofdata.

CO3:Employee the principles of linear regression and correlation, including least square method,predictingaparticularvaluesignificanceofthecorrelationcoefficient.

CO4:Knowtheassociationbetweentheattributes.Knowtheconstructionofpointandintervalestimators. Evaluatethepropertiesof estimators.

CO5:Demonstrateunderstandingofthetheoryofmaximumlikelihoodestimation.•Analyze StatisticaldatausingMS-Excel.

UNIT-I

Introduction-scopeandlimitationsofstatisticalmethods-classificationofdata-Tabulationofdata -DiagrammaticandGraphicalrepresentationofdata-Graphicaldeterminationofpercentilesandquartiles.

UNIT-II

Measuresoflocation:Arithmeticmean,median,mode,geometricmeanandHarmonicmeanandtheirproperties.

UNIT-III

Measuresofdispersion:Range,Quartiledeviation,meandeviation,Standarddeviation,combinedstandard deviation,co-efficient ofvariation.

UNIT-IV

MeasuresofSkewnessKarlPearson's,Bowley's,kelly'sandco-efficientofSkewnessandkurtosisbasedonmoments.

UNIT-V

Correlation-KarlPearson-spearman'srankcorrelation-concurrentdeviationmethods.RegressionAnalysis:SimpleRegressionEquations.

TextBooks

1.FundamentalofMathematicalStatistics-S.C.Gupta&V.K.Kapoor-SultanChand

ReferenceBooks

1. StatisticalMethods-SnedecorG.W.&CochranW.G.oxford&+DII
2. ElementsofStatistics-Mode.E.B.-PrenticeHall
3. StatisticalMethods-Dr.S.P.Gupta-SultanChand&Sons

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	3		3	2		2	1	2		3	3

CO_2	3	3	2	3		3	2	3	2	1	2		3	2
CO_3	2	2	2	3	2	3	2		2	1	2		3	1
CO_4	3	2	3	3		3	2		2	1	2	1	1	3
CO5	3	3	2	3		3	2		2	3	2	3	3	3

SEMESTER-II

MSCS201C: ADVANCED DATABASE MANAGEMENT SYSTEMS

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	AdvancedDatabase ManagementSystems	**Course Code**	MSCS201C
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives:

Theobjectiveofthecourseistopresentanintroductiontodatabasemanagementsystems,withanemphasisonhowtoorganize,maintainandretrieve-efficiently,andeffectively-informationfromaDBMS.

CourseOutcomes:

Uponsuccessfulcompletionofthiscourse,studentsshouldbeableto:

CO1:Describe the fundamental elements of relational database management systems, basicconceptsofrelationaldatamodel,entity-relationshipmodel,

CO2:Explain the relational databasedesign, relational algebraand SQL,Convert the ER-modelto relational tables, Design ER-models to represent simple database application scenariospopulaterelationaldatabaseandformulateSQLqueriesondata.

CO3:Improvethedatabasedesignbynormalization.

CO4:OverviewofPhysicalStorageMedia,FileOrganization,B+-TreeIndexFiles–B-TreeIndexFiles,QueryProcessing,Transaction Management

CO5:Toadministeradatabasebyrecommendingandimplementingproceduresincludingdatabasetuning, backup,queryprocessing,queryoptimizationandrecovery.
Understandadvancedqueryinganddecisionsupportsystem.

UNIT-I

FileSystemVs.DBMS-DatabaseSystemApplications-ViewofData-Databaselanguage–Databasedesign – ERModel_RelationalModel–NetworkDataModel–HierarchicalDataModel –DataStorage&Querying–DataArchitecture.

UNIT-II

RelationalModel–StructureofRelationalDatabases–RelationalAlgebraandCalculus–SQL–Basic Structure – Set Operations – Aggregate Functions – Null Values – Nested Queries – ComplexQueries–Views–ModificationoftheDatabase -AdvancedSQL–Triggers.

UNIT-III

Functional Dependencies - Features of Relational designs – Decomposition and Normalizationusing

Functional Dependencies and Multivalued Dependencies – Join dependencies- Domain keyNormalform.

UNIT-IV

OverviewofPhysicalStorageMedia–Magneticdisks–RAID–TerritoryStorage-FileOrganization – Organization of records in Files – Indexing and Hashing – Ordered Indices – B+ -Tree Index Files – B-Tree Index Files – multiple Key Access – Static and Dynamic Hashing – QueryProcessing– TransactionManagement–Transactions–Concurrency.

UNIT-V

Distributed Databases – Homogeneous and Heterogeneous Databases – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control. Case Study : Oracle –Introduction – Basics elements of SQL – Operators – Expression Functions – SQL Statements –PL/SQL- Triggers– Cursor.

TextBooks:

1.AbrahamSilberschatz,HenryF.KorthandS.Sudarshan-"DatabaseSystemConcepts",Fifth Edition,McGraw-Hill,2006.

ReferencesBooks:

1. RaghuRamakrishnanandJohannesGehrke,"DatabaseManagementSystems",TataMcGraw-HillPublishingCompany,2003.
2. RamezElmasriandShamkantB.Navathe,"FundamentalDatabaseSystems",ThirdEdition, Pearson Education, 2003.
3. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- "Database System Implementation"-PearsonEducation-2000.
4. Narang,"Databasemanagementsystems",2nded.,PHI

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2		3	1	3	2	2	2	3	2	3
CO_2	3	3	2	2		3	1	3	2	2	2	3	2	3
CO_3	2	2	2	2	2	3	1	3	2	2	2	3	2	2
CO_4	3	2	3	2		3	1	3	2	2	2	3	3	3
CO5	3	3	2	2		3	3	3	2	2	2	3	3	3

MSCS202C:COMPUTERNETWORKS

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	ComputerNetworks	**Course Code**	MSCS 202C
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseDescription:

The course introduces an overview of the concepts and fundamentals of computer networks, datacommunication concepts and techniques in a layered network architecture and their protocols,switching and routing, types of communication, various types of networks (LAN, MAN, WAN andWireless networks); bridges, routers and gateways; , network congestion, network topologies,network configuration and management, network model components, error detection and recovery;andlocalandremoteprocedures.

CourseObjectives

- Describehowcomputernetworksareorganizedwiththeconceptoflayeredapproach.
- ImplementasimpleLANwithhubs,bridgesandswitches.
- DescribehowpacketsintheInternetaredelivered.
- AnalyzethecontentsinagivenDataLinklayerpacket,basedonthelayerconcept.
- Describehowroutingprotocolswork.

CourseOutcomes(COs).

CO1: Understand fundamental underlying principles of computer networking,network components, categories of networks, OSI model and its functions.

CO2: Understand details and functionality of layered network architecture; express their knowledge in various error detection and data flow control techniques

CO3: To analyze the various routing algorithms, analyze performanceofvariouscommunicationprotocols.

CO4: Understandandcompare,distinguish the varioustransport and applicationlayer protocols

CO5: Understanding Client-Server model, SocketinterfaceIntroductiontoDNS,Distributionofnamespace,DNSintheInternet

UNIT–I:

Introduction, Network models – Internet model, OSI model Physical Layer: Signals – Analog,Digital, Digital Transmission – Coding, Sampling, Analog Transmission – Modulation of digitaland analog signal, Multiplexing – FDM, WDM, TDM, Transmission Media – cable, wireless,CircuitswitchingandTelephonenetwork,DSLTechnology,Cablemodern,SONET.

UNIT–II:

DataLinkLayer:Errordetectionandcorrection,DatalinkcontrolandProtocols–Stopandwait,Go-back-n, Selective repeat, HDLC, point to point access, Channelization, LANS – TraditionalEthernet,FastEthernet,GigabitEthernet,WirelessLAN‟s–IEEE802.11,Bluetooth,Connecting
LANs – Connecting devices, Backbone networks, Virtual LANS, Cellular telephony, Satellitenetworks,Virtualcircuit switching,Framerelay,ATM.

UNIT–III:

NetworkLayer:Inter-networks,Addressing,Routing,NetworklayerProtocols–ARP,IP,JCMP.IPV6,Routing–Introduction,Unicastrouting,Protocols–RIP,OSPF,BGP,MulticastRouting,Protocols–DVMRP,MOSPF,CBT,PIM.

UNIT–IV:

Transport Layer: Process-to-Process Delivery, UDP, TCP, Data traffic, Congestion and Control,Quality of service (QOS) and techniques to improve QOS, Integrated services, QOS in Switchednetworks. Security: Introduction. Symmetric-key cryptography, public key cryptography, Messagesecurity, Digital signature, User authentication, Key management, Kerberos. CommunicationSecurity,AuthenticationsProtocols,E-mailSecurity,Websecurity,SocialIssues.

UNIT–V:

Application Layer: Design issues, file transfer, access and management. Client-Server model,
SocketinterfaceIntroductiontoDNS,Distributionofnamespace,DNSintheInternet.Electronicmail,SMTP, FileTransfer,FTP,HTTP,WorldWideweb.

TextBooks:

1. ForouzanBA,DataCommunicationsandNetworking,4thedition,TataMcGraw-Hill,2007.
2. TanenbaumAS,ComputerNetworks,4thedition,PearsonEducation,2003.
3.

ReferenceBooks:

1. StallingsW,DataandComputerCommunications,7thedition,PearsonEducation,2004.
2. GalloMA,andHancockWM,ComputerCommunicationsandNetworkingTechnologies,ThomsonBrooks/Cole,2002.
3. Comer DE,ComputerNetworks–andInternetswithInternetApplications,4thedition,PearsonEducation,2004.
4. KutoseJF,andRossKW,ComputerNetworking–ATop-downApproachFealuringtheInternet,PearsonEducation,2001.
5. TomasiW,IntroductiontoDataCommunicationsandNetworking,PearsonEducation,2004

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO 1	3	3	2	3		3	2	3	2	2	2		2	1
CO 2	3	3	2	3		3	2	3	2		1		2	1
CO 3	2	2	2	3	2	3	2	3	2		1		2	3
CO 4	3	2	3	3		3	2	3	2		1	1	2	3
CO 5	3	3	2	3		3	2	3	2		2	3	3	3

MSCS203C:COMPUTERGRAPHICS

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	ComputerGraphics	**Course Code**	MSCS 203C
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives:

- Themainobjectiveofthecourseistointroducestudentswithfundamentalconceptsandtheoryo fcomputergraphics.
- Itpresentstheimportantdrawingalgorithm,polygonfitting,clippingand2Dtransformationcu rvesand anintroductionto3Dtransformation.
- Itprovidesthebasicsofapplicationprogramminginterfacewhichallowsstudentstodevel opprogrammingskillsinCG.

CourseOutcomes:
Uponthecompletionofthecoursestudentswillbeableto:-

CO1–Explaintheapplications,areas,andgraphicpipeline,displayandhardcopytechnologies.
CO2–Applyandcomparethealgorithmsfordrawing2Dimagesalsoexplainaliasing,anti-aliasingandhalftoningtechniques.
CO3–
Apply2D&3Dcomputergraphics.Analyzeandapplyclippingalgorithmsandtransformationon2Dimages.
CO4–
Solvetheproblemsonviewingtransformationsandexplaintheprojectionandhiddensurfaceremovalalgorithms.
CO5–
Explainbasicraytracingalgorithm,shading,shadows,curvesandsurfacesandalsosolvetheproblemsofcurves.

UNITI

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-displaydevices, Raster-scan systems, random scan systems, graphics monitors and work stations and inputdevices Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipsealgorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fillalgorithms.

UNITII

2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations,matrixrepresentationsandhomogeneouscoordinates,compositetransforms,transformationsbetween coordinate systems. 2-D Viewing: The viewing pipeline,

viewing coordinate referenceframe, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland andCyrus-becklineclippingalgorithms,Sutherland–Hodgemanpolygonclippingalgorithm.

UNITIII

3-DObjectrepresentation:Polygonsurfaces,quadricsurfaces,splinerepresentation,Hermitecurve,Bezier curve and B-spline curves, Bezier and B-spline surfaces. Basic illumination models, polygonrenderingmethods.

UNITIV

3-DGeometrictransformations:Translation,rotation,scaling,reflectionandsheartransformations,composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume andgeneral projection transformsand clipping.

UNITV

Visiblesurfacedetectionmethods:Classification,back-facedetection,depth-buffer,scan-line,depthsorting, BSP-tree methods, area sub-division and octree methods Computer animation: Design ofanimation sequence, general computer animation functions, raster animatio, computer animationlanguages, keyframesystems,motion specifications

TEXTBOOKS:

1. "ComputerGraphicsCversion",DonaldHearnandM.PaulineBaker,Pearsoneducation.
2. "ComputerGraphicsPrinciples&practice",secondeditioninC,Foley,VanDam,Feiner and Hughes,PearsonEducation.

REFERENCEBOOKS:

1. "ComputerGraphicsSecondedition",Zhigandxiang,RoyPlastock,Schaum'soutlines,Tata Mc GrawHilledition.
2. "ProceduralelementsforComputerGraphics",DavidFRogers,TataMcGrawhill,2ndedition.
3. "PrinciplesofInteractiveComputerGraphics",NeumanandSproul,TMH.
4. "PrinciplesofComputerGraphics",Shalini,Govil-Pai,Springer.
5. "ComputerGraphics",StevenHarrington,TMH.
6. ComputerGraphics,F.S.Hill,S.M.Kelley,PHI.
7. ComputerGraphics,P.Shirley,SteveMarschner&Others,CengageLearning.
8. ComputerGraphics&Animation,M.C.Trivedi,JaicoPublishingHouse.
9. AnIntegratedIntroductiontoComputerGraphicsandGeometricModelling,R.Goldman, CRCPress, Taylor&FrancisGroup.
10. ComputerGraphics,RajeshK.Maurya,WileyIndia.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO_1	3	3	2	3	2	3	1	2	1	3	3		2	2
CO_2	3	3	2	3	2	3		2	1	3	3		2	1
CO_3	2	2	2	3	2	3		2	1	3	3		1	2
CO_4	3	2	3	3	2	3		2	1	3	3	1	1	3
CO5	3	3	2	3	2	3		2	2	3	3	3	3	2

MSCS204GE:E-COMMERCE

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	E-Commerce	**Course Code**	MSCS204GE
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseDescriptionandObjectives:

This course provides an introduction to information systems for business and management. It is designedtofamiliarizestudentswithorganizationalandmanagerialfoundationsofsystems,thetechnicalfoundationfor understandinginformationsystems

Course Outcomes

AfterCompletionofthesubjectstudentshouldableto

CO1:Understandthebasicconceptsandtechnologiesusedinthefieldofmanagementinformationsystems

CO2: Have the knowledge of the different types of management information systems

CO3: Understand the processes of developing and implementing information systems

CO4:Beawareoftheethical,social,andsecurityissuesofinformationsystems

CO5: Understand Commerce, Limitations, history, applications, architecture,transactionmodels,paymentmethods,advantages,disadvantagesCasestudy

UNIT–I:

ElectronicCommerce:ElectronicCommerceFramework;ElectronicCommerceandMediaConvergence; The Anatomy of E-Commerce Application; Electronic Commerce OrganizationApplications- The Network Infrastructure for Electronic Commerce: Market Forces Influencing theI- Way; Components of the I Way; Network Access Equipment; the Last Mlle: Local Roads andAccess Ramps; Global Information Distribution: Networks: Public Policy Issues Shaping the I-Way.Casestudy:B2Becommerce

UNIT–II:

The Internet as a Network Infrastructure: The Internet Terminology; Chronological History of theInternet NSFNET: Architecture and Components: Globalization of the Academic Internet; InternetGovernance: The Internet Society –An Overview of Internet Applications –Electronic Commerce;WorldWideWeb(WWW)astheArchitecture:WebBackground:HypertextPublishing;Technology behind the Web: Security and the Web- Consumer-Oriented Electronic Commerce:Oriented Applications; Mercantile Process Models Mercantile Models from the Consumer‟sPerspective; Mercantile Models from the Merchant‟s Perspective. Case study: E-Commerce/HighSecurity(PCI)

UNIT–III:

Electronic Payment Systems: Types of Electronic Payment Systems; Smart Cards and ElectronicPayment Systems; Credit Card-Based Electronic Payment systems: Risk and Electronic PaymentSystems Designing Electronic Payment systems – Inter organizational Commerce and EDI: Legal,security,andPrivacyIssues:EDIandElectronicCommerce–EDIImplementation,MIME,andValue-Electronic Payment Systems: Types of Electronic Payment Systems; Smart Cards and ElectronicPayment Systems;

Credit Card-Based Electronic Payment systems: Risk and Electronic PaymentSystems Designing Electronic Payment systems – Inter organizational Commerce and EDI: Legal,security,andPrivacyIssues:EDIandElectronicCommerce–EDIImplementation,MIME,andValue- Added Networks : Standardization and EDI;EDI Software Implementation: EDIEnvelopefor Message Transport: Value- Added Networks (VANs); Internet – Based EDI. Case study: SocialMediaMarketing

UNIT–IV:

Intra organization Electronic Commerce: Internal Information System: Macro forces and InternalCommerce; Work-Flow Automation and Coordination; Customization and Internal Commerce;Supply Chain Management (SCM) – The Corporate Digital Library: Dimensions of InternalElectronicCommerceSystems;MakingaBusinessCaseforaDocumentLibrary; TypesofDigitalDocument Library; Types of Digital Documents; Issues behind Document Infrastructure; CorporateDataWarehouses. Casestudy:EmailMarketing,EmailPersonalization

UNIT-V:

M-Commerce: Introduction to Mobile Commerce, Limitations, history, applications, architecture,transactionmodels,paymentmethods,advantages,disadvantagesCasestudy:Mobileappmarketingcasestudy:O2PriorityMomentsgetssmallbusinessesonside

TEXTBOOK:

1.KalakotaandAndrewB.Whinston.FrontiersofElectronicCommerce,PearsonEducation.

REFERENCEBOOKS:

1. HenryChan,RaymondLee.TharanDillanandE.Chany,E-Commerce,Wiley,2003.
2. DanjelMinoliandEmunaMimoli,WebCommreceTechnology,TataMicGrawHill,1999.
3. MarilynGreensteinandToddMFeinman,aElectronicCommerce,TaraMcGrawHillEdition.
4. CraigPatridge,GigaibitNetworking,Addison–Wesley,1994
5. PaulM-Commerce:BookYourBusinesswiththePowerofMobileCommerce

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	3	3	2	1		2	3	3		3	3
CO_2	3	3	2	3	3	2	1	3	2	3	3		2	3
CO_3	2	2	2	3	3	2	1		2	3	3		1	3
CO_4	3	2	3	3	3	2	1		2	3	3	1	1	2
CO5	3	3	2	3	3	2	3		2	3	3	3	3	1

MSCS204GE:ACCOUNTINGANDFINANCIALMANAGEMENT

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	AccountingAndFinancial Management	**Course Code**	MSCS204GE
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

Course objectives:

CO1:defineanddescribethesourcesofFinance,FinancialManagement,WorkingCapital,InventoryManagement

CO2:Discuss&explainproposalswiththehelpofcapitalbudgeting,different sets of capital structure planning, gross working capital vs net working capital, impact ofdiscountingfactorsforselectionofproposal

CO3:Understanding EnteringInventoryVouchers;6.IntroductiontoVAT,workingcapital, inventory management, cash management

CO4:Tounderstandaboutoptimalcapitalstructure•Abletoanalyze,calculatefinancialstatementsusing variousratios,workingcapitalpolicies,Workingcapitalrequirement,optimalcapitalstructure

CO5:Kowledge aboutTheAdministrativeTallyA.FundamentalsofAccounting;B.FundamentalsofInventory

CourseLearningOutcomes:

FinancialManagementStudentswillbe

- Abletolist,defineanddescribethesourcesofFinance,FinancialManagement,WorkingCapital,InventoryManagement,approaches ofworkingcapitalfinances
- Abletocompare,differentiate,identify,discuss&explainproposalswiththehelpofcapitalbudgeting,different sets of capital structure planning, gross working capital vs net working capital, impact ofdiscountingfactorsforselectionofproposal,positive&negativesideofexcessiveworking capital,financial management, ratio analysis, working capital, inventory management, cash management,receivablesmanagement,capitalbudgeting,capitalstructure,leverage,costofcapital
- Able to prepare, choose, select & compute Performa of financial statement, statement of workingcapital requirement, statement of inventory management, more suitable proposal with the help ofcapital budgeting, best suitable option among different proposals with the help of capital budgeting,optimalcapitalstructure•Abletoanalyze,calculatefinancialstatementsusingvariousratios,workingcapitalpolicies,Workingcapitalrequirement,optimalcapitalstructure.

UNITI

1.Introduction;2.AccountingSystem;3.InventoryControlSystem;4.PayrollSystem

UNITII

1.StartingwithTally7.2;2.CreatingAccountsMasters;3.CreatingInventoryMasters;4.EnteringAccountsVouchers;

UNITIII

5.EnteringInventoryVouchers;6.IntroductiontoVAT(ValueAddedTax);7.Ledgersand VAT;
8. MoreonVAT;

UNITIV

9. VATDocumentsandReports;10.IntroductiontoTDS;11.Display/ReportsinTally;12.TheCollaborativeTally;

UNITV

13.TheAdministrativeTallyA.FundamentalsofAccounting;B.FundamentalsofInventory

TEXTBOOKS:

1. ComputerAccountingWithTally7.2,Firewall,FirewallMedia,,LaxmiPublications
2. ComdexTally9CourseKitbyNamrataAgrawal,DreamTechPress

REFERENCEBOOKS:

1. Tally9byDineshMaidarsaniByFirewallMedia
2. Tally9.0EnglishEditionGoogleEBookByComputerWorld

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2			2		3	3	3		3	3
CO2	3	3	2	2		3	2	3	3	3	3		3	2
CO3	2	2	2	2	2		2		3	3	3		2	1
CO4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS205CF:HUMANRIGHTSANDVALUEEDUCATION

Department	ComputerScience	**CourseType**	AECC
CourseTitle	HumanRightsandValue Education	**Course Code**	MSCS205CF
L-T-P	2-1-0	**Credits**	2
ContactHours	60Hrs	**DurationofSEE**	1.5Hrs
SEEMarks	50	**CIEMarks**	00

CourseObjectives:

CO1 :Toteachandinculcatetheimportanceofvalue-basedliving.
CO2: To give studentsadeeper understandingaboutthepurposeoflife.
CO3: Explaintheevolutionandgrowthofhumanrights
CO4: IdentifytheroleofIndianConstitutionandtheinclusionofhumanrightsinit.
CO5:
Analyzetheeffortsofeducationatvariouslevelstocreateanddevelopanawarenessonhumanrights,throughcurriculum,methods,techniques,strategiesandactivities.

CourseOutcomes:

- Studentswillemergeasresponsiblecitizenswithclearconvictiontopracticevaluesandethicsinlife.
- Studentswillcontributeinbuildingahealthynation
- Recognizetheimportanceofhumanrightstoanindividual.
- Classifyrightsintovariouscategorieswhichishelpfulforthegrowthanddevelopmentofanindividual.
- Realisehowimportanttoknowandtackleissuesthataresocially,culturally,physicallyandemotionallyimportant.
- Knowabouttheirrightsandprotectthem,howrightscontributetothedignityofthehumanpersonality.

UNITI

Value Education- Definition – relevance to present day -Concept of HumanValues – Selfintrospection – Self esteem. Family values - Components, structure and responsibilities of familyNeutralization of anger – Adjustability – Threats of family life – Status of women in family andsociety–Caringforneedyandelderly–Timeallotmentforsharingideasandconcerns.

UNITII

Medical ethics- Views of Charaka, Sushruta and Hippocratus on moral responsibility of medicalpractitioners.Codeofethicsformedicalandhealthcareprofessionals.Euthanasia,Ethicalobligationtoanimals,Ethicalissuesinrelationtohealthcareprofessionalsandpatients.Socialjusticeinhealthcare, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issuesraisedbynewbiologicaltechnologyor knowledge.

UNITIII

Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions.Characterics of ethical problems in management, ethical theories, causes of unethical behavior,ethicalabusesandworkethics.

UNITIV

Environmentalethics-Ethicaltheory,manandnature– Ecologicalcrisis,Pestcontrol,Pollutionandwaste,Climatechange,Energyandpopulation, Justiceandenvironmentalhealth.

UNITV

Social ethics- Organ trade, Human trafficking, Human rights violation and social disparitiesFeminist ethics, surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television MoviesandInternet.

Booksforstudy:

1. JohnSMackenjie:Amanualofethics.
2. "TheEthicsofManagement"byLarueToneHosmer,RichardD.IrwinInc.
3. "ManagementEthics– integrityatwork'byJosephA.PetrickandJohnF.Quinn,ResponseBooks:NewDelhi.
4. "Ethicsinmanagement"byS.A.Sherlekar,HimalayaPublishingHouse.
5. HaroldH.Titus:EthicsforToday
6. Maitra,S.K:HinduEthics
7. WilliamLilly:IntroductiontoEthics
8. Sinha:AManualofEthics
9. Manu:ManuDharmaSastraortheInstituteofManu:ComprisingtheIndiansystemofDuties:ReligiousandCivil(ed.)G.C.Haughton.
10. SusrutaSamhita:Tr.KavirajKunjanlal,KunjalalBrishagratha,ChowkambaSanskritseries,Vol.I, IIandIII,Varnasi,Vol IOO,16-20,21-32and 74-77only.
11. CarakaSamhita:Tr.Dr.RamKraranSarmaandVaidyaBhagavanDash,ChowkambhaSanskrit Seriesoffice,VaranasiI,II,III VolI PP 183-191.
12. Ethics,TheoryandContemporaryIssues,BarbaraMackinnon,Wadsworth/ThomsonLearning,2001.
13. AnalyzingMoralIssues,JudithA.Boss,MayfieldPublishingCompany,1999.
14. An IntroductiontoAppliedEthics(Ed.)JohnH.PietandAyodhyaPrasad,CosmoPublications.
15. TextbookforIntermediatelogic,EthicsandHumanValues,boardof Intermediate Education&TeluguAcademicHyderabad.
16. I.C.SharmaEthicalPhilosophyofIndia.Nagin&coJulundhar.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS206EF:PRINCIPLESOFMANAGEMENT

Department	ComputerScience	**CourseType**	SEC
CourseTitle	PrinciplesofManagement	**Course Code**	MSCS206EF
L-T-P	2-1-0	**Credits**	2
ContactHours	60Hrs	**DurationofSEE**	1.5Hrs
SEEMarks	50	**CIEMarks**	00

CourseObjectives:

CO1: ToenablethestudentstostudytheevolutionofManagement,
CO2: Tostudythefunctionsandprinciplesofmanagement.
CO3: Tolearntheapplicationoftheprinciplesinanorganization.
CO4: Toenabletheeffectiveandbarrierscommunicationintheorganization
CO5: Tostudythesystemandprocessofeffectivecontrollingintheorganization.

CourseOutcomes:

Attheendofthecourse,thestudentwillbeableto:.

- Uponcompletionofthecourse,studentswillbeabletohaveclearunderstandingofmanagerialfunctionslikeplanning, andhavesamebasicknowledgeoninternationalaspectofmanagement
- Tounderstandtheplanningprocessin theorganization
- Tounderstandtheconceptoforganization
- Demonstratetheabilitytodirecting,leadershipandcommunicateeffectively
- Toanalysisisolateissuesandformulatebestcontrolmethods.

Unit-I:**IntroductiontoManagement**

Management-meaning-significance-managementvsadministration– functionsofmanagement– Leadership–LeaderVsManager-Fayol'sprinciplesofmanagement.

Unit-II:**Planning**

Planning-meaning-significance–StepsinPanning-Decisionmaking– Stepsindecisionmakingprocess.

Unit-III:**Organization**

Organizing-meaning–Principlesoforganization–LineandStaffOrganisation-Organisationchart.

Unit-IV:**DelegationofAuthority**

Delegation -meaning -elements-principles- difficultiesin delegation-guidelinesformakingdelegationeffective- Centralization vsdecentralization

Unit-V:**Staffing andControlling**

Staffing–selectionprocedure–Coordination-Control–meaning–QualitiesofGoodControl

TextBooks

1.R.K.SharmaandShashiKGupataBusinessOrganizationandManagement-

KalayaniPublications.

ReferenceBooks:

1. Dr.C.D.Balaji and G.Prasad, BusinessOrganization and Management-Margham Publications,Chennai-17.
2. C.B.GupthaIndustrialOrganizationandManagement,SulthanChand.
3. Y.K.BushanBusinessorganizationandManagement,SulthanChand.
4. SherlekarBusinessOrganizationandManagement,HimalayaPublications.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS206EF:INTERNETOFTHINGS

Department	ComputerScience	CourseType	SEC
CourseTitle	InternetofThings	Course Code	MSCS206EF
L-T-P	2-1-0	Credits	2
ContactHours	60Hrs	DurationofSEE	1.5Hrs
SEEMarks	50	CIEMarks	00

CourseDescription

The Internet of Things (IoT) is everywhere. It provides advanced data collection, connectivity, andanalysisofinformationcollectedbycomputerseverywhere—takingtheconceptsofMachine-to-Machinecommunication fartherthaneverbefore.

CourseObjectives

CO1:TounderstandaboutthefundamentalsofInternetofThingsand itsbuildingblocksalongwiththeircharacteristics
CO2: TounderstandtherecentapplicationdomainsofIoTineverydaylife
CO3: Discussthearchitecture,operation,andbusinessbenefitsofan IoTsolution
CO4: ExaminethepotentialbusinessopportunitiesthatIoTcanuncover
CO5: ExploretherelationshipbetweenIoT,cloudcomputing,andbigdata
IdentifyhowIoTdiffersfromtraditionaldatacollectionsystems

CourseOutcomes

- AbletounderstandbuildingblocksofInternetofThingsandcharacteristicsandassociated technologies.
- ThestudentswillbeabletousetheIoTtechnologiesinpracticaldomainsofsociety.
- Thestudentswillbeabletogainknowledgeaboutthestateoftheartmethodologiesin IoTapplicationdomains.
- AbletorealizetherevolutionofInternetinMobileDevices,Cloud&SensorNetworks.
- AbletounderstandtheapplicationareasofIOT·

UNITI

FUNDAMENTALSOFIOT

Introduction-Characteristics-Physicaldesign-Protocols–Logicaldesign–Enablingtechnologies–
IoTLevels–DomainSpecificIoTs–IoTvsM2M.

UNITII

IOTDESIGNMETHODOLOGY
IoTsystemsmanagement–IoTDesignMethodology–
SpecificationsIntegrationandApplicationDevelopment.

UNITIII

BUILDINGIOTWITHRASPBERRYPI
Physicaldevice–RaspberryPiInterfaces–Programming–APIs/ Packages–Webservices

UNITIV

BUILDINGIOTWITHGALILEO/ARDUINO

IntelGalileoGen2withArduino-Interfaces-ArduinoIDE–Programming-APIsandHacks

UNITV

CASESTUDIESandADVANCEDTOPICS

VariousRealtimeapplicationsofIoT-ConnectingIoTtocloud–CloudStorageforIot–DataAnalyticsforIoT–Software&Management ToolsforIoT

REFERENCES:

1. ArshdeepBahga,VijayMadisetti,"InternetofThings–Ahands-onapproach",UniversitiesPress,2015.2.ManoelCarlosRamon,"Intel®Galileoand Intel®GalileoGen
2. APIFeaturesandArduinoProjectsforLinuxProgrammers",Apress,2014.
3. MarcoSchwartz,"InternetofThingswiththeArduinoYun",PacktPublishing,2014.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

SEMESTER-III

MSCS301C:DATAWAREHOUSINGANDDATAMINING

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	DataWarehousingand Datamining	**Course Code**	MSCS301C
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseDescription:

This course is designed to expand students' knowledge and skills gained in database management coursesand look in depth at data warehousing and data mining methods. The course examines the databasearchitectureandtechnologiesrequiredforsolvingcomplexproblemsofdataandinformation management,information retrieval, and knowledge discovery facing modern organizations. Case studiesoforganizationsusingthesetechnologiestosupportbusinessintelligencegatheringanddecisionmakingareexamined.Thiscourse also provides hands-on experience with state-of-the-art data warehousing and data mining methodsandtools.

CourseObjectives:

CO1:Befamiliarwithmathematicalfoundationsofdataminingtools.

CO2:Understandandimplementclassicalmodelsandalgorithmsindatawarehousesanddata mining

CO3:Characterizethekindsofpatternsthatcanbediscoveredbyassociationrulemining,classificationandclustering.

CO4:Masterdataminingtechniquesinvariousapplicationslikesocial,scientificandenvironmentalcontext.

CO5:Developskillinselectingtheappropriatedataminingalgorithmforsolvingpractical problems.

Course Learning Outcomes(COs):

Attheendofthiscoursestudentswillbeableto…

CLO1:Understandwarehousingarchitecturesandtoolsforsystematicallyorganizinglarge database
Andusetheir data to makestrategicdecisions.

CLO2:UnderstandKDDprocessforfindinginterestingpatternfromwarehouse.

CLO3:Removeredundancyandincompletedatafromthedatasetusingdatapreprocessing methods.

CLO4:Characterizethekindsofpatternsthatcanbediscoveredbyassociationrulemining.

CLO5:Discoverinterestingpatternsfromlargeamountsofdatatoanalyzeforpredictionsandclassification.

CLO6:Developadataminingapplicationfordataanalysisusingvarioustools.

Unit–I:

Chapter–I:DataWarehousing&OLAPTechnologies[Kambler–chapter3(3.1,3.2,3.3)]Chapter –II: Basic Data Mining Tasks: Classification-Regression-Time series Analysis Prediction-Clustering-Summarization-Association rules-Sequence discovery-Data mining Versus Knowledge discovery indatabases-the development of Data Mining-Data Mining issues-Data mining Metrics-SocialImplications of Data Mining-The future. [M.H.Dunhum – chapter 1(1.1 to 1.7)] Chapter- III: DataPreprocessing[Kambler–chapter 2(2.1 to 2.6)]

UNITII:

Chapter –I: Basic Data mining Tasks [M.H.Dunhum–chapter 1(1.1 to 1.7)] Chapter –II: Principlesof dimensional modeling-design decisions, Dimensional Modeling basics-R Modeling versusDimensionalmodeling-useofcasetools-Thestarschema-ReviewofasimpleSTARschema,insidea Dimension table, inside the fact table, the fact less fact table, Data Granularity. Star Schema keys-primary keys, surrogate keys, foreign keys. Advantages of star schema. Chapter –III: DimensionalModeling: Updates to the dimensional tables-Miscellaneous Dimensions-The Snowflake schema-Aggregatefacttables-Familiesofstars

UNIT-III:

Chapter–I:Classification:Introduction-Issuesinclassification-Statistical BasedAlgorithmRegression-Bayesian Classification-Distance based algorithm-Simple approach-K nearest approach-Decisiontreebasedalgorithms-ID3-C4.5&C5.0-CART-ScalableDTTechniquesNeuralnetworkbased algorithms-Propagation-NN Supervised Learning-Radial basis function works-Perceptrons-Rulebasedalgorithms [M.H.Dunhum –chapter 4(4.1 to4.6)]

UNIT–IV:

Chapter–I:Clustering:Introduction-Similarity&distancemeasures-outliers-Hierarchicalalgorithms agglomerative algorithms-Divisive clustering-Partitional Algorithms-Minimum spanningtreeSquarederrorclusteringalgorithm-K-meansclustering-nearestneighboralgorithm-PAMalgorithm-Bondenergyalgorithm-ClusteringwithGeneticAlgorithms-Clusteringwithneuralnetworks-Clusteringlargedatabases-BIRCH-DBSCAN-CUREalgorithm-Clusteringwithcategoricalattributes. [M.H.Dunhum –chapter 5(5.1 to5.7)]

UNIT-V:

Chapter –I: Associate Rules: - Introduction-Large Item sets-Basic Algorithms-Apriori Algorithm-Samplingalgorithm-Partitioning-ParallelandDistributedalgorithms-DataParallelism-Taskparallelism-ComparingApproaches-IncrementalRules-AdvancedAssociationRuleTechnique-Generalizedassociationrules-Multiplelevelassociationrules-Multiple–levelAssociationrules-Quantitative association rules-Using multiple minimum supports Measuring the Quality of a Rules.[M.H.Dunhumchapter6(6.1to6.8)]Chapter–II:Miningobjects-spatial,multimedia&textmining,wwwmining[Kamblerchapter10(10.1to10.5)]

TextBooks:

1. Data Mining – Introductory & Advanced topics by Margaret H. Dunham. Pearson Educationpublishers.
2. Dataminingconcepts&techniques-JiaweiHan&MichelineKamber

3. FundamentalsofDatawarehousing–PaulRajPonniah

ReferenceBooks:

1. DataMining–
   ConceptsandTechniquesbyHanandKamber,2001,MorganKaufmannPublishers
2. Oracle8i–DataWarehousingbyCohen,Abbey,Taub,TataMcGrawHill

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS302C:WEBTECHNOLOGIES

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	WebTechnologies	**Course Code**	MSCS 302C
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

Coursedescription:

Oncompletionofthiscourse,astudentwillbefamiliarwithclientserverarchitectureandabletodevelopa webapplicationusingjavatechnologies.Studentswillgaintheskillsandproject-basedexperienceneededforentryintowebapplication anddevelopmentcareers.

CourseObjectives:

CO1: Toteachstudentsthe basics ofserver-sidescriptingusingPHP

CO2: Toexplainwebapplication and developmentprocedures

CO3: Toimpartservlettechnologyforwritingbusinesslogic

CO4: TofacilitatestudentstoconnecttodatabasesusingJDBC

CO5: TofamiliarizevariousconceptsofapplicationdevelopmentusingJSP

CourseOutcomes:

- StudentsareabletodevelopadynamicwebpagebytheuseofjavascriptandDHTML,JQueryandPHP.
- ApplyJDBCandODBCtechnologiestocreatedatabaseconnectivity
- Studentswillbeabletowriteaserver-sidejavaapplicationcalledServlettocatchformdatasentfromclient, processit and storeit on database.
- Studentswillbeabletowriteaserver-sidejavaapplicationcalledJSPtocatchformdatasentfrom client andstoreitondatabase.

UNIT-I

Introduction to Internet-Browser Architecture-IE, Chrome-Search Engines-Introduction to HTML-5-HTML-5Tags-Audio,VideoTags–HTML-5Forms-Controls-CSSStyling-CSSTagsAttributes.

UNIT-II

Java Script-JQuery- JavaScript Programming Scripts- Control structures- Functions Document,Browser, Date, Math, String Objects-Events- JQuery Libraries-JQuery Objects, Functions – JQueryEvents-Animations.UNIT-III

AJAX Concepts- Simple AJAX objects-Ajax Libraries-Examples, Webservers IIS, Tomcat HostingWebsiteinaWebservers

UNIT-IV

Introduction to PHP-Control Structures-Arrays-Functions-Database connectivity Introduction toZENDFrameworkandapplications

UNIT-V

IntroductiontoJavaServlets,Servletsclassesandinterfaces-JavaDatabaseConnectivityIntroductiontoJSP-JavaServerPagescriplets-JSPObjects-JSPWebapplications

TEXTBOOK:

1. Deitel,DeitelandGoldbergInternet&WorldWideWidehowtoprogram"byEnd.PearsonEducation
2. IvanBayross,WebenabledcommercialApplicationDevelopmentinJava2.0BPB.
3. NicholasC.Zakas.,JeremyMcPeak,Joe Fawcett,ProfessionalAJAX,2ndEdition,Willeypublishing
4. HTML5Blackbook,KogentLearningSolutionsInc.

REFERENCEBOOKS:

1. RajKamalInternetandwebTechnologies,TataMcGrawHill,2002.
2. ChirsBates,WebProgramming,JohnWiley,2ndEdition
3. E.V.KumarandS.V.Subramanyam,WebServices.TataMcGrawHill,2004.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	3		3	2		2	1	1		3	3
CO_2	3	3	2	3		3	2	3	2	2	1		3	1
CO_3	2	2	2	3	2	3	2		2	2	2		1	1
CO_4	3	2	3	3		3	2		2	1	2		1	2
CO5	3	3	2	3		3	2		2	3	2	3	3	3

MSCS303C:SOFTWAREENGINEERING

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	SoftwareEngineering	**Course Code**	MSCS303C
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseOverview:

Studentswillgainexperienceonvariousprocessesusedin Softwareindustryforthedevelopmentof asoftwareproduct.Theyalsolearnabouttestingandmaintenanceofsoftwareproducts

Prerequisite:

1.BasicProgrammingSkills2.InnovativeThinking.3.EnthusiasmtolearnManagementconcepts.

CourseObjectives:

CO1:Toprovidetheideaofdecomposingthegivenproblemintoanalysis,Design,Implementation, Testing andMaintenancephases.

CO2:Toprovideanideaofusingvariousprocessmodelsinthesoftwareindustryaccordingtogivencircumstances.

CO3:TogaintheknowledgeofhowAnalysis,Design,Implementation,TestingandMaintenanceprocessesareconductedin a softwareproject.

CO4:Understanding and acquireknowledgweabout Testingstrategies– Strategiesandissues,testingstrategiesforandobject - Testingmethodsapplicableattheclasslevelinterclasstestingcasedesign

CO5: Knowledge about Softwarequality,framework,metricsforanalysismodeldesignmodel,sourcecaseandtesting.Managingsoftwareprojects– Themanagementspectrum,theW5HHprinciple,metricsin process, software measurement, and metrics

CourseOutcomes:

CLO1:Students will be able to decompose the given project in various phases of a life cycle

CLO2:Studentswillbeabletochoosetheappropriateprocessmodeldependingontheuser requirements

CLO3:Studentswillbeabletoperformvariouslifecycleactivitieslikeanalysis,design,CLO4:implementation,testingandmaintenance.

CLO5:Studentswillbeabletoknowvariousprocessusedionallthephasesoftheproduct

CLO6: Students can apply the knowledge, techniques and skills in the development of softwareproduct.

UNIT–I:

Software Engineering – Introduction, Generic view of process, models, an agile

view of process.Software Engineering practice – Software Engineering, communication, planning, modeling,construction practicesanddeployment.

UNIT-II:

SystemEngineering–Computer-basedsystems,thesystemengineeringHierarchy,businessprocessengineering,productengineeringandsystemmodeling.BuildingTheAnalysisModel–RequirementAnalysis,ModelingApproaches,DataModeling.BehavioralModel.Thewebengineeringprocess,analysismodels forwebapps.

UNIT–III:

DesignEngineering-Designprocessandquality,designconceptsthedesignmodel,andpattern-usedsoftware design. Architectural design – Software architecture, data design, architectural styles andpatterns, architectural design mapping data flow into a software architecture. Component-basedsoftwareengineering,Criticalsystemsdevelopment,Softwarereuse,Userinterfacedesign,webappsdesignissuesandarchitecturedesign.

UNIT–IV:

Testingstrategies–Strategiesandissues,testingstrategiesforandobject-orientedsoftware.Validationtestingandsystemtesting.Softwaretestingtactics–Fundamentals,black-boxandwhite-box testing white-box testing basis path testing. Control structure testing, black box testing, object-orientedtestingmethods.Testingmethodsapplicableattheclasslevelinterclasstestingcasedesign.Testingfor specializedenvironments,architecturesandapplications,webapplicationtesting–concepts, testingprocess, component level testing.

UNIT–V:

Productmetrics–Softwarequality,framework,metricsforanalysismodeldesignmodel,sourcecaseandtesting. Managingsoftwareprojects–Themanagementspectrum,theW5HHprinciple,metricsin process, software measurement, and metrics for software quality integrating metrics within thesoftwareprocess.Estimation–observations,decompositiontechniques,empiricalmodels,estimation for object-oriented projects other estimation techniques, project scheduling, riskmanagement, reengineering, Security engineering, Service-oriented software engineering, Aspect-orientedsoftwaredevelopment.

TextBook:

1. Roger, S, Pressman, Software Engineering, A Practitioner‟s Approach, Six Edition, McGraw-Hill,InternationalEdition,2005.
2. IanSommerville,SoftwareEngineering,PearsonEducation,8thEdition.

ReferenceBooks:

1. JamesFPeters,SoftwareEngineering,JohnWiley
2. WaruanSJawadekar,SoftwareEngineering,TataMcGrawHill,2004.
3. CarloGhezzi,MehdiJazayeri,DinoManrioli,FundamentalsofSoftwareEngineering,PHI,

2001PankajJalote,AnIntegratedapproachtoSoftwareEngineeringNarosa

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	3		3	1		3	1	3		2	2
CO_2	3	3	2	3		3	1	3	3	1	3		2	3
CO_3	2	2	2	3	2	3	1		3	1	3		1	1
CO_4	3	2	3	3		3	1		3	1	3	1	2	2
CO5	3	3	2	3		3	3		3	3	3	3	3	3

MSCS304-GE-A:SYSTEMSPROGRAMMING

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	SystemsProgramming	**Course Code**	MSCS304-GE-A
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

Overview:

The aim of this course is to provide students with knowledge and abilities to design system programs suchas assemblers, linkers, loaders, macro-processors, editors, interpreters, compilers and operating systemsusingmodernmethodologiesandtoimplementtheirdesignusingmoderndevelopmentto ols.

CourseObjectives:

CO1:Tointroducestudentthefundamentalmodeloftheprocessingofhigh-levellanguageprogramsforexecutiononcomputersystem.

CO2: To explain the basic operations that are performed from the time a computer is turned on until auserisableto executeprograms.

CO3: TounderstandandimplementAssembler,Loader,Linkers,Macros&Compilers.

CO4:

Tointroducestudentstheprocessmanagementandinformationmanagementviadifferent softwaretools.

CO5: Understand to devise, select, and use modern techniques and tools needed for the design andimplementation ofsystemprograms

CourseLearningOutcomes

Bytheendofthecoursestudentswillbeable to

- Adequate knowledge in system programs (assemblers, loaders, linkers, macro-processors, texteditors,debuggers,interpreters,compilers,operatingsystems).
- Ability to use theoretical and applied information in these areas to design system software withrealisticconstraints
- Recognize operating system functions such as memory management as pertaining to run timestoragemanagement
- Ability to conduct experiments, gather data, analyze and interpret results for investigating solutions to real life applications with assembly language programming and Unix shellprogramming.
- Ability to devise, select, and use modern techniques and tools needed for the design andimplementation ofsystemprograms.

UNITI:

Background introduction, system software and machine architecture, SIC, RISC, and CISCarchitecture. Assembler: basic assembler functions, machine dependent and independent assemblerfeatures,assemblerdesignoptions,andimplementationexamples.

UNITII:

Loading and linkers basic loader junction, machine dependent and independent loader features,loaderdesignoptions andimplementationexamples.Macroprocessors,basicmacroprocessorfunctionsmachines–independentmacroprocessorfeatures,macroprocessordesignoptions,implementationexamples.

UNITIII:

Compilers:basiccompilerfunctions,machinedependentandindependentcompilerfeatures,compiler design options and implementation examples. Other system software: text editors andinteractivedebuggingsystems

UNIT-IV

Introduction to Device Drivers, Design issues-Types of Drivers, Character driver-1 and Designissues, Character Driver-2- A/D converter and its design issues, Block driver-1 and its design issues-RAMDISKdriver-Anatomy-PrologueofdriversandprogrammingConsiderations.

UNIT-V

Introduction to Linux- Linux Architecture- X-windows- Linux administration tools - Commands touseLinuxOS-ExecutingLinuxShellscripts–ShellProgrammingconceptsShellscripts

TextBooks:

1. Leland.Beck, SystemSoftware:AnIntroductiontosystemsProgramming:3/e,PearsonEducations Asia,2003.
2. Georgepajari,WritingUnixDrivers,Addison–Wesley,1991.
3. RichardPetersen,LinuxcompleteReference,McGrawHillEducation(India)PrivateLimited;6edition(21November2007

ReferenceBooks:

1. Dhamdhere,SystemprogrammingandoperationSystemsBook2/E,TataMcGraw,Hill,1999
2. A.V.Aho,RaviSethiandJDUllman,“compilers,TechniquesandTools”,AddisonWesley, 1986.
3. JhonJ.Donovan,SystemProgrammingTataMcGrawHill2005.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2		2	1	3	1	2	2		2	2
CO_2	3	3	2	2		2	1	3	1	2	2		2	3
CO_3	2	2	2	2	2	2	1	3	1	2	2		1	1
CO_4	3	2	3	2		2	1	3	1	2	2	1	1	2
CO5	3	3	2	2		2	3	3	2	2	2	3	3	3

MSCS304GE-A:COMPUTERALGORITHMS

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	ComputerAlgorithms	**Course Code**	MSCS304GE-A
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseDescription:

Introduction to the design and analysis of computer algorithms. Topics will include concepts of algorithmcomplexity, and various algorithmic design patterns like divide and conquer, dynamic programming andgreedy algorithms. Course will also cover major algorithms and data structures for searching and sorting,graphs,andsomeoptimizationtechniques.

Courseobjectives:

CO1: To teach paradigms and approaches used to analyse and design algorithms and to appreciate theimpactofalgorithmdesigninpractice.
CO2: To make students understand how the worst-case time complexity of an algorithm is defined, howasymptoticnotationisusedtoprovidearoughclassificationofalgorithms.
CO3: To explain different computational models (e.g., divide-and-conquer), order notation and variouscomplexity measures (e.g., running time, disk space) to analyse the complexity/performance ofdifferentalgorithms.
CO4: To teach various advanced design and analysis techniques such as greedy algorithms, dynamicprogramming & know the concepts of tractable and intractable problems and the classes P, NP andNP-completeproblems.
CO5: to Describe the classes P, NP, and NPComplete and be able to prove that a certain problem isNP-Complete.

AbletoanalyzeStringmatchingalgorithms

CourseLearningObjectives:

- Able to Argue the correctness of algorithms using inductive proofs and Analyze worst-case runningtimesof algorithmsusingasymptoticanalysis.
- Abletoexplainimportantalgorithmicdesignparadigms(divide-and-conquer,greedymethod,dynamic-programming and Backtracking) and apply when an algorithmic design situation calls forit.
- Able to Explain the major graph algorithms and Employ graphs to model engineering problems,whenappropriate.
- AbletoComparebetweendifferentdatastructuresandpickanappropriatedatastructureforadesignsituation.
- Able to Describe the classes P, NP, and NPComplete and be able to prove that a certain problem isNP-Complete.
- AbletoanalyzeStringmatchingalgorithms.

UNITI:

Divide–and-ConquerandGreedyMethods.

UNITII:

DynamicProgramming;BasicTraversalandSearchTechnique.

UNITIII:

Backtracking;andBranch-andBoundTechnique.

UNITIV:

LowerboundTheory;NP-HardandNP-CompleteProblems

UNITV:

MeshandHypercubeAlgorithms,theFastFourierTransformanditsApplications.

TextBooks:

1.EillsHorowliz,SartajsahniandSanguthevarRajasekaran.ComputerAlgorithmsGalgotiaPublications,1999.

ReferenceBooks:

1. RCTLec,SSTeang,RCChangeandYTTsai,IntroductiontotheDesignandAnalysisofAlgorithms,McGraw-Hill2005.
2. R.JhonsonbaughandMschaefer,Algorithms,Pearsoneducation2004.
3. A.Levitin,IntroductiontotheDesignandAnalysisofAlgorithms,PearsonEducation2005.
4. THCoremen,CELeisersonandRLRivest,IntroductiontoAlgorithms,PHI
5. G.BrassedandP.Bratley,FundamentalsofAlgorithms,PHI

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS304-GE-A: USERINTERFACEDESIGNUSING.NETTECHNOLOGIES

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	UserInterfaceDesignUsing .NetTechnologies	**Course Code**	MSCS304-GE-A
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

LearningOutcomes:

Oncompletionofthiscourse,studentswillbeableto:

CO1: Understand theimportanceofuserinterfaceandbenefitsofgooddesign.

CO2:
Understandtheuserinterfacedesignprocessandbusinessfunction,Commandandnaturall anguages

CO3: Understandthetypesofsystemmenusandnavigationschemes,InteractionDevices

CO4: Understandthecharacteristicsofwindowsanddevice-basedcontrols.

CO5: UnderstandtheDotNettechnologyscreen-basedcontrolsandkindsof tests.

Unit–I:

Human factors of interactive software goals of system engineering and user-interface design,motivations, accommodation of human diversity goal for our profession. Theories, principles, andguidelines – High-level theories, object-action interface model, Principle 1.2 and 3, guide links fordatadisplayanddataentry,balanceofautomationandhumancontrol.Managingdesignproc esses

– Usability, design pillars, development methodologies, ethnographic observation, usability testing,surveys, and continuing assessments – expert reviews, usability testing and laboratories, surveysacceptancetests,evaluationduringactiveuse,andcontrolledpsychologicallyoriented experiments.

Unit–II:

Software tolls – Specification methods, interface- building tools and evaluation and critiquing tools.Directmanipulationandvirtualenvironments– examples,explanations,programming,visual,thinkingandiconshomeautomation,remotedi rectmanipulation,visualenvironments.Menuselection, form filling, and dialog boxes – Task – related organizations item presentation sequence,response time and display rate, fact movement through menus, menu layout, form fill in, and dialogboxes. Command and natural languages – Functionality to support users' tasks, command – organizationstrategies,thebenefitsofstructure,namingandabbreviations,commandmenus, naturallanguageincomputing.

Unit–III:

InteractionDevices–
Keyboardsandfunctionkeys,pointingdevices,speechrecognitiondigitizationand generation. Image and video displays, printers. Response time and display rate-Theoreticalfoundations,expectationsandattitudes,userproductivity,variability.Presentatio

nstyles:Balancingfunction and fashion – error messages, no anthropomorphic design, display design, color, Printedmanuals, Online Help and tutorials – Reading from paper versus form displays, preparation ofprinted manuals, and preparationofonlinefacilities.

Unit–IV:

Multiple – Window strategies – Individual – Window design, multiple-window design, Coordinatorby tightly – coupled windows. Image browsing and tightly –coupled windows, personal rolemanagementandelasticwindows.Computer-supportedcooperativework-goalsofcooperation,AsynchronousInteraction:Differenttimeandplace,SynchronousDistributed:Differentplace,sametime, face to face: same place, same time, Applying CSCW to Edition, Information search andvisualization – Database Query and phrase search in textual documents, multimedia documentsearches, information visualization. Advanced filtering. Hypermedia and the world wide web(www).

Unit–V:

Introduction to Dot Net technology c#.Net Language – Control structures – GUI controls –Database GUI Controls and its connectivity to databases – ASP.Net Fundamentals and Web pagesInterfacedesigning.

TextBooks:

1. BenShriderman,DesigningtheuserInterface,strategiesforeffectivehuman-ComputerintroductionThirdEdition,PearsonEducation,2004,(ForunitsI,II,IIIandIV).
2. Beginning.NET2.0bywroxpublications(ForUnitV).

ReferenceBooks:

1. Hix,DeborahandHartgon,H.RRX;DevelopinguseInterfaces,JohnWiley,1993.
2. Galitz,WilbertO.,It‟sTimetoClearYourWindows:DesigningGUIsthatWork,John WileyandSons,NewYork(1994)
3. ASP.NET2.0BlackBook,Dreamtechpublications.
4. VB.NET2.0BlackBook,Dreamtechpublications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	1	2	3	1	3	1	3	2		2	2
CO_2	3	3	2	1	2	3	1	3	1	3	2		2	3
CO_3	2	2	2	1	2	3	1	3	1	3	2		1	1
CO_4	3	2	3	2	2	3	1	3	1	3	2	1	1	2
CO5	3	3	2	1	2	3	3	3	2	3	2	3	3	2

MSCS304-GE-A:ITINFORENSICSCIENCE

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	ITinForensicScience	**Course Code**	MSCS304-GE-A
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives

CO1:Introduction aboutBiometrics,BiometricIdentification,BiometricVerification,BiometricEnrollment,Biometric System Security,AccessControlSecurityServices
CO2: Understanding the TechnicalSteganography,LinguisticSteganography,CopyRight Enforcement, Wisdom from Cryptography Principles of Steganography: Framework forSecret Communication, Security of Steganography System
CO3: Knowledge about Substitution systems and Bit Plane Tools, TransformDomain Techniques: - Spread Spectrum and Information hiding, Statistical Steganography,Distortion Techniques
CO4: To Understand Fourier Transformation, Fast Fourier Transformation, Discrete CosineTransformation, Mellin-Fourier Transformation, Wavelets, Split Images in Perceptual Bands.Applicationsof Transformationin Steganography
CO5:Knowledge aboutComputer Forensics, Rules of evidence, Evidence dynamics, Evidence collection, Data recovery

UNITI

Overview of Biometrics,BiometricIdentification,BiometricVerification,BiometricEnrollment,Biometric System Security. Authentication and Biometrics: Secure Authentication Protocols, AccessControlSecurityServices,MatchingBiometricSamples,Verificationbyhumans. Commonbiometrics:Finger PrintRecognition,FaceRecognition,SpeakerRecognition,IrisRecognition,HandGeometry,SignatureVerification

UNITII

IntroductiontoInformationHiding:TechnicalSteganography,LinguisticSteganography,CopyRight Enforcement, Wisdom from Cryptography Principles of Steganography: Framework forSecret Communication, Security of Steganography System, Information Hiding in Noisy Data ,Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding inWrittenText.

UNITIII

A Survey of Stenographic Techniques: Substitution systems and Bit Plane Tools, TransformDomain Techniques: - Spread Spectrum and Information hiding, Statistical Steganography,Distortion Techniques, Cover Generation Techniques. Steganalysis: Looking for Signatures: - ExtractinghiddenInformation,DisablingHiddenInformation.

UNITIV

Watermarking and Copyright Protection: Basic Watermarking, Watermarking Applications,RequirementsandAlgorithmicDesignIssues,EvaluationandBenchmarkingofWatermarkingsystem. Transform Methods: Fourier Transformation, Fast Fourier Transformation, Discrete CosineTransformation, Mellin-Fourier Transformation, Wavelets, Split Images in Perceptual Bands.Applicationsof Transformationin Steganography.

UNITV

Computer Forensics, Rules of evidence, Evidence dynamics, Evidence collection, Data recovery,Preservationofdigitalevidence,surveillancetoolsforfuturewarfare

References:

1. Katzendbisser,Petitcolas,"InformationHidingTechniquesforSteganographyandDigitalWatermarking",ArtechHouse.
2. Peter Wayner, "Disappearing Cryptography: Information Hiding, Steganography andWatermarking2/e",Elsevier
3. Bolle,Connellet.al.,"GuidetoBiometrics",Springer
4. JohnVecca,“ComputerForensics:CrimesceneInvestigation”,FirewallMedia
5. ChristopherL.T.Brown,“ComputerEvidence:CollectionandPreservation”,FirewallMedia

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS304-GE-A:SOFTWARETESTING

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	SoftwareTesting	**Course Code**	MSCS304-GE-A
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives

CO1:
Tostudyfundamentalconceptsinsoftwaretesting,includingsoftwaretestingobjectives,process,criteria,strategies,andmethods.
CO2:
Todiscussvarioussoftwaretestingissuesandsolutionsinsoftwareunittest;integration,regression,andsystemtesting.
CO3: To understandsoftwaretestautomationproblemsandsolutions.
Tolearnhowtoplanningatestproject,designtestcasesanddata,conducttestingoperations,managesoftwareproblemsanddefects,generateatestingreport.
CO4 Toexposetheadvancedsoftwaretestingtopics,suchasobject-orientedsoftwaretestingmethods,andcomponent-basedsoftwaretestingissues,challenges,andsolutions.Tolearnhowtowritesoftwaretestingdocuments,andcommunicatewithengineersinvariousforms
CO5
Togainsoftwaretestingexperiencebyapplyingsoftwaretestingknowledgeandmethodstopractice-orientedsoftwaretestingprojects.
Togainthetechniquesandskillsonhowtousemodernsoftwaretestingtoolstosupportsoftwaretestingprojects

LearningObjectives

Bytheendofthecourse,youshould:

1. Haveanabilitytoapplysoftwaretestingknowledgeandengineeringmethods.
2. Haveanabilitytodesignandconductasoftwaretestprocessforasoftwaretestingproject.
3. Haveanabilitytoidentifytheneedsofsoftwaretestautomation,anddefineanddevelopatesttool tosupporttestautomation.
4. Haveanabilityunderstandandidentifyvarioussoftwaretestingproblems,andsolvetheseproblemsbydesigningandselectingsoftwaretestmodels,criteria,strategies,andmethods.
5. Haveanabilitytousevariouscommunicationmethodsandskillstocommunicatewiththeirteammatestoconducttheirpractice-orientedsoftwaretestingprojects.
6. Havebasicunderstandingandknowledgeofcontemporaryissuesinsoftwaretesting,suchascomponent-based softwaretestingproblems
7. Haveanabilitytousesoftwaretestingmethodsandmodernsoftwaretestingtoolsfortheirtestingprojects

UNITI

SoftwareEngineeringEvaluation

- SoftwareDevelopmentProcessModels
- RequirementsManagement
- SoftwareDesign
- CodingandUnitTesting
- IntegrationTesting
- Systemtesting
- InstallationandAcceptance
- CustomerSupport/Maintenance

UNITII

SystemTestingProcess

- SystemtestingProcess
- SystemTestCommencement
- SystemTestPlanning
- TestDesign
- TestExecution
- TestReportingandDefectTracking

UNITIII

WinRunner8.0

- IntroductiontoWinRunner
- checkpointsinWinRunner
- DataDrivenandBatchTesting
- ImproveTestAutomationinWinRunner
- GUI Mapping
- WebtestOptioninWinRunner

UNITIV

QTP8.2

- QuickTestProIntroduction
- Edit TestScripts
- ImprovingTestAutomationinQTP
- DataDrivenandBatchTesting,WebTestOptionsinQTP

UNITV

LoadRunner8.0

- IntroductiontoPerformanceTesting
- VuserScriptCreationUsingLoadRunner
- VuserScriptExecutionand

ResultsAnalysisTestDirector

8.0

- SiteAdministrator,UnderstandingTestDirector

TEXTBOOK:

1. SoftwareTestingConceptsandToolsbyNageshwarRaoPusuluri,DreamtechPress,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS305-GE-B:CLOUDCOMPUTING

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	CloudComputing	**Course Code**	MSCS305-GE-B
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives:

- Identify thetechnicalfoundationsof cloudsystemsarchitectures.
- Analyzetheproblemsandsolutionstocloudapplicationproblems.
- Applyprinciplesofbestpracticeincloudapplicationdesignandmanagement.
- Identify and define technicalchallengesfor cloud applicationsand assess their importance.

CourseOutcomes(COs)

CO1:Understandthefundamentalprinciplesofdistributedcomputing.
CO2:UnderstandhowthedistributedcomputingenvironmentsknownasGridscanbebuiltfromlower-levelservices.
CO3:UnderstandtheimportanceofvirtualizationindistributedcomputingandhowthishasenabledthedevelopmentofCloudComputing.
CO4:AnalyzetheperformanceofCloudComputing.CO5:UnderstandtheconceptofCloudSecurity.
CO6:LearntheConceptofCloudInfrastructureModel

UNITI

UNDERSTANDINGCLOUDCOMPUTING:CloudComputing– HistoryofCloudComputing –CloudArchitecture–CloudStorage–WhyCloudComputingMatters– AdvantagesofCloudComputing –Disadvantagesof CloudComputing– CompaniesintheCloudToday– Cloud Services

UNITII

DEVELOPINGCLOUDSERVICES:Web-BasedApplication– ProsandConsofCloudServiceDevelopment–TypesofCloud ServiceDevelopment– Softwareas aService–Platform asaService –WebServices–On-DemandComputing– DiscoveringCloudServicesDevelopmentServicesandTools–AmazonEc2– GoogleAppEngine– IBMClouds

UNITIII

CLOUD COMPUTING FOR EVERYONE: Centralizing Email Communications –

Collaboratingon Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing forthe Community – Collaborating on Group Projects and Events – Cloud Computing for theCorporation

UNITIV

USING CLOUD SERVICES: Collaborating on Calendars, Schedules and Task Management –Exploring Online Scheduling Applications – Exploring Online Planning and Task Management –CollaboratingonEventManagement– CollaboratingonContactManagement–Collaboratingon
Project Management – Collaborating on Word Processing - Collaborating on Databases – StoringandSharingFiles

UNITV

OTHER WAYS TO COLLABORATE ONLINE: Collaborating via Web-Based CommunicationTools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating viaSocialNetworksandGroupware– Collaboratingvia BlogsandWikis

References:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You WorkandCollaborateOnline,QuePublishing, August 2008.
2. KumarSaurabh,"CloudComputing– InsightsintoNewEraInfrastructure",WileyIndian Edition,2011.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes forOndemand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo PtyLimited,July2008.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS 305-GE-B:BIGDATAANALYTICS

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	BigDataAnalytics	**Course Code**	MSCS305-GE-B
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives:

CO1:UnderstandtheBigDataPlatformanditsUsecases
CO2: ProvideanoverviewofApacheHadoopandhandsonHodoopEcoSystem
CO3: ApplyanalyticsonStructured,UnstructuredData.
CO4: ExposuretobusinessanalyticsandpredictiveAnalytics.
CO5: Business Analytics- Consumption of Analytics- Creation to Consumption of Analytics-Datavisualization by Organizations

LearningOutcomes:

- DescribeBigDataanditsimportancewithitsapplications
- DifferentiatevariousbigdatatechnologieslikeHadoopMapReduce,Pig,Hive,Hbaseand No-SQL.
- ApplytoolsandtechniquestoanalyzeBigData.
- DesignasolutionforagivenproblemusingsuitableBigDataTechniques

UNIT-I

What is Big Data - Varieties of Data - Unstructured data – Trends in Data Storage-IndustryExamplesofBigData

UNIT-II

Big data Technology – New and older approaches- Data Discovery – Open source technologies forBig Data Analytics- Cloud and Big Data –Big Data Foundation-Computation-Limitations Big DataEmergingTechnologies

UNIT-III

Business Analytics- Consumption of Analytics- Creation to Consumption of Analytics-Datavisualization by Organizations – 90/10 rule of critical thinking – Decision sciences and analytics-Learningoverknowledge-Agility-Scaleandconvergence-PrivacyandsecurityinBigData.

UNIT-IV

PredictiveAnalytics–LinearRegression–Decisiontrees-Neuralnetworks-ClassificationtreesEnsemblemethods-AssociationRules-Segmentation,SequenceRules,SocialNetworkanalytics.

UNIT-V

Hadoop – Components of Hadoop – Hadoop File System –Hadoop Technology Stack-DatawarehousingHadoop Concepts-Applicationsof Hadoopusing

PIG,YARN,HIVE.

TextBooks

1. MichealMinnelli,AmbigaDhiraj,Chambers,BigDataandBigAnalytics,WilleyandSonsInc,.
2. BartBeasens,AnalyticsinBigDataWorld,WilleyandSonsInc
3SameerWadker,MadhuSidhalingaiahandJasonWinner,ApacheHadoop,APress

MSCS305-GE-B:ARTIFICIALNEURALNETWORKS

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	ArtificialNeuralNetworks	**Course Code**	MSCS305-GE-B
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives:

Co1:Introduction about neural network? Human Brain, Models of a Neuron, Neural networksviewedasDirectedGraphs,NetworkArchitectures,KnowledgeRepresentation,ArtificialIntelligence

CO2: To Understand the Competitive,Boltzmannlearning,CreditAssignmentProblem,Memory, Adaption, Statistical nature of the learning process CO3: ApplyanalyticsonStructured,UnstructuredData.

CO4: Able to gain knowledge about BackpropagationalgorithmXORproblem,Heuristics,Outputrepresentation and decision rule, Computer experiment, feature detection

CO5:Understandingbasic feature mapping models, Self organization map,SOM algorithm, properties of feature map, computer simulations

UNITI

INTRODUCTION - what is a neural network? Human Brain, Models of a Neuron, Neural networksviewedasDirectedGraphs,NetworkArchitectures,KnowledgeRepresentation,Artificial Intelligence and Neural Networks (p. no's 1 –49) LEARNING PROCESS 1 – Error Correctionlearning,Memorybased learning,Hebbianlearing,(50-55)

UNITII

LEARNINGPROCESS2:Competitive,Boltzmannlearning,CreditAssignmentProblem,Memory, Adaption, Statistical nature of the learning process, (p. no's 50 –116) SINGLE LAYERPERCEPTRONS – Adaptive filtering problem, Unconstrained Organization Techniques, Linearleast square filters, least mean square algorithm, learning curves, Learning rate annealing techniques,perception –convergence theorem, Relation between perception and Bayes classifier for a GaussianEnvironment(p.no's117–155)

UNITIII

MULTILAYERPERCEPTRON– BackpropagationalgorithmXORproblem,Heuristics,Outputrepresentation and decision rule, Computer experiment, feature detection, (p. no's 156 –201) BACKPROPAGATION - back propagation and differentiation, Hessian matrix, Generalization, Crossvalidation, Network pruning Techniques, Virtuesand limitationsofbackpropagation learning,Acceleratedconvergence,supervisedlearning.(p.no's202–234)

UNITIV

SELF ORGANIZATION MAPS – Two basic feature mapping models, Self organization map,SOM algorithm, properties of feature map, computer simulations, learning vector quantization,Adaptivepatterclassification,HierarchalVectorquantilizer,contexmelMaps(p .no's443–469,9.1
–9.8)

UNITV

NEURODYNAMICS–
Dynamicalsystems,stavilityofequilibriumstates,attractors,neurodynamical models, manipulation of attractors' as a recurrent network paradigm (p. no's 664 –680,14.1–14.6)HOPFIELDMODELS–Hopfieldmodels,computerexperimentI(p.no's680-701,14.7–14.8)

TEXTBOOK:

1.NeuralnetworksAcomprehensivefoundations,SimonHhaykin,PearsonEducation2ndEdition2004

REFERENCEBOOKS:

1. Artificialneuralnetworks-B.VegnanarayanaPrenticeHalllofIndiaPLtd2005
2. NeuralnetworksinComputerintelligence,LiMinFuTMH2003
3. NeuralnetworksJamesAFreemanDavidMSkapuraPearsonEducation2004

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS305-GE-B:CYBERSECURITY

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	CyberSecurity	**Course Code**	MSCS305-GE-B
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives

The educational objectives of the program are:

CO1: Topreparestudentswiththetechnicalknowledgeandskillsneeded toprotectanddefendcomputersystemsandnetworks.

CO2: Todevelopgraduatesthatcanplan,implement,andmonitorcybersecuritymechanis mstohelpensurethe protectionofinformationtechnologyassets.

CO3: Todevelopgraduatesthatcanidentify,analyze,andremediatecomputersecuritybreaches.

CO4:To understand PROCEDURALISSUESDutyofCare,CriminalLiability,Proceduralissues,ElectronicCo ntracts&DigitalSignatures,Misappropriationofinformation

CO5: Knowledge about LegalDevelopments,Late1990to2000,Cybersecurity in Society, Security in cyber laws case. Studies, General Law and Cyber Law-a SwiftAnalysis.

Course LearningOutcomes

Uponcompletionofthedegreeprogram,studentswillbeableto:

1. Analyzeandevaluatethecybersecurityneedsofanorganization.
2. Conductacybersecurityriskassessment.
3. Measure the performanceand troubleshootcyber securitysystems.
4. Implement cyber securitysolutions.
5. Beabletousecybersecurity,informationassurance,andcyber/computerforensicssoftware/tool s.
6. Identifythekeycybersecurityvendorsinthemarketplace.
7. Designanddevelopasecurityarchitectureforanorganization.
8. Design operational and strategic cybersecurity strategiesandpolicies.

UNITI

FUNDAMENTALSOFCYBERSECURITYIntroduction-CyberSecurityanditsproblem-InterventionStrategies: Redundancy,

DiversityandAutarchy.

UNITII

ISSUESINCYBERSECURITYPrivateorderingsolutions,RegulationandJurisdictionf orglobalCyber security, Copy Rightsource of risks, Pirates, Internet Infringement, Fair Use, postings,criminal liability,FirstAmendments,DataLoss.

UNITIII

INTELLECTUALPROPERTYRIGHTSCopyRight-Sourceofrisks,Pirates,InternetInfringement, Fair Use, postings, Criminal Liability, First Amendments, Losing Data, Trademarks,Defamation, Privacy-Common Law Privacy, Constitutional law, Federal Statutes, Anonymity,Technologyexpandingprivacyrights.

UNITIV

PROCEDURALISSUESDutyofCare,CriminalLiability,Proceduralissues,Electronic Contracts&DigitalSignatures,Misappropriationofinformation,CivilRights,Tax,Evid ence.

UNITV

LEGALASPECTSOFCYBERSECURITYEthics,LegalDevelopments,Late1990to2 000,Cybersecurity in Society, Security in cyber laws case. Studies, General Law and Cyber Law-a SwiftAnalysis.

TextBooks:

1. JonathanRosenoer,"CyberLaw:ThelawoftheInternet",Springer-Verlag,1997.
2. MarkFGrady,FransescoParisi,"TheLawandEconomicsofCyberSecurity",Cambridge UniversityPress,2006.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS305-GE-B:MOBILEAPPDEVELOPMENT

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	MobileAppDevelopment	**Course Code**	MSCS305-GE-B
L-T-P	3-1-0	**Credits**	4
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	80	**CIEMarks**	20

CourseObjectives:

CO1: TofacilitatestudentstounderstandandroidSDK
CO2: TohelpstudentstogainabasicunderstandingofAndroidapplicationdevelopment
CO3: ToinculcateworkingknowledgeofAndroidStudiodevelopmenttool
CO4:
basicconceptsinmobileapplicationandunderstandtheprocessesofproducingmobileapplications.Theywillalsodevelopskillsandtechniquesindesigninganddevelopingmobileapplication works.
CO5: implementation – Touchframeworks–DatapersistenceusingCoreDataandSQLite–LocationawareapplicationsusingCoreLocationandMapKit

CourseOutcomes:
Attheendofthiscourse,studentswillbeableto:

- identifythebasicknowledgeonmobileapplicationenvironmentandtechnology
- explaintheconceptsandprocessesofmobileapplicationdevelopment
- discuss designanddevelopment issues specific to mobileapplications
- designanddevelopmobileapplications,usingdevelopmenttoolsandenvironments.
- ProgrammobileapplicationsfortheAndroidoperatingsystemandiosthatusebasicandadvanced phonefeatures,andDeployapplications

UNITI

Introduction to mobile applications – Embedded systems - Market and business drivers for mobileapplications – Publishing and delivery of mobile applications – Requirements gathering andvalidationformobileapplications

UNITII

BASIC DESIGN: Introduction – Basics of embedded systems design – Embedded OS - Designconstraintsformobileapplications,bothhardwareandsoftwarerelated–Architectingmobileapplications – User interfaces for mobile applications – touch events and gestures – Achieving qualityconstraints–performance,usability,security,availabilityandmodifiability.

UNITIII

ADVANCED DESIGN: Designing applications with multimedia and web access capabilities –IntegrationwithGPSandsocialmedianetworkingapplications–Accessingapplicationshostedinacloudcomputingenvironment–Designpatternsformobileapplications.

UNITIV

TECHNOLOGY I - ANDROID: Introduction – Establishing the development environment –Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite –Packaging and deployment – Interaction with server-side applications – Using Google Maps, GPSandWifi– Integration with socialmedia applications.

UNITV

TECHNOLOGY II - IOS : Introduction to Objective C – iOS features – UI implementation – TouchframeworksDatapersistenceusingCoreDataandSQLite– LocationawareapplicationsusingCoreLocationandMapKit– Integratingcalendarandaddressbookwithsocialmediaapplication –UsingWifi-iPhonemarketplace.

References:

1. http://developer.android.com/develop/index.html
2. JeffMcWherterandScottGowell,"ProfessionalMobileApplicationDevelopment",Wrox,2012
3. CharlieCollins,MichaelGalpinandMatthiasKappler,"AndroidinPractice",DreamTech,2012
4. JamesDoveyandAshFurrow,"BeginningObjectiveC",Apress,2012
5. DavidMark,JackNutting,JeffLaMarcheandFredericOlsson,"BeginningiOS6Development:ExploringtheiOSSDK",Apress,2013.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS-307EF:MULTIMEDIA

Department	ComputerScience	**CourseType**	DSCC
CourseTitle	Multimedia	**Course Code**	MSCS307EF
L-T-P	2-1-0	**Credits**	2
ContactHours	60Hrs	**DurationofSEE**	1.5Hrs
SEEMarks	50	**CIEMarks**	00

CourseObjectives:

CO1: To identify a range of concepts, techniques and tools for creating and editing the interactivemultimediaapplications.
CO2: Toidentifythecurrentandfutureissuesrelatedtomultimediatechnology.
CO3: To identify both theoretical and practical aspects in designing multimedia systems surroundingthe emergence of multimedia technologies using contemporary hardware and softwaretechnologies.
CO4: Understanding and implement Visual Display Systems – CRT - video adapter card - video adapter cable – LCD – PDP - opticalstoragemedia-CDtechnology-DVDTechnology-CompressionTypesandTechniques
CO5:Able to Implement3Dmodelingandanimationtools-imageeditingtools–soundeditingtools-digitalmovietools

Course LearningOutcomes:

Uponsuccessfulcompletionofthissubject, students should:

- beabletocriticallyanalyzeandsynthesizethekeycomponentsofmultimediatechnologiesincluding text,graphics,voice,videoandanimation;
- be able todefinethe characteristics of eachmedia typeanddescribe their application;
- beabletodevelop,editandimproveinteractivewebpagesthatincorporateavarietyofdigitalmedia such as graphics,voice,animation and video;
- Useandapplytoolsforimageprocessing,video,soundandanimation.
- Applyacquiredknowledgeinthefieldofmultimediainpracticeandindependentlycontinuetoexpandknowledgeinthisfield.

UNITI

INTRODUCTION
Introduction to Multimedia – Characteristics – Utilities – Creation -Uses – Promotion – DigitalRepresentation–MediaandDatastreams–MultimediaArchitecture–MultimediaDocuments

UNITII

ELEMENTSOFMULTIMEDIA

Multimedia Building Blocks: Text, Graphics, Video Capturing, Sound Capturing, and Editing Introto 2D & 3D Graphics -surface characteristics and texture - lights – Animation: key frames &Tweening,techniques,principlesofanimation,3Danimation,fileformats.

UNITIII

MULTIMEDIASYSTEMS

Visual Display Systems – CRT - video adapter card - video adapter cable – LCD – PDP-opticalstoragemedia-CDtechnology-DVDTechnology-CompressionTypesandTechniques–CODEC-GIFcodingstandards–lossyandlossless–JPEG-MPEG-1-MPEG-2-MP3-Fractals –MDBS

UNITIV

MULTIMEDIATOOLS

Authoring tools – features and types - card and page-based tools - icon and object-based tools - timebased tools - cross platform authoring tools – Editing tools - text editing and word processing tools -OCRsoftware-paintinganddrawingtools–

UNITV

3Dmodelingandanimationtools-imageeditingtools–soundeditingtools-digitalmovietools–plug-insanddeliveryvehiclesforwww

References:

1. ParekhR"PrinciplesofMultimedia"TataMcGraw-Hill,2006.
2. RalfSteinmetz,KlaraNahrstedt,"Multimedia:Computing,CommunicationsandApplications" PrenticeHall,1995.
3. JohnVillamilandLouisMolina,"Multimedia;AnIntroduction",PrenticeHall,NewDelhi1998.
4. TayVaughan,"Multimedia:MakingItWork"McGraw-HillProfessional,2006
5. Deitel&Deitel"Internet&WorldWideWebHowtoProgram",Fourth Edition– PrenticeHall,2008
6. BANERJIASHOK&GHOSHANANDAMOHAN,MultimediaTechnologies,TMH,NewDelhi,2010
7. Li,Ze-Nian&Drew-MarkS,"FundamentalsofMultimedia,"PhiLearningPrivateLimited,New Delhi,2012

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO_1	3	3	2	2			2		3	3	3		3	3
CO_2	3	3	2	2		3	2	3	3	3	3		3	2
CO_3	2	2	2	2	2		2		3	3	3		2	1
CO_4	3	2	3	2			2		3	3	3	1	1	2
CO5	3	3	2	2			2		3	3	2	3	3	2

MSCS401P:MAJORPROJECTWORK:

Department	ComputerScience	**CourseType**	DSEC
CourseTitle	MajorProjectWork	**Course Code**	MSCS401P
L-T-P	0-0-24	**Credits**	12
ContactHours	60Hrs	**DurationofSEE**	3Hrs
SEEMarks	200	**CIEMarks**	100

The project will be one semester duration. The student will be advised to approach different organizationsinvolved in science communication activities as per interest and specialization of students, mostly locatedintheplaceofthestudy.Theywillhavetocarryoutaprojectworkrelatedtotheareaofinterestandsubmita project report at the end of the semester. The students shall defend their dissertation in front of expertsduringviva-voceexaminations.

1. ProjectSeminar(Internal) :50 Marks
2. ProjectReport(Internal) :50 Marks
3. National/InternationalConferencePublicationProceedings(External) : 50 Marks(Paperbasedonp andpublished in theformof proceedings)
4. National/InternationalJournalPublication(External) : 50 Marks(Paperbasedonp andshouldbe published)
5. VivaVoce(External) : 50 Marks
6. ProjectExecution(External) : 50Marks

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF CM & CS

DEPARTMENT OF COMMERCE



Course

M.COM (REGULAR)

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

Name of the Department : Dept. of Commerce

1. About the Department

The Department of Commerce was one of the oldest departments established during the academic year 1969-70 in SV University (Estd.1954) to offer M.Com degree course under the aegis of Economics Department, S.V. University College of Arts and Sciences and subsequently it emerged as an independent entity during the year 1971, with Dr. O.R. Krishna Swamy as the founder member of the Department. Under the re-organized set-up during 2006, the Department became a part of the College of Commerce, Management and Information Sciences. For the new millennium, a new course i.e., MFM was started in the year 1999 under semester system. And M.Com (A&F) was started during the academic year 2005-06. Both M.Com and MFM courses were modified to incorporate Choice Based Credit System (CBCS) during the academic year 2006-07. The Department of Commerce is one of the biggest Departments in Sri Venkateswara University campus with a total strength of 320 students. To meet the overwhelming demand for accounting and finance professionals, the Department offers three courses viz., M.Com on Regular basis, M.Com (FM) and M.Com (A&F) on self-supporting basis besides PhD program. Currently, based on NEP guidelines syllabi is restructured to include core, generic electives, compulsory foundations, skill oriented course, mandatory project report, and open electives.

2. Vision, mission of the Department

Vision

"To promote accounting and finance professionals through a process of quality and value based education, consultancy, counselling, persistent skill development and infusion of human values for vibrant future".

Mission

- To groom competent, confident, creative and committed professionals in the field of accounting and finance.
- To provide the students with inclusive facilities to cater to their industry learning, placement opportunities and social needs
- To make the students occupy good positions in academic and research institutions and consultancy organizations.

M. COM (REGULAR)

PROGRAMME SPECIFIC OUTCOMES (PSOs)

After completion of the programme, the student would be able to

- PSO 1: Familiarise the concepts of accounting and its branches-cost accounting and management accounting, finance, marketing, organizational behavior, managerial economics, quantitative techniques for business decisions and analyse the importance of these areas for placing business entity in right perspective.
- PSO 2: Acquire knowledge in business environment and marketing and HR to design constructive strategies for better prospects of business in the changing socio-economic and political conditions.
- PSO 3: Examine critically the accounting standards and reporting so as to evolve an effective accounting and reporting system.
- PSO 4: Diagnose the human behavior in organizational settings and involve in groups and teams with enthusiasm and also recognize the importance of human and professional ethics in human life and corporate life as well.
- PSO 5: Understand the value of marketing, sales promotion techniques and learn how to prepare financial statements on accounting inventory bases through tally accounting software and also acquire skills in becoming good entrepreneurs.
- PSO 6: Acquire knowledge in the field of tax planning and management, personality development, e-commerce, international financial management, e-banking operations and obtain skills in the field of cost and management accounting for arriving at concrete decisions for prosperity of business.

PROGRAMME OBJECTIVES (POBs)

After successful completion of two year Post- Graduate Degree programme in Commerce, the student would be able to

- **POB1: (KB) Knowledge Based**

  Apply Knowledge in the functional areas of management and analyse the significance of commerce in modern times. To interpret the significance of Commerce in modern times and apply as acquired knowledge in the management functional areas.

- **POB2: (PA) Problem Analysis**

  Acquire knowledge about the concepts and postulates of accounting its branches, finance and HRM and trace out appropriate solutions to the compulsory problem.To be able to gain knowledge regarding the concepts of branches of accounting like HRM & Finance by finding out solutions to every problems.

- **POB3: (Inv) Investigation**

  Critically analyse the qualitative and quantitative data on contemporary issues in the field of accounting and finance. To study the contemporary issues in areas of Accounts and Finance based on qualitative and quantitative data.

- **POB4: (Des) Design**

  Obtain skills in designing and conducting survey during the course of Project work and impact knowledge. To impact knowledge by learning skills in project work through conduct of survey of design.

- **POB5: (Tools) Use of Tools**

  Learn about the application of different statistical tools and techniques so as to arrive at suitable decision in the business and its success. To take a decision by applying various statistical tools which is dependent on business success.

- **POB6: (Team) Individual team work**

  Discern knowledge about the group dynamics and team building so as to participate in community extension and outreach programmes. So as to gain and perceive knowledge

- **POB7: (Comm) Communication skills**

  Inculcate communication skills and learn interview participation techniques for acquire Proper placement. To develop skills required for placement like interview techniques and participation techniques.

- **POB8: (Prof) Professionalism**

  Demonstrate professionalism in undertaking independent research surveys and project works. To exhibit the professionalism in terms of project works and research surveys.

- **POB9: (Impact) Impacts of course as society and environment**

  Understand the emerging trends in the field of Accounting, Finance, Marketing and HRM and their impact on society and demonstrate the knowledge required for sustainable development of industry and service sector. To make students able to showcase the knowledge required for the sustainable development of industry and service sector in the emerging fields of Accounting, Finance, Marketing and HRM.

- **POB10:(Social) Social responsibility**

  To understand and have continual knowledge to assess societal legal and cultural issues and the consequent responsibility relevant to the accounting, finance, marketing and tax planning practices by applying the reasoning provided by them.

- **POB11: (Ethics) Ethics and Equities**

  To explore the morals and ethical values in various walks of life and professions through axiomatic wisdom.

- **POB12: (LLL) Life Long Learning**

  To apply learning skills and techniques obtained through theoretical, conceptual framework, computer practical and project field experiences to resolve contemporary issues.

PROGRAMME OUTCOMES (POs)

After successful completion of two year Post- Graduate Degree programme in Commerce, the student would be able to

- **PO1: (KB) Knowledge Based**
  Apply Knowledge in the functional areas of management and analyse the significance of commerce in modern times.
- **PO2: (PA) Problem Analysis**
  Acquire knowledge about the concepts and postulates of accounting its branches, finance and HRM and trace out appropriate solutions to the compulsory problem.
- **PO3: (Inv.) Investigation**
  Critically analyse the qualitative and quantitative data on contemporary issues in the field of accounting and finance.
- **PO4: (Des) Design**
  Obtain skills in designing and conducting survey during the course of Project work and impact knowledge.
- **PO5: (Tools) Use of Tools**
  Learn about the application of different statistical tools and techniques so as to arrive at suitable decision in the business and its success.
- **PO6: (Team) Individual team work**
  Discern knowledge about the group dynamics and team building so as to participate in community extension and outreach programmes.
- **PO7: (Comm.) Communication skills**
  Inculcate communication skills and learn interview participation techniques for acquire Proper placement.
- **PO8: (Prof) Professionalism**
  Demonstrate professionalism in undertaking independent research surveys and project works.
- **PO9: (Impact) Impacts of course as society and environment**
  Understand the emerging trends in the field of Accounting, Finance, Marketing and HRM and their impact on society and demonstrate the knowledge required for sustainable development of industry and service sector.
- **PO10: (Social) Social responsibility**
  Apply reasoning provided by the continual knowledge to assess societal legal and cultural issues and the consequent responsibility relevant to the accounting, finance, marketing and tax planning practices.
- **PO11: (Ethics) Ethics and Equities**
  Explore the axiomatic wisdom an ethics and equities in various walks of life and professions and learn who to thrive in the society with moral and ethical values.
- **PO12: (LLL) Life Long Learning**
  Recognise the need for, and have the skills to engage in independent and life-long learning in the broadest context of changes and turbulent environment revolved around commerce, trade and industry. Also apply learning skills and techniques obtained through theoretical, conceptual framework, computer practical and project field experiences to resolve contemporary issues.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- **PEO 1:** To interpret the areas for placing business entity in the right perspective in the areas of importance of cost accounting and management accounting, finance, marketing, organizational behaviour, managerial economics, quantitative techniques for business decisions along with the concepts of accounting.
- **PEO 2:** To know the ideology for the changing socio-economic and political conditions in business environment and marketing and HR to design constructive strategies for better prospects of business.
- **PEO 3:** To critically observe an effective accounting and reporting system so as to evolve with the accounting standards and reporting.
- **PEO 4:** To establish the importance of human and professional ethics in human life and corporate life as well in organizational settings and involve in groups and teams with enthusiasm and also recognize the human behaviour.
- **PEO 5:** To comprehend and learn how to prepare financial statements on accounting inventory bases through tally accounting software and also acquire skills in becoming good entrepreneurs by analysing the value of marketing, sales promotion techniques.
- **PEO 6:** To make judgments for arriving at concrete decisions for prosperity of business in the field of tax planning and management, personality development, e-commerce, international financial management, e-banking operations and obtain skills in the field of cost and management accounting.

SRI VENKATESWARA UNIVERSITY: TIRUPATI
SVU COLLEGE OF COMMERCE, MANAGEMENT AND COMPUTER SCIENCE

DEPARTMENT OF COMMERCE
(Revised Scheme of Instruction and Examination, Syllabus etc., under CBCS Regulations -2016 is Amended as per NEP-2020)
(With effect from the batch admitted in the academic year 2021-22)

MASTER OF COMMERCE - REGULAR

SEMESTER- I

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (R) 101	Accounting Standards & Reporting	6	4	Core-Theory	20	80	100
2.	M.Com (R) 102	Organisational Behaviour	6	4		20	80	100
3.	M.Com (R) 103	Business Environment and Policy	6	4		20	80	100
4.	M.Com (R) 104	Managerial Economics	6	4		20	80	100
5.	M.Com (R) 105	A Quantitative Techniques for Business Decisions	6	4	*CF	20	80	100
		B Research Methodology in Social Sciences						
		C Banking and Insurance Services						
6.	M.Com (R) 106	A Business Communication Skills	6	4	*EF	20	80	100
		B Principles of Management						
Total			**36**	**24**		**120**	**480**	**600**
7.	M.Com (R) 107	Human Values and Professional Ethics - I	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core papers are Mandatory**
- ***Compulsory Foundation – choose one paper**
- ***Elective Foundation - Choose one paper**
- **Audit course- 100 Marks (Internal) –Zero Credits under Self Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra Credits**

SEMESTER- II

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (R) 201	Human Resource Management	6	4	Core-Theory	20	80	100
2.	M.Com (R) 202	Financial Management	6	4		20	80	100
3.	M.Com (R) 203	Marketing Management	6	4		20	80	100
4.	M.Com (R) 204	Advanced Cost Accounting	6	4		20	80	100
5.	M.Com (R) 205	A Corporate Governance	6	4	CF	20	80	100
		B Legal Aspects of Business						
		C Risk Management						
6.	M.Com (R) 206	A e-Banking Operations	6	4	EF	20	80	100
		B Management Information Systems						
		Total	**36**	**24**	**Total**	**120**	**480**	**600**
7.	M.Com (R) 207	Human Values and Professional Ethics - II	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core papers are Mandatory**
- **Compulsory Foundation – choose one paper**
- **Elective Foundation - Choose one paper**
- **Audit course- 100 Marks (Internal) –Zero Credits under Self Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra Credits**

SEMESTER- III

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (R) 301	Financial Markets and Services	6	4	Core-Theory	20	80	100
2.	M.Com (R) 302	Accounting for Managerial Decisions	6	4		20	80	100
3.	M.Com (R) 303	A Tally with GST Applications	6	4	Generic Elective	20	80#	100
		B Security Analysis and Portfolio Management						
		C Entrepreneurship & MSMEs	6	4		20	80	100
		D Total Quality Management						
4.	M.Com (R) 304	Internal Audit and standard Audit Practices	6	4	*Skill Oriented	20	80	100
5.	M.Com (R) 305	A Fundamentals of Accounting	6	4	Open Elective	20	80	100
		B Personal Financial Planning						
Total			**36**	**24**		**120**	**480**	**600**

- **All CORE Papers are Mandatory**
- **Generic Elective – Choose two papers**
- ***Skill Oriented Course is Mandatory.**
- **Open electives are for the students of other departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**
- **#Regarding 303a: Tally with GST Applications of 80 marks, 60 marks for semester end examination and 20 marks for practical's for which the candidate has to submit the record.**

SEMESTER- IV

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (R) 401	International Financial Management	6	4	Core-Theory	20	80	100
2.	M.Com (R) 402	Tax Planning & Management	6	4		20	80	100
3.	M.Com (R) 403	A GST and Customs Duty	6	4	Generic Elective	20	80	100
		B Strategic Management						
		C Personality Development and Soft Skills	6	4		20	80	100
		D E-Commerce						
4.	M.Com (R) 404	Project Report & Viva–Voce	6	4	* PW	-	-	100**
5.	M.Com (R) 405	A Security Market Operations	6	4	Open Elective	20	80	100
		B Business Ethics						
Total			**36**	**24**		**120**	**480**	**600**

- **All CORE Papers are Mandatory**
- **Generic Elective – Choose two papers**
- ***Multi-Disciplinary course / Project Work is Mandatory**
- **Open electives are for the students of other departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**
- ****In IV semester, paper 404 – Project Report and Viva-voce, this consists of 100 marks (50 marks for project report and 50 marks for viva-voce).**

M.Com (R) I Semester

PAPER –101: ACCOUNTING STANDARDS AND REPORTING

(Core Paper)

(With Effect from the academic year2021–22)

Course Objectives

- To increase the knowledge of students on accounting principles and standards
- To enable the students to do inventory valuation
- To impart the ability to find out the cash flows
- To provide the skills to value goodwill
- To create awareness about IFRS and segment reporting

Unit –I	Introduction: Accounts Concepts and Principles – GAAP (AS–1)–Branches of Accounting – Users of Accounting; Accounting Standards: Concepts – Types – Benefits – Accounting Standards in India –Indian Accounting Standards. (Theory only)
Unit – II	Inventory Valuation: (AS–2) Concept – Need for inventory valuation – Inventory Valuation methods – Valuation of Inventory. (Theory and Problems)
Unit – III	Cash flow statement (AS–3): Meaning and definitions – Scope – Objectives – Benefits – Classification of cash inflow and outflow–Presentation of cash flow statement – Methods – Disclosures.(Theory only)
Unit –IV	Valuation of Goodwill (AS–26) : Concept– Factors affecting goodwill – Types of goodwill — Need for valuation – Methods of goodwill Valuation – Average method– Super profit method – Annuity method (Theory and Problems)
Unit – V	Reporting: International Financial Reporting Standards (IFRS)–Concept–List of IFRS– Segment Reporting (AS–17)–Concept – Objectives – Purposes – Segment reporting (AS–17) – Advantages and disadvantages of segment reporting. (Theory only)

REFERENCE BOOKS:

1. JawaharLal; Accounting theory and Practice, Himalya Publishing House, New Delhi.
2. B. K .Banerjee, Financial Accounting – A dynamic approach Printice Hall India Pvt. Ltd., New Delhi
3. CA. Ravi KanthMiriyala; Accounting standards made easy, Bharat Law House Pvt. Ltd. New Delhi
4. NithinBalwani, Accounting and Finance for Manager, Excel Books, New Delhi.
5. http://en.wikipedia.org/wiki/IFRS

Course Outcomes

Upon completion of this course, students will be able to

CO1: Familiarise about principles of accounting, accounting and reporting standards
CO2: Acquire knowledge on methods of valuation of inventory and Goodwill
CO3: Understand the importance and flow of cash
CO4: Students acquires the skills of goodwill valuation.
CO5: Provide an idea about segment and interim reporting.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

3-High, 2- Medium, 1- Low.

M.Com (R) I Semester

PAPER –102: ORGANISATIONAL BEHAVIOUR

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Acquire knowledge on the conceptual frame work and emerging issues of OB
- Study different theories of personality and motivation
- Form a clear idea on group dynamics and inculcate the skills to become a leader
- Learn about Organizational structures and clear understanding of management of Inter personal conflicts.
- Obtain knowledge on Organization dynamics as to organization culture, organizational change and know the significance of OB today.

Unit – I Introduction: Organizational Behaviour (OB) – Definition – Nature and Scope –Foundations –OB Model – Importance – Limitations. (Theory only)

Unit – II Individual Behaviour: Foundations of individual behaviour – Personality – Theories of personality –Trait and social learning theories – Motivation– Theories of motivation – McGregor's theory X and theory Y, Maslow's Model and Herzberg's two – Factory theory.(Theory only)

Unit – III Group Dynamics: Foundations of group behaviour – Reasons for group formation – Types of groups – Leadership – Theories of leadership (trait theory; behaviour theories) – Behavioural model (Managerial grid) – Fiedler's contingency Theory.(Theory only)

Unit – IV Organizational Processes: Organizational Change – Causes – Types – OD Interventions – Organizational conflicts – Changing view of conflicts –Inter-personal conflicts – Transactional analysis – Johari window – Life positions. (Theory only)

Unit – V Organizational Dynamics: Organizational Culture – types – Individual behaviour in the global perspective – Cultural differences– Cross Culture – Cultural adjustment – Managerial responses – Emerging Issues in OB. (Theory only)

REFERENCE BOOKS:

1. Aswathappa K., Organizational Behavior: Text, Cases and Games, Himalaya Publishing House, Hyderabad.
2. Fred Luthans, Organizational Behaviour, Tata McGraw Hill Publishing House, New Delhi.
3. JitS.Chandan, Organization Behaviour, Vikas Publishing House, New Delhi.
4. John W. Newstrom and Keith Davis, Organizational Behaviour, Human Behaviour at work, Tata McGraw Hill Publishing House, New Delhi.
5. Kavita Singh, Organisational Behaviour: Text and Cases, Pearson, Delhi.

Course Outcomes

CO1: Understand the framework for OB and its emerging issues
CO2: Diagnose the outcome of different theories of personality and motivation.
CO3: Acquire knowledge on group dynamics and learn skills that help him to become a leader.
CO4: Outline appropriate form of organizational structure and understand clearly better man agent of interpersonal conflicts.
CO5: Obtain wisdom as organizational dynamics as to organizational Culture, managing resistance to change. Also learn the concept of OB and its significance in modern times.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2								
CO2		3		3	3		2				3	3
CO3	3	3		3	2	3	3	3	2	2	2	1
CO4	3	3	3	3		1	1	2	2	1	1	3
CO5	3	2		2	1		2	2	2	1	1	3

3-High, 2- Medium, 1- Low.

M.Com (R) I Semester

PAPER –103: BUSINESS ENVIRONMENT AND POLICY

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Examine business environment, concept, nature and scope; scanning, monitoring, changing dimensions of business environment.
- Illustrates economic environment nature and scope and new economic policy.
- Develop political, legal environment; reasons for state intervention and government business interface.
- Study the socio-cultural environment nature, impact of social responsibility and business ethics.
- Interpret global environment; benefits and problems of MNCs and WTO.

Unit – I Business Environment: Concept – Nature – Scope–Significance– Types of Environment– Internal and External Environment– Factors Influencing Business Environment– Techniques of Environmental Scanning and Monitoring – Emerging Dimensions of Business Environment. (Theory only)

Unit – II Economic Environment: Concept – Nature –Scope – Elements of Economic Environment – Economic System and Business Environment– Economic planning – Industrial policy – Fiscal policy– Monetary Policy–New economic policy. (Theory only)

Unit – III Political and Legal Environment: Concepts– Political institutions – Rationale and Extent of State Intervention – Reasons for State Intervention – Types of Intervention – Government Business Interface – Legal Environment–Changing Dimensions of Legal Environment. (Theory only)

Unit – IV Socio– Cultural Environment: Concept –Elements of Socio –Cultural Environment –Impact– Social Responsibility of Business – Business Ethics – Corporate Governance. (Theory only)

Unit – V Global Environment**:** Concept**–** Nature –Scope –Significance–Foreign Investment in India –Benefits and problems of MNCs – Strategies for Going Global –EXIM Policy–FEMA–Emerging Challenges of Global Business. (Theory only)

REFERENCE BOOKS

1. Francis Cherunilam, Business environment – Text and cases, Himalaya Publishing House.
2. K. Aswathappa, Essentials of Business environment, Himalaya Publishing House.
3. Pandey G.N. Environmental Management, Vikas publishing house.
4. Raj Agarwal, Business Environment, Excel publications.
5. Sundaram& Black. International Business Environment Text and cases, PHI.
6. Chari, S.N. International Business, Wiley India.

Course Outcomes

CO1: Identify concept, nature, factors influencing and dimensions in business environment.
CO2: Impart knowledge on economic environment, foreign technology agreements, monitory and fiscal policies and new economic policy.
CO3: Examine the politico legal environment, state intervention, reasons and types.
CO4: Understand the socio cultural environment, its nature and concept, business ethics and corporate Governance.
CO5: Understand the rationale for global environment, strategies for going global, WTO and the trading blocks.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2	1		2		2	3			
CO2	2		1			1				3		2
CO3	1		2	2		3			2			3
CO4	3		3						1			
CO5	3	2								3		3

3-High, 2- Medium, 1- Low.

M.Com (R) I Semester

PAPER –104: MANAGERIAL ECONOMICS

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Integrate with managerial economics meaning, nature, scope, characteristics, uses and principles.
- Employ demand forecasting objectives and methods; forecasting demand for new product.
- Allocate cost analysis, cost concepts and cost control and reduction.
- Examine production analysis basic concept and types; factors of production and returns to scale.
- Categorize nature of profits, profit planning and marginal uses of break-even analysis

Unit- I INTRODUCTION: Meaning, nature and scope of Managerial Economics– Principles of managerial economics - Role and responsibilities ofmanagerial economist – Profit: Economic profit vs. accounting profit; Profit functions: Profit optimization and slope of profit; Techniques and methods of measuring profit; Profit planning: Objective and factors affecting profit planning - Policies and techniques of profit maximization. (Theory only)

Unit-II DEMAND ANALYSIS: Demand theory and analysis - Factors determining demand – Law of diminishing marginal utility - Indifference curve analysis – Elasticity of demand: Price elasticity – Income elasticity – Cross elasticity (including problems); Demand forecasting: Objectives,methods and criteria for effective demand forecasting. (Theory only)

Unit-III COST ANALYSIS: Cost concepts and classification – Economies of scale – Short-run and Long-run cost functions –Cost control vs. cost reduction – Tools for cost control and cost reduction - Cost-Volume-Profit analysis (BEP – including problems) and its applications in cost of production. (Theory only)

Unit-IV PRODUCTION ANALYSIS: Meaning of production function - Law of variable proportions – Production with one variable input and production with two variable inputs - Law of diminishing marginal returns - Factors of production and returns to scale – Cobb-Douglas production function – Production iso-quant and iso-cost. (Theory only)

Unit-V MARKET STRUCTURE: Perfect competition: Price determination in short-run and long-run; Monopoly: Price determination in short-run and long-run; Monopsony: Price determination in short-run and long-run; Oligopoly: Price determination in short-run and long-run. (Theory only)

REFERENCE BOOKS:

1. Joel Dean. Managerial Economics, Pearson Education.
2. Varshiney&Maheswari, Managerial Economics, Sultan Chand & Co.
3. Mehta P.L., Managerial Economics, Sultan Chand & Co.
4. Dwivedi D.N., Managerial Economics, Himalaya Publishing House.
5. Trivedi M. L., Managerial Economics, McGraw Hill.

6. Mote, Paul & Gupta, Managerial Economics, McGraw Hill Ltd,

Course Outcomes

CO1: acquire managerial skills and responsibilities as a managerial economist.
CO2: Forecast the demand using opinion polling and statistical methods for existing and new products.
CO3: analyze the cost output relationship and economies of scale for cost control and cost reduction.
CO4: Appraise the input and output relationship through law of variable proportions and Cobb Douglas production function and formulate the policies on profit maximization.
CO5: Assess nature of profits, different views and functions of profits.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3			1	3			1		
CO2			3	1	3							2
CO3		3			1				2			
CO4				2	2							3
CO5		2	2		1							3

7. 3-High, 2- Medium, 1- Low.

M.Com (R) I Semester

PAPER –105(A) : QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives

- Appreciate the use of quantitative techniques, methods of business forecasting and quantitative techniques in business decisions.
- Formulate F distribution and multiple co-relations co-efficient.
- Study probability and non-probability distributions.
- Formulate sampling theory, testing of hypothesis and type I and type II errors.
- Identify linear programming advantages and disadvantages; graphical and simplex method.

Unit– I Quantitative Techniques and Business Forecasting: Concept – Classification of Quantitative Techniques – Statistical Techniques – Programming or Operations Research Techniques –Role of Quantitative Techniques in Business and Industry – Quantitative Techniques and Business Management – Limitations of Quantitative Techniques – Methods of Business Forecasting. (Theory only)

Unit–II Probability and Probability Distributions: Basics of probability– Binomial – Poisson – Normal Distributions – Baye's Theorem. (Theory and problems)

Unit–III Sampling Theory: Concept – Types of Sampling – Hypothesis Testing–The Null Hypothesis– The significance level – Hypothesis Testing Procedure – Type I and Type II errors – Inference from Small Sample Mean Tests – Difference Between the Means of Two Independent Samples – Difference Between the Means of Two Dependent Samples of Paired Observations 't–test' and χ^2 (Chi–Square) test and its applications. (Theory and problems)

Unit–IV Analysis of Variance (F–test): Concept – Assumptions –Testing Equality of Population Means – One–way and Two–way Classifications. (Theory and Problems)

Unit–V Linear Programming: Concept – Requirements for application of Linear Programming– Assumptions–Advantages and limitations – Applications of Linear programming problem – Formulation of Linear Programming problem– Graphical Method–Simplex method. (Theory and problems)

REFERENCE BOOKS:

1. Gupta, S.P.Statistical Methods, S.Chand& Sons, New Delhi
2. Tulasian P.C., and Vishal Pandey, Quantitative Techniques – Theory and Problems Pearson Education New Delhi
3. Gupta and Khanna "Quantitative Techniques for Business Managers" PHI, New Delhi.
4. Andnda Sharma, Quantitative Techniques, Himalaya Publications, Hyderabad.

5. Kothari C.R… Quantitative Techniques Vikas Publications, Mumbai. Vikas Publications, Mumbai.

Course Outcomes

CO1: Identify the concepts Quantitative Techniques and business forecasting, quantitative approach to management as well as in business decision making.
CO2: Understand the test for equality of two population variances, analysis of variance and one way and two way classified data, basics and distributions of probability.
CO3: Demonstrate hypothesis testing, testing difference between the means of two independent/dependent samples chi-square test, requirements for application of linear programming, Formulation of linear programming problem and graphic and simplex methods of solving linear programming.
CO4: Examine the hypothesis testing
CO5: Analyse linear programming concept

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3			3		2					
CO2	3	3			3							
CO3	3	3			3		2					
CO4	3	3			3		3					
CO5	3	3	1	2	3							

3-High, 2- Medium, 1- Low.

M.Com (R) I Semester

PAPER –105(B) : RESEARCH METHODOLOGYIN SOCIAL SCIENCES

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

1. To understand the concept of Research along with its significance.
2. To know the classification of research and approaches to it.
3. To interpret the methods and sources of data collection with special attention to questionnaire and schedule construction.
4. To cognize the meaning of sampling and characteristics of a good sample.
5. To get to know the meaning of interpretation and report writing.

UNIT – I Introduction: Meaning and concept of research – significance of research – Characteristics of research–objectives and motivation in research –Importance of research in Social sciences – limitations of research.(Theory only).

UNIT – II Research methodology and Research methods: Meaning –Research methods vs. Methodology – Classification of research–Pure research – Applied research – Explanatory research – Descriptive research– Historical research – Research Approaches(Theory only).

UNIT – III Methods of data collection: Meaning and importance of data – Sources of data – Methods of collecting primary data and secondary data – Construction of schedule and questionnaire– Selection of appropriate method for data collection – Limitations of collecting primary and secondary data – Difference between schedule and questionnaire (Theory only).

UNIT – IV Sampling: Meaning – Methods of sampling – Random and Non–Random sampling methods – Sampling errors – Census and sample survey – Significance of sampling – factors determining sampling – Criteria of selecting a sampling procedure – Characteristics of a good sample (Theory only).

UNIT – V Interpretation and Report writing: Interpretation – Meaning – Techniques – Precautions – Report writing – Meaning –Types of reports – Steps in report writing – Precautions for writing research report – Footnotes and Bibliography – Ethical norms in research – Plagiarism (Theory only).

REFERENCE BOOKS:

1. Krishna Swami, O.R. and Ranganatham, M. "Methodology of Research in Social Sciences", Himalaya Publishing House, Mumbai.
2. Kothari, C.R.,"Research Methodology: Methods and Techniques": New Age International Publishers, New Delhi.
3. Goode and Hatt: "Methods in Social Research", New York: McGraw Hill.
4. Singh, Jaspal, "Introduction to Methods of Social Research", New Delhi, Sterling Publishers Pvt., Ltd.,.
5. Murthy. C.,"Research methodology", Vrinda Publishing Pvt., Ltd., New Delhi.

Course Outcomes:

1. Understand the concept of Research along with its significance.
2. Know the classification of research and approaches to it.
3. Interpret the methods and sources of data collection with special attention to questionnaire and schedule construction.
4. Cognize the meaning of sampling and characteristics of a good sample.
5. Get to know the meaning of interpretation and report writing.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) I Semester

Paper– 105(C): BANKING AND INSURANCE SERVICES

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

1. To understand Indian Financial System.
2. To know the functioning of Banks in India.
3. To interpret concept of risk and risk management.
4. To cognize concepts of life and non-life insurance.
5. To get to know the meaning of insurance and its pricing.

Unit – I	Financial System – Structure of Indian Financial System – Financial Institutions – Role in the Economy – Introduction to Banking Business – Historical Perspective – Types of Bank – Structure of Indian Banking System – Recent Trends in Banking Sector.(Theory only).
Unit – II	Commercial Banks – Structure – Functions – Types – Retail Banking – Rural Banking – ElectronicBanking – NPAs – Mobile Banking – Merits and Demerits – Banking Sector Reforms – Regulatory Mechanism.(Theory only).
Unit – III	Concept of Risk – Types – Risk Management – Methods of Handling Risks – Risk Management in Banks – Concept of Insurance – Essentials of Insurance Contract – Functions – Classification of Insurance – Current Trends in Insurance Sector.(Theory only).
Unit – IV	Life Insurance and Non Life Insurance – Fire Insurance – Types – Marine Insurance – Nomination – Assignment – Paid Up Value – Surrender Value – Claim Settlement – Progress in Business.(Theory only).
Unit – V	Insurance Pricing – Insurance Rating – Methods – Calculation of Premium – Legal Frame Work – IRDA – Salient Features – Regulations – Future Prospects for Indian Insurance Industry.(Theory only).

REFERENCE BOOKS:

1. Agarwal, O.P, Banking and Insurance, Himalaya Publishing House, New Delhi.
2. TyotsnaSethi and Niswan Bhatia, Elements of Banking and Insurance, Prentice Hall Of India (P) Ltd, New Delhi.
3. Kaninika Mishra, Fundamentals of Life Insurance – Theories and Application, PHI Learning Private.Ltd, Delhi.
4. Periasamy, P and Veeraselvam, M.,Risk and Insurance Management, Vijay Nicole Imprints Private Ltd, Noida.
5. Satya Pal Sharma, N.K, Anthony,R, Banking and Insurance, Himalaya Publishing House, New Delhi.

Course Outcomes:

1. Understanding Indian Financial System.
2. Knowing the functioning of Banks in India.
3. Interpreting concept of risk and risk management.
4. Cognizing concepts of life and non-life insurance.
5. Knowing the meaning of insurance and its pricing.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) I Semester

PAPER –106 (A) : BUSINESS COMMUNICATION SKILLS

(Elective Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

COB1: To understand the basics of process, models and methods of communication.
COB2: To analyze various types of non-verbal communication skills.
COB3: To analyze various types of verbal communication skills.
COB4: To discuss the contents of various written communication tools.
COB5: To evaluate the protocols for cross-cultural communication across the globe.

Unit–I: INTRODUCTION: Concept– Objectives– Process of communication – Methods of communication: Oral, written, non–verbal, visual, audio–visual, signs, signals and symbols, silence; Types of communication: Personal, business, internal external, upward, downward, formal, informal, lateral, interactive, mass, and grapevine;Barriers to communication – Factors affecting communication – Essentials of effective communication. (Theory only)

Unit–II: NON–VERBAL COMMUNICATION:Meaningand **t**ypes of non–verbal communication– Body language, postures and gestures – Attire – Appearance – Handshake, personal space, timing, behaviour, smile; Listening skills: Process and types of listening – Barriers to listening – Requirements for effective listening – Humor in communication – Leadership and communication. (Theory only)

Unit–III: VERBAL COMMUNICATION: Meetings: Role of chairperson – Conferences – Presentation skills – making presentations – Requirements for effective presentation; Speaking: Choosing a method of speaking – Analyzing the audience – Persuasive speaking; Report writing: Types of reports – Structure of reports – Individual, annual and committee reports – Essentials of good report writing. (Theory only)

Unit–IV: WRITTEN COMMUNICATION**:** Business letters: Essentials, Parts, and forms of business letters; Types of business letters: Tenders, quotations and orders – Circulars and memos – Office notes – Representations and suggestions – Reminders and follow up. (Theory only)

Unit–V: MEDIA AND MULTI–CULTURAL COMMUNICATION**:** Building better relations with media –Framework for managing relations with investors and governments – Impact of multi-cultural communication on business – Etic and emic approaches to culture – Overcoming cross–cultural communication problems – Cultural communication protocol in China, France, England, Switzerland, USA, and India. (Theory only)

REFERENCE BOOKS:

1. Penrose, Rasberry and Myers, “Business communication for managers”, Cengage Learning.
2. Disanza, “Business and professional communication”, Pearson Education.
3. CSG Krishnamacharyalu and L. Ramakrishna, “Business communications”, Himalaya Publishing House.
4. Krizan Merrier, Logan and Williams, “Effective Business Communication”, Cengage Learning.
5. Kelly Quintanilla and Shawn T Wahl, “Business and Professional communication”, Sage Publications.

Course Outcomes:

CO1: Understand the effective modes and methods of communication in a Business situation.
CO2: Make oneself confident to use body language and other non-verbal communication in gaining leadership.
CO3: Equip oneself strong in communicating verbally.
CO4: Equip with skills in written communication.
CO5: Build skills in managing relations with media and distinguish the protocols observed across the globe.

COs-POs mapping:

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2					2	3					
CO2	2					2	3					
CO3	1							2				2
CO4	2				3		2					
CO5	1		2			2	3					

3- High, 2- Medium, 1- Low.

M.Com (R) I Semester

PAPER –106(B) : PRINCIPLES OF MANAGEMENT

(Elective Foundation)

(With effect from the academic year 2021–22)

Course Objectives

1. To comprehend the concept of management, skills and its process.
2. To learn management as a process with its principles and functions.
3. To learn the modern management process, business process engineering and reconstruction.
4. To understand the concept of Management By Objective (MBO) and quality circles.
5. To be aware of functional, personnel, financial, production, marketing, strategic and human resource managements.

UNIT–I: Concept of Management – Definition – Nature of Management – ManagementSkills – The Management Process – Features of Management – Trends towards Managerial Revolution in India.(Theory only).

UNIT–II: Management as a process – Principles and functions of ManagementOperative and Managerial functions – Planning – Organizing – Staffing – Directing – Communication – Leadership – Motivation – Co-ordination – Controlling.(Theory only).

UNIT – III: Modern Management Concepts – Business Plans – Purpose – Contents – Preparation of Plan – Business Process Re-engineering – Re-structuring – Relationship between Re-engineering and Re-structuring – Customer Relationship Management – Benefits of CRM.(Theory only).

UNIT – IV: Management by Objectives – Benefits of MBO – Setting of Objectives – Limitations of MBO – Making MBO Effective – Quality Circles.(Theory only).

UNIT–V: Functional Management – Personnel Management – Financial Management – Production Management - Marketing Management – Human Resource Management – Strategic Management – Social Responsibilities of a Modern Manager.(Theory only).

REFERENCES:

1. Govindarajan.M, Natarajan.S, Principles of Management, PHI Learning Pvt Ltd., Delhi.
2. Guptha.RS, Sharma.BD, Bhalla NS, Principles and Practices of Management, Kalyani Publishers, New Delhi.
3. Natarajan.K, Ganesan.KP, Principles of Management, Himalaya Publishing House, New Delhi.
4. Sherlekar.SA, Management, Himalaya Publishing House, New Delhi.
5. Thamos N Duening, John M Ivancevich, Management Principles and Guidelines, Atomic Dog Publishing, USA.

Course Outcomes:

1. Comprehending the concept of management, skills and its process.
2. Learning management as a process with its principles and functions.
3. Learning the modern management process, business process engineering and reconstruction.
4. Understanding the concept of Management By Objective (MBO) and quality circles.
5. Being aware of functional, personnel, financial, production, marketing, strategic and human resource managements.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) I Semester

PAPER -107: HUMAN VALUES AND PROFESSIONAL ETHICS – I

(Audit Course)

(With effect from the academic year 2021–22)

Course Objectives

COB1: To create awareness on basics of life and professions.
COB2: To make oneself capable to distinguish between subjective and objective values of society and individual.
COB3: To understand in depth the values and yams of life.
COB4: To understand the cultural values embedded in right from Bhagavad Gita till today's Gandhian philosophy.
COB5: To grasp prescription and proscription as stated in the scripts of Hinduism.

UNIT – I Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

UNIT – II Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral,concepts- right, ought, duty, obligation, justice responsibility and freedom,Good behavior and respect for elders.

UNIT – III Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy),Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)- Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).

UNIT – IV Bhagavad Gita- (a) Niskamakarma.(b) Buddhism- The Four Noble Truths – Arya astangamarga(c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious, Tolerance, Gandhian Ethics.

UNIT – V Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study:

1. R. Subramanian, Professional Ethics, Oxford University press,New Delhi,2013.
2. John S Mackenjie: A manual of ethics.
3. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
4. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
5. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
6. Harold H. Titus: Ethics for Today
7. Maitra, S.K: Hindu Ethics
8. William Lilly : Introduction to Ethics
9. Sinha: A Manual of Ethics

10. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.

11. Susruta Samhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.

12. CarakaSamhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.

13. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

14. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 199

COURSE OUTCOMES:

CO1: Understand the axiomatic wisdom on ethics in various walks of life and professions.
CO2: Distinguish between various subjective and objective values that kick start one's rational behavior.
CO3: Learn and assimilate the Hinduism's four values of Purusharthas and Patanjali's five Yamas of life.
CO4: Acculturate the values embedded in Indian religious right from Bhavad Gita to Gandhian Ethics.
CO5: To excavate various prescriptive punishments stated in ancient legal texts of Hinduism like Manusmriti and Yajnavalkyasmrithithat worked as weapons to eradicate criminalism.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								3			
CO2	2									3		
CO3			3						1			
CO4	2	3									2	
CO5			2							3		3

3-High, 2- Medium, 1- Low.

M.Com (R) II Semester

PAPER – 201: HUMAN RESOURCE MANAGEMENT

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Understands the concept, nature, scope, functions and objectives of human resource management.
- Carryout the job design, job analysis; Human Resource Planning, recruitment process and selection procedure.
- Examines developing and motivating human resource; Job evaluation and Quality circles.
- Elaborates maintenance of human resource, fringe benefits, employee relations and collective bargaining.
- Inspects human resource management in knowledge, process of knowledge management and virtual organizations.

Unit – I INTRODUCTION**:** Human Resource Management (HRM): Nature and scope – Objectives and functions; Evolution of HRM – Need for studying HRM – HRM policies and principles – HR Strategies – Traditional vs. strategic HRM – Challenges in HRM. (Theory only)

Unit – II ACQUISITION OF HR:Job Design: Approaches and process; Job Analysis: purposes and Process;Human Resource planning: Objectives – Factors affecting HRP– Process of HRP; Recruitment: Purposes – Factors governing recruitment– Recruitment process; Selection: Procedure – Factors governing selection;Placement and induction. (Theory only)

Unit – III TRAINING AND DEVELOPMENT OF HR: Nature and importance of training and development programs — Training vs. development – On–the–job training methods – Off–the–job training methods – Evaluation of training programs;Performance appraisal: Purposes – Methods; Job evaluation: Objectives – Principles – Methods– Advantages and problems; Career planning: Elements, merits and limitations. (Theory only)

Unit – IV MAINTENANCE OF HR:Wage and salary (w&s) administration: Principles– Process of determiningw&s**–**Wage payment methods – Incentives – Fringe benefits– Wage Policy in India; Work environment and quality of work life – Industrial relations – Disciplinary procedure – Grievance handling procedure – Collective Bargaining process. (Theory only)

Unit – V TRENDS IN HRM: Employer's brand – Business Process Outsourcing – HR Matrix; Knowledge Management: Objectives – Process; Virtual organizations: Features and types; TQM and employee productivity – HR Audit – Ethical issues in HRM – HR Information System (HRIS): Objectives – Design.(Theory only)

REFERENCE BOOKS:

1. K. Aswathappa, Human Resource Management, McGraw Hill Publications.
2. P. SubbaRao, Human Resource Management, Himalaya Publishing House.
3. N.K. Singh, Human Resource Management, Excel Publications.
4. Jyothi, Human Resource Management, Oxford university press.
5. Shashi Gupta and Rosy Joshi, Kalyani Publishers.

Course Outcomes

CO1: Explain the basic concepts, functions and objectives, evolution and development.
CO2: Critically analyze the approaches and process of job design, factors affecting human resource planning, importance of recruiting, placement and induction and nature and importance of training and career planning.
CO3: Acquire knowledge on compensation management; grievance handling and collective bargaining discover the process of knowledge management and role of leader in organizations.
CO4: Learn about compensation management with wage structure, wage payment methods incentives, fringe benefits and employee relations.
CO5: Critically analyse knowledge management and its process, virtual organisations, features, types and issues of learning organisation and role of leader in organisations.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2		1		2	1			
CO2		2				2		3		2		
CO3	3			3		3		1	2			
CO4					2	3				1		
CO5			1			2			3			3

6. 3-High, 2- Medium, 1- Low.

M.Com (R) – II Semester
PAPER – 202: FINANCIAL MANAGEMENT
(Core Paper)
(With effect from the academic year 2021–22)

Course Objectives

- Describe meaning, functions and objectives; role of financial manager.
- Examine investment decision, capital budgeting, techniques of CB and methods of CB.
- Investigate management of working capital, needs and concepts.
- Asses financing decision, capital structure and capital theories.
- Design dividend decision and theories of dividend.

Unit –I Finance: Concept – Functions of Finance – Objectives of Financial Management – Profit Maximization Vs Wealth Maximization – Organization of Finance Function – Role of the Modern Financial Manager. (Theory only)

Unit– II Investment Decision: Capital Budgeting– Concept– Process – Techniques of Capital Budgeting – Traditional Methods – Payback Period (PB)– Average Rate of Return – Discounted Cash Flow Techniques – Net Present Value– Internal Rate of Return and Profitability Index .(Theory and Problems)

Unit–III Management of Working Capital: Concepts– Need for working capital– OperatingCycle– Estimation of working capital Requirements–Management of Cash –Receivables and Inventory. (Theory and Problems)

Unit–IV Financing Decision: Capital Structure –Concept–Theories of capital structure – NI – NOI– Traditional and MM Theories; Computation of Leverages– Operating Leverage– Financial Leverage and Combined Leverage; Cost of Capital –Concept– Computation of Specific cost of capital– Determination of weighted Average Cost of capital. (Theory and Problems)

Unit–V Dividend Decision: Types of Dividends– Factors Influencing the Dividend policy –Theories of Dividend – Walter-Gordon and MM Hypothesis (Theory only)

REFERENCE BOOKS:

1. Pandy, I.M: Financial Management – Vikas Publishing House, New Delhi.
2. SheebaKapil, Financial Management, Pearson Education, New Delhi.
3. Jonathan Berk Peter DeMarzo, Financial Management, Pearson Education.
4. Chandrabose, Fundamentals of Financial Management – PHI, New Delhi.
5. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi.
6. Maheswari, S.N.:Financial Management, Sultan Chand and Sons, New Delhi.
7. Kulakarni. P.V., Financial Management Himalaya Publishing Houses Co Ltd, Mumbai.
8. Van Horne: Financial Management and Policy, Prentice Hall of India, New Delhi.
9. Prasanna Chandra, Financial Management, Tata McGraw Hill, New Delhi
10. SheebaKapil, Financial Management Strategy, Implementation and Control, PragathiPrakasam Publication, Meerut.

Course Outcomes

CO1: Examine the objectives of financial management using present value and future value concepts.
CO2: Evaluate opportunity of investment decision applying techniques of capital budgeting and estimate the Working capital requirements of an enterprise.
CO3: Analyze financing decisions using theories of capital structure and weighted average cost of capital and Estimate the degree of risk through leverage concept.
CO4: Assess the dividend distribution of a firm through important theories of dividend.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1						1				2
CO2		3			2	1					1	
CO3			2	1			2		3			
CO4			1		3							2
CO5				2			1	2				

3-High, 2- Medium, 1- Low.

M.Com (R) II Semester

PAPER –203: MARKETING MANAGEMENT

(Core Paper)

(With effect from the academic year 2021–22)

Course objectives (COBs):

- To introduce to basics of market segmentation and consumer behavior.
- To understand the metrics and components associated with Product and Price mix of 4Ps of marketing mix.
- To instill knowledge and skills in advertising, sales promotion, personal selling, publicity and direct marketing of Promotion mix.
- To lead the network of offline and online distribution networks of Place mix.
- To acquire skills in conducting marketing research surveys, and others.

Unit – I INTRODUCTION**:** Concept of Marketing - Nature and scope- Evolution- Approaches to the study of marketing- Importance - Role of marketing in Indian economy- 4Ps of marketing; Marketing environment: Micro and macro; Market segmentation: Bases for market segmentation – Characteristics of effective segmentation;Factors affecting buying behaviour. (Theory only)

Unit – II PRODUCT MIX AND PRICE MIX**:**Product Mix**:** Classification of products - Product mix and productline decisions; New product development: - Stages of new product development; Product Life Cycle (PLC): Features, objectives, and strategies in different phases of PLC; Branding: Pros and cons of Single, multiple and private branding strategies; Packaging: advantages and strategies; Labelling; PRICING: Objectives -factors influencing pricing policy -Pricing policies and strategies. (Theory only)

Unit – III PROMOTION MIX**:** Process of marketing communications; Advertising: Pros and cons – Types – Criteria for selection of advertising agencies –Media selection –Measuring impact of advertising ;Publicity: Objectives and tools – Advertising vs. publicity; Sales promotion: Objectives –Tools and techniques; Personal selling: Steps in personal selling – Salesmanship; Impact of promotion mix elements during different stages of PLC - E-CRM (Theory only)

Unit – IV PLACEMIX**:** Marketing Channels:Channel levels – Functions of distribution channels - Factors influencing channel selection - Vertical and horizontal integrations of channels - Causes of channel conflict; Functions of wholesaler and retailer- Trends in retailing- Formats of retail stores – E- marketing tools: SEO – Marketing analytics — Pay-per-Click marketing - Affiliate marketing – Social media marketing. (Theory only)

Unit – V Market Information system (MIS)**:** Components of MIS – Process of marketing research - Market research agencies in India - Marketing ethics – Indian laws affecting 4Ps of marketing. (Theory only)

REFERENCE BOOKS:

1. Philip Kotler, Principles of Marketing, Pearson Education.
2. Rama Swamy&Namakumari, Marketing Management, Sage Publications.
3. RajanSaxena, Marketing Management, McGraw Hill publications.
4. Dr.R.L.Varshney and Dr. S.L. Gupta, Marketing management Text and cases, Sulthan Chand & sons.
5. Arun Kumar, N. Meenakshi, Marketing Management, Vikas Publications.

Course Outcomes

CO1: Chew the cud of the conceptual backdrop of marketing, acquire skills in segmenting any market, and understand the dynamics of consumer behavior.
CO2: Understand the tree structure of product mix, learn to develop a new product and strategies during its life cycle, brand and label and price it.
CO3: Acquire skills to design advertising, sales promotion techniques, and stepping into the shoes of sales executive and acquire a hold on selecting a media and agency for advertising.
CO4: Lead and coordinate the distribution network in offline and online marketing models.
CO5: Demonstrate professionalism in design and implementation of the components of MIS

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			2		3			3				
CO2												
CO3					3			3				3
CO4		2				3					2	2
CO5				3	2							1

M.Com (R) II Semester

PAPER –204: ADVANCED COST ACCOUNTING

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Obtain knowledge on the concept of cost accounting and know how it is different from financial and management accounting;
- Understand the features and objectives of process costing and calculation of process losses and Inter-process profits.
- Know the concept of equivalent production and accounting treatment for joint and by-products.
- Acquire knowledge on budgetary control and preparation of various functional budgets.
- Perceive the significance of ABC in cost ascertainment and control.

Unit– I	Introduction – Cost Accounting – Objectives – Scope – Advantages and limitations –Cost Accounting vs. Financial Accounting and Cost Accounting vs. Management Accounting – Concept of Cost – Cost Classification – Installation of Costing System. (Theory Only)
Unit– II	Process Costing: Features and objectives of process costing –Process Losses – Normal Loss– Abnormal Loss – Abnormal Gain – Treatment of Process Losses – Equivalent Production – Methods. (Theory and Problems)
Unit–III	Cost Control and Cost Reduction – Essentials for success of cost control – Advantages and Limitations – Differential Costing – Differences between Marginal Costing and Differential Costing – Characteristics and Significance of Differential Costing. (Theory and Problems)
Unit–IV	Budgetary Control: Concept of budget and budgetary control – Objectives – Benefits and limitations of budgetary control – Classification of Budget – Functional and Flexible budgets. (Theory and Problems)
Unit– V	Activity based costing: Concept – Meaning – Definition and characteristics ofABC – Different stages in ABC – ABC and cost drivers – Advantages ofImplementing ABC. (Theory and Problems)

REFERENCE BOOKS:

1. Jain S.P., AND K.L.Narang, Cost Accounting Principles and Practice Kalayani Publishers New Delhi.
2. Rathnam P.V., Rathanm S costing advanced problems and solutions, KitabMahal Distributors.
3. Maheswari S.N., Advanced problems and solutions in cost accounting, Sultan Chand & Sons
4. Bhar B.K., Cost accounting methods and problems, Academic Publishers, Kolkata.
5. Pillai R.S.N., and V.Bhagavathi: Cost Accounting, Sultan Chand and Co.Ltd, New Delhi.

Course Outcomes

CO1: Understand the concept of cost accounting and distinguish between cost accounting, financial accounting and management accounting.
CO2: Explicate process costing, features, objectives its and calculate process losses and inter process profits.
CO3: Analyse the concept of equivalent production and its calculation by applying different methods. Also diagnose accounting treatment for products and joint products.
CO4: Perceive budget and budget control and prepare budget in functional areas.
CO5: Outline the uniqueness of ABC in the process of cost ascertainment and its control.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			2			2		2		1
CO2	2	1			2		2		2	1	1	3
CO3	1	3			3		1	1	3	2	2	
CO4	3	2		2	1		2	3				2
CO5	2	2		1	2		2		2		3	

3-High, 2- Medium, 1- Low.

M.Com (R) II Semester

PAPER –205(A) : CORPORATE GOVERNANCE

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives

- Obtain knowledge on CG Mechanism and emerging issues in CG
- Know the genesis of CG in China USA and UK and also the code of the best practices.
- Gain Knowledge on the historical backdrop of CG in India and the guild lines pronounced by
- Various committees for effective practice in India.
- Discern knowledge on the composition of Board of Directors and Audit Committees and know
- The role of internal Auditors in India.

  Understand the CG standards and practices in India with focus on IT and futures of CG in India.

UNIT – I Corporate governance: Meaning – Need – Importance – Corporate Governance(CG) mechanism – CG Systems – Indian model of CG – CG and Value maximization – Issues in Corporate Governance.(Theory only)

UNIT – II Emergence of Corporate governance: Developments in USA and UK – Role of World Bank – OCED – McKinsey – Sarbanes –Oxley Act,2002 – World Committees on CG – The Cadbury Committee. The Hampel Committee – Principles of good CG and code of best practices. (Theory only)

UNIT –III Corporate Governance in India: Need and Importance – Historical perspective – Indian Committees and guidelines on CG – Naresh Chandra Committee – Narayana Murthy Committee – J.J Irani Committee – Kumara Mangalam Birla Committee – The CII initiatives – SEBI initiative – CG practice in India. (Theory only)

UNIT –IV Board of Directors and Audit Committee: Board of Directors and their role in CG – Composition of Board – CG issues relating to Board – Independent Directors – Clause 49 of listing agreement – Audit Committee: Duties and responsibilities of Auditors – Composition of Audit Committee – CG and internal auditors – Indian situation.(Theory only)

UNIT – V Corporate Governance Standards and practices in India: CG Standards – Methods for examining the quality and effectiveness of CG – CG standards in Indian context – CG in IT sector – Pioneers in good CG practices – Problems of CG in India – CG and Business Ethics – CG and Corporate social responsibility (CSR) – Future of CG in India.(Theory only)

REFERENCE BOOKS

1. Fernando A.C – Corporate Governance – principles, Policies and practices – Pearson Education.
2. Subash Chandra Das – Corporate Governance – Codes, Systems, Standards and Practices – PHI.
3. Kesho Prasad – Corporate Governance – PHI Learning – New Delhi–2009
4. Singh S – Corporate Governance – Global Concepts and Practices – Excel Books.
5. Donald H. Chew Jr. Staurt L Gillan – Corporate Governance at Crossroads – Tata McGraw Hill Co. Ltd.,

Course Outcomes

CO1: Assess the Corporate Governance (CG) mechanism and analyse the emerging issues in the arena of CG.
CO2: Trace out the emergence of CG in USA and UK and findings of Cadbury and Hospel committees and better understanding of code of best practices.
CO3: Grasp the historical backdrop of CG in India and perceive the guidelines pronounced by various committees on CG for its effective practice in India.
CO4: Know about the composition of Board of Directions and Audit Committees and visualise the current status of internal auditors in Indian context.
CO5 Exact knowledge on CG standards and practices in India with reference to IT sector and analyse the future of CG in India.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2						2	2	2	
CO2	3		3						2	2	2	
CO3	2		2	1	2				1	2	2	
CO4	3		2						2	2		
CO5	3								1			2

3-High, 2- Medium, 1- Low.

M.Com (R) II Semester

PAPER –205(B) : LEGAL ASPECTS OF BUSINESS

(Compulsory Foundation)

(With Effect from the academic year2021–22)

Course Objectives:

- To understand companies act and its history.
- To know the framework of companies like board of directors and auditors.
- To interpret the Negotiable Instruments Act, 1881.
- To cognize Competition Act, 2002.
- To get to know the essence of cyberspace and cyber law.

Unit–I Companies Act–I: History of Companies Act–Meaning and Nature of a Company–Kinds of Companies–Formation and Incorporation of Company–Steps in Incorporation of a Company–Memorandum of Association–Article of Association–Prospectus. (Theory only)

Unit–II Companies Act–II: Board of Directors–Types of Directors–Appointment of Directors–Board Meetings–Duties and Liabilities of Directors–Removal of Director. Company Auditors–Appointment–Responsibilities of Company Auditor–Removal of Auditor. (Theory only)

Unit–III Negotiable Instruments Act, 1881: Meaning of Negotiable Instruments–Characteristics–Classification of Instruments–Different provisions relating to Negotiation, Negotiability, Assign ability–Rights and Obligation of parties–Presentation of Instruments–Rules of Compensation. (Theory only)

Unit–IV Competition Act, 2002: Introduction–Competition–Meaning–Objectives–Extent of Applicability–Competition of Commission of India–Areas affecting Competition–Duties, Powers and Functions of Commission–Penalties. (Theory only)

Unit–V Cyberspace and cyber Law: Introduction to cyber space and cyber law–Components of cyber law–Categories Cyber Law–Punishments–Components of cyber law–Internet governing bodies–International aspects of electronic contracting–Global issues of Privacy in cyber space. (Theory only)

REFERENCE BOOKS:

1. M.C. Kuchhal, Modern Indian Company Law, Mahavir Publications.
2. N.D. Kapoor, Elements of Company Law, Sultan Chand.
3. K.L. Maheshwari and R.K. Maheshwari, Company Law & Secretarial Practice, New Royal Company.
4. Bimal N. Patel, Banking Law and Negotiable Instrument Act, Eastern Book Company.
5. Universal Law Series, Negotiable Instrument Act, Lexis Nexis, Chennai.
6. NehaVyas, Competition Law, Eastern Book Company, Lucknow.
7. H.K. Saharay, Text Book on Competition Law, Universal Law Publishing.
8. Ramandeepkaurnagra, Cyber laws and Intellectual Property Rights, Kalyani Publishers, 7e.
9. Nina Godbole&SunitBelapureCyber Security, Wiley India Pvt Ltd.

Course Outcomes:

1. Understanding companies act and its history.
2. Knowing the framework of companies like board of directors and auditors.
3. Interpreting the Negotiable Instruments Act, 1881.
4. Cognizing Competition Act, 2002.
5. Knowing the essence of cyberspace and cyber law.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) II Semester

PAPER–205(C): RISK MANAGEMENT

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

- To learn the concept of risk management.
- To enhance knowledge in risk management by individuals.
- To cognize the Enterprise Risk Management and its process.
- To understand the Risk Management Information System.
- To learn in detail about advanced topics in risk management.

Unit – I Concept of Risk Management – Types – Objectives – Functions – Risk Management Process – Steps – Methods of Handling Risk – Risk Retention – Control.(Theory only).

Unit – II Risk Management by Individuals – Influencing Factors – Mitigating Individual Risks – Insurance – Objectives – Costs and Benefits. (Theory only).

Unit – III Enterprise Risk Management (ERM) – Process – Components – Risk Exposures – ERM Basics – COSO Frame Work for ERM – Emerging Role of CRO and ERM in Insurance – Tools and Techniques of ERM.(Theory only).

Unit – IV Risk Management Information System (RMIS) – Objectives and Functions – Emerging Trends – Risk Manager Tasks and Responsibilities – Risk Management Strategies – Benefits.(Theory only).

Unit – V Advanced Topics in Risk Management – Changing Scope of Risk Management – Financial Analysis in Risk Management – Decision Making –Management Tools – Loss Forecasting – Control Methods.(Theory only).

REFERENCE BOOKS:

1. Arunajatesam.S, Risk Management Insurance, Macnillan publishers India Ltd.
2. Bhattacharya. K.M, Risk Management in Indian Banks, Himalaya Publishing House.
3. George, E. Rejda, Principles of Risk Management and Insurance, Pearson Education.
4. Gupta, P. K, Insurance and Risk Management, Himalaya Publishing House.
5. Harrington. E, Risk Management and Insurance, Tata McGraw Hill Publishing Company Limited.

Course Outcomes:

1. Learning the concept of risk management.
2. Enhancing knowledge in risk management by individuals.
3. Cognize the Enterprise Risk Management and its process.
4. Understanding the Risk Management Information System.
5. Learning in detail about advanced topics in risk management.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) II Semester

PAPER –206(A) : E–BANKING OPERATIONS

(Elective Foundation)

(With effect from the academic year 2021–22)

Course objectives (COBs):

COB1: To understand the RBI's financial norms to be followed by commercial banks.
COB2: To investigate into the roles of various commercials banks in India.
COB3: To analyze the mechanism of offline and online borrowing and lending of funds.
COB4: Familiarize with merits and demerits o e-banking applications.
COB5: Categorize the financial frauds in e-banking sector.

UNIT – I IndianBanking: Definition – Functions – Pubic vs. private sector banks; Banks vs.NBFCs –Foreign banks – Regional Rural Banks – State Co–operative Banks – District Central Co–operative Banks –Urban Co–operative Banks.(Theory only).

UNIT –II Banking services: Accepting of Deposits – Lending of funds – Retail banking – Merchant banking – Factoring services – Investment banking – Mutual fund services – Bill discounting – Issue of Letter of Credit (LC).(Theory only).

UNIT – III E–banking: Concept – NPCI – UPI – Debit Cards – Credit cards – RTGS vs. NEFT – Electronic Clearing System – Telephone Banking – Pros and cons of E–banking –Challenges in E–Banking.(Theory only).

UNIT–IV Payment systems: Pre–paid (PP) cards – Open and closed Pre–Paid cards – Post–paid creditcards –Steps in credit card processing – Requirement metrics of an effective e–payment system.(Theory only).

UNIT–V E–banking frauds: Electronic Clearing Services – Frauds in E–banking operations – Thesecurity measures taken by banks.(Theory only).

REFERENCE BOOKS

1. Ravindra Kumar, Deshpande, E–Banking, Pacific Books International.
2. Indian Institute of Banking, Digital Banking, Mumbai.
3. The Banker, Mumbai (Journal)

Course Outcomes (COs)

CO1: Familiarize oneself with safety, liquidity, profitability and productivity norms of banks as prescribed by RBI.
CO2: Acquaint oneself with the role of RRBs, SCBs, DCCBs, and UCBs in India.
CO3: Analyze the mechanisms involved in borrowing and lending of funds, and e-banking operations.
CO4: Equip oneself with pros and cons involved in application of various modes of e-banking.
CO5: Investigate into frauds encountered and security measures taken in e-clearing services in banking sector.

COs-POs mapping

POs/COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				3			2				
CO2	2		3									
CO3	1		2		3							
CO4						2		2				
CO5			3						3		3	

3- High, 2- Medium, 1- Low.

M.Com (R) II Semester

PAPER – 206(B): MANAGEMENT INFORMATION SYSTEMS

(Elective Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

- To learn the concept of Management Information Systems, Business Intelligence, Database Models, RDBMS, Data processing.
- To enhance knowledge in Systems Engineering.
- To cognize the design of MIS and Business Process Re-engineering.
- To understand the applications of MIS.
- To learn in detail about Decision Support System and ERP.

Unit-I: Introduction: Concepts of Management Information System(MIS)-Classification and their implications – Business intelligence – Database models – Database design – RDBMS and MIS; Data processing: Transaction processing – Application processing – Information system processing; Role of MIS:In management and organization effectiveness, and strategic business planning. (Theory only)

Unit-II**:** Systems Engineering (SE)**:** Types and classes of system – General model of SE – Need for system analysis – Analysis of existing and new system - System development model – Structured System Analysis and Design (SAD) – Object-oriented Analysis (OOA) – System Development through Object Oriented Technology (OOT) – Object Oriented Analysis and Design(OOAD) – Systems Development Life Cycle (SDLC). (Theory only)

Unit-III: Design of MIS and Business Process Reengineering (BPR)**:** Planning of MIS – Determining information requirements – Organization, development and implementation of MIS – Development process of MIS – Need for design of MIS – Process of design of MIS – Strategic management and MIS – Process and value stream models of business – Reasons for delay in business process – MIS and Business Process Reengineering. (Theory only)

Unit-IV: Applications of MIS:Human Resource information system – Financial information system – Production information system – Marketing information system – Material Management Information system – Services information system. (Theory only)

Unit-V: Decision Support System (DSS) and ERP: Decision Support Systems and Group Decision Support Systems – Applications of DSS – Knowledge Management System – Benefits of MIS and DSS – Enterprise Resource Planning (ERP) – ERP modules – Benefits of ERP - ERP evaluation and implementation. (Theory only)

REFERENCE BOOKS:

1. Kenneth C. Laudon and Jane P. Laudon: Management Information Systems, PHI and
2. Pearson Education.
3. Rainer, Turban, Potter:Introduction to Information Systems, WILEY-India.
4. James A. Obrein: Management Information Systems, Tata McGraw Hill.
5. Dharminder and Sangeetha: Management Information Systems, Excel books.
6. Alexis Leon: ERP (Demystified), Tata McGraw Hill.

Course Outcomes:

1. Learning the concept of Management Information Systems, Business Intelligence, Database Models, RDBMS, Data processing.
2. Enhancing knowledge in Systems Engineering.
3. Cognize the design of MIS and Business Process Re-engineering.
4. Understanding the applications of MIS.
5. Learning in detail about Decision Support System and ERP.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) I Semester

PAPER -207: HUMAN VALUES AND PROFESSIONAL ETHICS – II

(Audit Course)

(With effect from the academic year 2021–22)

Course Objectives

COB1: To create awareness on value education.
COB2: To make oneself capable to possessing knowledge in medical ethics.
COB3: To understand in depth the business ethics.
COB4: To understand the environmental ethics.
COB5: To grasp and apply social ethics.

UNIT – I Value Education- Definition - relevance to present day - Concept of Human Values - self introspection -Self esteem. Family values-Components,structure and responsibilities of family- Neutralization of anger – AdjustabilityThreats of family life -Status of women in family and society - Caring for needy and elderly Time allotment for sharing ideas and concerns.

UNIT – II Medical ethics- Views of Charaka, Sushruta and Hippocratus on moralresponsibility of medicalpractitioners. Code of ethics for medical and healthcare.Euthanasia, Ethical obligation to animals, Ethical issues in relation to healthCare professionalsprofessionals and patients. Social justice in health care, by human cloning, problems of abortion. Ethical issues in genetic engineering Ethical issues raised new biological technology or knowledge.

UNIT – III Business ethics- Ethical standards of business-Immoral and illegal practicesand their solutions.Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

UNIT – IV Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pestcontrol, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

UNIT – V Social ethics- Organ trade, Human trafficking, Human rights violation and socialdisparities,Feminist ethics, Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television,Movies and Internet.

BOOKS FOR STUDY:

1. R. Subramanian, Professional Ethics, Oxford University press,New Delhi,2013.
2. John S Mackenjie: A manual of ethics.
3. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
4. “Management Ethics-integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
5. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
6. Harold H. Titus: Ethics for Today
7. Maitra, S.K: Hindu Ethics
8. William Lilly : Introduction to Ethics

9. Sinha: A Manual of Ethics
10. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haug.

Course Outcomes:

CO1: Able to create awareness on value education.
CO2: Make oneself capable to possessing knowledge in medical ethics.
CO3: Understanding in depth the business ethics.
CO4: Understanding the environmental ethics.
CO5: Grasping and appling social ethics.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								3			
CO2	2									3		
CO3			3						1			
CO4	2	3									2	
CO5			2							3		3

3-High, 2- Medium, 1- Low.

M.Com (R) – III Semester

PAPER –301: FINANCIAL MARKETS AND SERVICES

(Core Paper)

(With effect from the academic year 2021–22)

Course objectives (COBs):

- To understand the framework of Indian financial system and money market.
- To evaluate the metrics of primary market and secondary capital market.
- To demonstrate the role of merchant bankers.
- To analyze the metrics involved in credit rating the financial instruments issued by companies in primary market.
- To create plans and understand the metrics for getting finance from venture capital firms.

UNIT–I FINANCIAL SYSTEM AND MONEY MARKET: Indian Financial system: Evolution – Structure – Functions – Components; Role in the Indian economic development; Financial Sector reforms: MONEY MARKET: Significance– Instruments of money market including Call money, Commercial bills, Commercial papers, Certificates of deposits, Repo and reverse repo, MMMFs, Money market derivatives and Primary dealers. (Theory only)

UNIT–II CAPITAL MARKET AND SEBI:Structure, participants and instruments of CAPITAL MARKET; Primary market: Functions –Methods of floating new issues –Intermediaries including merchant bankers, underwriters, bankers, brokers and registrars to the issue, debenture trustees, and portfolio managers; Secondary market: Listing and online trading of securities – Categories of shares – Primary market vs. secondary market – CDSL and NSDL; SEBI: Functions– Powers. (Theory only)

UNIT–III MERCHANT BANKING: Concept –Origin and evolution – Scope – Functions – Commercial banking Vs merchant banking; SEBI Regulations on pre–issue and post– Issue obligations of merchant banker. (Theory only)

UNIT–IV CREDIT RATING AND FACTORING: CREDIT RATING: Significance – Features – Process of credit rating – Advantages and drawbacks of credit rating; Rating methodology of CRISIL, CARE, ICRA, FITCH; SEBI regulations on credit rating;FACTORING:Mechanism – Functions – Types; Factoring Vs bills discounting – Legal aspects of factoring agreement (Theory only).

UNIT–V VENTURE CAPITAL FINANCING AND MUTUAL FUNDS: Features – Stages of venture capital financing (VCF) – Financial analysis – Investment nurturing and its types – Exit route –Management buy–ins and management buy–outs – Mezzanine finance – VCF scenario in India – SEBI Regulations on VCF; MUTUAL FUNDS: Concept – Classification of MFs– Organization and management –MF evaluation – SEBI Guidelines on MFs (Theory only).

REFERENCE BOOKS

1. Gordon, E., and Nataraja, K., Financial Markets and Service, Himalaya Publications.
2. Guruswamy S, Merchant banking and financial services, McGrawHill Publications.
3. Khan, M.Y., Financial Services, Tata McGraw Hill Publications.
4. Machiraju, H.R., Merchant Banking, New Age Interrnational Publishers.
5. Gupta, S.K., and NishaAggarwal, Financial Services, Kalyani Publishers.

Course Outcomes

CO1: Examine the components of the Indian financial system and reforms in it with a detailed review on money market components.
CO2: Have an in-depth analysis of capital market including primary and secondary market and powers of SEBI regulating this market.
CO3: Familiarize oneself with functions of merchant bankers and their obligations to SEBI.
CO4: Demonstrate the methodology involved in rating the financial instruments by credit rating organizations and in mapping factoring mechanism.
CO5: Explore the possibility of getting venture capital finance during different stages of business within the framework of SEBI regulations and to familiarize with mutual funds.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2									
CO2	1		2					2				
CO3										3		
CO4				3	2							
CO5		1						3				

M.Com (R) III Semester

PAPER –302: ACCOUNTING FOR MANAGERIAL DECISIONS

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Learn the concept of management accounting, cost analysis for pricing decision and different methods of pricing
- Understand different managerial decisions influencing short and long-term financing
- Study the concept of Responsibility Accounting and its uses and trends.
- Know the essential parameters for evaluation of divisional performance and the emerging issues today
- Obtain comprehensive knowledge on management reporting and reporting practices of Indian corporate.

Unit – I Managerial accounting – Functions –Limitations– Pricing Decisions – Objectives – Factors influencing Pricing decisions – Cost analysis for pricing decisions – Product pricing methods – Full cost pricing – Mark–up pricing – Break–even pricing – Target pricing . (Theory and Problems)

Unit – II Managerial decisions – Cost behaviour – Determination of sales mix – Exploring new markets – Discontinuance of a product line – Make or buy decisions – Equipment Replacement Decision – Shut down or continue (Theory and Problems)

Unit – III Responsibility Accounting (RA) – Concept – Process of implementing RA – Managerial uses– Responsibility centres – Cost centre – Revenue Centre – Profit centre – Investment Centre – Responsibility performance reporting – Objectives (Theory and Problems)

Unit – IV Divisional performance and transfer pricing –Evaluation of divisional performance – Contribution margin approach – Return on investment approach – Residual income approach – Transfer pricing – Methods of transfer pricing (Theory and Problems)

Unit – V Management Reporting – Concept – Modes of reporting – Types of reports – Requisites of a good report – Management Reporting System – Forms of management reports – Reporting practices in Indian corporates (Theory only)

REFERENCE BOOKS:

1. Charles T. Horngren, G.L. Sundem and W.O. Stratoon, Introduction to Management Accounting, Pearson, Delhi.
2. Jawaharala, Management Accounting, Himalaya Publishers, Mumbai.
3. Kulshrestha, N.K., Management Accounting, Tata McGraw Hill, New Delhi.
4. Khan.M.Y, Jain.P.K, Management Accounting(7th edition), McGraw Hill, New Delhi, 2018.
5. Maheswari, S.N., Principles of Management Accounting, Sultan Chand & Sons, New Delhi.

6. PrashantaAtma, Cost and management Accounting, Himalaya Publishing House, Hyderabad.
7. Robert S. Kaplan and Anthony A. Atkinso, Advanced management Accounting, Prentice hall, New Delhi.
8. Sahaf M.A., Management Accounting Principles and Practice, Vikas Publishing House, Mumbai.
9. Sharma R.K and Gupta, S.K., Management Accounting, Kalyani Publishers, Ludhiana.

Course Outcomes

CO1:	Understand the concept of Managerial Accounting, cost analysis for pricing decisions and also learn different product pricing methods.
CO2:	Know the significance of different managerial decisions affecting the short term and long term financing .
CO3:	Analyse the concept of RA, managerial utility of different responsibility centres and acquaintance with the emerging trends issues in RA.
CO4:	Familiarise the evaluation of divisional performance parameters and describe the emerging issues in TP
CO5:	Elucidate the concept of management reporting and have awareness about reporting practices adopted by Indian corporate.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		1			1				
CO2	3	1	2		2			1				
CO3	3	1	1		1			3				
CO4	3	1		1			1	1				
CO5	3	2	1		1							

3-High, 2- Medium, 1- Low.

M.Com (R) III Semester

PAPER –303(A) : TALLY WITH GST APPLICATIONS

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives

- To acquaint oneself with skills to prepare financial statements through Tally ERP.
- To understand basics of GST system.
- To know steps involved in generating GSTR reports.
- To know the metrics in calculation and generation of TDS and service tax reports.
- To acquire skills to create payroll receipts.

Unit–I Features of Tally accounting – Components of Gateway of Tally and button panel – Purposes and components of F11 And F12 – Creation and setting up of a company – Accounting Masters: Creation, alteration and deletion of single and multiple groups – Creation, alteration of single and multiple ledgers – Recording transactions in accounting vouchers: Creation and alteration of vouchers – Display and print of financial statements (Theory and lab).

Unit–II Inventory: Configuration **–** Inventory Masters:Creation, display and alteration of stock groups, stock categories, godowns, units of measure, stock items – Recording transactions: Creation of inventory vouchers – Display and print of inventory reports (Theory and lab).

Unit – III GST: Enabling GST features in Tally **(**Configuration) **–** Basics of GST – Rates of GST – Configure GST details of your company – Creating Party Ledgers & Tax Ledgers – Setting up of SGST, CGST, IGST rates for input and output – Creation of vouchers – Recording intra and inter–state vouchers with GST tax ledgers; Types of invoice under GST: Tax invoice vs. Bill of supply; Contents of tax invoice – Display and print of GST reports (Theory and lab).

Unit–IV TDS: Configuration –Company creation**–**Creation of ledgers and vouchers **–** Recording advance and balance payments of Tax – Generation of TDS reports (Theory and lab).

Unit–V Payroll: Configuration – Payroll features**–**Enabling payroll details – Creation of payroll masters– Creating the Pay Head ledgers – Creating the employee details and salary details of an individual – Creating details of Attendance types; List of Payroll Voucher types: Pay roll voucher and attendance voucher;Recording Attendance and Payroll voucher entries – Display and print of various payroll reports (Theory and lab).

REFERENCE BOOKS:

1. Nadhani, A.K. and Nadhani, K.K. Implementing Tally BPB Publication.
2. Kiran Kumar, K.Tally, Laasya Publishers, Hyderabad
3. NeerajGoyal, RohitSachdeva, Tally with GST Applications, Kalyani Publishers.
4. Vishnu Priya Singh, Tally, Computech Publications Ltd, New Delhi.
5. www.Tallyeducation.com

Course Outcomes

Co1: Acquire skills in preparing company financial statements on accounting and inventory bases through Tally accounting software.
CO2: Have a bird's eye view on GST system including methodology in evaluating time, place and value of supply of goods and services, and input tax credit mechanism.
CO3: Be skillful in recording interstate and intrastate supply and return of goods and in generating various GSTR reports.
CO4: Equip oneself with skills in recording payments and generation of TDS and service tax reports.
CO5: Demonstrate the practical knowledge on creating and printing of various payroll receipts.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2									2
CO2	3							2				
CO3					2			3				
CO4					2			2				
CO5					2			2				

3-High, 2- Medium, 1- Low.

M.Com (R) III Semester

PAPER –303(B) :: SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

(Generic Elective)

(With effect from the academic year 2021–22)

Unit – I Securities Analysis : Basics of Investment–Objectives – Fundamental Analysis –Technical analysis – Efficient Market Hypothesis(EMH) –Forms of EMH – Random Walk theory– Implications (Theory only)

Unit – II Valuation of Securities: Valuation of Equity shares– Dividend capitalization Methods – Earning Capitalization Methods; Valuation of Bonds–Basic concepts–Types of Bonds–Measuring Bond Duration. (Theory and Problems)

Unit – III Portfolio Theory: Capital Asset Pricing Model (CAPM) –Assumptions – Capital market line vs. Security Market Line (SML) – Arbitrage Pricing Theory– Assumptions. (Theory and Problems)

Unit – IV Portfolio Evaluation: Concept – Measures of portfolio performance –Sharpe's Performance Index – Treynor's Performance Index –Jensen's Performance Index. (Theory and Problems)

Unit – V Portfolio Revision: Concept – Need –Formula plans – Assumptions–Advantages and disadvantages –Types of Formula plans –Portfolio Revision strategies. (Theory only)

REFERENCE BOOKS:

1. PrasannaChandra : Analysis and Portfolio Management, Tata McGraw Hill Co. Ltd., New Delhi.
2. Kevin, Security Analysis and Portfolio Management, PHI, New Delhi.
3. Avadani V.A.: Security Analysis and Portfolio Management, Himalaya Publishing House, New Delhi, 2008.
4. Prethi Singh, Investment Management, Security Analysis and Portfolio Management, Himalaya Publishing House, New Delhi.
5. Dhamodharan : Investment Valuation, Johnweely and sons, New York.

Course Outcomes

CO1: Apply the tools and techniques of fundamental analysis, technical analysis and Random Walk theory for expected return on investment.
CO2: Ascertain the value of equity shares and bonds through different valuation models to buy and sell decision.
CO3: Analyze the portfolio selection through significant models like capital asset pricing model (CAPM) and Arbitrage pricing theory (APT).
CO4: Evaluate the performance of the portfolio through ideal measures and revise the portfolio for better performance.
CO5: Analyse portfolio revision, types of formula plans and strategies of portfolio revision.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1		2			1				1
CO2		3			3				1		2	
CO3		2	3	1	3							
CO4				3	2		1					
C05	3					3	2					2

3-High, 2- Medium, 1- Low.

M.Com (R) III Semester

PAPER –303(C): ENTERPRENEUSRHIP AND MSMEs

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives:

- To understand the concept of entrepreneurship along with its importance.
- To know the concept of Entrepreneur and characteristics of entrepreneurial skills.
- To interpret concept of modern small business enterprises.
- To cognize setting up of a small business enterprises.
- To get to know the financing of small business enterprises.

UNIT – I Entrepreneurship: Importance of entrepreneurship – Concept of Entrepreneurship– Characteristics of successful Entrepreneur – Classification of Entrepreneurs – Problems of Entrepreneurs and capacity building for Entrepreneurship – Evolution of Entrepreneurship in India – Profile of successful Entrepreneurs in India. (Theory only)

UNIT –II The Intrapreneur: Characteristics of intrepreneurial environment – The role of Entrepreneurs – Managers and Entrepreneurs –Environment for Entrepreneurship and Entrepreneurial skills – Skills for a new class of Entrepreneurs.(Theory only)

UNIT –III Modern small business enterprises: Role of small scale industries in Indian economy – Concept and Definition of SSI – Indian Industrial Policy Resolutions and Objectives – Micro, Small, and Medium Enterprises(MSMEs) – Salient features of MSMEs Act,2006 – Problems and prospects of MSMEs in free economy – MSME Amendment Act, 2020.(Theory only)

UNIT – IV Setting up of a Small business enterprises – identifying the business opportunity – Business enterprises – Institutional support for small business enterprises in India – Central level institutions – State level institutions –Other agencies – industry– Other agencies – Industry associations (Theory only)

UNIT –V Finances for small business enterprises: Short term, medium term and long term finances – means of finance – financial assistance for small business enterprises – credit facilities to small business enterprises – Small Industry Development Bank of India (SIDBI) – Channels of SIDBI assistance.(Theory only)

REFERENCE BOOKS

1. Vasanth Desai, " Small Scale Industries and Entrepreneurship " Himalaya Publishing House, Mumbai.
2. Vasanth Desai," Entrepreneurial Development and Project Management", Himalaya Publishing House, Mumbai.
3. Vasanth Desai" Dynamics of Entrepreneurial Development and Management" Himalaya Publishing House, Mumbai

4. PoornimaChadrantinath.” Entrepreneurship Development and Smll Business Enteprises”Pearson Education, New Delhi.
5. Neeta Baporikar,” Entrepreneurship Development and Project management”Himalaya Publishing House, Mumbai
6. Thomas W.Zimmerer and HormanM.Scarborough” Essentials of Entrepreneurship and Small Business Management : Pearson Education Inc., Delhi

Course Outcomes:

1. Understanding the concept of entrepreneurship along with its importance.
2. Knowing the concept of Intrapreneur and characteristics of entrepreneurial skills.
3. Interpreting concept of modern small business enterprises.
4. Cognizing the setting up of small business enterprises.
5. Knowing the financing of small business enterprises.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) III Semester

PAPER –303(D) : TOTAL QUALITY MANAGEMENT

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives:

- To understand the concept of Total quality management.
- To know the concept of management tools.
- To interpret Tools and techniques of TQM.
- To cognize the concept of six sigma.
- To get to know the business process reengineering.

UNIT-I Total Quality Management (TQM): Concept of Quality –Importance of QualityBasic Concepts of Total Quality Management – Evolution of TQM – Principles of TQM – Significance of TQM – TQM Framework – Benefits and Limitations of TQM. (Theory Only)

UNIT– II Management Tools: Concept –Types of Tools – Forced Field Analysis – Affinity Diagram – Just in time –Quality Circles – Cost Benefit Analysis – Flow Charts – Run and Control Charts – Check Sheets – Histograms – Scatter Diagrams – Cause and Effect Analysis – Process Simulation.(Theory Only)

UNIT– III Tools and Techniques of TQM: Tools for Design Processes – Taguchi Methods – Bench Marking– Total Productive Maintenance – ISO 9000 – ISO 14000 and ISO 18000. (TheoryOnly)

UNIT– IV Six Sigma: Concept – Competitive Advantage – Implementation of Six Sigma – Design for Six Sigma and Tools. (Theory Only)

UNIT– V Business Process Reengineering: Concept– Principles and Applications of Business ProcessReengineering–Reengineering Process–Benefits and Limitations of Business Process Reengineering. (Theory Only)

REFERENCE BOOKS

1. Besterfiled, D.H. “Total Quality Management”, Pearson Education, Inc.
2. Zeiri., “Total Quality Management for Engineers”, Wood Head Publishers.
3. Evans, J. R., and Lidsay, W.M., “The Management and Control of Quality”, 5th Edition,South–Western.
4. Oakland.J.S. “Total Quality Management”, Butterworth – Hcinemann Ltd., Oxford,
5. Narayana V. and Sreenivasan, N.S., “Quality Management – Concepts and Tasks”, NewAgeInternational,
6. KanishkaBedi., “Quality Management”, Oxford University Press,
7. ShridharaBhat, K., “Total Quality Management”, Himalaya Publishing House Pvt. Ltd., Hyderabad.

Course Outcomes:

1. Understanding the concept of Total quality management.
2. Knowing the concept of management tools.
3. Interpreting Tools and techniques of TQM.
4. Cognizing the concept of six sigma.
5. Knowing the business process reengineering.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) III Semester

PAPER –304: INTERNAL AUDIT AND STANDARD AUDIT PRACTICES

(Skill Oriented Course)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

1. Conceptualize the knowledge in internal control including evaluation techniques.
2. Learn the meaning, features, objectives and advantages of internal audit.
3. Ascertain the basis of auditing with information systems by skill enhancement.
4. Illustrate the audit under computerized information system environment along with its internal control.
6. Outline and synthesize the reporting and its presentation techniques.

Unit 1 Introduction to internal control: Meaning – Objectives – Basic elements of internal control – Types of internal control systems – Preventive and detective controls – Advantages and limitations of internal control – Techniques for evaluation of internal control system – Native record – Check list – Flow chart – Internal control questionnaire.(Theory only)

Unit 2 Internal Audit: Meaning –features – advantages – Need of internal audit – Internal control vs. Internal audit – Internal audit vs. Operational audit; internal check: Meaning – Objectives – Features of good internal check system.(Theory only)

Unit 3 Auditing of Information Systems: Overview of Information Systems – Attributes of Information – Need for Audit of Information Systems – Effect of Computers on Audit – Changes to evidence collection – Changes to evidence evaluation – Skills required for Information Systems Auditor – Functions of IS Auditor – Categories of Information Systems Audit – Steps in Information System Audit – Role of IS Auditor in Physical Access Controls – Understanding the Layers and related audit issues. (Theory only)

Unit 4 Internal Audit under Computerized Information System (CIS) Environment**:**Special audit techniques using the computer – Scope of audit in a CIS Environment – Impact of changes on business processes (for shifting from manual to electronic medium) – Audit approaches in a CIS Environment – Internal Controls in a CIS Environment – Internal Control requirements under CIS Environment – Approach to auditing in a CIS environment – Computer Assisted Audit Techniques (CAATs). (Theory only)

Unit–V Internal audit reporting: Concept – Basic elements of internal audit report – Features of good internal audit report – Frequency of report – Segment reporting – Documentation of reporting – Importance of report drafting – Report presentation techniques – Report submission – Storage of working papers and back-up of data. (Theory only)

REFERENCES:

Advanced Auditing and Standards on Internal Audit, Issued by ICAI.

1. Information Systems Control and Audit, Issued by ICAI.
2. Standards On Internal Audit – issued by ICAI.
3. Kamal Garg, Handbook on Internal Audit: Bharat Law House.

Course Outcomes (COs):

1. To acquire knowledge in internal control, learn its advantages, limitations and techniques.
2. To learn the features, advantages and need for internal audit.
3. To enhance skills and know-how in auditing of Information systems.
4. To showcase the environment of Internal Audit under computerised information system.
5. To amend the skills and knowledge in Internal Audit reporting along with reports presentation.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2				3	2				1
CO2	3	3		1	2			1	2		1	
CO3		2	3				3	1		1		3
CO4	1		3			2			1		1	
CO5	2			3	2			1				2

3-High, 2- Medium, 1- Low.

M.Com (R) III Semester

PAPER –305(A): FUNDAMENTALS OF ACCOUNTING

(Open Elective)

(With effect from the academic year 2021–22)

Course Objectives:

- To provide basic knowledge on accounting and its preparation.
- To enable the students to prepare final accounts
- To help the students to acquire the skills of financial statement analysis
- To provide the basic knowledge on cost accounting.
- To develop the student ability to use the tools of management accounting

Unit–I Accounting – Nature and Scope – Branches of Accounting – Financial Accounting – Types —Principles and concepts – Branches of Accounting – Accounting Standards –Types of Accounting Standards–Advantages.(Theory only)

Unit–II Journal and Final Accounts: Meaning of an Account–Accounting Equation– Meaning and format of Journal–Ledger posting– Preparation of Trial Balance– Profit and Loss Account– Balance sheet. (Theory only and Problem)

Unit–III Financial Statement Analysis: Meaning – Classification – Trend analysis – Comparative statement analysis – Common size statement analysis–Advantages of Financial statement analysis. (Theory only)

Unit – IV Cost Accounting: Nature, Scope and Objectives– Concept of cost – Classification – Behaviour of cost – Elements of cost – Principles of costing – Preparation of cost sheet.(Theory only and Problem)

Unit – V Managerial Accounting – Nature, Scope and Objectives – Budgetary Control – Types of Budget – Advantages of budgeting – Limitations – Preparation of budgets (Theory only)

REFERENCE BOOKS:

1. Jain S.P, Narang K.L and SimmiAgarwal, “Accounting For Managers”, KalyaniPublishers, New Delhi.
2. Wild. J.J., Subramanyam, K.R. Halsey, R.F., Financial Statement analysis, Tata McGraw Hill.
3. NarayanaSwamy, “Financial Accounting: A Managerial Perspective”, Pearson Education.
4. Prasad, G. “ Financial Accounting and Analysis” Jai Bharat Publishers, Guntur.
5. Ramachandran and Kakani, “ Finanical Accounting for Management”, TMH, New Delhi.
6. Jain and Narang, “Accountancy” Vol 1, Kalyani Publishers.
7. Jain and Narang, “ Cost Accounting”, Kalyani Publishers.
8. R.K.SharmaandShashi K Gupta, “Management Accounting”, Kalyani Publishers.
9. S.N. Maheswari, Accounting for Managment, Sultan Chand Publishing House Pvt. Ltd.

Course Outcomes

CO1: Provides knowledge about basic principles, branches of accounting, accounting standards and book-keeping.
CO2: Enables the students to prepare and solve the final accounts
CO3: Explores the talents of financial statement analysis
CO4: Able to know the concepts used in cost accounting
CO5: Understand about the concept, tools and management accounting.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				2			1				
CO2		3			2				1			
CO3		3				2						1
CO4	3			2				1				
CO5	3				1			2				

3-High, 2- Medium, 1- Low.

M.Com (R) III Semester

PAPER –305(B) : PERSONAL FINANCIAL PLANNING

(Open Elective)

(With effect from the academic year 2021–22)

Course Objectives:

1. To understand the concept of personal finance planning.
2. To know the products of personal finance planning.
3. To interpret risk and return concepts along with its types.
4. To cognize and apply personal tax planning.
5. To get to know the perspectives of personal finance and policy.

UNIT I Personal Finance Planning– Nature – Scope – Objectives– Need – Process – Principles of Personal Finance –Safety– Liquidity–Solvency and Management of Wealth.(Theory only)

UNIT II Products of Personal Finance Planning – Bank Deposits – Post Office Savings – Mutual Funds –Shares–Corporate and Govt. Bonds– Chit Funds–Real Estate– Gold–Silver.(Theory only)

UNIT III Risk and Return– Concepts – Types of Risk and Return – Diversification of Risk – Measurement of Risk and Return – Investment Planning– Time value of Money – Compound Value –Computation of Returns on Personal Investments. (Theory only)

UNIT IV Personal Tax Planning: Nature of Income – Expenses – Deductions– Taxable Benefits–Income Splitting–Tax Advantaged Investment–Deferred Income Plans– Income and Dividends from Business and Self–Employment.(Theory only)

UNIT V Personal Finance and Policy Perspectives: Impact of Government Policy– Union Budget– Cost of Living –Retirement Saving Plans– Pension plans – Provident Fund, Gratuity–LIC –GIC –Reverse Mortgage Plans. (Theory only)

REFERENCE BOOKS

1. Personal Finance by Jack R. Kapoor, Les R. Dlabay and Robert J. Hughes, Tat McGraw–Hill Publishing Company Ltd. New Delhi.
2. Financial Education by Reserve Bank of India – rbi.org.
3. Personal Finance columns in The Economic Times, The Business Line and Financial Express Daily News Papers.
4. Information Broachers of Post Offices, Banks, Mutual Funds, Insurance Companies Internet Sources– BSE, NSE, SEBI, RBI, IRDA, AMFI etc.

Course Outcomes:

1. Understanding the concept of personal finance planning.
2. Knowing the products of personal finance planning.
3. Interpreting risk and return concepts along with its types.
4. Cognizing and apply personal tax planning.
5. Knowing the perspectives of personal finance and policy.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) IV Semester

PAPER – 401: **INTERNATIONAL FINANCIAL MANAGEMENT**

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Determine international financial management concept, importance, nature and scope.
- Demonstrate foreign exchange market and exchange rate mechanism; types of exchange rates.
- Evaluate foreign exchange exposure concept, relevance and classification; management of accounting exposure.
- Evaluate international project appraisal concept and approaches; international perspective of working capital.
- Plan international equity investment concept, risk and return; major market segments and international financing decision.

Unit – I International Financial Management (IFM) : Concept –Nature and Scope– Importance – Domestic and Offshore Markets –Role of International Financial Manager – Changes in Global Financial Markets –Challenges– International Monetary System–Emerging Dimensions .(Theory only).

Unit – II Foreign Exchange Market and Exchange Rate Mechanism: Foreign Exchange Markets – Structure – Types of Exchange rates – Exchange Rate Quotations – Direct and Indirect – Buying and Selling Rates – Forward market quotation – Nominal and Real Exchange Rates in Financial Decisions.(Theory only)

Unit – III Foreign Exchange Exposure: Concept – Relevance of Foreign exchange Exposure – Transaction Exposure– Operating Exposure – Accounting Exposure –Hedging and Managing Tools of Exposures. (Theory only)

Unit – IV International Project Appraisal: Concept – Approaches – Net present Value Approach – Adjusted Present Value Framework – Options Approach – The Practice of Cross Border Direct Investment Appraisal– International Perspectives of Working Capital.(Theory only).

Unit – V International Equity Investment: Concept – Risk and Return from Foreign Equity Investment – Equity Financing in the International Markets – Long–Term Borrowings in Global Capital Markets–International Financing Decision. (Theory only)

REFERENCE BOOKS:

1. Apte.P.G.,: International Financial Management, Tata McGraw Hill Publishing House, New Delhi.
2. Siddaiah, T, International Financial Management, Pearson, New Delhi.
3. Sharan V. : International Financial Management, Prentice Hall of India Publishing, New Delhi
4. Bhalla,V.K. : International Financial Management, AnmolPublicatins, New Delhi.
5. AvadhaniV.A. : International Finance, Himalaya Publishing House, Mumbai.
6. Eun&Resnick., : International Financial Management, Tata McGraw Hill Publishing Company lLtd., New Delhi.

Course Outcomes:

CO1: Ascertain the recent changes in global financial markets and international monetary system so as to forecast exchange rates and use foreign exchange rate mechanism.
CO2: Measure foreign exchange exposure and hedge foreign exchange exposure.
CO3: Appraise projects using international capital budgeting techniques and estimate the working capital requirements in international perspective.
CO4:Analyze the risk and return for equity and long term debt financing in global capital markets.
CO5: Formulate international equity investment and long-term borrowings in global capital markets.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		2			1				
CO2	2	2	1		2			1				
CO3	1	2		1	2			1				
CO4	1	2	1	3				2				
CO5	1	2	2	2				1				

3-High, 2- Medium, 1- Low.

M.Com (R) IV Semester

PAPER –402: TAX PLANNING AND MANAGEMENT

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- To comprehend the basic knowledge about tax concepts and planning.
- To provide knowledge on sources of income under different heads
- To acquire the knowledge on tax planning with regard to location
- To provide the skills of tax planning regard to managerial decisions.
- To create awareness about tax incentive of exports.

UNIT– I Income Tax Law: Evolution of Taxation Law – Basic Concepts – Residential status – Tax Planning and management: Concepts – Tax avoidance – Tax evasion.(Theory only)

UNIT –II Tax Planning – Individuals: Heads of Income for Individuals – Income from Salary – Income from business and profession – Tax relief – Concession – Rebates – Deductions and Incentives. (Theory and problems)

UNIT –III Corporate Tax Planning–I: Tax Planning with references to new establishment – Location –Form – Nature and Capital structure – Short term loans – Term loans – Public deposits – Bonus Issues – Dividend Policies.(Theory and problems)

UNIT – IV Corporate Tax planning–II: Managerial decisions – Tax planning in respect of owned funds or borrowed capital – Lease Vs Purchase – Purchase by instalments Vs hire – Make or buy decisions. (Theory only)

UNIT– V Tax Planning – Incentives and Export Promotion: Schemes for encouraging exports – Import duty relief schemes – Free Trade Zones (FTZs) – Special Economic Zones (SEZs) – Export Processing Zones (EPZs) – Salient features of Software Technology Parks (STPs) – Electronic Hardware Technology Parks (EHTPs) – Export Promotion schemes under EXIM Policy. (Theory only)

REFERENCE BOOKS:

1. Ahuja G.K. and Ravi Gupta: Systematic Approach to Income Tax and Central Sales Tax, Bharat Law House, New Delhi.
2. Circulars issued by C.B.D.T
3. Income Tax Act, 1961
4. Income Tax Rules, 1962
5. Lakhotia R.N: Corporate Tax Planning, Vision Publications , Delhi,
6. Singhania, V.K.Direct Taxes: Law and Practice, Taxman’s Publications Delhi.
7. Singhania, V. K: Direct Taxes Planning and Management, Taxman’s Publications Delhi.
8. Melhotra, MC and Goyal, S.P: Income Tax Law and Accounts including tax planning, SahityaBhavan Publication, Agra.

Course Outcomes

CO1: Enables to know the concepts of tax law andable identify the difference between tax evasion and tax planning.
CO2: Understands the sources and heads of income for individuals
CO3: Gains the knowledge of tax planning with regard to location and nature of business
CO4: Learns tax planning concepts and apply the same of Corporate Business Enterprise
CO5: Familiarises about the tax planning incentives and export promotion.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1		1			2				
CO2	3	2		1				2				
CO3	2	1	1	1								2
CO4	3		2		1							
CO5	2	3		2								

3-High, 2- Medium, 1- Low.

M.Com (R) IV Semester

PAPER – 403(A) : GSTAND CUSTOMS DUTY

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

- Outline the concepts of GST, its applicability, features and objectives.
- Look into the registration procedures and return types under GST.
- Exemplify about the supply of goods and services along with valuation.
- Draft the eligibility for ITC by learning the concepts of ITC.
- Ascertain customs duty and find out its assessable value.

Unit–I Introduction: Concept of GST – Structure of GST – Features of CGST, SGST, UTGST, and IGST Acts – Objectives of GST – VAT vs. GST – Benefits of GST – Applicability of GST – Exemptions from GST – Rates of GST. (Theory only).

Unit–II Registration under GST: Persons liable and persons not–liable for registrations; Types of dealers in GST – Deemed registration – Registration process for new applicants – Cancellation of registration and revocation; Reverse Charge Mechanism; Returns under GST: Person liable to pay GST– Computation of GST – Liability and payment of GST –Types of GST returns– Revision of GST returns – Penalty/Late fee – Refund of GST (Theory and problems).

Unit–III Supply of goods and services:Scope of supply: Types of supply based on location, combination, and recipient and tax treatment – Time of Supply – Place of Supply – Value of Supply (Theory and problems).

Unit–IV Input Tax Credit (ITC): Concept – Eligibility for taking Input Tax Credit (ITC) –Utilization of ITC – Conditions for taking ITC – Input Tax Credit in special circumstances – Distribution of ITC by Input Service Distributor (ISD) – Computation of ITC (Theory and problems).

Unit–V Customs duty: Definitions –Circumstances of levy of customs duties – Types of customs duties – Exemption from customs duties – Import procedure under customs –Export Procedure under customs – Method of valuation for customs – Calculation of assessable value – Calculation of custom duty (Theory and problems).

REFERENCES:

1. R. G. Saha, Divyesh Shah, Usha Devi N, GST (Indirect Taxes), Himalaya Publishers.
2. ICMAI, Study material on Indirect taxation, ICMAI.
3. VandanaBangar and YogendraBangar, Indirect Tax Laws, AadhyaPrakashan Publishers.
4. V. S. Datey, GST Ready Reckoner, Taxmann Publications.
5. AvadeshOjha, GST, Taxmann Publications.

Course Outcomes (COs):

- To develop knowledge in the areas of GST by learning its objectives, benefits, applicability and exemptions.
- To learn the mechanism of GST and its registration along with returns.
- To enhance skills regarding taxable value of supplies and supply of goods and services.
- To amend knowledge in GST input tax credit and its computation.
- To showcase the know-how of customs duty including calculation of the assessable value.

CO-PO Mappings

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1						2				1
CO2	2	2	1		1			1				
CO3	2	1						1				
CO4	2	1	1		1							
CO5	3	1	1		2			1				1

3-High, 2- Medium, 1- Low.

M.Com (R) IV Semester

PAPER – 403(B): STRATEGIC MANAGEMENT

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives:

1. To understand the concept of Strategy.
2. To know the environmental appraisal and organisational appraisal.
3. To interpret strategy formulation.
4. To cognize strategy implementation.
5. To get to know about the strategy evaluation.

Unit – I Introduction**:** Understanding strategy – Dimensions of strategic decisions – Process of strategic management –Strategists and their role in strategic management – Hierarchy of strategic intent – Strategic intent– Vision– mission, Business definition– Goals and objectives.(Theory only)

Unit – II Environmental appraisal and Organizational appraisal: Concept of environment– Environmental sectors– Environmental scanning– Appraising the environment– Organizational appraisal – Dynamics of internal environment– Organizational capability factors– Considerations in organizational appraisal – Methods and techniques used for organizational appraisal– Structuring organizational appraisal. (Theory only)

Unit – III Strategy Formulation: Concept– Strategy framework for analyzing competition – Porters value chain analysis– Competitive advantage of a firm – Entry and exist barriers – Formulation of strategy at corporate– Business and functional levels – types of Strategies – Offensive strategy – Defensive strategy– Vertical integration strategy– Horizontal strategy– Tailoring strategy– strategic analysis and choice. (Theory only)

Unit – IV Strategy Implementation: Concept– Activating strategies – Inter relationship between formulation and implementation– Aspects of strategy implementation – Project implementation – Resource allocation – Structural implementation– Structural considerations – Structures for strategies – Organizational design and change – Organizational systems – Behavioural implementation – Leadership implementation – Corporate culture – Corporate politics and use of power – Personal values and business ethics– Social responsibility and strategic management – Functional and operational implementation. (Theory only)

Unit – V Strategy Evaluation: Concept – Strategic review– Evaluation and control – Nature of strategy evaluation– Strategy evaluation framework – Published sources of strategy – Evaluation in formation – Characteristics of an ethical evaluation system – Contingency planning – Auditing – Computer to evaluate strategy. (Theory only)

REFERENCE BOOKS

1. AzharKazmi, Business Policy and Strategic Management, TATA McGraw Hill.
2. SubbaRao. P, Business Strategic Management, Himalaya Publications.
3. John A. Pearce & Richard B. Robbin, Strategic Management, AITBS Publications.
4. Srinivastava, Management policy and strategic management, Himalaya Publications.
5. Porter. M Competitive Strategic techniques for analyzing industries and competitor, the free Press, New York.
6. Thomas L. Wheelen, J. David Hunger, KrishRangarajan, Concept in strategic management and business policies, PHI
7. Fred R. David, strategic Management Concepts and cases, PHI.

Course Outcomes:

1. Understanding the concept of Strategy.
2. Knowing the environmental appraisal and organisational appraisal.
3. Interpreting strategy formulation.
4. Cognizing strategy implementation.
5. Knowing about the strategy evaluation.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (R) IV Semester

PAPER – 403(C) :PERSONALITY DEVELOPMENT AND SOFT SKILLS

(Generic Elective)

(With effect from the academic year 2021–22)

Course objectives (COBs):

COB1: Familiarize with the theories of personality including sick and healthy personalities.

COB2: Dramatize the processes involved in effective reading, listening, messaging and feedback.

COB3: Develop the skills for coaching, mentoring, persuading and change making.

COB4: Develop the skills to be lead leader, chair the meeting, problem solver, conflict resolver and negotiator.

COB5: Develop self esteem and build positive attitude and personality.

Unit–I	Foundations of personality development (PD): Concept of Personality – Theories of personality: Psycho-dynamic theory - Trait theory – Big-5 Theory; Personality Determinants: Physical, social, educational, family, intellectual and emotional determinants; Causes for sick personality and healthy Personality. (Theory only)
Unit-II	Self-awareness skills: Self-awareness and management; communicating: Sending inter personal messages – Listening and reading non-verbal messages – Providing feedback. (Theory only)
Unit-III	Motivating: Goal setting skills – Coaching -Counselling and Mentoring – Empowering people through delegation; Leading: Politicking - Persuading - Applying leadership styles – Managing Change. (Theory only)
Unit- IV	Teaming skills: Working with teams – Running meetings – Valuing diversity: Problem solving: Ethical decision making - Creative problem solving – Resolving conflicts – Negotiation. (Theory only)
Unit- V	Self-esteem skills: Characteristics – Causes of low self-esteem – Steps to build positive self-esteem; Attitude: Steps in building positive attitude; Interpersonal skills; Steps in developing positive Personality. (Theory only)

REFERENCE BOOKS:

1. Elizabeth B.Hurlock: Personality Development, Tata McGraw Hill.
2. Stephen P.Robbins and Philip L Hunsaker: Training in interpersonal skills, Pearson Education.
3. Shiv Khera: You can Win, McMilan Publications.
4. Robert M. Sherfield. Rhonda J.Montgomery, PatricaG.Moody: Developing soft
5. Skills, Person Education.
6. Biswajit Das,Satpath: Business Communication & Personality Development, Excel Publication.

Course Outcomes (COs):

CO1: Acquire conceptual knowledge on the theories of personality and its determinants that lead to either sick or healthy personalities.

CO2: Manage effectively the self-awareness to manage active reading, listening, messaging and feeding back.

CO3: Train oneself to be a coach, mentor, leader, persuader, and change maker.

CO4: Demonstrate the skills in teaming, running meetings, problems solving, conflict resolution and negotiation.

CO5: Realize the causes and impact of self-esteem and ways to build positive attitude and personality.

COs-POs mapping:

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2									
CO2			2				2			3		
CO3						3	2	2				
CO4						3	2	3				
CO5						2			2	2		

M.Com (R) IV Semester

PAPER –403(D) : E-COMMERCE

(Generic Elective)

(With effect from the academic year 2021–22)

Course objectives (COBs):

- Understand the basics of E-Commerce, its models, applications and IT Act.
- Illustrate the fundamentals of internet technology, and web page creation in HTML.
- Evaluate the tools and security involved in e-payment methods.
- Differentiate various frauds involved in E-Commerce.

Familiarize with the applications of EC in functional areas of management.

Unit-I Introduction: Concept of E-Commerce– Features– Driving forces - Benefits and limitations– Applications of E-commerce; B2B and B2C models of E-commerce – E- Commerce vs. E-Business- Future of E-commerce. (Theory only)

Unit-II Internet Technology: Internet vs. intranet vs. extranet –Firewalls - Internet protocols TCP/IP, HTTP, SMTP, FTP - Utility programs: Telnet, Finger, Ping, Tracer - WWW – Internet features and services - Portal vs website vs. communities - HTML and web design – Block chain technology. (Theory only)

Unit-III E-Payments**:** Types of e-payments - SET and SSL protocols; EDIFACT, EDI; Cryptography methods – Generation of digital signature – Generation of e-cash, e-wallets, and E-cheques –Credit cards and Third Party Processors work - Bitcoin. (Theory only)

Unit-IV Issues in E-Commerce**:** Social issues - Legal issues – Privacy issues - Ethical issues – IPR issues; Regulatory framework of E-commerce under Information Technology Act (Theory only)

Unit-V E-Commerce Applications**:** Advertising – Supply chain management – Marketing research – Financial services – Publishing – Entertainment - Retailing – Trading stocks – Role of ERP solutions in e-commerce. (Theory only)

REFERENCE BOOKS:

1. E-Commerce, Kenneth Laudon, Pearson Education India.
2. Michael Chung, Jae lee, David King, Efraim Turban: E-commerce – A Managerial Perspective, Pearson Education India.
3. David Whiteley: E-Commerce – Strategy, Technologies and Applications, Tata McGraw Hill.
4. Kamalesh Bajaj, Debjani Nag: E-Commerce - The Cutting edge of Business, Tata McGraw Hill.

Course Outcomes

CO1:	Understand the fundamentals of EC, its applications, and models, and the provisions of IT ACT on EC.
CO2:	Comprehend the internet technology, its protocols, and acquire skills in designing a web page through HTML.
CO3:	Realize the theoretical base on the protocols and cryptography involved in E-payments, and methodology involved in the use of e-payment tools.
CO4:	Critically examine the frauds and piracies involved in EC, including legal, privacy, ethical and IPR issues.
CO5:	Apply the EC technology in advertising, supply chain, marketing research, financial services, publishing, entertainment, retailing and stock market trading.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				2							
CO2	1				3							2
CO3	2				2							
CO4			2							2	2	
CO5					3			2				

3-High, 2- Medium, 1- Low.

M.Com (R) IV Semester

PAPER –404:**PROJECT REPORT & VIVA - VOCE**

(Project Work)

(With effect from the academic year 2021–22)

M.Com (R) IV Semester

PAPER –405(A) : **SECURITY MARKET OPERATIONS**

(Open Elective)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

1.Learn the basic concepts of Indian securities market.
2. Explore the areas of secondary markets in special reference to SEBI guidelines.
3. Exemplify about listing of securities in BSE and NSE.
4. Investigate into Indian stock exchanges.
5. Illustrate about stock market with special reference to BSE sensex and NSE indices.

UNIT – I Indian Securities Market: Concept– Functions – Intermediaries –Primary Market – Nature–Role of Primary Market–Problems of New Issues Market – IPOs –SEBI Guidelines for Primary Market– Recent Trends in Primary Market.(Theory only)

UNIT – II Secondary Market: Concept – Nature – Functions – Organization –Regulatory Framework for Stock Exchanges in India – SEBI Guidelines for Secondary Market–Recent Trends in Secondary Market.(Theory only)

UNIT– III Listing of Securities: Concept – Merits and Demerits of Listing – Listing Requirements–Listing of Rights Issue– Bonus Issue– Further Issue – Listing Conditions of BSE and NSE – Delisting.(Theory only)

UNIT – IV Indian Stock Exchanges: Concept–Functions–BSE –Different Trading Systems – Different Types of Settlements –NSE–Market Segments–NEAT System Operations–Market Types –DematSettlement.(Theory only)

UNIT – V Stock Market Indices: Concept – Purpose and Consideration in Developing Index – Methods – Market Indices in India – BSE SENSEX– NSE Indices – S &P CNX Nifty.(Theory only)

REFERENCEBOOKS

1. PunithahvathyPandian, Security Analysis and Portfolio Management, Vikas Publishing House Pvt. Ltd.
2. V. A. Avadhani, investment and securities Market in India, Himalaya Publishing House.
3. Prasanna Chandra, Security Analysis and portfolio management, Tata McGraw – Hill.
4. SanjeevAgarwal, A Guide to Indian Capital Market, Bharat Publishers.
5. Ravi Puliani and Mahesh Puliani, Manual of SEBI, Bharat Publication.

Course Outcomes (COs):

1. To advocate the learned knowledge in Indian securities market.
2. To explore the areas of secondary markets along with the SEBI guidelines.
3. To acquire adequate knowledge in listing of securities and their delisting.
4. To get to know about the concepts of Indian stock Exchanges.
5. To exemplify the concepts of stock market indices and CNX Nifty.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2							1	1	
CO2	3	3			2			1	3			3
CO3	2	2		3		3		1			2	
CO4			3		2		1		1			1
CO5	1			3		2		2		3		

3-High, 2- Medium, 1- Low.

M.Com (R) IV Semester

PAPER –405(B) : **BUSINESS ETHICS**

(Open Elective)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

1. Learn the basic concepts of business ethics.
2. Explore the important theories of ethics.
3. Exemplify about ethical decision making business.
4. Investigate into Globalisation and business ethics.
5. Illustrate about creating ethical organisations.

UNIT – I Business Ethics: Meaning, Principles of Business Ethics – Evolution and Development of Business Ethics – Importance and Need for Business Ethics – Significance of Business Ethics – Values and Ethics in Business – Code of Ethics. (Theory only)

UNIT – II Nature and some important Theories of Ethics – Sources of Business Ethics – Managing Ethics – Values, Ethics and Business Strategy – Ethical issues and Dilemmas in Business –Sources of Ethical Problems – Improving Ethics in Business – Theory of Ethical Egoism – Theory of Ethical Utilitarianism – Theory of Egalitarianism. (Theory only)

UNIT – III Ethical decision-making in Business – Ethical decision making with Cross-holder conflicts and competition – Applying Moral Philosophy to Ethical Decisionmaking – Factors influencing Ethical Decision making –A framework of Ethical Decisionmaking – Using the Ethical decision making framework to improve Ethical decisions.(Theory only)

UNIT – IV Globalisation and Business Ethics – History of Globalisation – Growth of Global Corporations – Factors facilitating Globalisation – Business Ethics in Global Economy – Ethical perceptions and International Business – Global Values – Role of Ethics in International Business. (Theory only)

UNIT – V Creating an Ethical Organisation – Human nature and unethical behaviour in organisations – Code of conduct –Code of Ethics vs. Code of Conduct –Ethics Committees – Ethics Communication Systems – Ethics Training Programming – Disciplinary system – System to monitor and enforce Ethical Standards.(Theory only)

REFERENCE BOOKS:

1. Business Ethics (Concepts, Application, Framework and cultural Impact), K. Aswathappa and Others, Himalaya Publishing House.
2. Business Ethics – A Case Perspective, O.C. Ferrell, John Fredrich and Linda Ferrell CengageLeachery.
3. Business Ethics – An Indian Perspective, A.C. Fernando, Pearson.
4. Business Ethics (Indian Edition), Andrew Crane Dirk Matten, Oxford University Press, New Delhi.
5. Essentials of Business Environment (Test, Cases &Exercises), K. Aswathappa, Himalaya Publishing House.

Course Outcomes:

1. Learning the basic concepts of business ethics.
2. Exploring the important theories of ethics.
3. Exemplifying about ethical decision making business.
4. Investigating into Globalisation and business ethics.
5. Illustrating about creating ethical organisations.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2							1	1	
CO2	3	3			2			1	3			3
CO3	2	2		3		3		1			2	
CO4			3		2		1		1			1
CO5	1			3		2		2		3		

3-High, 2- Medium, 1- Low.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF CM & CS

DEPARTMENT OF COMMERCE



Course

M.COM (ACCOUNTING & FINANCE)

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

Name of the Department : Dept. of Commerce

1. About the Department

The Department of Commerce was one of the oldest departments established during the academic year 1969-70 in SV University (Estd. 1954) to offer M.Com degree course under the aegis of Economics Department, S.V. University College of Arts and Sciences and subsequently it emerged as an independent entity during the year 1971, with Dr. O.R. Krishna Swamy as the founder member of the Department. Under the re-organized set-up during 2006, the Department became a part of the College of Commerce, Management and Information Sciences. For the new millennium, a new course i.e., MFM was started in the year 1999 under semester system. And M.Com (A&F) was started during the academic year 2005-06. Both M.Com and MFM courses were modified to incorporate Choice Based Credit System (CBCS) during the academic year 2006-07. The Department of Commerce is one of the biggest Departments in Sri Venkateswara University campus with a total strength of 320 students. To meet the overwhelming demand for accounting and finance professionals, the Department offers three courses viz., M.Com on Regular basis, M.Com (FM) and M.Com (A&F) on self-supporting basis besides PhD program. Currently, based on NEP guidelines syllabi is restructured to include core, generic electives, compulsory foundations, skill oriented course, mandatory project report, and open electives.

2. Vision, mission of the Department

VISION

"To promote accounting and finance professionals through a process of quality and value based education, consultancy, counselling, persistent skill development and infusion of human values for vibrant future".

MISSION

- To groom competent, confident, creative and committed professionals in the field of accounting and finance.
- To provide the students with inclusive facilities to cater to their industry learning, placement opportunities and social needs
- To make the students occupy good positions in academic and research institutions and consultancy organizations.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

After completion of the programme, the student would be able to

- PSO 1: Perceive the framework of OB, HRM, marketing, finance and other functional areas of management.
- PSO 2: Acquire knowledge in the field of financial management and get knowledge in different tools and techniques of FM.
- PSO 3: Examine critically the accounting standards and reporting so as to evolve an effective accounting and reporting system.
- PSO 4: Diagnose the different aspects relating to IFM, SAPM, financial engineering and investment management.
- PSO 5: Understand the value of marketing, sales promotion techniques and learn how to prepare financial statements on accounting inventory bases through tally accounting software and also acquire skills in becoming good entrepreneurs.
- PSO 6: Secure wisdom in the field of tax planning and management, personality development, e-commerce, international financial management, e-banking operations and obtain skills in the field of cost and management accounting for arriving at concrete decisions for prosperity of business.

PROGRAMME OBJECTIVES (POBs)

After successful completion of two year Post- Graduate Degree programme in Commerce, the student would be able to

- **POB1: (KB) Knowledge Based**

  Apply Knowledge in the functional areas of management and analyse the significance of commerce in modern times. To interpret the significance of Commerce in modern times and apply as acquired knowledge in the management functional areas.

- **POB2: (PA) Problem Analysis**

  Acquire knowledge about the concepts and postulates of accounting its branches, finance and HRM and trace out appropriate solutions to the compulsory problem.To be able to gain knowledge regarding the concepts of branches of accounting like HRM & Finance by finding out solutions to every problems.

- **POB3: (Inv) Investigation**

  Critically analyse the qualitative and quantitative data on contemporary issues in the field of accounting and finance. To study the contemporary issues in areas of Accounts and Finance based on qualitative and quantitative data.

- **POB4: (Des) Design**

  Obtain skills in designing and conducting survey during the course of Project work and impact knowledge. To impact knowledge by learning skills in project work through conduct of survey of design.

- **POB5: (Tools) Use of Tools**

  Learn about the application of different statistical tools and techniques so as to arrive at suitable decision in the business and its success. To take a decision by applying various statistical tools which is dependent on business success.

- **POB6: (Team) Individual team work**

  Discern knowledge about the group dynamics and team building so as to participate in community extension and outreach programmes. So as to gain and perceive knowledge

- **POB7: (Comm) Communication skills**

  Inculcate communication skills and learn interview participation techniques for acquire Proper placement. To develop skills required for placement like interview techniques and participation techniques.

- **POB8: (Prof) Professionalism**

  Demonstrate professionalism in undertaking independent research surveys and project works. To exhibit the professionalism in terms of project works and research surveys

- **POB9: (Impact) Impacts of course as society and environment**

Understand the emerging trends in the field of Accounting, Finance, Marketing and HRM and their impact on society and demonstrate the knowledge required for sustainable development of industry and service sector. To make students able to showcase the knowledge required for the sustainable development of industry and service sector in the emerging fields of Accounting, Finance, Marketing and HRM.

- **POB10: (Social) Social responsibility**

  To understand and have continual knowledge to assess societal legal and cultural issues and the consequent responsibility relevant to the accounting, finance, marketing and tax planning practices by applying the reasoning provided by them.

- **POB11: (Ethics) Ethics and Equities**

  To explore the morals and ethical values in various walks of life and professions through axiomatic wisdom.

- **POB12: (LLL) Life Long Learning**

  To apply learning skills and techniques obtained through theoretical, conceptual framework, computer practical and project field experiences to resolve contemporary issues.

PROGRAMME OUTCOMES (POs)

After successful completion of two year Post- Graduate Degree programme in Commerce, the student would be able to

- **PO1: (KB) Knowledge Based**
  Understand the emerging trends in accounting and finance and their impact on the economy.
- **PO2: (PA) Problem Analysis**
  Identify and analyse the field of functional areas of management, more particularly accounting and finance and explore suitable solutions to the problems.
- **PO3: (Inv) Investigation**
  Acquired managerial skills and investigate into complex areas of accounting, finance and service.
- **PO4: (Des) Design**
  Obtain skills in designing and conducting survey during the course of Project work and impact knowledge.
- **PO5: (Tools): Use of Tools**
  Learn about the application of different statistical tools and techniques so as to arrive at suitable decision in the business and its success.
- **PO6: (Team) Individual team work**
  Discern knowledge about the group dynamics and team building so as to participate in community extension and outreach programmes.
- **PO7: (Comm) Communication skills**
  Inculcate communication skills and learn interview participation techniques for acquire Proper placement.
- **PO8: (Prof) Professionalism**
  Demonstrate professionalism in undertaking independent research and project works in the areas of accounting and finance.
- **PO9: (Impact) Impacts of course on society and environment**
  Acquire knowledge on the current trends in accounting and financial system and their impact on the economy and society as well.
- **PO10: (Social) Social responsibility**
  Apply reasoning provided by the continual knowledge to assess societal legal and cultural issues and the consequent responsibility relevant to the accounting, finance, marketing and tax planning practices.
- **PO11: (Ethics) Ethics and Equities**
  Explore the axiomatic wisdom an ethics and equities in various walks of life and professions and learn who to thrive in the society with moral and ethical values.
- **PO12: (LLL) Life-long learning**
  Apply learning skills and techniques acquired through theory and practical computer and project field works to tackle the current issues in field of accounting and finance. Also perceive the new concepts like ABC, Financial engineering etc.,

PROGRAMME EDUCATIONAL OBJECTIVES (PEOBs)

- **PEOB 1:** To interpret the areas for placing business entity in the right perspective in the areas of importance of cost accounting and management accounting, finance, marketing, organizational behavior, managerial economics, quantitative techniques for business decisions along with the concepts of accounting.
- **PEOB 2:** To know the ideology for the changing socio-economic and political conditions in business environment and marketing and HR to design constructive strategies for better prospects of business.
- **PEOB 3:** To critically observe an effective accounting and reporting system so as to evolve with the accounting standards and reporting.
- **PEOB 4:** To establish the importance of human and professional ethics in human life and corporate life as well in organizational settings and involve in groups and teams with enthusiasm and also recognize the human behavior.
- **PEOB 5:** To comprehend and learn how to prepare financial statements on accounting inventory bases through tally accounting software and also acquire skills in becoming good entrepreneurs by analysing the value of marketing, sales promotion techniques.
- **PEOB 6:** To make judgments for arriving at concrete decisions for prosperity of business in the field of tax planning and management, personality development, e-commerce, international financial management, e-banking operations and obtain skills in the field of cost and management accounting.

SRI VENKATESWARA UNIVERSITY: TIRUPATI
SVU COLLEGE OF COMMERCE, MANAGEMENT AND COMPUTER SCIENCE

DEPARTMENT OF COMMERCE
(Revised Scheme of Instruction and Examination, Syllabus etc., under CBCS Regulations -2016 is Amended as per NEP-2020)
(With effect from the batch admitted in the academic year 2021-22)

MASTER OF COMMERCE – ACCOUNTING & FINANCE

SEMESTER- I

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (A&F) 101	Accounting Standards & Reporting	6	4	Core-Theory	20	80	100
2.	M.Com (A&F) 102	Organizational Behaviour	6	4		20	80	100
3.	M.Com (A&F) 103	Business Environment and Policy	6	4		20	80	100
4.	M.Com (A&F) 104	Managerial Economics	6	4		20	80	100
5.	M.Com (A&F) 105	A Corporate Governance B Research Methodology in Social Sciences C Banking and Insurance Services	6	4	*CF	20	80	100
6.	M.Com (A&F) 106	A Business Communication Skills B Principles of Management	6	4	*EF	20	80	100
Total			**36**	**24**		**120**	**480**	**600**
7.	M.Com (A&F) 107	Human Values and Professional Ethics - I	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core papers are Mandatory**
- ***Compulsory Foundation – choose one paper**
- ***Elective Foundation - Choose one paper**
- **Audit course- 100 Marks (Internal) –Zero Credits under Self Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra Credits**

SEMESTER- II

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (A&F) 201	Advanced cost Accounting	6	4	Core-Theory	20	80	100
2.	M.Com (A&F) 202	Financial Management	6	4		20	80	100
3.	M.Com (A&F) 203	Marketing Management	6	4		20	80	100
4.	M.Com (A&F) 204	Accounting Practices in Banks	6	4		20	80	100
5.	M.Com (A&F) 205	A Quantitative Techniques for Business Decisions B Legal Aspects of Business C Risk Management	6	4	CF	20	80	100
6.	M.Com (A&F) 206	A e-Banking Operations B Management Information Systems	6	4	EF	20	80	100
		Total	**36**	**24**	**Total**	**120**	**480**	**600**
7.	M.Com (A&F) 207	Human Values and Professional Ethics - II	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All CORE Papers are Mandatory**
- **Compulsory Foundation – Choose one paper**
- **Elective – Foundation – Choose one paper.**
- **Audit Course – 100 Marks (Internal) – Zero Credits under Self Study**
- **Interested students may register for MOOC with the approval of the concerned DDC. But, it will be considered for the award of the grade as open elective only giving extra credits.**
- **Students will be directed to collect field data from different industrial units during summer vacation forpreparation of project reports and viva–voce.**

SEMESTER- III

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (A&F) 301	Financial Derivatives	6	4	Core-Theory	20	80	100
2.	M.Com (A&F) 302	Financial Markets and Services	6	4		20	80	100
3.	M.Com (A&F) 303	A Tally with GST Applications	6	4	Generic Elective	20	80#	100
		B Accounting for Managerial Decisions						
		C Tax planning & Management	6	4		20	80	100
		D International Accounting & Reporting						
4.	M.Com (A&F) 304	Internal Audit and standard Audit Practices	6	4	*Skill Oriented	20	80	100
5.	M.Com (A&F) 305	A Fundamentals of Accounting	6	4	Open Elective	20	80	100
		B Personal Financial Planning						
Total			**36**	**24**		**120**	**480**	**600**

- **All CORE Papers are Mandatory**
- **Generic Elective – Choose two papers**
- ***Skill Oriented Course is Mandatory.**
- **Open electives are for the students of other departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**
- **#Regarding 303a: Tally with GST Applications of 80 marks, 60 marks for semester end examination and 20 marks for practical's for which the candidate has to submit the record.**

SEMESTER- IV

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (A&F) 401	Strategic Financial Management	6	4	Core-Theory	20	80	100
2.	M.Com (A&F) 402	Investment Management	6	4		20	80	100
3.	M.Com (A&F) 403	A International Financial Management	6	4	Generic Elective	20	80	100
		B Personality Development and Soft Skills						
		C Mergers & Acquisitions	6	4		20	80	100
		D GST and Customs Duty						
4.	M.Com (A&F) 404	Project Report & Viva–Voce	6	4	* PW	-	-	100**
5.	M.Com (A&F) 405	A Security Market Operations	6	4	Open Elective	20	80	100
		B Business Ethics						
Total			**36**	**24**		**120**	**480**	**600**

- **All CORE Papers are Mandatory**
- **Generic Elective – Choose two papers**
- ***Multi-Disciplinary course / Project Work is Mandatory**
- **Open electives are for the students of other departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**
- ****In IV semester, paper 404 – Project Report and Viva-voce, this consists of 100 marks (50 marks for project report and 50 marks for viva-voce).**

M.Com (A&F) I Semester

PAPER –101: ACCOUNTING STANDARDS AND REPORTING

(Core Paper)

(With Effect from the academic year2021–22)

Course Objectives

- To increase the knowledge of students on accounting principles and standards
- To enable the students to do inventory valuation
- To impart the ability to find out the cash flows
- To provide the skills to value goodwill
- To create awareness about IFRS and segment reporting

Unit –I Introduction: Accounts Concepts and Principles – GAAP (AS–1)–Branches of Accounting – Users of Accounting; Accounting Standards: Concepts – Types – Benefits – Accounting Standards in India –Indian Accounting Standards.(Theory only)

Unit – II Inventory Valuation: (AS–2) Concept – Need for inventory valuation – Inventory Valuation methods – Valuation of Inventory. (Theory and Problems)

Unit – III Cash flow statement (AS–3): Meaning and definitions – Scope – Objectives – Benefits – Classification of cash inflow and outflow–Presentation of cash flow statement – Methods – Disclosures.(Theory only)

Unit –IV Valuation of Goodwill (AS–26): Concept– Factors affecting goodwill – Types of goodwill – Need for valuation – Methods of good will Valuation – Average method– Super profit method – Annuity method. (Theory and Problems)

Unit – V Reporting: International Financial Reporting Standards (IFRS)–Concept–List of IFRS– Segment Reporting (AS–17)–Concept – Objectives – Purposes – Segment reporting(AS–17) – Advantages and disadvantages of segment reporting. (Theory only)

REFERENCE BOOKS:

1. JawaharLal; Accounting theory and Practice, Himalya Publishing House, New Delhi.
2. B. K .Banerjee, Financial Accounting – A dynamic approach Printice Hall India Pvt. Ltd., New Delhi
3. CA. Ravi KanthMiriyala; Accounting standards made easy, Bharat Law House Pvt. Ltd. New Delhi
4. NithinBalwani, Accounting and Finance for Manager, Excel Books, New Delhi.
5. http://en.wikipedia.org/wiki/IFRS

Course Outcomes

Upon completion of this course, students will be able to

CO1: Familiarize about principles of accounting, accounting and reporting standards
CO2: Acquire knowledge on methods of valuation of inventory and Goodwill
CO3: Understand the importance and flow of cash
CO4: Students acquires the skills of goodwill valuation.
CO5: Provide an idea about segment and interim reporting.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1					1	2			1
CO2	3	3			2			1		1		1
CO3	3		2	2	2	1						
CO4	3	3			2				1			
CO5	3		2				1	1				

3-High, 2- Medium, 1- Low.

M.Com (A&F) I Semester

PAPER –102: ORGANISATIONAL BEHAVIOUR

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Acquire knowledge on the conceptual frame work and emerging issues of OB
- Study different theories of personality and motivation
- Form a clear idea on group dynamics and inculcate the skills to become a leader
- Learn about Organizational structures and clear understanding of management of Interpernual conflicts.
- Obtain knowledge on Organization dynamics as to organization culture, organizational change and know the significance of OB today.

Unit – I Introduction: Organizational Behaviour (OB) – Definition – Nature and Scope –Foundations –OB Model – Importance – Limitations. (Theory only)

Unit – II Individual Behaviour: Foundations of individual behaviour – Personality – Theories of personality –Trait and social learning theories – Motivation– Theories of motivation – McGregor's theory X and theory Y, Maslow's Model and Herzberg's two – Factory theory.(Theory only)

Unit – III Group Dynamics: Foundations of group behaviour – Reasons for group formation – Types of groups – Leadership – Theories of leadership (trait theory; behaviour theories) – Behavioural model (Managerial grid) – Fiedler's contingency Theory.(Theory only)

Unit – IV Organizational Processes: Organizational Change – Causes – Types – OD Interventions – Organizational conflicts – Changing view of conflicts –Inter-personal conflicts – Transactional analysis – Johari window – Life positions. (Theory only)

Unit – V Organizational Dynamics: Organizational Culture – types – Individual behaviour in the global perspective – Cultural differences– Cross Culture – Cultural adjustment – Managerial responses – Emerging Issues in OB. (Theory only)

REFERENCE BOOKS:

1. Aswathappa K., Organizational Behavior: Text, Cases and Games, Himalaya Publishing House, Hyderabad.
2. Fred Luthans, Organizational Behaviour, Tata McGraw Hill Publishing House, New Delhi.
3. JitS.Chandan, Organization Behaviour, Vikas Publishing House, New Delhi.

4. John W. Newstrom and Keith Davis, Organizational Behaviour, Human Behaviour at work, Tata McGraw Hill Publishing House, New Delhi.
5. Kavita Singh, Organisational Behaviour: Text and Cases, Pearson, Delhi.

102 :ORGANISATIONAL BEHAVIOUR
CO1: Understand the framework for OB and its emerging issues
CO2: Diagnose the outcome of different theories of personality and motivation.
CO3: Acquire knowledge on group dynamics and learn skills that help him to become a leader.
CO4: Outline appropriate form of organisational structure and understand clearly better man agent of interpersonal conflicts.
CO5: Obtain wisdom as organisational dynamics as to organizational Culture, managing resistance to change. Also learn the concept of OB and its significance in modern times.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2								
CO2		3		3	3		2				3	3
CO3	3	3		3	2	3	3	3	2	2	2	1
CO4	3	3	3	3		1	1	2	2	1	1	3
CO5	3	2		2	1		2	2	2	1	1	3

3-High, 2- Medium, 1- Low.

M.Com (A&F) I Semester

PAPER –103: BUSINESS ENVIRONMENT AND POLICY

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Examine business environment, concept, nature and scope; scanning, monitoring, changing dimensions of business environment.
- Illustrates economic environment nature and scope and new economic policy.
- Develop political, legal environment; reasons for state intervention and government business interface.
- Study the socio cultural environment nature, impact of social responsibility and business ethics.
- Interpret global environment; benefits and problems of MNCs and WTO.

Unit – I Business Environment: Concept – Nature – Scope–Significance– Types of Environment– Internal and External Environment– Factors Influencing Business Environment– Techniques of Environmental Scanning and Monitoring –Emerging Dimensions of Business Environment. (Theory only)

Unit – II Economic Environment: Concept – Nature –Scope – Elements of Economic Environment – Economic System and Business Environment– Economic planning – Industrial policy – Fiscal policy– Monetary Policy–New economic policy. (Theory only)

Unit – III Political and Legal Environment: Concepts– Political institutions – Rationale and Extent of State Intervention – Reasons for State Intervention – Types of Intervention – Government Business Interface – Legal Environment– Changing Dimensions of Legal Environment. (Theory only)

Unit – IV Socio– Cultural Environment: Concept –Elements of Socio –Cultural Environment –Impact– Social Responsibility of Business – Business Ethics – Corporate Governance. (Theory only)

Unit – V Global Environment**:** Concept**–** Nature –Scope –Significance–Foreign Investment in India –Benefits and problems of MNCs – Strategies for Going Global –EXIM Policy–FEMA–Emerging Challenges of Global Business. (Theory only)

REFERENCE BOOKS

1. Francis Cherunilam, Business environment – Text and cases, Himalaya Publishing House.
2. K. Aswathappa, Essentials of Business environment, Himalaya Publishing House.
3. Pandey G.N. Environmental Management, Vikas publishing house.
4. Raj Agarwal, Business Environment, Excel publications.
5. Sundaram& Black. International Business Environment Text and cases, PHI.
6. Chari, S.N. International Business, Wiley India.

103 :BUSINESS ENVIRONMENT AND POLICY
CO1:Identify concept, nature, factors influencing and dimensions in business environment.
CO2: Impart knowledge on economic environment, foreign technology agreements, monitory and fiscal policies and new economic policy.
CO3: Understand the rationale for global environment, strategies for going global, WTO and the trading blocks.
CO4:Understand the socio cultural environment
CO5:Examine the rationale for global environment

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2	1		2		2	3			
CO2	2		1			1				3		2
CO3	1		2	2		3			2			3
CO4	3		3						1			
CO5	2		1	3				3				1

3-High, 2- Medium, 1- Low.

M.Com (A&F) I Semester

PAPER –104: MANAGERIAL ECONOMICS

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Integrate with managerial economics meaning, nature, scope, characteristics, uses and principles.
- Employ demand forecasting objectives and methods; forecasting demand for new product.
- Allocate cost analysis, cost concepts and cost control and reduction.
- Examine production analysis basic concept and types; factors of production and returns to scale.
- Categorize nature of profits, profit planning and marginal uses of break-even analysis

Unit- I INTRODUCTION: Meaning, nature and scope of Managerial Economics– Principles of managerial economics - Role and responsibilities ofmanagerial economist –PROFIT: Economic profit vs. accounting profit; Profit functions: Profit optimization and slope of profit; Techniques and methods of measuring profit; Profit planning: Objective and factors affecting profit planning - Policies and techniques of profit maximization. (Theory only)

Unit-II DEMAND ANALYSIS: Demand theory and analysis - Factors determining demand – Law of diminishing marginal utility - Indifference curve analysis – Elasticity of demand: Price elasticity – Income elasticity – Cross elasticity (including problems); Demand forecasting: Objectives,methods, and criteria for effective demand forecasting. (Theory only)

Unit-III COST ANALYSIS: Cost concepts and classification – Economies of scale – Short-run and Long-run cost functions –Cost control vs. cost reduction – Tools for cost control and cost reduction - Cost-Volume-Profit analysis (BEP – including problems) and its applications in cost of production. (Theory only)

Unit-IV PRODUCTION ANALYSIS: Meaning of production function - Law of variable proportions – Production with one variable input and production with two variable inputs - Law of diminishing marginal returns - Factors of production and returns to scale – Cobb-Douglas production function – Production iso-quant and iso-cost. (Theory only)

Unit-V MARKET STRUCTURE: Perfect competition: Price determination in short-run and long-run; Monopoly: Price determination in short-run and long-run; Monopsony: Price determination in short-run and long-run; Oligopoly: Price determination in short-run and long-run. (Theory only)

REFERENCE BOOKS:

1. Joel Dean. Managerial Economics, Pearson Education.
2. Varshiney&Maheswari, Managerial Economics, Sultan Chand & Co.
3. Mehta P.L., Managerial Economics, Sultan Chand & Co.
4. Dwivedi D.N., Managerial Economics, Himalaya Publishing House.
5. Trivedi M. L., Managerial Economics, McGraw Hill.

6. Mote, Paul & Gupta, Managerial Economics, McGraw Hill Ltd,

104 : MANAGERIAL ECONOMICS
CO1: Acquire managerial skills and responsibilities as a managerial economist.
CO2: Forecast the demand using opinion polling and statistical methods for existing and new products.
CO3: Analyze the cost output relationship and economies of scale for cost control and cost reduction.
CO4: Appraise the input and output relationship through law of variable proportions and Cobb-Douglas production function and formulate the policies on profit maximisation.
CO5: Assess nature of profits, different views and functions of profits.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3			1	3			1		
CO2			3	1	3							2
CO3		3			1				2			
CO4				2	2							3
CO5		2	2		1							3

3-High, 2- Medium, 1- Low.

M.Com (A&F) I Semester

PAPER – 105(A): CORPORATE GOVERNANCE

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives

- Obtain knowledge on CG Mechanism and emerging issues in CG
- Know the genesis of CG in China USA and UK and also the code of the best practices.
- Gain Knowledge on the historical backdrop of CG in India and the guild lines pronounced by
  various committees for effective practice in India.
- Discern knowledge on the composition of Board of Directors and Audit Committees and know the role of internal Auditors in India.
- Understand the CG standards and practices in India with focus on IT and futures of CG in India.

UNIT – I Corporate governance: Meaning – Need – Importance – Corporate Governance(CG) mechanism – CG Systems – Indian model of CG – CG and Value maximization – Issues in Corporate Governance.(Theory only)

UNIT – II Emergence of Corporate governance: Developments in USA and UK – Role of World Bank – OCED – McKinsey – Sarbanes –Oxley Act,2002 – World Committees on CG – The Cadbury Committee. The Hampel Committee – Principles of good CG and code of best practices. (Theory only)

UNIT –III Corporate Governance in India: Need and Importance – Historical perspective – Indian Committees and guidelines on CG – Naresh Chandra Committee – Narayana Murthy Committee – J.J Irani Committee – Kumara Mangalam Birla Committee – The CII initiatives – SEBI initiative – CG practice in India. (Theory only)

UNIT –IV Board of Directors and Audit Committee: Board of Directors and their role in CG – Composition of Board – CG issues relating to Board – Independent Directors – Clause 49 of listing agreement – Audit Committee: Duties and responsibilities of Auditors – Composition of Audit Committee – CG and internal auditors – Indian situation.(Theory only)

UNIT – V Corporate Governance Standards and practices in India: CG Standards – Methods for examining the quality and effectiveness of CG – CG standards in Indian context – CG in IT sector – Pioneers in good CG practices – Problems of CG in India – CG and Business Ethics – CG and Corporate social responsibility (CSR) – Future of CG in India.(Theory only)

REFERENCE BOOKS

1. Fernando A.C – Corporate Governance – principles, Policies and practices – Pearson Education.

2. Subash Chandra Das – Corporate Governance – Codes, Systems, Standards and Practices – PHI.
3. Kesho Prasad – Corporate Governance – PHI Learning – New Delhi–2009
4. Singh S – Corporate Governance – Global Concepts and Practices – Excel Books.
5. Donald H. Chew Jr. Staurt L Gillan – Corporate Governance at Crossroads – Tata McGraw Hill Co. Ltd.,

105 : CORPORATE GOVERNANCE
CO1: Assess the Corporate Governance (CG) mechanism and analyse the emerging issues in the arena of CG.
CO2: Trace out the emergence of CG in USA and UK and findings of Cadbury and Hospel committees and better understanding of code of best practices.
CO3: Grasp the historical backdrop of CG in India and perceive the guidelines pronounced by various committees on CG for its effective practice in India.
CO4: Know about the composition of Board of Directions and Audit Committees and visualise the current status of internal auditors in Indian context.
CO5: Exact knowledge on CG standards and practices in India with reference to IT sector and analyse the future of CG in India.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2						2	2	2	
CO2	3		3						2	2	2	
CO3	2		2	1	2				1	2	2	
CO4	3		2						2	2		
CO5	3								1			2

3-High, 2- Medium, 1- Low.

M.Com (A&F) I Semester

PAPER –105(B) : RESEARCH METHODOLOGY IN SOCIAL SCIENCES

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

1. To understand the concept of Research along with its significance.
2. To know the classification of research and approaches to it.
3. To interpret the methods and sources of data collection with special attention to questionnaire and schedule construction.
4. To cognize the meaning of sampling and characteristics of a good sample.
5. To get to know the meaning of interpretation and report writing.

UNIT – I Introduction: Meaning and concept of research – significance of research – Characteristics of research–objectives and motivation in research – Importance of research in Social sciences – limitations of research.(Theory only)

UNIT – II Research methodology and Research methods: Meaning – Research methods vs. Methodology – Classification of research–Pure research – Applied research – Explanatory research – Descriptive research– Historical research – Research Approaches.(Theory only)

UNIT – III Methods of data collection: Meaning and importance of data – Sources of data – Methods of collecting primary data and secondary data – Construction of schedule and questionnaire– Selection of appropriate method for data collection – Limitations of collecting primary and secondary data – Difference between schedule and questionnaire.(Theory only)

UNIT – IV Sampling: Meaning – Methods of sampling – Random and Non–Random sampling methods – Sampling errors – Census and sample survey – Significance of sampling – factors determining sampling – Criteria of selecting a sampling procedure – Characteristics of a good sample.(Theory only)

UNIT – V Interpretation and Report writing: Interpretation – Meaning – Techniques – Precautions – Report writing – Meaning –Types of reports – Steps in report writing – Precautions for writing research report – Footnotes and Bibliography – Ethical norms in research – Plagiarism.(Theory only)

REFERENCE BOOKS:

1. Krishna Swami, O.R. and Ranganatham, M. “Methodology of Research in Social Sciences”, Himalaya Publishing House, Mumbai.
2. Kothari, C.R.,“Research Methodology: Methods and Techniques”: New Age International Publishers, New Delhi.

3. Goode and Hatt: “Methods in Social Research”, New York: McGraw Hill.
4. Singh, Jaspal, “Introduction to Methods of Social Research”, New Delhi, Sterling Publishers Pvt., Ltd.,.
5. Murthy. C.,“Research methodology”, Vrinda Publishing Pvt., Ltd., New Delhi.

Course Outcomes:

1. Understand the concept of Research along with its significance.
2. Know the classification of research and approaches to it.
3. Interpret the methods and sources of data collection with special attention to questionnaire and schedule construction.
4. Cognize the meaning of sampling and characteristics of a good sample.
5. Get to know the meaning of interpretation and report writing.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (A&F) I Semester

Paper– 105(C): BANKING AND INSURANCE SERVICES

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

1. To understand Indian Financial System.
2. To know the functioning of Banks in India.
3. To interpret concept of risk and risk management.
4. To cognize concepts of life and non-life insurance.
5. To get to know the meaning of insurance and its pricing.

Unit – I Financial System – Structure of Indian Financial System – Financial Institutions – Role in the Economy – Introduction to Banking Business – Historical Perspective – Types of Bank – Structure of Indian Banking System – Recent Trends in Banking Sector. (Theory only)

Unit – II Commercial Banks – Structure – Functions – Types – Retail Banking – Rural Banking – Electronic Banking – NPAs – Mobile Banking – Merits and Demerits – Banking Sector Reforms – Regulatory Mechanism. (Theory only)

Unit – III Concept of Risk – Types – Risk Management – Methods of Handling Risks – Risk Management in Banks – Concept of Insurance – Essentials of Insurance Contract – Functions – Classification of Insurance – Current Trends in Insurance Sector. (Theory only)

Unit – IV Life Insurance and Non Life Insurance – Fire Insurance – Types – Marine Insurance – Nomination – Assignment – Paid Up Value – Surrender Value – Claim Settlement – Progress in Business. (Theory only)

Unit – V Insurance Pricing – Insurance Rating – Methods – Calculation of Premium – Legal Frame Work – IRDA – Salient Features – Regulations – Future Prospects for Indian Insurance Industry. (Theory only)

REFERENCE BOOKS:

1. Agarwal, O.P, Banking and Insurance, Himalaya Publishing House, New Delhi.
2. TyotsnaSethi and Niswan Bhatia, Elements of Banking and Insurance, Prentice Hall Of India (P) Ltd, New Delhi.
3. Kaninika Mishra, Fundamentals of Life Insurance – Theories and Application, PHI Learning Private. Ltd, Delhi.
4. Periasamy, P and Veeraselvam, M.,Risk and Insurance Management, Vijay Nicole Imprints Private Ltd, Noida.
5. Satya Pal Sharma, N.K, Anthony,R, Banking and Insurance, Himalaya Publishing House, New Delhi.

Course Outcomes:

1. Understanding Indian Financial System.
2. Knowing the functioning of Banks in India.

3. Interpreting concept of risk and risk management.
4. Cognizing concepts of life and non-life insurance.
5. Knowing the meaning of insurance and its pricing.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (A&F) I Semester

PAPER –106(A) : BUSINESS COMMUNICATION SKILLS

(Elective Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

COB1: To understand the basics of process, models and methods of communication.
COB2: To analyze various types of non-verbal communication skills.
COB3: To analyze various types of verbal communication skills.
COB4: To discuss the contents of various written communication tools.
COB5: To evaluate the protocols for cross-cultural communication across the globe.

Unit–I: INTRODUCTION:Concept– Objectives– Process of communication – Methods of communication: Oral, written, non–verbal, visual, audio–visual, signs, signals and symbols, silence;Types of communication: Personal, business, internal external, upward, downward, formal, informal, lateral, interactive, mass, and grapevine; Barriers to communication – Factors affecting communication – Essentials of effective communication. (Theory only)

Unit–II: NON–VERBAL COMMUNICATION:Meaningand **t**ypes of non–verbal communication– Body language, postures and gestures – Attire – Appearance – Handshake, personal space, timing, behavior, smile; Listening skills: Process and types of listening – Barriers to listening – Requirements for effective listening – Humor in communication – Leadership and communication. (Theory only)

Unit–III: VERBAL COMMUNICATION: Meetings: Role of chairperson – Conferences – Presentation skills – making presentations – Requirements for effective presentation; Speaking: Choosing a method of speaking – Analyzing the audience – Persuasive speaking; Report writing: Types of reports – Structure of reports – Individual, annual and committee reports – Essentials of good report writing. (Theory only)

Unit–IV: WRITTEN COMMUNICATION**:** Business letters: Essentials, Parts, and forms of business letters; Types of business letters: Tenders, quotations and orders – Circulars and memos – Office notes – Representations and suggestions – Reminders and follow up. (Theory only)

Unit–V: MEDIA AND MULTI–CULTURAL COMMUNICATION**:** Buildingbetter relations with media –Framework for managing relations with investors and governments – Impact of multicultural communication on business – Etic and emic approaches to culture – Overcoming cross–cultural communication problems – Cultural communication protocol in China, France, England, Switzerland, USA, and India. (Theory only)

REFERENCE BOOKS:

1. Penrose, Rasberry and Myers, “Business communication for managers”, Cengage Learning.
2. Disanza, “Business and professional communication”, Pearson Education.
3. CSG Krishnamacharyalu and L. Ramakrishna, “Business communications”, Himalaya Publishing House.
4. Krizan Merrier, Logan and Williams, “Effective Business Communication”, Cengage Learning.

5. Kelly Quintanilla and Shawn T Wahl, “Business and Professional communication”, Sage Publications.

COURSE OUTCOMES:

CO1: Understand the effective modes and methods of communication in a Business situation.
CO2: Make oneself confident to use body language and other non-verbal communication in gaining leadership.
CO3: Equip oneself strong in communicating verbally.
CO4: Equip with skills in written communication.
CO5: Build skills in managing relations with media and distinguish the protocols observed across the globe.

COs-POs mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2					2	3					
CO2	2					2	3					
CO3	1							2				2
CO4	2				3		2					
CO5	1		2			2	3					

3-High, 2- Medium, 1- Low.

M.Com (A&F) I Semester

PAPER –106(B) : PRINCIPLES OF MANAGEMENT

(Elective Foundation)

(With effect from the academic year 2021–22)

Course Objectives

1. To comprehend the concept of management, skills and its process.
2. To learn management as a process with its principles and functions.
3. To learn the modern management process, business process engineering and reconstruction.
4. To understand the concept of Management By Objective (MBO) and quality circles.
5. To be aware of functional, personnel, financial, production, marketing, strategic and human resource managements.

UNIT–I: Concept of Management – Definition – Nature of Management – Management Skills – The Management Process – Features of Management – Trends towards Managerial Revolution in India.(Theory only)

UNIT–II: Management as a process – Principles and functions of Management – Operative and Managerial functions – Planning – Organizing – Staffing – Directing – Communication – Leadership – Motivation – Co-ordination – Controlling.(Theory only)

UNIT – III: Modern Management Concepts – Business Plans – Purpose – Contents – Preparation of Plan – Business Process Re-engineering – Re-structuring – Relationship between Re-engineering and Re-structuring – Customer Relationship Management – Benefits of CRM.(Theory only)

UNIT – IV: Management by Objectives – Benefits of MBO – Setting of Objectives – Limitations of MBO – Making MBO Effective – Quality Circles.(Theory only)

UNIT–V: Functional Management – Personnel Management – Financial Management – Production Management - Marketing Management – Human Resource Management – Strategic Management – Social Responsibilities of a Modern Manager.(Theory only)

REFERENCES:

1. Govindarajan.M, Natarajan.S, Principles of Management, PHI Learning Pvt Ltd., Delhi, 2013.
2. Guptha.RS, Sharma.BD, Bhalla NS, Principles and Practices of Management, Kalyani Publishers, New Delhi, 2016.
3. Natarajan.K, Ganesan.KP, Principles of Management, Himalaya Publishing House, New Delhi, 2015.
4. Sherlekar.SA, Management, Himalaya Publishing House, New Delhi, 1997.

5. Thamos N Duening, John M Ivancevich, Management Principles and Guidelines, Atomic Dog Publishing, USA.

Course Outcomes:

1. Comprehending the concept of management, skills and its process.
2. Learning management as a process with its principles and functions.
3. Learning the modern management process, business process engineering and reconstruction.
4. Understanding the concept of Management By Objective (MBO) and quality circles.
5. Being aware of functional, personnel, financial, production, marketing, strategic and human resource managements.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (A&F) I Semester

PAPER -107: HUMAN VALUES AND PROFESSIONAL ETHICS – I

(Audit Course)

(With effect from the academic year 2021–22)

Course Objectives

COB1: To create awareness on basics of life and professions.

COB2: To make oneself capable to distinguish between subjective and objective values of society and individual.

COB3: To understand in depth the values and yams of life.

COB4: To understand the cultural values embedded in right from Bhagavad Gita till today's Gandhian philosophy.

COB5: To grasp prescription and proscription as stated in the scripts of Hinduism.

UNIT – I Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

UNIT – II Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral, concepts- right, ought, duty, obligation, justice responsibility and freedom, Good behavior and respect for elders.

UNIT – III Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha (Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).

UNIT – IV Bhagavad Gita- (a) Niskamakarma.(b) Buddhism- The Four Noble Truths – Arya astangamarga (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious, Tolerance, Gandhian Ethics.

UNIT – V Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study:

1. R. Subramanian, Professional Ethics, Oxford University press,New Delhi,2013.
2. John S Mackenjie: A manual of ethics.
3. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
4. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
5. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
6. Harold H. Titus: Ethics for Today
7. Maitra, S.K: Hindu Ethics
8. William Lilly : Introduction to Ethics
9. Sinha: A Manual of Ethics

10. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.

11. Susruta Samhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.

12. CarakaSamhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.

13. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

14. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company

106 : HUMAN VALUES AND PROFESSIONAL ETHICS – I
CO1: Understand the axiomatic wisdom on ethics in various walks of life and professions.
CO2: Distinguish between various subjective and objective values that kick start one's rational behavior.
CO3: Learn and assimilate the Hinduism's four values of Purusharthas and Patanjali's five Yamas of life.
CO4: Acculturate the values embedded in Indian religious right from Bhavad Gita to Gandhian Ethics.
CO5: To excavate various prescriptive punishments stated in ancient legal texts of Hinduism like Manusmriti and Yajnavalkyasmrithithat worked as weapons to eradicate criminalism.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								3			
CO2	2									3		
CO3			3						1			
CO4	2	3									2	
CO5			2							3		3

3-High, 2- Medium, 1- Low.

M.Com (A&F) II Semester

PAPER – 201: ADVANCED COST ACCOUNTING

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Obtain knowledge on the concept of cost accounting and know how it is different from financial and management accounting;
- Understand the features and objectives of process costing and calculation of process losses and Inter-process profits.
- Know the concept of equivalent production and accounting treatment for joint and by-products.
- Acquire knowledge on budgetary control and preparation of various functional budgets.
- Perceive the significance of ABC in cost ascertainment and control.

Unit– I	Introduction – Cost Accounting – Objectives – Scope – Advantages and limitations – Cost Accounting vs. Financial Accounting and Cost Accounting vs. Management Accounting – Concept of Cost – Cost Classification – Installation of Costing System. (Theory Only)
Unit– II	Process Costing: Features and objectives of process costing –Process Losses – Normal Loss– Abnormal Loss – Abnormal Gain – Treatment of Process Losses – Equivalent Production – Methods. (Theory and Problems)
Unit–III	Cost Control and Cost Reduction – Essentials for success of cost control – Advantages and Limitations – Differential Costing – Differences between Marginal Costing and Differential Costing – Characteristics and Significance of Differential Costing. (Theory and Problems)
Unit–IV	Budgetary Control: Concept of budget and budgetary control – Objectives – Benefits and limitations of budgetary control – Classification of Budget – Functional and Flexible budgets. (Theory and Problems)
Unit– V	Activity based costing: Concept – Meaning – Definition and characteristics ofABC – Different stages in ABC – ABC and cost drivers – Advantages ofImplementing ABC. (Theory and Problems)

REFERENCE BOOKS:

1. Jain S.P., AND K.L.Narang, Cost Accounting Principles and Practice Kalayani Publishers New Delhi.
2. Rathnam P.V., Rathanm S costing advanced problems and solutions, KitabMahal Distributors.
3. Maheswari S.N., Advanced problems and solutions in cost accounting, Sultan Chand & Sons
4. Bhar B.K., Cost accounting methods and problems, Academic Publishers, Kolkata.

5. Pillai R.S.N., and V.Bhagavathi: Cost Accounting, Sultan Chand and Co. Ltd, New Delhi.

201 : ADVANCED COST ACCOUNTING
CO1: Understand the concept of cost accounting and distinguish between cost accounting, financial accounting and management accounting.
CO2: Explicate process costing, features, objectives its features, and calculate process losses and inter process profits.
CO3: Analyse the concept of equivalent production and its calculation by applying different methods. Also diagnose accounting treatment by for products and joint products.
CO4: Perceive budget and budgetary control and prepare budgets in functional areas of Management.
CO5: Outline the uniqueness of ABC in the process of cost ascertainment and its control.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			2			2		2		1
CO2	2	1			2		2		2	1	1	3
CO3	1	3			3		1	1	3	2	2	
CO4	3	2		2	1		2	3				2
CO5	2	2		1	2		2		2		3	

3-High, 2- Medium, 1- Low.

M.Com (A&F)II Semester

PAPER – 202: FINANCIAL MANAGEMENT

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Describe meaning, functions and objectives; role of financial manager.
- Examine investment decision, capital budgeting, techniques of CB and methods of CB.
- Investigate management of working capital, needs and concepts.
- Asses financing decision, capital structure and capital theories.
- Design dividend decision and theories of dividend.

Unit – I Finance: Concept – Functions of Finance – Objectives of Financial Management – Profit Maximization Vs Wealth Maximization – Organization of Finance Function – Role of the Modern Financial Manager. (Theory only)

Unit– II Investment Decision: Capital Budgeting– Concept– Process – Techniques of Capital Budgeting – Traditional Methods – Payback Period (PB)– Average Rate of Return – Discounted Cash Flow Techniques – Net Present Value– Internal Rate of Return and Profitability Index.(Theory and Problems)

Unit–III Management of Working Capital: Concepts– Need for working capital– OperatingCycle– Estimation of working capital Requirements–Management of cash–Receivables and Inventory. (Theory and Problems)

Unit–IV Financing Decision: Capital Structure –Concept–Theories of capital structure – NI_– NOI– Traditional and MM Theories; Computation of Leverages– Operating Leverage– Financial Leverage and Combined Leverage; Cost of Capital –Concept–Computation of Specific cost of capital– Determination of weighted Average Cost of capital. (Theory and Problems)

Unit–V Dividend Decision: Types of Dividends– Factors Influencing the Dividend policy –Theories of Dividend – Walter– Gordon and MM Hypothesis (Theory only)

REFERENCE BOOKS:

1. Pandy, I.M: Financial Management – Vikas Publishing House, New Delhi.
2. SheebaKapil, Financial Management, Pearson Education ,New Delhi.
3. Jonathan Berk Peter DeMarzo, Financial Management, Pearson Education,2008.
4. Chandrabose, Fundamentals of, Financial Management – PHI, New Delhi.
5. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi.
6. Maheswari, S.N.:Financial Management, Sultan Chand and Sons, New Delhi.
7. Kulakarni. P.V., Financial Management Himalaya Publishing Houses Co Ltd, Mumbai.
8. Van Horne: Financial Management and Policy, Prentice Hall of India, New Delhi.
9. Prasanna Chandra, Financial Management Tata McGraw Hill, New Delhi
10. SheebaKapil, Financial Management Strategy, Implementation and Control, PragathiPrakasam Publication, Meerut.

202 : FINANCIAL MANAGEMENT
CO1: Examine the objectives of financial management using present value and future value concepts.
CO2: Evaluate opportunity of investment decision applying techniques of capital budgeting and estimate the working capital requirements of an enterprise.
CO3: Analyse financing decisions using theories of capital structure and weighted average cost of capital and estimate the degree of risk through leverage concept.
CO4: Assess the dividend distribution of a firm through important theories of dividend.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1						1				2
CO2		3			2	1					1	
CO3			2	1			2		3			
CO4			1		3							2
CO5				2			1	2				

3-High, 2- Medium, 1- Low.

M.Com (A&F) II Semester

PAPER –203: MARKETING MANAGEMENT

(Core Paper)

(With effect from the academic year 2021–22)

Course objectives (COBs):

COB1: To introduce to basics of market segmentation and consumer behavior.

COB2: To understand the metrics and components associated with Product and Price mix of 4Ps of marketing mix.

COB3: To instill knowledge and skills in advertising, sales promotion, personal selling, publicity and direct marketing of Promotion mix.

COB4: To lead the network of offline and online distribution networks of Place mix.

COB5: To acquire skills in conducting marketing research surveys, and others.

Unit – I INTRODUCTION**:** Concept of Marketing - Nature and scope- Evolution- Approaches to the study of marketing- Importance - Role of marketing in Indian economy- 4Ps of marketing; Marketing environment: Micro and macro; Market segmentation: Bases for market segmentation – Characteristics of effective segmentation;Factors affecting buying behaviour. (Theory only)

Unit – II PRODUCT MIX AND PRICE MIX**:** Product Mix**:** Classification of products -Product mix and productline decisions; New product development: - Stages of new product development; Product Life Cycle (PLC): Features, objectives, and strategies in different phases of PLC; Branding: Pros and cons of Single, multiple and private branding strategies; Packaging: advantages and strategies; Labelling; PRICING: Objectives -factors influencing pricing policy -Pricing policies and strategies. (Theory only)

Unit – III PROMOTION MIX**:** Process of marketing communications; Advertising: Pros and cons – Types – Criteria for selection of advertising agencies –Media selection –Measuring impact of advertising;Publicity: Objectives and tools – Advertising vs. publicity; Sales promotion: Objectives –Tools and techniques; Personal selling: Steps in personal selling – Salesmanship; Impact of promotion mix elements during different stages of PLC - E-CRM (Theory only)

Unit – IV PLACEMIX**:** Marketing Channels:Channel levels – Functions of distribution channels - Factors influencing channel selection - Vertical and horizontal integrations of channels - Causes of channel conflict; Functions of wholesaler and retailer- Trends in retailing- Formats of retail stores – E- marketing tools: SEO – Marketing analytics — Pay-per-Click marketing - Affiliate marketing – Social media marketing. (Theory only)

Unit – V Market Information system (MIS)**:** Components of MIS – Process of marketing research - Market research agencies in India - Marketing ethics – Indian laws affecting 4Ps of marketing. (Theory only)

REFERENCE BOOKS:

1. Philip Kotler, Principles of Marketing, Pearson Education.
2. Rama Swamy&Namakumari, Marketing Management, Sage Publications.
3. RajanSaxena, Marketing Management, McGraw Hill publications.

4. Dr.R.L.Varshney and Dr. S.L. Gupta, Marketing management Text and cases, Sulthan Chand & sons.
5. Arun Kumar, N. Meenakshi, Marketing Management, Vikas Publications.

203 : MARKETING MANAGEMENT
CO1: Chew the cud of the conceptual backdrop of marketing, acquire skills in segmenting any market, and understand the dynamics of consumer behavior.
CO2: Understand the tree structure of product mix, learn to develop a new product and strategies during its life cycle, brand and label and price it.
CO3: Acquire skills to design advertising, sales promotion techniques, and stepping into the shoes of sales executive and acquire a hold on selecting a media and agency for advertising.
CO4: Lead and coordinate the distribution network in offline and online marketing models.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			2		3			3				
CO2												
CO3					3			3				3
CO4		2				3					2	2
CO5				3	2							1

3-High, 2- Medium, 1- Low.

M.Com (A&F) II Semester

PAPER –204: ACCOUNTING PRACTICES IN BANKS

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives:

- To increase the knowledge of students on accounting principles and standards
- To provide knowledge about the financial statements and its analysis.
- To provide conceptual knowledge on the accounting practices in banks.
- To provide the skills to prepare bank reconciliation statement.
- To create abilities to prepare and present the final accounts of banking companies.

UNIT–I Accounting: Meaning–Nature–Scope–Functions –Need for Accounting in Banking–Accounting cycle–Accounting Concepts and Conventions–GAAP–Accounting standards in India.(Theory only)

UNIT–II Financial Statements–Meaning and types of financial statements Nature, and Limitations of financial statements–Analysis and interpretation of financial statements–Types of financial analysis–Tools of financial analysis–Ratio analysis–Analysis of Funds Flow and Cash Flow Statement. (Theory only)

UNIT–III Accounting in Banks–Rules for bank accounts, cash/clearing/transfer vouchers/system–subsidiary book and main day book–General Ledger–Branch Vs Bank Accounts–Bank Balance Sheet Structure of accounts–categories of Assets, Liabilities and Net worth Components. Accounting for Non–Performing of Assets–Preparation of Final Accounts–Final Accounts of Banking Companies–Disclosure requirements. (Theory only)

UNIT–IV Banking Company Accounts I – Bank Reconciliation Statement–Need–Reasons for differences between cash book and Pass Book Balance–Problems of Favourable and Overdraft Balance–Ascertainment of Correct Cash Book Balance.(Theory only)

UNIT–V Banking Company Accounts II – Important Provision concerning conduct of Banking Business in India–Bankers Books–Preparation and Presentation of Final Accounts of Banking Companies. (Theory only)

REFERENCE BOOK

1. Jain and Narang, Accounting Part–I, Kalyani Publishing, Ludhiana.
2. R.NarayanaSwamy, Financial Accounting, Prentice Hall of India.
3. Arunlanadam, Advances Accounting, Himalaya Publishing House.
4. Ashok Sehgal Deepak Sehgal: Advance Accounting–II, Corporate Accounting,Taxmain's Publications.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Acquires knowledge on the basic concepts, conventions and standards of accounting
CO2: Student able to understand the financial statements and apply tools to analysis
CO3: Gain knowledge about accounting process in banks and preparation of final accounts.
CO4: Acquires skills in preparation of Bank Reconciliation statement.
CO5: Able to apply accounting knowledge in preparation and presentation of final accounts of banking companies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1		2			1	1			1
CO2	3	3	2		3		1	1				
CO3	3	1	2		1		1	1				1
CO4	3	3	2		1			1	1			1
CO5	3	3	2		1		1	1				1

3-High, 2- Medium, 1- Low.

M.Com (A&F) II Semester

PAPER –205(A) : QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives

- Appreciate the use of quantitative techniques, methods of business forecasting and quantitative techniques in business decisions.
- Formulate F distribution and multiple co-relations co-efficient.
- Study probability and non-probability distributions.
- Formulate sampling theory, testing of hypothesis and type I and type II errors.
- Identify linear programming advantages and disadvantages; graphical and simplex method.

Unit– I Quantitative Techniques and Business Forecasting: Concept – Classification of Quantitative Techniques – Statistical Techniques – Programming or Operations Research Techniques –Role of Quantitative Techniques in Business and Industry – Quantitative Techniques and Business Management – Limitations of Quantitative Techniques – Methods of Business Forecasting. (Theory only)

Unit–II Probability and Probability Distributions: Basics of probability– Binomial – Poisson – Normal Distributions – Baye's Theorem. (Theory and problems)

Unit–III Sampling Theory: Concept – Types of Sampling – Hypothesis Testing–The NullHypothesis– The significance level – Hypothesis Testing Procedure – Type I and Type II errors – Inference from Small Sample Mean Tests – Difference Between the Means of Two Independent Samples – Difference Between the Means of Two Dependent Samples of Paired Observations 't–test' and χ^2 (Chi–Square) test and its applications. (Theory and problems)

Unit–IV Analysis of Variance (F–test): Concept – Assumptions –Testing Equality of PopulationMeans – One–way and Two–way Classifications. (Theory and Problems)

Unit–V Linear Programming: Concept – Requirements for application of Linear Programming– Assumptions–Advantages and limitations – Applications of Linear programming problem – Formulation of Linear Programming problem– Graphical Method–Simplex method. (Theory and problems)

REFERENCE BOOKS:

1. Gupta, S.P.Statistical Methods, S.Chand& Sons, New Delhi
2. Tulasian P.C., and Vishal Pandey, Quantitative Techniques – Theory and Problems Pearson Education New Delhi
3. Gupta and Khanna "Quantitative Techniques for Business Managers" PHI, New Delhi.
4. Andnda Sharma, Quantitative Techniques, Himalaya Publications, Hyderabad.

5. Kothari C.R… Quantitative Techniques Vikas Publications, Mumbai. Vikas Publications, Mumbai.

205: QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS
CO1:Identify the concepts Quantitative Techniques and business forecasting, quantitative approach to management as well as in business decision making.
CO2: Understand the test for equality of two population variances, analysis of variance and one way and two way classified data, basics and distributions of probability.
CO3: Demonstrate hypothesis testing, testing difference between the means of two independent/dependent samples chi-square test, requirements for application of linear programming, Formulation of linear programming problem and graphic and simplex methods of solving linear programming.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3			3		2					
CO2	3	3			3							
CO3	3	3			3		2					
CO4	3	3			3		3					
CO5	3	3	1	2	3							

3-High, 2- Medium, 1- Low.

M.Com (A&F) II Semester

PAPER – 205(B) : LEGAL ASPECTS OF BUSINESS

(Compulsory Foundation)

(With Effect from the academic year2021–22)

Course Objectives:

1. To understand companies act and its history.
2. To know the framework of companies like board of directors and auditors.
3. To interpret the Negotiable Instruments Act, 1881.
4. To cognize Competition Act, 2002.
5. To get to know the essence of cyberspace and cyber law.

Unit–I Companies Act–I: History of Companies Act–Meaning and Nature of a Company–Kinds of Companies–Formation and Incorporation of Company–Steps in Incorporation of a Company–Memorandum of Association–Article of Association–Prospectus. (Theory only)

Unit–II Companies Act–II: Board of Directors – Types of Directors – Appointment of Directors – Board Meetings – Duties and Liabilities of Directors – Removal of Director. Company Auditors – Appointment – Responsibilities of Company Auditor – Removal of Auditor. (Theory only)

Unit–III Negotiable Instruments Act, 1881: Meaning of Negotiable Instruments – Characteristics –Classification of Instruments – Different provisions relating to Negotiation, Negotiability, Assign ability – Rights and Obligation of parties – Presentation of Instruments – Rules of Compensation. (Theory only)

Unit–IV Competition Act, 2002: Introduction – Competition – Meaning – Objectives – Extent of Applicability – Competition of Commission of India – Areas affecting Competition – Duties, Powers and Functions of Commission – Penalties. (Theory only)

Unit–V Cyberspace and cyber Law: Introduction to cyber space and cyber law – Components of cyber law – Categories Cyber Law–Punishments–Components of cyber law – Internet governing bodies – International aspects of electronic contracting – Global issues of Privacy in cyber space. (Theory only)

REFERENCE BOOKS:

1. M.C. Kuchhal, Modern Indian Company Law, Mahavir Publications.
2. N.D. Kapoor, Elements of Company Law, Sultan Chand.
3. K.L. Maheshwari and R.K. Maheshwari, Company Law & Secretarial Practice, New Royal Company.
4. Bimal N. Patel, Banking Law and Negotiable Instrument Act, Eastern Book Company.
5. Universal Law Series, Negotiable Instrument Act, Lexis Nexis, Chennai.
6. NehaVyas, Competition Law, Eastern Book Company, Lucknow.
7. H.K. Saharay, Text Book on Competition Law, Universal Law Publishing.

8. Ramandeepkaurnagra, Cyber laws and Intellectual Property Rights, Kalyani Publishers, 7e.
9. Nina Godbole&SunitBelapure Cyber Security, Wiley India Pvt Ltd.

Course Outcomes:

1. Understanding companies act and its history.
2. Knowing the framework of companies like board of directors and auditors.
3. Interpreting the Negotiable Instruments Act, 1881.
4. Cognizing Competition Act, 2002.
5. Knowing the essence of cyberspace and cyber law.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (A&F) II Semester

Paper– 205(C): RISK MANAGEMENT

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

1. To learn the concept of risk management.
2. To enhance knowledge in risk management by individuals.
3. To cognize the Enterprise Risk Management and its process.
4. To understand the Risk Management Information System.
5. To learn in detail about advanced topics in risk management.

Unit – I Concept of Risk Management – Types – Objectives – Functions – Risk Management Process – Steps – Methods of Handling Risk – Risk Retention – Control. (Theory only)

Unit – II Risk Management by Individuals – Influencing Factors – Mitigating Individual Risks – Insurance – Objectives – Costs and Benefits. (Theory only)

Unit – III Enterprise Risk Management (ERM) – Process – Components – Risk Exposures – ERM Basics – COSO Frame Work for ERM – Emerging Role of CRO and ERM in Insurance – Tools and Techniques of ERM. (Theory only)

Unit – IV Risk Management Information System (RMIS) – Objectives and Functions – Emerging Trends – Risk Manager Tasks and Responsibilities – Risk Management Strategies – Benefits. (Theory only)

Unit – V Advanced Topics in Risk Management – Changing Scope of Risk Management – Financial Analysis in Risk Management – Decision Making – Management Tools – Loss Forecasting – Control Methods. (Theory only)

REFERENCE BOOKS:

1. Arunajatesam.S, Risk Management Insurance, Macnillan publishers India Ltd.
2. Bhattacharya. K.M, Risk Management in Indian Banks, Himalaya Publishing House.
3. George, E. Rejda, Principles of Risk Management and Insurance, Pearson Education.
4. Gupta, P. K, Insurance and Risk Management, Himalaya Publishing House.
5. Harrington. E, Risk Management and Insurance, Tata McGraw Hill Publishing Company Limited.

Course Outcomes:

1. Learning the concept of risk management.
2. Enhancing knowledge in risk management by individuals.
3. Cognize the Enterprise Risk Management and its process.
4. Understanding the Risk Management Information System.
5. Learning in detail about advanced topics in risk management.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (A&F) II Semester

PAPER –206(A) : E–BANKING OPERATIONS

(Elective Foundation)

(With effect from the academic year 2021–22)

Course objectives (COBs):

- To understand the RBI's financial norms to be followed by commercial banks.
- To investigate into the roles of various commercials banks in India.
- To analyze the mechanism of offline and online borrowing and lending of funds.
- Familiarize with merits and demerits o e-banking applications.
- Categorize the financial frauds in e-banking sector.

UNIT – I: IndianBanking: Definition– Functions – Pubic vs. private sector banks; Banks vs. NBFCs – Foreign banks – Regional Rural Banks – State Co–operative Banks – District Central Co–operative Banks – Urban Co–operative Banks.(Theory only)

UNIT –II: Banking services: Accepting of Deposits – Lending of funds – Retail banking – Merchant banking – Factoring services – Investment banking –Mutual fund services – Bill discounting – Issue of Letter of Credit (LC).(Theory only)

UNIT – III E–banking: Concept – NPCI – UPI – Debit Cards – Credit cards – RTGS vs. NEFT – Electronic Clearing System – Telephone Banking – Pros and cons of E–banking – Challenges in E–Banking.(Theory only)

UNIT–IV Payment systems: Pre–paid (PP) cards – Open and closed Pre–Paid cards – Post–paid credit cards – Steps in credit card processing – Requirement metrics of an effective e–payment system.(Theory only)

UNIT–V E–banking frauds: Electronic Clearing Services – Frauds in E–banking operations – The security measures taken by banks.(Theory only)

REFERENCE BOOKS:

1. Ravindra Kumar, Deshpande, E–Banking, Pacific Books International.
2. Indian Institute of Banking, Digital Banking, Mumbai.
3. The Banker, Mumbai (Journal)

Course Outcomes:

CO1: Familiarize oneself with safety, liquidity, profitability and productivity norms of banks as prescribed by RBI.
CO2: Acquaint oneself with the role of RRBs, SCBs, DCCBs, and UCBs in India.
CO3: Analyze the mechanisms involved borrowing and lending of funds, and e-banking operations.
CO4: Equip oneself with pros and cons involved in application of various modes of e-banking.
CO5: Investigate into frauds encountered and security measures taken in e-clearing services in banking sector.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				3			2				
CO2	2		3									
CO3	1		2		3							
CO4						2		2				
CO5			3						3		3	

3-High, 2- Medium, 3- Low.

M.Com (A&F) II Semester

PAPER – 206(B): MANAGEMENT INFORMATION SYSTEMS

(Elective Foundation)

(With effect from the academic year 2021–22)

Course objectives (COBs):

COB1: To understand the RBI's financial norms to be followed by commercial banks.
COB2: To investigate into the roles of various commercials banks in India.
COB3: To analyze the mechanism of offline and online borrowing and lending of funds.
COB4: Familiarize with merits and demerits o e-banking applications.
COB5: Categorize the financial frauds in e-banking sector.

Unit-I: Introduction:Concepts of Management Information System(MIS)-Classification and their implications – Business intelligence – Database models – Database design – RDBMS and MIS; Data processing: Transaction processing – Application processing – Information system processing; Role of MIS:In management and organization effectiveness, and strategic business planning. (Theory only)

Unit-II**:** Systems Engineering (SE) **:**Types and classes of system – General model of SE – Need for system analysis – Analysis of existing and new system - System development model – Structured System Analysis and Design (SAD) – Object-oriented Analysis (OOA) – System Development through Object Oriented Technology (OOT) – Object Oriented Analysis and Design(OOAD) – Systems Development Life Cycle (SDLC). (Theory only)

Unit-III: Design of MIS and Business Process Reengineering (BPR)**:** Planning of MIS – Determining information requirements – Organization, development and implementation of MIS – Development process of MIS – Need for design of MIS – Process of design of MIS – Strategic management and MIS – Process and value stream models of business – Reasons for delay in business process – MIS and Business Process Reengineering. (Theory only)

Unit-IV: Applications of MIS:Human Resource information system – Financial information system – Production information system – Marketing information system – Material Management Information system – Services information system. (Theory only)

Unit-V: Decision Support System (DSS) and ERP: Decision Support Systems and Group Decision Support Systems – Applications of DSS – Knowledge Management System – Benefits of MIS and DSS – Enterprise Resource Planning (ERP) – ERP modules – Benefits of ERP - ERP evaluation and implementation. (Theory only)

REFERENCE BOOKS:

1. Kenneth C. Laudon and Jane P. Laudon: Management Information Systems, PHI andPearson Education.
2. Rainer, Turban, Potter:Introduction to Information Systems, WILEY-India.

3. James A. Obrein: Management Information Systems, Tata McGraw Hill.
4. Dharminder and Sangeetha: Management Information Systems, Excel books.
5. Alexis Leon: ERP (Demystified), Tata McGraw Hill.

Course Outcomes (COs)

CO1: Familiarize oneself with safety, liquidity, profitability and productivity norms of banks as prescribed by RBI.
CO2: Acquaint oneself with the role of RRBs, SCBs, DCCBs, and UCBs in India.
CO3: Analyze the mechanisms involved in borrowing and lending of funds, and e-banking operations.
CO4: Equip oneself with pros and cons involved in application of various modes of e-banking.
CO5: Investigate into frauds encountered and security measures taken in e-clearing services in banking sector.

COs-POs mapping

POs/COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				3			2				
CO2	2		3									
CO3	1		2		3							
CO4						2		2				
CO5			3						3		3	

3- High, 2- Medium, 1- Low.

M.Com (A&F) I Semester

PAPER -207: HUMAN VALUES AND PROFESSIONAL ETHICS – II

(Audit Course)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

COB1: To understand the application of value education.
COB2: To create awareness on codes of ethics in healthcare profession.
COB3: To apply the business ethics in management.
COB4: To analyze the ethical issues involved in the protection of environment.
COB5: To understand framework of legal protection on various social menaces.

UNIT – I Value Education- Definition - relevance to present day - Concept of Human Values - self introspection -Self esteem. Family values-Components,structure and responsibilities of family- Neutralization of anger – AdjustabilityThreats of family life -Status of women in family and society - Caring forneedy and elderly Time allotment for sharing ideas and concerns.

UNIT – II Medical ethics- Views of Charaka, Sushruta and Hippocratus on moralresponsibility of medicalpractitioners. Code of ethics for medical and healthcare.Euthanasia, Ethical obligation to animals, Ethical issues in relation to healthCare professionalsprofessionals and patients. Social justice in health care, by human cloning, problems of abortion. Ethical issues in genetic engineering Ethical issues raised new biological technology or knowledge.

UNIT – III Business ethics- Ethical standards of business-Immoral and illegal practicesand their solutions.Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

UNIT – IV Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pestcontrol, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

UNIT – V Social ethics- Organ trade, Human trafficking, Human rights violation and socialdisparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media-Impact of Newspapers, Television,Movies and Internet.

BOOKS FOR STUDY:

1. R. Subramanian, Professional Ethics, Oxford University press,New Delhi,2013.
2. John S Mackenjie: A manual of ethics.
3. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
4. “Management Ethics-integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
5. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
6. Harold H. Titus: Ethics for Today
7. Maitra, S.K: Hindu Ethics
8. William Lilly : Introduction to Ethics
9. Sinha: A Manual of Ethics

10. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haug

206 : HUMAN VALUES AND PROFESSIONAL ETHICS – II
CO1: Assimilate the relevance of value education in promoting human values, knowing oneself, familial values, respect for women, and caring for needy and elderly.
CO2: Embrace the awareness on prescribed code of ethics and social justice in healthcare profession including cloning, abortion and genetic engineering.
CO3: Acquire integrated knowledge on business ethics across the functional areas of management.
CO4: Envision the environmental ethics to protect the earth, climate, and human being.
CO5: Acquaint oneself with laws on social menaces including organ trade, girl trafficking, surrogacy, and ethics of media triumvirate.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									3	3		
CO2									2	3	2	
CO3		2									3	
CO4									1	2	3	
CO5	3						2					

3-High, 2- Medium, 1- Low.

M.Com (A&F) III Semester

PAPER – 301: FINANCIAL DERIVATIVES

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Outline financial derivatives concepts, features and types; traders in financial derivatives markets.
- Identify forwards and future contracts concepts, types, uses and functions.
- Prioritise options in financial derivatives and option pricing models.
- Compose swap market futures, types and interest rate; pricing swaps.
- Synthesize stock index futures, options and trading of stock futures and options.

Unit–I Financial Derivatives–Concept–Features– Types – Uses– Traders in Financial Derivatives Market–IndianFinancial Derivatives Market – Emerging Trends. (Theory Only)

Unit–II Forwards and Futures Contracts: Concepts– Functions – Advantages and Disadvantages –Forwards vs. Futures –Determination of Forwards and Futures Prices.(Theory and Problems)

Unit–III Options: Concept–Types of options – Difference between Options and Futures–Option Hedging Strategies –Option Pricing Models– Binomial Option Pricing Model– One step and Two Step Models–Black – ScholesOption Pricing Model. (Theory and Problems)

Unit–IV Swap Market – Concept –Features of Swap –Advantages and Disadvantages of Swaps Types of Swaps – Interest Rate Swap –Currency Swap –Equity Swaps –Pricing of Swaps. (Theory only)

Unit –V Stock Index Features– Concept –Common Features– Portfolio Management and StockIndex Features– Speculation and Stock Index Features –Trading of Stock Index Features.(Theory and Problems)

REFERENCE BOOKS:

1. Pandey , I.M., Financial Management, Vikas Publications , New Delhi.
2. Gupta, S.L., Financial Derivatives, PHI Learning Pvt. Ltd, New Delhi.
3. Bhalla, V.K.Investment Management
4. John C.Hulll Derivatives. PHI Publisher Ltd, New Delhi
5. John C. Hull, Introduction to Future and Options Market. PHI Publisher Ltd, New Delhi,
6. Kumar, S.S.S., Financial Derivatives, Prentice Hall of India Pvt., Ltd New Delhi.
7. Bargi's., Futures and Options, McGraw Hill Publishing House Ltd, New Delhi.

301 : FINANCIAL DERIVATIVES
CO1: Explore the trends in Indian financial derivatives market and use futures and forwards to hedge the risk to make profit.

CO2: Use option trading strategies to hedge the risk and determine the option price applying relevant models.
CO3: Apply different types of swap contracts to manage risk and gain profits.
CO4: Acquire trading skills for stock index features and options in financial derivatives market.
CO5: Compose stock index features and trading of stock index options.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1			2			1				
CO2	3	2	1	1	1			1				
CO3	3	2	1	1	2			2				
CO4	3	2	2	1	2			1				
CO5	2	1	1	1				1				

3-High, 2- Medium, 1- Low.

M.Com (A&F) – III Semester

PAPER –302: FINANCIAL MARKETS AND SERVICES

(Core Paper)

(With effect from the academic year 2021–22)

Course objectives (COBs):

COB1: To understand the framework of Indian financial system and money market.

COB2: To evaluate the metrics of primary market and secondary capital market.

COB3: To demonstrate the role of merchant bankers.

COB4: To analyze the metrics involved in credit rating the financial instruments issued by companies in primary market.

COB5: To create plans and understand the metrics for getting finance from venture capital firms.

UNIT–I FINANCIAL SYSTEM AND MONEY MARKET: Indian Financial system: Evolution – Structure – Functions – Components; Role in the Indian economic development; Financial Sector reforms: MONEY MARKET: Significance– Instruments of money market including Call money, Commercial bills, Commercial papers, Certificates of deposits, Repo and reverse repo, MMMFs, Money market derivatives and Primary dealers. (Theory only)

UNIT–II CAPITAL MARKET AND SEBI:Structure, participants and instruments of CAPITAL MARKET; Primary market: Functions –Methods of floating new issues –Intermediaries including merchant bankers, underwriters, bankers, brokers and registrars to the issue, debenture trustees, and portfolio managers; Secondary market: Listing and online trading of securities – Categories of shares – Primary market vs. secondary market – CDSL and NSDL; SEBI: Functions– Powers. (Theory only)

UNIT–III MERCHANT BANKING: Concept –Origin and evolution – Scope – Functions – Commercial banking Vs merchant banking; SEBI Regulations on pre–issue and post– Issue obligations of merchant banker. (Theory only)

UNIT–IV CREDIT RATING AND FACTORING: CREDIT RATING: Significance – Features – Process of credit rating – Advantages and drawbacks of credit rating; Rating methodology of CRISIL, CARE, ICRA, FITCH; SEBI regulations on credit rating;FACTORING:Mechanism – Functions – Types; Factoring Vs bills discounting – Legal aspects of factoring agreement (Theory only).

UNIT–V VENTURE CAPITAL FINANCING AND MUTUAL FUNDS: Features – Stages of venture capital financing (VCF) – Financial analysis – Investment nurturing and its types – Exit route –Management buy–ins and management buy–outs – Mezzanine finance – VCF scenario in India – SEBI Regulations on VCF; MUTUAL FUNDS: Concept – Classification of MFs– Organization and management –MF evaluation – SEBI Guidelines on MFs (Theory only).

REFERENCE BOOKS:

1. Gordon, E., and Nataraja, K., Financial Markets and Service, Himalaya Publications.

2. Guruswamy S, Merchant banking and financial services, McGrawHill Publications.
3. Khan, M.Y., Financial Services, Tata McGraw Hill Publications.
4. Machiraju, H.R., Merchant Banking, New Age Interrnational Publishers.
5. Gupta, S.K., and NishaAggarwal, Financial Services, Kalyani Publishers.

302: FINANCIAL MARKETS AND SERVICES
CO1: Examine the components of the Indian financial system and reforms in it with a detailed review on money market components.
CO2: Have an in-depth analysis of capital market including primary and secondary market and powers of SEBI regulating this market.
CO3: Familiarize oneself with functions of merchant bankers and their obligations to SEBI.
CO4: Demonstrate the methodology involved in rating the financial instruments by credit rating organizations and in mapping factoring mechanism.
CO5: Explore the possibility of getting venture capital finance during different stages of business within the framework of SEBI regulations and to familiarize with mutual funds.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2									
CO2	1		2					2				
CO3										3		
CO4				3	2							
CO5		1						3				

3-High, 2- Medium, 1- Low.

M.Com (A&F) III Semester

PAPER – 303(A): TALLY WITH GST APPLICATIONS

(Generic Elective)

(With effect from the academic year 2021–22)

Course objectives (COBs):

COB1: To acquaint oneself with skills to prepare financial statements through Tally ERP.
COB2: To understand basics of GST system.
COB3: To know steps involved in generating GSTR reports.
COB4: To know the metrics in calculation and generation of TDS and service tax reports.
COB5: To acquire skills to create payroll receipts.

Unit–I Features of Tally accounting – Components of Gateway of Tally and button panel – Purposes and components of F11 And F12 – Creation and setting up of a company – Accounting Masters: Creation, alteration and deletion of single and multiple groups – Creation, alteration of single and multiple ledgers – Recording transactions in accounting vouchers: Creation and alteration of vouchers – Display and print of financial statements (Theory and lab).

Unit–II Inventory: Configuration – Inventory Masters: Creation, display and alteration of stock groups, stock categories, godowns, units of measure, stock items – Recording transactions: Creation of inventory vouchers – Display and print of inventory reports (Theory and lab).

Unit – III GST: Enabling GST features in Tally (Configuration) – Basics of GST – Rates of GST – Configure GST details of your company – Creating Party Ledgers & Tax Ledgers – Setting up of SGST, CGST, IGST rates for input and output – Creation of vouchers – Recording intra and inter–state vouchers with GST tax ledgers; Types of invoice under GST: Tax invoice vs. Bill of supply; Contents of tax invoice – Display and print of GST reports (Theory and lab).

Unit–IV TDS: Configuration –Company creation – Creation of ledgers and vouchers – Recording advance and balance payments of Tax – Generation of TDS reports (Theory and lab).

Unit–V Payroll: Configuration – Payroll features – Enabling payroll details – Creation of payroll masters– Creating the Pay Head ledgers – Creating the employee details and salary details of an individual – Creating details of Attendance types; List of Payroll Voucher types: Pay roll voucher and attendance voucher;Recording Attendance and Payroll voucher entries – Display and print of various payroll reports (Theory and lab).

REFERENCE BOOKS:

1. Nadhani, A.K. and Nadhani, K.K. Implementing Tally BPB Publication.
2. Kiran Kumar, K. Tally, Laasya Publishers, Hyderabad
3. NeerajGoyal, RohitSachdeva, Tally with GST Applications, Kalyani Publishers.
4. Vishnu Priya Singh, Tally, Computech Publications Ltd, New Delhi.

5. www.Tallyeducation.com

303: COMPUTER APPLICATIONS IN BUSINESS
Co1: Acquire skills in preparing company financial statements on accounting and inventory bases through Tally accounting software.
CO2: Have a bird's eye view on GST system including methodology in evaluating time, place and value of supply of goods and services, and input tax credit mechanism.
CO3: Be skillful in recording interstate and intrastate supply and return of goods and in generating various GSTR reports.
CO4: Equip oneself with skills in recording payments and generation of TDS and service tax reports.
CO5: Demonstrate the practical knowledge on creating and printing of various payroll receipts.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2									2
CO2	3							2				
CO3					2			3				
CO4					2			2				
CO5					2			2				

3-High, 2- Medium, 1- Low.

M.Com (A&F) III Semester

PAPER –303(B): ACCOUNTING FOR MANAGERIAL DECISIONS

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives:

- Learn the concept of management accounting, cost analysis for pricing decision and different methods of pricing
- Understand different managerial decisions influencing short and long-term financing
- Study the concept of Responsibility Accounting and its uses and trends.
- Know the essential parameters for evaluation of divisional performance and the emerging issues today
- Obtain comprehensive knowledge on management reporting and reporting practices of Indian corporates.

Unit – I Managerial accounting – Functions –Limitations– Pricing Decisions – Objectives – Factors influencing Pricing decisions –Cost analysis for pricing decisions – Product pricing methods – Full cost pricing – Mark–up pricing – Break–even pricing – Target pricing . (Theory and Problems)

Unit – II Managerial decisions – Cost behaviour – Determination of sales mix – Exploring new markets – Discontinuance of a product line – Make or buy decisions – Equipment Replacement Decision – Shut down or continue (Theory and Problems)

Unit – III Responsibility Accounting (RA) – Concept – Process of implementing RA – Managerial uses– Responsibility centres – Cost centre – Revenue Centre – Profit centre – Investment Centre – Responsibility performance reporting – Objectives (Theory and Problems)

Unit – IV Divisional performance and transfer pricing –Evaluation of divisional performance – Contribution margin approach – Return on investment approach – Residual income approach – Transfer pricing – Methods of transfer pricing (Theory and Problems)

Unit – V Management Reporting – Concept – Modes of reporting – Types of reports – Requisites of a good report – Management Reporting System – Forms of management reports – Reporting practices in Indian corporates (Theory only)

REFERENCE BOOKS:

1. Charles T. Horngren, G.L. Sundem and W.O. Stratoon, Introduction to Management Accounting, Pearson, Delhi.
2. Jawaharala, Management Accounting, Himalaya Publishers, Mumbai.
3. Kulshrestha, N.K., Management Accounting, Tata McGraw Hill, New Delhi.
4. Khan.M.Y, Jain.P.K, Management Accounting(7th edition), McGraw Hill, New Delhi, 2018.
5. Maheswari, S.N., Principles of Management Accounting, Sultan Chand & Sons, New Delhi.

6. PrashantaAtma, Cost and management Accounting, Himalaya Publishing House, Hyderabad.
7. Robert S. Kaplan and Anthony A. Atkinso, Advanced management Accounting, Prentice hall, New Delhi.
8. Sahaf M.A., Management Accounting Principles and Practice, Vikas Publishing House, Mumbai.
9. Sharma R.K and Gupta, S.K., Management Accounting, Kalyani Publishers, Ludhiana.

Course Outcomes

Upon completion of this course, students will be able to

CO1:	Understand the concept of Managerial Accounting, cost analysis for pricing decisions and also learn different product pricing methods
CO2:	Know the significance of different managerial decisions affecting the short term and long term financing .
CO3:	Analyse the concept of RA, managerial utility of different responsibility centres and acquaintance with the emerging trends issues in RA.
CO4:	Familiarise the evaluation of divisional performance parameters and describe the emerging issues in TP
CO5:	Elucidate the concept of management reporting and have awareness about reporting practices adopted by Indian corporate.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	3	2	1		1			1				
CO2	3	1	2		2			1				
CO3	3	1	1		1			3				
CO4	3	1		1			1	1				
CO5	3	2	1		1							

3-High, 2- Medium, 1- Low.

M.Com (A&F) III Semester

PAPER –303(C): TAX PLANNING AND MANAGEMENT

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives

- To comprehend the basic knowledge about tax concepts and planning.
- To provide knowledge on sources of income under different heads
- To acquire the knowledge on tax planning with regard to location
- To provide the skills of tax planning regard to managerial decisions.
- To create awareness about tax incentive of exports.

UNIT– I Income Tax Law: Evolution of Taxation Law – Basic Concepts – Residential status – Tax Planning and management: Concepts – Tax avoidance – Tax evasion.(Theory only)

UNIT –II Tax Planning – Individuals: Heads of Income for Individuals – Income from Salary – Income from business and profession – Tax relief – Concession – Rebates – Deductions and Incentives.(Theory and problems)

UNIT –III Corporate Tax Planning–I: Tax Planning with references to new establishment – Location –Form – Nature and Capital structure – Short term loans – Term loans – Public deposits – Bonus Issues – Dividend Policies.(Theory and problems)

UNIT – IV Corporate Tax planning–II: Managerial decisions – Tax planning in respect of owned funds or borrowed capital – Lease Vs Purchase – Purchase by instalmentsvs.hire – Make or buy decisions.(Theory only)

UNIT– V Tax Planning – Incentives and Export Promotion: Schemes for encouraging exports – Import duty relief schemes – Free Trade Zones (FTZs) – Special Economic Zones (SEZs) – Export Processing Zones (EPZs) – Salient features of Software Technology Parks (STPs) – Electronic Hardware Technology Parks (EHTPs) – Export Promotion schemes under EXIM Policy. (Theory only)

REFERENCE BOOKS:

1. Ahuja G.K. and Ravi Gupta: Systematic Approach to Income Tax and Central Sales Tax, Bharat Law House, New Delhi.
2. Circulars issued by C.B.D.T
3. Income Tax Act, 1961
4. Income Tax Rules, 1962
5. Lakhotia R.N: Corporate Tax Planning, Vision Publications , Delhi,
6. Singhania, V.K.Direct Taxes: Law and Practice, Taxman’s Publications Delhi.
7. Singhania, V. K: Direct Taxes Planning and Management, Taxman’s Publications Delhi.
8. Melhotra, MC and Goyal, S.P: Income Tax Law and Accounts including tax planning, SahityaBhavan Publication, Agra.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Understand the concept of entrepreneurs and entrepreneurship
CO2: Provide an idea about entrepreneur and skills of entrepreneur
CO3: Impart knowledge about the role of SSIs and modern business enterprises MSMEs
CO4: Enable to identify the new business opportunities and setting up of small business.
CO5: Give an idea about the sources of finances for small business.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	3	1	2	1			1	3	1	1		
CO2	3	3	1	2	1		1	2	3	1		
CO3	3	1	1					1				
CO4	3							3	1			
CO5	3	1	1					2	1			

3-High, 2- Medium, 1- Low.

M.Com (A&F) III Semester

PAPER – 303(D) : INTERNATIONAL ACCOUNTING AND REPORTING

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives:

- To provide the conceptual knowledge on international accounting and its status.
- To impart the knowledge on international accounting standards.
- To provide knowledge on combination and consolidation of international business.
- To comprehend the skills to analyse the international financial statements.
- To enable the students to understand financial reporting and disclosure practices of international business.

Unit –I International Accounting: concept –nature – scope– importance – international audit types– Status of International Accounting in select countries. (Theory only)

Unit– II International Accounting Standards– Concept – Objectives– Need for harmonization– IFRS and Indian GAAP– Global convergence accounting – Need for Convergence – Benefits and challenges of Convergence (Theory only)

Unit – III International Business Combinations and Consolidations – Concept – Need for consolidations Motives of combinations –Accounting treatment of combinations–Consolidation techniques– Mechanics of Consolidations. (Theory only)

Unit–IV International Financial Statement Analysis– Concept – Need for financial statement analysis– techniques – Complexities in analysis of global financial statements– Challenges and Opportunities in cross border analysis. (Theory only)

Unit –V International Financial Reporting and Disclosure – Introduction– Need for Transnational reporting and disclosure– Developments of disclosure – Reporting and disclosure practices; Segment Disclosure, Corporate governance disclosure.(Theory only)

REFERENCE BOOKS:

1. Mohapatra, A.K.Das “International Accounting, prentice Hall of Indian Pvt.Ltd. New Delhi.
2. RathoreShirin: “ International Accounting” Prentice Hall India, New Delhi.
3. SuddagaranM.Shahrokh, International Accounting – A User perspective” Taxman India., New Delhi.
4. Gupta Ambarish “Financial Accounting for Management – An analytical perspective “ Pearson Education, New Delhi.

5. NobesChestopher& Parker Rober. " Comparative International Accounting" Pearson Education, New Delhi.
6. FDC Choi and G.G. Mueller, ' An introduction to multinational Accounting' Prentice Hall, New Delhi.
7. Richard E Baker, Valdean C. LembkeThomases King, McGraw – Hill Higher Education, Irwin.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Understands the concepts of international accounting and its status in various countries.
CO2: Understands the international accounting and reporting standards.
CO3: Acquires knowledge of combination and consolidation of international business
CO4: Gains ability to analyse international financial statements
CO5: Aware of financial reporting and disclosure practices of international business.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	2			1	1				1
CO2	3	2	1		1		1	1				1
CO3	3	2	1		1		1	1				
CO4	3	3	1	1								1
CO5	3	3	2					1				1

3-High, 2- Medium, 1- Low.

M.Com (A&F) III Semester

PAPER – 304: INTERNAL AUDIT AND STANDARD AUDIT PRACTICES

(Skill Oriented Course)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

1. Conceptualise the knowledge in internal control including evaluation techniques.
2. Learn the meaning, features, objectives and advantages of internal audit.
3. Ascertain the basis of auditing with information systems by skill enhancement.
4. Illustrate the audit under computerized information system environment along with its internal control.
5. Outline and synthesize the reporting and its presentation techniques.

Unit – I Introduction to internal control: Meaning – objectives – Basic elements of internal control – Types of internal control systems – Preventive and detective controls – Advantages and limitations of internal control – Techniques for evaluation of internal control system – Native record – Check list – Flow chart – Internal control questionnaire.(Theory only)

Unit – II Internal Audit: Meaning –features – advantages – Need of internal audit – Internal control Vs. Internal audit – Internal audit Vs. Operational audit; Internal check: Meaning – Objectives – Features of good internal check system.(Theory only)

Unit – III Auditing of Information Systems: Overview of Information Systems – Attributes of Information – Need for Audit of Information Systems – Effect of Computers on Audit – Changes to evidence collection – Changes to evidence evaluation – Skills required for Information Systems Auditor – Functions of IS Auditor – Categories of Information Systems Audit – Steps in Information System Audit – Role of IS Auditor in Physical Access Controls – Understanding the Layers and related audit issues. (Theory only)

Unit – IV Internal Audit under Computerized Information System (CIS) Environment**:** **S**pecial audit techniques using the computer – Scope of audit in a CIS Environment – Impact of changes on business processes (for shifting from manual to electronic medium) – Audit approaches in a CIS Environment – Internal Controls in a CIS Environment – Internal Control requirements under CIS Environment – Approach to auditing in a CIS environment – Computer Assisted Audit Techniques (CAATs). (Theory only)

Unit – V Internal audit reporting: Concept – Basic elements of internal audit report – Features of good internal audit report – Frequency of report – Segment reporting – Documentation of reporting – Importance of report drafting – Report presentation techniques – Report submission – Storage of working papers and back–up of data. (Theory only)

REFERENCES:

1. Advanced Auditing and Standards on Internal Audit, Issued by ICAI.
2. Information Systems Control and Audit, Issued by ICAI.

3. Standards On Internal Audit – issued by ICAI.
4. Kamal Garg, Handbook on Internal Audit: Bharat Law House.

Course Outcomes (COs):

1. To acquire knowledge in internal control, learn its advantages, limitations and techniques.
2. To learn the features, advantages and need for internal audit.
3. To enhance skills and know-how in auditing of Information systems.
4. To showcase the environment of Internal Audit under computerised information system.
5. To amend the skills and knowledge in Internal Audit reporting along with reports presentation.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	3		2				3	2				1
CO2	3	3		1	2			1	2		1	
CO3		2	3				3	1		1		3
CO4	1		3			2			1		1	
CO5	2			3	2			1				2

3-High, 2- Medium, 1- Low.

M.Com (A&F) III Semester

PAPER –305(A): FUNDAMENTALS OF ACCOUNTING

(Open Elective)

(With effect from the academic year 2021–22)

Course Objectives

- To provide basic knowledge on accounting and its preparation.
- To enable the students to prepare final accounts
- To help the students to acquire the skills of financial statement analysis
- To provide the basic knowledge on cost accounting.
- To develop the student ability to use the tools of management accounting.

Unit–I: Accounting – Nature and Scope – Branches of Accounting – Financial Accounting – Types —Principles and concepts – Branches of Accounting – Accounting Standards –Types of Accounting Standards–Advantages.(Theory only)

Unit–II Journal and Final Accounts: Meaning of an Account–Accounting Equation– Meaning and format of Journal–Ledger posting– Preparation of Trial Balance–Profit and Loss Account– Balance sheet. (Theory only and Problem)

Unit–III Financial Statement Analysis: Meaning – Classification – Trend analysis – Comparative statement analysis – Common size statement analysis– Advantages of Financial statement analysis. (Theory only)

Unit – IV Cost Accounting: Nature, Scope and Objectives– Concept of cost – Classification – Behaviour of cost – Elements of cost – Principles of costing – Preparation of cost sheet.(Theory only and Problem)

Unit – V Managerial Accounting – Nature, Scope and Objectives – Budgetary Control – Types of Budget – Advantages of budgeting – Limitations – Preparation of budgets (Theory only)

REFERENCE BOOKS:

1. Jain S.P, Narang K.L and SimmiAgarwal, “Accounting For Managers”, KalyaniPublishers, New Delhi.
2. Wild. J.J., Subramanyam, K.R. Halsey, R.F., Financial Statement analysis, Tata McGraw Hill.
3. NarayanaSwamy, “Financial Accounting: A Managerial Perspective”, Pearson Education.
4. Prasad, G. “ Financial Accounting and Analysis” Jai Bharat Publishers, Guntur.
5. Ramachandran and Kakani, “ Finanical Accounting for Management”, TMH, New Delhi.
6. Jain and Narang, “Accountancy” Vol 1, Kalyani Publishers, 1983.
7. Jain and Narang, “ Cost Accounting”, Kalyani Publishers.
8. R.K.SharmaandShashi K Gupta, “Management Accounting”, Kalyani Publishers.
9. S.N. Maheswari, Accounting for Managment, Sultan Chand Publishing House Pvt. Ltd.

FUNDAMENTAL OF ACCOUNTING
CO1: Provide knowledge about basic principles, branches of accounting, accounting standards and book-keeping.
CO2: Enable the students to prepare and solve the final accounts
CO3: Explore the talents of financial statement analysis
CO4: Able to know the concepts used in cost accounting
CO5: Understand about the concept, tools and management accounting.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				2			1				
CO2		3			2				1			
CO3		3				2						1
CO4	3			2				1				
CO5	3				1			2				

3-High, 2- Medium, 1- Low.

M.Com (A&F) III Semester

PAPER –305(B) :PERSONAL FINANCIAL PLANNING

(Open Elective)

(With effect from the academic year 2021–22)

Course Objectives:

1. To understand the concept of personal finance planning.
2. To know the products of personal finance planning.
3. To interpret risk and return concepts along with its types.
4. To cognize and apply personal tax planning.
5. To get to know the perspectives of personal finance and policy.

UNIT I Personal Finance Planning– Nature – Scope – Objectives– Need – Process – Principles of Personal Finance –Safety– Liquidity–Solvency and Management of Wealth.(Theory only)

UNIT II Products of Personal Finance Planning – Bank Deposits – Post Office Savings – Mutual Funds –Shares–Corporate and Govt. Bonds– Chit Funds–Real Estate– Gold–Silver.(Theory only)

UNIT III Risk and Return– Concepts – Types of Risk and Return – Diversification of Risk – Measurement of Risk and Return – Investment Planning– Time value of Money – Compound Value –Computation of Returns on Personal Investments. (Theory only)

UNIT IV Personal Tax Planning: Nature of Income – Expenses – Deductions– Taxable Benefits–Income Splitting–Tax Advantaged Investment–Deferred Income Plans– Income and Dividends from Business and Self–Employment.(Theory only)

UNIT V Personal Finance and Policy Perspectives: Impact of Government Policy– Union Budget– Cost of Living –Retirement Saving Plans– Pension plans– Provident Fund, Gratuity–LIC –GIC –Reverse Mortgage Plans. (Theory only)

REFERENCE BOOKS

1. Personal Finance by Jack R. Kapoor, Les R. Dlabay and Robert J. Hughes, Tat McGraw–Hill Publishing Company Ltd. New Delhi.
2. Financial Education by Reserve Bank of India – rbi.org.
3. Personal Finance columns in The Economic Times, The Business Line and Financial Express Daily News Papers.
4. Information Broachers of Post Offices, Banks, Mutual Funds, Insurance Companies
5. Internet Sources– BSE, NSE, SEBI, RBI, IRDA, AMFI etc.

Course Outcomes:

1. Understanding the concept of personal finance planning.

2. Knowing the products of personal finance planning.
3. Interpreting risk and return concepts along with its types.
4. Cognizing and apply personal tax planning.
5. Knowing the perspectives of personal finance and policy.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (A&F) IV Semester

PAPER –401: STRATEGIC FINANCIAL MANAGEMENT

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Describe strategic management concept, importance and purpose; strategic planning concept and characteristics,
- Explain Strategic financial management success factors and constraints.
- Illustrate corporate valuation approaches and guidelines; value based management.
- Identify financial distress and restructuring; countering financial distress.
- Justify corporate sickness and financial engineering; fund raising and fund deployment strategies.

Unit– I Strategic Management: Concept – Important Concerns – Purpose – Constraints – Process– Strategic Planning– Concept – Characteristics – Components –Benefits– Constraints of Strategic Planning. (Theory only)

Unit–II Strategic Financial Management: Concept–Scope–Characteristics–Importance – Success Factors–Strategic Financial Planning – Principals of Strategic Financial Planning. (Theory only)

Unit–III Corporate Valuation: Concept – Objectives – Approaches of Corporate Valuation–Value Based Management–Elements–Significance–Process– Methods of Value Based Management. (Theory and problems)

Unit–IV Financial Distress and Restructuring: Concept – Characteristics – Reasons for Corporate Financial Distress – Cost of Financial Distress – Impact of Financial Distress – Countering Financial Distress. (Theory only)

Unit–V Corporate Sickness and Financial Engineering: Concept – Managerial Causes of Sickness – Revival –Financial Engineering: Concept – Approaches to Innovative Financial Engineering –Fund Deployment Strategies– Financial Re–engineering. (Theory only)

REFERENCE BOOKS:

1. RajniSofat and PreetiHiro: Strategic Financial Management. Prentice Hall of India Learning Pvt., New Delhi.
2. Dr.Pradip Kumar Sinha: Strategic Financial Management. Excel Books, New Delhi.
3. G.P.Jakhotiya: Strategic Financial Management. Vikas Publishing House Pvt. Ltd., NewDelhi.
4. Allen: An Introduction to Strategic Financial Management. Koran Page
5. Mathew P.K: Corporate Restructuring in India: Perspectives. McMillian.

Strategic Financial Management
CO1: Draft strategic financial planning using success factors and constraints of strategic management and strategic financial management.

CO2: Appraise the corporate valuation and value based management through critical approaches.
CO3: Assess the impact of financial distress with quantitative and qualitative cost elements for corporate restructuring.
CO4: Acquire and adopt innovative strategies through financial engineering and re-engineering to counter corporate sickness.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				3		2			1		1	
CO2	1		3				2					
CO3			3					1				
CO4		2		1	2		1					3
CO5	3					3		2				2

3-High, 2- Medium, 1- Low.

M.Com (A&F) IV Semester

PAPER –402: INVESTMENT MANAGEMENT

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Discuss investment concept, characteristics and objectives; types of investment and process of investment.
- Classify risk, return analysis, types of risk and measurement of return.
- Investigate valuation of securities, value of equity shares and equity valuation models.
- Inspect portfolio analysis, selection of traditional and modern portfolio analysis.
- Compose portfolio evaluation, measures of portfolio performance and mutual funds.

Unit – I Investment : Concept – Elements–Importance – Objectives – Factors of Sound Investment–Investmentvs. Speculation–Investment vs. Gambling–Investment Process–Investment Media – Types of Investments – Financial Investments – Non–financial Investments . (Theory only)

Unit – II Risk and Return Analysis: Concepts – Classification of Risk – Systematic Risk–Unsystematic risk – Types of Systematic risk–Types of Unsystematic Risk – Risk Aversion– Risk Premium – Return – Holding Period Return – Expected Value of Return.(Theory only)

Unit –III Valuation of Securities: Valuation of Equity Shares–Dividend Capitalization Methods–Earning Capitalization Methods; Valuation of Bonds–Basic Concepts–Types of Bonds–Measuring Bond Duration. (Theory and Problems)

Unit – IV Portfolio Analysis: Concept –Markowitz's Model–Assumptions–Capital Asset Pricing Model (CAPM)–Assumptions– Capital Market Line vs. Security Market Line.(Theory and Problems)

Unit – V Portfolio Evaluation: Concept –Measures of Portfolio Performance–Sharpe's Performance Index – Treynor's Performance Index –Jensen's Performance Index. (Theory and Problems)

REFERENCE BOOKS:

1. Prasanna Chandra: Analysis and Portfolio Management, Tata McGraw Hill Co. Ltd., New Delhi.
2. Kevin, Security Analysis and Portfolio Management, PHI, New Delhi.
3. Avadani V.A.: Security Analysis and Portfolio Management, Himalaya Publishing House, New Delhi, 2008.
4. Prethi Singh, Investment Management, Security Analysis and Portfolio Management, Himalaya Publishing House, New Delhi, 2005.

5. Dhamodharan : Investment Valuation, Johnweely and sons, Johnweely and Sons, New York.
6. Donald E.Fischer& Ronald J.Jordan: Security Analysis and Portfolio Mangement, Pearsons Education (Singapore) Pvt, Ltd., New Delhi.

INVESTMENT MANAGEMENT
CO1: Acquire skills in investment environment and trade in the stock markets.
CO2: Analyse the risk and expected return of portfolio through various measures.
CO3: Calculate the value of equity shares and bonds through various valuation models to buy and sell decisions.
CO4: Analyze the selection of portfolio through Markowitz model and evaluate the performance of the portfolio using standard measures for revision of the portfolio

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1	1				3	2			2
CO2	3	3	1					2				1
CO3	2	3	2	2	3			1				
CO4	2	2		2	2			1				
CO5	2	2	3		2			1				

3-High, 2- Medium, 1- Low.

M.Com (A&F) IV Semester

PAPER – 403(A) : INTERNATIONAL FINANCIAL MANAGEMENT

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives

- Determine international financial management concept, importance, nature and scope.
- Demonstrate foreign exchange market and exchange rate mechanism; types of exchange rates.
- Evaluate foreign exchange exposure concept, relevance and classification; management of accounting exposure.
- Evaluate international project appraisal concept and approaches; international perspective of working capital.
- Plan international equity investment concept, risk and return; major market segments and international financing decision.

Unit – I International Financial Management (IFM) : Concept –Nature and Scope– Importance – Domestic and Offshore Markets –Role of International Financial Manager – Changes in Global Financial Markets –Challenges– International Monetary System–Emerging Dimensions .(Theory only).

Unit – II Foreign Exchange Market and Exchange Rate Mechanism: Foreign Exchange Markets – Structure – Types of Exchange rates – Exchange Rate Quotations – Direct and Indirect – Buying and Selling Rates – Forward market quotation – Nominal and Real Exchange Rates in Financial Decisions.(Theory only)

Unit – III Foreign Exchange Exposure: Concept – Relevance of Foreign exchange Exposure – Transaction Exposure– Operating Exposure – Accounting Exposure –Hedging and Managing Tools of Exposures. (Theory only)

Unit – IV International Project Appraisal: Concept – Approaches – Net present Value Approach – Adjusted Present Value Framework – Options Approach – The Practice of Cross Border Direct Investment Appraisal– International Perspectives of Working Capital.(Theory only).

Unit – V International Equity Investment: Concept – Risk and Return from Foreign Equity Investment – Equity Financing in the International Markets – Long– Term Borrowings in Global Capital Markets–International Financing Decision. (Theory only)

REFERENCE BOOKS:

1. Apte.P.G.,: International Financial Management, Tata McGraw Hill Publishing House, New Delhi.
2. Siddaiah, T, International Financial Management, Pearson, New Delhi.
3. Sharan V. : International Financial Management, Prentice Hall of India Publishing, New Delhi

4. Bhalla,V.K. : International Financial Management, AnmolPublicatins, New Delhi.
5. AvadhaniV.A. : International Finance, Himalaya Publishing House, Mumbai.
6. Eun&Resnick., : International Financial Management, Tata McGraw Hill Publishing Company lLtd., New Delhi.

Course Outcomes:

CO1: Ascertain the recent changes in global financial markets and international monetary system so as to forecast exchange rates and use foreign exchange rate mechanism.
CO2: Measure foreign exchange exposure and hedge foreign exchange exposure.
CO3: Appraise projects using international capital budgeting techniques and estimate the working capital requirements in international perspective.
CO4:Analyze the risk and return for equity and long term debt financing in global capital markets.
CO5: Formulate international equity investment and long-term borrowings in global capital markets.

CO-PO Mapping

Cours	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO1**	**PO1**	**PO1**
CO1	3	2	1		2			1				
CO2	2	2	1		2			1				
CO3	1	2		1	2			1				
CO4	1	2	1	3				2				
CO5	1	2	2	2				1				

3-High, 2- Medium, 1- Low.

M.Com (A&F) IV Semester

PAPER – 403(B) : PERSONALITY DEVELOPMENT AND SOFT SKILLS

(Generic Elective)

(With effect from the academic year 2021–22)

Course objectives (COBs):

COB1: Familiarize with the theories of personality including sick and healthy personalities.

COB2: Dramatize the processes involved in effective reading, listening, messaging and feedback.

COB3: Develop the skills for coaching, mentoring, persuading and change making.

COB4: Develop the skills to be lead leader, chair the meeting, problem solver, conflict resolver and negotiator.

COB5: Develop self esteem and build positive attitude and personality.

Unit–I Foundations of personality development (PD): Concept of Personality – Theories of personality: Psycho-dynamic theory - Trait theory – Big-5 Theory; Personality Determinants: Physical, social, educational, family, intellectual and emotional determinants; Causes for sick personality and healthy Personality. (Theory only)

Unit-II Self-awareness skills: Self-awareness and management; communicating: Sending inter personal messages – Listening and reading non-verbal messages –Providing feedback. (Theory only)

Unit-III Motivating: Goal setting skills – Coaching -Counselling and Mentoring – Empowering people through delegation; Leading: Politicking - Persuading - Applying leadership styles – Managing Change. (Theory only)

Unit- IV Teaming skills: Working with teams – Running meetings – Valuing diversity: Problem solving: Ethical decision making - Creative problem solving – Resolving conflicts – Negotiation. (Theory only)

Unit- V Self-esteem skills: Characteristics – Causes of low self-esteem – Steps to build positive self-esteem; Attitude: Steps in building positive attitude; Interpersonal skills; Steps in developing positive Personality. (Theory only)

REFERENCE BOOKS:

1. Elizabeth B.Hurlock: Personality Development, Tata McGraw Hill.
2. Stephen P.Robbins and Philip L Hunsaker: Training in interpersonal skills, Pearson Education.
3. Shiv Khera: You can Win, McMilan Publications.
4. Robert M. Sherfield. Rhonda J.Montgomery, PatricaG.Moody: Developing soft
5. Skills, Person Education.
6. Biswajit Das,Satpath: Business Communication & Personality Development, Excel Publication.

Course Outcomes (COs):

CO1: Acquire conceptual knowledge on the theories of personality and its determinants that lead to either sick or healthy personalities.

CO2: Manage effectively the self-awareness to manage active reading, listening, messaging and feeding back.

CO3: Train oneself to be a coach, mentor, leader, persuader, and change maker.

CO4: Demonstrate the skills in teaming, running meetings, problems solving, conflict resolution and negotiation.

CO5: Realize the causes and impact of self-esteem and ways to build positive attitude and personality.

COs-POs mapping:

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2									
CO2			2				2			3		
CO3						3	2	2				
CO4						3	2	3				
CO5						2			2	2		

M.Com (A&F) IV Semester

PAPER – 403(C): MERGERS AND ACQUISITIONS

(Generic Elective)

(With Effect from the academic year2021–22)

Course Objectives:

- To impart basic knowledge on the concepts and forms of corporate restructuring.
- To enlighten the students about merger waves and procedures.
- To provide the knowledge the procedures of acquisitions and role of SEBI.
- To comprehend the students of concept and types of demerger and reverse merger.
- To provide the knowledge about the methods of accounting in M&A.

Unit–I Corporate Restructuring: Concept – Characteristics – Purposes for Restructuring – Forms of Corporate Restructuring: Expansion – Contraction – Corporate Control – Changes in Ownership Structures – Effects of Restructuring–Constraints of Corporate Restructuring. (Theory only)

Unit–II Mergers: Concept– Characteristics – Merger Waves – Reasons and Objectives of Mergers – Types of Mergers – Procedure and Steps for Merger – Legal Issues and Compliances of Merger in India – Role of Investment Banker. (Theory only)

Unit–III Acquisitions: Concept– Characteristics – Advantages – Types of Acquisitions/Takeovers – Modes of Takeover – Takeover Provisions before SEBI – SEBI Takeover Code – Takeover tactics and strategies – Constrains to Acquisitions. (Theory only)

Unit–IV Corporate Demergers: Concept– Types – Modes– Advantages of demergers/divisions/splits – Concept of Reverse Mergers – Provisions under Tax Laws for Reverse Merger – Requirements of reverse merger – Salient features of reverse merger under Sec.72 A. (Theory only)

Unit–V Accounting Aspects: Introduction – Accounting Standard–14 – AccountingMethods for M&A – Pooling of interest method – Purchase accounting method – Accounting practices in India – Treatment of Reserves and Goodwill. (Theory only)

REFERENCE BOOKS:

1. J.C. Verma, Corporate Mergers, Amalgamations & Takeovers, Bharat Law House, New Delhi
2. NishkantJha, Mergers, Acquisitions and Corporate Restructuring, Himalaya Publishing House, Mumbai
3. Prasad G Godbole, Mergers, Acquisitions and Corporate Restructuring, Vikas Publishing House Pvt. Ltd., Noida.
4. H.R. Machiraju, Mergers Acquisitions and Takeovers, New Age International Publishers, New Delhi.
5. RavindharVadapalli, Mergers, Acquisitions and Business Valuation, Excel Books, New Delhi.

6. J.B. Gupta, Strategic Financial Management, Taxmann Publications Pvt. Ltd., New Delhi.
7. SEBI Guidelines on Mergers & Acquisitions.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Understand corporate restructuring concepts and forms
CO2: Student have an idea about the waves and procedures of mergers
CO3: Able to develop the procedures involved in Acquisitions and know the constraints of Acquisitions and the role of SEBI
CO4: Understand about the concept and types of demerger and reverse merger.
CO5: Enable the students to apply the methods of accounting for M&A, and tax aspects.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			3	2	2		2		1		1
CO2	3			2	2	2		1				1
CO3	3		2	2		2		1		1		1
CO4	3		2		2			1				1
CO5	3				3	2			1	1		1

3-High, 2- Medium, 1- Low.

M.Com (A&F) IV Semester

PAPER –403(D): GSTAND CUSTOMS DUTY

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

1. Outline the concepts of GST, its applicability, features and objectives.
2. Look into the registration procedures and return types under GST.
3. Exemplify about the supply of goods and services along with valuation.
4. Draft the eligibility for ITC by learning the concepts of ITC.
5. Ascertain customs duty and find out its assessable value.

Unit–I Introduction: Concept of GST – Structure of GST – Features of CGST, SGST, UTGST, and IGST Acts – Objectives of GST – VAT vs. GST – Benefits of GST – Applicability of GST – Exemptions from GST – Rates of GST (Theory only).

Unit–II Registration under GST: Persons liable and persons not–liable for registrations; Types of dealers in GST – Deemed registration – Registration process for new applicants – Cancellation of registration and revocation; Reverse Charge Mechanism; Returns under GST: Person liable to pay GST– Computation of GST – Liability and payment of GST –Types of GST returns– Revision of GST returns – Penalty/Late fee – Refund of GST (Theory and problems).

Unit–III Supply of goods and services:Scope of supply: Types of supply based on location, combination, and recipient and tax treatment – Time of Supply – Place of Supply – Value of Supply (Theory and problems).

Unit–IV Input Tax Credit (ITC): Concept – Eligibility for taking Input Tax Credit (ITC)–Utilization of ITC – Conditions for taking ITC – Input Tax Credit in special circumstances – Distribution of ITC by Input Service Distributor (ISD) – Computation of ITC (Theory and problems).

Unit–V Customs duty: Definitions–Circumstances of levy of customs duties – Types of customs duties – Exemption from customs duties – Import procedure under customs –Export Procedure under customs – Method of valuation for customs – Calculation of assessable value – Calculation of custom duty (Theory and problems).

REFERENCES:

1. R. G. Saha, Divyesh Shah, Usha Devi N, GST (Indirect Taxes), Himalaya Publishers.
2. ICMAI, Study material on Indirect taxation, ICMAI.
3. VandanaBangar and YogendraBangar, Indirect Tax Laws, AadhyaPrakashan Publishers.
4. V. S. Datey, GST Ready Reckoner, Taxmann Publications.
5. AvadeshOjha, GST, Taxmann Publications.

Course Outcomes (COs):

- To develop knowledge in the areas of GST by learning its objectives, benefits, applicability and exemptions.
- To learn the mechanism of GST and its registration along with returns.
- To enhance skills regarding taxable value of supplies and supply of goods and services.
- To amend knowledge in GST input tax credit and its computation.
- To showcase the know-how of customs duty including calculation of the assessable value.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1						2				1
CO2	2	2	1		1			1				
CO3	2	1						1				
CO4	2	1	1		1							
CO5	3	1	1		2			1				1

3-High, 2- Medium, 1- Low.

M.Com (A&F) IV Semester

PAPER –404 :PROJECT REPORT & VIVA - VOCE

(Project Work)

(With effect from the academic year 2021–22)

M.Com (A&F) IV Semester

PAPER –405(A) : SECURITY MARKET OPERATIONS

(Open elective)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

1. Learn the basic concepts of Indian securities market.
2. Explore the areas of secondary markets in special reference to SEBI guidelines.
3. Exemplify about listing of securities in BSE and NSE.
4. Investigate into Indian stock exchanges.
5. Illustrate about stock market with special reference to BSE sensex and NSE indices.

UNIT – I Indian Securities Market: Concept– Functions – Intermediaries –Primary Market – Nature–Role of Primary Market–Problems of New Issues Market – IPOs –SEBI Guidelines for Primary Market– Recent Trends in Primary Market.(Theory only)

UNIT – II Secondary Market: Concept – Nature – Functions – Organization – Regulatory Framework for Stock Exchanges in India – SEBI Guidelines for Secondary Market–Recent Trends in Secondary Market.(Theory only)

UNIT– III Listing of Securities: Concept – Merits and Demerits of Listing – Listing Requirements–Listing of Rights Issue– Bonus Issue– Further Issue – Listing Conditions of BSE and NSE – Delisting.(Theory only)

UNIT – IV Indian Stock Exchanges: Concept–Functions–BSE –Different Trading Systems – Different Types of Settlements –NSE–Market Segments–NEAT System Operations–Market Types –DematSettlement.(Theory only)

UNIT – V Stock Market Indices: Concept – Purpose and Consideration in Developing Index – Methods – Market Indices in India – BSE SENSEX– NSE Indices – S &P CNX Nifty.(Theory only)

REFERENCEBOOKS

1. PunithahvathyPandian, Security Analysis and Portfolio Management, Vikas Publishing House Pvt. Ltd.
2. V. A. Avadhani, investment and securities Market in India, Himalaya Publishing House.
3. Prasanna Chandra, Security Analysis and portfolio management, Tata McGraw – Hill.
4. SanjeevAgarwal, A Guide to Indian Capital Market, Bharat Publishers.
5. Ravi Puliani and Mahesh Puliani, Manual of SEBI, Bharat Publication.

Course Outcomes (COs):

1. To advocate the learned knowledge in Indian securities market.
2. To explore the areas of secondary markets along with the SEBI guidelines.
3. To acquire adequate knowledge in listing of securities and their delisting.

4. To get to know about the concepts of Indian stock Exchanges.
5. To exemplify the concepts of stock market indices and CNX Nifty.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2							1	1	
CO2	3	3			2			1	3			3
CO3	2	2		3		3		1			2	
CO4			3		2		1		1			1
CO5	1			3		2		2		3		

3-High, 2- Medium, 1- Low.

M.Com (A&F) IV Semester

PAPER –405(B) : BUSINESS ETHICS

(Open elective)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

1.Learn the basic concepts of business ethics.
2. Explore the important theories of ethics.
3. Exemplify about ethical decision making business.
4. Investigate into Globalisation and business ethics.
5. Illustrate about creating ethical organisations.

UNIT – I Business Ethics: Meaning, Principles of Business Ethics – Evolution and Development of Business Ethics – Importance and Need for Business Ethics – Significance of Business Ethics – Values and Ethics in Business – Code of Ethics. (Theory only)

UNIT – II Nature and some important Theories of Ethics – Sources of Business Ethics – Managing Ethics – Values, Ethics and Business Strategy – Ethical issues and Dilemmas in Business – Sources of Ethical Problems – Improving Ethics in Business – Theory of Ethical Egoism – Theory of Ethical Utilitarianism – Theory of Egalitarianism. (Theory only)

UNIT – III Ethical Decision making in Business – Ethical Decision making with Cross-holder conflicts and competition – Applying Moral Philosophy to Ethical Decision–making – Factors influencing Ethical Decision making – A framework of Ethical Decision–making – Using the Ethical decision making framework to improve Ethical decisions.(Theory only)

UNIT – IV Globalisation and Business Ethics – History of Globalisation – Growth of Global Corporations – Factors facilitating Globalisation – Business Ethics in Global Economy – Ethical perceptions and International Business – Global Values – Role of Ethics in International Business.(Theory only)

UNIT – V Creating an Ethical Organisation – Human nature and unethical behaviour in organisations – Code of conduct – Code of Ethics vs. Code of Conduct – Ethics Committees – Ethics Communication Systems – Ethics Training Programming – Disciplinary system – System to monitor and enforce Ethical Standards.(Theory only)

REFERENCE BOOKS:

1. Business Ethics (Concepts, Application, Framework and cultural Impact), K. Aswathappa and Others, Himalaya Publishing House, 2017.
2. Business Ethics – A Case Perspective, O.C. Ferrell, John Fredrich and Linda Ferrell CengageLeachery.
3. Business Ethics – An Indian Perspective, A.C. Fernando, Pearson.

4. Business Ethics (Indian Edition), Andrew Crane Dirk Matten, Oxford University Press, New Delhi.
5. Essentials of Business Environment (Test, Cases & Exercises), K. Aswathappa, Himalaya Publishing House 15th Revised Edition.

Course Outcomes:

1. Learning the basic concepts of business ethics.
2. Exploring the important theories of ethics.
3. Exemplifying about ethical decision making business.
4. Investigating into Globalisation and business ethics.
5. Illustrating about creating ethical organisations.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2							1	1	
CO2	3	3			2			1	3			3
CO3	2	2		3		3		1			2	
CO4			3		2		1		1			1
CO5	1			3		2		2		3		

3-High, 2- Medium, 1- Low.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF CM & CS

DEPARTMENT OF COMMERCE



Course

M.COM (FINANCIAL MANAGEMENT)

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

Name of the Department : Dept. of Commerce

About the Department

The Department of Commerce was one of the oldest departments established during the academic year 1969-70 in SV University (Estd. 1954) to offer M.Com degree course under the aegis of Economics Department, S.V. University College of Arts and Sciences and subsequently it emerged as an independent entity during the year 1971, with Dr. O.R. Krishna Swamy as the founder member of the Department. Under the re-organized set-up during 2006, the Department became a part of the College of Commerce, Management and Information Sciences. For the new millennium, a new course i.e., MFM was started in the year 1999 under semester system. And M.Com (A&F) was started during the academic year 2005-06. Both M.Com and MFM courses were modified to incorporate Choice Based Credit System (CBCS) during the academic year 2006-07. The Department of Commerce is one of the biggest Departments in Sri Venkateswara University campus with a total strength of 320 students. To meet the overwhelming demand for accounting and finance professionals, the Department offers three courses viz., M.Com on Regular basis, M.Com (FM) and M.Com (A&F) on self-supporting basis besides PhD program. Currently, based on NEP guidelines syllabi is restructured to include core, generic electives, compulsory foundations, skill oriented course, mandatory project report, and open electives.

Vision, mission of the Department

VISION

"To promote accounting and finance professionals through a process of quality and value based education, consultancy, counselling, persistent skill development and infusion of human values for vibrant future".

MISSION

- To groom competent, confident, creative and committed professionals in the field of accounting and finance.
- To provide the students with inclusive facilities to cater to their industry learning, placement opportunities and social needs
- To make the students occupy good positions in academic and research institutions and consultancy organizations.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

After completion of the programme, the student would be able to

- PSO 1: Understand the framework of OB, HRM, marketing, finance and other functional areas of management.
- PSO 2: Obtain knowledge in the field of financial management and get knowledge in different tools and techniques of FM.
- PSO 3: Examine critically the accounting standards and reporting so as to evolve an effective accounting and reporting system.
- PSO 4: Diagnose the different aspects relating to IFM, SAPM, financial engineering and investment management.
- PSO 5: Understand the value of marketing, sales promotion techniques and learn how to prepare financial statements on accounting inventory bases through tally accounting software and also acquire skills in becoming good entrepreneurs.
- PSO 6: Acquire knowledge in the field of tax planning and management, personality development, e-commerce, international financial management, e-banking operations and obtain skills in the field of cost and management accounting for arriving at concrete decisions for prosperity of business.

PROGRAMME OBJECTIVES (POBs)

After successful completion of two year Post- Graduate Degree programme in Commerce, the student would be able to

- **POB1: (KB) Knowledge Based**

  Apply Knowledge in the functional areas of management and analyse the significance of commerce in modern times. To interpret the significance of Commerce in modern times and apply as acquired knowledge in the management functional areas.

- **POB2: (PA) Problem Analysis**

  Acquire knowledge about the concepts and postulates of accounting its branches, finance and HRM and trace out appropriate solutions to the compulsory problem.To be able to gain knowledge regarding the concepts of branches of accounting like HRM & Finance by finding out solutions to every problems.

- **POB3: (Inv) Investigation**

  Critically analyse the qualitative and quantitative data on contemporary issues in the field of accounting and finance. To study the contemporary issues in areas of Accounts and Finance based on qualitative and quantitative data.

- **POB4: (Des) Design**

  Obtain skills in designing and conducting survey during the course of Project work and impact knowledge. To impact knowledge by learning skills in project work through conduct of survey of design.

- **POB5: (Tools) Use of Tools**

  Learn about the application of different statistical tools and techniques so as to arrive at suitable decision in the business and its success. To take a decision by applying various statistical tools which is dependent on business success.

- **POB6: (Team) Individual team work**

  Discern knowledge about the group dynamics and team building so as to participate in community extension and outreach programmes. So as to gain and perceive knowledge

- **POB7: (Comm) Communication skills**

  Inculcate communication skills and learn interview participation techniques for acquire Proper placement. To develop skills required for placement like interview techniques and participation techniques.

- **POB8: (Prof) Professionalism**

  Demonstrate professionalism in undertaking independent research surveys and project works. To exhibit the professionalism in terms of project works and research surveys

- **POB9: (Impact) Impacts of course as society and environment**

  Understand the emerging trends in the field of Accounting, Finance, Marketing and HRM and their impact on society and demonstrate the knowledge required for sustainable development of industry and service sector. To make students able to showcase the knowledge required for the sustainable development of industry and service sector in the emerging fields of Accounting, Finance, Marketing and HRM.

- **POB10: (Social) Social responsibility**

  To understand and have continual knowledge to assess societal legal and cultural issues and the consequent responsibility relevant to the accounting, finance, marketing and tax planning practices by applying the reasoning provided by them.

- **POB11: (Ethics) Ethics and Equities**

  To explore the morals and ethical values in various walks of life and professions through axiomatic wisdom.

- **POB12: (LLL) Life Long Learning**

  To apply learning skills and techniques obtained through theoretical, conceptual framework, computer practical and project field experiences to resolve contemporary issues.

PROGRAMME OUTCOMES (POs)

After successful completion of two year Post- Graduate Degree programme in Commerce, the student would be able to

- **PO1: (KB) Knowledge Based**
  Familiarise oneself with the objectives of financial management and have on insight into the various concepts, tools and techniques of financial management.
- **PO2: (PA) Problem Analysis**
  Analyse the crucial and critical issues in the area of finance and apply various techniques to take such issues and explore appropriate solutions to the problems that cramped finance area.
- **PO3: (Inv) Investigation**
  Obtain knowledge and investigate into the areas like financing and investment decision making, trends in working capital management, assessing the trends in strategic and International Financial Management
- **PO4: (Des) Design**
  Obtain skills in designing and conducting survey during the course of Project work and impact knowledge.
- **PO5: (Tools) Use of Tools**
  Learn about the application of different statistical tools and techniques so as to arrive at suitable decision in the business and its success.
- **PO6: Team Individual team work**
  Discerns knowledge about the group dynamics and team building so as to participate in community extension and outreach programmes.
- **PO7: (Comm) Communication skills**
  Inculcate communication skills and learn interview participation techniques for acquire Proper placement.
- **PO8: (Prof) Professionalism**
  Exhibit professionalism to take up necessary and project works in the field of corporate finance and arrival at concrete solutions to many complex problems that have bearing on corporate finance.
- **PO9: (Impact) Impacts of course as society and environment**
  Understand the emerging trends in the field of Accounting, Finance, Marketing and HRM and their impact on society and demonstrate the knowledge required for sustainable development of industry and service sector.
- **PO10: (Social) Social responsibility**
  Apply reasoning provided by the continual knowledge to assess societal legal and cultural issues and the consequent responsibility relevant to the accounting, finance, marketing and tax planning practices.
- **PO11: (Ethics) Ethics and Equities**
  Explore the axiomatic wisdom an ethics and equities in various walks of life and professions and learn who to thrive in the society with moral and ethical values.
- **PO12: (LLL) Life Long Learning**
  Recognise the need for, and have the skills to engage in independent and life-long learning in the broadest context of changes and turbulent environment revolved around commerce, trade and industry. Also apply learning skills and techniques obtained through theoretical,

conceptual framework, computer practical and project field experiences to resolve contemporary issues.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOBs)

- **PEOB 1:** To interpret the areas for placing business entity in the right perspective in the areas of importance of cost accounting and management accounting, finance, marketing, organizational behaviour, managerial economics, quantitative techniques for business decisions along with the concepts of accounting.
- **PEOB 2:** To know the ideology for the changing socio-economic and political conditions in business environment and marketing and HR to design constructive strategies for better prospects of business.
- **PEOB 3:** To critically observe an effective accounting and reporting system so as to evolve with the accounting standards and reporting.
- **PEOB 4:** To establish the importance of human and professional ethics in human life and corporate life as well in organizational settings and involve in groups and teams with enthusiasm and also recognize the human behaviour.
- **PEOB 5:** To comprehend and learn how to prepare financial statements on accounting inventory bases through tally accounting software and also acquire skills in becoming good entrepreneurs by analysing the value of marketing, sales promotion techniques.
- **PEOB 6:** To make judgments for arriving at concrete decisions for prosperity of business in the field of tax planning and management, personality development, e-commerce, international financial management, e-banking operations and obtain skills in the field of cost and management accounting.

SRI VENKATESWARA UNIVERSITY: TIRUPATI
SVU COLLEGE OF COMMERCE, MANAGEMENT AND COMPUTER SCIENCE

DEPARTMENT OF COMMERCE
(Revised Scheme of Instruction and Examination, Syllabus etc., under CBCS Regulations -2016 is Amended as per NEP-2020)
(With effect from the batch admitted in the academic year 2021-22)

MASTER OF COMMERCE – FINANCIAL MANAGEMENT

SEMESTER- I

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (FM) 101	Accounting Standards & Reporting	6	4	Core-Theory	20	80	100
2.	M.Com (FM) 102	Financial Management	6	4		20	80	100
3.	M.Com (FM) 103	Business Environment and Policy	6	4		20	80	100
4.	M.Com (FM) 104	Organisational Behaviour	6	4		20	80	100
5.	M.Com (FM) 105	A Quantitative Techniques for BusinessDecisions	6	4	*CF	20	80	100
		B Research Methodology in Social Sciences						
		C Managerial Economics						
6.	M.Com (FM) 106	A Business Communication Skills	6	4	*EF	20	80	100
		B Principles of Management						
Total			**36**	**24**		**120**	**480**	**600**
7.	M.Com (FM) 107	Human Values and Professional Ethics - I	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core papers are Mandatory**
- ***Compulsory Foundation – choose one paper**
- ***Elective Foundation - Choose one paper**
- **Audit course- 100 Marks (Internal) –Zero Credits under Self Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra Credits**

SEMESTER- II

S. No	Code	Title of the Course	Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (FM) 201	Advanced cost Accounting	6	4	Core-Theory	20	80	100
2.	M.Com (FM) 202	Financial Markets and Services	6	4		20	80	100
3.	M.Com (FM) 203	Strategic Financial Management	6	4		20	80	100
4.	M.Com (FM) 204	Corporate Governance	6	4		20	80	100
5.	M.Com (FM) 205	A Working Capital Management	6	4	CF	20	80	100
		B Legal Aspects of Business						
		C Risk Management						
6.	M.Com (FM) 206	A e-Banking Operations	6	4	EF	20	80	100
		B Management Information Systems						
		Total	**36**	**24**	**Total**	**120**	**480**	**600**
7.	M.Com (FM) 207	Human Values and Professional Ethics - II	**0**	**0**	Audit Course	**100**	**0**	**0**

- **All Core papers are Mandatory**
- **Compulsory Foundation – choose one paper**
- **Elective Foundation - Choose one paper**
- **Audit course- 100 Marks (Internal) –Zero Credits under Self Study**
- **Interested Students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extra Credits**

SEMESTER- III

S. No	Code	Title of the Course		Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (FM) 301	Security Analysis and Portfolio Management		6	4	Core-Theory	20	80	100
2.	M.Com (FM) 302	Accounting for Managerial Decisions		6	4		20	80	100
3.	M.Com (FM) 303	A	Tally with GST Applications	6	4	Generic Elective	20	80#	100
		B	International Financial Management						
		C	Tax planning & Management	6	4		20	80	100
		D	Entrepreneurship & MSMEs						
4.	M.Com (FM) 304	Internal Audit and standard Audit Practices		6	4	*Skill Oriented	20	80	100
5.	M.Com (FM) 305	A	Fundamentals of Accounting	6	4	Open Elective	20	80	100
		B	Personal Financial Planning						
Total				**36**	**24**		**120**	**480**	**600**

- **All CORE Papers are Mandatory**
- **Generic Elective – Choose two papers**
- ***Skill Oriented Course is Mandatory.**
- **Open electives are for the students of other departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**
- **#Regarding 303a: Tally with GST Applications of 80 marks, 60 marks for semester end examination and 20 marks for practical's for which the candidate has to submit the record.**

SEMESTER- IV

S. No	Code	Title of the Course		Credit Hrs / Week	No. of Credits	Core / Elective	IA	SEE	Total Marks
1.	M.Com (FM) 401	Financial Derivatives		6	4	Core-Theory	20	80	100
2.	M.Com (FM) 402	Project Planning & Control		6	4		20	80	100
3.	M.Com (FM) 403	A	Insurance Management	6	4	Generic Elective	20	80	100
		B	Personality Development and Soft Skills						
		C	International Accounting & Reporting	6	4		20	80	100
		D	GST and Customs Duty						
4.	M.Com (FM) 404	Project Report & Viva–Voce		6	4	* PW	-	-	100**
5.	M.Com (FM) 405	A	Security Market Operations	6	4	Open Elective	20	80	100
		B	Business Ethics						
Total				**36**	**24**		**120**	**480**	**600**

- **All CORE Papers are Mandatory**
- **Generic Elective – Choose two papers**
- ***Multi-Disciplinary course / Project Work is Mandatory**
- **Open electives are for the students of other departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self study.**
- **Interested students may register for MOOC with the approval of the concerned DDC.**
- ****In IV semester, paper 404 – Project Report and Viva-voce, this consists of 100 marks (50 marks for project report and 50 marks for viva-voce).**

M.Com (FM) I Semester
PAPER –101: ACCOUNTING STANDARDS AND REPORTING
(Core Paper)
(With Effect from the academic year2021–22)

Course Objectives

- To increase the knowledge of students on accounting principles and standards
- To enable the students to do inventory valuation
- To impart the ability to find out the cash flows
- To provide the skills to value goodwill
- To create awareness about IFRS and segment reporting

Unit –I Introduction: Accounts Concepts and Principles – GAAP (AS–1)–Branches of Accounting – Users of Accounting; Accounting Standards: Concepts – Types – Benefits – Accounting Standards in India –Indian Accounting Standards.(Theory only)

Unit – II Inventory Valuation: (AS–2) Concept – Need for inventory valuation – Inventory Valuation methods – Valuation of Inventory. (Theory and Problems)

Unit – III Cash flow statement (AS–3): Meaning and definitions – Scope – Objectives –Benefits – Classification of cash inflow and outflow–Presentation of cash flow statement – Methods – Disclosures.(Theory only)

Unit –IV Valuation of Goodwill (AS–26): Concept– Factors affecting goodwill – Types of goodwill — Need for valuation – Methods of goodwill Valuation – Average method– Super profit method – Annuity method. (Theory and Problems)

Unit – V Reporting: International Financial Reporting Standards (IFRS)–Concept–List of IFRS– Segment Reporting (AS–17)–Concept – Objectives – Purposes – Segment reporting (AS–17) – Advantages and disadvantages of segment reporting. (Theory only)

REFERENCE BOOKS:

1. JawaharLal; Accounting theory and Practice, Himalya Publishing House, New Delhi.
2. B. K .Banerjee, Financial Accounting – A dynamic approach Prentice Hall India Pvt. Ltd., New Delhi
3. CA. Ravi KanthMiriyala; Accounting standards made easy, Bharat Law House Pvt. Ltd. New Delhi
4. NithinBalwani, Accounting and Finance for Manager, Excel Books, New Delhi.
5. http://en.wikipedia.org/wiki/IFRS

Course Outcomes

Upon completion of this course, students will be able to

CO1: Familiarises about principles of accounting, accounting and reporting standards
CO2: Acquires knowledge on methods of valuation of inventory and goodwill
CO3: Understands the importance and flow of cash
CO4: Students acquires the skills of goodwill valuation.
CO5: Provide an idea about segment and interim reporting.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				2			2				1
CO2	3		3		2				2	1		1
CO3	3			2	2				1		1	
CO4				3		2	2					1
CO5	3				2	2		1				1

3-High, 2- Medium, 1- Low.

M.Com (FM) I Semester
PAPER –102: FINANCIAL MANAGEMENT
(Core Paper)
(With Effect from the academic year2021–22)

Course Objectives:

- To increase the knowledge of students on accounting principles and standards
- To enable the students to do inventory valuation
- To impart the ability to find out the cash flows
- To provide the skills to value goodwill
- To create awareness about IFRS and segment reporting

Unit – I Finance: Concept – Functions of Finance – Objectives of Financial Management – Profit Maximization Vs. Wealth Maximization – Organization of Finance Function – Role of the Modern Financial Manager. (Theory only)

Unit– II Investment Decision: Capital Budgeting– Concept– Process – Techniques of Capital Budgeting – Traditional Methods – Payback Period (PB)– Average Rate of Return – Discounted Cash Flow Techniques – Net Present Value– Internal Rate of Return and Profitability Index. (Theory and Problems)

Unit–III Financing Decision: Capital Structure – Concept- Theories of Capital Structure – Net Income approach (NI), Net Operating Income approach (NOI) - Traditional and MM Theories –Cost of Capital: Concept-Computation of Specific Cost of Capital – Determination of weighted Average Cost of Capital. (Theory & Problems)

Unit–IV Leverage Analysis: Concept - Types – Operating – Financial and Combined leverages - Computation of Leverages - EBIT – EPS Analysis –Financial Breakeven- Indifference Points. (Theory and Problems)

Unit–V Dividend Decision: Types of Dividends– Factors Influencing the Dividend policy –Theories of Dividend – Walter– Gordon and MM Hypothesis (Theory only)

REFERENCE BOOKS:

1. Pandy, I.M: Financial Management – Vikas Publishing House, New Delhi.
2. SheebaKapil, Financial Management, Pearson Education ,New Delhi.
3. Jonathan Berk Peter DeMarzo, Financial Management, Pearson Education,2008.
4. Chandrabose, Fundamentals of, Financial Management – PHI, New Delhi.
5. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi.
6. Maheswari, S.N.:Financial Management, Sultan Chand and Sons, New Delhi.
7. Kulakarni. P.V., Financial Management Himalaya Publishing Houses Co Ltd , Mumbai.
8. Van Horne: Financial Management and Policy, Prentice Hall of India, New Delhi.
9. Prasanna Chandra, Financial Management Tata McGraw Hill, New Delhi
10. SheebaKapil, Financial Management Strategy, Implementation and Control, PragathiPrakasam Publication, Meerut.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Examine the objectives of financial management using present value and future value concepts.
CO2: Evaluate opportunity of investment decision applying techniques of capital budgeting and estimate the working capital requirements of an enterprise.
CO3: Analyse financing decisions using theories of capital structure and weighted average cost of capital and estimate the degree of risk through leverage concept.
CO4: Assess the dividend distribution of a firm through important theories of dividend.
CO5: Categorise dividend decision and theories of dividend policy.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1						1				2
CO2		3			2	1					1	
CO3			2	1			2		3			
CO4			1		3							2
CO5				2			1	2				

3-High, 2- Medium, 1- Low.

M.Com (FM) I Semester

PAPER –103: BUSINESS ENVIRONMENT AND POLICY

(Core Paper)

(With Effect from the academic year2021–22)

Course Objectives:

- Examine business environment, concept, nature and scope; scanning, monitoring, changing dimensions of business environment.
- Illustrates economic environment nature and scope and new economic policy.
- Develop political, legal environment; reasons for state intervention and government business interface.
- Study thesocio cultural environment nature, impact of social responsibility and business ethics.
- Interpret global environment; benefits and problems of MNCs and WTO.

Unit – I Business Environment**:** Concept – Nature –Scope–Significance–Types of Environment– Internal and External Environment– Factors Influencing Business Environment–Techniques of Environmental Scanning and Monitoring –Emerging Dimensions of Business Environment. (Theory only)

Unit – II Economic Environment**:** Concept – Nature –Scope –Elements of Economic Environment– Economic System and Business Environment– Economic planning – Industrial policy –Fiscal policy– Monetary Policy–New economic policy. (Theory only)

Unit – III Political and Legal Environment**:** Concepts– Political institutions – Rationale and Extent of State Intervention – Reasons for State Intervention – Types of Intervention –Government Business Interface – Legal Environment–Changing Dimensions of Legal Environment. (Theory only)

Unit – IV Socio– Cultural Environment**:** Concept–Elements of Socio –Cultural Environment –Impact– Social Responsibility of Business – Business Ethics – Corporate Governance. (Theory only)

Unit – V Global Environment**:** Concept**–** Nature –Scope –Significance–Foreign Investment in India – Benefits and problems of MNCs – Strategies for Going Global –EXIM Policy–FEMA– Emerging Challenges of Global Business. (Theory only)

REFERENCE BOOKS

1. Francis Cherunilam, Business environment – Text and cases, Himalaya Publishing House.
2. K. Aswathappa, Essentials of Business environment, Himalaya Publishing House.
3. Pandey G.N. Environmental Management, Vikas publishing house.
4. Raj Agarwal, Business Environment, Excel publications.
5. Sundaram& Black. International Business Environment Text and cases, PHI.
6. Chari, S.N. International Business, Wiley India.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Identify concept, nature, factors influencing and dimensions in business environment.
CO2: Impart knowledge on economic environment, foreign technology agreements, monitory and fiscal policies and new economic policy.
CO3: Understand the rationale for global environment, strategies for going global, WTO and the trading blocks.
CO4: Understand the socio cultural environment
CO5: Examine the rationale for global environment

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					1		2		2			3
CO2	3	2	3	1				2				2
CO3		3	1	1	3				1			
CO4	1				3	2				3		1
CO5	3	2								3		3

3-High, 2- Medium, 1- Low.

M.Com (FM) I Semester

PAPER –104: ORGANISATIONAL BEHAVIOUR

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- Acquire knowledge on the conceptual frame work and emerging issues of OB
- Study different theories of personality and motivation
- Form a clear idea on group dynamics and inculcate the skills to become a leader
- Learn about Organizational structures and clear understanding of management of Interpernual conflicts.
- Obtain knowledge on Organization dynamics as to organization culture, organizational change and know the significance of OB today.

Unit – I Introduction: Organizational Behaviour (OB) – Definition – Nature and Scope – Foundations –OB Model – Importance – Limitations. (Theory only)

Unit – II Individual Behaviour: Foundations of individual behaviour – Personality –Theories of personality –Trait and social learning theories – Motivation– Theories of motivation – McGregor's theory X and theory Y, Maslow's Model and Herzberg's two – Factory theory.(Theory only)

Unit – III Group Dynamics: Foundations of group behaviour – Reasons for group formation – Types of groups – Leadership – Theories of leadership (trait theory; behaviour theories) – Behavioural model (Managerial grid) – Fiedler's contingency Theory.(Theory only)

Unit – IV Organizational Processes: Organizational Change – Causes – Types – OD Interventions – Organizational conflicts – Changing view of conflicts –Inter-personal conflicts – Transactional analysis – Johari window – Life positions. (Theory only)

Unit – V Organizational Dynamics: Organizational Culture – types – Individual behaviour in the global perspective – Cultural differences– Cross Culture – Cultural adjustment – Managerial responses – Emerging Issues in OB. (Theory only)

REFERENCE BOOKS:

1. Aswathappa K., Organizational Behavior: Text, Cases and Games, Himalaya Publishing House, Hyderabad.
2. Fred Luthans, Organizational Behaviour, Tata McGraw Hill Publishing House, New Delhi.
3. JitS.Chandan, Organization Behaviour, Vikas Publishing House, New Delhi.
4. John W. Newstrom and Keith Davis, Organizational Behaviour, Human Behaviour at work, Tata McGraw Hill Publishing House, New Delhi.
5. Kavita Singh, Organisational Behaviour: Text and Cases, Pearson, Delhi.

Course Outcomes

CO1: Understand the framework for OB and its emerging issues
CO2: Diagnose the outcome of different theories of personality and motivation.
CO3: Acquire knowledge on group dynamics and learn skills that help him to become a leader.
CO4: Outline appropriate form of organisational structure and understand clearly better man agent of interpersonal conflicts.
CO5: Obtain wisdom as organisational dynamics as to organisational Culture, managing resistance to change. Also learn the concept of OB and its significance in modern times.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2								
CO2		3		3	3		2				3	3
CO3	3	3		3	2	3	3	3	2	2	2	1
CO4	3	3	3	3		1	1	2	2	1	1	3
CO5	3	2		2	1		2	2	2	1	1	3

3-High, 2- Medium, 1- Low.

M.Com (FM) I Semester

PAPER –105(A): QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives

- Appreciate the use of quantitative techniques, methods of business forecasting and quantitative techniques in business decisions.
- Formulate F distribution and multiple co-relations co-efficient.
- Study probability and non-probability distributions.
- Formulate sampling theory, testing of hypothesis and type I and type II errors.
- Identify linear programming advantages and disadvantages; graphical and simplex method.

Unit– I Quantitative Techniques and Business Forecasting: Concept – Classification of Quantitative Techniques – Statistical Techniques – Programming or Operations Research Techniques – Role of Quantitative Techniques in Business and Industry – Quantitative Techniques and Business Management – Limitations of Quantitative Techniques – Methods of Business Forecasting. (Theory only)

Unit–II Probability and Probability Distributions: Basics of probability – Binomial –Poisson – Normal Distributions – Baye's Theorem. (Theory and problems)

Unit–III Sampling Theory: Concept – Types of Sampling – Hypothesis Testing – The Null Hypothesis – The significance level – Hypothesis Testing Procedure – Type I and Type II errors – Inference from Small Sample Mean Tests – Difference Between the Means of Two Independent Samples – Difference Between the Means of Two Dependent Samples of Paired Observations 't–test' and χ^2 (Chi–Square) test and its applications. (Theory and problems)

Unit–IV Analysis of Variance (F–test): Concept – Assumptions – Testing Equality of Population Means – One–way and Two–way Classifications. (Theory and Problems)

Unit–V Linear Programming: Concept – Requirements for application of Linear Programming – Assumptions – Advantages and limitations – Applications of Linear programming problem – Formulation of Linear Programming problem– Graphical Method – Simplex method. (Theory and problems)

REFERENCE BOOKS:

1. Gupta, S.P.Statistical Methods, S.Chand& Sons, New Delhi
2. Tulasian P.C., and Vishal Pandey, Quantitative Techniques – Theory and Problems Pearson Education New Delhi
3. Gupta and Khanna "Quantitative Techniques for Business Managers" PHI, New Delhi.
4. Ananda Sharma, Quantitative Techniques, Himalaya Publications, Hyderabad.
5. Kothari C.R… Quantitative Techniques Vikas Publications, Mumbai. Vikas Publications, Mumbai.

Course Outcomes

Upon completion of this course, students will be able to

CO1:Identify the concepts Quantitative Techniques and business forecasting, quantitative approach to management as well as in business decision making.
CO2:Understand the test for equality of two population variances, analysis of variance and one way and two way classified data, basics and distributions of probability.
CO3: Demonstrate hypothesis testing, testing difference between the means of two independent/dependent samples chi-square test, requirements for application of linear programming, Formulation of linear programming problem and graphic and simplex methods of solving linear programming.
CO4:Examine the hypothesis testing
CO5:Analyse linear programming concept

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3			3		2					
CO2	3	3			3							
CO3	3	3			3	2						
CO4	3	3			3	3						
CO5	3	3	1	2	3							

3-High, 2- Medium, 1- Low.

M.Com (FM) I Semester

PAPER –105(B): RESEARCH METHODOLOGY IN SOCIAL SCIENCES

(Compulsory Foundation)

(With effect from the academic year 2021–22)

Course Objectives:

- To understand the concept of Research along with its significance.
- To know the classification of research and approaches to it.
- To interpret the methods and sources of data collection with special attention to questionnaire and schedule construction.
- To cognize the meaning of sampling and characteristics of a good sample.
- To get to know the meaning of interpretation and report writing.

UNIT – I Introduction: Meaning and concept of research – significance of research – Characteristics of research–objectives and motivation in research – Importance of research in Social sciences – limitations of research.(Theory only)

UNIT – II Research methodology and Research methods: Meaning – Research methods vs. Methodology – Classification of research–Pure research – Applied research – Explanatory research – Descriptive research– Historical research – Research Approaches.(Theory only)

UNIT – III Methods of data collection: Meaning and importance of data – Sources of data – Methods of collecting primary data and secondary data – Construction of schedule and questionnaire– Selection of appropriate method for data collection – Limitations of collecting primary and secondary data – Difference between schedule and questionnaire.(Theory only)

UNIT – IV Sampling: Meaning – Methods of sampling – Random and Non–Random sampling methods – Sampling errors – Census and sample survey – Significance of sampling – factors determining sampling – Criteria of selecting a sampling procedure – Characteristics of a good sample.(Theory only)

UNIT – V Interpretation and Report writing: Interpretation – Meaning – Techniques – Precautions – Report writing – Meaning –Types of reports – Steps in report writing – Precautions for writing research report – Footnotes and Bibliography – Ethical norms in research – Plagiarism.(Theory only)

REFERENCE BOOKS:

1. Krishna Swami, O.R. and Ranganatham, M. "Methodology of Research in Social Sciences", Himalaya Publishing House, Mumbai.
2. Kothari, C.R.,"Research Methodology: Methods and Techniques": New Age International Publishers, New Delhi.
3. Goode and Hatt: "Methods in Social Research", New York: McGraw Hill.
4. Singh, Jaspal, "Introduction to Methods of Social Research", New Delhi, Sterling Publishers Pvt., Ltd.,.
5. Murthy. C.,"Research methodology", Vrinda Publishing Pvt., Ltd., New Delhi.

Course Outcomes:

1. Understand the concept of Research along with its significance.
2. Know the classification of research and approaches to it.
3. Interpret the methods and sources of data collection with special attention to questionnaire and schedule construction.
4. Cognize the meaning of sampling and characteristics of a good sample.
5. Get to know the meaning of interpretation and report writing.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (FM) I Semester
PAPER –105(C) : MANAGERIAL ECONOMICS
(Compulsory Foundation)
(With effect from the academic year 2021–22)

Course Objectives

- Integrate with managerial economics meaning, nature, scope, characteristics, uses and principles.
- Employ demand forecasting objectives and methods; forecasting demand for new product.
- Allocate cost analysis, cost concepts and cost control and reduction.
- Examine production analysis basic concept and types; factors of production and returns to scale.
- Categorize nature of profits, profit planning and marginal uses of break-even analysis

Unit- I INTRODUCTION: Meaning, nature and scope of Managerial Economics– Principles of managerial economics - Role and responsibilities ofmanagerial economist –PROFIT: Economic profit vs. accounting profit; Profit functions: Profit optimization and slope of profit; Techniques and methods of measuring profit; Profit planning: Objective and factors affecting profit planning - Policies and techniques of profit maximization. (Theory only)

Unit-II DEMAND ANALYSIS: Demand theory and analysis - Factors determining demand – Law of diminishing marginal utility - Indifference curve analysis – Elasticity of demand: Price elasticity – Income elasticity – Cross elasticity (including problems); Demand forecasting: Objectives,methods, and criteria for effective demand forecasting. (Theory only)

Unit-III COST ANALYSIS: Cost concepts and classification – Economies of scale – Short-run and Long-run cost functions –Cost control vs. cost reduction – Tools for cost control and cost reduction - Cost-Volume-Profit analysis (BEP – including problems) and its applications in cost of production. (Theory only)

Unit-IV PRODUCTION ANALYSIS: Meaning of production function - Law of variable proportions – Production with one variable input and production with two variable inputs - Law of diminishing marginal returns - Factors of production and returns to scale – Cobb-Douglas production function – Production iso-quant and iso-cost. (Theory only)

Unit-V MARKET STRUCTURE: Perfect competition: Price determination in short-run and long-run; Monopoly: Price determination in short-run and long-run; Monopsony: Price determination in short-run and long-run; Oligopoly: Price determination in short-run and long-run. (Theory only)

REFERENCE BOOKS:

1. Joel Dean. Managerial Economics, Pearson Education.
2. Varshiney&Maheswari, Managerial Economics, Sultan Chand & Co.
3. Mehta P.L., Managerial Economics, Sultan Chand & Co.
4. Dwivedi D.N., Managerial Economics, Himalaya Publishing House.
5. Trivedi M. L., Managerial Economics, McGraw Hill.
6. Mote, Paul & Gupta, Managerial Economics, McGraw Hill Ltd,

Course Outcomes

CO1: acquire managerial skills and responsibilities as a managerial economist.
CO2: Forecast the demand using opinion polling and statistical methods for existing and new products.
CO3: analyze the cost output relationship and economies of scale for cost control and cost reduction.
CO4: Appraise the input and output relationship through law of variable proportions and Cobb-Douglas production function and formulate the policies on profit maximization.
CO5: Assess nature of profits, different views and functions of profits.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3			1	3			1		
CO2			3	1	3							2
CO3		3			1				2			
CO4				2	2							3
CO5		2	2		1							3

1. 3-High, 2- Medium, 1- Low.

M.Com (FM) I Semester
PAPER – 106(A): BUSINESS COMMUNICATION SKILLS
(Elective Foundation)
(With effect from the academic year 2021–22)

Course Objectives:

COB1: To understand the basics of process, models and methods of communication.
COB2: To analyze various types of non-verbal communication skills.
COB3: To analyze various types of verbal communication skills.
COB4: To discuss the contents of various written communication tools.
COB5: To evaluate the protocols for cross-cultural communication across the globe.

Unit–I: INTRODUCTION: Concept– Objectives– Process of communication – Methods of communication: Oral, written, non–verbal, visual, audio–visual, signs, signals and symbols, silence; Types of communication: Personal, business, internal external, upward, downward, formal, informal, lateral, interactive, mass, and grapevine; Barriers to communication – Factors affecting communication – Essentials of effective communication. (Theory only)

Unit–II: NON–VERBAL COMMUNICATION:Meaningand **t**ypes of non–verbal communication– Body language, postures and gestures – Attire – Appearance – Handshake, personal space, timing, behaviour, smile; Listening skills: Process and types of listening – Barriers to listening – Requirements for effective listening – Humour in communication – Leadership and communication. (Theory only)

Unit–III: VERBAL COMMUNICATION: Meetings: Role of chairperson – Conferences – Presentation skills – making presentations – Requirements for effective presentation; Speaking: Choosing a method of speaking – Analysing the audience – Persuasive speaking; Report writing: Types of reports – Structure of reports – Individual, annual and committee reports – Essentials of good report writing. (Theory only)

Unit–IV: WRITTEN COMMUNICATION**:** Business letters: Essentials, Parts, and forms of business letters; Types of business letters: Tenders, quotations and orders – Circulars and memos – Office notes – Representations and suggestions – Reminders and follow up. (Theory only)

Unit–V: MEDIA AND MULTI–CULTURAL COMMUNICATION**:** Building better relations with media –Framework for managing relations with investors and governments – Impact of multicultural communication on business – Etic and emic approaches to culture – Overcoming cross–cultural communication problems – Cultural communication protocol in China, France, England, Switzerland, USA, and India. (Theory only)

REFERENCE BOOKS:

1. Penrose, Rasberry and Myers, “Business communication for managers”, Cengage Learning.
2. Disanza, “Business and professional communication”, Pearson Education.
3. CSG Krishnamacharyalu and L. Ramakrishna, “Business communications”, Himalaya Publishing House.
4. Krizan Merrier, Logan and Williams, “Effective Business Communication”, Cengage Learning.
5. Kelly Quintanilla and Shawn T Wahl, “Business and Professional communication”, Sage Publications.

Course outcomes:

CO1: Understand the effective modes and methods of communication in a business situation.
CO2: Make oneself confident to use body language and other non-verbal communication in gaining leadership.
CO3: Equip oneself strong in communicating verbally.
CO4: Equip with skills in written communication.
CO5: Build skills in managing relations with media and distinguish the protocols observed across the globe.

CO PO MAPPING

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2					2	3					
CO2	2					2	3					
CO3	1							2				2
CO4	2				3		2					
CO5	1		2			2	3					

3- High, 2- Medium, 1- Low

M.Com (FM) I Semester
PAPER – 106(B):PRINCIPLES OF MANAGEMENT
(Elective Foundation)
(With effect from the academic year 2021–22)

Course Objectives

- To comprehend the concept of management, skills and its process.
- To learn management as a process with its principles and functions.
- To learn the modern management process, business process engineering and reconstruction.
- To understand the concept of Management By Objective (MBO) and quality circles.
- To be aware of functional, personnel, financial, production, marketing, strategic and human resource managements.

UNIT–I: Concept of Management – Definition – Nature of Management – Management Skills – The Management Process – Features of Management – Trends towards Managerial Revolution in India.(Theory only)

UNIT–II: Management as a process – Principles and functions of Management – Operative and Managerial functions – Planning – Organizing – Staffing – Directing – Communication – Leadership – Motivation – Co-ordination – Controlling.(Theory only)

UNIT – III: Modern Management Concepts – Business Plans – Purpose – Contents – Preparation of Plan – Business Process Re-engineering – Re-structuring – Relationship between Re-engineering and Re-structuring – Customer Relationship Management – Benefits of CRM.(Theory only)

UNIT – IV: Management by Objectives – Benefits of MBO – Setting of Objectives – Limitations of MBO – Making MBO Effective – Quality Circles.(Theory only)

UNIT–V: Functional Management – Personnel Management – Financial Management – Production Management - Marketing Management – Human Resource Management – Strategic Management – Social Responsibilities of a Modern Manager.(Theory only)

REFERENCES:

1. Govindarajan.M, Natarajan.S, Principles of Management, PHI Learning Pvt Ltd., Delhi, 2013.
2. Guptha.RS, Sharma.BD, Bhalla NS, Principles and Practices of Management, Kalyani Publishers, New Delhi, 2016.
3. Natarajan.K, Ganesan.KP, Principles of Management, Himalaya Publishing House, New Delhi, 2015.
4. Sherlekar.SA, Management, Himalaya Publishing House, New Delhi, 1997.
5. Thamos N Duening, John M Ivancevich, Management Principles and Guidelines, Atomic Dog Publishing, USA.

Course Outcomes:

1. Comprehending the concept of management, skills and its process.
2. Learning management as a process with its principles and functions.
3. Learning the modern management process, business process engineering and reconstruction.
4. Understanding the concept of Management By Objective (MBO) and quality circles.
5. Being aware of functional, personnel, financial, production, marketing, strategic and human resource managements.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (FM) I Semester
PAPER -107: HUMAN VALUES AND PROFESSIONAL ETHICS – I
(Audit Course)
(With effect from the academic year 2021–22)

Course Objectives

COB1: To create awareness on basics of life and professions.
COB2: To make oneself capable to distinguish between subjective and objective values of society and individual.
COB3: To understand in depth the values and yams of life.
COB4: To understand the cultural values embedded in right from Bhagavad Gita till today's Gandhian philosophy.
COB5: To grasp prescription and proscription as stated in the scripts of Hinduism.

UNIT – I Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

UNIT – II Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral, concepts- right, ought, duty, obligation, justice responsibility and freedom, Good behavior and respect for elders.

UNIT – III Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha (Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).

UNIT – IV Bhagavad Gita- (a) Niskamakarma.(b) Buddhism- The Four Noble Truths – Arya astangamarga (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious, Tolerance, Gandhian Ethics.

UNIT – V Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study:

1. R. Subramanian, Professional Ethics, Oxford University press,New Delhi,2013.
2. John S Mackenjie: A manual of ethics.
3. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
4. "Management Ethics - integrity at work' by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
5. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
6. Harold H. Titus: Ethics for Today
7. Maitra, S.K: Hindu Ethics
8. William Lilly : Introduction to Ethics
9. Sinha: A Manual of Ethics

10. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.

11. Susruta Samhita: Tr.KavirajKunjanlal, KunjalalBrishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.

12. CarakaSamhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.

13. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

14. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company.

Course Outcomes:

106 : HUMAN VALUES AND PROFESSIONAL ETHICS – I
CO1: Understand the axiomatic wisdom on ethics in various walks of life and professions.
CO2: Distinguish between various subjective and objective values that kick start one's rational behavior.
CO3: Learn and assimilate the Hinduism's four values of Purusharthas and Patanjali's five Yamas of life.
CO4: Acculturate the values embedded in Indian religious right from Bhavad Gita to Gandhian Ethics.
CO5: To excavate various prescriptive punishments stated in ancient legal texts of Hinduism like Manusmriti and Yajnavalkyasmrithithat worked as weapons to eradicate criminalism.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								3			
CO2	2									3		
CO3			3						1			
CO4	2	3									2	
CO5			2							3		3

3-High, 2- Medium, 1- Low.

M.Com (FM) II Semester

PAPER – 201: ADVANCED COST ACCOUNTING
(Core Paper)
(With effect from the academic year 2021–22)

Course Objectives

- Co 1: Obtain knowledge on the concept of cost accounting and know how it is different from financial and management accounting;
- Co 2: Understand the features and objectives of process costing and calculation of process losses and Inter-process profits.
- Co 3: Know the concept of equivalent production and accounting treatment for joint and by-products.
- Co 4: Acquire knowledge on budgetary control and preparation of various functional budgets.
- Co 5: Perceive the significance of ABC in cost ascertainment and control.

Unit– I	Introduction – Cost Accounting – Objectives – Scope – Advantages and limitations – Cost Accounting vs. Financial Accounting and Cost Accounting vs. Management Accounting – Concept of Cost – Cost Classification – Installation of Costing System. (Theory Only)
Unit– II	Process Costing: Features and objectives of process costing –Process Losses – Normal Loss– Abnormal Loss – Abnormal Gain – Treatment of Process Losses – Equivalent Production – Methods. (Theory and Problems)
Unit–III	Cost Control and Cost Reduction – Essentials for success of cost control – Advantages and Limitations – Differential Costing – Differences between Marginal Costing and Differential Costing – Characteristics and Significance of Differential Costing. (Theory and Problems)
Unit–IV	Budgetary Control: Concept of budget and budgetary control – Objectives – Benefits and limitations of budgetary control – Classification of Budget – Functional and Flexible budgets. (Theory and Problems)
Unit– V	Activity based costing: Concept – Meaning – Definition and characteristics of ABC – Different stages in ABC – ABC and cost drivers – Advantages of Implementing ABC. (Theory and Problems)

REFERENCE BOOKS:

1. Jain S.P., AND K.L.Narang, Cost Accounting Principles and Practice Kalayani Publishers New Delhi.
2. Rathnam P.V., Rathanm S costing advanced problems and solutions, KitabMahal Distributors.
3. Maheswari S.N., Advanced problems and solutions in cost accounting, Sultan Chand & Sons
4. Bhar B.K., Cost accounting methods and problems, Academic Publishers, Kolkata.
5. Pillai R.S.N., and V.Bhagavathi: Cost Accounting, Sultan Chand and Co. Ltd, New Delhi.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Understand the concept of cost accounting and distinguish between cost accounting, financial accounting and management accounting.
CO2: Explicate process costing, features, objectives its features, and calculate process losses and inter process profits.
CO3: Analyse the concept of equivalent production and its calculation by applying different methods. Also diagnose accountingtreatment by for products and joint products.
CO4: Perceive budget and budgetary control and prepare budgets in functional areas of Management.
CO5: Outline the uniqueness of ABC in the process of cost ascertainment and its control.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3			3			2		3		
CO2	3	3			3		1	3	2	1	1	
CO3	3	3			3		1	3	3	2	1	1
CO4	3	3		1	3		2	3	1	2	1	1
CO5	3	3		1	3		2	3	3	2		3

3-High, 2- Medium, 1- Low.

M.Com (FM) – II Semester

PAPER – 202: FINANCIAL MARKETS AND SERVICES

(Core Paper)

(With effect from the academic year 2021–22)

Course Objectives

- COB1: To understand the framework of Indian financial system and money market.
- COB2: To evaluate the metrics of primary market and secondary capital market.
- COB3: To demonstrate the role of merchant bankers.
- COB4: To analyze the metrics involved in credit rating the financial instruments issued by companies in primary market.
- COB5: To create plans and understand the metrics for getting finance from venture capital firms.

UNIT–I FINANCIAL SYSTEM AND MONEY MARKET: Indian Financial system: Evolution – Structure – Functions – Components; Role in the Indian economic development; Financial Sector reforms: MONEY MARKET: Significance–Instruments of money market including Call money, Commercial bills, Commercial papers, Certificates of deposits, Repo and reverse repo, MMMFs, Money market derivatives and Primary dealers. (Theory only)

UNIT–II CAPITAL MARKET AND SEBI: Structure, participants and instruments of CAPITAL MARKET; Primary market: Functions –Methods of floating new issues –Intermediaries including merchant bankers, underwriters, bankers, brokers and registrars to the issue, debenture trustees, and portfolio managers; Secondary market: Listing andonline trading of securities – Categories of shares – Primary market vs. secondary market – CDSL and NSDL; SEBI: Functions– Powers. (Theory only)

UNIT–III MERCHANT BANKING: Concept – Originand evolution – Scope – Functions – Commercial banking vs. merchant banking; SEBI Regulations on pre–issue and post– Issue obligations of merchant banker. (Theory only)

UNIT–IV CREDIT RATING AND FACTORING: CREDIT RATING: Significance – Features – Process of credit rating – Advantages and drawbacks of credit rating; Rating methodology of CRISIL, CARE, ICRA, FITCH; SEBI regulations on credit rating; FACTORING: Mechanism – Functions – Types; Factoring vs. bills discounting – Legal aspects of factoring agreement (Theory only).

UNIT–V VENTURE CAPITAL FINANCING AND MUTUAL FUNDS: Features – Stages of venture capital financing (VCF) – Financial analysis – Investment nurturing and its types – Exit route –Management buy–ins and management buy–outs – Mezzanine finance – VCF scenario in India – SEBI Regulations on VCF; MUTUAL FUNDS: Concept – Classification of MFs– Organization and management –MF evaluation – SEBI Guidelines on MFs (Theory only).

REFERENCE BOOKS

1. Gordon, E., and Nataraja, K., Financial Markets and Service, Himalaya Publications.
2. Guruswamy S, Merchant banking and financial services, McGrawHill Publications.
3. Khan, M.Y., Financial Services, Tata McGraw Hill Publications.
4. Machiraju, H.R., Merchant Banking, New Age Interrnational Publishers.
5. Gupta, S.K., and NishaAggarwal, Financial Services, Kalyani Publisher

Course Outcomes

Upon completion of this course, students will be able to

CO1: Examine the components of the Indian financial system and reforms in it with a detailed review on money market components.
CO2: Have an in-depth analysis of capital market including primary and secondary market and powers of SEBI regulating this market.
CO3: Familiarize oneself with functions of merchant bankers and their obligations to SEBI.
CO4: Demonstrate the methodology involved in rating the financial instruments by credit rating organizations and in mapping factoring mechanism.
CO5: Explore the possibility of getting venture capital finance during different stages of business within the framework of SEBI regulations and to familiarize with mutual funds.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2									
CO2	1		2					2				
CO3										3		
CO4				3	2							
CO5		1						3				

3-High, 2- Medium, 1- Low.

M.Com (FM) – II Semester
PAPER –203: STRATEGIC FINANCIAL MANAGEMENT
(Core Paper)
(With effect from the academic year 2021–22)

Course Objectives

- Describe strategic management concept, importance and purpose; strategic planning concept and characteristics,
- Explain Strategic financial management success factors and constraints.
- Illustrate corporate valuation approaches and guidelines; value based management.
- Identify financial distress and restructuring; countering financial distress.
- Justify corporate sickness and financial engineering; fund raising and fund deployment strategies.

Unit– I Strategic Management: Concept – Important Concerns – Purpose – Constraints – Process– Strategic Planning– Concept – Characteristics – Components –Benefits– Constraints of Strategic Planning. (Theory only)

Unit–II Strategic Financial Management: Concept–Scope–Characteristics–Importance – Success Factors–Strategic Financial Planning – Principals of Strategic Financial Planning. (Theory only)

Unit–III Corporate Valuation: Concept – Objectives – Approaches of Corporate Valuation–Value Based Management–Elements–Significance–Process–Methods of Value Based Management. (Theory and problems)

Unit–IV Financial Distress and Restructuring: Concept – Characteristics – Reasons for Corporate Financial Distress – Cost of Financial Distress – Impact of Financial Distress – Countering Financial Distress. (Theory only)

Unit–V Corporate Sickness and Financial Engineering: Concept – Managerial Causes of Sickness – Revival –Financial Engineering: Concept – Approaches to Innovative Financial Engineering –Fund Deployment Strategies– Financial Re–engineering. (Theory only)

REFERENCE BOOKS:

1. RajniSofat and PreetiHiro: Strategic Financial Management. Prentice Hall of India Learning Pvt., New Delhi.
2. Dr.Pradip Kumar Sinha: Strategic Financial Management. Excel Books, New Delhi.
3. G.P.Jakhotiya: Strategic Financial Management. Vikas Publishing House Pvt. Ltd., NewDelhi.
4. Allen: An Introduction to Strategic Financial Management. Koran Page
5. Mathew P.K: Corporate Restructuring in India: Perspectives. McMillian.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Draft strategic financial planning using success factors and constraints of strategic management and strategic financial management.
CO2: Appraise the corporate valuation and value based management through critical approaches.
CO3: Assess the impact of financial distress with quantitative and qualitative cost elements for corporate restructuring.
CO4: Acquire and adopt innovative strategies through financial engineering and re-engineering to counter corporate sickness.
CO5: Analyze portfolio revision concept, need and strategies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				3		2			1		1	
CO2	1		3				2					
CO3		2	3					1				
CO4				1	2		1					3
CO5	3					3		2				2

3-High, 2- Medium, 1- Low.

M.Com (FM) II Semester

PAPER –204: CORPORATE GOVERNANCE
(Core Paper)
(With effect from the academic year 2021–22)

Course Objectives:

- Co 1 : Obtain knowledge on CG Mechanism and emerging issues in CG
- Co 2 : Know the genesis of CG in China USA and UK and also the code of the best practices.
- Co 3 : Gain Knowledge on the historical backdrop of CG in India and the guild lines pronounced by various committees for effective practice in India.
- Co 4 : Discern knowledge on the composition of Board of Directors and Audit Committees and know the role of internal Auditors in India.
- Co 5 : Understand the CG standards and practices in India with focus on IT and futures of CG in India.

UNIT – I Corporate governance : Meaning – Need – Importance – Corporate Governance(CG) mechanism – CG Systems – Indian model of CG – CG and Value maximization – Issues in Corporate Governance.(Theory only)

UNIT – II Emergence of Corporate governance: Developments in USA and UK – Role of World Bank – OCED – McKinsey – Sarbanes –Oxley Act,2002 – World Committees on CG – The Cadbury Committee. The Hampel Committee – Principles of good CG and code of best practices. (Theory only)

UNIT –III Corporate Governance in India: Need and Importance – Historical perspective – Indian Committees and guidelines on CG – Naresh Chandra Committee – Narayana Murthy Committee – J.J Irani Committee – Kumara Mangalam Birla Committee – The CII initiatives – SEBI initiative – CG practice in India. (Theory only)

UNIT –IV Board of Directors and Audit Committee: Board of Directors and their role in CG – Composition of Board – CG issues relating to Board – Independent Directors – Clause 49 of listing agreement – Audit Committee: Duties and responsibilities of Auditors – Composition of Audit Committee – CG and internal auditors – Indian situation.(Theory only)

UNIT – V Corporate Governance Standards and practices in India: CG Standards – Methods for examining the quality and effectiveness of CG – CG standards in Indian context – CG in IT sector – Pioneers in good CG practices – Problems of CG in India – CG and Business Ethics – CG and Corporate social responsibility (CSR) – Future of CG in India.(Theory only)

REFERENCE BOOKS

1. Fernando A.C – Corporate Governance – principles, Policies and practices – Pearson Education.
2. Subash Chandra Das – Corporate Governance – Codes, Systems, Standards and Practices – PHI.
3. Kesho Prasad – Corporate Governance – PHI Learning – New Delhi–2009
4. Singh S – Corporate Governance – Global Concepts and Practices – Excel Books.
5. Donald H. Chew Jr. Staurt L Gillan – Corporate Governance at Crossroads – Tata McGraw Hill Co. Ltd.,

Course Outcomes

Upon completion of this course, students will be able to

CO1: Assess the Corporate Governance (CG) mechanism and analyse the emerging issues in the arena of CG.
CO2: Trace out the emergence of CG in USA and UK and findings of Cadbury and Hostel committees and better understanding of code of best practices.
CO3: Grasp the historical backdrop of CG in India and perceive the guidelines pronounced by various committees on CG for its effective practice in India.
CO4: Know about the composition of Board of Directions and Audit Committees and visualise the current status of internal auditors in Indian context.
CO5: Exact knowledge on CG standards and practices in India with reference to IT sector and analyse the future of CG in India.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2						2	2	2	
CO2	3		3						2	2	2	
CO3	2		2	1	2				1	2	2	
CO4	3		2						2	2		
CO5	3								1			2

3-High, 2- Medium, 1- Low.

M.Com (FM) II Semester Syllabus

PAPER –205(A) :WORKING CAPITAL MANAGEMENT
(Compulsory Foundation)

(With Effect from the academic year2021–22)

Course Objectives:

- To impart basic knowledge on working capital concepts and source of WC
- To provide the skills to estimate working capital
- To enables the students familiarise with the cash management techniques.
- To comprehend the concept of receivables and its management.
- To provide the skills of inventory management with different techniques.

Unit–I Introduction: Concept of working of capital – Need and Significance – Types of working capital – Permanent and Variable working capital – Sources of Working Capital – Long–term sources – Short–term sources – Financing of Current Assets: Matching – Conservative – Aggressive Approaches (Theory only)

Unit–II Estimation of Working Capital: Determinants of Working Capital – Techniques of Forecasting Working Capital – Operating Cycle – Estimation of Gross and Net Working Capital requirements (Theory and Problems)

Unit–III Cash Management: Concept – Objectives – Motives – Facets – Cash collection and disbursement – Optimum Cash balances – Investment of surplus funds – Cash Budget – Cash Management Techniques – Cash Management Models: Baumol Model – Miller and Orr Model. (Theory and Problems)

Unit–IV Receivables Management: Concept – Nature and goals – Variables – Credit policy – Optimum credit policy – Credit evaluation – Monitoring receivables.(Theory only)

Unit–V Inventory management: Concept – Need – Objectives – Level of Inventory – Techniques of Inventory Management – EOQ analysis – ABC analysis – JIT system – VED analysis. (Theory and problems)

REFERENCE BOOKS:

1. Pandey, I.M. Financial Management, Vikas Publishing House, New Delhi.
2. Hrishikes Bhattacharya, Working Capital Management–Strategies and Techniques, Prentice–Hall of India Pvt. Ltd., New Delhi.
3. G.V. SatyaSekhar, Working Capital Management, Wiley India Pvt. Ltd., New Delhi.
4. R.P. Rutagi, Working Capital Management, Taxmann Publications Private Limited, New Delhi.
5. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi.
6. Prasanna Chandra, Financial Management, Tata McGraw Hill, New Delhi.
7. Van Horne: Financial Management and Policy, Prentice Hall of India, New Delhi.
8. Maheswari, S.N: Financial Management, Sultan Chand and Sons, New Delhi.
9. Kulakarni, P.V., Financial Management, Himalaya Publishing House, Mumbai.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Explain the basic concepts, functions and objectives, evolution and development.
CO2: Critically analyse the approaches and process of job design, factors affecting human resource planning, importance of recruiting, placement and induction and nature and importance of training and career planning.
CO3: Acquire knowledge on compensation management; grievance handling and collective bargaining discover the process of knowledge management and role of leader in organisations.
CO4: Understands the concepts of receivables and its management
CO5: Acquires the knowledge about techniques of inventory management and its application

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2		2	1						
CO2	3	2		1	2							
CO3	3	2	1		3							
CO4	3								2		2	1
CO5	3	2			2							1

3-High, 2- Medium, 1- Low.

M.Com (FM) II Semester

PAPER – 205(B) : LEGAL ASPECTS OF BUSINESS
(Compulsory Foundation)

(With Effect from the academic year2021–22)

Course Objectives:

- To understand companies act and its history.
- To know the framework of companies like board of directors and auditors.
- To interpret the Negotiable Instruments Act, 1881.
- To cognize Competition Act, 2002.
- To get to know the essence of cyberspace and cyber law.

Unit–I Companies Act–I: History of Companies Act–Meaning and Nature of a Company–Kinds of Companies–Formation and Incorporation of Company– Steps in Incorporation of a Company–Memorandum of Association–Article of Association–Prospectus. (Theory only)

Unit–II Companies Act–II: Board of Directors – Types of Directors – Appointment of Directors – Board Meetings – Duties and Liabilities of Directors – Removal of Director. Company Auditors – Appointment – Responsibilities of Company Auditor – Removal of Auditor. (Theory only)

Unit–III Negotiable Instruments Act, 1881: Meaning of Negotiable Instruments – Characteristics – Classification of Instruments – Different provisions relating to Negotiation, Negotiability, Assign ability – Rights and Obligation of parties – Presentation of Instruments – Rules of Compensation. (Theory only)

Unit–IV Competition Act, 2002: Introduction – Competition – Meaning – Objectives – Extent of Applicability – Competition of Commission of India – Areas affecting Competition – Duties, Powers and Functions of Commission – Penalties. (Theory only)

Unit–V Cyberspace and cyber Law: Introduction to cyber space and cyber law – Components of cyber law – Categories Cyber Law–Punishments–Components of cyber law – Internet governing bodies – International aspects of electronic contracting – Global issues of Privacy in cyber space. (Theory only)

REFERENCE BOOKS:

1. M.C. Kuchhal, Modern Indian Company Law, Mahavir Publications.
2. N.D. Kapoor, Elements of Company Law, Sultan Chand.
3. K.L. Maheshwari and R.K. Maheshwari, Company Law & Secretarial Practice, New Royal Company.
4. Bimal N. Patel, Banking Law and Negotiable Instrument Act, Eastern Book Company.
5. Universal Law Series, Negotiable Instrument Act, Lexis Nexis, Chennai.
6. NehaVyas, Competition Law, Eastern Book Company, Lucknow.
7. H.K. Saharay, Text Book on Competition Law, Universal Law Publishing.
8. Ramandeepkaurnagra, Cyber laws and Intellectual Property Rights, Kalyani Publishers, 7e.
9. Nina Godbole&SunitBelapure Cyber Security, Wiley India Pvt Ltd.

Course Outcomes:

1. Understanding companies act and its history.
2. Knowing the framework of companies like board of directors and auditors.
3. Interpreting the Negotiable Instruments Act, 1881.
4. Cognizing Competition Act, 2002.
5. Knowing the essence of cyberspace and cyber law.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (FM) II Semester Syllabus

PAPER– 205(C): RISK MANAGEMENT
(Compulsory Foundation)
(With Effect from the academic year2021–22)

Course Objectives:

- To learn the concept of risk management.
- To enhance knowledge in risk management by individuals.
- To cognize the Enterprise Risk Management and its process.
- To understand the Risk Management Information System.
- To learn in detail about advanced topics in risk management.

Unit – I Concept of Risk Management – Types – Objectives – Functions – Risk Management Process –Steps – Methods of Handling Risk – Risk Retention – Control.(Theory only)

Unit – II Risk Management by Individuals – Influencing Factors – Mitigating Individual Risks – Insurance – Objectives – Costs and Benefits. (Theory only)

Unit – III Enterprise Risk Management (ERM) – Process – Components – Risk Exposures – ERM Basics – COSO Frame Work for ERM – Emerging Role of CRO and ERM in Insurance – Tools and Techniques of ERM. (Theory only)

Unit – IV Risk Management Information System (RMIS) – Objectives and Functions – Emerging Trends – Risk Manager Tasks and Responsibilities – Risk Management Strategies – Benefits. (Theory only)

Unit – V Advanced Topics in Risk Management – Changing Scope of Risk Management – Financial Analysis in Risk Management – Decision Making –Management Tools – Loss Forecasting – Control Methods. (Theory only)

REFERENCE BOOKS:

1. Arunajatesam.S, Risk Management Insurance, Macnillan publishers India Ltd.
2. Bhattacharya. K.M, Risk Management in Indian Banks, Himalaya Publishing House.
3. George, E. Rejda, Principles of Risk Management and Insurance, Pearson Education.
4. Gupta, P. K, Insurance and Risk Management, Himalaya Publishing House.
5. Harrington. E, Risk Management and Insurance, Tata McGraw Hill Publishing Company Limited.

Course Outcomes:

1. Learning the concept of risk management.
2. Enhancing knowledge in risk management by individuals.
3. Cognize the Enterprise Risk Management and its process.
4. Understanding the Risk Management Information System.
5. Learning in detail about advanced topics in risk management.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (FM) II Semester
PAPER – 206(A): E–BANKING OPERATIONS
(Elective Foundation)
(With effect from the academic year 2021–22)

Course objectives (COBs):

- To understand the RBI's financial norms to be followed by commercial banks.
- To investigate into the roles of various commercials banks in India.
- To analyze the mechanism of offline and online borrowing and lending of funds.
- Familiarize with merits and demerits o e-banking applications.
- Categorize the financial frauds in e-banking sector.

UNIT – I IndianBanking: Definition– Functions – Pubic vs. private sector banks; Banks vs. NBFCs – Foreign banks – Regional Rural Banks – State Co–operative Banks – District CentralCo-operative Banks – Urban Co-operative Banks.(Theory only)

UNIT –II Banking services: Accepting of Deposits – Lending of funds – Retail banking – Merchant banking – Factoring services – Investment banking – Mutual fund services – Bill discounting – Issue of Letter of Credit (LC). (Theory only)

UNIT – III E–banking: Concept – NPCI – UPI – Debit Cards – Credit cards – RTGS vs. NEFT – Electronic Clearing System – Telephone Banking – Pros and cons of E–banking –Challenges in E–Banking. (Theory only)

UNIT–IV Payment systems: Pre–paid (PP) cards – Open and closed Pre–Paid cards – Post–paid credit cards – Steps in credit card processing – Requirement metrics of an effective e–payment system.(Theory only)

UNIT–V E–banking frauds: Electronic Clearing Services – Frauds in E–banking operations –The security measures taken by banks.(Theory only)

REFERENCE BOOKS:

1. Ravindra Kumar, Deshpande, E–Banking, Pacific Books International.
2. Indian Institute of Banking, Digital Banking, Mumbai.
3. The Banker, Mumbai (Journal)

Course Outcomes

CO1: Familiarize oneself with safety, liquidity, profitability and productivity norms of banks as prescribed by RBI.
CO2: Acquaint oneself with the role of RRBs, SCBs, DCCBs, and UCBs in India.
CO3: Analyze the mechanisms involved borrowing and lending of funds, and e-banking operations.
CO4: Equip oneself with pros and cons involved in application of various modes of e-banking.
CO5: Investigate into frauds encountered and security measures taken in e-clearing services in banking sector.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				3			2				
CO2	2		3									
CO3	1		2		3							
CO4						2		2				
CO5			3						3		3	

3-High, 2- Medium, 1- Low.

M.Com (FM) II Semester

PAPER – 206(B): MANAGEMENT INFORMATION SYSTEMS

(Elective Foundation)

(With effect from the academic year 2021–22)

Course objectives (COBs):

COB1: To understand the RBI's financial norms to be followed by commercial banks.
COB2: To investigate into the roles of various commercials banks in India.
COB3: To analyze the mechanism of offline and online borrowing and lending of funds.
COB4: Familiarize with merits and demerits o e-banking applications.
COB5: Categorize the financial frauds in e-banking sector.

Unit-I: Introduction: Concepts of Management Information System(MIS)- Classification and their implications – Business intelligence – Database models – Database design – RDBMS and MIS; Data processing: Transaction processing – Application processing – Information system processing; Role of MIS: In management and organization effectiveness, and strategic business planning. (Theory only)

Unit-II**:** Systems Engineering (SE) **:**Types and classes of system – General model of SE – Need for system analysis – Analysis of existing and new system - System development model – Structured System Analysis and Design (SAD) – Object-oriented Analysis (OOA) – System Development through Object Oriented Technology (OOT) – Object Oriented Analysis and Design(OOAD) – Systems Development Life Cycle (SDLC). (Theory only)

Unit-III: Design of MIS and Business Process Reengineering (BPR)**:** Planning of MIS – Determining information requirements – Organization, development and implementation of MIS – Development process of MIS – Need for design of MIS – Process of design of MIS – Strategic management and MIS – Process and value stream models of business – Reasons for delay in business process – MIS and Business Process Reengineering. (Theory only)

Unit-IV: Applications of MIS: Human Resource information system – Financial information system – Production information system – Marketing information system – Material Management Information system – Services information system. (Theory only)

Unit-V: Decision Support System (DSS) and ERP: Decision Support Systems and Group Decision Support Systems – Applications of DSS – Knowledge Management System – Benefits of MIS and DSS – Enterprise Resource Planning (ERP) – ERP modules – Benefits of ERP - ERP evaluation and implementation. (Theory only)

REFERENCE BOOKS:

1. Kenneth C. Laudon and Jane P. Laudon: Management Information Systems, PHI andPearson Education.
2. Rainer, Turban, Potter: Introduction to Information Systems, WILEY-India.
3. James A. Obrein: Management Information Systems, Tata McGraw Hill.
4. Dharminder and Sangeetha: Management Information Systems, Excel books.
5. Alexis Leon: ERP (Demystified), Tata McGraw Hill.

Course Outcomes (COs)

CO1: Familiarize oneself with safety, liquidity, profitability and productivity norms of banks as prescribed by RBI.
CO2: Acquaint oneself with the role of RRBs, SCBs, DCCBs, and UCBs in India.
CO3: Analyze the mechanisms involved in borrowing and lending of funds, and e-banking operations.
CO4: Equip oneself with pros and cons involved in application of various modes of e-banking.
CO5: Investigate into frauds encountered and security measures taken in e-clearing services in banking sector.

COs-POs mapping

POs/COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				3			2				
CO2	2		3									
CO3	1		2		3							
CO4						2		2				
CO5			3						3		3	

3- High, 2- Medium, 1- Low.

M.Com (FM) II Semester
PAPER -207: HUMAN VALUES AND PROFESSIONAL ETHICS – II
(Audit Course)
(With effect from the academic year 2021–22)

Course Objectives

COB1: To create awareness on value education.
COB2: To make oneself capable to possessing knowledge in medical ethics.
COB3: To understand in depth the business ethics.
COB4: To understand the environmental ethics.
COB5: To grasp and apply social ethics.

UNIT – I Value Education- Definition - relevance to present day - Concept of Human Values - self introspection –Self esteem. Family values-Components, structure and responsibilities of family- Neutralization of anger – Adjustability Threats of family life -Status of women in family and society - Caring for needy and elderly Time allotment for sharing ideas and concerns.

UNIT – II Medical ethics- Views of Charaka, Sushruta and Hippocratus on moralresponsibility of medicalpractitioners. Code of ethics for medical and healthcare. Euthanasia, Ethical obligation to animals, Ethical issues in relation to healthCare professionalsprofessionals and patients. Social justice in health care, by human cloning, problems of abortion. Ethical issues in genetic engineering Ethical issues raised new biological technology or knowledge.

UNIT – III Business ethics- Ethical standards of business-Immoral and illegal practicesand their solutions.Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

UNIT – IV Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pestcontrol, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

UNIT – V Social ethics- Organ trade, Human trafficking, Human rights violation and socialdisparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television,Movies and Internet.

BOOKS FOR STUDY:

1. R. Subramanian, Professional Ethics, Oxford University press,New Delhi,2013.
2. John S Mackenjie: A manual of ethics.
3. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
4. “Management Ethics-integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
5. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
6. Harold H. Titus: Ethics for Today
7. Maitra, S.K: Hindu Ethics
8. William Lilly : Introduction to Ethics
9. Sinha: A Manual of Ethics
10. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haug

Course Outcomes:

CO1: Able to create awareness on value education.
CO2: Make oneself capable to possessing knowledge in medical ethics.
CO3: Understanding in depth the business ethics.
CO4: Understanding the environmental ethics.
CO5: Grasping and appling social ethics.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								3			
CO2	2									3		
CO3			3						1			
CO4	2	3									2	
CO5			2							3		3

3-High, 2- Medium, 1- Low.

M.Com (FM) III Semester

PAPER – 301: SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT
(Core Paper)
(With effect from the academic year 2021–22)

Course Objectives

- Describe strategic management concept, importance and purpose; strategic planning concept and characteristics,
- Explain Strategic financial management success factors and constraints.
- Illustrate corporate valuation approaches and guidelines; value based management.
- Identify financial distress and restructuring; countering financial distress.
- Justify corporate sickness and financial engineering; fund raising and fund deployment strategies.

Unit – I Securities Analysis : Basics of Investment–Objectives – Fundamental Analysis –Technical analysis – Efficient Market Hypothesis(EMH) –Forms of EMH –Random Walk Theory– Implications (Theory only)

Unit – II Valuation of Securities: Valuation of Equity shares–Dividend capitalization Methods – Earning Capitalization Methods; Valuation of Bonds–Basic concepts–Types of Bonds– Measuring Bond Duration. (Theory and Problems)

Unit – III Portfolio Theory: Capital Asset Pricing Model (CAPM) –Assumptions – Capital Market Line vs. Security Market Line (SML) – Arbitrage Pricing Theory– Assumptions. (Theory and Problems)

Unit – IV Portfolio Evaluation: Concept – Measures of portfolio performance –Sharpe's Performance Index – Treynor's Performance Index –Jensen's Performance Index. (Theory and Problems)

Unit – V Portfolio Revision: Concept – Need – Formula plans – Assumptions–Advantages and Disadvantages – Types of Formula plans – Portfolio Revision Strategies. (Theory only)

REFERENCE BOOKS:

1. PrasannaChandra: Analysis and Portfolio Management, Tata McGraw Hill Co. Ltd., New Delhi.
2. Kevin, Security Analysis and Portfolio Management, PHI, New Delhi.
3. Avadani V.A.: Security Analysis and Portfolio Management, Himalaya Publishing House, New Delhi, 2008.
4. Prethi Singh, Investment Management, Security Analysis and Portfolio Management, Himalaya Publishing House, New Delhi.
5. Dhamodharan : Investment Valuation, Johnweely and Sons, New York.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Apply the tools and techniques of fundamental analysis, technical analysis and Random Walk theory for expected return on investment.
CO2: Ascertain the value of equity shares and bonds through different valuation models to buy and sell decision.
CO3: Analyze the portfolio selection through significant models like capital asset pricing model (CAPM) and Arbitrage pricing theory (APT).
CO4: Evaluate the performance of the portfolio through ideal measures and revise the portfolio for better performance.
CO5: Apply the tools and techniques of fundamental analysis, technical analysis and Random Walk theory for expected return on investment.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1					1				1
CO2		3			3						1	
CO3		2	3	1	3							
CO4				3	2		1					
CO5	3					3	2					2

3-High, 2- Medium, 3- Low

M.Com (FM) III Semester
PAPER – 302: ACCOUNTING FOR MANAGERIAL DECISIONS
(Core Paper)
(With effect from the academic year 2021–22)

Course Objectives:

- Learn the concept of management accounting, cost analysis for pricing decision and different methods of pricing
- Understand different managerial decisions influencing short and long-term financing
- Study the concept of Responsibility Accounting and its uses and trends.
- Know the essential parameters for evaluation of divisional performance and the emerging issues today
- Obtain comprehensive knowledge on management reporting and reporting practices of Indian corporates.

Unit – I	Managerial accounting – Functions –Limitations– Pricing Decisions – Objectives – Factors influencing Pricing decisions – Cost analysis for pricing decisions – Product pricing methods – Full cost pricing – Mark–up pricing – Break–even pricing – Target pricing . (Theory and Problems)
Unit – II	Managerial decisions – Cost behaviour – Determination of sales mix – Exploring new markets – Discontinuance of a product line – Make or buy decisions – Equipment Replacement Decision – Shut down or continue (Theory and Problems)
Unit – III	Responsibility Accounting (RA) – Concept – Process of implementing RA – Managerial uses– Responsibility centres – Cost centre – Revenue Centre – Profit centre – Investment Centre – Responsibility performance reporting – Objectives (Theory and Problems)
Unit – IV	Divisional performance and transfer pricing –Evaluation of divisional performance – Contribution margin approach – Return on investment approach – Residual income approach – Transfer pricing – Methods of transfer pricing (Theory and Problems)
Unit – V	Management Reporting – Concept – Modes of reporting – Types of reports – Requisites of a good report – Management Reporting System – Forms of management reports – Reporting practices in Indian corporates (Theory only)

REFERENCE BOOKS:

1. Charles T. Horngren, G.L. Sundem and W.O. Stratoon, Introduction to Management Accounting, Pearson, Delhi.
2. Jawaharala, Management Accounting, Himalaya Publishers, Mumbai.
3. Kulshrestha, N.K., Management Accounting, Tata McGraw Hill, New Delhi.
4. Khan.M.Y, Jain.P.K, Management Accounting(7th edition), McGraw Hill, New Delhi, 2018.
5. Maheswari, S.N., Principles of Management Accounting, Sultan Chand & Sons, New Delhi.
6. PrashantaAtma, Cost and management Accounting, Himalaya Publishing House, Hyderabad.
7. Robert S. Kaplan and Anthony A. Atkinso, Advanced management Accounting, Prentice hall, New Delhi.
8. Sahaf M.A., Management Accounting Principles and Practice, Vikas Publishing House, Mumbai.
9. Sharma R.K and Gupta, S.K., Management Accounting, Kalyani Publishers, Ludhiana.

Course Outcomes

Upon completion of this course, students will be able to

CO1:	Understand the concept of Managerial Accounting, cost analysis for pricing decisions and also learn different product pricing methods
CO2:	Know the significance of different managerial decisions affecting the short term and long term financing .
CO3:	Analyse the concept of RA, managerial utility of different responsibility centres and acquaintance with the emerging trends issues in RA.
CO4:	Familiarise the evaluation of divisional performance parameters and describe the emerging issues in TP
CO5:	Elucidate the concept of management reporting and have awareness about reporting practices adopted by Indian corporate.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		1			1				
CO2	3	1	2		2			1				
CO3	3	1	1		1			3				
CO4	3	1		1			1	1				
CO5	3	2	1		1							

3-High, 2- Medium, 1- Low.

M.Com (FM) III Semester
PAPER – 303(A) : TALLY WITH GST APPLICATIONS
(Generic Elective)
(With effect from the academic year 2021–22)

Course Objectives:

- COB1: To acquaint oneself with skills to prepare financial statements through Tally ERP.
- COB2: To understand basics of GST system.
- COB3: To know steps involved in generating GSTR reports.
- COB4: To know the metrics in calculation and generation of TDS and service tax reports.
- COB5: To acquire skills to create payroll receipts.

Unit–I Features of Tally accounting – Components of Gateway of Tally and button panel – Purposes and components of F11 And F12 – Creation and setting up of a company – Accounting Masters: Creation, alteration and deletion of single and multiple groups – Creation, alteration of single and multiple ledgers – Recording transactions in accounting vouchers: Creation and alteration of vouchers – Display and print of financial statements (Theory and lab).

Unit–II Inventory: Configuration – Inventory Masters: Creation, display and alteration of stock groups, stock categories, godowns, units of measure, stock items –Recording transactions: Creation of inventory vouchers – Display and print of inventory reports (Theory and lab).

Unit – III GST: Enabling GST features in Tally (Configuration) – Basics of GST – Rates of GST – Configure GST details of your company – Creating Party Ledgers & Tax Ledgers – Setting up of SGST, CGST, IGST rates for input and output – Creation of vouchers – Recording intra and inter–state vouchers with GST tax ledgers; Types of invoice under GST: Tax invoice vs. Bill of supply; Contents of tax invoice – Display and print of GST reports (Theory and lab).

Unit–IV TDS: Configuration –Company creation – Creation of ledgers and vouchers – Recording advance and balance payments of Tax – Generation of TDS reports (Theory and lab).

Unit–V Payroll: Configuration – Payroll features – Enabling payroll details – Creation of payroll masters– Creating the Pay Head ledgers – Creating the employee details and salary details of an individual – Creating details of Attendance types; List of Payroll Voucher types: Pay roll voucher and attendance voucher ; Recording Attendance and Payroll voucher entries – Display and print of various payroll reports (Theory and lab).

REFERENCE BOOKS:

1. Nadhani, A.K. and Nadhani, K.K. Implementing Tally BPB Publication.
2. Kiran Kumar, K. Tally, Laasya Publishers, Hyderabad
3. NeerajGoyal, RohitSachdeva, Tally with GST Applications, Kalyani Publishers.
4. Vishnu Priya Singh, Tally, Computech Publications Ltd, New Delhi.
5. www.Tallyeducation.com

Course Outcomes

Upon completion of this course, students will be able to

CO1: Acquire skills in preparing company financial statements on accounting and inventory bases through Tally accounting software.
CO2: Have a bird's eye view on GST system including methodology in evaluating time, place and value of supply of goods and services, and input tax credit mechanism.
CO3: Be skillful in recording interstate and intrastate supply and return of goods and in generating various GSTR reports.
CO4: Equip oneself with skills in recording payments and generation of TDS and service tax reports.
CO5: Demonstrate the practical knowledge on creating and printing of various payroll receipts.

CO-PO Mapping

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2									2
CO2	3							2				
CO3					2			3				
CO4					2			2				
CO5					2			2				

M.Com (FM) III Semester
PAPER –303(B) : INTERNATIONAL FINANCIAL MANAGEMENT
(Generic Elective)
(With effect from the academic year 2021–22)

Course Objectives

- Determine international financial management concept, importance, nature and scope.
- Demonstrate foreign exchange market and exchange rate mechanism; types of exchange rates.
- Evaluate foreign exchange exposure concept, relevance and classification; management of accounting exposure.
- Evaluate international project appraisal concept and approaches; international perspective of working capital.
- Plan international equity investment concept, risk and return; major market segments and international financing decision.

Unit – I International Financial Management (IFM) : Concept –Nature and Scope–Importance – Domestic and Offshore Markets –Role of International Financial Manager – Changes in Global Financial Markets –Challenges– International Monetary System–Emerging Dimensions .(Theory only).

Unit – II Foreign Exchange Market and Exchange Rate Mechanism: Foreign Exchange Markets – Structure – Types of Exchange rates – Exchange Rate Quotations – Direct and Indirect – Buying and Selling Rates – Forward market quotation – Nominal and Real Exchange Rates in Financial Decisions.(Theory only)

Unit – III Foreign Exchange Exposure: Concept – Relevance of Foreign exchange Exposure – Transaction Exposure– Operating Exposure – Accounting Exposure –Hedging and Managing Tools of Exposures. (Theory only)

Unit – IV International Project Appraisal: Concept – Approaches – Net present Value Approach – Adjusted Present Value Framework – Options Approach – The Practice of Cross Border Direct Investment Appraisal– International Perspectives of Working Capital.(Theory only).

Unit – V International Equity Investment: Concept – Risk and Return from Foreign Equity Investment – Equity Financing in the International Markets – Long–Term Borrowings in Global Capital Markets–International Financing Decision. (Theory only)

REFERENCE BOOKS:

1. Apte.P.G.,: International Financial Management, Tata McGraw Hill Publishing House, New Delhi.
2. Siddaiah, T, International Financial Management, Pearson, New Delhi.
3. Sharan V. : International Financial Management, Prentice Hall of India Publishing, New Delhi
4. Bhalla,V.K. : International Financial Management, AnmolPublicatins, New Delhi.
5. AvadhaniV.A. : International Finance, Himalaya Publishing House, Mumbai.
6. Eun&Resnick., : International Financial Management, Tata McGraw Hill Publishing Company Ltd., New Delhi.

Course Outcomes

Upon completion of this course, students will be able to

CO1:Ascertain the recent changes in global financial markets and international monetary system so as to forecast exchange rates and use foreign exchange rate mechanism.
CO2: Measure foreign exchange exposure and hedge foreign exchange exposure.
CO3: Appraise projects using international capital budgeting techniques and estimate the working capital requirements in international perspective.
CO4:Analyze the risk and return for equity and long term debt financing in global capital markets.
CO5: Formulate international equity investment and long-term borrowings in global capital markets.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		2			1				
CO2	2	2	1		2			1				
CO3	1	2		1	2			1				
CO4	1	2	1	3				2				
CO5	1	2	2	2				1				

3-High, 2- Medium, 1- Low.

M.Com (FM) III Semester

PAPER –303(C) : TAX PLANNING AND MANAGEMENT
(Generic Elective)
(With effect from the academic year 2021–22)

Course Objectives

- To comprehend the basic knowledge about tax concepts and planning.
- To provide knowledge on sources of income under different heads
- To acquire the knowledge on tax planning with regard to location
- To provide the skills of tax planning regard to managerial decisions.
- To create awareness about tax incentive of exports.

UNIT– I Income Tax Law: Evolution of Taxation Law – Basic Concepts – Residential status – Tax Planning and management: Concepts – Tax avoidance – Tax evasion.(Theory only)

UNIT –II Tax Planning – Individuals: Heads of Income for Individuals – Income from Salary – Income from business and profession – Tax relief – Concession – Rebates – Deductions and Incentives.(Theory and problems)

UNIT –III Corporate Tax Planning–I: Tax Planning with references to new establishment – Location – Form – Nature and Capital structure – Short term loans – Term loans – Public deposits – Bonus Issues – Dividend Policies.(Theory and problems)

UNIT – IV Corporate Tax planning–II: Managerial decisions – Tax planning in respect of owned funds or borrowed capital – Lease Vs Purchase – Purchase by instalments Vs hire – Make or buy decisions.(Theory only)

UNIT– V Tax Planning – Incentives and Export Promotion: Schemes for encouraging exports – Import duty relief schemes – Free Trade Zones (FTZs) – Special Economic Zones (SEZs) – Export Processing Zones (EPZs) – Salient features of Software Technology Parks (STPs) – Electronic Hardware Technology Parks (EHTPs) – Export Promotion schemes under EXIM Policy. (Theory only)

REFERENCE BOOKS:

1. Ahuja G.K. and Ravi Gupta: Systematic Approach to Income Tax and Central Sales Tax, Bharat Law House, New Delhi.
2. Circulars issued by C.B.D.T
3. Income Tax Act, 1961
4. Income Tax Rules, 1962
5. Lakhotia R.N: Corporate Tax Planning, Vision Publications , Delhi,
6. Singhania, V.K.Direct Taxes: Law and Practice, Taxman’s Publications Delhi.
7. Singhania, V. K: Direct Taxes Planning and Management, Taxman’s Publications Delhi.
8. Melhotra, MC and Goyal, S.P: Income Tax Law and Accounts including tax planning, SahityaBhavan Publication, Agra.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Understand the concept of entrepreneurs and entrepreneurship
CO2: Provide an idea about entrepreneur and skills of entrepreneur
CO3: Impart knowledge about the role of SSIs and modern business enterprises MSMEs
CO4: Enable to identify the new business opportunities and setting up of small business.
CO5: Give an idea about the sources of finances for small business.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1			1	3	1	1		
CO2	3	3	1	2	1		1	2	3	1		
CO3	3	1	1					1				
CO4	3							3	1			
CO5	3	1	1					2	1			

3-High, 2- Medium, 1- Low.

M.Com (FM) III Semester

PAPER –303(D): ENTERPRENEUSRHIP AND MSMEs
(Generic Elective)
(With effect from the academic year 2021–22)

Course Objectives:

- To provide basic knowledge about entrepreneurs and entrepreneurship
- To enable the students to acquire the skills of entrepreneur
- To help the students to comprehend about the role of SSIs/MSMEs
- To enable the students to acquire the skills to exploit the business opportunities
- To create awareness about the sources of finance to small business

UNIT – I Entrepreneurship: Importance of entrepreneurship – Concept of Entrepreneurship– Characteristics of successful Entrepreneur – Classification of Entrepreneurs – Problems of Entrepreneurs and capacity building for Entrepreneurship – Evolution of Entrepreneurship in India – Profile of successful Entrepreneurs in India. (Theory only)

UNIT –II The Intrapreneur: Characteristics of intrapreneurial environment – The role of Entrepreneurs – Managers and Entrepreneurs – environment for Entrepreneurship Entrepreneurial skills – Skills for a new class of Entrepreneurs.(Theory only)

UNIT –III Modern small business enterprises: Role of small scale industries in Indian economy – Concept of and Definition of SSI – Government Industrial Policy Resolutions and Objectives – Growth and performance of small scale industries in India – Micro, Small, and Medium Enterprises(MSMEs) – Salient features of MSMEs Act,2006 – problems and prospects of MSMEs in free economy– MSME Amendment Act, 2020.(Theory only)

UNIT – IV Setting up of a Small business enterprises – identifying the business opportunity – Business enterprises – Institutional support for small business enterprises in India – Central level institutions – State level institutions –Other agencies – industry– Other agencies – Industry associations (Theory only)

UNIT –V Finances for small business enterprises: Short term, medium term and long term finances – means of finance – financial assistance for small business enterprises – credit facilities to small business enterprises – Small Industry Development Bank of India (SIDBI) – Channels of SIDBI assistance.(Theory only)

REFERENCE BOOKS:

1. Vasanth Desai, " Small Scale Industries and Entrepreneurship " Himalaya Publishing House, Mumbai.
2. Vasanth Desai," Entrepreneurial Development and Project Management", Himalaya Publishing House, Mumbai.
3. Vasanth Desai" Dynamics of Entrepreneurial Development and Management" Himalaya Publishing House, Mumbai
4. PoornimaChadrantinath." Entrepreneurship Development and Smll Business Enteprises"Pearson Education, New Delhi.
5. Neeta Baporikar," Entrepreneurship Development and Project management"Himalaya Publishing House, Mumbai
6. Thomas W.Zimmerer and HormanM.Scarborough" Essentials of Entrepreneurship and Small Business Management : Pearson Education Inc., Delhi

Course Outcomes

CO1: Understand the concept of entrepreneurs and entrepreneurship

CO2: Provides an idea about intrapreneur and skills of entrepreneur

CO3: Imparts knowledge about the role of SSIs and modern business enterprises MSMEs

CO4: Enables to identify the new business opportunities and setting up of small business

CO5: Gives an idea about the sources of finances for small business

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1			1	3	1	1		
CO2	3	3	1	2	1		1	2	3	1		
CO3	3	1	1					1				
CO4	3							3	1			
CO5	3	1	1					2	1			

3-High, 2- Medium, 1- Low.

M.Com (FM) III Semester

PAPER – 304: INTERNAL AUDIT AND STANDARD AUDIT PRACTICES

(Skill Oriented Course)

(With effect from the academic year 2021–22)

Course Objectives (COBs):

1. Conceptualise the knowledge in internal control including evaluation techniques.
2. Learn the meaning, features, objectives and advantages of internal audit.
3. Ascertain the basis of auditing with information systems by skill enhancement.
4. Illustrate the audit under computerised information system environment along with its internal control.
5. Outline and synthesize the reporting and its presentation techniques.

Unit 1: Introduction to internal control: Meaning – objectives – Basic elements of internal control – Types of internal control systems – Preventive and detective controls – Advantages and limitations of internal control – Techniques for evaluation of internal control system – Native record – Check list – Flow chart – Internal control questionnaire.(Theory only)

Unit 2: Internal Audit: Meaning –features – advantages – Need of internal audit –Internal control Vs. Internal audit – Internal audit Vs. Operational audit; internal check: Meaning – Objectives – Features of good internal check system.(Theory only)

Unit 3 Auditing of Information Systems: Overview of Information Systems – Attributes of Information – Need for Audit of Information Systems – Effect of Computers on Audit – Changes to evidence collection – Changes to evidence evaluation – Skills required for Information Systems Auditor – Functions of IS Auditor – Categories of Information Systems Audit – Steps in Information System Audit – Role of IS Auditor in Physical Access Controls – Understanding the Layers and related audit issues. (Theory only)

Unit 4 Internal Audit under Computerized Information System (CIS) Environment**: S**pecial audit techniques using the computer – Scope of audit in a CIS Environment – Impact of changes on business processes (for shifting from manual to electronic medium) – Audit approaches in a CIS Environment – Internal Controls in a CIS Environment – Internal Control requirements under CIS Environment – Approach to auditing in a CIS environment – Computer Assisted Audit Techniques (CAATs). (Theory only)

Unit 5: Internal audit reporting: Concept – Basic elements of internal audit report – Features of good internal audit report – Frequency of report – Segment reporting – Documentation of reporting – Importance of report drafting – Report presentation techniques – Report submission – Storage of working papers and back–up of data. (Theory only)

REFERENCES:

1. Advanced Auditing and Standards on Internal Audit, Issued by ICAI.
2. Information Systems Control and Audit, Issued by ICAI.
3. Standards On Internal Audit – issued by ICAI.
4. Kamal Garg, Handbook on Internal Audit: Bharat Law House.

Course Outcomes(COs):

1. To acquire knowledge in internal control, learn its advantages, limitations and techniques.
2. To learn the features, advantages and need for internal audit.
3. To enhance skills and know-how in auditing of Information systems.
4. To showcase the environment of Internal Audit under computerised information system.
5. To amend the skills and knowledge in Internal Audit reporting along with reports presentation.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2				3	2				1
CO2	3	3		1	2			1	2		1	
CO3		2	3				3	1		1		3
CO4	1		3			2			1		1	
CO5	2			3	2			1				2

3-High, 2- Medium, 1- Low.

M.Com (FM) III Semester

PAPER –305(A): FUNDAMENTALS OF ACCOUNTING
(Open Elective)
(With effect from the academic year 2021–22)

Course Objectives

- To provide basic knowledge on accounting and its preparation.
- To enable the students to prepare final accounts
- To help the students to acquire the skills of financial statement analysis
- To provide the basic knowledge on cost accounting.
- To develop the student ability to use the tools of management accounting.

Unit–I: Accounting – Nature and Scope – Branches of Accounting – Financial Accounting – Types – –Principles and concepts – Branches of Accounting –Accounting Standards –Types of Accounting Standards–Advantages.(Theory only)

Unit–II: Journal and Final Accounts: Meaning of an Account–Accounting Equation–Meaning and format of Journal–Ledger posting– Preparation of Trial Balance–Profit and Loss Account–Balance sheet. (Theory only and Problem)

Unit–III: Financial Statement Analysis: Meaning – Classification – Trend analysis – Comparative statement analysis – Common size statement analysis–Advantages of Financial statement analysis. (Theory only)

Unit – IV: Cost Accounting: Nature, Scope and Objectives– Concept of cost – Classification – Behaviour of cost – Elements of cost – Principles of costing – Preparation of cost sheet.(Theory only and Problem)

Unit – V Managerial Accounting – Nature, Scope and Objectives – Budgetary Control – Types of Budget – Advantages of budgeting – Limitations – Preparation of budgets (Theory only)

REFERENCE BOOKS:

1. Jain S.P, Narang K.L and SimmiAgarwal, "Accounting For Managers", KalyaniPublishers, New Delhi.
2. Wild. J.J., Subramanyam, K.R. Halsey, R.F., Financial Statement analysis, Tata McGraw Hill.
3. NarayanaSwamy, "Financial Accounting: A Managerial Perspective", Pearson Education.
4. Prasad, G. " Financial Accounting and Analysis" Jai Bharat Publishers, Guntur.
5. Ramachandran and Kakani, " Finanical Accounting for Management", TMH, New Delhi.
6. Jain and Narang, "Accountancy" Vol 1, Kalyani Publishers, 1983.
7. Jain and Narang, " Cost Accounting", Kalyani Publishers.
8. R.K.SharmaandShashi K Gupta, "Management Accounting", Kalyani Publishers.
9. S.N. Maheswari, Accounting for Managment, Sultan Chand Publishing House Pvt. Ltd.

Course Outcomes

CO1: Provides knowledge about basic principles, branches of accounting, accounting standards and book-keeping.
CO2: Enables the students to prepare and solve the final accounts
CO3: Explores the talents of financial statement analysis
CO4: Able to know the concepts used in cost accounting
CO5: Understand about the concept, tools and management accounting.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				2			1				
CO2		3			2				1			
CO3		3				2						1
CO4	3			2				1				
CO5	3				1			2				

3-High, 2- Medium, 1- Low.

M.Com (FM) III Semester

PAPER –305(B) : PERSONAL FINANCIAL PLANNING
(Open Elective)
(With effect from the academic year 2021–22)

Course Objectives:

- To understand the concept of personal finance planning.
- To know the products of personal finance planning.
- To interpret risk and return concepts along with its types.
- To cognize and apply personal tax planning.
- To get to know the perspectives of personal finance and policy.

UNIT I Personal Finance Planning– Nature – Scope – Objectives– Need – Process – Principles of Personal Finance –Safety– Liquidity–Solvency and Management of Wealth.(Theory only)

UNIT II Products of Personal Finance Planning – Bank Deposits – Post Office Savings – Mutual Funds –Shares–Corporate and Govt. Bonds– Chit Funds–Real Estate– Gold–Silver.(Theory only)

UNIT III Risk and Return– Concepts – Types of Risk and Return – Diversification of Risk – Measurement of Risk and Return – Investment Planning– Time value of Money – Compound Value –Computation of Returns on Personal Investments. (Theory only)

UNIT IV Personal Tax Planning: Nature of Income – Expenses – Deductions– Taxable Benefits– Income Splitting–Tax Advantaged Investment–Deferred Income Plans– Income and Dividends from Business and Self–Employment.(Theory only)

UNIT V Personal Finance and Policy Perspectives: Impact of Government Policy– Union Budget– Cost of Living –Retirement Saving Plans– Pension plans– Provident Fund, Gratuity–LIC – GIC –Reverse Mortgage Plans. (Theory only)

REFERENCE BOOKS:

1. Personal Finance by Jack R. Kapoor, Les R. Dlabay and Robert J. Hughes, Tat McGraw–Hill Publishing Company Ltd. New Delhi.
2. Financial Education by Reserve Bank of India – rbi.org.
3. Personal Finance columns in The Economic Times, The Business Line and Financial Express Daily News Papers.
4. Information Broachers of Post Offices, Banks, Mutual Funds, Insurance Companies
5. Internet Sources– BSE, NSE, SEBI, RBI, IRDA, AMFI etc.

Course Outcomes:

1. Understanding the concept of personal finance planning.
2. Knowing the products of personal finance planning.
3. Interpreting risk and return concepts along with its types.
4. Cognizing and apply personal tax planning.
5. Knowing the perspectives of personal finance and policy.

CO PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								2			1
CO2	3				2					1		
CO3	2					1		3				
CO4	3			3				2				1
CO5	3							2			1	

M.Com (FM) IV Semester

PAPER – 401: FINANCIAL DERIVATIVES
(Core Paper)
(With effect from the academic year 2021–22)

Course Objectives

- Outline financial derivatives concepts, features and types; traders in financial derivatives markets.
- Identify forwards and future contracts concepts, types, uses and functions.
- Prioritise options in financial derivatives and option pricing models.
- Compose swap market futures, types and interest rate; pricing swaps.
- Synthesize stock index futures, options and trading of stock futures and options.

Unit–I Financial Derivatives–Concept–Features– Types – Uses– Traders in Financial Derivatives Market–IndianFinancial Derivatives Market – Emerging Trends. (Theory Only)

Unit–II Forwards and Futures Contracts: Concepts– Functions – Advantages and Disadvantages – Forwards vs.Futures–Determination of Forwards and Futures Prices.(Theory and Problems)

Unit–III Options: Concept–Types of options – Difference between Options and Futures–Option Hedging Strategies –Option Pricing Models– Binomial Option Pricing Model– One step and Two Step Models–Black –ScholesOption Pricing Model. (Theory and Problems)

Unit–IV Swap Market – Concept –Features of Swap –Advantages and Disadvantages of Swaps Types of Swaps – Interest Rate Swap –Currency Swap –Equity Swaps –Pricing of Swaps. (Theory only)

Unit –V Stock Index Features– Concept –Common Features– Portfolio Management and StockIndex Features– Speculation and Stock Index Features –Trading of Stock Index Features.(Theory and Problems)

REFERENCE BOOKS:

1. Pandey , I.M., Financial Management, Vikas Publications , New Delhi.
2. Gupta, S.L., Financial Derivatives, PHI Learning Pvt. Ltd, New Delhi.
3. Bhalla, V.K.Investment Management
4. John C.Hulll Derivatives. PHI Publisher Ltd, New Delhi
5. John C. Hull, Introduction to Future and Options Market. PHI Publisher Ltd, New Delhi,
6. Kumar, S.S.S., Financial Derivatives, Prentice Hall of India Pvt., Ltd New Delhi.
7. Bargi's., Futures and Options, McGraw Hill Publishing House Ltd, New Delhi.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Explore the trends in Indian financial derivatives market and use futures and forwards to hedge the risk to make profit.
CO2: Use option trading strategies to hedge the risk and determine the option price applying relevant models.
CO3: Apply different types of swap contracts to manage risk and gain profits.
CO4: Acquire trading skills for stock index features and options in financial derivatives market.
CO5: Compose stock index features and trading of stock index options.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		2			1				
CO2	2	2	1		2			1				
CO3	1	2		1	2			1				
CO4	1	2	1	3				2				
CO4	1	2	2	2				1				

3-High, 2- Medium, 1- Low.

M.Com (FM) IV Semester

PAPER – 402: PROJECT PLANNING AND CONTROL
(Core Paper)
(With effect from the academic year 2021–22)

Course Objectives

- Define a project and operations of corporate long range planning and phases of capital budgeting.
- Distinguishes project ideas and technical analysis, project rating index and methods of forecasting.
- Illustrates financial analysis project planning, forms of project organization and performance evaluation of project.
- Understand Social cost benefit analysis and methods of SCBA
- Contrast public projects context of Indian projects, approval procedure and guidelines for preparation of feasibility report.

Unit –I Projects And Operations: Concept – Nature and Characteristics of a Project – **Categories of** Projects **–** Project Life Cycle**–** Concept of Project Management – Tasks and Responsibilities of a Project Manager – Capital investments – Importance and Difficulties – Phases of Capital Budgeting – Facets of Project Analysis – Elementary Investment Strategies. (Theory only)

Unit–II Project Ideas and Technical Analysis: Generation of Project Ideas – Monitoring the Environment – Corporate Appraisal – Scouting for Project Ideas – Preliminary Screening – Project Rating Index – Sources of Primary and Secondary Information – Conduct of Market Survey – Methods of Demand Forecasting – Material Inputs and Utilities – Manufacturing Technology – Product Mix–Capacity of Plant – Location and Site – Machineries and Equipment. (Theory only)

Unit–III Financial Analysis And Project Planning: Cost of Project – Means of Finance – Estimation of Sales and Production – Profitability Projections – Break-Even Point – Projected Cash Flow Statement – Forms of Project Organization – Project Planning – Functions of planning – Planning the project work – Tools of planning – Hierarchy of plans – Project Control – Purpose of Control – Human aspects of project management – Pre-Requisites for Successful Project Implementation – Abandonment Analysis. (Theory only)

Unit–IV Social Cost Benefit Analysis (SCBA): Social Cost Benefit Analysis – Concept and Rationale for SCBA – Commercial Profitability vs. SCBA – Methods for SCBA – UNIDO Approach – Little-Mirrlees (L-M) Approach – SCBA in India. (Theory only)

Unit–V Public Projects: NITI Aayog; Project Appraisal and Management Division (PADM); Core functions – Institutional Arrangement for appraisal of Schemes and Projects; Original Cost Estimates (OCE); Time frame for appraisal and approval of schemes and projects – Appraisal and approval of public-funded schemes and projects – Generic structure of a Detailed Project Report (DPR) – Format for EFC/SFC memorandum for appraisal of projects. (Theory only)

REFERENCE BOOKS:

1. Prasanna Chandra "Projects, Planning, Analysis, Selection, Implementation and Review;" TATA McGraw Hill Publishing House, New Delhi, 2008.
2. S.Choudhury "Project Management" TATA McGraw Hill Publishing House, New Delhi, 2006.
3. R.B.Khanna, "Project Management", PHI Learning Private Limited, New Delhi, 2011.
4. Rajeev M.Gupta, "Project Management", PHI Learning Private Limited, New Delhi, 2014.
5. Faculty of Commerce, "Project Evaluation & Management", Dr.B.R.Ambedkar Open University, Hyderabad.

Course Outcomes

Upon completion of this course, students will be able to

CO1: Identify basic concepts, nature and characteristics of a project, importance, difficulties and phases of capital budgeting.
CO2: Impart knowledge on project ideas and technical analysis, project rating index, sources of primary and secondary information, methods of demand forecasting, financial analysis and project planning and pre-requisites for successful project implementation.
CO3: Familiarise the concept of social cost benefit analysis, compare and contrast between commercial profitability vs SCBA, approaches of SCBA, public projects, appraisal and approval of government funded plan projects and schemes and generic structure for detailed project report.
CO4: Critically analyse the concept of social cost benefit analysis
CO5: Assess public projects in Indian context

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				1		2		2			3
CO2	3	2	3	1				2				2
CO3		3	1	1	3				1			
CO4	1				3	2				3		1
CO5	3	2								3		3

3-High, 2- Medium, 1- Low.

M.Com (FM) IV Semester

PAPER – 403(A): INSURANCE MANAGEMENT

(Generic elective)

(With effect from the academic year 2021–22)

Course Objectives

Co 1 : Perceive the concept of RM, Socio-economic relevance, regulatory framework and latest developments in Insurance sector.

Co 2 : Acquire knowledge on various types of life insurance policies and the terminology relating to the concept of insurance.

Co 3 : Understand different types of non-life insurance with reference to marine and fire insurance and their progress and claim settlement thereon.

Co 4: Seek awareness on miscellaneous insurance including health, personal accident crop insurance and practical problems in implementation and claim settlement.

Co 5: Understand different aspects of management of investments of funds by LIC and GIS, Legal Restrictions on their investments. Also exhibit the global insurance scenario and future Prospects of India insurance.

Unit – I Introduction**:** Concept of Risk – Types of risk – Risk management – Objectives – Methods of handling risk – Concept of insurance – fundamental principles – Socio–economic significance –Regulatory framework– Growth and Development of Insurance in India – Emerging challenges. (Theory only)

Unit – II Types of Insurance: Life insurance – Essentials of life insurance contract – Classification of life insurance policies – Re–insurance – Double insurance – Assignment – Surrender value – Settlement of Claims – Progress of life insurance business in India – Role of LIC. (Theory only)

Unit – III Non–Life Insurance: Marine insurance – Marine losses – Types of marine insurance Settlement of claims – Fire insurance – Nature – Uses – Settlement of claims – Progress of fire insurance. (Theory only)

Unit – IV Investment of funds: Principles– Types of investment – Factors influencing investment decisions – Legal restrictions on investments by LIC. (Theory only)

Unit – V Miscellaneous Insurance: Health insurance and Personal accident Insurance – objectives – uses – Crop insurance – salient features – Uses – Operation of crop insurance scheme – Practical problems (Theory only)

REFERENCE BOOKS:

1. George E.Rejda, Principles of Risk management and Insurance (Ninth Ed.,) Pearson education, Inc. and Dorling Kindersley Publishing Inc. Delhi.
2. Gupta, P.K., Insurance and Risk Management, Himalaya Publishing House, Hyderabad.
3. Mathew, J.J., Insurance: Principles and Practice, RBSA Publishers, Jaipur.
4. Mishra, M.N., and Mishra, S.B., Insurance Principles and practice, S.Chand& Co., Ltd., New Delhi.
5. NaliniPravaTiripathy and Prabir pal, Insurance: Theory and prace, PHI Learning Pvt., Ltd., New Delhi.
6. Periasamy, P., and VeeraSelvam, Risk and Insurance Management, Vijay Nicole Imprints Ltd., Chennai.
7. Periasamy, P., Principles and practice of Insurance, Himalaya Publishing House, New Delhi.

Course Outcomes

Upon completion of this course, students will be able to

CO1:	Acquire knowledge on RM and understand the concept of insurance, its socio-economic relevance, regulatory framework and current developments in Indian Insurance sector.
CO2:	Indentify different types of life insurance policies and different terms confining to the concept of insurance contract.
CO3:	Describe the types of non-life insurance mainly marine and fire insurance and discern knowledge settlement of claim and progress of insurance.
CO4:	Be familiar with miscellanies insurance including crop insurance, practical impediments and settlement of claims.
CO5:	Explicate different aspects of investment of funds and delineate the legal restrictions on investment by LIC and GIS. Also review the global scenarios of insurance and its future prospects in India.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3							2	2	2	2	
CO2	3		1				1	1	2	2		
CO3	3							1	1			
CO4	3						1		2	1		
CO5	3							1	1	1		

3-High, 2- Medium, 1- Low.

M.Com (FM) IV Semester

PAPER – 403(B): PERSONALITY DEVELOPMENT AND SOFT SKILLS

(Generic elective)

(With effect from the academic year 2021–22)

Course objectives (COBs):

COB1: Familiarize with the theories of personality including sick and healthy personalities.

COB2: Dramatize the processes involved in effective reading, listening, messaging and feedback.

COB3: Develop the skills for coaching, mentoring, persuading and change making.

COB4: Develop the skills to be lead leader, chair the meeting, problem solver, conflict resolver and Negotiator.

COB5: Develop self esteem and build positive attitude and personality.

Unit–I Foundations of personality development (PD): Concept of Personality – Theories of personality: Psycho-dynamic theory - Trait theory – Big-5 Theory; Personality Determinants: Physical, social, educational, family, intellectual and emotional determinants; Causes for sick personality and healthy Personality. (Theory only)

Unit-II Self-awareness skills: Self-awareness and management; communicating: Sending inter personal messages – Listening and reading non-verbal messages –Providing feedback. (Theory only)

Unit-III Motivating: Goal setting skills – Coaching -Counselling and Mentoring – Empowering people through delegation; Leading: Politicking - Persuading - Applying leadership styles – Managing Change. (Theory only)

Unit- IV Teaming skills: Working with teams – Running meetings – Valuing diversity: Problem solving: Ethical decision making - Creative problem solving – Resolving conflicts – Negotiation. (Theory only)

Unit- V Self-esteem skills: Characteristics – Causes of low self-esteem – Steps to build positive self-esteem; Attitude: Steps in building positive attitude; Interpersonal skills; Steps in developing positive Personality. (Theory only)

REFERENCE BOOKS:

1. Elizabeth B.Hurlock: Personality Development, Tata McGraw Hill.
2. Stephen P.Robbins and Philip L Hunsaker: Training in interpersonal skills, Pearson Education.
3. Shiv Khera: You can Win, McMilan Publications.
4. Robert M. Sherfield. Rhonda J.Montgomery, PatricaG.Moody: Developing soft
5. Skills, Person Education.
6. Biswajit Das,Satpath: Business Communication & Personality Development, Excel Publication.

Course Outcomes (COs):

CO1: Acquire conceptual knowledge on the theories of personality and its determinants that lead to either sick or healthy personalities.

CO2: Manage effectively the self-awareness to manage active reading, listening, messaging and feeding back.

CO3: Train oneself to be a coach, mentor, leader, persuader, and change maker.

CO4: Demonstrate the skills in teaming, running meetings, problems solving, conflict resolution and negotiation.

CO5: Realize the causes and impact of self-esteem and ways to build positive attitude and personality.

COs-POs mapping:

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2									
CO2			2				2			3		
CO3						3	2	2				
CO4						3	2	3				
CO5						2			2	2		

M.Com (FM) IV Semester

PAPER – 403(C): INTERNATIONAL ACCOUNTING AND REPORTING

(Generic Elective)

(With effect from the academic year 2021–22)

Course Objectives:

- To provide the conceptual knowledge on international accounting and its status.
- To impart the knowledge on international accounting standards.
- To provide knowledge on combination and consolidation of international business.
- To comprehend the skills to analyse the international financial statements.
- To enable the students to understand financial reporting and disclosure practices of international business.

Unit –I International Accounting: concept –nature – scope– importance – international audit types– Status of International Accounting in select countries. (Theory only)

Unit– II International Accounting Standards– Concept – Objectives– Need for harmonization– IFRS and Indian GAAP– Global convergence accounting – Need for Convergence – Benefits and challenges of Convergence (Theory only)

Unit – III International Business Combinations and Consolidations – Concept – Need for consolidations Motives of combinations –Accounting treatment of combinations– Consolidation techniques– Mechanics of Consolidations. (Theory only)

Unit–IV International Financial Statement Analysis– Concept – Need for financial statement analysis– techniques – Complexities in analysis of global financial statements– Challenges and Opportunities in cross border analysis. (Theory only)

Unit –V International Financial Reporting and Disclosure – Introduction– Need for Transnational reporting and disclosure– Developments of disclosure – Reporting and disclosure practices; Segment Disclosure, Corporate governance disclosure.(Theory only)

REFERENCE BOOKS:

1. Mohapatra, A.K.Das "International Accounting, prentice Hall of Indian Pvt.Ltd. New Delhi.
2. RathoreShirin: " International Accounting" Prentice Hall India, New Delhi.
3. SuddagaranM.Shahrokh, International Accounting – A User perspective" Taxman India., New Delhi.
4. Gupta Ambarish "Financial Accounting for Management – An analytical perspective " Pearson Education, New Delhi.
5. NobesChestopher& Parker Rober. " Comparative International Accounting" Pearson Education, New Delhi.
6. FDC Choi and G.G. Mueller, ' An introduction to multinational Accounting' Prentice Hall, New Delhi.
7. Richard E Baker, Valdean C. LembkeThomases King, McGraw – Hill Higher Education, Irwin.

Course Outcomes:

CO1: Understands the concepts of international accounting and its status in various countries.

CO2: Understands the international accounting and reporting standards.

CO3: Acquires knowledge of combination and consolidation of international business

CO4: Gains ability to analyse international financial statements

CO5: Aware of financial reporting and disclosure practices of international business.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1						2				1
CO2	2	2	1		1			1				
CO3	2	1						1				
CO4	2	1	1		1							
CO5	3	1	1		2			1				1

3-High, 2- Medium, 1- Low.

M.Com (FM) IV Semester
PAPER – 403(D): GST AND CUSTOMS DUTY
(With effect from the academic year 2021–22)

Course Objectives (COBs):

1. Outline the concepts of GST, its applicability, features and objectives.
2. Look into the registration procedures and return types under GST.
3. Exemplify about the supply of goods and services along with valuation.
4. Draft the eligibility for ITC by learning the concepts of ITC.
5. Ascertain customs duty and find out its assessable value.

Unit–I Introduction: Concept of GST – Structure of GST – Features of CGST, SGST, UTGST, and IGST Acts – Objectives of GST – VAT vs. GST – Benefits of GST – Applicability of GST – Exemptions from GST – Rates of GST (Theory only).

Unit–II Registration under GST: Persons liable and persons not–liable for registrations; Types of dealers in GST – Deemed registration – Registration process for new applicants – Cancellation of registration and revocation; Reverse Charge Mechanism; Returns under GST: Person liable to pay GST– Computation of GST – Liability and payment of GST –Types of GST returns– Revision of GST returns – Penalty/Late fee – Refund of GST (Theory and problems).

Unit–III Supply of goods and services:Scope of supply: Types of supply based on location, combination, and recipient and tax treatment – Time of Supply – Place of Supply – Value of Supply (Theory and problems).

Unit–IV Input Tax Credit (ITC): Concept – Eligibility for taking Input Tax Credit (ITC)–Utilization of ITC – Conditions for taking ITC – Input Tax Credit in special circumstances – Distribution of ITC by Input Service Distributor (ISD) – Computation of ITC (Theory and problems).

Unit–V Customs duty: Definitions–Circumstances of levy of customs duties – Types of customs duties – Exemption from customs duties – Import procedure under customs –Export Procedure under customs – Method of valuation for customs – Calculation of assessable value – Calculation of custom duty (Theory and problems).

REFERENCES:

1. R. G. Saha, Divyesh Shah, Usha Devi N, GST (Indirect Taxes), Himalaya Publishers.
2. ICMAI, Study material on Indirect taxation, ICMAI.
3. VandanaBangar and YogendraBangar, Indirect Tax Laws, AadhyaPrakashan Publishers.
4. V. S. Datey, GST Ready Reckoner, Taxmann Publications.
5. AvadeshOjha, GST, Taxmann Publications.

Course Outcomes (COs):

- To develop knowledge in the areas of GST by learning its objectives, benefits, applicability and exemptions.
- To learn the mechanism of GST and its registration along with returns.
- To enhance skills regarding taxable value of supplies and supply of goods and services.
- To amend knowledge in GST input tax credit and its computation.
- To showcase the know-how of customs duty including calculation of the assessable value.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1						2				1
CO2	2	2	1		1			1				
CO3	2	1						1				
CO4	2	1	1		1							
CO5	3	1	1		2			1				1

3-High, 2- Medium, 1- Low.

M.Com (FM) IV Semester

PAPER –404 :PROJECT REPORT & VIVA - VOCE

(Project Work)

(With effect from the academic year 2021–22)

M.Com (FM) IV Semester
PAPER –405(A) : SECURITY MARKET OPERATIONS
(Open elective)
(With effect from the academic year 2021–22)

Course Objectives (COBs):

1. Learn the basic concepts of Indian securities market.
2. Explore the areas of secondary markets in special reference to SEBI guidelines.
3. Exemplify about listing of securities in BSE and NSE.
4. Investigate into Indian stock exchanges.
5. Illustrate about stock market with special reference to BSE sensex and NSE indices.

UNIT – I Indian Securities Market: Concept– Functions – Intermediaries –Primary Market – Nature– Role of Primary Market–Problems of New Issues Market – IPOs –SEBI Guidelines for Primary Market– Recent Trends in Primary Market.(Theory only)

UNIT – II Secondary Market: Concept – Nature – Functions – Organization –Regulatory Framework for Stock Exchanges in India – SEBI Guidelines for Secondary Market–Recent Trends in Secondary Market.(Theory only)

UNIT– III Listing of Securities: Concept – Merits and Demerits of Listing – Listing Requirements– Listing of Rights Issue– Bonus Issue– Further Issue – Listing Conditions of BSE and NSE – Delisting.(Theory only)

UNIT – IV Indian Stock Exchanges: Concept–Functions–BSE –Different Trading Systems – Different Types of Settlements –NSE–Market Segments–NEAT System Operations–Market Types – DematSettlement.(Theory only)

UNIT – V Stock Market Indices: Concept – Purpose and Consideration in Developing Index – Methods – Market Indices in India – BSE SENSEX– NSE Indices – S &P CNX Nifty.(Theory only)

REFERENCEBOOKS:

1. PunithahvathyPandian, Security Analysis and Portfolio Management, Vikas Publishing House Pvt. Ltd.
2. V. A. Avadhani, investment and securities Market in India, Himalaya Publishing House.
3. Prasanna Chandra, Security Analysis and portfolio management, Tata McGraw – Hill.
4. SanjeevAgarwal, A Guide to Indian Capital Market, Bharat Publishers.
5. Ravi Puliani and Mahesh Puliani, Manual of SEBI, Bharat Publication.

Course Outcomes (COs):

1. To advocate the learned knowledge in Indian securities market.
2. To explore the areas of secondary markets along with the SEBI guidelines.
3. To acquire adequate knowledge in listing of securities and their delisting.
4. To get to know about the concepts of Indian stock Exchanges.
5. To exemplify the concepts of stock market indices and CNX Nifty.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2							1	1	
CO2	3	3			2			1	3			3
CO3	2	2		3		3		1			2	
CO4			3		2		1		1			1
CO5	1			3		2		2		3		

3-High, 2- Medium, 1- Low.

M.Com (FM) IV Semester
PAPER –405(B) :BUSINESS ETHICS
(Open elective)
(With effect from the academic year 2021–22)

Course Objectives (COBs):

1. Learn the basic concepts of business ethics.
2. Explore the important theories of ethics.
3. Exemplify about ethical decision making business.
4. Investigate into Globalisation and business ethics.
5. Illustrate about creating ethical organisations.

UNIT – I Business Ethics: Meaning, Principles of Business Ethics – Evolution and Development of Business Ethics – Importance and Need for Business Ethics – Significance of Business Ethics – Values and Ethics in Business – Code of Ethics .(Theory only)

UNIT – II Nature and some important Theories of Ethics – Sources of Business Ethics – Managing Ethics – Values, Ethics and Business Strategy – Ethical issues and Dilemmas in Business – Sources of Ethical Problems – Improving Ethics in Business – Theory of Ethical Egoism – Theory of Ethical Utilitarianism – Theory of Egalitarianism. (Theory only)

UNIT – III Ethical Decision making in Business – Ethical Decision making with Cross–holder conflicts and competition – Applying Moral Philosophy to Ethical Decision–making – Factors influencing Ethical Decision making – A framework of Ethical Decision–making – Using the Ethical decision making framework to improve Ethical decisions.(Theory only)

UNIT – IV Globalisation and Business Ethics – History of Globalisation – Growth of Global Corporations – Factors facilitating Globalisation – Business Ethics in Global Economy – Ethical perceptions and International Business – Global Values – Role of Ethics in International Business. (Theory only)

UNIT – V Creating an Ethical Organisation – Human nature and unethical behaviour in organisations – Code of conduct – Code of Ethics vs. Code of Conduct – Ethics Committees – Ethics Communication Systems – Ethics Training Programming – Disciplinary system – System to monitor and enforce Ethical Standards.(Theory only)

REFERENCE BOOKS:

1. Business Ethics (Concepts, Application, Framework and cultural Impact), K. Aswathappa and Others, Himalaya Publishing House, 2017.
2. Business Ethics – A Case Perspective, O.C. Ferrell, John Fredrich and Linda Ferrell CengageLeachery.
3. Business Ethics – An Indian Perspective, A.C. Fernando, Pearson.
4. Business Ethics (Indian Edition), Andrew Crane Dirk Matten, Oxford University Press, New Delhi.
5. Essentials of Business Environment (Test, Cases & Exercises), K. Aswathappa, Himalaya Publishing House 15th Revised Edition.

Course Outcomes:

1. Learning the basic concepts of business ethics.
2. Exploring the important theories of ethics.
3. Exemplifying about ethical decision making business.
4. Investigating into Globalisation and business ethics.
5. Illustrating about creating ethical organisations.

CO-PO Mapping

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2							1	1	
CO2	3	3			2			1	3			3
CO3	2	2		3		3		1			2	
CO4			3		2		1		1			1
CO5	1			3		2		2		3		

3-High, 2- Medium, 1- Low.

- SRI VENKATESWARA UNIVERSITY: TIRUPATI

SVU COLLEGE OF PHARMACEUTICAL SCIENCES

DEPARTMENT OF PHARMACY



Course

B. PHARMACY PROGRAMME (Self Supporting Course)

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

B. PHARMACY PROGRAMME

(PCI Syllabus)

Choice based credit system (CBCS) Pattern

About the Department

The Pharmacy course was started in 2006 in the department of Biochemistry. The Pharmacy department was established in 2016, to promote advanced science and research in pharmaceutical sciences and to cater to the needs of the student community of A.P. in general and of the Rayalaseema region. The courses offered by the department are M.Pharmacy in 2006, B.Pharmacy in 2013 and PhD in 2015 and these are self supporting courses. Department has basic research facilities which include equipment like Centrifuges Spectrophotometers and required for carrying out research.

Vision

- To impart quality and value embedded education and research in Pharmaceutical Sciences.
- To create technologically superior and ethically strong global manpower, in the arena of Pharmacy Profession.
- Carving the youth as dynamic, competent, valued and knowledgeable Professionals of Pharmacy field.

Mission

- Transforming Students into Full-fledged Pharmacists and participate actively in the field of Pharmacy.
- Promoting Quality Research in Emerging Areas of Pharmaceutical Sciences.
- To instill scientific zeal and develop skilled human resource to meet contemporary challenges in Pharmacy Profession.
- To facilitate young adult learners with opportunities to hone their ethics and leadership potential.
- Imparting technical education that encourages Independent thinking, develops strong domain of knowledge, hones contemporary skills and Positive attitudes towards holistic growth of young minds.
- Evolving the Institution into a Center of Academic and Research Excellence in Pharmaceutical Education and lead the field of pharmaceutical sciences and pharmacy practice with the mission of strengthening the healthcare of the country.

Programme Specific Outcomes

At the end of successful completion of programme, a graduate will

- Have adequate knowledge and scientific information regarding basic principles of Pharmaceutical & Medicinal Chemistry, Pharmaceutics including Cosmeticology, Pharmacology, and Pharmacognosy including herbal medicines.
- Be able to develop and assure the quality of various pharmaceutical dosage forms including those of herbal origin as per standards of official books, WHO and other regulatory agencies like USFDA, MHRA etc.
- Be able to counsel the patients leading to physical and social well being and work as a team member of clinical trial.
- Be able to do product detailing, marketing, distribution and selling of pharmaceutical products.
- Be able to perform experimental procedures as per laboratory standards in the area of Pharmaceutics, Pharmaceutical Chemistry, Pharmacology and Pharmacognosy..
- Be able to perform research on various medical aspects and implement the Pharmaceutical knowledge in formulating the best suitable dosage form to provide high quality medicines to the society.

Programme Objectives

- To uphold all laws, regulations, safety and ethical standards that apply to the experimental procedures in animals and the environment
- To impart adequate hands-on training in various animal models and determine the effects of drugs using animal models
- To provide practical inputs in pharmacokinetic studies of various drugs and formulations in animals to establish in-vitro and in-vivo correlations
- Acquire practical knowledge in various analytical techniques used in molecular biology
- To train students in using suitable statistical methods for interpretation of results
- To prepare the students in teamwork, lifelong learning and continuous improvement

Programme Outcomes

After the completion of the B.Pharmacy Programme the students will be able to,

- Develop an understanding for the need of pharmaceutical sciences and technology towards giving quality life to people in society through the quality of medicines.
- Apply the knowledge and skills gained through education to gain recognition in professional course and society.
- Create awareness in society about the effective and safe use of medicines.
- Act efficiently as a leader in the diverse areas of the profession to demonstrate the ability to plan and implement professional activities.
- Provide a practical knowledge of the basic pharmaceutical sciences and the skill, acquire to deal with problems in pharmaceutical field
- Develop ability for in-depth information and critical thinking in order to identify, formulate and solve the issues related to Pharmaceutical Industry, Regulatory Agencies, Hospital Pharmacy & clinical Pharmacy for better services to the community.
- Identify the goals and regulations involved in the drug discovery and development, manufacture, distribution and sale of medicines and develop problem-based learning approach and analytical thinking in his/her academic and professional life.

- Update the knowledge through continuous learning to face the challenges for better services to the community.
- Design and develop process to perform experiments in various pharmaceutical areas like Pharmacognosy, Pharmaceutical Chemistry including Analytical Chemistry, Pharmaceutical Biotechnology, Pharmacology, Formulation and Development.
- Fill the gap with other health care communities to provide innovative solutions for the purpose of maintain public health.
- Develop team spirit for the development of student profession to the social needs and professional ethics.
- Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- Create a talent pool by involving students in research projects and to make students to undertake research projects under faculty guidance for publication.
- Foster ambitious desire among students to undertake higher studies, career growth and life-long learning.

Programme Educational Objectives

- To produce Pharmacy graduates with strong fundamental concepts and high technical competence in pharmaceutical sciences and technology.
- To provide students with a strong and well defined concepts in the¬ various fields of pharmaceutical sciences viz., Pharmaceutics, Pharmaceutical chemistry, Pharmacognosy, Pharmacology and Pharmacy Practice according to the requirement of pharmaceutical industries, community and hospital pharmacy.
- To develop a sense of teamwork and awareness amongst students¬ towards the importance of interdisciplinary approach for developing competence in solving complex problems in the area of Pharmaceutical Sciences.
- To encourage the students to participate in life-long learning¬ process for a highly productive career and to relate the concepts of Pharmaceutical Sciences towards serving the cause of the society

SVU COLLEGE OF PHARMACEUTICAL SCIENCES

SRI VENKATESWARA UNIVERSITY,

Tirupati - 517502

B. PHARMACY PROGRAMME

(PCI Syllabus)

Choice based credit system (CBCS) Pattern

SEMESTER I

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP101T	Human Anatomy and Physiology I– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP102T	Pharmaceutical Analysis I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP103T	Pharmaceutics I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP104T	Pharmaceutical Inorganic Chemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP105T	Communication skills – Theory *	5	10	1 Hr	15	35	1.5 Hrs	50
BP106RBT BP106RMT	Remedial Biology/ Mathematics – Theory*	5	10	1 Hr	15	35	1.5 Hrs	50
BP107P	Human Anatomy and Physiology –	5	10	4 Hrs	15	35	4 Hrs	50

	Practical							
BP108P	Pharmaceutical Analysis I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP109P	Pharmaceutics I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP110P	Pharmaceutical Inorganic Chemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP111P	Communication skills – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
BP112RBP	Remedial Biology – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
Total		**70/75[$]/ 80[#]**	**115/125 [$]/130[#]**	**23/24[$]/26[#] Hrs**	**185/200[$]/210[#]**	**490/525[$]/ 540[#]**	**31.5/33[$]/35[#] Hrs**	**675/725[$]/ 750[#]**

[#]Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course**.**

[$]Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course**.**

***** Non University Examination (NUE)

Semester II

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP201T	Human Anatomy and Physiology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP202T	Pharmaceutical Organic Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP203T	Biochemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP204T	Pathophysiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP205T	Computer Applications in Pharmacy – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP206T	Environmental sciences – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP207P	Human Anatomy and Physiology II –Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP208P	Pharmaceutical Organic Chemistry I– Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP209P	Biochemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP210P	Computer Applications in Pharmacy – Practical*	5	5	2 Hrs	10	15	2 Hrs	25

Total	**80**	**125**	**20 Hrs**	**205**	**520**	**30 Hrs**	**725**

***** The subject experts at college level shall conduct examinations

Semester III

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP301T	Pharmaceutical Organic Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP302T	PhysicalPharmaceuticsI –Theory	10	15	1 Hr	25	75	3 Hrs	100
BP303T	Pharmaceutical Microbiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP304T	Pharmaceutical Engineering – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP305P	Pharmaceutical Organic Chemistry II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP306P	Physical Pharmaceutics I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP307P	Pharmaceutical Microbiology – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP308P	Pharmaceutical Engineering – Practical	5	10	4 Hr	15	35	4 Hrs	50
Total		**60**	**100**	**20**	**160**	**440**	**28Hrs**	**600**

Semester IV

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP401T	Pharmaceutical Organic Chemistry III– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP402T	Medicinal Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP403T	Physical Pharmaceutics II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP404T	Pharmacology I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP405T	Pharmacognosy I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP406P	Medicinal Chemistry I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP407P	Physical Pharmaceutics II – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP408P	Pharmacology I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP409P	Pharmacognosy I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
Total		**70**	**115**	**21 Hrs**	**185**	**515**	**31 Hrs**	**700**

Semester V

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP501T	Medicinal Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP502T	Industrial PharmacyI– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP503T	Pharmacology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP504T	Pharmacognosy II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP505T	Pharmaceutical Jurisprudence – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP506P	Industrial PharmacyI– Practical	5	10	4 Hr	15	35	4 Hrs	50
BP507P	Pharmacology II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP508P	Pharmacognosy II – Practical	5	10	4 Hr	15	35	4 Hrs	50
Total		**65**	**105**	**17 Hr**	**170**	**480**	**27 Hrs**	**650**

Semester VI

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP601T	Medicinal Chemistry III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP602T	Pharmacology III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP603T	Herbal Drug Technology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP605T	Pharmaceutical Biotechnology– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP606T	Quality Assurance– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP607P	Medicinal chemistry III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP608P	Pharmacology III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP609P	Herbal Drug Technology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
Total		**75**	**120**	**18 Hrs**	**195**	**555**	**30 Hrs**	**750**

Semester VII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP701T	Instrumental Methods of Analysis – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP702T	Industrial Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP703T	Pharmacy Practice – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP704T	Novel Drug Delivery System – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP705 P	Instrumental Methods of Analysis – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP706 PS	Practice School*	25	-	-	25	125	5 Hrs	150
Total		**70**	**70**	**8Hrs**	**140**	**460**	**21 Hrs**	**600**

* The subject experts at college level shall conduct examinations

Semester VIII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP801T	Biostatistics and Research Methodology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP802T	Social and Preventive Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP803ET	Pharmaceutical Marketing – Theory	10 + 10 = 20	15 + 15 = 30	1 + 1 = 2 Hrs	25 + 25 = 50	75 + 75 = 150	3 + 3 = 6 Hrs	100 + 100 = 200
BP804ET	Pharmaceutical Regulatory Science – Theory							
BP805ET	Pharmacovigilance – Theory							
BP806ET	Quality Control and Standardization of Herbals – Theory							
BP807ET	Computer Aided Drug Design – Theory							
BP808ET	Cell and Molecular Biology – Theory							
BP809ET	Cosmetic Science – Theory							
BP810ET	Experimental Pharmacology – Theory							

BP811ET	Advanced Instrumentation Techniques – Theory							
BP812PW	Project Work	-	-	-	-	150	4 Hrs	150

Total	**40**	**60**	**4 Hrs**	**100**	**450**	**16 Hrs**	**550**

SEMESTER I

Course Code	Course Title	No of Hours Per week	No of Credits
BP101T	Human Anatomy and Physiology I– Theory	04	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives:

1. Understanding the gross morphology, structure and functions of various organs of the human body.
2. Knowledge on various homeostatic mechanisms and their imbalances.
3. Identification of the various tissues and organs of different systems of human body.
4. Understanding the coordinated working pattern of different organs of each system.

Course Content:

Unit I

Introduction to human body

Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

Cellular level of organization

Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine

Tissue level of organization

Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

Unit II

Integumentary system: Structure and functions of skin

Skeletal system

Divisions of skeletal system, types of bone, salient features and functionsof bones of axial and appendicular skeletal system Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

Joints

Structural and functional classification, types of joints movements and its articulation

Unit III

Body fluids and blood

Body fluids, composition and functions of blood, hemopoeisis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.

Lymphatic system

Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

Unit IV

Peripheral nervous system:

Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves.

Special senses

Structure and functions of eye, ear, nose and tongue and their disorders.

Unit V

Cardiovascular system

Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

Text Books:

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,GuytonandJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.

Course Outcomes:

After completion of the course the student able to

1. Know the fundamental knowledge on the structure and functions of the various systems of the human body.
2. Understanding all the homeostatic mechanisms of the body
3. Understand the relationship of anatomy with various disciplines of pharmacy.
4. Understand the dynamic constancy of the body, cell and its components, tissue and types of tissue, blood, and its function and composition.
5. Can understand theimbalance in the normal functioning of various systems under various pathological settings.
6.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	2	2	2	2	2	2	2
CO2	2	2	2	2	2	2	1	2	1	1	1	1
CO3	3	3	3	2	3	3	3	3	3	3	3	3
CO4	2	2	2	1	1	2	2	2	2	2	1	1
CO5	2	2	3	1	3	2	3	2	3	3	1	2

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP102T	Pharmaceutical Analysis I–Theory	04	04
Sessional Marks: 25		**End Semester Examination Marks : 75**	

Objectives:

1. Understand the principles of volumetric and electro chemical analysis
2. Carryout various volumetric and electrochemical titrations
3. Develop analytical skills

Course Content:

Unit I

UNIT-I (a) Pharmaceutical analysis- Definition and scope i) Different techniques of analysis ii) Methods of expressing concentration iii) Primary and secondary standards. iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate (b)Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures (c)Pharmacopoeia, Sources of impurities in medicinal agents,limit tests.

UNIT-II • Acid base titration: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves • Non aqueous titration: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

UNIT-III • Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.

•Complexometric titration: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate. •Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.

• Basic Principles,methods and application of diazotisation titration.

UNIT-IV Redox titrations (a) Concepts of oxidation and reduction (b) Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate.

UNIT-V • Electrochemical methods of analysis

•Conductometry- Introduction, Conductivity cell, Conductometric titrations, applications.

•Potentiometry - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.

• Polarography - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications.

Text Books:

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
5. John H. Kennedy, Analytical chemistry principles 6. Indian Pharmacopoeia.

Course Outcomes:

After completion of the course, the student able to

1. It gives knowledge about the fundamental methodology to prepare different strength of solutions.
2. It facilitate the students to predict the sources of mistakes and errors.
3. It also helps to develop the fundamentals of volumetric analytical skills.
4. It provides the basic knowledge in the principles of electrochemical analytical techniques
   The student will be provided with the skillto improve by the course content in terms of analytical techniques to perform the estimation of different category drugs.
5. Develop insight into the fundamental chemical principlesthat facilitate the analytical estimations.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	2	2	2	2	2	1	1	1
CO2	3	3	1	1	3	3	3	1	2	1	2	2
CO3	3	3	3	2	3	3	3	2	3	2	2	2
CO4	3	3	3	2	3	3	3	2	3	2	2	1
CO5	3	3	2	1	3	3	3	2	3	1	1	1

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP103 T	Pharmaceutics-I(Theory)	04	04
Sessional Marks: 25		**End Semester Examination Marks : 75**	

Objectives:

1. Know the history of profession of pharmacy
2. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
3. Understand the professional way of handling the prescription
4. Preparation of various conventional dosage forms.

Course Content:

Unit I

Historical background and development of profession of pharmacy: HistoryofprofessionofPharmacy inIndianinrelationtopharmacyeducationindustryand organization, Pharmacy as a career, Pharmacopoeias: Introduction totheIP, BP,USP and ExtraPharmacopoeia.

Dosageforms: Introductiontodosageforms,classificationanddefinitions

Prescription: Definition, Parts of prescription, handling of Prescription andErrorsin prescription.

Posology: Definition, Factors affecting posology. Pediatric dose calculationsbasedonage,body weight and bodysurfacearea.

Unit II

Pharmaceutical calculations: Weights and measures – Imperial &Metricsystem, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing pointandmoleweighteightt.

Powders: Definition, classification, advantages and disadvantages, Simple &compound powders – official preparations, dusting powders, effervescent,efflorescentandhygroscopicpowders,eutecticmixtures.Geometricdilutions.

Liquid dosage forms: Advantages and disadvantages of liquid dosage forms.Excipients used in formulation of liquid dosage forms. Solubility enhancementtechniques

Unit III

Monophasic liquids: Definitions and preparations of Gargles, Mouthwashes,Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments andLotions.

Biphasicliquids:

Suspensions: Definition, advantages and disadvantages, classifications,Preparation of suspensions; Flocculated and Deflocculated suspension &stabilityproblemsand methods to overcome.

Emulsions: Definition, classification, emulsifying agent, test for the identificationof type of Emulsion, Methods of preparation & stability problems and methods toovercome.

Unit IV

Suppositories: Definition, types, advantages and disadvantages, types of bases,methods of preparations. Displacement value & its calculations, evaluation ofsuppositories.

Pharmaceutical incompatibilities: Definition, classification, physical, chemicalandtherapeuticincompatibilities with examples.

Unit V

Semisolid dosage forms: Definitions, classification, mechanisms and factorsinfluencing dermal penetration of drugs. Preparation of ointments, pastes, creamsand gels. Excipients used in semi solid dosage forms. Evaluation of semi soliddosagesforms

Text Books:

H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.

2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.

3. M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh. 4. Indian pharmacopoeia.

5. British pharmacopoeia.

6. Lachmann. Theory and Practice of Industrial Pharmacy,Lea&Febiger Publisher, The University of Michigan.

7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.

11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.

12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.Dispensing Pharmacy, Cooper &Gunns CBS, Publ. and Distributors New Delhi – (2008).

13 Dispensing Pharmacy, R.M Metha, 2006 Vallabh Publication, New Delhi.

REFERENCES

1. Text Book of Pharmaceutics, E.A. Rawlins, Bentley"s ELBS publ.

2. Essential dosage calculations -Hospital Pharmacy. Lorria& William, William Hassan.

Course Outcomes:

After Completion of the course the student able to

1. Recognize the formulation aspects of different dosage forms;
2. Formulate different types of dosage forms;
3. Appreciate the importance of good formulation for effectiveness.
4. Do different pharmaceutical calculation involved in formulation.
5. Gain basic knowledge of various Pharmacopoeias and their significance with respect to the various fields of pharmaceutical sciences.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	3	3	3	3	3	3	1	1
CO2	2	2	2	2	3	3	3	2	2	2	1	1
CO3	2	2	2	1	3	3	2	2	2	2	1	1
CO4	2	3	2	2	2	3	3	2	2	2	1	1

CO5	3	3	2	2	2	3	3	2	3	3	1	1

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP104T	Pharmaceutical Inorganic Chemistry–Theory	04	04
Sessional Marks: 25	**End Semester Examination Marks : 75**		

Objectives:

1.Knowledge on the history and concept of pharmacopoeia and its editions.

2**.** Understanding the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.

3. The medicinal and pharmaceutical importance of inorganic compounds.

4. Knowledge on various anions and cations of different pharmaceutical inorganic compounds.

5. Knowledge on methods to prepare inorganic pharmaceuticals.

Course Content:

UNIT I

Impurities in pharmaceutical substances:

History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate.

General methods of preparation, assay for the compounds superscripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes.

UNIT II

Acids, Bases and Buffers

Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.

Major extra and intracellular electrolytes

Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.

Dental products

Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

UNIT III

Gastrointestinal agents Acidifiers

Ammonium chloride* and Dil. HCl

Antacid

Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture

Cathartics

Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite

Antimicrobials

Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations.

UNIT IV

Miscellaneous compounds Expectorants

Potassium iodide, Ammonium chloride*.

Emetics

Copper sulphate*, Sodium potassium tartarate Haematinics: Ferrous sulphate*, Ferrous gluconate

Poison and Antidote

Sodium thiosulphate*, Activated charcoal, Sodium nitrite333

Astringents

Zinc Sulphate, Potash Alum

UNIT V

Radiopharmaceuticals

Radio activity, Measurement of radioactivity, Properties of α, β, γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I131 , Storage conditions, precautions & pharmaceutical application of radioactive substances.

Text Books

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4 th edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3 rd Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand&Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian Pharmacopoeia.

Course Outcomes:

1.To understand the history and concept of pharmacopoeia and its editions.

2. Knowledge about the sources of impurities and methods to determine the impurities in inorganic pharmaceuticals.

3. Identification of limit tests of different pharmaceutical inorganic compounds.

4. Understand the method to prepare inorganic pharmaceuticals.

5. Justify the medicinal importance of acidifiers, antacids, cathartics and antimicrobial agents as gastrointestinal agents in addition to the awareness on handling and applications of radiopharmaceuticals.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	2	3	2	1	1
CO2	3	2	2	2	3	3	2	2	2	2	1	1
CO3	2	2	1	2	3	3	3	2	3	3	1	1
CO4	2	3	2	3	2	3	2	3	3	2	1	1
CO5	2	2	2	1	2	2	2	2	3	2	1	1

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP105T	Communication skills– Theory	02	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

Objectives:

1. To enable students speak effectively in formal and informal situation.
2. To equip the students with a wide range of vocabulary,so as to enable them use language more effectively.
3. To understand the strategies of the interviews to facilitate better response during the"placement" interviews.
4. To understand the characteristics of successful group discussions.
5. To identify areas of evaluation of GDs(group discussion) conducted by organization as part of the selection presentation.
6. Effectively manage the team as a team player.

Course Content:

Unit I

Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context

Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers

Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment**Unit Unit II**

Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication

Communication Styles: Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

Unit III

Basic Listening Skills: Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations

Effective Written Communication: Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication

Writing Effectively: Subject

Unit IV

Interview Skills: Purpose of an interview, Do's and Dont's of an interview

Giving Presentations: Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

Unit V

Group Discussion: Introduction, Communication skills in group discussion, Do's and Dont's of group discussion

Text Books:

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konarnira, 2ndEdition, New arrivals – PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning indiapvt.ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009
12. Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999

Course Outcomes:

After Completion of the course the student able to

1. To equip students with Pre-presentations and to understand the structure of a good presentation and devise various techniques for delivering a successful presentation.
2. To help students overcome stage fear and take questions.
3. To enable the students to become global citizens.
4. This course will prepare the young pharmacy student to interact effectively with doctors, nurses and other health workers.
5. At the end of the course the students will get the soft skills set to work cohesively with the team as a team player and add value to the pharmaceutical business.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	3	2	1	1	2	1	1	2	2
CO2	2	2	1	2	1	3	2	3	2	2	2	1
CO3	3	3	3	3	2	2	2	3	2	2	2	2
CO4	3	2	2	3	2	2	2	2	1	2	2	2
CO5	1	1	2	3	1	1	2	2	2	1	2	2

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP106RBT	Remedial Biology –Theory	02	02
Sessional Marks:15End Semester Examination Marks :35			

Objectives: The student shall be able to know

1.Know the classification and salient features of five kingdoms of life.

2.Understand the basic components of anatomy and physiology of plant.

3.Know understand the basic components of anatomy and physiology animal with special reference to human.

Course Content:

Unit I

Living world:

Definition and characters of living organisms.
Diversity im the living world.
Binomial nomenclature
Five kingdoms of life and basis of classification salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus.

MORPHOLOGY OF FLOWERING PLANTS

Morphology of different parts of flowering plants-Root, stem, inflorescence, flower, leaf, fruit, seed.
General anatomy of Root, stem, leaf of monocotyledons and dicotyledons.

Unit II

Body fluids and circulation

Composition of blood, blood groups, coagulation of blood.
Composition and functions of lymph.
Human circulatory system.
Structure of human heart and blood vessels.
Cardiac cycle, Cardiac output and ECG.

Digestion and Absorption

Human alimentary canal and digestive glands.

Role of digestive enzymes.

Digestion, absorption and assimilation of digested food.

Breathing and respiration

Human respiratory system.

Mechanism of breathing and its regulation.

Exchange of gases, transport of gases, and regulation of respiration.

Respiratory volumes.

Unit III

Excretory products and their elimination

Modes of excretion.

Human excretory system-structure and function.

Urine formation.

Renin angiotensin system.

Neural control and coordination

Definition and classification of nervous system.

Structure of a neuron.

Generation and conduction of nerve impulse.

Structure of brain and spinal cord.

Functions of cerebrum, cerebellum, hypothalamus, and medulla oblongata.

Chemical coordination and regulation

Endocrine glands and their secretions.

Functions of hormones secreted by endocrine glands.

Human Reproduction

Parts of female reproductive system.

Parts of male reproductive system.

Spermatogenesis and Oogenesis.

Menstrual cycle.

Unit IV

Plants and mineral nutrition:

Essential mineral, macro and micro nutrients.

Nitrogen metabolism, Nitrogen cycle, Biological nitrogen fixation.

Photosynthesis

Autotrophic nutrition, photosynthesis, photosynthetic pigments, Factors affecting photosynthesis.

Unit V

Plant respiration: Respiration, glycolysis, fermentation (anaerobic).

Plant growth and development

Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators.

Cell – The unit of life

Structure and functions of cell and cell organelles. Cell division.

Tissues

Definition, types of tissues, location and functions.

Text books

a. Text book of Biology by S.B. Gokhale.
b. A Text book of biology by Dr.Thulajappa and Dr.Seetaram.

Reference Books

a. A text book of Biology by B.V. Sreenivasa Naidu.
b. A text book of biology by Naidu and Murthy.
c. Botany for degree students by A.C. Dutta.
d. Outlines of Zoology by M. Ekambaranathaayyer and T.N. Ananthakrishnan.
e. A manual for pharmaceutical Biology practical by S.B. Gokhale and C.K. Kokate.

Course Outcomes:

After Completion of the course the student able to

1.Know the kingdoms of life.

2.Know the body fluids, absorption, digestion, respiration.

3.Know the excretory products, neural control, chemical coordination, and human reproduction.

4.Know the Nutrition in plants and photosynthesis.

5.Know the respiration in plants, cell, and tissues.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	1	1	1	1	1	1	1	1	2	1	1	1
CO3	1	1	1	1	1	1	1	1	2	1	1	1
CO4	1	1	1	1	1	1	1	1	2	1	1	1
CO5	1	1	1	1	1	1	1	1	1	1	1	1

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP106RMT	Remedial Mathematics– Theory	02	02
Sessional Marks:15	**End Semester Examination Marks :35**		

Objectives:

1. Know the theory and their application in Pharmacy

2. Solve the different types of problems by applying theory

3. Appreciate the important application of mathematics in Pharmacy

Course Content:

Unit-I

Partial fraction

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction , Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

Logarithms

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

Function*:*

Real Valued function, Classification of real valued functions,

Limits and continuity :

Introduction , Limit of a function, Definition of limit

Unit-II

Matrices and Determinant:

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix

method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem,Applicationof Matrices in solving Pharmacokinetic equations

Unit- III

Calculus

Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function , Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of *xnw.r.t*x,where*n*is any rational number, Derivative of *ex,*, Derivative of loge *x ,* Derivative of *ax* ,Derivative of trigonometric functions from first principles (without Proof), Successive Differentiation, Conditions

Unit- IV

Analytical Geometry

Introduction: Signs of the Coordinates, Distance formula,

Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

Integration:

Introduction, Definition, Standard formulae, Rules of integration , Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

Unit- V

Differential Equations : Some basic definitions, Order and degree, Equations in separable form , Homogeneous equations, Linear Differential equations, Exact equations, Application in solving Pharmacokinetic equations

Laplace Transform : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, Application in solving Chemical kinetics and Pharmacokinetics equations

Text Books

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
3. Integral Calculus by Shanthinarayan
4. Higher Engineering Mathematics by Dr.B.S.Grewal

Course Outcomes:

1. This program shall create an awareness about the mathematical problems, to develop an statistical evaluation.
2. To adopt skills in identifying and solving problems.
3. Know the theory and their application in Pharmacy research
4. Solve the different types of problems by applying theory in drug discovery
5. Deal with mathematical correlations in pharmacokinetic modeling studies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	1	1	2	1	3	1	1	1
CO2	1	2	1	1	2	1	3	1	3	1	2	1
CO3	2	2	2	1	2	2	2	2	3	2	1	2
CO4	1	2	2	1	1	2	2	2	3	2	1	1
CO5	2	2	1	1	1	1	2	1	3	1	1	2

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP107P	Human Anatomy and Physiology – Practical	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

Objectives:

1. Knowledge on various experiments related to special senses and nervous system.
2. Understanding the procedure for estimation of the various experiments related to the haemotology.
3. Perform and record the blood pressure, heart rate, pulse rate.
4. Knowledge on basic terminologies used in anatomy and physiology to identify body parts, directional terms, body planes and various organ system within human body.

Course Content:

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

Text Books:

6. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.

7. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
8. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
9. Text book of Medical Physiology- Arthur C,GuytonandJohn.E. Hall. Miamisburg, OH, U.S.A.
10. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
11. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
12. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers,New Delhi.

Course Outcomes:

After Completion of the course the student is able to

1. Differentiate the structures of the various systems of the human body.
2. Perform the experiments like blood cell count, hemoglobin content, bleeding and clotting time and various physiological Parameters theoretically and practically.
3. Identify the structural (microscopically and macroscopically) and functional details about different organ systems such as cardiovascular, lymphatic, digestive,and muscular system
4. Understand some simple clinical methods employed in thegeneral diagnosis of diseases.
5. Insight into the influence of a given disease condition on certain vital clinical parameters.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	2	2	2	2	2	2	2
CO2	2	2	2	2	2	2	1	2	1	2	1	1
CO3	3	3	3	2	3	3	3	3	3	3	3	3
CO4	2	2	2	1	1	2	2	2	2	2	1	1
CO5	2	2	3	1	3	2	3	2	3	3	2	2

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP108P	Pharmaceutical Analysis I – Practical	04	02
Sessional Marks: 15		**End Semester Examination Marks : 35**	

Objectives:

1. Thissubjects deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

2. Knowledge on various type of titrations

3. Handling of physico-chemical equipment .

4. Calculation of molarity, normality, percentage puity etc.

Course Content:

I .Limit Test of the following

(1) Chloride

(2) Sulphate

(3) Iron

(4) Arsenic

II .Preparation and standardization of

(1) Sodium hydroxide

(2) Sulphuric acid

(3) Sodium thiosulfate

(4) Potassium permanganate

(5) Ceric ammonium sulphate

III .Assay of the following compounds along with Standardization of Titrant

(1) Ammonium chloride by acid base titration

(2) Ferrous sulphate by Cerimetry

(3) Copper sulphate by Iodometry

(4) Calcium gluconate by complexometry

(5) Hydrogen peroxide by Permanganometry

(6) Sodium benzoate by non-aqueous titration

(7) Sodium Chloride by precipitation titration

IV .Determination of Normality by electro-analytical methods

(1) Conductometric titration of strong acid against strong base

(2) Conductometric titration of strong acid and weak acid against strong base

(3) Potentiometric titration of strong acid against strong base

Text Books:

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London

2. A.I. Vogel, Text Book of Quantitative Inorganic analysis

3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry

4. Bentley and Driver's Textbook of Pharmaceutical Chemistry

5. John H. Kennedy, Analytical chemistry principles

6. Indian Pharmacopoeia.

Course Outcomes:

1. This course is designed to perform and get trained to the electro chemical tests like potentiometery, complexometery, polarimetery.

2. Hands on training on different titrations like complexometric titrations, precipitation titrations, redox titrations.

3.Under stand the process of limit test and procedures.

4.Gain knowledge on the determination of Normality, Molarity, Molality.

5. Understand the process how to prepare the solution and its standardization.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	2	2	2	2	2	1	1	1
CO2	3	3	1	1	3	3	3	3	2	1	2	2
CO3	3	3	3	2	3	3	3	2	3	2	2	2
CO4	3	3	3	2	3	3	3	3	3	2	2	1
CO5	3	3	2	2	3	3	3	2	3	1	1	1

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP109P	Pharmaceutics I – Practical	04	02
Sessional Marks: 15		**End Semester Examination Marks : 35**	

OBJECTIVES;

1. Understand the basics of different dosage forms,
2. Know the importance pharmaceutical calculations.
3. Understanding Preparation and procedures of various conventional dosage forms;
4. Understanding pharmaceutical incompatibilities and their side-effects

Course Content:

Syrups

a) SyrupIP'66

b) CompoundsyrupofFerrousPhosphate BPC'68

2. Elixirs

a)Piperazinecitrateelixir

b)Paracetamolpediatric elixir

3. Linctus

a)TerpinHydrateLinctusIP'66

4. Solutions

b)IodineThroatPaint(MandlesPaint)

a) Strongsolutionofammoniumacetate

b) Cresolwithsoapsolution

c) Lugol'ssolution

5. Suspensions

a) Calaminelotion

b) MagnesiumHydroxidemixture

c) AluminimumHydroxidegel

6. Emulsions

a) TurpentineLiniment

b) Liquidparaffine emulsion

7. PowdersandGranules

a) ORSpowder(WHO)

b) Effervescentgranules

c) Dustingpowder

d) Divdedpowders

8. Suppositories

a) Glycerogelatinsuppository

b) Cocabutter suppository

c) ZincOxide suppository

9. Semisolids

a) Sulphurointment

b) Non-staining-iodineointmentwithmethylsalicylate

c) Carbopalgel

10. GarglesandMouthwashes

a) Iodinegargle

b) Chlorhexidinemouthwash

COURSE OUTCOMES:

1. This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts of preparing the different conventional dosage forms.
2. To understand the different pharmaceutical calculation involved in formulation;
3. Practical knowledge on formulation procedure of different dosage forms;

4. Highlights the Practical allowance to formulate different types of dosage forms;and
5. Gain Knowledge on criteria to appreciate the good formulation for effectiveness.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	3	3	3	3	3	3	1	1
CO2	2	2	2	1	3	3	3	2	2	2	1	1
CO3	2	2	2	2	3	3	2	3	2	2	1	1
CO4	2	3	2	1	2	3	3	3	2	2	1	1
CO5	3	3	2	2	2	3	3	2	3	3	1	1

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP110P	Pharmaceutical Inorganic Chemistry– Practical	04	02
Sessional Marks: 15	**End Semester Examination Marks :35**		

Objectives:

1. Understanding the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.

2. The medicinal and pharmaceutical importance of inorganic compounds.

4. Identification on different types of limit test in pharmaceutical inorganic compounds.

5. Knowledge on methods to prepare inorganic pharmaceuticals.

Course Content:

I Limit tests for following ions

Limit test for Chlorides and Sulphates

Modified limit test for Chlorides and Sulphates

Limit test for Iron

Limit test for Heavy metals

Limit test for Lead

Limit test for Arsenic

II Identification test

Magnesium hydroxide

Ferrous sulphate

Sodium bicarbonate

Calcium gluconate

Copper sulphate

III Test for purity

Swelling power of Bentonite

Neutralizing capacity of aluminum hydroxide gel

Determination of potassium iodate and iodine in potassium Iodide

IV Preparation of inorganic pharmaceuticals

Boric acid

Potash alum

Ferrous sulphate

Text Books

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, StahlonePress of University of London, 4 th edition.
2. Indian Pharmacopoeia

Course Outcomes:

1. To recall the sources of limit tests, preparation and identification of compounds.
2. To demonstrate the preparation of inorganic pharmaceuticals
3. To apply knowledge to perform modified limit tests.
4. To analyze various inorganic pharmaceutical compounds.
5. Knowledge of preparation methods ofinorganic pharmaceuticals.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	2	3	2	1	1
CO2	3	3	2	1	2	3	2	2	2	1	1	1
CO3	2	2	1	1	3	3	2	2	3	2	1	1
CO4	3	3	3	3	3	3	2	2	2	1	1	1
CO5	2	2	2	1	2	2	2	2	3	1	1	1

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP111P	Communication skills– Practical	02	01
Sessional Marks : 10		**End Semester Examination Marks : 15**	

Objectives:

1. To enable students speak effectively in formal and informal situation.
2. To equip the students with a wide range of vocabulary,so as to enable them use language more effectively.
3. To understand the strategies of the interviews to facilitate better response during the"placement" interviews.
4. To understand the characteristics of successful group discussions.
5. To identify areas of evaluation of GDs(group discussion) conducted by organization as part of the selection presentation.

Course Content:

Thefollowing learning modules are to be conducted using wordsworth® English language lab software

Basic communication covering the following topics

Meeting People

Asking Questions

Making Friends

What did you do?

Do’s and Dont’s

Pronunciations covering the following topics

Pronunciation (Consonant Sounds)

Pronunciation and Nouns

Pronunciation (Vowel Sounds)

Advanced Learning

Listening Comprehension / Direct and Indirect Speech

Figures of Speech

Effective Communication

Writing Skills

Effective Writing

Interview Handling Skills

E-Mail etiquette

Presentation Skills

Text Books:

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011

2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011

3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013

4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011

5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013

6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010

7. Communication skills for professionals, Konarnira, 2ndEdition, New arrivals – PHI, 2011

8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011

9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning indiapvt.ltd, 2011

10. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011

11. Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009

12. Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999

Course Outcomes:

After Completion of the course the student able to

1. To equip students with Pre-presentations and to understand the structure of a good presentation and devise various techniques for delivering a successful presentation.
2. To help students overcome stage fear and take questions.
3. To enable the students to become global citizens.
4. This course will prepare the young pharmacy student to interact effectively with doctors, nurses and other health workers.
5. At the end of the course the students will get the soft skills set to work cohesively with the team as a team player and add value to the pharmaceutical business.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	3	2	1	1	2	1	1	2	2
CO2	1	1	2	2	1	1	1	1	1	1	1	1
CO3	1	3	1	3	1	2	2	3	1	2	2	2
CO4	1	2	2	3	1	1	1	2	1	2	2	2
CO5	1	1	2	3	2	2	1	2	2	1	2	2

3-High, 2-Medium, 1-Low

BP112RBP REMEDIAL BIOLOGY-PRACTICAL

Course Code	Course Title	No of Hours Per week	No of Credits
BP112RBP	Remedial biology – Practical	02	01
Sessional Marks:10End Semester Examination Marks :15			

OBJECTIVES:

1.To know about microscope, different cutting techniques, mounting, staining and permanent slide preparation.

2.To study about cell and morphology of plants and its modifications.

3.To study about frog by using computer models.

4.To study and identify bones and microscopic tissues.

5.To determine blood groups, blood pressure and tidal volume.

1.Introduction to experiments in biology

a. Study of microscope.

b. Section cutting techniques.

c. Mounting and staining.

d. Permanent slide preparation.

2. Study of cell and its inclusions.

3. Study of stem, root, leaf, seed, fruit, flower and their modifications.

4. Detailed study of frog by using computer models.

5. Microscopic study and identification of tissues pertinent to stem, root, leaf, seed, fruit and flower.

6. Identification of bones.

7. Determination of blood group.

8. Determination of blood pressure.

9. Determination of tidal volume.

REFERENCE BOOKS:

1.Practical human anatomy and physiology by S.R. Kale and R.R.Kale.

2. A manual for pharmaceutical biology practical by S.B. Gokhale, C.K.Kokate and S,P.shriwastava.

3. Biology practical manual according to National core curriculum. Biology forum of Karnataka. Prof. M.J.H. Shafi.

OUTCOMES: The student able to know

1. How to use microscope, section cutting, mounting, staining, and permanent slide preparation.
2. About the cell and its functions.
3. About the frog with respect to human.
4. About the bone and tissues in humans and plants.
5. About the blood groups, blood pressure and tidal volume.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	1	1	1	1	1	1	1	1	2	1	1	1
CO3	1	1	1	1	1	1	1	1	2	1	1	1
CO4	1	1	1	1	1	1	1	1	2	1	1	1
CO5	1	1	1	1	1	1	1	1	1	1	1	1

3-High, 2-Medium, 1-Low

SVU COLLEGE OF PHARMACEUTICAL SCIENCES

SRI VENKATESWARA UNIVERSITY,

Tirupati - 517502

B. PHARMACY PROGRAMME

(PCI Syllabus)

Choice based credit system (CBCS) Pattern

SEMESTER II

Course Code	Course Title	No of Hours Per week	No of Credits
BP 201T	Human Anatomy and Physiology-II – Theory	4	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives:

1. Understand the gross morphology, structure and functions of various organs of the human body.
2. Thorough knowledge on various homeostatic mechanisms and their imbalances.
3. Step wise procedures to understand and perform the hematological tests like blood cell count, Hb estimation, bleeding time, clotting time etc
4. To know the working pattern of different organs of each system.
5. Differentiate various tissues and organs of different systems of human body.
6. knowledge on interlinked mechanisms in the maintenance of normal functioning of human body.

Course Content:

UNIT I

- **Nervous system**

  Organization of nervous system, neuron neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid, structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity).

UNIT II

- **Digestive system**

  Anatomy of GIT Tract with special reference to anatomy and functions of stomach,(Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT.

- **Energetics**

  Formation and role of ATP, creatinine phosphate and BMR.

UNIT III

- **Respiratory system**

  Anatomyof respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration.

  Lung Volumes and capacities, transport of respiratory gases, artificial respiration and resuscitation methods.

- **Urinary system**

  Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

UNIT IV

- **Endocrine system**

  classification of hormones, mechanism of hormone action, structure and function of pituitary gland, thyroid gland, parathyroid gland,adrenal gland, pancreas, pineal gland, thymus and their disorders.

UNIT V

- **Reproductive system**

Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization,spermatogenesis, oogenesis, pregnancy and parturition.

- **Introduction to genetics**

  Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance.

Text Books

1. Essentials of Medical Physiology by K.Sembulingam and P.sembulingam. Jaypee brothes medical publishers, New Delhi.

2. Anatomy and physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York

3. Physiological basis of Medical practice-Best and Tailor. Williams &Wilkins Co,Riverview, MI USA.

4. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA USA.

5. Text book of Human histology by Inderbir singh.

6. Text book of Medical physiology by Arthur C Guyton.

Course Outcomes:

1. Know the gross morphology, structure and functions of various organs of the human body.

2. Perform all the hematological tests with the help of specimens

3. Note all the points regarding the tissues various organs of human body

4. Brief knowledge on clinical significance of various systems in our body.

5. Application of the role of genetics in day to day life.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1	3	1	1	2	1	2	2	2
CO2	3	3	2	2	3	1	2	3	1	2	2	2
CO3	3	2	3	2	3	2	2	3	1	2	2	2
CO4	2	3	3	3	3	1	2	2	1	3	3	3
CO5	2	3	2	3	2	1	2	2	1	1	3	3

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP202T	Pharmaceutical Organic Chemistry I - Theory	04	04
Internal Marks :25		**End Semester Examination Marks :** 75	

Objectives:

1. To impart knowledge on writing organic structures, various methods of nomenclature, and isomerism respectively.
2. To create awareness on the aspects of chemical reactivity and stability.
3. To motivate towards understanding the organic reactions.

Course Content:

Generalmethodsofpreparation/ synthesisand chemical reactionsof the compound classessuperscriptedwithasterisk(*)tobe discussed.

Emphasisondefinition,types,classification,principles/mechanisms,applications,examples anddifferences.

Unit I

- **Classification,nomenclatureandisomerism**

ClassificationofOrganicCompounds

CommonandIUPACsystemsofnomenclatureof organiccompounds(upto10Carbonsopenchainandcarbocyclicco mpounds)

Structuralisomerismsinorganiccompounds

Unit II

- **Alkanes*,Alkenes*and Conjugateddienes***

SP^3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins.Stabilitiesofalkenes,SP^2hybridizationinalkenes

E_1andE_2reactions–kinetics,orderofreactivityofalkylhalides,rearrangementofcarbocations, Saytzeffs orientation and evidences.E_1 verses E_2 reactions, Factors affecting E_1andE_2reactions.Ozonolysis,electrophilicadditionreactionsofalkenes,Markownikoff'sorient

ation,freeradicaladditionreactionsofalkenes,AntiMarkownikoff'sorientation.

Stabilityofconjugateddienes,Diel-Alder,electrophilicaddition,freeradicaladditionreactionsofconjugated dienes,allylicrearrangement

Unit III

- **Alkyl halides***

  SN_1andSN_2reactions-kinetics,orderofreactivityofalkylhalides,stereochemistryandrearrangementofcarbocations.

  SN_1versusSN_2reactions,Factorsaffecting$SN_1$and SN_2reactions

  Structureandusesofethylchloride,Chloroform,trichloroethylene,tetrachloroethylene,dichloromethane,tetrachloromethaneandiodoform.

- **Alcohols*-**

  Qualitativetests,StructureandusesofEthylalcohol,Methylalcohol,chlorobutanol, Cetosterylalcohol,Benzyl alcohol,Glycerol,Propyleneglycol

Unit IV

- **Carbonylcompounds*(Aldehydesandketones)**

  Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation,Cannizzaroreaction,CrossedCannizzaroreaction,Benzoincondensation,Perkincondensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone,Chloralhydrate,Hexamine,Benzaldehyde,Vanilin,Cinnamaldehyde.

Unit V

- **Carboxylicacids***

  Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitativetestsfor carboxylicacids,amideand ester

  Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalicacid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl

salicylate andAcetylsalicylicacid

- **Aliphaticamines*-**
  Basicity,effectofsubstituentonBasicity.Qualitativetest,Structureandusesof Ethanolamine,Ethylenediamine,Amphetamine

Text Books (All Latest Editions):

1. Organic ChemistrybyMorrisonandBoyd
2. OrganicChemistrybyI.L.Finar ,Volume-I
3. Textbook of OrganicChemistrybyB.S.Bahl&ArunBahl.
4. Organic ChemistrybyP.L.Soni
5. Reaction and reaction mechanisms by Ahluwaliah/ Chatwal.

Course Outcomes:

After Completion of this course, the student could be able to:

1. Guess and writethestructure, systematic/ trivial name, and pharmaceutical uses (if any)associated with the specifiedorganic compounds.
2. Understand the general concept of isomerism and distinguish structural isomers.
3. Infer the chemical nature of the compounds on the basis of qualitative chemical tests.
4. Understand the significance of certain electronic effects with respect to the reactivity/ stability of organic compounds specified.
5. Understand and gain insight into the organic reactions by analyzing their fair reaction mechanisms.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	3	3	2	3	3	1	2	3
CO2	2	2	3	1	3	1	2	3	3	1	1	3
CO3	3	3	3	2	3	3	3	3	3	2	2	3
CO4	3	3	3	3	3	2	3	2	3	2	2	3
CO5	3	3	3	3	3	3	2	2	3	2	2	3

6. 3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP203T	Biochemistry – Theory	04	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives:

1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

Course Content:

Unit I

Biomolecules

Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

Bioenergetics

Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.

Energy rich compounds; classification; biological significances of ATP and cyclic AMP

Unit II

Carbohydrate metabolism

Glycolysis – Pathway, energetics and significance

Citric acid cycle- Pathway, energetics and significance

HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency

Glycogen metabolism Pathways and glycogen storage diseases (GSD)

Gluconeogenesis- Pathway and its significance

Hormonal regulation of blood glucose level and Diabetes mellitus

Biological oxidation

Electron transport chain (ETC) and its mechanism.

Oxidative phosphorylation & its mechanism and substrate phosphorylation

Inhibitors ETC and oxidative phosphorylation/Uncouplers

Unit III

Lipid metabolism

β-Oxidation of saturated fatty acid (Palmitic acid)

61

Formation and utilization of ketone bodies; ketoacidosis

De novo synthesis of fatty acids (Palmitic acid)

Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D

Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

Amino acid metabolism

General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders

Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)

Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline

Catabolism of heme; hyperbilirubinemia and jaundice

Unit IV

Lipid metabolism

β-Oxidation of saturated fatty acid (Palmitic acid)

61

Formation and utilization of ketone bodies; ketoacidosis

De novo synthesis of fatty acids (Palmitic acid)

Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D

Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

Amino acid metabolism

General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders

Catabolism of phenylalanine and tyrosine and their metabolic disorders

(Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)

Synthesis and significance of biological substances; 5-HT, melatonin,

dopamine, noradrenaline, adrenaline

Catabolism of heme; hyperbilirubinemia and jaundice

Unit V

Enzymes

Introduction, properties, nomenclature and IUB classification of enzymes

Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)

Enzyme inhibitors with examples

Regulation of enzymes: enzyme induction and repression, allosteric

enzymes regulation

Therapeutic and diagnostic applications of enzymes and isoenzymes

Coenzymes –Structure and biochemical functions

Text Books:

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical student

Course Outcomes:

After Completion of the course the student able to

1. Know the fundamental knowledge on the biochemical Pathways of the body
2. Understanding the catalytic role of enzymes, importance of enzyme inhibitors
3. Understand the genetic organization of mammalian genome
4. To Understand the DNA in the synthesis of RNAs and proteins
5. Present the results, conclusions, and relevance of scientific experiments to a specific audience

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	3	3	2	3	3	1	2	3

CO2	2	2	3	1	3	1	2	3	3	1	1	3
CO3	3	3	3	2	3	3	3	3	3	2	2	3
CO4	3	3	3	3	3	2	3	2	3	2	2	3
CO5	3	3	3	3	3	3	2	2	3	2	2	3

7. 3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 204T	PathopphysiologyI–Theory	04	04
Sessional Marks: 25		**End Semester Examination Marks : 75**	

Objectives:

1. This subject describe the etiology and pathogenesis of the selected disease states.

2. Knowledge on name the signs and symptoms of the diseases.

3. It also describe and Mention the complications of the diseases.

Course Content:

Unit I

UNIT-I Basic principles of Cell injury and Adaptation: Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury,Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage),Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia),Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis &Alkalosis,Electrolyte imbalance.

- Basic mechanism involved in the process of inflammation and repair: Introduction, Clinical signs of inflammation, Different types of Inflammation,Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's,Mediators of inflammation,Basic principles of wound healing in the skin,Pathophysiology of Atherosclerosis

UNIT-II Cardiovascular System: Hypertension, congestive heart failure, ischemic heart disease (angina,myocardial infarction, atherosclerosis and arteriosclerosis)

- Respiratory system:Asthma, Chronic obstructive airways diseases.
- Renal system:Acute and chronic renal failure .

UNIT-III Haematological Diseases: Iron deficiency, megaloblasticanemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia

- Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones
- Nervous system: Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.
- Gastrointestinal system: Peptic Ulcer

UNIT-IV Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.

- Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout
- Principles of cancer: classification, etiology and pathogenesis of cancer
- Diseases of bones and joints:Rheumatoid Arthritis, Osteoporosis,Gout
- Principles of Cancer: Classification, etiology and pathogenesis of Cancer

UNIT-V- Infectious diseases:Meningitis,Typhoid, Leprosy, Tuberculosis Urinary tract infections
- Sexually transmitted diseases:AIDS, Syphilis, Gonorrhea

Text Books:

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins &Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.

2. Harsh Mohan; Text book of Pathology; 6 th edition; India; Jaypee Publications; 2010.

3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12 th edition; New York; McGraw-Hill; 2011.

4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;

5. William and Wilkins, Baltimore;1991 [1990 printing].

6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston;Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.

7. Guyton A, John .E Hall; Textbook of Medical Physiology; 12 th edition; WB Saunders Company; 2010.

8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9 th edition; London; McGraw-Hill Medical; 2014.

9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6 th edition; Philadelphia; WB Saunders Company; 1997. 10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3 rd edition; London; Churchill Livingstone publication; 2003.

Course Outcomes:

After Completion of the course the student able

1. Identifies Name the signs, symptoms and complications of the diseases.
2. Students Get thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms.
3. To Study the aetiology and pathogenesis of the selected disease states
4. The baseline knowledge required to practice medicine safely, confidently, rationally and effectively.
5. The ability to search the medical literature, including electronic databases, and to locate and interpret up-to-date evidence to optimize patient care.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	1	2	1	3	3	1	1	2
CO2	2	3	3	2	3	1	1	3	2	3	2	3
CO3	3	3	3	3	3	2	1	3	3	2	2	3
CO4	3	3	3	3	3	3	3	3	3	2	2	3
CO5	3	3	3	3	3	3	1	2	3	3	2	3

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP205T	Computer Applications in Pharmacy – Theory	03	03
Sessional Marks : 25		**End Semester Examination Marks : 50**	

Objectives:

1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy

UNIT I

Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement ,Two's complement method, binary multiplication, binary division

Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project

UNIT II

Web technologies:Introduction to HTML, XML,CSS and Programming languages, introduction to web servers and Server Products

Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

UNIT III

Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring

Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

UNIT IV

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

UNIT V

Computers as data analysis in Preclinical development:

Chromatographic dada analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System(TIMS)

Text Books:

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

Course Outcomes:

After Completion of the course the student is able to

1 know the various types of application of computers in pharmacy profession

2. know the various types of databases used in profession

3. know the usage of softwares in pharmacy

4. Operate a variety of advanced spreadsheet, operating system and word processing functions.

5. Maintain quality assurance through critically evaluating procedures and results.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	3	3	2	2	3	1	1	1	3
CO2	2	3	3	2	3	1	1	3	2	3	2	3
CO3	1	2	3	2	2	2	1	3	2	3	2	2
CO4	2	3	3	3	3	3	3	2	2	2	2	3
CO5	3	3	3	1	3	3	3	2	3	3	2	3

Course Code	Course Title	No of Hours Per week	No of Credits
BP206T	Environmental Science– Theory	03	03
Sessional Marks:25	**End Semester Examination Marks :50**		

Objectives:

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature.

Course Content:

Unit-I

The Multidisciplinary nature of environmental studies

Natural Resources

Renewable and non-renewable resources

Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

Unit-II

Ecosystems

Concept of an ecosystem.

Structure and function of an ecosystem.

Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit- III

Environmental Pollution

Air pollution; Water pollution; Soil pollution

Text Books

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers,
Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. BharuchaErach, The Biodiversity of India, MapinPublishingPvt. Ltd.,
Ahmedabad – 380 013, India, 4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,
Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment.

Course Outcomes:

1. This program shall create an awareness about environmental problems, develop an attitude towards of concern for the environment.
2 To compare the natural, renewable and non-renewable resources and the problems associated with them.
3 To motivate the learners to participate in environment protection and improvement.
4 To analyze the concepts of eco system including structure and functions.
5 To adopt skills in identifying and solving environmental problems.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	2	1	1	1	2	1	1	1	2
CO2	2	1	1	1	1	1	1	2	1	1	2	1
CO3	2	2	2	3	3	2	1	2	1	1	1	2
CO4	2	2	1	1	1	1	1	2	1	2	2	2
CO5	1	2	2	1	1	1	1	2	1	1	1	1

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP207P	Human Anatomy And Physiology II – (Practical)	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

Objectives:

1. know the gross morphology, structure and functions of various organs of the human body.

2. Perform all the hematological tests with the help of specimens.

3 Note all the points regarding the tissues various organs of human body.

4 Brief knowledge on clinical significance of various systems in our body.

5 Application of the role of genetics in day to day life.

Course Content:

1. To study the integumentary and special senses using specimen and models
2. To Study the nervous system and endocrine system using specimen and models
3. To demonstrate the function of olfactory nerve.
4. To demonstrate the visual and reflex activity.
5. Recording of body temperature.
6. To examine the different types of taste.
7. Recording of basal mass index.
8. Study of family planning devices and pregnancy diagnosis test.
9. To demonstrate positive and negative feedback mechanism.
10. To determine Tidal volume and vital capacity.
11. Permanent slides of vital organs and gonads.
12. To demonstrate total blood count by cell analyser

Text Books

1. Practical workbook of Human physiology by Srinageswari and Rajeev Sharma.

2. Note all the points regarding the tissues various organs of human body
3. Brief knowledge on clinical significance of various systems in our body.
4. Application of the role of genetics in day to day life.

Course Outcomes:

This subject is to inculcate the students about the structure and functioning of various systems and to perform hematological tests, body temperature and BMI.

1. Prepare the charts and tables for easy understanding of various systems and positive & negative feed back mechanism.

2. Awareness on family planning devices and pregnancy diagnosis test.

3. Identify the structural (microscopically and macroscopically) and functional details about different organ systems such as cardiovascular, lymphatic, digestive, muscular system

4. Identify the various tissues and organs of different systems of human body.

5. Homeostasis mechanisms and their imbalances

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	1	1	2	2	1	1	1	2	1	3	2	1
CO3	1	1	1	1	1	1	1	1	1	2	1	1
CO4	1	1	1	1	2	1	1	1	2	2	1	2
CO5	1	1	1	1	2	1	2	1	2	2	1	1

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP208P	Pharmaceutical Organic Chemistry I - Practical	04	02
Internal Marks :15		**End Semester Examination Marks :** 35	

Objectives:

1. To impart practical knowledge on various fundamental tests for the identification of some elements and compounds of pharmaceutical importance.
2. To create awareness on basic techniques practiced in the organic synthesis.
3. Allow to gain insight into the construction of molecular models and their significance.

Course Content:

1. Systematicqualitativeanalysisofunknownorganiccompoundslike

Preliminarytest:color,odour,aliphatic/aromaticcompounds,saturationandunsaturation, etc.

Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne'stest

Solubilitytest

FunctionalgrouptestlikePhenols,Amides/Urea,Carbohydrates,Amines,Carboxylicacids,Aldehydesand Ketones,Alcohols,Esters,AromaticandHalogenatedHydrocarbons,NitrocompoundsandAnilides.

Meltingpoint/Boilingpointoforganiccompounds

Identificationoftheunknowncompoundfromtheliteratureusing meltingpoint/ boilingpoint.

Preparationofthederivativesandconfirmationoftheunknowncompoundbymeltingpoint/ boilingpoint.

Minimum5unknownorganiccompoundsto beanalysedsystematically.

2. Preparationofsuitablesolidderivativesfromorganiccompounds

3. Constructionofmolecularmodels

Text Books:

1. Practical OrganicChemistrybyMannand Saunders.
2. Vogel'stextbookofPracticalOrganicChemistry
3. AdvancedPracticalorganicchemistrybyN.K.Vishnoi.
4. Introduction toOrganicLaboratorytechniquesbyPavia,Lampman andKriz.

Course Outcomes:

After Completion of the course the student could be able to:

1. Assess the identity in terms of the physico-chemical properties of the compounds of specified chemical classes.
2. Get hands- on- experience in basic techniques of organic synthesis.
3. Account for reactivity / stability of compounds.
4. Write the reaction, name the reaction and orientation of reaction.
5. Write the structure, name and the type of isomerisms of the organic compounds.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	2	2	1	1	2	1	1	2
CO2	1	1	1	1	1	1	2	2	1	2	1	2
CO3	1	1	1	1	1	2	2	1	2	1	1	2
CO4	1	1	1	1	2	2	1	2	3	1	1	2
CO5	1	1	1	1	2	2	2	1	2	1	1	2

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP209P	Biochemistry – Practical	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

Objectives:

5. Understanding the gross morphology, structure and functions of various organs of the human body.
6. Knowledge on various homeostatic mechanisms and their imbalances.
7. Identification of the various tissues and organs of different systems of human body.
8. Understanding the coordinated working pattern of different organs of each system.

Course Content:

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

Text Books:

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.

7. Outlines of Biochemistry by Conn and Stumpf

Course Outcomes:

After Completion of the course the student able to perform

1.Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch), Proteins (albumin and Casein)

2. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)

3. Qualitative analysis of urine for abnormal constituents

4. Determination of blood creatinine, blood sugar, serum total cholesterol

5.Study the effect of substrate concentration on salivary amylase activity.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	2	2	1	2	1	1	2
CO2	3	2	1	1	2	2	1	1	2	1	1	2
CO3	3	3	1	2	2	2	1	1	2	1	1	2
CO4	3	2	1	1	2	2	2	1	2	1	1	2
CO5	2	2	1	1	2	2	2	1	2	1	1	2

3-High, 2-Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP210P	Computer Applications in Pharmacy – Practical	02	01
Sessional Marks : 10		**End Semester Examination Marks : 15**	

Objectives:

1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy

Course Content

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
3 Retrieve the information of a drug and its adverse effects using online tools
4 Creating mailing labels Using Label Wizard , generating label in MS WORD
5 Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

Text Books:

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA

3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)

4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

Course Outcomes:

After Completion of the course the student is able to

1 know the various types of application of computers in pharmacy profession

2. know the various types of databases used in profession

3. know the usage of softwares in pharmacy

4.create a HTML, web page to show personal information.

5.Generating report and printing the report from patient database

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	2	1	3	2	3	2	3	2
CO2	2	3	2	2	3	2	2	2	1	1	1	2
CO3	2	3	1	1	2	2	3	2	3	2	2	3
CO4	2	3	1	1	3	3	2	1	2	1	2	3
CO5	2	2	3	2	2	3	2	1	2	3	2	3

3-High, 2-Medium, 1-Low

SEMESTER III

Course Code	Course Title	No of Hours Per week	No of Credits
BP 301 T	Pharmaceutical organic chemistry II (Theory)	03+ 01 (Tutorial)	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives: Upon completionofthecoursethestudentshallbeableto

1. writethestructure,nameandthetypeofisomerismoftheorganic compound
2. writethereaction,namethereactionandorientationofreactions
3. account for reactivity/stabilityof compounds,
4. prepareorganiccompounds

CourseContent:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to beexplained

To emphasize on definition,types,classification,principles/mechanisms,applications, examplesanddifferences

UNITI

- **Benzeneanditsderivatives**
  - **A.** Analytical, synthetic and other evidences in the derivation of structureofbenzene,Orbitalpicture,resonanceinbenzene,aromaticcharacters ,Huckel'srule
  - **B.** Reactionsofbenzene-nitration,sulphonation,halogenation-reactivity,Friedelcraftsalkylation-reactivity,limitations,Friedelcraftsacylation.
  - **C.** Substituents,effectofsubstituentsonreactivity andorientationofmonosubstitutedbenzenecompoundstowardselectrophilicsubstitutionreaction
  - **D.** StructureandusesofDDT,Saccharin, BHCandChloramine

UNITII

- **Phenols*-**
  Acidityofphenols,effectofsubstituentsonacidity,qualitativetests,Structureanduseso fphenol,cresols, resorcinol,naphthols
- **AromaticAmines*-**
  Basicityofamines,effectofsubstituentsonbasicity,andsyntheticusesof aryldiazonium salts
- **AromaticAcids*–**
  Acidity,effectofsubstituentsonacidityandimportantreactionsofbenzoicacid.

UNIT III

FatsandOils

a. Fattyacids–reactions Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Dryingoils.
b. Analyticalconstants–Acidvalue,Saponificationvalue,Estervalue,Iodine value, Acetyl value, Reichert Meissl (RM) value – significance andprincipleinvolvedintheirdetermination.

UNITIV

- **Polynuclearhydrocarbons:**

a. Synthesis,reactions
b. StructureandmedicinalusesofNaphthalene,Phenanthrene,Anthracene,Diphen ylmethane,Triphenylmethaneandtheirderivatives

UNITV

- **Cycloalkanes***
  Stabilities–Baeyer'sstraintheory, limitation of Baeyer'sstraintheory,Coulson and Moffitt's modification, Sachse Mohr's theory (Theory ofstrainlessrings),reactionsofcyclopropaneandcyclobutaneonly.

Recommended Books(LatestEditions)

1.OrganicChemistrybyMorrison andBoyd

1. OrganicChemistrybyI.L.Finar, Volume-I
2. Textbook of OrganicChemistrybyB.S.Bahl&ArunBahl.
3. Organic ChemistrybyP.L.Soni

4. Practical OrganicChemistrybyMannand Saunders.
5. Vogel'stextbookofPracticalOrganicChemistry
6. AdvancedPracticalorganicchemistrybyN.K.Vishnoi.
7. Introduction toOrganicLaboratorytechniquesbyPavia,LampmanandKriz.

COURSE OUTCOME:

After Completion of this course, the student could be able to:

1. Guess and writethestructure according to the stereochemical specifications.
2. Fairly understand the aspects of heterocyclic chemistry in terms of naming and reactivity.
3. Assess and understand the pharmaceutical applications and importance of the specified named reactions
4. Infer the chemical nature of the compounds on the basis of qualitative chemical tests.
5. Understand the significance of certain electronic effects with respect to the reactivity/ stability of organic compounds specified.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	1	1	1	1	2	1	3	3	3
CO2	3	1	2	1	1	1	1	2	1	3	3	3
CO3	3	1	2	1	1	1	1	1	1	3	3	3
CO4	3	1	2	1	1	1	2	1	1	3	3	3
CO5	3	1	2	1	1	1	2	1	1	3	3	3

3- High, 2- Medium, 1- Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 302 T	Physical Pharmaceutics I (Theory)	03+ 01 (Tutorial)	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives: Uponthecompletionofthecoursestudentshallbeableto

1. Understandvariousphysicochemicalpropertiesofdrugmoleculesinthedes igningthedosageforms
2. Knowtheprinciplesofchemicalkinetics&tousethem forstabilitytestingnaddeterminationofexpirydateofformulations
3. Demonstrate use of physicochemical properties in the formulationdevelopmentandevaluationofdosageforms.

CourseContent:

UNIT-I

Solubilityofdrugs: Solubilityexpressions,mechanismsofsolutesolventinteractions,idealsolubility parameters,solvation&association,quantitativeapproachtothefactorsinfluencingsolubilityofdr ugs,diffusionprinciplesinbiologicalsystems.Solubilityofgas in liquids,solubility of liquidsin liquids,(Binary solutions,idealsolutions)Raoult'slaw,realsolutions. Partially miscible liquids, Critical solution temperature andapplications.Distributionlaw,its limitationsandapplications

UNIT-II

States of Matter and properties of matter: State of matter, changes in the state of matter,latentheats,vapourpressure,sublimationcriticalpoint,eutecticmixtures,gases,aerosolsin halers,relativehumidity,liquidcomplexes,liquidcrystals,glassystates,solid-crystalline,amorphous& polymorphism.

Physicochemicalpropertiesofdrugmolecules: Refractiveindex,opticalrotation,dielectriccons tant,dipolemoment,dissociationconstant,determinationsandapplications

UNIT-III

Surfaceandinterfacialphenomenon: Liquidinterface,surface&interfacialtensions,surface free energy, measurement of surface & interfacial tensions, spreading coefficient,adsorptionatliquidinterfaces,surfaceactiveagents,HLBScale,solubilisation,deter gency,adsorptionatsolidinterface.

UNIT-IV

Complexationandproteinbinding: Introduction,ClassificationofComplexation,App lications,methodsofanalysis,proteinbinding,Complexationanddrugaction,crystalline structures ofcomplexesandthermodynamictreatment ofstabilityconstants.

UNIT-V

pH,buffersandIsotonicsolutions: Sorensen'spHscale,pHdetermination(electrometr ic and calorimetric), applications of buffers, buffer equation, buffer capacity,buffersinpharmaceuticalandbiologicalsystems,bufferedisotonicsolutions.

Recommended Books:(LatestEditions)

1. PhysicalPharmacybyAlfredMartin
2. ExperimentalPharmaceuticsbyEugene,Parott.
3. TutorialPharmacybyCooper and Gunn.
4. StocklosamJ.PharmaceuticalCalculations,Lea &Febiger,Philadelphia.
5. LibermanH.A,LachmanC.,PharmaceuticalDosageforms,Tablets, Volume-1to3,MarcelDekkarInc.
6. LibermanH.A,LachmanC,PharmaceuticalDosageforms. Dispersesystems,volume1,2,3.Marcel DekkarInc.
7. Physical PharmaceuticsbyRamasamyCandManavalanR.

COURSE OUTCOME

1. The course deals with the various physical and physicochemical properties
2. Principles involved in dosage forms/formulations.
3. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development
4. Stability studies of pharmaceutical dosage forms
5. Standardisation of the pharmaceutical dosage forms

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	1	1	1	2	2	2	2	3
CO2	3	1	2	3	1	1	1	2	2	2	2	3
CO3	3	1	2	3	1	1	1	2	2	2	2	3
CO4	3	1	3	3	1	1	1	2	2	1	1	3
CO5	3	1	3	3	1	1	1	2	2	1	1	3

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 303 T	Pharmaceutical Microbiology (Theory)	03+ 01 (Tutorial)	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives: Upon completionofthesubjectstudentshallbeableto;

1. Understandmethodsofidentification,cultivationandpreservationofvariousmicroorganisms
2. To understand the importance and implementation of sterlization inpharmaceuticalprocessingandindustry
3. Learn sterilitytestingof pharmaceutical products.
4. Carriedoutmicrobiological standardizationofPharmaceuticals.
5. Understandthecellculturetechnologyanditsapplicationsinpharmaceutica lindustries.

Course Content:

UnitI

Introduction,historyofmicrobiology,itsbranches,scopeanditsimportance.IntroductiontoProkaryotesandEukaryotesStudyofultra-structureandmorphologicalclassificationofbacteria,nutritional requirements, raw materials used for culture media and physicalparameters forgrowth,growth curve, isolationand preservation methodsforpurecultures,cultivationofanaerobes,quantitativemeasurementofbacterialgrowth (total&viablecount).Studyofdifferenttypesofphaseconstrastmicroscopy,darkfieldmicroscopyandelectronmicroscopy.

UnitII

Identificationofbacteriausingstainingtechniques(simple,Gram's&Acidfaststaining)andbiochemicaltests (IMViC).Study of principle, procedure, merits, demerits and applications of physical,chemicalgaseous,radiationandmechanicalmethodofsterilization.Evaluation of theefficiencyof sterilization methods.Equipmentsemployedinlargescalesterilization.Sterilityindicators.

UnitIII

Study of morphology, classification, reproduction/replication andcultivationofFungi andViruses.Classificationandmode ofactionofdisinfectantsFactorsinfluencingdisinfection,antisepticsandtheirevaluation.Forbacterio staticandbactericidalactionsEvaluationofbactericidal&Bacteriostatic.Sterilitytestingofproducts(s olids,liquids,ophthalmicandothersterileproducts)accordingtoIP,BPandUSP.

UnitIV

Designingofasepticarea,laminarflowequipments;study ofdifferentsources of contamination inan aseptic area and methodsof prevention,cleanareaclassification.

Principles and methods of different microbiological assay. Methods forstandardizationofantibiotics,vitaminsandaminoacids.Assessmentofanewantibiotic.

UnitV

Typesofspoilage,factorsaffectingthemicrobialspoilageofpharmaceuticalproducts,sourcesandtypesof microbialcontaminants,assessmentofmicrobialcontaminationandspoilage.Preservationofpharmaceu ticalproductsusingantimicrobialagents,evaluation ofmicrobialstabilityofformulations.

Growthofanimalcellsinculture,generalprocedureforcellculture,Primary,establ ished andtransformedcellcultures.

Application ofcellcultures inpharmaceutical industryandresearch.

RecommendedBooks(Latestedition)

1. W.B.HugoandA.D.Russel:PharmaceuticalMicrobiology,BlackwellSc ientificpublications,OxfordLondon.
2. PrescottandDunn.,IndustrialMicrobiology, 4th edition,CBSPublishers&Distributors,Delhi.
3. Pelczar,ChanKreig,Microbiology,TataMcGrawHilledn.
4. MalcolmHarris, BalliereTindallandCox:PharmaceuticalMicrobiology.
5. Rose:IndustrialMicrobiology.
6. Probisher,Hinsdilletal:FundamentalsofMicrobiology,9thed.Japan
7. CooperandGunn's:TutorialPharmacy,CBSPublisherandDistribution.

8. Peppler:MicrobialTechnology.

COURSE OUTCOME :

After Completion of the course the student able to

1. To acquire knowledge on HVAC systems, layout designs, GMP standards sanitation personal hygiene in sterile product manufacturing facilities.
2. To know the various types of sterile products with their formulation in large scale industries.
3. To develop skill for lab scale manufacture of few SVPs, LVPs, ophthalmic products with labelling and quality control.
4. To develop skill for microbiological assays
5. To get the knowledge of Pharmaceutical Spoilage

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	2	1	2	1	1	1	2	2	1
CO2	3	1	1	2	1	2	1	2	2	2	3	1
CO3	3	1	2	1	1	3	2	3	3	2	2	2
CO4	3	2	3	3	1	3	3	3	3	2	2	2
CO5	3	2	3	3	1	3	3	3	3	2	2	2

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 304 T	Pharmaceutical Engineering (Theory)	03+ 01 (Tutorial)	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives: Upon completionofthecoursestudentshallbeable:

1. Toknowvariousunit operationsusedin Pharmaceuticalindustries.
2. Tounderstandthematerialhandlingtechniques.
3. Toperformvariousprocessesinvolvedinpharmaceuticalmanufacturingprocess.
4. Tocarryoutvarioustesttopreventenvironmentalpollution.
5. Toappreciateandcomprehendsignificanceofplantlayoutdesignforoptimu museofresources.
6. Toappreciatethevariouspreventivemethodsusedforcorrosioncontrolin Pharmaceuticalindustries.

Coursecontent:

UNIT-I

- **Flowoffluids:** Typesof manometers,Reynoldsnumber anditssignificance,Bernoulli'stheoremanditsapplications,Energylosses, Orificemeter,Venturimeter,Pitot tubeandRotometer.
- **SizeReduction:**Objectives,Mechanisms&Lawsgoverningsizereduction, factors affecting size reduction, principles, construction, working, uses, merits anddemerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & endrunnermill.
- **SizeSeparation:**Objectives,applications&mechanismofsizeseparation,o fficialstandardsofpowders,sieves,sizeseparationPrinciples,construction, working,uses,meritsanddemeritsofSieveshaker,cycloneseparator,Airsep arator,Bagfilter&elutriationtank.

UNIT-II

- **Heat Transfer:** Objectives, applications & Heat transfer mechanisms. Fourier'slaw, Heat transfer by conduction, convection & radiation. Heat interchangers &heatexchangers.

- **Evaporation:**Objectives,applicationsandfactorsinfluencingevaporation, differences between evaporation and other heat process. principles, construction,working,uses,meritsanddemeritsofSteamjacketedkettle,horizontaltubeevaporator,climbingfilmevaporator,forcedcirculationevaporator,multipleeffect evaporator&Economyofmultipleeffect evaporator.

- **Distillation:**BasicPrinciplesandmethodologyofsimpledistillation,flashdistillation,fractionaldistillation,distillationunderreducedpressure,steamdistillation&moleculardistillation

UNIT-III

- **Drying:** Objectives, applications & mechanismof drying process, measurements& applications of Equilibrium Moisture content, rate of drying curve. principles,construction, working, uses, merits and demerits of Tray dryer, drum dryer spraydryer,fluidizedbeddryer,vacuum dryer,freezedryer.

- **Mixing:** Objectives, applications & factors affecting mixing, Difference betweensolidandliquidmixing,mechanismofsolidmixing,liquidsmixingandsemisolidsmixing.Principles,Construction,Working,uses,MeritsandDemeritsof Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer,planetarymixers, Propellers, Turbines, Paddles& SilversonEmulsifier,

UNIT-IV

- **Filtration:**Objectives,applications,Theories&Factorsinfluencingfiltration,filteraids,filtermedias.Principle,Construction,Working,Uses,Meritsan

ddemeritsofplate&framefilter,filterleaf,rotary drumfilter,Metafilter&Cartridgefilter,membranefilters andSeidtzfilter.

- **Centrifugation:**Objectives,principle&applicationsofCentrifugation,principles, construction, working, uses, merits and demerits of Perforated basketcentrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & supercentrifuge.

UNIT-V

- **Materialsofpharmaceuticalplantconstruction,Corrosionanditsprevention:** Factors affecting during materials selected for Pharmaceutical plantconstruction,Theoriesofcorrosion,typesofcorrosionandthereprevention.Ferrousandnonferrousmetals,inorganicandorganicnonmetals,basicofmaterialhandlingsystems.

Recommended Books:(LatestEditions)

1. Introductiontochemicalengineering– WalterLBadger&JuliusBanchero,Latestedition.
2. Solidphaseextraction,Principles,techniquesandapplicationsbyNigelJ.K.Simpson-Latestedition.
3. Unitoperationofchemicalengineering–McabeSmith,Latestedition.
4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latestedition.
5. Remingtonpracticeofpharmacy-Martin,Latestedition.
6. Theoryand practiceof industrial pharmacybyLachmann.,Latest edition.
7. Physicalpharmaceutics-C.V.SSubrahmanyametal.,Latestedition.
8. CooperandGunn'sTutorialpharmacy,S.J.Carter,Latestedition.

COURSE OUTCOME :

1. To know various unit operations involved in manufacturing of pharmaceuticals.
2. To understand the concepts of flow of fluids, size reduction and size separation.

3 To perform different mechanisms of heat transfer.

4 To compare and contrast different types of evaporation and distillation process.

5 To determine the factors influencing mixing, filtration and centrifugation.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	1	1	1	2	2	3	3	3
CO2	3	1	1	3	1	1	1	2	2	3	3	3
CO3	3	1	2	3	1	1	1	2	3	3	2	3
CO4	3	1	3	3	1	1	1	2	3	2	2	3
CO5	3	1	3	3	1	1	1	2	3	2	1	3

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 305 P	Pharmaceutical organic chemistry II (Practical)	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

OBJECTIVES :

1. To impart practical knowledge on various fundamental tests for the identification of some elements and compounds of pharmaceutical importance.

2.To create awareness on basic techniques practiced in the organic synthesis.

3.Allow to gain insight into the construction of molecular models and their significance.

I Experimentsinvolvinglaboratorytechniques

- Recrystallization
- Steamdistillation

II Determinationoffollowingoilvalues(includingstandardizationofr eagents)

- Acidvalue
- Saponificationvalue
- Iodinevalue

III Preparationofcompounds

- Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline byacylationreaction.
- 2,4,6-Tribromoaniline/ParabromoacetanilidefromAniline/
- Acetanilide byhalogenation(Bromination)reaction.
- 5-Nitrosalicylicacid/MetadinitrobenzenefromSalicylicacid/N

itro benzenebynitrationreaction.

- Benzoic acidfromBenzyl chloride byoxidationreaction.
- Benzoicacid/Salicylicacidfromalkylbenzoate/alkylsalicylat ebyhydrolysisreaction.
- 1-Phenylazo-2-naptholfromAnilinebydiazotizationandcouplingreactions.
- BenzilfromBenzoinbyoxidationreaction.
- DibenzalacetonefromBenzaldehydebyClaisonSchmidt reaction
- Cinnammic acidfromBenzaldehydebyPerkinreaction
- *P*-Iodobenzoicacidfrom *P*-aminobenzoicacid

Recommended Books(LatestEditions)

1.OrganicChemistrybyMorrison andBoyd

8. OrganicChemistrybyI.L.Finar, Volume-I
9. Textbook of OrganicChemistrybyB.S.Bahl&ArunBahl.
10. Organic ChemistrybyP.L.Soni
11. Practical OrganicChemistrybyMannand Saunders.
12. Vogel'stextbookofPracticalOrganicChemistry
13. AdvancedPracticalorganicchemistrybyN.K.Vishnoi.
14. Introduction toOrganicLaboratorytechniquesbyPavia,LampmanandKriz.

COURSE OUTCOME :

1.Assess the identity in terms of the physico-chemical properties of the compounds of specified chemical classes.

2.Get hands- on- experience in basic techniques of organic synthesis.

3. Infer the chemical nature of the compounds on the basis of qualitative chemical tests.

4. Understand the significance of certain electronic effects with respect to the reactivity/ stability of organic compounds specified.

5. Understand and gain insight into the organic reactions by analyzing their fair reaction mechanisms.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO18	PO9	PO10	PO11	PO12
CO1	3	3	2	3	1	1	1	1	2	1	1	11
CO2	3	3	2	3	1	1	1	1	2	1	1	1
CO3	3	3	3	3	1	1	1	1	2	1	1	1
CO4	3	3	3	3	1	1	1	1	2	1	1	1
CO5	3	3	3	3	1	1	1	1	2	1	1	1

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 306 P	Physical Pharmaceutics I (Practical)	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

OBJECTIVES :

1. To analyse the solubility of various drugs and excipients

2. Experiment on partition coefficient of different compounds and various solubility systems,

To examine the surface tension, HLB number of a various surfactant

3. Evaluate stability constant of complex compound.

2. the solubilityof drugatroomtemperature. Determination of pKa value by Half Neutralization/ Henderson Hasselbalchequation.
3. DeterminationofPartitionco-efficientofbenzoicacidinbenzeneandwater
4. DeterminationofPartitionco-efficientofIodineinCCl$_4$andwater
5. Determination of% composition of NaCl in a solution using phenol-water system byCSTmethod
6. Determination ofsurfacetensionofgiven liquidsbydropcount and dropweightmethod
7. DeterminationofHLBnumberofasurfactantbysaponificationmethod
8. DeterminationofFreundlichandLangmuirconstantsusingactivatedcharcoal
9. Determinationofcriticalmicellarconcentrationofsurfactants
10. Determinationofstabilityconstant anddonoracceptorratioofPABA-Caffeinecomplexbysolubilitymethod
11. DeterminationofstabilityconstantanddonoracceptorratioofCupric-GlycinecomplexbypHtitrationmethod

Recommended Books:(LatestEditions)

1. PhysicalPharmacybyAlfredMartin
2. ExperimentalPharmaceuticsbyEugene,Parott.
3. TutorialPharmacybyCooper and Gunn.
4. StocklosamJ.PharmaceuticalCalculations,Lea &Febiger,Philadelphia.
5. LibermanH.A,LachmanC.,PharmaceuticalDosageforms,Tablets, Volume-1to3,MarcelDekkarInc.
6. LibermanH.A,LachmanC,PharmaceuticalDosageforms. Dispersesystems,volume1,2,3.Marcel DekkarInc.
7. Physical PharmaceuticsbyRamasamyCandManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J.Thimmasettee
9. PhysicalPharmaceuticsbyC.V.S.Subramanyam
10. TestbookofPhysicalPhramacy,byGauravJain&RoopK.Khar

COURSE OUTCOME :

1. This course helps to compare and evaluate the solubility of various combination compound modify for better solubility approaches by use different level of methods
2. recognize the formulation aspects of different dosage forms;
3. formulate different types of dosage forms;
4. appreciate the importance of good formulation for effectiveness.
5. do different pharmaceutical calculation involved in formulation;

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	1	1	1	1	2	1	1	1
CO2	3	3	2	3	1	1	1	1	2	1	1	1
CO3	3	3	3	3	1	1	1	1	2	1	1	1
CO4	3	3	3	3	1	1	1	1	2	1	1	1
CO5	3	3	3	3	1	1	1	1	2	1	1	1

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 307 P	Pharmaceutical Microbiology (Practical)	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

OBJECTIVES :

1. To know about the specialities and specifications of sterile products along with applications, routes of administration, general requirements, manufacture, quality control and packaging materials to differentiate these with non-sterile formulations.
2. To understand the classification of sterile products on various basis conventional, ophthalmic and novel sterile with their formulations and large scale manufacture.
3. To know about the GMP standards, layout design, sanitation, personal hygiene and training in sterile manufacture products.

Course Content :

1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator,laminarflow,aseptichood,autoclave,hotairsterilizer,deepfreezer,refrig erator,microscopesusedin experimental microbiology.
2. Sterilizationofglassware,preparationandsterilizationofmedia.
3. Subculturingofbacteriaandfungus.Nutrientstabsandslantspreparations.
4. Stainingmethods-
   Simple,Gramsstainingandacidfaststaining(Demonstrationwithpractical).
5. Isolationofpurecultureofmicro-
   organismsbymultiplestreakplatetechniqueandothertechniques.
6. Microbiological assayofantibiotics bycupplatemethodandothermethods
7. MotilitydeterminationbyHangingdropmethod.
8. Sterilitytestingofpharmaceuticals.
9. Bacteriologicalanalysisofwater
10. Biochemicaltest.

RecommendedBooks (Latestedition)

1. W.B.HugoandA.D.Russel:PharmaceuticalMicrobiology,BlackwellScientificpublications,OxfordLondon.
2. PrescottandDunn.,IndustrialMicrobiology, 4thedition,CBSPublishers&Distributors,Delhi.
3. Pelczar,ChanKreig,Microbiology,TataMcGrawHilledn.
4. MalcolmHarris, BalliereTindallandCox:PharmaceuticalMicrobiology.
5. Rose:IndustrialMicrobiology.
6. Probisher,Hinsdilletal:FundamentalsofMicrobiology,9thed.Japan
7. CooperandGunn's:TutorialPharmacy,CBSPublisherandDistribution.
8. Peppler:MicrobialTechnology.
9. I.P.,B.P.,U.S.P.-latesteditions.
10. Ananthnarayan:TextBookofMicrobiology,Orient-Longman,Chennai
11. Edward:FundamentalsofMicrobiology.
12. N.K.Jain:PharmaceuticalMicrobiology,VallabhPrakashan,Delhi
13. Bergeysmanualofsystematicbacteriology,WilliamsandWilkins-AWaverlycompany.

COURSE OUTCOME :

After Completion of the course the student able to

1. Learners gain knowledge on some sterile marketed products.
2. Learners gain knowledge on blood products which are not possible in laboratory and large scale manufacture.
3. To know the skills of aseptic techniques principles of sterilization and validation of aseptic areas.
4. Knowledge on blood products and surgical dressing with their formulation details.
5. Production of asceptic products and quality control.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	1	1	2	8	3	1	3	1
CO2	3	2	1	3	1	1	2	2	3	1	2	1
CO3	3	1	2	3	1	2	1	2	2	2	2	2
CO4	3	2	2	3	1	2	2	1	1	2	2	2
CO5	3	2	3	3	1	3	2	1	1	2	2	2

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 308 P	Pharmaceutical Engineering (Practical)	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

OBJECTIVES :

To know various unit operations used in Pharmaceutical industries.

2. To understand the material handling techniques.

3. To perform various processes involved in pharmaceutical manufacturing process.

4. To carry out various test to prevent environmental pollution.

5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.

6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

I. Determinationofradiationconstantofbrass,iron,unpaintedandpainted glass.

II. Steamdistillation –Tocalculatetheefficiencyofsteam distillation.

III. To determine theoverallheattransfercoefficientbyheatexchanger.

IV. Constructionofdryingcurves(forcalciumcarbonateandstarch).

V. Determinationofmoisturecontentandlossondrying.

VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use ofDewpointmethod.

VII. DescriptionofConstructionworkingandapplicationofPharmaceuticalMachinery such as rotary tablet machine, fluidized bed coater, fluid energy mill,dehumidifier.

VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations –Construction of various size frequency curves including

IX. Sizereduction:ToverifythelawsofsizereductionusingballmillanddeterminingKicks,Rittinger's,Bond'scoefficients,powerrequirementandcriticalspeed ofBall Mill.

X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryerandsuchothermajorequipment.

XI. FactorsaffectingRateofFiltrationandEvaporation(Surfacearea,Concent

rationandThickness/ viscosity

XII. TostudytheeffectoftimeontheRateofCrystallization.

XIII. To calculate the uniformity Index for given sample by using Double ConeBlender.

COURSE OUTCOME

1. To understand the basic principles involved in unit operations such as size reduction, size separation, distillation and drying.
2. To demonstrate and explain about the construction, working and applications of pharmaceutical equipment's such as colloid mill, planetary mixer, fluidized bed dryer and freeze dryer.
3. To experiment with the process variables of filtration, evaporation and infer the same.
4. To determine radiation constant of brass, iron, unpainted and painted glass.
5. To determine overall heat transfer coefficient by heat exchanger and calculate the efficiency of steam distillation.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	1	1	2	2	2	3	3	2
CO2	3	2	1	3	1	1	2	2	2	3	3	2
CO3	3	3	1	3	2	1	2	2	2	3	3	2
CO4	3	1	2	3	2	1	2	2	2	3	3	2
CO5	3	1	2	3	3	1	2	2	2	3	3	2

3- High, 2- Medium, 1-Low

SEMESTER IV

Course Code	Course Title	No of Hours Per week	No of Credits
BP 401 T	Pharmaceutical organic chemistry III (Theory)	03+ 01 (Tutorial)	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives:

1. To enlighten on various aspects of stereoisomerism.
2. To create awareness on the nomenclature of heterocyclic compounds, their reactivity, and chemical reactions.
3. To highlight the importance of above heterocyclic compounds with respect to some of the drug classes that bear them as structural scaffolds.
4. To emphasize some of the named reactions and their applications with respect to pharmacy.

CourseContent:

Note:Toemphasizeondefinition,types,mechanisms,examples,uses/applic ationsUNIT-I

Stereoisomerism

Opticalisomerism–

Opticalactivity,enantiomerism,diastereoisomerism,mesocompoundsEl ementsofsymmetry,chiral andachiralmolecules
DLsystemofnomenclatureofopticalisomers,sequencerules,RSsystemofnomenclatureof optical isomers

Reactionsofchiralmolecules

Racemicmodificationandresolutionofracemicmixture.Asym metricsynthesis: partialandabsolute

UNIT-II

Geometricalisomerism

Nomenclatureofgeometricalisomers(CisTrans,EZ,SynAntisystems)
Methodsofdeterminationofconfigurationofgeometricalisomers.
ConformationalisomerisminEthane,n-ButaneandCyclohexane.

Stereoisomerisminbiphenylcompounds(Atropisomerism)andconditionsforopticalactivity.
Stereospecificandstereoselectivereactions

UNIT-III

Heterocycliccompounds:

Nomenclatureandclassification

Synthesis,reactionsandmedicinalusesoffollowingcompounds/derivativesPyrrole,Furan,andThiopheneRelativearomaticityandreactivityofPyrrole,Furan andThiophene

UNIT-IV

Synthesis,reactionsandmedicinalusesoffollowingcompounds/derivativesPyrazole,Imidazole,OxazoleandThiazole.Pyridine, Quinoline,Isoquinoline, AcridineandIndole.BasicityofpyridineSynthesisandmedicinalusesofPyrimidine,Purine,azepinesandtheirderivatives

UNIT-V

Reactionsofsyntheticimportance

Metalhydridereduction($NaBH_4$and$LiAlH_4$),Clemmensenreduction,Birchreduction,WolffKishnerreduction.Oppenauer-oxidationandDakinreaction. Beckmanns rearrangement and Schmidt rearrangement.Claisen-Schmidtcondensation

RecommendedBooks(LatestEditions)

1. OrganicchemistrybyI.L.Finar,Volume-I&II.
2. A textbook oforganicchemistry–Arun Bahl,B.S.Bahl.

3. HeterocyclicChemistrybyRajK.Bansal
4. Organic ChemistrybyMorrisonandBoyd
5. HeterocyclicChemistrybyT.L.Gilchrist

COURSE OUTCOME :

After Completion of this course, the student could be able to:

1. Guess and writethestructure according to the stereochemical specifications.
2. Fairly understand the aspects of heterocyclic chemistry in terms of naming and reactivity.
3. Assess and understand the pharmaceutical applications.
4. Importance of the specified named reactions.
5. Synthesis of different pharmaceutical products.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	3	1	1	1	2	1	3	3	3
CO2	3	1	2	3	1	1	1	2	1	3	3	3
CO3	3	1	2	3	1	1	1	1	1	3	3	2
CO4	3	1	2	3	1	1	1	1	1	3	3	2
CO5	3	1	2	3	1	1	1	1	1	3	3	2

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 402 T	Medicinal chemistry I (Theory)	03+ 01 (Tutorial)	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives:1. Understand the chemistry of drugs and its pharmacological activity.

2. Understand the drug metabolic pathways, adverse effects and therapeutic value of drugs.

3. Know the Structural Activity Relationship (SAR) of different class of drugs.

4. Chemical synthesis of drugs.

CourseContent:

Study of the development of the following classes of drugs, Classification, mechanism ofaction, uses of drugs mentioned in the course, Structure activity relationship of selectiveclassofdrugsas specified in thecourseand synthesisofdrugssuperscripted (*)

UNIT-I

IntroductiontoMedicinalChemistry

History and development of medicinal chemistryPhysicochemicalpropertiesinrelationtobiologica laction

Ionization,Solubility,PartitionCoefficient,Hydrogenbonding,Proteinbinding,Chelation,Bi oisosterism,OpticalandGeometricalisomerism.

Drugmetabolism

Drugmetabolismprinciples-PhaseIandPhaseII.

Factorsaffectingdrugmetabolism includingstereochemicalaspects.

UNIT-II

DrugsactingonAutonomicNervousSystemAd renergicNeurotransmitters:

Biosynthesisandcatabolismofcatecholamine. Adrenergicreceptors (Alpha&Beta)andtheirdistribution.

Sympathomimeticagents:SARofSympathomimeticagents

Directacting:Nor-epinephrine,Epinephrine,Phenylephrine*,Dopamine,

Methyldopa,Clonidine,Dobutamine,Isoproterenol,Terbutaline,Salbutamol*,Bitolterol,Naphazoline,OxymetazolineandXylometazoline.

- Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine,Propylhexedrine.
- Agentswithmixedmechanism:Ephedrine,Metaraminol.

AdrenergicAntagonists:

Alphaadrenergicblockers: Tolazoline*,Phentolamine,Phenoxybenzamine,Prazosin,Dihydroergotamine,Methysergide.

Betaadrenergicblockers:SARofbetablockers,Propranolol*,Metibranolol,Atenolol,Betazolol,Bisoprolol,Esmolol,Metoprolol,Labetolol,Carvedilol.

UNIT-III

Cholinergicneurotransmitters:

Biosynthesisandcatabolismofacetylcholine.

Cholinergicreceptors(Muscarinic&Nicotinic)andtheirdistribution.

Parasympathomimeticagents:SARofParasympathomimeticagents

Directactingagents: Acetylcholine,Carbachol*,Bethanechol,Methacholine,Pilocarpine.

Indirectacting/Cholinesterase inhibitors(Reversible & Irreversible): Physostigmine,Neostigmine*,Pyridostigmine,Edrophoniumchloride,Tacrine hydrochloride, Ambenonium chloride, Isofluorphate, Echothiophateiodide,Parathione,Malathion.

Cholinesterasereactivator: Pralidoximechloride.

CholinergicBlockingagents:SARofcholinolyticagents

Solanaceousalkaloidsandanalogues: Atropinesulphate,Hyoscyaminesulphate,Scopolaminehydrobromide,Homatropinehydrobromide,Ipratropiumbromide*.

Syntheticcholinergicblockingagents: Tropicamide,Cyclopentolatehydrochloride,Clidiniumbromide,Dicyclominehydrochloride*,Glycopyrrolate,Methanthelinebromide,Propanthelinebromide,Benztropinemesylate,Orphenadrinecitrate, Biperidinehydrochloride,Procyclidinehydrochloride*, Tridihexethylchloride,Isopropamide iodide,Ethopropazinehydrochloride.

UNIT-IV

DrugsactingonCentralNervousSystem

A. **SedativesandHypnotics:**

Benzodiazepines:SAR ofBenzodiazepines,Chlordiazepoxide,Diazepam*,Oxazepam,Chlorazepate,Lorazepam,Alprazolam,Zolpidem

Barbiturtes:SARofbarbiturates,Barbital*,Phenobarbital,Mephobarbital,Amobarbital, Butabarbital, Pentobarbital,Secobarbital

Miscelleneous:

Amides&imides:Glutethmide.

Alcohol&theircarbamatederivatives:Meprobomate,Ethchlorvynol.Aldehy de&theirderivatives:Triclofossodium,Paraldehyde.

B. Antipsychotics

Phenothiazeines:SARofPhenothiazeines-Promazinehydrochloride,Chlorpromazinehydrochloride*,Triflupromazine,Thioridazinehydrochloride,Piperacetazinehydrochloride,Prochlorperazinemaleate,Trifluoperazinehydrochloride.

RingAnaloguesofPhenothiazeines: Chlorprothixene,Thiothixene,Loxapine succinate,Clozapine.

Flurobuterophenones: Haloperidol,Droperidol,Risperidone.

Betaaminoketones: Molindonehydrochloride.

Benzamides: Sulpieride.

Anticonvulsants: SAR of Anticonvulsants**,** mechanism of anticonvulsantaction

Barbiturates:Phenobarbitone,Methabarbital.

Hydantoins: Phenytoin*,Mephenytoin,Ethotoin

Oxazolidinediones: Trimethadione,Paramethadione

Succinimides: Phensuximide, Methsuximide, Ethosuximide*

Urea andmonoacylureas: Phenacemide, Carbamazepine*

Benzodiazepines:Clonazepam

Miscellaneous: Primidone,Valproicacid,Gabapentin,Felbamate

UNIT– V

DrugsactingonCentralNervousSystem

Generalanesthetics:

Inhalationanesthetics: Halothane*,Methoxyflurane,Enflurane,Sevoflurane,Isoflurane,Desflurane.

Ultrashortactingbarbitutrates: Methohexitalsodium*,Thiamylalsodium,Thiopental sodium.

Dissociativeanesthetics: Ketaminehydrochloride.

Narcoticandnon-narcoticanalgesics

Morphineandrelateddrugs:SARofMorphineanalogues,Morphinesulphate,Codeine,Meperidinehydrochloride,Anilerdinehydrochloride,Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*,Methadonehydrochloride*,Propoxyphenehydrochloride,Pentazocine, Levorphanoltartarate.

Narcoticantagonists: Nalorphinehydrochloride,Levallorphantartarate,Naloxonehydrochloride.

Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid*,Meclofenamate, Indomethacin, Sulindac, Tolmetin,Zomepriac, Diclofenac,Ketorolac,Ibuprofen*,Naproxen, Piroxicam, Phenacetin, Acetaminophen,Antipyrine,Phenylbutazone.

RecommendedBooks(LatestEditions)

1. WilsonandGiswold'sOrganicmedicinalandPharmaceuticalChemistry.
2. Foye'sPrinciplesofMedicinalChemistry.
3. Burger'sMedicinalChemistry,VolItoIV.
4. Introductiontoprinciplesofdrugdesign-SmithandWilliams.
5. Remington'sPharmaceuticalSciences.
6. Martindale'sextrapharmacopoeia.
7. Organic ChemistrybyI.L.Finar, Vol.II.
8. The OrganicChemistryofDrugSynthesis byLednicer, Vol. 1-5.

COURSE OUTCOME

This subject is designed to impart

1. Fundamental knowledge on the structure, chemistry..
2. Therapeutic value of drugs.
3. Understand the Structural Activity Relationship (SAR) of drugs.
4. Importance of physicochemical properties and metabolism of drugs.
5. Chemical synthesis of important drugs under each class.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	1	1	1	2	2	1	2	2
CO2	3	1	1	3	1	1	1	2	2	1	2	2
CO3	3	1	1	3	1	1	1	2	2	1	2	1
CO4	3	1	1	3	1	1	1	2	2	1	2	1
CO5	3	1	1	3	1	1	1	2	2	1	2	1

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 403 T	Physical Pharmaceutics II (Theory)	03+ 01 (Tutorial)	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives: Uponthecompletionofthecoursestudentshallbeableto

1. Understandvariousphysicochemicalpropertiesofdrugmoleculesinthedesigningthedosageforms
2. Knowtheprinciplesofchemicalkinetics&tousethem forstabilitytestingnaddeterminationofexpirydateofformulations
3. Demonstrate use of physicochemical properties in the formulationdevelopmentandevaluationofdosageforms.

CourseContent:

UNIT-I

Colloidaldispersions: Classificationofdispersedsystems&theirgeneralcharacteristics,size&shapesofcolloidalparticles,classificationofcolloids&comparative account of their general properties. Optical, kinetic & electrical properties.Effectof electrolytes,coacervation,peptization&protectiveaction.

UNIT-II

Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature,non-Newtoniansystems,pseudoplastic,dilatant,plastic,thixotropy,thixotropyinformulation,determinationofviscosity,capillary,fallingSphere,rotationalviscometers

Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain,ElasticModulus

UNIT-III

Coarse dispersion: Suspension, interfacial properties of suspended particles, settling insuspensions, formulation of flocculated and

deflocculatedsuspensions. Emulsions andtheories of emulsification, microemulsion and multiple emulsions; Stability of emulsions,preservation of emulsions,rheologicalpropertiesofemulsions andemulsionformulation byHLBmethod.

UNIT-IV

Micromeretics: Particle size and distribution, mean particle size, number and weightdistribution,particlenumber,methodsfordeterminingparticlesizebydifferentmethods, counting and separation method, particle shape, specific surface, methods fordeterminingsurfacearea,permeability,adsorption,derivedpropertiesofpowders,porosity,packingarrangement,densities,bulkiness&flowproperties.

UNIT-V

Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, units of basicrate constants, determination of reaction order. Physical and chemical factors influencingthe chemical degradation of pharmaceutical product: temperature, solvent, ionic strength,dielectric constant, specific & general acid base catalysis, Simple numerical problems.Stabilization of medicinal agents against common reactions like hydrolysis & oxidation.Acceleratedstabilitytestinginexpirationdatingofpharmaceuticaldosageforms.Photolyticdegradation andits prevention.

1. PhysicalPharmacybyAlfredMartin,Sixthedition
2. ExperimentalpharmaceuticsbyEugene,Parott.
3. Tutorial pharmacybyCooper andGunn.
4. StocklosamJ.Pharmaceuticalcalculations,Lea&Febiger,Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3,MarcelDekkarInc.
6. LibermanH.A,LachmanC,Pharmaceuticaldosageforms.Dispersesystems,volume1,2,3.Marcel DekkarInc.

COURSE OUTCOME :

1. The course deals with the various physical and physicochemical properties
2. Principles involved in dosage forms/formulations.
3. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development.
4. Stability studies of pharmaceutical dosage forms
5. Better knowledge on the different properties of ingredients

403T PH PHA II

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	1	2	2	1	1	1	2	3
CO2	3	2	3	3	1	2	2	1	1	1	2	2
CO3	3	2	3	3	1	1	1	2	1	1	2	2
CO4	3	2	3	3	1	1	1	2	2	1	2	2
CO5	3	2	3	3	1	2	2	3	2	1	2	2

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 404 T	Pharmacology I (Theory)	03+ 01 (Tutorial)	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives:

Upon completionofthiscoursethestudentshouldbeableto

1. Understandthepharmacological actionsofdifferentcategoriesofdrugs
2. Explainthemechanismofdrugactionatorgansystem/subce llular/macromolecularlevels.
3. Apply the basic pharmacological knowledge in the prevention and treatment ofvariousdiseases.
4. Observetheeffect ofdrugs on animals bysimulated experiments
5. Appreciate correlation ofpharmacologywithotherbiomedicalsciences

CourseContent:

UNIT-I **0**

1. GeneralPharmacology

a. IntroductiontoPharmacology-Definition,historicallandmarksandscopeofpharmacology,natureandsource ofdrugs,essentialdrugsconceptandroutesofdrug administration, Agonists, antagonists(competitive and non competitive), sparereceptors,addiction,tolerance,dependence,tachyphylaxis,idiosyncras y,allergy.

b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism andexcretionofdrugs.Enzymeinduction,enzymeinhibition,kineticsof elimination

UNIT-II **12Hours**

GeneralPharmacology

a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theoriesand classification of receptors, regulation of receptors. drug receptors interactionssignaltransductionmechanisms,G-protein–coupledreceptors,ionchannelreceptor,transmembrane enzyme linked receptors, transmembrane JAK-STAT bindingreceptorand receptors that regulate transcription factors, dose responserelationship, therapeutic index, combined effects of drugs and factors modifyingdrugaction.

b. Adversedrugreactions.

c. Druginteractions(pharmacokineticandpharmacodynamic)

d. Drugdiscoveryandclinicalevaluation ofnew drugs- Drugdiscoveryphase,preclinical evaluation phase, clinical trial phase, phases of clinical trials andpharmacovigilance.

UNIT-III

2. Pharmacologyofdrugsactingonperipheralnervoussystem

a. OrganizationandfunctionofANS.

b.Neurohumoraltransmission,co-transmissionandclassificationofneurotransmitters.

c. Parasympathomimetics,Parasympatholytics,Sympathomimetics,sympatholytics.

d. Neuromuscularblockingagentsandskeletalmusclerelaxants(peripheral).

e. Localanestheticagents.

f. Drugsusedinmyastheniagravisandglaucoma

UNIT-IV **0**

3. Pharmacologyofdrugsactingoncentralnervoussystem

a. NeurohumoraltransmissionintheC.N.S.specialemphasisonimportanceofv ariousneurotransmitterslikewithGABA,Glutamate,Glycine,serotonin,do pamine.

b. Generalanestheticsandpre-anesthetics**.**

c. Sedatives,hypnoticsandcentrallyactingmuscle relaxants.

d. Anti-epileptics

e. Alcoholsanddisulfiram

UNIT-V

3. Pharmacologyofdrugsactingoncentralnervoussystem

a. Psychopharmacologicalagents:Antipsychotics,antidepressants,anti-anxietyagents,anti-manicsandhallucinogens.

b. DrugsusedinParkinsonsdiseaseandAlzheimer'sdisease.

c. CNSstimulantsandnootropics.

d. Opioidanalgesicsand antagonists

e. Drugaddiction,drugabuse,toleranceanddependence.

RecommendedBooks(LatestEditions)

1. RangH.P., DaleM.M.,RitterJ.M., FlowerR. J.,RangandDale'sPharmacology,.ChurchilLivingstoneElsevier
2. KatzungB.G.,Masters S.B.,TrevorA.J.,Basicandclinicalpharmacology, TataMcGraw-Hill
3. GoodmanandGilman's,ThePharmacologicalBasisofTherapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A.K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point LippincottWilliams &Wilkins
5. MycekM.J,GelnetS.BandPerperM.M.Lippincott'sIllustratedReviews-Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers MedicalPublishers(P)Ltd, NewDelhi.
7. SharmaH.L.,SharmaK.K.,Principlesof Pharmacology,Parasmedicalpublisher Modern Pharmacologywithclinical Applications,byCharles R.Craig&Robert

COURSE OUTCOME :

1. The subject is to impart knowledge about the action of the drug, different routes of drug administration, toxic effects etc.
2. Students would have understood the pharmacological actions of different

categories of drugs.

3. Mechanism of drug action at organ system, sub cellular and macromolecular levels have been studied.
4. They have understood the application of basic pharmacological knowledge in the prevention and treatment of different diseases.
5. Signal transduction mechanism of various receptors have been understood.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	2	1	1	1	2	2	1	2	1
CO2	3	1	1	2	1	1	1	2	2	1	2	1
CO3	2	2	2	3	1	2	3	2	1	2	3	2
CO4	2	2	2	3	2	2	1	2	1	2	1	2
CO5	1	3	2	3	2	2	1	1	2	1	1	2

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 405 T	**PharmacognosyAndPhytochemistry I** (Theory)	03+ 01 (Tutorial)	04
Sessional Marks : 25		**End Semester Examination Marks : 75**	

Objectives:

1. Students should know about the techniques involved in cultivation and production of crude drugs

2. Study about crude drugs, their uses and chemical nature of drugs

3.Familiar with the evaluation techniques for herbal drugs

4. Evaluate the microscopic and macroscopic characteristics of the crude drugs

CourseContent:

UNIT-I

IntroductiontoPharmacognosy:

(a) Definition,history,scopeanddevelopmentofPharmacognosy

(b) SourcesofDrugs–Plants,Animals,Marine&Tissueculture

(c) Organizeddrugs,unorganizeddrugs(driedlatex,driedjuices,driedextracts,gu msandmucilages,oleoresinsandoleo- gum -resins).

Classificationofdrugs:

Alphabetical,morphological,taxonomical,chemical,pharmacological,chemoand serotaxonomicalclassificationofdrugs

Qualitycontrolof Drugsof NaturalOrigin:

Adulterationofdrugsofnaturalorigin.Evaluationbyorganoleptic,microscopic,phy sical,chemicaland biologicalmethodsandproperties.

Quantitativemicroscopyofcrudedrugsincludinglycopodiumsporemethod,leafcon
stants,cameralucidaanddiagramsofmicroscopic objectstoscale
withcameralucida.

UNIT-II

Cultivation,Collection,Processingandstorageofdrugsofnaturalorigin:

CultivationandCollectionofdrugsofnat
uraloriginFactors influencing
cultivation of medicinal
plants.Planthormonesand
theirapplications.

Polyploidy,mutationandhybridizationwithreferencetomedicinalplants

Conservationofmedicinalplants

UNIT-III

Planttissueculture:

Historicaldevelopmentofplanttissueculture,typesofcultures,Nutritionalrequirem
ents,growthand theirmaintenance.

Applicationsofplanttissueculture inphar
macognosy.Edible vaccines

UNITIV

Pharmacognosyinvarioussystemsofmedicine:

RoleofPharmacognosy
inallopathyandtraditionalsystemsofmedicinenamely,Ayurveda,Unani,Siddha,H
omeopathyand Chinesesystemsof medicine.

Introductiontosecondarymetabolites:

Definition,classification,propertiesandtestforidentificationofAlkaloids,Glycosides,Flavonoids,Tannins, Volatileoiland Resins

UNITV

Studyofbiologicalsource,chemicalnatureandusesofdrugsofnaturalorigincontainingfollowingdrugs

PlantProducts:

Fibers-Cotton,Jute,Hemp

Hallucinogens,Teratogens,Naturalallergens

Primarymetabolites:

Generalintroduction,detailedstudywithrespecttochemistry,sources,preparation, evaluation, preservation, storage, therapeutic used and commercial utility as PharmaceuticalAids and/orMedicines forthefollowingPrimarymetabolites:

Carbohydrates: Acacia,Agar,Tragacanth,Honey

ProteinsandEnzymes: Gelatin,casein,proteolyticenzymes(Papain,bromelain,serratiopeptidase,urokinase, streptokinase,pepsin).

Lipids(Waxes,fats,fixedoils):Castoroil,Chaulmoograoil,WoolFat,BeesWax

MarineDrugs:

Novelmedicinalagentsfrommarinesources

RecommendedBooks(LatestEditions)

1. WilsonandGiswold'sOrganicmedicinalandPharmaceuticalChemistry.

2. Foye'sPrinciplesofMedicinalChemistry.

3. Burger'sMedicinalChemistry,VolItoIV.

4. Introductiontoprinciplesofdrugdesign-SmithandWilliams.

5. Remington'sPharmaceuticalSciences.

6. Martindale'sextrapharmacopoeia.

7. Organic ChemistrybyI.L.Finar, Vol.II.

8. The OrganicChemistryofDrugSynthesis byLednicer, Vol. 1-5.

9. IndianPharmacopoeia.

10. Textbookofpracticalorganicchemistry-A.I.Vogel.

COURSE OUTCOME :

After Completion of the course the student able to

1. This subject is intended to impart students about the fundamental knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially, involved in the study of producing plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine.
2. Significance of pharmacognostic parameters & study of crude drugs.
3. Understand the underlying reason of evolutionary significance of secondary metabolites production in plants & other organisms & deduce their significance as medicinal molecules.
4. How these primary metabolites are used comprehensively as a source to develop Pharmaceutical & industrial applications.
5. Study about the source, name, chemical structures, methods of extraction, qualitative & quantitative analysis of glycosides & tannin.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	3	2	2	1	1	3	2	1	2	2	3	2
CO2	3	2	2	1	1	3	3	1	2	3	2	2
CO3	2	2	1	2	2	2	3	2	2	3	2	1
CO4	2	1	1	2	3	2	2	2	2	2	1	1
CO5	2	1	2	3	3	1	1	2	1	1	1	1

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 406 P	Medicinal chemistry I (Practical)	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

OBJECTIVE :

Know about the structure, & physico chemical properties of drugs

2. Understand the procedures for the preparation of drugs.

3. standardize procedures for the assay preparations

4. Determine the partition coefficient for any two drugs

5. Know the steps involved in the synthesis of drugs in each class.

Preparationofdrugs/intermediates

1,3-pyrazole

1,3-oxazole

Benzimidazole

Benztriazole

2,3-diphenyl quinoxaline

Benzocaine

Phenytoin

Phenothiazine

Barbiturate

Assayofdrugs

Chlorpromazine

Phenobarbitone

Atropine

Ibuprofen

Aspirin

Furosemide

DeterminationofPartition coefficientforanytwodrugs

RecommendedBooks(LatestEditions)

1. WilsonandGiswold'sOrganicmedicinalandPharmaceuticalChemistry.
2. Foye'sPrinciplesofMedicinalChemistry.
3. Burger'sMedicinalChemistry,VolItoIV.
4. Introductiontoprinciplesofdrugdesign-SmithandWilliams.
5. Remington'sPharmaceuticalSciences.
6. Martindale'sextrapharmacopoeia.
7. Organic ChemistrybyI.L.Finar, Vol.II.
8. The OrganicChemistryofDrugSynthesis byLednicer, Vol. 1-5.
9. IndianPharmacopoeia.
10. Textbookofpracticalorganicchemistry-A.I.Vogel.

COURSE OUTCOME :

This subject is to inculcate the students will able to know

1. Basic knowledge on scope of Medicinal chemistry and interlinked subjects

2. Handling the glassware and Preparations of the synthetic drugs and how to calibrate the chemicals.

3. Perform the synthesis of the drugs with their chemical structures.

4. Compare the test drug with that of the standard drug by assay methods.

5. Understand the partition coefficient of any two drugs.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	2	1	1	1	1	1	1	1
CO2	3	1	2	3	2	1	2	1	1	1	1	1
CO3	2	2	1	2	1	1	2	2	2	1	2	2
CO4	2	2	1	1	1	2	2	2	2	1	2	2
CO5	1	1	1	1	3	2	2	2	2	1	2	3

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 407 P	Physical pharmaceutics II (Practical)	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

OBJECTIVES :

To analyse the solubility of various drugs and excipients

2. Experiment on partition coefficient of different compounds and various solubility systems,

To examine the surface tension, HLB number of a various surfactant

3. Evaluate stability constant of complex compound.

1. Determinationofparticlesize,particlesizedistributionusingsievingmethod
2. Determinationofparticlesize,particlesizedistributionusingMicroscopicmethod
3. Determinationofbulkdensity,truedensityandporosity
4. Determinetheangleofreposeandinfluenceoflubricantonangleofrepose

5. DeterminationofviscosityofliquidusingOstwald'sviscometer
6. Determinationsedimentationvolumewitheffectofdifferentsuspendingagent
7. Determinationsedimentationvolumewitheffectofdifferentconcentration ofsinglesuspendingagent
8. Determination of viscosityof semisolidbyusingBrookfield viscometer
9. Determinationofreactionrateconstantfirstorder.
10. Determinationofreactionrateconstantsecondorder
11. Accelerated stabilitystudies

RecommendedBooks:(LatestEditions)

7. PhysicalPharmacybyAlfredMartin,Sixthedition
8. ExperimentalpharmaceuticsbyEugene,Parott.
9. Tutorial pharmacybyCooper andGunn.
10. StocklosamJ.Pharmaceuticalcalculations,Lea&Febiger,Philadelphia.
11. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkarInc.

12. LibermanH.A,LachmanC,Pharmaceuticaldosageforms.Dispersesystems,volume1,2,3.Marcel DekkarInc.
13. Physical PharmaceuticsbyRamasamyC, andManavalan R.

COURSE OUTCOME :

1. This course helps to compare and evaluate the solubility of various combination compound modify for better solubility approaches by use different level of methods.
2. recognize the formulation aspects of different dosage forms;
3. formulate different types of dosage forms;
4. appreciate the importance of good formulation for effectiveness.
5. do different pharmaceutical calculation involved in formulation;

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	2	1	1	2	2	3	3	3
CO2	2	1	2	2	2	1	2	2	2	3	3	3
CO3	3	1	3	2	1	1	2	2	1	3	3	2
CO4	3	1	3	1	1	1	2	1	1	2	2	2
CO5	3	1	2	1	1	1	1	1	1	2	2	2

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 408 P	Pharmacology I (Practical)	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

OBJECTIVES

1. To understand the handling of different equipments used in experimental pharmacology.
2. Knowledge on miotics and mydriasis, locomotor movements.
3. All the simulation techniques has been demonstrated by using software as animal dissection has been banned for UG studies.

1. Introductiontoexperimentalpharmacology.
2. Commonlyused instruments in experimental pharmacology.
3. Studyofcommonlaboratoryanimals.
4. MaintenanceoflaboratoryanimalsasperCPCSEAguidelines.
5. Commonlaboratorytechniques.Bloodwithdrawal,serumandplasmaseparation,anestheticsand euthanasiaused foranimal studies.
6. Studyof differentroutesof drugsadministrationin mice/rats.
7. Studyofeffectofhepaticmicrosomalenzymeinducersonthephenobarbitonesleepingtimeinmice.
8. Effectof drugsonciliarymotilityoffrogoesophagus
9. Effectofdrugsonrabbiteye.
10. Effectsofskeletalmusclerelaxantsusingrota-rodapparatus.
11. Effect of drugsonlocomotoractivityusingactophotometer.
12. AnticonvulsanteffectofdrugsbyMESandPTZmethod.
13. Studyof stereotypeand anti-catatonic activityofdrugs onrats/mice.
14. Studyofanxiolyticactivityofdrugsusingrats/mice.

15. Studyoflocalanestheticsbydifferentmethods

Note: All laboratory techniques and animal experiments are demonstrated by simulatedexperimentsbysoftwares andvideos

RecommendedBooks(LatestEditions)

1. RangH.P., DaleM.M.,RitterJ.M., FlowerR. J.,RangandDale'sPharmacology,.ChurchilLivingstoneElsevier
2. KatzungB.G.,Masters S.B.,TrevorA.J.,Basicandclinicalpharmacology, TataMcGraw-Hill
3. GoodmanandGilman's,ThePharmacologicalBasisofTherapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A.K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point LippincottWilliams &Wilkins
5. MycekM.J,GelnetS.BandPerperM.M.Lippincott'sIllustratedReviews-Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers MedicalPublishers(P)Ltd, NewDelhi.
7. SharmaH.L.,SharmaK.K.,Principlesof Pharmacology,Parasmedicalpublisher
8. Modern Pharmacologywithclinical Applications,byCharles R.Craig&Robert,
9. GhoshMN.FundamentalsofExperimentalPharmacology.Hilton&Company, Kolkata.
10. KulkarniSK.Handbookofexperimentalpharmacology.VallabhPrakashan,

COURSE OUTCOME :

After successful completion of this course, students will be able to:

1. Handling of different instruments used in Experimental Pharmacology.

2. Know about the different routes of drug administration, blood withdrawal etc.,
3. Evaluate the different activities on animals.
4. Demonstration of different simulation methods.
5. Knowledge on the activities of various drugs

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	1	3	2	1	2	2	3	2
CO2	3	2	2	1	1	3	3	1	2	3	2	2
CO3	2	2	1	2	2	2	3	2	2	3	2	1
CO4	2	1	1	2	3	2	2	2	2	2	1	1
CO5	2	1	2	3	3	1	1	2	1	1	1	1

3- High, 2- Medium, 1-Low

Course Code	Course Title	No of Hours Per week	No of Credits
BP 409 P	Pharmacognosy and Phytochemistry (Practical)	04	02
Sessional Marks : 15		**End Semester Examination Marks : 35**	

OBJECTIVES :

- Remembering different morphological and microscopical characteristic features of crude drugs.
- Attaining knowledge about how the cellular structures of crude drugs are formed
- Qualitative and Quantitative evaluation should be done to know about the quality and purity of drug constituents present
- Physical and chemical evaluation methods should be performed to identify that the drug is in ure form or adulterated

1. Analysisofcrudedrugsbychemicaltests:(i)Tragaccanth(ii)Acacia(iii)Ag ar(iv)Gelatin(v)starch(vi) Honey(vii) Castor oil
2. Determination of stomatalnumberandindex
3. Determination of veinis let number, veinis let termination and palisideratio.
4. Determinationofsizeofstarchgrains,calciumoxalatecrystalsbyeyepiece micrometer
5. Determination of Fiber length and width
6. DeterminationofnumberofstarchgrainsbyLycopodiumsporemethod
7. DeterminationofAshvalue
8. DeterminationofExtractivevaluesofcrudedrugs
9. Determination of moisture content of crudedrugs
10. Determination of swelling index and foaming

RecommendedBooks:(LatestEditions)

1. W.C.Evans,TreaseandEvansPharmacognosy,16thedition,W.B.Soun ders &Co.,London,2009.

2. Tyler,V.E.,Brady,L.R.andRobbers,J.E.,Pharmacognosy,9thEdn ., LeaandFebiger,Philadelphia,1988.
3. Text BookofPharmacognosybyT.E.Wallis
4. MohammadAli.PharmacognosyandPhytochemistry,CBSP ublishers&Distribution,NewDelhi.
5. TextbookofPharmacognosybyC.K.Kokate,Purohit,Gokhlae(2007),37t hEdition,NiraliPrakashan, NewDelhi.
6. HerbaldrugindustrybyR.D.Choudhary(1996),IstEdn,Eastern Publisher,NewDelhi.
7. EssentialsofPharmacognosy,Dr.SH.Ansari,IIndedition,Birlapublica tions,NewDelhi, 2007
8. PracticalPharmacognosy:C.K.Kokate,Purohit,Gokhlae
9. AnatomyofCrudeDrugsbyM.A. Iyengar

COURSE OUTCOME :

After successful completion of this course, students will be able to:

1. Demonstrate chemical tests to identify unorganized crude drugs
2. Evaluate the quality and purity of crude drugs
3. Perform linear measurements for crude drug identification
4. The main purpose of subject is to impart the students the knowledge of how thesecondary metabolites is produced in the crude drugs, how to isolate and identify andproduce them industrially.
5. Also, this subject involves the study of producing the plants andphytochemicals through plant tissue culture, drug interactions and basic principles oftraditional system of medicine

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	1	2	2	1	1	1	2	3
CO2	3	2	2	3	1	2	2	1	1	1	2	2
CO3	2	2	2	2	1	1	1	2	1	1	1	2
CO4	2	2	1	3	1	1	1	2	2	1	2	2
CO5	3	2	3	3	1	2	2	3	2	1	2	2

3- High, 2- Medium, 1-Low

SEMISTER V

Course Code	Course Title	No of Hours Per week	No of Credits
BP501T.	**MEDICINAL CHEMISTRY – II-Theory**	03+01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks : 75**	

Objectives: Upon completion of the course the student shall be able to

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways, adverse effect and therapeutic value ofdrugs
3. Know the Structural Activity Relationship of different class of drugs
4. Study the chemical synthesis of selected drugs

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

Course Content

UNIT- I

Antihistaminic agents: Histamine, receptors and their distribution in thehumanbodyH1–antagonists: Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines cuccinate, Clemastine fumarate, Diphenylphyraline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizinehydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidinehydrochloride*, Phenidaminetartarate, Promethazine hydrochloride*,Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate,Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodiumH2-antagonists: Cimetidine*, Famotidine, Ranitidin.Gastric Proton pump inhibitors: Omeprazole,Lansoprazole, Rabeprazole,PantoprazoleAnti-neoplastic agents:Alkylating agents: Meclorethamine*, Cyclophosphamide, Melphalan,Chlorambucil, Busulfan, ThiotepaAntimetabolites: Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, AzathioprineAntibiotics: Dactinomycin, Daunorubicin,

Doxorubicin, BleomycinPlant products: Etoposide, Vinblastin sulphate, Vincristin sulphateMiscellaneous: Cisplatin, Mitotane.

UNIT – II

Anti-anginal:

Vasodilators: Amyl nitrite, Nitroglycerin*, Pentaerythritol tetranitrate, Isosorbidedinitrite*, Dipyridamole. Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazemhydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine. Diuretics:Carbonic anhydrase inhibitors: Acetazolamide*, Methazolamide,Dichlorphenamide.Thiazides: Chlorthiazide*, Hydrochlorothiazide, Hydroflumethiazide,Cyclothiazide,Loop diuretics: Furosemide*, Bumetanide, Ethacrynic acid.Potassium sparing Diuretics: Spironolactone, Triamterene, Amiloride.Osmotic Diuretics: MannitolAnti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazeprilhydrochloride, Quinapril hydrochloride, Methyldopatehydrochloride,* Clonidinehydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodiumnitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.

UNIT- III

Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramidephosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride,Mexiletine hydrochloride, Lorcainide hydrochloride, Amiodarone, Sotalol.Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine andCholestipolCoagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin*,Anisindione, clopidogrelDrugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide,Bosentan, Tezosentan.

UNIT- IV

Drugs acting on Endocrine systemNomenclature, Stereochemistry and metabolism ofsteroidsSex hormones: Testosterone, Nandralone, Progestrones, Oestriol, Oestradiol,Oestrione, Diethyl stilbestrol.Drugs for erectile dysfunction: Sildenafil, Tadalafil.

Oral contraceptives: Mifepristone, Norgestril, LevonorgestrolCorticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone,DexamethasoneThyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil,Methimazole.

UNIT – V

Antidiabetic agents:Insulin and its preparationsSulfonyl ureas: Tolbutamide*,Chlorpropamide, Glipizide, Glimepiride.Biguanides: Metformin.Thiazolidinediones: Pioglitazone, Rosiglitazone. Meglitinides: Repaglinide,

Nateglinide.Glucosidase inhibitors: Acrabose, Voglibose.Local Anesthetics: SAR of Local anestheticsBenzoic Acid derivatives; Cocaine, Hexylcaine, Meprylcaine, Cyclomethycaine,Piperocaine.Amino Benzoic acid derivatives: Benzocaine*, Butamben, Procaine*, Butacaine, Propoxycaine, Tetracaine, Benoxinate. Lidocaine/Anilide derivatives: Lignocaine, Mepivacaine, Prilocaine, Etidocaine.Miscellaneous: Phenacaine, Diperodon, Dibucaine.*

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry. 3. Burger's Medicinal Chemistry, Vol I to IV.
4.Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II. 8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1to 5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

Course Outcome:

1. This subject is designed to impart fundamental knowledge on the structure, chemistry
2. To acquire knowledge of therapeutic value of drugs.
3. The subject emphasizes on structure activityrelationships of drugs, importance of physicochemical properties and metabolism ofdrugs.
4. The syllabus also emphasizes on chemical synthesis of important drugs under each class.
5. To understand the drug development of chemical moieties

CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	4	2	3	2	3	2	5	1	2	1	2	1
CO2	4	2	3	2	3	2	5	1	2	1	2	1

CO3	4	2	3	2	3	2	4	1	2	1	2	1
CO4	4	2	3	2	3	2	4	1	2	1	2	1
CO5	4	2	3	2	3	2	5	1	2	1	2	1

Course Code	Course Title	No of Hours Per week	No of Credits
BP502T.	Industrial Pharmacy-I- Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives:

Upon completion of the course the student shall be able to

1. Know the various pharmaceutical dosage forms and their manufacturingtechniques.
2. Know various considerations in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for theirquality

Course content:

UNIT-I

Preformulation Studies: Introduction to preformulation, goals and objectives, study ofphysicochemical characteristics of drug substances.

a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flowproperties, solubility profile (pKa, pH, partition coefficient), polymorphism

b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerizationBCS classification of drugs & its significantApplication of preformulation considerations in thedevelopment of solid, liquid oral andparenteral dosage forms and its impact on stability of dosage forms.

UNIT-II

Tablets:

a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems.Equipment's and tablet tooling.

b. Tablet coating: Types of coating, coating materials, formulation of coatingcomposition, methods of coating, equipment employed and defects incoating.

c. Quality control tests: In process and finished product tests

Liquid orals: Formulation and manufacturing consideration of syrups and elixirssuspensions and emulsions; Filling and packaging; evaluation of liquid oralsofficial inpharmacopoeia

UNIT-III

Capsules:

a. Hard gelatin capsules: Introduction, Production of hard gelatin capsule shells. Sizeofcapsules, Filling, finishing and special techniques of formulation of hard gelatincapsules,manufacturing defects. In process and final product quality control testsfor capsules.

b. Soft gelatin capsules: Nature of shell and capsule content, size ofcapsules,importance of base adsorption and minim/gram factors, production, inprocess and final product quality control tests. Packing, storage and stability testingof soft gelatin capsules and their applications.

Pellets: Introduction, formulation requirements, pelletization process, equipments formanufacture of pellets

UNIT-IV

Parenteral Products:

a. Definition, types, advantages and limitations. Preformulation factors and essentialrequirements, vehicles, additives, importance of isotonicity

b. Production procedure, production facilities and controls,aseptic processing

c. Formulation of injections, sterile powders, large volume parenterals andlyophilized products.

d. Containers and closures selection, filling and sealing of ampoules, vials and infusionfluids. Quality control tests of parenteral products.

Ophthalmic Preparations: Introduction, formulation considerations; formulation of eyedrops, eye ointments and eye lotions; methods of preparation; labeling, containers;evaluation of ophthalmic preparations

UNIT-V

Cosmetics: Formulation and preparation of the following cosmetic preparations:lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes andsunscreens.Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol

systems; formulation and manufacture of aerosols; Evaluation of aerosols; Qualitycontrol and stability studies.

Packaging Materials Science: Materials used for packaging of pharmaceutical products,factors influencing choice of containers, legal and official requirements for containers,stability aspects of packaging materials, quality control tests.

Course Outcome:

1. To understand the formulation of solid dosage form
2. To acqire knowledge on opharmaceutical additives and various pharmaceutical dosage forms on the performance ofthe drug product.
3. To understand of the capsule formulation and characterization
4. To understand the formulation of injection and capacitation of sterile product
5. To understand the preparation of cosmetics and evaluation studies

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	5	3	4	3	5	5	2	1	1	2	3	3
CO2	4	3	4	3	5	4	2	1	1	2	3	3
CO3	5	3	3	4	4	4	2	1	1	2	3	3
CO4	4	3	4	5	4	4	2	1	1	2	3	3
CO5	4	3	4	4	4	4	2	1	1	2	3	3

Course Code	Course Title	No of Hours Per week	No of Credits
BP503T.	PHARMACOLOGY-II- Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives: Upon completion of this course the student should be able to

1. Understand the mechanism of drug action and its relevance in the treatment ofdifferent diseases
2. Demonstrate isolation of different organs/tissues from the laboratory animals bysimulated experiments
3. Demonstrate the various receptor actions using isolated tissue preparation
4. Appreciate correlation of pharmacology with related medical sciences

Course Content:

UNIT-I

1. Pharmacology of drugs acting on cardio vascular system

a. Introduction to hemodynamic and electrophysiology of heart.

b. Drugs used in congestive heart failure

c. Anti-hypertensive drugs.

d. Anti-anginal drugs.

e. Anti-arrhythmic drugs.

f. Anti-hyperlipidemic drugs.

UNIT-II

1. Pharmacology of drugs acting on cardio vascular system

a. Drug used in the therapy of shock.

b. Hematinics, coagulants and anticoagulants.

c. Fibrinolytics and anti-platelet drugs

d. Plasma volume expanders

2. Pharmacology of drugs acting on urinary system

a. Diuretics

b. Anti-diuretics.

UNIT-III

3. Autocoids and related drugs

a. Introduction to autacoids and classification

b. Histamine, 5-HT and their antagonists.

c. Prostaglandins, Thromboxanes and Leukotrienes.

d. Angiotensin, Bradykinin and Substance P. e. Non-steroidal anti-inflammatory agents

f. Anti-gout drugs

g. Antirheumatic drugs

UNIT-IV

5. Pharmacology of drugs acting on endocrine system

a. Basic concepts in endocrine pharmacology. b. Anterior Pituitary hormones- analogues andtheir inhibitors.

c. Thyroid hormones- analogues and their inhibitors.

d. Hormones regulating plasma calcium level- Parathormone, Calcitonin andVitamin-D.

d. Insulin, Oral Hypoglycemic agents and glucagon.

e. ACTH and corticosteroids.

UNIT-V

5. Pharmacology of drugs acting on endocrine system

a. Androgens and Anabolic steroids.

b. Estrogens, progesterone and oral contraceptives.

c. Drugs acting on the uterus.

6. Bioassay

a. Principles and applications of bioassay. b.Types of bioassay

c. Bioassay of insulin, oxytocin, vasopressin, ACTH,d-tubocurarine,digitalis, histamineand 5-HT

Course Outcome:

1. This subject is intended to impart the fundamental knowledge of drug pharmacology
2. To understand the various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body
3. To understand of general pharmacology of Non-steroidal anti-inflammatory agents
4. To understand ofPharmacology of drugs acting on endocrine system
5. To understand of emphasis on the basic concepts of bioassay

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	5	4	2	4	5	5	1	2	1	2	2	2
CO2	5	4	3	4	5	5	1	2	1	2	2	3
CO3	5	4	4	4	5	5	1	2	1	2	2	3
CO4	4	4	3	4	5	5	1	2	1	2	2	3
CO5	5	4	3	3	5	5	1	2	1	2	2	3

Course Code	Course Title	No of Hours Per week	No of Credits
BP504T.	PHARMACOGNOSY AND PHYTOCHEMISTRY II- Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives:

Upon completion of the course, the student shall be able

1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
2. to understand the preparation and development of herbal formulation.
3. to understand the herbal drug interactions
4. to carryout isolation and identification of phytoconstituents

Course Content:

UNIT-I

Metabolic pathways in higher plants and their determination

a) Brief study of basic metabolic pathways and formation of different secondary metabolitesthrough these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway. b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

UNIT-II

General introduction, composition, chemistry & chemical classes, biosources, therapeuticuses and commercial applications of followingsecondary metabolites:

Alkaloids: Vinca, Rauwolfia, Belladonna, Opium,Phenylpropanoids and Flavonoids: Lignans,Tea, RutaSteroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis

Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander,

Tannins: Catechu, Pterocarpus

Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony

Glycosides: Senna, Aloes, Bitter AlmondIridoids, Other terpenoids &Naphthaquinones: Gentian, Artemisia, taxus, carotenoids

UNIT-III

Isolation, Identification and Analysis of Phytoconstituents

a) Terpenoids: Menthol, Citral, Artemisin

b) Glycosides: Glycyrhetinic acid &Rutin

c) Alkaloids: Atropine,Quinine,Reserpine,Caffeine

d) Resins: Podophyllotoxin, Curcumin

UNIT-IV

Industrial production, estimation and utilization of the following phytoconstituents:Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

UNIT V

Basics of Phytochemistry

Modern methods of extraction, application of latest techniques like Spectroscopy,chromatography and electrophoresis in the isolation, purification and identification of crudedrugs.

Course Outcome:

1. The main purpose of subject is to impart the students the knowledge of how thesecondary metabolites is produced in the crude drugs,
2. To understand of how to isolate and identify andproduce them industrially.
3. The study of producing the plants andphytochemicals through plant tissue culture,
4. To understand the drug interactions and basic principles oftraditional system of medicine
5. To understand the basic photochemistry of isolation and purification of crude drugs

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	5	4	2	4	5	5	1	2	1	2	2	1
CO2	5	4	3	4	5	5	1	2	1	2	2	1

CO3	5	4	4	4	5	5	1	2	1	2	2	1
CO4	4	4	3	4	5	5	1	2	1	2	2	1
CO5	5	4	3	3	5	5	1	2	1	2	2	1

Course Code	Course Title	No of Hours Per week	No of Credits
BP505T.	PHARMACEUTICAL JURISPRUDENCE- Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives:

Upon completion of the course, the student shall be able to understand:

1. The Pharmaceutical legislations and their implications in the development andmarketing of pharmaceuticals.
2. Various Indian pharmaceutical Acts and Laws
3. The regulatory authorities and agencies governing the manufacture and sale ofpharmaceuticals
4. The code of ethics during the pharmaceutical practice

Course Content:

UNIT-I

Drugs and Cosmetics Act, 1940 and its rules 1945:
Objectives, Definitions, Legal definitions of schedules to the Act andRules
Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties. Manufacture of drugs – Prohibition of manufactureand sale of certain drugs,Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture ofnew drug, loanlicense and repacking license.

UNIT-II

Drugs and Cosmetics Act, 1940 and its rules 1945.Detailed study of Schedule G, H, M, N, P, T, U, V, X, Y, Part XII B, Sch F & DMR (OA)Sale of Drugs – Wholesale, Retail sale and

Restricted license. Offences and penaltiesLabeling& Packing of drugs- General labeling requirements and specimen labels fordrugs and cosmetics, List of permitted colors. Offences and penalties.

Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugsLaboratory, Drugs Consultative Committee, Government drug analysts, Licensingauthorities, controlling authorities, Drugs Inspectors

UNIT-III

Pharmacy Act –1948: Objectives, Definitions, Pharmacy Council of India; itsconstitution and functions, Education Regulations, State and Joint state pharmacycouncils; constitution and functions, Registration of Pharmacists, Offences andPenalties

Medicinal and Toilet Preparation Act –1955: Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations,Manufacture of Ayurvedic,Homeopathic, Patent & Proprietary Preparations.Offences and Penalties.

Narcotic Drugs and Psychotropic substances Act-1985 and Rules: Objectives,Definitions, Authorities and Officers, Constitution and Functions of narcotic &Psychotropic Consultative Committee, National Fund for Controlling the DrugAbuse, Prohibition, Control and Regulation, opium poppy cultivation and productionof poppy straw, manufacture, sale and export of opium, Offences and Penalties

UNIT-IV

Study of Salient Features of Drugs and Magic Remedies Act and itsrules: Objectives, Definitions, Prohibition of certain advertisements, Classes of
Exempted advertisements, Offences and Penalties

Prevention of Cruelty to animals Act1960: Objectives, Definitions, InstitutionalAnimal Ethics Committee, CPCSEA guidelines for Breeding and Stocking ofAnimals, Performance of Experiments, Transfer and acquisition of animals forexperiment, Records, Power to suspend or revoke registration, Offences and Penalties

National Pharmaceutical Pricing Authority: Drugs Price Control Order (DPCO)-2013.Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations,Retail price andceiling price of scheduled formulations, National List of EssentialMedicines (NLEM)

UNIT-V

Pharmaceutical Legislations – A brief review, Introduction, Study of drugs enquirycommittee, Health survey and development committee, Hathi committee andMudaliar committee

Code of Pharmaceutical ethics D definition, Pharmacist in relation to his job, trade, medicalprofession and his profession, Pharmacist's oath

Medical Termination of Pregnancy Act

Right to Information Act

Introduction to Intellectual Property Rights (IPR)

Recommended books: (Latest Edition)

1. Forensic Pharmacy by B. Suresh
2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9. Bare Acts of the said laws published by Government. Reference books (Theory)

Course Outcome:

1. This course is designed to impart basic knowledge on importantlegislations related to the profession of pharmacy in India.
2. To recall the pharmaceutical legislations, ethics, right to information, medical termination of pregnancy and intellectual property rights.
3. To relate the significance of Drugs and cosmetics act 1940 and its rules 1945 in relation to import and manufacture of drugs.
4. To apply the knowledge on schedules pertaining to Drugs and cosmetics act 1940 and its rules 1945 and also administration of the act and rules.
5. To understand the functions of pharmacy councils and implementation of education regulations in pharmacy.To appraise the importance of medicinal and toilet preparations act and narcotic drugs and psychotropic substances act and rules.

CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	3	5	3	5	2	1	4	1	4	5	4
CO2	1	3	5	3	5	2	1	4	1	4	5	4
CO3	1	3	4	3	5	2	1	4	1	4	5	4
CO4	1	3	3	3	5	2	1	4	1	4	5	4
CO5	1	3	4	3	5	2	1	4	1	4	5	4

Course Code	Course Title	No of Hours Per week	No of Credits
BP506P.	**Industrial Pharmacy-I- Practical**	**04**	**02**
Sessional Marks: 15		**End Semester Examination Marks:35**	

Objectives:

Upon completion of the course the student shall be able to

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality
4. This course to knowledge on formulation and evaluation of different types of tablets and capsules, injection, ointments, creams

Course content

1. Preformulation studies on paracetamol/asparin/or any other drug
2. Preparation and evaluation of Paracetamol tablets
3. Preparation and evaluation of Aspirin tablets
4. Coating of tablets- film coating of tables/granules
5. Preparation and evaluation of Tetracycline capsules
6. Preparation of Calcium Gluconate injection
7. Preparation of Ascorbic Acid injection
8. Qulaity control test of (as per IP) marketed tablets and capsules
9. Preparation of Eye drops/ and Eye ointments
10. Preparation of Creams (cold / vanishing cream)
11. Evaluation of Glass containers (as per IP)

Recommended Books: (Latest Editions)

1. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman

&J.B.Schwartz

2. Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman &Lachman

3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman

4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition

5. Remington: The Science and Practice of Pharmacy, 20th edition PharmaceuticalScience (RPS)

6. Theory and Practice of Industrial Pharmacy by Liberman & Lachman

7. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchilllivingstone, Latest edition

8. Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger,Philadelphia, 5thedition, 2005

9. Drug stability - Principles and practice by Cartensen& C.J. Rhodes, 3rd Edition,Marcel Dekker Series, Vol 107.

Course outcome:

1. This is help to understand the basic information of formulation process and how to optimise quality control solid, semisolid and parenteral dosage forms
2. Course enables the student to understand and appreciate the influence ofpharmaceutical manufacture of
3. Understand the various pharmaceutical dosage forms
4. Performance ofthe drugproduct by used of specific technology
5. Pharmaceutical product process development

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	4	4	5	3	5	2	1	4	5	4	3	3
CO2	4	3	5	3	5	2	1	4	5	4	3	3
CO3	4	3	4	3	5	2	1	4	5	4	3	3
CO4	4	4	3	3	5	2	1	4	5	4	3	3
CO5	4	3	4	3	5	2	1	4	5	4	3	3

CourseCode	CourseTitle	NoofHoursPerweek	NoofCredits
BP507P.	**PHARMACOLOGY-II- Practical**	**04**	**02**
SessionalMarks:15		**EndSemesterExaminationMarks: 35**	

Objectives:

1.To understand the handling of different equipments used in experimental pharmacology.

2.Toknowaboutthepreparationandpurposeofdifferentphysiologicalsaltsolutionsusedintheexperimental pharmacology.

3. Knowledgeonmioticsandmydriasis,locomotormovements.

4.All the simulationtechniques hasbeendemonstrated byusingsoftwareasanimaldissectionhasbeen banned for UGstudies.

Coursecontent

1. Introductiontoin-vitropharmacologyandphysiologicalsaltsolutions.
2. Effectofdrugsonisolatedfrogheart.
3. Effectofdrugsonbloodpressureandheartrateofdog.
4. Studyofdiureticactivityofdrugsusingrats/mice.
5. DRCof acetylcholineusingfrog rectus abdominismuscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominismuscleandratileumrespectively.
7. Bioassayofhistamineusingguineapigileumbymatchingmethod.
8. Bioassayofoxytocin usingrat uterinehornby interpolationmethod.
9. Bioassayofserotoninusing ratfundusstripby threepointbioassay.
10. Bioassayof acetylcholineusing ratileum/colonby fourpoint bioassay.
11. Determination of PA2 value of prazosin using rat anococcygeus muscle (by Schilds plotmethod).

12. DeterminationofPD2value usingguineapigileum.
13. Effectofspasmogensandspasmolyticsusingrabbitjejunum.
14. Anti-inflammatoryactivityofdrugsusingcarrageenaninducedpaw-edemamodel.
15. Analgesicactivityofdrugusingcentralandperipheralmethods

Note: All laboratory techniques and animal experiments are demonstrated by simulatedexperimentsby softwaresand videos

RecommendedBooks(LatestEditions)

1. RangH.P.,DaleM.M.,RitterJ.M.,FlowerR.J.,RangandDale'sPharmacology,ChurchilLivingstoneElsevier
2. KatzungB.G.,MastersS.B.,TrevorA.J.,Basicandclinicalpharmacology,TataMcGraw-Hill.
3. GoodmanandGilman's,ThePharmacologicalBasisofTherapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K.,BradleyR.W.,AppliedTherapeutics,TheClinicaluseofDrugs,ThePointLippincottWilliams & Wilkins.
5. MycekM.J,GelnetS.BandPerperM.M.Lippincott'sIllustratedReviews-Pharmacology.
6. K.D.Tripathi. Essentials ofMedical Pharmacology, , JAYPEE BrothersMedicalPublishers (P)Ltd, NewDelhi.
7. SharmaH.L.,SharmaK.K.,PrinciplesofPharmacology,Parasmedicalpublisher
8. ModernPharmacologywithclinicalApplications,byCharlesR.Craig&Robert.
9. GhoshMN.FundamentalsofExperimentalPharmacology.Hilton&Company,Kolkata.
10. KulkarniSK.Handbookofexperimentalpharmacology.VallabhPrakashan.

CourseOutcome:

After successful completion of this course, students will be able to

1. HandlingofdifferentinstrumentsusedinExperimentalPharmacology.
2. Knowaboutthedifferentroutesofdrugadministration,bloodwithdrawaletc. Evaluatethe differentactivities on animals.
3. Demonstrationofdifferentsimulationmethods.
4. Theywouldhavefinallylearnttoapplytheknowledgeofdrugspracticallyusingsimulatedpharmacologicalexperiments**.**
5. CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	4	5	3	5	2	1	4	5	4	3	3
CO2	3	3	5	3	5	2	1	4	5	4	3	3
CO3	3	3	4	3	5	2	1	4	5	4	3	3
CO4	3	4	3	3	5	2	1	4	5	4	3	3
CO5	3	3	4	3	5	2	1	4	5	4	3	3

Course Code	Course Title	No of Hours Per week	No of Credits
BP508P.	PHARMACOGNOSY AND PHYTOCHEMISTRY II- Practical	04	02
Sessional Marks: 15		End Semester Examination Marks: 35	

Objectives:

To identify Morphology, histology and powder characteristics & extraction & detectionof:Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander

2. Exercise involving isolation & detection of active principles

a. Caffeine - from tea dust.

b. Diosgenin from Dioscorea

c. Atropine from Belladonna

d. Sennosides from Senna

3. Separation of sugars by Paper chromatography

4. TLC of herbal extract of different compounds

Course content

1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander

2. Exercise involving isolation & detection of active principles

a. Caffeine - from tea dust.

b. Diosgenin from Dioscorea

c. Atropine from Belladonna

d. Sennosides from Senna

3. Separation of sugars by Paper chromatography

4. TLC of herbal extract

5. Distillation of volatile oils and detection of phytoconstitutents by TLC

6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Recommended Books: (Latest Editions)

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co.,London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers &Distribution, New Delhi.
3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition,NiraliPrakashan, New Delhi.
4. Herbal drug industry by R.D. Choudhary (1996), IstEdn, Eastern Publisher, New Delhi.

5. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, NewDelhi, 2007
6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi,2005.
8. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
9. Pharmacognosy &Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
10. The formulation and preparation of cosmetic, fragrances and flavours. 11. Remington'sPharmaceutical sciences. 12. Text Book of Biotechnology by Vyas and Dixit.
13. Text Book of Biotechnology by R.C. Dubey.

Course Outcome:

1. To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents by use chromatographic technique
2. The main purpose of subject is to impart the students the knowledge of how thesecondary metabolites is produced in the crude drugs,
3. To understand of how to isolate and identify andproduce them industrially.
4. The study of producing the plants andphytochemicals through plant tissue culture,
5. To understand the drug interactions and basic principles oftraditional system of medicine

CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	4	5	3	5	2	1	4	5	4	3	3
CO2	3	3	5	3	5	2	1	4	5	4	3	3
CO3	3	3	4	3	5	2	1	4	5	4	3	3
CO4	3	4	3	3	5	2	1	4	5	4	3	3
CO5	3	3	4	3	5	2	1	4	5	4	3	3

SEMESTER VI

Course Code	Course Title	No of Hours Per week	No of Credits
BP601T.	MEDICINAL CHEMISTRY – III-Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives:

Upon completion of the course student shall be able to

1. Understand the importance of drug design and different techniques of drugdesign.
2. Understand the chemistry of drugs with respect to their biological activity.
3. Know the metabolism, adverse effects and therapeutic value of drugs.
4. Know the importance of SAR of drugs.

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted by (*)

Course Content:

UNIT – I

Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activityrelationship, Chemical degradation classification and important products ofthe following classes.

β-Lactam antibiotics: Penicillin, Cepholosporins, β- Lactamase inhibitors,Monobactams

Aminoglycosides: Streptomycin, Neomycin, Kanamycin

Tetracyclines: Tetracycline,Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline

UNIT – II

Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activityrelationship,Chemical degradation classification and important products ofthe following classes.

Macrolide: Erythromycin Clarithromycin, Azithromycin.

Miscellaneous: Chloramphenicol*, Clindamycin.

Prodrugs: Basic concepts and application of prodrugs design.

Antimalarials: Etiology of malaria. Quinolines: SAR, Quinine sulphate, Chloroquine*,Amodiaquine, Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine. Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.

Miscellaneous: Pyrimethamine, Artesunete, Artemether, Atovoquone.

UNIT – III

Anti-tubercular Agents

Synthetic anti-tubercular agents: Isoniozid*, Ethionamide, Ethambutol,Pyrazinamide, Paraamino salicylic acid.*

Anti-tubercular antibiotics: Rifampicin, Rifabutin, CycloserineStreptomycine, Capreomycinsulphate.Urinary tract anti-infective agents

Quinolones: SAR of quinolones, Nalidixic Acid,Norfloxacin, Enoxacin,Ciprofloxacin*,Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin,Moxifloxacin

Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine. Antiviral agents:Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridinetrifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine,Lamivudine, Loviride, Delavirding, Ribavirin,Saquinavir, Indinavir,Ritonavir.

UNIT – IV

Antifungal agents:

Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin.Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole,Oxiconazole Tioconozole, Miconazole*, Ketoconazole, Terconazole,Itraconazole, Fluconazole, Naftifinehydrochloride, Tolnaftate*. Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole,Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*,Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.Sulphonamides and SulfonesHistorical development, chemistry, classification and SAR of Sulfonamides:Sulphamethizole,Sulfisoxazole,

Sulphamethizine, Sulfacetamide*,Sulphapyridine, Sulfamethoxaole*,Sulphadiazine, Mefenide acetate, Sulfasalazine.Folate reductase inhibitors: Trimethoprim*,Cotrimoxazole.Sulfones: Dapsone*.

UNIT – V

Introduction to Drug DesignVarious approaches used in drug design.Physicochemical parameters used in quantitative structure activityrelationship (QSAR) such as partitioncoefficient, Hammet's electronicparameter, Tafts steric parameter and Hanschanalysis.Pharmacophoremodeling and docking techniques. Combinatorial Chemistry: Concept and applications

chemistry: solid phase and solution phase synthesis.of combinatorial

Course Outcome:

1. This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs.
2. The subject emphasis on modern techniques ofrational drug design like quantitative structure activity relationship (QSAR),
3. To understand the Prodrugconcept, combinatorial chemistry and Computer aided drug design (CADD).
4. To understand the emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR),
5. To understand the therapeutic uses and synthesis of importantdrugs.

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	4	2	3	2	3	2	5	1	2	1	2	1
CO2	4	2	3	2	3	2	5	1	2	1	2	1
CO3	4	2	3	2	3	2	4	1	2	1	2	1
CO4	4	2	3	2	3	2	4	1	2	1	2	1
CO5	4	2	3	2	3	2	5	1	2	1	2	1

Course Code	Course Title	No of Hours Per week	No of Credits
BP602T.	PHARMACOLOGY-III- Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives:

Upon completion of this course the student should be able to:

1. understand the mechanism of drug action and its relevance in the treatment ofdifferent infectious diseases
2. comprehend the principles of toxicology and treatment of various poisoningsand
3. appreciate correlation of pharmacology with related medical sciences.

Course Content:

UNIT-I

1. Pharmacology of drugs acting on Respiratory system

a. Anti -asthmatic drugs

b. Drugs used in the management of COPD

c. Expectorants and antitussives

d. Nasal decongestants

e. Respiratory stimulants

2. Pharmacology of drugs acting on the Gastrointestinal Tract

a. Antiulcer agents.

b. Drugs for constipation and diarrhoea. c. Appetite stimulants and suppressants.

d. Digestants and carminatives.

e. Emetics and anti-emetics.

UNIT-II

3. Chemotherapy

a. General principles of chemotherapy. b. Sulfonamides and cotrimoxazole.

c. Antibiotics- Penicillins, cephalosporins, chloramphenicol, macrolides,quinolones and fluoroquinolins, tetracycline and aminoglycosides

UNIT-III

3. Chemotherapy

a. Antitubercular agents

b. Antileprotic agents

c. Antifungal agents

d. Antiviral drugs

e.Anthelmintics

f. Antimalarial drugs

g. Antiamoebic agents

UNIT-IV

Chemotherapy

l. Urinary tract infections and sexually transmitted diseases.

Chemotherapy of malignancy.

4. Immunopharmacology

a. Immunostimulants

b. Immunosuppressant

Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars

UNIT-V

5. Principles of toxicology

a. Definition and basic knowledge of acute, subacute and chronic toxicity.

b. Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicityand mutagenicity

c. General principles of treatment of poisoning

d. Clinical symptoms and management of barbiturates, morphine, organophosphosphoruscompound and lead, mercury and arsenic poisoning.

6. Chronopharmacology

a. Definition of rhythm and cycles.

b. biological clock and their significance leading to chronotherapy.

Course Outcome:

1. To understand the basic pharmacology of various drugs impart the fundamental knowledge on various aspects
2. To understand (classification, mechanism of action, therapeutic effects, clinical uses, side effects

3. To understand contraindications) of drugs acting on respiratory and gastrointestinal system, infectious
4. To understand diseases, immuno-pharmacology and in addition,
5. To understand emphasis on the principles of toxicology and chrono pharmacology.

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	5	4	2	4	5	5	1	2	1	2	2	1
CO2	5	4	3	4	5	5	1	2	1	2	2	1
CO3	5	4	4	4	5	5	1	2	1	2	2	1
CO4	4	4	3	4	5	5	1	2	1	2	2	1
CO5	5	4	3	3	5	5	1	2	1	2	2	1

Course Code	Course Title	No of Hours Per week	No of Credits
BP603T.	HERBAL DRUG TECHNOLOGY-Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives:

Upon completion of this course the student should be able to:

1. understand raw material as source of herbal drugs from cultivation to herbal drugproduct
2. know the WHO and ICH guidelines for evaluation of herbal drugs
3. know the herbal cosmetics, natural sweeteners, nutraceuticals
4. appreciate patenting of herbal drugs, GMP.

Course content:

UNIT-I

Herbs as raw materials

Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparationSource of HerbsSelection, identification and authentication of herbal materialsProcessing of herbal raw materialBiodynamic AgricultureGood agricultural practices in cultivation of medicinal plants including Organic farming.

Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides. Indian Systems of Medicine

a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy

b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika,Churna, Lehya and Bhasma.

UNIT-II

Nutraceuticals

General aspects, Market, growth, scope and types of products available in the market. Healthbenefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritablebowel syndrome and various Gastro intestinal diseases. Study of following herbs as

health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, SpirulinaHerbal-Drug and Herb-Food Interactions: General introduction to interaction and

classification.

Study of following drugs and their possible side effects and interactions:Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

UNIT-III

Herbal Cosmetics

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gumscolours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin

care, hair care and oral hygiene products.

Herbal excipients:

Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors& perfumes. Herbal formulations:

Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage formslike phytosomes

UNIT- IV

Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugsStability testing of herbal drugs. Patenting and Regulatory requirements of natural products:

a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy

b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

UNIT-V

General Introduction to Herbal Industry

Herbal drugs industry: Present scope and future prospects. A brief account of plant-basedindustries and institutions involved in work on medicinal andaromatic plants in India. Schedule T – Good Manufacturing Practice of Indian systems of medicineComponents of GMP (Schedule – T) and its objectivesInfrastructural requirements, working space, storage

area, machinery and equipment,standard operating procedures, health and hygiene, documentation and records.

Course Outcome:

1. To basic understanding of herbal drugindustry,
2. To understanding the quality of raw material, guidelines for quality of herbal drugs,
3. To understanding herbal cosmetics,natural sweeteners, nutraceutical etc.
4. To understanding the subject also emphasizes on Good ManufacturingPractices (GMP),
5. To understanding patenting and regulatory issues of herbal drugs

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	5	4	2	4	5	5	1	2	1	2	2	1
CO2	5	4	3	4	5	5	1	2	1	2	2	1
CO3	5	4	4	4	5	5	1	2	1	2	2	1
CO4	4	4	3	4	5	5	1	2	1	2	2	1
CO5	5	4	3	3	5	5	1	2	1	2	2	1

Course Code	Course Title	No of Hours Per week	No of Credits
BP604T.	BIOPHARMACEUTICS AND PHARMACOKINETICS- Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives:

Upon completion of the course student shall be ableto:

1. Understand the basic concepts in biopharmaceutics and pharmacokinetics andtheir significance.
2. Use of plasma drug concentration-time data to calculate the pharmacokineticparameters to describe the kinetics of drug absorption, distribution,metabolism, excretion, elimination.
3. To understand the concepts of bioavailability and bioequivalence of drugproducts and their significance.
4. Understand various pharmacokinetic parameters, their significance &applications.

Course Content:

UNIT-I

Introduction

BiopharmaceuticstoAbsorption; Mechanisms of drug absorption through GIT, factors influencing drugabsorption though GIT, absorption of drug from Non per oral extra-vascularroutes, Distribution Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, plasma and tissue protein binding of drugs, factors affectingprotein-drug binding. Kinetics of protein binding, Clinical significance of proteinbinding of drugs

UNIT- II

Elimination: Drug metabolism and basic understanding metabolic pathways renalexcretion of drugs, factors affecting renal excretion of drugs, renal clearance, non-renalroutes of drug excretion of drugs

Bioavailability and Bioequivalence: Definition and Objectives of bioavailability, absolute and relative bioavailability, measurement of bioavailability, in-vitro drugdissolution models, in-vitro-in-vivo correlations, bioequivalence studies, methods toenhance the dissolution rates and bioavailability of poorly soluble drugs.

UNIT- III

Pharmacokinetics: Definition and introduction to Pharmacokinetics, Compartmentmodels, non-compartment models, physiological models, One compartment openmodel.

(a). Intravenous Injection (Bolus)

(b). Intravenous infusion and

(c) Extravascular administrations. Pharmacokinetics parameters - KE, t1/2, Vd, AUC,Ka, Clt andCLR- definitions methods of eliminations, understanding of their significance and application

UNIT- IV

Multicompartment models: Two compartment open model. IV bolusKinetics of multiple dosing, steady state drug levels, calculation of loading andmaintenance doses and their significance in clinical settins.

UNIT- V

Nonlinear Pharmacokinetics:

a. Introduction,

b. Factors causing non-linearity.

c. Michaelis-menton method of estimating parameters, Explanation with example ofdrugs.

Recommended Books: (Latest Editions)

1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi.

2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari

3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition,Prentice-Hall Inernationaledition.USA

4. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B.Jaiswal,VallabhPrakashan Pitampura, Delhi

5. Pharmacokinetics: By Milo Glbaldi Donald, R. Mercel Dekker Inc. 6. Hand Book ofClinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott byADIS Health Science Press.
7. Biopharmaceutics; By Swarbrick
8. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and
9. Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
10. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack,Publishing Company,Pennsylvania 1989.
11. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Rebort F Notari Marcel Dekker Inn, New York and Basel, 1987.
12. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvnia

Course Outcome:

1. To understand of basic knowledge and skills of Biopharmaceutics
2. To understand the basic process of drug in body
3. To understand pharmacokinetics models to understand ADME Studies
4. To understand compartmental models to drug Pharmacokinetics their applications
5. To understand the pharmaceutical dosage form as per in pharmaceutical development

CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	5	4	4	3	5	5	5	3	3	3	3	4
CO2	5	4	4	3	5	4	5	3	3	3	3	4
CO3	5	4	3	4	4	4	5	3	4	3	3	4
CO4	5	4	4	5	4	4	5	3	5	3	3	4
CO5	5	4	4	4	4	4	5	3	4	3	3	4

Course Code	Course Title	No of Hours Per week	No of Credits
BP605T.	PHARMACEUTICAL BIOTECHNOLOGY - Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives:

Upon completion of the subject student shall be able to;

1. Understanding the importance of Immobilized enzymes in PharmaceuticalIndustries
2. Genetic engineering applications in relation to production of pharmaceuticals
3. Importance of Monoclonal antibodies in Industries
4. Appreciate the use of microorganisms in fermentation technology

Course Content

Unit I

a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences.

b) Enzyme Biotechnology- Methods of enzyme immobilization and applications.

c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries.

d) Brief introduction to Protein Engineering. e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase. f) Basic principles of genetic engineering.

Unit II

a) Study of cloning vectors, restriction endonucleases and DNA ligase.

b) Recombinant DNA technology. Application of genetic engineering in medicine.

c) Application of r DNA technology and genetic engineering in the production of:

i) Interferon ii) Vaccines- hepatitis- B iii) Hormones-Insulin.

d) Brief introduction to PCR

Unit III

Types of immunity- humoral immunity, cellular immunity

a) Structure of Immunoglobulins

b) Structure and Function of MHC

c) Hypersensitivity reactions, Immune stimulation and Immune suppressions.

d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity. e) Storage conditions and stability of official vaccines

f) Hybridoma technology- Production, Purification and Applications

g) Blood products and Plasma Substituties.

Unit IV

a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting.

b) Genetic organization of Eukaryotes and Prokaryotes

c) Microbial genetics including transformation, transduction, conjugation, plasmids andtransposons.

d) Introduction to Microbial biotransformation and applications.

e) Mutation: Types of mutation/mutants.

Unit V

a) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring.

b) large scale production fermenter design and its various controls.

c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin,

d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substituties.

Recommended Books (Latest edition):

1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applicationsof RecombinantDNA: ASM Press Washington D.C.

2. RA Goldshy et. al., :Kuby Immunology.

3. J.W. Goding: Monoclonal Antibodies.

4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by RoyalSociety of Chemistry. 5. Zaborsky: Immobilized Enzymes, CRC Press, Degraland, Ohio.

6. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell ScientificPublication.

7. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi

Course Outcome:

1. To understand the Biotechnology has a long promise to revolutionize the biological sciences andtechnology.
2. To understand the Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting.
3. To understand the Biotechnology is leading to new biological revolutions in diagnosis, preventionand cure of diseases, new and cheaper pharmaceutical drugs.
4. To understand the Biotechnology has already produced transgenic crops and animals and
5. To understand the futurepromises lot more. It is basically a research-based subject.

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	4	3	2	3	2	3	3	2	3	2	2	3
CO2	4	3	3	3	2	3	3	2	3	2	2	3
CO3	4	3	4	3	2	3	3	2	3	2	2	3
CO4	4	3	3	3	2	3	3	2	3	2	2	3
CO5	4	3	3	3	2	3	3	2	3	2	2	3

Course Code	Course Title	No of Hours Per week	No of Credits
BP606T.	PHARMACEUTICAL QUALITY ASSURANCE- Theory	03+01 (Tutorial)	04
Sessional Marks: 25		End Semester Examination Marks: 75	

Objectives: Upon completion of the course student shall be able to:

1.understand the cGMP aspects in a pharmaceutical industry

2.appreciate the importance of documentation

3.understand the scope of quality certifications applicable to pharmaceuticalindustries

understand the responsibilities of QA & QC departments

Course content:

UNIT – I

Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMPTotal Quality Management (TQM): Definition, elements, philosophiesICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM,with special emphasis on Q-series guidelines, ICH stability testing guidelinesQuality by design (QbD): Definition, overview, elements of QbD program, toolsISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registrationNABL accreditation : Principles and procedures

UNIT - II

Organization and personnel: Personnel responsibilities, training, hygiene and personal records.

Premises: Design, construction and plant layout, maintenance, sanitation, environmentalcontrol, utilities and maintenance of sterile areas, control of

contamination.Equipments and raw materials: Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

UNIT – III

Quality Control: Quality control test for containers, rubber closures and secondary packingmaterials.Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities,Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of aNonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities

UNIT – IV

Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal.Document maintenance in pharmaceutical industry: Batch Formula Record, Master FormulaRecord, SOP, Quality audit, Quality Review and Quality documentation, Reports anddocuments, distribution records.

UNIT – V

Calibration and Validation: Introduction, definition and general principles of calibration,qualification and validation, importance and scope of validation, types of validation, validation

master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General

principles of Analytical method Validation.Warehousing: Good warehousing practice,materials management

Recommended Books: (Latest Edition)

1. Quality Assurance Guide by organization of Pharmaceutical Products of India.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69.
3. Quality Assurance of Pharmaceuticals- A compendium of Guide lines and Relatedmaterials Vol I WHO Publications.
4. A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh
5. How to Practice GMP's – P P Sharma. 6. ISO 9000 and Total Quality Management – Sadhank G Ghosh
7. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysisand Quality specification for Pharmaceutical Substances, Excipients and Dosageforms
8. Good laboratory Practices – Marcel Deckker Series

9. ICH guidelines, ISO 9000 and 14000 guidelines

Course Outcome:

1. To understand the various aspects of quality control
2. To understand the and qualityassurance aspects of pharmaceutical industries.
3. To understand the deals with the important aspects likes GMP, QC tests,
4. To understand the documentation, quality certifications
5. To understand the regulatory affairs.

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	4	3	2	3	2	3	3	2	3	2	2	3
CO2	4	3	3	3	2	3	3	2	3	2	2	3
CO3	4	3	4	3	2	3	3	2	3	2	2	3
CO4	4	3	3	3	2	3	3	2	3	2	2	3
CO5	4	3	3	3	2	3	3	2	3	2	2	3

Course Code	Course Title	No of Hours Per week	No of Credits
BP607P.	MEDICINAL CHEMISTRY- III- Practical	04	02
Sessional Marks: 15		End Semester Examination Marks: 35	

Objectives:

To understand to synthesis of selected molecules

To understand the binary and ternary mixture analysis to identification of compounds

Course content

I Preparation of drugs and intermediates

1 Sulphanilamide

2 7-Hydroxy, 4-methyl coumarin

3 Chlorobutanol

4 Triphenyl imidazole

5 Tolbutamide

6 Hexamine

II Assay of drugs

1 Isonicotinic acid hydrazide

2 Chloroquine

3 Metronidazole

4 Dapsone

5 Chlorpheniramine maleate

6 Benzyl penicillin

III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique

IV Drawing structures and reactions using chem draw®

V Determination of physicochemical properties such as logP, clogP, MR, Molecularweight, Hydrogen bond donors and acceptors for class of drugs course contentusing drug design software Drug likeliness screening (Lipinskies RO5)

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry. 2. Foye's Principles of Medicinal Chemistry. 3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences. 6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II. 8. The Organic Chemistry of Drug Synthesis byLednicer, Vol. 1-5.
9. Indian Pharmacopoeia. 10. Text book of practical organic chemistry- A.I.Vogel.

Course Outcome:

This course helps to how to separation and identification compound given unknown mixture.

It imparts take it knowledge on crude separation and identification technique

CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	4	4	5	3	5	2	1	4	5	4	3	3
CO2	4	3	5	3	5	2	1	4	5	4	3	3
CO3	4	3	4	3	5	2	1	4	5	4	3	3
CO4	4	4	3	3	5	2	1	4	5	4	3	3
CO5	4	3	4	3	5	2	1	4	5	4	3	3

Course Code	Course Title	No of Hours Per week	No of Credits
BP608 P.	PHARMACOLOGY-III-Practical	04	02
Sessional Marks: 15		End Semester Examination Marks: 35	

Objectives:

1.To understand the handling of different equipments used in experimental pharmacology.

2.To know about the preparation and purpose of different physiological salt solutions used in the experimental pharmacology.

3.Knowledge on miotics and mydriasis, locomotor movements.

4.All the simulation techniques has been demonstrated by using software as animal dissection has been banned for UG studies.

Course Content

1. Dose calculation in pharmacological experiments
2. Antiallergic activity by mast cell stabilization assay
3. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model.
4. Study of effect of drugs on gastrointestinal motility
5. Effect of agonist and antagonists on guinea pig ileum
6. Estimation of serum biochemical parameters by using semi- autoanalyser
7. Effect of saline purgative on frog intestine
8. Insulin hypoglycemic effect in rabbit
9. Test for pyrogens (rabbit method)
10. Determination of acute oral toxicity (LD50) of a drug from a given data
11. Determination of acute skin irritation / corrosion of a test substance
12. Determination of acute eye irritation / corrosion of a test substance
13. Calculation of pharmacokinetic parameters from a given data
14. Biostatistics methods in experimental pharmacology (student's t test, ANOVA)

15. Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)

*Experiments are demonstrated by simulated experiments/videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata McGraw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A.K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point LippincottWilliams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers MedicalPublishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisherModern Pharmacology with clinical Applications, by Charles R.Craig& Robert,
8. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata,
9. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,
10. N.Udupa and P.D. Gupta, Concepts in Chronopharmacology.

Course Outcome:

After successful completion of this course, students will be able to:

1. Handling of different instruments used in Experimental Pharmacology.
2. Know about the different routes of drug administration, blood withdrawal etc.,
3. Evaluate the different activities on animals.
4. Demonstration of different simulation methods.
5. They would have finally learnt to apply the knowledge of drugs practically using simulated pharmacological experiments

CO-PO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12

CO1	4	4	5	3	5	2	1	4	5	4	3	3
CO2	4	3	5	3	5	2	1	4	5	4	3	3
CO3	4	3	4	3	5	2	1	4	5	4	3	3
CO4	4	4	3	3	5	2	1	4	5	4	3	3
CO5	4	3	4	3	5	2	1	4	5	4	3	3

Course Code	Course Title	No of Hours Per week	No of Credits
BP609P.	HERBAL DRUG TECHNOLOGY--Practical	04	02
Sessional Marks: 15		End Semester Examination Marks: 35	

Objectives:

1.To perform preliminary phytochemical screening of crude drugs.

2.To prepare and standardized of extract in cosmetic formulations semisolid dosage form

3. To Determination of Aldehyde content, phenol content, total alkaloid

Course Content

1. To perform preliminary phytochemical screening of crude drugs.

2. Determination of the alcohol content of Asava and Arista

3. Evaluation of excipients of natural origin

4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.

5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements. 6. Monograph analysis of herbal drugs from recent Pharmacopoeias

7. Determination of Aldehyde content

8. Determination of Phenol content

9. Determination of total alkaloids

Recommended Books: (Latest Editions)

1. Textbook of Pharmacognosy by Trease& Evans.

2. Textbook of Pharmacognosy by Tyler, Brady & Robber.

3. Pharmacognosy by Kokate, Purohit and Gokhale

4. Essential of Pharmacognosy by Dr.S.H.Ansari

5. Pharmacognosy & Phytochemistry by V.D.Rangari

6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)

7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

Course Outcome:

1. To understand the of phytochemical screening of crude drugs
2. To understand thedetermination of herbal content
3. To understand the various types of Evaluation of excipients
4. To understand theAyurvedic Formulation
5. To understand the various Quality Control of Herbal Drugs

CO-PO Mapping

Course	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	4	4	5	3	5	2	1	4	5	4	3	3
CO2	4	3	5	3	5	2	1	4	5	4	3	3
CO3	4	3	4	3	5	2	1	4	5	4	3	3
CO4	4	4	3	3	5	2	1	4	5	4	3	3
CO5	4	3	4	3	5	2	1	4	5	4	3	3

SEMESTER VII

Course Code	Course Title	No of Hours Per week	No of Credits
BP701T	Instrumental Methods of Analysis (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25End Semester Examination Marks: 75			

Objectives:

1) Elaborate various principles, theory and instruments employed for the characterization and analysis of drugs.
2) Elaborate various principles, theory and instruments employed for the characterization and analysis of drugs.
3) Studying the basic concepts, types and principles of various volumetric methods.
4) Studying the basic concepts, principles of gravimetric method of analysis
5) Understanding basic concepts types and principles of various electrochemical methods of analysis.

Course Contents:

UNIT - I

UV Visible spectroscopy: Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations. Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode. Applications - Spectrophotometric titrations, Single component and multi component analysis Fluorimetry Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications

UNIT –II

IR spectroscopy: Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications

Flame Photometry-Principle, interferences, instrumentation and applications

Atomic absorption spectroscopy- Principle, interferences, instrumentation and applications

Nepheloturbidometry- Principle, instrumentation and applications

UNIT –III

Introduction to chromatography:

Adsorption and partition column chromatography-Methodology, advantages, disadvantages and applications.

Thin layer chromatography- Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications.

Paper chromatography-Introduction, methodology, development techniques, advantages, disadvantages and applications

Electrophoresis– Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications

UNIT –IV

Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications

High performance liquid chromatography (HPLC)-Introduction, theory, instrumentation, advantages and applications.

UNIT –V

Ion exchange chromatography- Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications

Gel chromatography- Introduction, theory, instrumentation and applications Affinity chromatography- Introduction, theory, instrumentation and applications

Text Books:

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors

4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

Course Outcomes:

After Completion of the course the student able to

1) To understand selected instrumental analytical techniques (spectroscopic and chromatographic methods) and differentiate with volumetric analysis.
2) To gain knowledge on interaction of EMR with matter and to build the analytical understanding at the level of atom, group and molecular structure of organic and inorganic compounds with different functional groups and their applications in pharmacy.
3) To maximize knowledge on characterization and estimation of ions by spectroscopical techniques
4) To simplify affinity of matter with stationary phase and mobile phase, physical and chemical. This subject is intended to impart students about the fundamental knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially, involved in the study of producing plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine.
5) To maximize knowledge on Ion exchange chromatography and Gel chromatography along with their pharmaceutical applications.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	3	2	2	2	2	3	2	2	2	3	3	3
CO2	3	2	2	2	2	2	2	2	2	3	3	3
CO3	3	2	2	2	2	3	2	2	2	3	3	3
CO4	3	2	2	2	2	2	2	2	2	3	3	3
CO5	3	2	2	2	2	2	2	2	2	3	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP702T	Industrial Pharmacy II (Theory)	03+ 01 (Tutorial)	04
Sessional Marks:25		**End Semester Examination Marks:75**	

Objectives:

1. The scheduled activities in a pharmaceutical firm.
2. The pre formulation studies of pilot batches of pharmaceutical industry.
3. The significance of dissolution and product stability
4. Manage the scale up process in pharmaceutical industry.
5. Assist in technology transfer.
6. To establish safety guidelines, which prevent industrial hazards

Course Content:

UNIT-I

Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology

UNIT-II

Technology development and transfer: WHO guidelines for Technology Transfer(TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipment, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoUs, legal issues

UNIT-III

Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals

Regulatory requirements for drug approval: Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

UNIT-IV

Quality management systems: Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP

UNIT-V

Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

Text Books:

(Latest Editions) 1. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http,//en.wikipedia.org/wiki/Regulatory_ Affairs.

2. International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php

3. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.

4. Regulatory Affairs brought by learning plus, inc. available at http.//www.cgmp.com/ra.htm.

Course Outcomes:

After successful completion of this course, students will be able to:

1. This course is designed to impart knowledge and skills necessary to train the students to be on par with the routine of Industrial activities in Production.
2. On completion of this course, it is expected that students will be able to understand various concepts of Technology development and transfer.
3. Handle the scheduled activities in a pharmaceutical firm. Manage the production of large batches of pharmaceutical formulations.
4. Understand the concepts and applicatyion Quality management systemsin pharmaceutical industry.
5. Understand the concepts of Indian Regulatory requirements and approval procedures for New Drugs and their application in pharmaceutical industry.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	3	2	2	2	3	3	3
CO2	3	3	3	3	3	3	2	2	2	3	3	3
CO3	3	3	2	2	2	2	2	2	2	3	3	3
CO4	3	3	3	3	3	3	2	2	2	3	3	3
CO5	3	3	2	2	2	2	2	2	2	3	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP703T	Pharmacy Practice (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks : 75**	

Objectives:

1. Know various drug distribution methods in a hospital
2. Appreciate the pharmacy stores management and inventory control
3. Monitor drug therapy of patient through medication chart review and clinical review
4. Obtain medication history interview and counsel the patients
5. Identify drug related problems

Course Content:

UNIT I:

a) Hospital and its organization- Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and medical staffs involved in the hospital and their functions.

b) Hospital pharmacy and its organization- Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists.

c) Adverse drug reaction Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting 149 drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management.

d) Community Pharmacy- Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

UNIT II:

a) Drug distribution system in a hospital Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, dispensing of drugs to ambulatory patients, and dispensing of controlled drugs.

b) Hospital formulary Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary.

c) Therapeutic drug monitoring Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.

d) Medication adherence Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence.

e) Patient medication history interview Need for the patient medication history interview, medication interview forms.

f) Community pharmacy management Financial, materials, staff, and infrastructure requirements.

UNIT III:

a) Pharmacy and therapeutic committee Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.

b) Drug information services Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information.

c) Patient counselling Definition of patient counselling; steps involved in patient counselling, and Special cases that require the pharmacist

d) Education and training program in the hospital Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education.

e) Prescribed medication order and communication skills Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.

UNIT IV

a) Budget preparation and implementation Budget preparation and implementation

b) Clinical Pharmacy Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and pharmaceutical care. Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern.

c) Over the counter (OTC) sales Introduction and sale of over the counter, and Rational use of common over the counter medications.

UNIT V

a) Drug store management and inventory control Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure

b) Investigational use of drugs Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.

c) Interpretation of Clinical Laboratory Tests Blood chemistry, haematology, and urinalysis

Text Books:

1. Merchant S.H. and Dr.J.S.Quadry. A textbook of hospital pharmacy, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.

2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. A textbook of Clinical Pharmacy Practice- essential concepts and skills, 1 st ed. Chennai: Orient Longman Private Limited; 2004.

3. William E. Hassan. Hospital pharmacy, 5th ed. Philadelphia: Lea &Febiger; 1986.

4. Tipnis Bajaj. Hospital Pharmacy, 1st ed. Maharashtra: Career Publications; 2008.

5. Scott LT. Basic skills in interpreting laboratory data, 4thed. American Society of Health System Pharmacists Inc; 2009.

6. Parmar N.S. Health Education and Community Pharmacy, 18th ed. India: CBS Publishers & Distributers; 2008.

Journals:

1. Therapeutic drug monitoring. ISSN: 0163-4356

2. Journal of pharmacy practice. ISSN : 0974-8326

3. American journal of health system pharmacy. ISSN: 1535-2900 (online)

4. Pharmacy times (Monthly magazine)

Course Outcomes:

1. Understand the elements of pharmaceutical care and provide comprehensive patient care services
2. Interpret the laboratory results to aid the clinical diagnosis of various disorders.
3. Provide integrated, critically analysed medicine and poison information to enable healthcare professionals in the efficient patient management.
4. Monitor drug therapy of patient through medication chart review and clinical review.
5. Obtain medication history interview and counsel the patients. Identify drug related problems

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	3	3	2	2	3	3	3
CO2	3	3	3	3	2	3	3	2	2	3	3	3
CO3	3	3	3	3	2	3	3	2	2	3	3	3
CO4	3	3	3	3	3	3	3	2	2	3	3	3
CO5	3	3	3	3	3	3	3	2	2	3	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP704T	Novel Drug Delivery System (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. The various approaches for development of novel drug delivery systems.
2. The criteria for selection of drugs and polymers for the development of NTDS
3. The formulation and evaluation of novel drug delivery systems
4. The need, concept, design and evaluation of various customized, sustained and controlled release dosage forms.
5. To formulate and evaluate various novel drug delivery systems

Course Contents:

UNIT-I

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design-controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations

Polymers: Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.

UNIT-II

Microencapsulation: Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications

Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems

Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implants and osmotic pump

UNIT-III

Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches

Gastro-retentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high density systems, inflatable and gastroadhesive systems and their applications **Naso-pulmonary drug delivery system**: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, and nebulizers

UNIT-IV

Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications

UNIT-V

Ocular Drug Delivery Systems: Introduction, intra ocular barriers and methods to overcome –Preliminary study, ocular formulations and ocuserts

Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

Text Books:

1. Y W. Chien, Novel Drug Delivery Systems, 2 nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.

2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.

3. Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim

4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).

5. S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, VallabhPrakashan, New Delhi, First edition 2002.

Journals

1. Indian Journal of Pharmaceutical Sciences (IPA)

2. Indian Drugs (IDMA)

3. Journal of Controlled Release (Elsevier Sciences)

4. Drug Development and Industrial Pharmacy (Marcel & Decker) 5. International Journal of Pharmaceutics (Elsevier Sciences)

Course Outcomes:

1. This subject is designed to impart basic knowledge on the area of novel drug delivery systems.
2. To understand various approaches for development of novel drug delivery systems and technologies.
3. To understand the criteria for selection of drugs and polymers for the development of Transdermal Drug Delivery Systems and Gastro-retentive drug delivery systems, their formulation and evaluation.
4. Understand the formulation and evaluation of targeted drug delivery systems using novel techniques.
5. To understand the need, concept, design and evaluation of various customized, sustained and controlled release dosage forms.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	3	2	2	2	3	3	2	2	3	2	3	2
CO2	3	2	2	2	3	3	2	2	3	2	3	2
CO3	3	2	2	2	3	3	2	2	3	2	3	2
CO4	3	2	2	2	3	3	2	2	3	2	3	2
CO5	3	2	2	2	3	3	2	2	3	2	3	2

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP705P	Instrumental Methods of Analysis (Practical)	04	02
Sessional Marks: 15		**End Semester Examination Marks: 35**	

Objectives:

To develop ability to work in pharmaceutical industries on modern analytical methods, instruments like

1. Analytical method development, Validation,
2. Analytical research
3. Achieving global standards.

Course Contents:

1 Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds

2 Estimation of dextrose by colorimetry

3 Estimation of sulphanilamide by colorimetry

4 Simultaneous estimations of ibuprofen and paracetamol by UV spectroscopy

5 Assay of paracetamol by UV- Spectrophotometry

6 Estimation of quinine sulfate by fluorimetry

7 Study of quenching of fluorescence

8 Determination of sodium by flame photometry

9 Determination of potassium by flame photometry

10 Determination of chlorides and sulphates by nepheloturbidometry

11 Separation of amino acids by paper chromatography

12 Separation of sugars by thin layer chromatography

13 Separation of plant pigments by column chromatography

14 Demonstration experiment on HPLC

15 Demonstration experiment on Gas Chromatography

Practical Books:

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

Course Outcomes:

1. Discusses the effect of impurities on the quality of drugs and behavioural pattern of drugs
2. Aids in understanding the SOP and usage of software associated with various analytical instruments
3. Helps in gaining knowledge of interpretation of spectra and of chromatograms.
4. Develop skill in analysing various pharmaceutical dosage forms.
5. Work on various analytical equipments and their application in pharmaceutical industry.

CO-PO Mapping:

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	3	2	2	3	2	3	2
CO2	3	2	2	2	3	3	2	2	3	2	3	2
CO3	3	2	2	2	3	3	2	2	3	2	3	2
CO4	3	2	2	2	3	3	2	2	3	2	3	2
CO5	3	2	2	2	3	3	2	2	3	2	3	2

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP706PS	Practice School	12	06
Sessional Marks: 25		**End Semester Examination Marks: 125**	

Objectives:

Every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice school declared by the program committee from time to time. At the end of the practice school, every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at college leveland grade point shall be awarded.

Course Outcomes:

After successful completion of this course students will be able to:

1. Work in team and undertake a project in the area of Pharmacy
2. Present, exhibit and document the project work • Develop a project report
3. Apply concepts of pharmaceutical sciences for executing the project
4. Apply appropriate research methodology while formulating a project
5. Define specifications, synthesize, analyse, develop and evaluate a project

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	3	2	3	2	3	2
CO2	3	3	3	2	3	3	3	2	3	2	3	2
CO3	3	3	3	2	3	3	3	2	3	2	3	2
CO4	3	3	3	2	3	3	3	2	3	2	3	2
CO5	3	3	3	2	3	3	3	2	3	2	3	2

3=High, 2=Medium, 1=Low.

SEMESTER VIII

Course Code	Course Title	No of Hours Per week	No of Credits
BP801T	Biostatistics and Research Methodology (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. Discuss the various steps involved in conducting research.
2. Defining between the different types of research and list the motivation in research.
3. Recall the basic criteria for a good research problem encountered by researchers in India.
4. Featuring of a good research design and recalling the principles of research design.

Course Contents:

UNIT-I

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion: Dispersion, Range, standard deviation, pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

UNIT-II

Regression: Curve fitting by the method of least squares, fitting the lines y= a + bx and x = a + by, Multiple regression, standard error of regression– Pharmaceutical Examples

Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test (Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

UNIT-III

Non- Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

UNIT-IV

Blocking and confounding system for Two-level factorials

Regression modelling: Hypothesis testing in Simple and Multiple regressionmodels

Introduction to Practical components of Industrial and Clinical Trials Problems: Statistical Analysis Using Excel, SPSS, MINITAB ®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach.

UNIT-V

Design and Analysis of experiments:

Factorial Design: Definition, Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Text Books (Latest edition):

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.

2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha

3. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,

4. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery

Course Outcomes:

1. Develop the ability to apply the methods while working on a research project work
2. Describe the appropriate statistical methods required for a particular research design
3. Choose the appropriate research design and develop appropriate research hypothesis for a research project
4. Develop a appropriate framework for research studies.
5. Design and implement the principles of research design.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	3	2	3	2	3	2
CO2	3	3	3	2	3	3	3	2	3	2	3	2
CO3	3	3	3	2	3	3	3	2	3	2	3	2
CO4	3	3	3	2	3	3	3	2	3	2	3	2
CO5	3	3	3	2	3	3	3	2	3	2	3	2

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP802T	Social and Preventive Pharmacy (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. The purpose of this course is to introduce to students a number of health issues and their challenges.
2. This course also introduced a number of national health programmes.
3. The roles of the pharmacist in these contexts are also discussed.

Course Contents:

UNIT I:

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health

Hygiene and health: personal hygiene and health care; avoidable habits.

UNIT II:

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse.

UNIT III:

National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

UNIT IV:

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

UNIT V:

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

TEXT BOOKS (LATEST EDITION):

1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2 nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications

2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy RabindraNath, SahaIndranil, 4 th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications

3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6 th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications

4. Essentials of Community Medicine—A Practical Approach, HiremathLalita D, HiremathDhananjaya A, 2 nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications

5. Park Textbook of Preventive and Social Medicine, K Park, 21 st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.

6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

Recommended **Journals:**

1. Research in Social and Administrative Pharmacy, Elsevier, Ireland

Course Outcomes:

1. After the successful completion of this course, the student shall be able to: Acquire high consciousness/ realization of current issues related to health and pharmaceutical problems within the country and worldwide.
2. Have a critical way of thinking based on current healthcare development.

3. Evaluate alternative ways of solving problems related to health and pharmaceutical issues.
4. The purpose of this course is to introduce the students a number of health issues and their challenges.
5. To introduce the students about the roles of a pharmacist in community services.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	2	3	3	3	2
CO2	3	3	3	3	3	3	3	2	3	3	3	2
CO3	3	3	3	3	3	3	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	2	3	3	3	2
CO5	3	3	3	3	3	3	3	2	3	3	3	2

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP803ET	Pharma Marketing Management (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. The course aims to provide an understanding of marketing concepts.
2. Technologies and their applications in the pharmaceutical industry

Course Contents:

UNIT I

Marketing: Definition, general concepts and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior.

Pharmaceutical market: Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation&targeting.Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist.Analyzing the Market role of market research.

UNIT II

Product decision: Classification, product line and product mix decisions, product life cycle,product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labelling decisions, Product management in pharmaceutical industry.

UNIT III

Promotion: Methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.

UNIT IV

Pharmaceutical marketing channels: Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.

Professional sales representative (PSR): Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.

UNIT V

Pricing: Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order)and NPPA (National Pharmaceutical Pricing Authority).

Emerging concepts in marketing: Vertical & Horizontal Marketing; RuralMarketing; Consumerism; Industrial Marketing; Global Marketing.

Text Books: (Latest Editions)

1. Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi

2. Walker, Boyd and Larreche: Marketing Strategy- Planning and Implementation, Tata MC GrawHill, New Delhi.

3. Dhruv Grewal and Michael Levy: Marketing, Tata MC Graw Hill

4. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India

5. RajanSaxena: Marketing Management; Tata MC Graw-Hill (India Edition)

6. Ramaswamy, U.S &Nanakamari, S: Marketing Managemnt:Global Perspective, IndianContext,Macmilan India, New Delhi.

7. Shanker, Ravi: Service Marketing, Excell Books, New Delhi

Course Outcomes:

1. Recognise the concepts, need and importance of management and application of the various principles of marketing management.
2. Understanding the concepts of product decision.
3. Evaluate and apply various approaches of promotion in marketing management.

4. Access various pharmaceutical management channels and their applications in the pharmaceutical industry
5. Evaluate and apply concepts of pricing and related regulatory agencies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	3	2	2	3	3	3
CO2	3	3	3	3	3	2	3	2	2	3	3	3
CO3	3	3	3	3	3	2	3	2	2	3	3	3
CO4	3	3	3	3	3	2	3	2	2	3	3	3
CO5	3	3	3	3	3	2	3	2	2	3	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP804ET	Pharmaceutical Regulatory Science (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. Explain the stages of drug discovery and discussing preclinical and non-clinical activities in new drug discovery.
2. Describe about clinical studies of drug discovery and importance of generic drugs
3. Concept of generic drugs development and explaining the procedure for the export of pharmaceutical products from India.
4. Discussing the regulatory requirements for drug registration in ASEAN countries.
5. Enlisting the basic requirements of ACTD (ASEAN common technical document) research

Course Contents:

UNIT I

New Drug Discovery and development Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

UNIT II

Regulatory Approval Process Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA). Changes to an approved NDA / ANDA.

Regulatory authorities and agencies Overview of regulatory authorities of India, United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

UNIT III

Registration of Indian drugproduct in overseas market Procedure for export of pharmaceutical products, technical documentation, Drug Master Files (DMF), Common

Technical Document (CTD), electronic Common Technical Document (eCTD), ASEAN Common Technical Document (ACTD)research.

UNIT IV

Clinical trials Developing clinical trial protocols, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials

UNIT V

Regulatory Concepts Basic terminology, guidance, guidelines, regulations, Laws and Acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book.

Text Books (Latest edition):

1. Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, NiraliPrakashan.
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences,Vol.Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences,Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.
5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus.
6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and IsaderKaufer, Marcel Dekker series, Vol.143
7. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
8. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene

Course Outcomes:

1. Explain the process of drug discovery, development and generic product development
2. Describe the regulatory approval process and registration procedures for API and drug products.

3. Basic understanding of regulations of India with other global regulated markets
4. Understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
5. Learn the basic understanding the importance of orange book, Federal Register, Code of Federal Regulatory, and purple book.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	3	3	2	2	3	3	3
CO2	3	3	3	2	2	3	3	2	2	3	3	3
CO3	3	3	3	2	2	3	3	2	2	3	3	3
CO4	3	3	3	2	2	3	3	2	2	3	3	3
CO5	3	3	3	2	2	3	3	2	2	3	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP805ET	Pharmacovigilance (Theory)	03+01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings.
2. To know the chemistry, manufacturing controls and their regulatory.
3. To know the approval process of documents filing process of IND, NDA.
4. Upon completion of the course, it is expected that the students will be able to The Concepts of innovator and generic drugs, drug development understand The Regulatory guidance's and guidelines for filing and approval process.

Course Contents:

UNIT I

Introduction to Pharmacovigilance

- History and development of Pharmacovigilance
- Importance of safety monitoring of Medicine
- WHO international drug monitoring programme
- Pharmacovigilance Program of India(PvPI)

Introduction to adverse drug reactions

- Definitions and classification of ADRs
- Detection and reporting
- Methods in Causality assessment
- Severity and seriousness assessment
- Predictability and preventability assessment
- Management of adverse drug reactions

Basic terminologies used in pharmacovigilance

- Terminologies of adverse medication related events
- Regulatory terminologies

UNIT II

Drug and disease classification

- Anatomical, therapeutic and chemical classification of drugs
- International classification of diseases
- Daily defined doses
- International Non proprietary Names for drugs

Drug dictionaries and coding in pharmacovigilance

- WHO adverse reaction terminologies
- MedDRA and Standardised MedDRA queries
- WHO drug dictionary
- Eudravigilance medicinal product dictionary

Information resources in pharmacovigilance

- Basic drug information resources
- Specialised resources for ADRs

Establishing pharmacovigilance programme

- Establishing in a hospital
- Establishment & operation of drug safety department in industry
- Contract Research Organisations (CROs)
- Establishing a national programme

UNIT III

Vaccine safety surveillance

- Vaccine Pharmacovigilance
- Vaccination failure
- Adverse events following immunization

Pharmacovigilance methods

- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study
- Targeted clinical investigations

Communication in pharmacovigilance

- Effective communication in Pharmacovigilance
- Communication in Drug Safety Crisis management
- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

UNIT IV

Safety data generation

- Pre clinical phase
- Clinical phase
- Post approval phase (PMS)

ICH Guidelines for Pharmacovigilance

- Organization and objectives of ICH
- Expedited reporting
- Individual case safety reports
- Periodic safety update reports
- Post approval expedited reporting
- Pharmacovigilance planning
- Good clinical practice in pharmacovigilance studies

UNIT V

Pharmacogenomics of adverse drug reactions

- Genetics related ADR with example focusing PK parameters.

Drug safety evaluation in special population

- Paediatrics
- Pregnancy and lactation
- Geriatrics

CIOMS

- CIOMS Working Groups
- CIOMS Form

CDSCO (India) and Pharmacovigilance

- D&C Act and Schedule Y
- Differences in Indian and global pharmacovigilance requirements

TEXT BOOKS (LATEST EDITION):

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.

2. Practical Drug Safety from A to Z by Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance: Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller, Wiley Publishers.
6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert, Jones& Bartlett Publishers.
7. Textbook of Pharmacoepidemiolog edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy, Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills:G.Parthasarathi, Karin NyfortHansen,Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by YashpalMunjal 11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna
11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna

Course Outcomes:

1. Explain the regulatory requirements for conducting clinical trial
2. Describe in detail about various types of clinical trial designs
3. Explain the responsibilities of key players involved in clinical trials
4. Describe the documentational requirements for Clinical trials
5. Explain Adverse drug reaction and its management

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	3	3	3	2	3	3	3
CO2	3	3	3	3	2	3	3	3	2	3	3	3
CO3	3	3	3	3	2	3	3	3	2	3	3	3
CO4	3	3	3	3	2	3	3	3	2	3	3	3
CO5	3	3	3	3	2	3	3	3	2	3	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP806ET	Quality Control and Standardization of Herbals (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. Explaining method of quality assurance of traditional system of medicine in herbal drug industries.
2. Explaining method of quality assurance of traditional system of medicine in herbal drug industries by following Good Laboratory
3. Good Agricultural Practices (GAP) guidelines in traditional system of medicine for quality assurance in herbal drug industries
4. WHO guidelines on Current Good Manufacturing Practices (cGMP) for herbal medicines
5. Good Agricultural and Collection Practices (GACP) for Medicinal Plants.

Course Contents:

UNIT I

Basic tests for drugs – Pharmaceutical substances, Medicinal plants materials and dosage forms WHO guidelines for quality control of herbal drugs. Evaluation of commercial crude drugs intended for use

UNIT II

Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine. WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines WHO Guidelines on GACP for Medicinal Plants.

UNIT III

EU and ICH guidelines for quality control of herbal drugs**.** Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

UNIT IV

Stability testing of herbal medicines. Application of various chromatographic techniques in standardization of herbal products. Preparation of documents for new drug application and export registration GMP requirements and Drugs & Cosmetics Act provisions.

UNIT V

Regulatory requirements for herbal medicines. WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems Comparison of various Herbal Pharmacopoeias. Role of chemical and biological markers in standardization of herbal products

Text Books: (Latest Editions)

1. Pharmacognosy by Trease and Evans

2. Pharmacognosy by Kokate, Purohit and Gokhale

3. Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I , Carrier Pub., 2006.

4. Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002.

5. EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,

6. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

7. Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-8.

8. WHO. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998. WHO. Guidelines for the Appropriate Use of Herbal Medicines.

WHO Regional Publications, Western Pacific Series No 3, WHO Regional office for the Western Pacific, Manila, 1998.

9. WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981.

10. WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.

11. WHO. WHO Global Atlas of Traditional, Complementary and Alternative Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005.

12. WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.

Course Outcomes:

1. Explain basic tests for drugs to obtain dosage form for pharmaceutical substances and medicinal plants
2. Explain methods for evaluation of pharmaceutical substances, medicinal plants and commercial crude drugs.
3. Describe guidelines for cGMP, GAP, GMP and GLP for quality assurance of herbal drugs in industry
4. Describe guidelines for quality control of herbal drugs and evaluation of safety and efficacy of herbal medicines.
5. Explain regulatory approval process and their registration in Indian and international markets.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	3	2	3	2	3	3	3
CO2	3	2	3	2	2	3	2	3	2	3	3	3
CO3	3	2	3	2	2	3	2	3	2	3	3	3

CO4	3	2	3	2	2	3	2	3	2	3	3	3
CO5	3	2	3	2	2	3	2	3	2	3	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP807ET	Computer Aided Drug Design (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. Discussing the various stages of drug discovery and lead discovery and its identification.
2. Validate the diversity of drug targets the various rational approaches to lead discovery.
3. Design the analogue synthesis using lead molecule.
4. Constructing the different algorithms in De novo drug design
5. Compare the various techniques in Virtual Screening and develop the protocols for Pharmacophore based screening.

Course Contents:

UNIT-I

Introduction to Drug Discovery and Development Stages of drug discovery and development

Lead discovery and Analog Based Drug Design Rational approaches to lead discovery based on traditional medicine, Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation.

Analog Based Drug Design: Bioisosterism, Classification, Bioisosteric replacement. Any three case studies

UNIT-II

Quantitative Structure Activity Relationship (QSAR) SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammet's substituent constant and Tafts steric constant. Hansch analysis, Free Wilson analysis, 3D-QSAR approaches like COMFA and COMSIA.

UNIT-III

Molecular Modelling and virtual screening techniques

Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore-based Screening,

Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. De novo drug design.

UNIT-IV

Informatics & Methods in drug design Introduction to Bioinformatics, cheminformatics. ADME databases, chemical, biochemical and pharmaceutical databases.

UNIT-V

Molecular Modeling: Introduction to molecular mechanics and quantum mechanics.Energy Minimization methods and Conformational Analysis, global conformational minima determination.

Text Books (Latest Editions)

1. Robert GCK, ed., "Drug Action at the Molecular Level" University Prak Press Baltimore.

2. Martin YC. “Quantitative Drug Design” Dekker, New York.

3. Delgado JN, Remers WA eds “Wilson &Gisvolds’s Text Book of Organic Medicinal & Pharmaceutical Chemistry” Lippincott, New York.

4. Foye WO “Principles of Medicinal chemistry ‘Lea &Febiger.

5. Koro lkovas A, Burckhalter JH. “Essentials of Medicinal Chemistry” Wiley Interscience.

6. Wolf ME, ed “The Basis of Medicinal Chemistry, Burger’s Medicinal Chemistry” John Wiley & Sons, New York.

7. Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press.

8. Smith HJ, Williams H, eds, “Introduction to the principles of Drug Design” Wright Boston.

9. Silverman R.B. “The organic Chemistry of Drug Design and Drug Action” Academic Press New York.

Course Outcomes:

1. Explain the various stages of drug discovery and learn the concept of bioisosterism.
2. Describe physicochemical Properties and the techniques involved in QSAR
3. Explain various structure-based drug design methods (Molecular docking, Denovo drug design)
4. Learn the concept of pharmacophore and modelling techniques
5. Explain the various techniques in Virtual Screening

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	2	3	2	3	3	3
CO2	3	2	2	2	3	2	2	3	2	3	3	3
CO3	3	2	2	2	3	2	2	3	2	3	3	3
CO4	3	2	2	2	3	2	2	3	2	3	3	3
CO5	3	2	2	2	3	2	2	3	2	3	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP808ET	Cell and Molecular Biology (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. It deals with understanding the molecular aspects of the biology.
2. It majorly emphasizes the concepts of central dogma of molecular biology spanning from DNA Replication till Protein Synthesis and Reverse transcription.
3. It also helps in understanding the concepts of cellular function

Course Content:

UNIT I

a) Cell and Molecular Biology: Definition's theory and basics and Applications.

b) Cell and Molecular Biology: History and Summation.

c) Properties of cells and cell membrane.

d) Prokaryotic versus Eukaryotic

e) Cellular Reproduction

f) Chemical Foundations – an Introduction and Reactions (Types)

UNIT II

a) DNA and the Flow of Molecular Information

b) DNA Functioning

c) DNA and RNA

d) Types of RNA

e) Transcription and Translation

UNIT III

a) Proteins: Defined and Amino Acids

b) Protein Structure

c) Regularities in Protein Pathways

d) Cellular Processes

e) Positive Control and significance of Protein Synthesis

UNIT IV

a) Science of Genetics

b) Transgenics and Genomic Analysis

c) Cell Cycle analysis

d) Mitosis and Meiosis

e) Cellular Activities and Checkpoints

UNIT V

a) Cell Signals: Introduction

b) Receptors for Cell Signals

c) Signaling Pathways: Overview

d) Misregulation of Signaling Pathways

e) Protein-Kinases: Functioning

Text Books (latest edition):

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.

2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.

3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.

4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.

5. Rose: Industrial Microbiology.

6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan

7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.

8. Peppler: Microbial Technology.

9. Edward: Fundamentals of Microbiology.

10. N.K.Jain: Pharmaceutical Microbiology, VallabhPrakashan, Delhi

11. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company

12. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C.

Course Outcomes:

1. It deals with understanding the molecular aspects of the biology.
2. It majorly emphasizes the concepts of central dogma of molecular biology spanning from DNA Replication till Protein Synthesis and Reverse transcription.
3. It also helps in understanding the concepts of cellular function
4. It deals with understanding the molecular aspects of the biology. It majorly emphasizes the concepts of central dogma of molecular biology spanning from DNA Replication till Protein Synthesis and Reverse transcription.
5. It also helps in understanding the concepts of cellular function.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	3	3	2	3	2	3	3
CO2	3	3	2	2	3	3	3	2	3	2	3	3
CO3	3	3	2	2	3	3	3	2	3	2	3	3
CO4	3	3	2	2	3	3	3	2	3	2	3	3
CO5	3	3	2	2	3	3	3	2	3	2	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP809ET	Cosmetic Science (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. cosmeceuticals (cosmetics with skin, hair and oral care benefits), Personal care and hygiene products.
2. Provide a multidisciplinary scientific knowledge to gain expertise in the field and to respond the industry challenges effectively.
3. Provide with knowledge on marketing approaches on studying consumer need, need gaps, managing competition and global markets.
4. Provide practical skills in the area of biology, formulation science and analytical techniques required to scientifically design and develop products.
5. Develop your potential to have a career in this fast-growing industry in the area of product development & research, regulatory.

Course Contents:

UNIT I

Classification of cosmetic and cosmeceutical products Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs

Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application

Skin: Basic structure and function of skin.

Hair: Basic structure of hair. Hair growth cycle.

Oral Cavity: Common problem associated with teeth and gums.

UNIT II

Principles of formulation and building blocks of skin care products: Face wash, Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages. Application of these products in formulation of cosmecuticals.

Antiperspants& deodorants- Actives & mechanism of action.

Principles of formulation and building blocks of Hair care products: Conditioning shampoo, Hair conditioner, anti-dandruff shampoo. Hair oils. Chemistry and formulation of Para-phylenediamine based hair dye. Principles of formulation and building blocks of oral care products: Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash.

UNIT III

Sun protection, Classification of Sunscreens and SPF. Role of herbs in cosmetics: Skin Care: Aloe and turmeric Hair care: Henna and amla. Oral care: Neem and clove

Analytical cosmetics: BIS specification and analytical methods for shampoo, skin- cream and toothpaste.

UNIT IV

Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps,andsyndet bars. Evolution and skin benfits.

UNIT V

Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis. Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor. Antiperspirants and Deodorants- Actives and mechanism of action

Text Books:

1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.

2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4 th Edition, Vandana Publications Pvt. Ltd., Delhi.

3) Text book of cosmelicology by Sanju Nanda &Roop K. Khar, Tata Publishers.

Course Outcomes:

1. Cosmetic Science is an interdisciplinary applied science program providing students with the opportunities to develop professional skills and fundamental concepts driving cosmetic science.

2. Cosmetic Science focuses on the needs of the cosmetic industry and its consumers, in addition to providing students with the critical and evaluative skills to become professional scientists.
3. Cosmetic Science covers a range of sciences, both pure and applied, formulation development and industry operations, all of which give you a broad range of career opportunities.
4. Provide with knowledge on marketing approaches on studying consumer need, need gaps, managing competition and global markets.
5. Provide practical skills in the area of biology, formulation science and analytical techniques required to scientifically design and develop products.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	3	3	3	2	3	2
CO2	3	3	3	2	3	2	3	3	3	2	3	2
CO3	3	3	3	2	3	2	3	3	3	2	3	2
CO4	3	3	3	2	3	2	3	3	3	2	3	2
CO5	3	3	3	2	3	2	3	3	3	2	3	2

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP810ET	Experimental Pharmacology (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. Understanding the in vivo and in vitro experiments, use of software for the study of preclinical experiments.
2. Understanding the PA2 and PD2 value of drugs using isolated tissue preparations.
3. Understanding the brief idea about statistics, its applications in experimental pharmacology.
4. Understanding to solve problems using various statistical tests

Course Contents:

UNIT –I

Laboratory Animals: Study of CPCSEA and OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals, Common lab animals: Description and applications of different species and strains of animals. Popular transgenic and mutant animals. Techniques for collection of blood and common routes of drug administration in laboratory animals, Techniques of blood collection and euthanasia.

UNIT –II

Preclinical screening models

a. Introduction: Dose selection, calculation and conversions, preparation of drug solution/suspensions, grouping of animals and importance of sham negative and positive control groups. Rationale for selection of animal species and sex for the study.

b. Study of screening animal models for Diuretics, nootropics, anti-Parkinson's,antiasthmatics, **Preclinical screening models:** for CNS activity- analgesic, antipyretic,anti-inflammatory, general anaesthetics, sedative and hypnotics, antipsychotic, antidepressant, antiepileptic, antiparkinsonism, alzheimer's disease

UNIT –III

Preclinical screening models: for ANS activity, sympathomimetics, sympatholytic, parasympathomimetic, parasympatholytic, skeletal muscle relaxants, drugs acting on eye, local anaesthetics.

UNIT –IV

Preclinical screening models: for CVS activity- antihypertensives, diuretics, antiarrhythmic, antidyslepidemic, anti-aggregatory, coagulants, and anticoagulants Preclinical screening models for other important drugs like antiulcer, antidiabetic, anticancer and antiasthmatics.

Research methodology and Bio-statistics Selection of research topic, review of literature, research hypothesis and study design Pre-clinical data analysis and interpretation using Students 't' test and One-way ANOVA. Graphical representation of data.

Text Books (latest edition):

1. Fundamentals of experimental Pharmacology-by M.N.Ghosh
2. Hand book of Experimental Pharmacology-S.K.Kulakarni
3. CPCSEA guidelines for laboratory animal facility.
4. Drug discovery and Evaluation by Vogel H.G.
5. Drug Screening Methods by Suresh Kumar Gupta and S. K. Gupta
6. Introduction to biostatistics and research methods by PSS Sundar Rao and J Richard

Course Outcomes:

1. Study of commonly used instruments in experimental pharmacology.
2. Introduction to CPCSEA guidelines and OECD guidelines.
3. Introduction to animal physiology with their biochemical reference values in various animal species.
4. Study of methods for collection of blood, body fluids and urine from experimental animals.
5. Record the effect of drug on Concentration Response Curves (CRC) using suitable isolated tissue preparations (Synergism and Antagonism).

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	3	3	3	2	3	2	2	3
CO2	3	3	2	3	3	3	3	2	3	2	2	3
CO3	3	3	2	3	3	3	3	2	3	2	2	3
CO4	3	3	2	3	3	3	3	2	3	2	2	3

CO5	3	3	2	3	3	3	3	2	3	2	2	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP811ET	Advanced Instrumentation Techniques (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. Know various sampling techniques employed in analysis of solid, semisolid and liquids dosage forms
2. Brief knowledge about electromagnetic spectrum and its interaction with matter.
3. Understand the principal, instrumentation and working of different instrumental analytical techniques available for quality control.
4. Study various qualitative and quantitative applications of atomic and molecular spectrophotometric methods.

Course Contents:

UNIT-I

Nuclear Magnetic Resonance Spectroscopy Principles of H-NMR and C-NMR, chemical shift, factors affecting chemical shift, coupling constant, Spin - spin coupling, relaxation, instrumentation and applications

Mass Spectrometry- Principles, Fragmentation, Ionization techniques – Electron impact, chemical ionization, MALDI, FAB, Analysers-Time of flight and Quadrupole, instrumentation, applications

UNIT-II

Thermal Methods of Analysis: Principles, instrumentation and applications of ThermogravimetricAnalysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC)

X-Ray Diffraction Methods: Origin of X-rays, basic aspects of crystals, Xray Crystallography, rotating crystal technique, single crystal diffraction,powder diffraction, structural elucidation and applications.

UNIT-III

Calibration and validation-as per ICH and USFDA guidelines

Calibration of following Instruments Electronic balance, UV-Visible spectrophotometer, IR spectrophotometer, Fluorimeter, Flame Photometer, HPLC and GC

UNIT-IV

Radio immune assay: Importance, various components, Principle, different methods, Limitation and Applications of Radio immunoassay

Extraction techniques: General principle and procedure involved in the solid phase extraction and liquid-liquid extraction

UNIT-V

Hyphenated techniques-LC-MS/MS, GC-MS/MS, HPTLC-MS.

Text Books (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

Course Outcomes:

1. Apply the analytical techniques to study bulk-drug pharmaceuticals, quality control.
2. Develop in-depth knowledge and critical awareness of the application of modern.
3. Know preparation and standardization of various concentrations of acids and bases.
4. Understand the basic concepts involved in electro-analytical techniques and its types.
5. Understand theory, principle, types and techniques of coulometric titration

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	2	3	2	2	3
CO2	3	3	3	3	3	3	3	2	3	2	2	3
CO3	3	3	3	3	3	3	3	2	3	2	2	3
CO4	3	3	3	3	3	3	3	2	3	2	2	3

CO5	3	3	3	3	3	3	3	2	3	2	2	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP812ET	Dietary Supplements and Nutraceuticals (Theory)	03+ 01 (Tutorial)	04
Sessional Marks: 25		**End Semester Examination Marks: 75**	

Objectives:

1. Know the regulatory Requirements for nutraceuticals
2. Understand the regulation for registration and labelling of nutraceuticals and food supplements in India, USA and Europe.

Course Contents:

UNIT I

a. Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Nutraceuticals, Health problems and diseases that can be prevented or cured by Nutraceuticals i.e. weight control, diabetes, cancer, heart disease, stress, osteoarthritis, hypertension etc.

b. Public health nutrition, maternal and child nutrition, nutrition and ageing, nutrition education in community.

c. Source, Name of marker compounds and their chemical nature, Medicinal uses and health benefits of following used as nutraceuticals/functional foods: Spirulina, Soyabean, Ginseng, Garlic, Broccoli, Gingko, Flaxseeds

UNIT II

Phytochemicals as nutraceuticals: Occurrence and characteristic features (chemical nature medicinal benefits) of following

a) Carotenoids- α and β-Carotene, Lycopene, Xanthophylls, leutin

b) Sulfides: Diallylsulfides, Allyl trisulfide.

c) Polyphenolics: Reservetrol

d) Flavonoids- Rutin ,Naringin, Quercitin, Anthocyanidins, catechins, Flavones

e) Prebiotics / Probiotics.: Fructo oligosaccharides, Lactobacillum

f) Phytoestrogens :Isoflavones, daidzein, Geebustin, lignans

g) Tocopherols

h) Proteins, vitamins, minerals, cereal, vegetables and beverages as functional foods: oats, wheat bran, rice bran, sea foods, coffee, tea and the like.

UNIT III

a) Introduction to free radicals: Free radicals, reactive oxygen species, production of free radicals in cells, damaging reactions of free radicals on lipids, proteins, Carbohydrates, nucleic acids.

b) Dietary fibres and complex carbohydrates as functional food ingredients.

UNIT IV

a) Free radicals in Diabetes mellitus, Inflammation, Ischemic reperfusion injury, Cancer, Atherosclerosis, Free radicals in brain metabolism and pathology, kidney damage, muscle damage. Free radicals involvement in other disorders. Free radicals theory of ageing.

b) Antioxidants: Endogenous antioxidants – enzymatic and nonenzymatic antioxidant defence, Superoxide dismutase, catalase, Glutathione peroxidase, Glutathione Vitamin C, Vitamin E, α- Lipoic acid, melatonin Synthetic antioxidants: Butylated hydroxy Toluene, Butylated hydroxy Anisole.

c) Functional foods for chronic disease prevention

UNIT V

a) Effect of processing, storage and interactions of various environmental factors on the potential of nutraceuticals.

b) Regulatory Aspects; FSSAI, FDA, FPO, MPO, AGMARK. HACCP and GMPs on Food Safety. Adulteration of foods.

c) Pharmacopeial Specifications for dietary supplements and nutraceuticals.

Text Books:

1. Dietetics by Sri Lakshmi

2. Role of dietary fibres and nutraceuticals in preventing diseases by K.TAgusti and P.Faizal: BSPunblication.

3. Advanced Nutritional Therapies by Cooper. K.A., (1996).

4. The Food Pharmacy by Jean Carper, Simon & Schuster, UK Ltd., (1988).

5. Prescription for Nutritional Healing by James F.Balch and Phyllis A.Balch 2 ndEdn., Avery Publishing Group, NY (1997).

6. G. Gibson and C.williams Editors 2000 Functional foods WoodheadPubl.Co.London.

7. Goldberg, I. Functional Foods. 1994. Chapman and Hall, New York.

8. Labuza, T.P. 2000 Functional Foods and Dietary Supplements: Safety, Good Manufacturing Practice (GMPs) and Shelf-Life Testing in Essentials of Functional Foods M.K. Sachmidl and T.P. Labuza eds. Aspen Press.
9. Handbook of Nutraceuticals and Functional Foods, Third Edition (Modern Nutrition)
10. Shils, ME, Olson, JA, Shike, M. 1994 Modern Nutrition in Health and Disease. Eighth edition. Lea and Febiger

Course Outcomes:

1. Know different Acts and guidelines that regulate Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals industry in India.
2. Understand the approval process and regulatory requirements.
3. Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food& Nutraceuticals.
4. Know various approaches in treating and preventing diseases.
5. Understand the regulation for registration and labelling of nutraceuticals and food supplements in India, USA and Europe.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	2	3	3	2	2	3	3
CO2	3	3	2	2	3	2	3	3	2	2	3	3
CO3	3	3	2	2	3	2	3	3	2	2	3	3
CO4	3	3	2	2	3	2	3	3	2	2	3	3
CO5	3	3	2	2	3	2	3	3	2	2	3	3

3=High, 2=Medium, 1=Low.

Course Code	Course Title	No of Hours Per week	No of Credits
BP813PW	Project Work	12	06
Sessional Marks: -		**End Semester Examination Marks: 150**	

Objectives:

1. Final Year Projects represent the culmination of study towards the Bachelor of Pharmaceutical sciences degree. Projects offer the opportunity to apply and extend material learned throughout the program. Assessment is by means of a seminar presentation, submission of a thesis, and a public demonstration of work undertaken.
2. In contrast to the majority of courses studied elsewhere in the program, projects are undertaken individually or in small groups.
3. This necessarily introduces the dimension of workload management into the program to enable completion of a large, relatively unstructured "assignment" over the course of the semester.

Course Outcomes:

After successful completion of this course students will be able to:

1. Work in team and undertake a project in the area of Pharmacy
2. Apply concepts of pharmaceutical sciences for executing the project
3. Apply appropriate research methodology while formulating a project
4. Define specifications, synthesize, analyse, develop and evaluate a project
5. Present, exhibit and document the project work • Develop a project report

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3

CO3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3

3=High, 2=Medium, 1=Low

SRI VENKATESWARA UNIVERSITY: TIRUPATI

SVU COLLEGE OF PHARMACEUTICAL SCIENCES

DEPARTMENT OF PHARMACY



Course

M. PHARMACY PHARMACOLOGY

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

M. PHARMACY PROGRAMME
Choice based credit system (CBCS) Pattern

(Pharmacology)

About the Department

The Pharmacy course was started in 2006 in the department of Biochemistry. The Pharmacy department was established in 2016, to promote advanced science and research in pharmaceutical sciences and to cater to the needs of the student community of A.P. in general and of the Rayalaseema region. The courses offered by the department are M.Pharmacy in 2006, B.Pharmacy in 2013 and PhD in 2015 and these are self supporting courses. Department has basic research facilities which include equipment like Centrifuges Spectrophotometers and required for carrying out research.

Vision

- To impart quality and value embedded education and research in Pharmaceutical Sciences.
- To create technologically superior and ethically strong global manpower, in the arena of drug innovation.
- Carving the youth as dynamic, competent, valued and knowledgeable Professionals in the field of Pharmacology.

Mission

- Transforming Students into Full-fledged Pharmacists and participate actively in the field of Pharmacy.
- Promoting Quality Research in Emerging Areas of Pharmaceutical Sciences.
- To instill scientific zeal and develop skilled human resource to meet contemporary challenges in Pharmacy Profession.
- To facilitate young adult learners with opportunities to hone their ethics and leadership potential.
- Imparting technical education that encourages Independent thinking, develops strong domain of knowledge, hones contemporary skills and Positive attitudes towards holistic growth of young minds.

- Evolving the Institution into a Center of Academic and Research Excellence in Pharmaceutical Education and lead the field of pharmaceutical sciences and pharmacy practice with the mission of strengthening the healthcare of the country.

Programme Specific Outcomes

At the end of successful completion of programme, a Post graduate will

- Have adequate knowledge and scientific information regarding basic principles of Pharmacology, and Pharmacognosy including herbal medicines.
- Be able to develop new dosage regimens including those of herbal origin as per standards of official books.
- Be able to perform experimental procedures as per laboratory standards in the area of Pharmacology.
- Be able to counsel the patients leading to physical and social well being and work as a team member of clinical trial.
- Be able to perform research on various medical aspects and implement the Pharmaceutical knowledge in formulating the best suitable dosage form to provide high quality medicines to the society.

Programme Objectives

- To uphold all laws, regulations, safety and ethical standards that apply to the experimental procedures in animals and the environment
- To impart adequate hands-on training in various animal models and determine the effects of drugs using animal models
- To provide practical inputs in pharmacokinetic studies of various drugs and formulations in animals to establish in-vitro and in-vivo correlations
- Acquire practical knowledge in various analytical techniques used in molecular biology
- To train students in using suitable statistical methods for interpretation of results
- To prepare the students in teamwork, lifelong learning and continuous improvement

Programme Outcomes

After the completion of the M.Pharm Pharmacology Programme the students will be able to,

- Produce Pharmacy graduates with strong basics and high technical knowledge to cater the various areas of Drug Development
- Develop an understanding for the need of pharmaceutical sciences and technology towards giving quality life to people in society through the quality of drugs.
- Apply the knowledge and skills gained through education to gain recognition in professional course and society.
- Act efficiently as a leader in the diverse areas of the profession to demonstrate the ability to plan and implement professional activities.
- Develop ability for in-depth information and critical thinking in order to identify, formulate and solve the issues related to Pharmaceutical Industry, Regulatory Agencies, Hospital Pharmacy & clinical Pharmacy for better services to the community.
- Identify the goals and regulations involved in the drug discovery and development, manufacture, distribution and sale of medicines and develop problem-based learning approach and analytical thinking in his/her academic and professional life.
- Update the knowledge through continuous learning to face the challenges for better services to the community.
- Design and develop process to perform experiments in various pharmaceutical areas like Pharmacognosy, Pharmaceutical Chemistry including Analytical Chemistry, Pharmaceutical Biotechnology, Pharmacology, Formulation and Development.
- Fill the gap with other health care communities to provide innovative solutions for the purpose of maintain public health.
- Develop team spirit for the development of student profession to the social needs and professional ethics.
- Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- Create a talent pool by involving students in research projects and to make students to undertake research projects under faculty guidance for publication.

Programme Specific Outcomes

At the end of successful completion of programme, a Post graduate will

- Have adequate knowledge and scientific information regarding basic principles of Pharmacology, and Pharmacognosy including herbal medicines.
- Be able to develop new dosage regimens including those of herbal origin as per standards of official books.
- Be able to perform experimental procedures as per laboratory standards in the area of Pharmacology.
- Be able to counsel the patients leading to physical and social well being and work as a team member of clinical trial.
- Be able to perform research on various medical aspects and implement the Pharmaceutical knowledge in formulating the best suitable dosage form to provide high quality medicines to the society.

STRUCTURE OF COURSESMASTER OF PHARMACY

TABLE –1: COURSE OF STUDY FOR M. PHARM - PHARMACOLOGY

I SEMESTER						
Course code	**Course**	**Credit hours**	**Credit points**	**Hrs/wk**	**Marks**	**Core/Elective**
MPL101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100	Core
MPL102T	Advanced Pharmacology-I	4	4	4	100	Core
MPL103T	Pharmacological andToxicological Screening Methods-I	4	4	4	100	Core
MPL104T	Cellular and Molecular Biology	4	4	4	100	Core
MPL105P	Pharmacology PracticalI	12	6	12	150	
	Seminar/Assignment	7	4	7	100	
Total		**35**	**26**	**35**	**650**	
II SEMESTER						
Course code	**Course**	**Credit Hours**	**Credit points**	**Hrs/wk**	**Marks**	**Core/Elective**
MPL201T	Advanced PharmacologyII	4	4	4	100	Core
MPL202T	Pharmacological andToxicological Screening Methods-II	4	4	4	100	Core
MPL204T	Clinical Research and Pharmacovigilance	4	4	4	100	Core
-	**Elective**	4	4	4	100	
MPL205P	Pharmacology Practical II	12	6	12	150	
	Seminar/Assignment	7	4	7	100	
Total		**35**	**26**	**35**	**650**	

ELECTIVES OFFERED						
Course code	**Course**	**Credit Hours**	**Credit points**	**Hrs/wk**	**Marks**	**Core/Elective**
MPH 203T	Computer Aided Drug Delivery System	4	4	4	**100**	Elective
MPC 203T	Computer Aided Drug Design	4	4	4	**100**	Elective
MPA 203T	Quality Control & Quality Assurance	4	4	4	**100**	Elective
MPH 204T	Cosmetic & Cosmeceuticals	4	4	4	**100**	Elective
MPL 203T	Principles of Drug Discovery	4	4	4	**100**	Elective

TABLE 2: COURSE OF STUDY FOR M. PHARM - PHARMACEUTICS

I SEMESTER						
Course code	**Course**	**Credit hours**	**Credit points**	**Hrs/wk**	**Marks**	**Core/Elective**
MPH101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100	Core
MPH102T	Drug Delivery System	4	4	4	100	Core
MPH103T	Modern Pharmaceutics	4	4	4	100	Core
MPH104T	Regulatory Affairs	4	4	4	100	Core
MPH105P	Pharmaceutics Practical I	12	6	12	150	
	Seminar/Assignment	7	4	7	100	
Total		**35**	**26**	**35**	**650**	
II SEMESTER						
Course code	**Course**	**Credit Hours**	**Credit points**	**Hrs/wk**	**Marks**	**Core/Elective**
MPH201T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	4	4	4	100	Core
MPH202T	Advance Bio Pharmaceutics and Pharmacokinetics	4	4	4	100	Core
MPH 204T	Cosmetic & Cosmeceuticals	4	4	4	100	Core
-	**Elective**	4	4	4	100	

MPH205P	Pharmaceutics Practical II	12	6	12	150	
	Seminar/Assignment	7	4	7	100	
Total		**35**	**26**	**35**	**650**	

ELECTIVES OFFERED

Course code	Course	Credit Hours	Credit points	Hrs/ wk	Marks	Core/Elective
MPH 203T	Computer Aided Drug Delivery System	4	4	4	**100**	Elective
MPC 203T	Computer Aided Drug Design	4	4	4	**100**	Elective
MPA 203T	Quality Control & Quality Assurance	4	4	4	**100**	Elective
MPL 204T	Clinical Research & Pharmacovigilance	4	4	4	**100**	Elective
MPL 203T	Principles of Drug Discovery	4	4	4	**100**	Elective

TABLE –3: COURSE OF STUDY FOR M. PHARM III SEMESTER (COMMONFOR ALL SPECIALIZATIONS)

Course code	Course	Credit Hours	Credit points	Marks
MRM 301T	Research Methodology and Biostatistics*	4	4	100
-	Journal club*	2	2	50
-	Research Proposal Presentation*	8	4	100
-	Viva Voce*	1	1	25
Total		15	11	275

*Non University Examination

TABLE – 4: COURSE OF STUDY FOR M. PHARM. IV SEMESTER (COMMONFOR ALL SPECIALIZATIONS)

Course code	Course	Credit Hours	Credit points	Marks
-	Thesis Evaluation	40	20	500
-	Research work and Colloquium	10	10	250
Total		50	30	750

FIRST SEMESTER

Course Code	Course Title	No of Hours Per week	No of Credits
MPA 101T	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	04	04
Sessional Marks: 15			Continuous mode:10
End Semester Examination Marks: 75			Totalmarks:100

OBJECTIVES:

After completion of course student is able to know about chemicals and excipients. The analysis of various drugs in single and combination dosage forms. Theoretical and practical skills of the instruments

COURSE CONTENT:

UNIT- I

UV-Visible spectroscopy: Theory, Laws, Instrumentation associated with UV- Visible spectroscopy, Choice of solvents and solvent effect and Applications of UVVisible spectroscopy, Difference/ Derivative spectroscopy.

a. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier -Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation.

b. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence (Characterestics of drugs that can be analysed by fluorimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer. c. Flame emission spectroscopy and atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

UNIT-II

1HNMR spectroscopy Principle, Instrumentation, Solvent requirement in 1HNMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Applications of 1HNMR spectroscopy. Brief outline of principles of 13C NMR.

Unit III

Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.

UNIT-IV

Chromatography: Principle, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: a. High Performance Thin Layer Chromatography. b. Gas chromatography c. High Performance Liquid chromatography d. Ultra-High Performance Liquid chromatography e. LC-MS f. Affinity chromatography

UNIT-V

a. Electrophoresis: Principle, Instrumentation, working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing. b. X ray Crystallography: Production of X rays, Different X ray methods, Bragg ‘s law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X- ray diffraction.

UNIT-VI

a. Immunoassays: Principles, procedures and types of RIA, ELISA b. Thermal techniques: Principle, instrumentation and pharmaceutical applications of DTA, DSC, TGA.

REFERENCES:

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A.Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers. 4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II,
4 th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol 11, Marcel. Dekker Series
8. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi.
9. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley & Sons, 1982

COURSE OUTCOMES:

1. Explain the importance of modern instrumentation in pharmaceutical analysis.Describe the fundamental principles and applications of spectroscopic techniques Viz., UV- Visible, IR,Students also able to demonstrate and use flame photometry, nepheloturbidometry
2. To determine the structural and functional group identification by using NMR-C13 and H1
3. Qualitative and quantitative identification of compound by Mass spectroscopy using different ionization technique
4. The chromatographic techniques for qualitative and quantitative analysis of pharmaceutical compounds.
5. The electrophoresis techniques and their applications in pharmaceutical industry.
6. Principle procedures involved in immunoassay and pharmaceutical applications: RIA, ELISA. DTA, DSC, TGA.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	1	3	2	1	2	1	2	3	1
CO2	3	1	2	3	2	2	1	2	3	3
CO3	1	1	2	1	3	1	2	3	1	3
CO4	3	2	3	2	1	2	3	3	1	1
CO5	3	2	3	2	1	2	3	2	1	3
CO6	2	1	2	3	1	2	3	1	2	1

Course Code	Course Title	No of Hours Per week	No of Credits
MPL 102T	ADVANCED PHARMACOLOGY-I	04	04
Sessional Marks: 15 End Semester Examination Marks: 75		Continuous mode:10 Totalmarks:100	

OBJECTIVES:

1. Upon completion of the course the students shall be able to:
2. Discuss the pathophysiology and pharmacotherapy of certain diseases
3. Explain the mechanism of drug actions at cellular and molecular level
4. Understand the adverse effects and contraindications
5. Understand clinical uses of drugs used in treatment of diseases

COURSE CONTENT:

UNIT- I

Neurotransmission

1. General aspects and steps involved in neurotransmission.
2. Neurohumoral transmissioninautonomicnervoussystem(Detailedstudy about neurotransmitters - Adrenaline and Acetyl choline).
3. Neurohumoral transmission in centralnervoussystem(Detailed study about neurotransmitter pathways - Serotonergic, dopaminergic, GABA, glutamate and glycine pathways).
4. Non adrenergic non cholinergic transmission (NANC). Cotransmission
5. Peptidenergic neurotransmission: Neuropeptides and Neuromodulators

UNIT-II

SystemicPharmacology

A detailed study on pathophysiology of diseases wherever applicable, mechanism of action, pharmacology and toxicology of existing as well as novel drugs used in the following systems

Autonomic Pharmacology

Parasympathomimetics and Parasympatholytics, Sympathomimetics and Sympatholytics

Unit III

CentralnervoussystemPharmacology

General and local anesthetics. Sedatives and hypnotics, drugs used to treat anxiety. Depression, psychosis, mania, epilepsy, neurodegenerative diseases. Narcotic and non-narcotic analgesics.

UNIT-IV

CardiovascularPharmacology

Diuretics, anti-hypertensives, anti-ischemics, anti- arrhythmics, drugs for heart failure and hyperlipidemia. Hematinics, coagulants , anticoagulants, fibrinolytics and antiplatelet drugs.

UNIT-V

Autocoid Pharmacology

The physiological and pathological role of Histamine, Serotonin, Kinins, Prostaglandins Opioid autocoids. Pharmacology of antihistamines, 5HT antagonist

REFERENCES:

1. The Pharmacological Basis of Therapeutics, Goodman and Gillman ‘s
2. Principles of Pharmacology. The Pathophysiologic basis of drug Therapy by David E Golan, Armen H, Tashjian Jr, Ehrin Armstrong, April W, Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers.
3. Basic and Clinical Pharmacology by B.G Katzung
4. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.
5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and AndrewB.C.Yu.
6. Graham Smith. Oxford textbook of Clinical Pharmacology.
7. Avery Drug Treatment
8. Dipiro Pharmacology, Pathophysiological approach.
9. Green Pathophysiology for Pharmacists. Robbins & Cortan Pathologic Basis of Disease,9th Ed. (Robbins Pathology
10. A Complete Textbook of Medical Pharmacology by Dr. S.K Srivastava published byAPC Avichal Publishing Compan
11. KD.Tripathi. Essentials of Medical Pharmacology.
12. Modern Pharmacology with Clinical Applications, Craig Charles R. & Stitzel Robert E.,Lippincott Publishers
13. Clinical Pharmacokinetics & Pharmacodynamics: Concepts and Applications – Malcolm Rowland and Thomas N.Tozer, Wolters Kluwer, Lippincott Williams & Wilkins Publishers
14. Applied biopharmaceutics and Pharmacokinetics, Pharmacodynamics andDrugmetabolismforindustrialscientists
15. Modern Pharmacology,Craig CR. &Stitzel RE, Little Brown Company

COURSE OUTCOMES:

1. Explain general pharmacological concepts such as pharmacodynamics and pharmacokinetics
2. Explain the general concept of Neurotransmission, neurotransmitters and drugs affecting it &Explain the Pharmacology of sympathetic and parasympathetic neurotransmitters including their agonist and antagonist
3. Explain the different Classes of drugs used in various CNS disorders like anxiety, depression, mania,psychosis, epilepsy, neurodegenerative diseases &Describe the Pharmacology of general and local anesthetics &Classify & Explain the Pharmacology of narcotic and non-narcotic analgesics
4. Explain the Pharmacology of cardiovascular drugs such as diuretics, anti-hypertensives, anti-ischemic, anti-hyperlipidemic, drugs used in CCF,hematinics, coagulants, anti-coagulants, fibrinolytics and antiplatelet drugs
5. Describe the physiological and pathological role of histamine,5-HT, Kinins,prostaglandins, opioid autacoids and Pharmacology of antihistamines and 5-HT antagonist.

CO-PO-MAPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	2	1	1	1	2	2	1	3	2
CO2	3	2	2	3	1	2	3	2	2	1	2	1
CO3	2	1	3	2	2	3	1	2	3	2	2	3
CO4	1	1	2	1	3	1	2	1	1	3	1	1
CO5	2	1	2	2	2	1	2	1	2	2	1	2

3- High, 2- Medium, 1- Low

Course Code	Course Title	No of Hours Per week	No of Credits
MPL 103T	Pharmacological And Toxicological Screening Methods-I	04	04
Sessional Marks: 15			Continuous mode:10
End Semester Examination Marks: 75			Totalmarks:100

OBJECTIVES:

1. Upon completion of the course the student shall be able to,
2. Appraise the regulations and ethical requirement for the usage of experimental animals.
3. Describe the various animals used in the drug discovery process and good laboratorypractices in maintenance and handling of experimental animals
4. Describe the various newer screening methods involved in the drug discovery process
5. Appreciate and correlate the preclinical data to humans

COURSE CONTENT:

UNIT- I

Laboratory Animals

Common laboratory animals: Description, handling and applications of different species and strains of animals.

Transgenic animals: Production, maintenance and applications. Anaesthesia and euthanasia of experimental animals.

Maintenance and breeding of laboratoryanimals.

CPCSEA guidelines to conduct experiments on animals.

UNIT-II

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.

General principles of preclinical screening.

CNS Pharmacology, CNS stimulants and depressants, anxiolytics, anti-psychotics and anti-epileptics

Drugs for neurodegenerative diseases like Parkinsonism and Alzheimers.

Drugs acting on Autonomic Nervous System.

Unit III

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.

Respiratory Pharmacology: anti-asthmatics and anti-allergics.

Reproductive Pharmacology: Aphrodisiacs and anti-fertility agents. Analgesics, anti-inflammatory and anti-pyretic agents.

Gastrointestinal drugs: anti-ulcer, anti -emetic, anti-diarrheal and laxatives.

UNIT-IV

PrePreclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.

Cardiovascular Pharmacology: anti-hypertensives, anti-arrythmics, anti-ischemics,anti- atherosclerotic agents and diuretics.

Drugs for metabolic disorders like anti-diabetic, anti-dyslipidemic agents. Anti-cancer agents.

Hepatoprotective screening methods

UNIT-V

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.

Immunomodulators, Immunosuppressants and immunostimulants Limitations of animal experimentation

Alternate animal experiments- In silico and in vitro approaches
Extrapolation of in vitro data to preclinical and preclinical to humans

REFERENCES:

1. Biological standardization by J.H. Burn D.J. Finney and I.G. Goodwin
2. Screening methods in Pharmacology by Robert Turner. A
3. Evaluation of drugs activities by Laurence and Bachrach
4. Methods in Pharmacology by Arnold Schwartz.
5. Fundamentals of experimental Pharmacology by M.N.Ghosh
6. Pharmacological experiment on intact preparations by Churchill Livingstone
7. Drug discovery and Evaluation by Vogel H.G.
8. Experimental Pharmacology by R.K.Goyal.
9. Preclinical evaluation of new drugs by S.K. Guta
10. Handbook of Experimental Pharmacology, SK.Kulkarni
11. Practical Pharmacology and Clinical Pharmacy, SK.Kulkarni, 3rd Edition.
12. David R.Gross. Animal Models in Cardiovascular Research, 2nd Edition, Kluwer Academic Publishers, London, UK.
13. Screening Methods in Pharmacology, Robert A.Turner.
14. Rodents for Pharmacological Experiments, Dr.Tapan Kumar chatterjee.
15. Practical Manual of Experimental and Clinical Pharmacology by Bikash Medhi (Author), Ajay Prakash (Author)

COURSE OUTCOMES:

1. Describe the regulations and ethical requirement for the usage of various species and strains of experimental animals and explain CPCSEA guidelines, GLP,
2. Classify Bioassay, Explain the principle, scope, limitations and methods of bioassay
3. Classify and explain various preclinical invitro ,invivo and other possible animal alternative models for the screening of following classes of drugs such as behavioral and muscle co ordination, CNS stimulants and depressants, anxiolytics, anti-psychotics, anti epileptics and nootropics.
4. Drugs for neurodegenerative diseases like Parkinsonism, Alzheimers and multiple sclerosis. Drugs acting on Autonomic Nervous System.
5. Classify and explain various preclinical invitro ,invivo and other possible animal alternative models for the screening of following classes of drugs such as Respiratory Pharmacology: anti-asthmatics, drugs for COPD and anti allergics. Reproductive Pharmacology: Aphrodisiacs and antifertility agents Analgesics, antiinflammatory agents

CO-PO-MAPING

course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	2	1	2	1	2	2	1	3	3
CO2	3	2	3	3	1	2	3	2	2	1	2	2
CO3	3	3	2	2	2	3	3	2	3	2	2	2
CO4	2	2	1	1	1	2	2	2	2	2	1	2
CO5	2	1	2	1	1	1	2	1	1	1	2	2

Course Code	Course Title	No of Hours Per week	No of Credits
MPL 104T	Cellular and Molecular Pharmacology	04	04
Sessional Marks: 15		Continuous mode:10	
End Semester Examination Marks: 75		Totalmarks:100	

OBJECTIVES:

1. Upon completion of the course, the student shall be able to,
2. Explain the receptor signal transduction processes.
3. Explain the molecular pathways affected by drugs.
4. Appreciate the applicability of molecular pharmacology and biomarkers in drugdiscovery process.
5. Demonstrate molecular biology techniques as applicable for pharmacology

COURSE CONTENT:

UNIT- I

Cell biology

Structure and functions of cell and its organelles. Introduction to Cell Biology
Protein Structure and Function. Membranes and Cell Architecture. MembraneTransport. Genes, Genomics and Chromosomes.Applications of siRNA and micro RNA, gene mapping and gene sequencing.

UNIT-II

Cell signaling

1. Intercellular and intracellular signaling pathways.
2. Classification of receptor family and molecular structure of ligand gated ion channels; G-proteincoupled receptors, tyrosine kinase receptors and nuclear receptors.
3. Secondary messengers: cyclic AMP, cyclic GMP, calcium ion, inositol 1,4,5-trisphosphate, (IP3), NO, and diacylglycerol.
4. Detailed study of following intracellular signaling pathways: cyclic AMP signaling pathway, mitogen-activated protein kinase (MAPK) signaling, Janus kinase (JAK)/signal transducer and activator of transcription (STAT) signaling pathway

Unit III

Molecular pharmacology

Pharmacology of sodium, calcium, potassium and chloride channels and their modulators. NMDA, GABA, Glycine, Serotonin, Dopamine, Histamine and Endothelin (ET) receptors,
their classification, signal transduction mechanism, agonists and antagonists.
Role of Cytokines, Prostaglandins, TNF-α, Bradykinins, Leucotrienes, PAF, Interferons and Adhesion molecules in Inflammation.

UNIT-IV

Cell Cycle

Introduction to the Cell Cycle, Phase and Regulation of Cell cycle and Cell Proliferation, Mitosis, Meiosis and Cytokinesis.
Cell death– events, regulators, intrinsic and extrinsic pathways of apoptosis.
Necrosis and autophagy

UNIT-V

CellculturetechniquesandBiosimilars

Basic equipment's used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization of cells and their application. Principles and applications of cell viability assays, glucose uptake assay, Calcium influx assays. Principles and applications of flow cytometry.

Biosimilars: Definitions, Generics and Branded drugs, biosimilars, introduction to biologics, differences between biosimilars and generics, manufacturing process and technical challenges associated with production of biosimilar molecules, current status of biosimilars.

REFERENCES:

1. Molecular Biology of The Cell - Bruce Alberts and et al. 5th ed. Garland Science.
2. Cell and Molecular Biology - E.D.P. De Robertis & E.M.F. De Robertis Jr. 8th ed. Wolter Publications.
3. Molecular Cell Biology - Harvey Lodish et al. 6th ed. W.H. Freeman & Company.
4. Molecular Biology and Biotechnology - John M Walker & Ralph Raple. 5th ed. RSC Publications.
5. A Concise Reference Advanced Molecular Biology - R.M. Twyman, Viva Books Pvt. Ltd.
6. Principles of Gene Manipulation and Genomics - S.B. Primrose & R.M. Twyman. 7th edn.
7. The Cell, A Molecular Approach - Geoffrey M Cooper.
8. Pharmacogenomics - J. Licinio & M.L. Wong
9. Handbook of Cell Signaling – A. Ralph et al. 2nd ed.
10. Molecular Pharmacology: From DNA to Drug Discovery - John Dickenson et al.
11. Basic Cell Culture Protocols - Cheril D Helgason & Cindy L Miller
12. Basic Cell Culture (Practical Approach) - J. M. Davis.
13. Animal Cell Culture: A Practical Approach - John R Masters.
14. Current Protocols in Molecular Biology - Frederick M. Ausuvel et al. Vol 1 to 6.

COURSE OUTCOMES:

1. Explain cellular structure and functions and cell regulation
2. Describe molecular and cellular cell signaling pathways & Describe in detail Principles and applications of genomic and proteomic tools
3. Principles ,applications and recent advances in gene therapy & Describe in detail Principles and applications of Pharmacogenomics
4. Explain the Principles and applications of proteomics science
5. Describe in detail Principles and applications of Immunotherapeutics& Describe Cell culture techniques and biosimilars

CO-PO MAPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1	1	2	1	1	2	1	1
CO2	3	3	3	2	1	1	2	1	1	1	2	1
CO3	3	3	3	3	1	1	1	1	1	1	2	1
CO4	2	2	3	2	2	1	1	1	2	1	1	1
CO5	2	1	3	1	1	1	1	1	2	1	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
MPL 104T	PharmacologicalPractical-I	04	04
Totalmarks:150			

COURSE CONTENT:

1. AnalysisofpharmacopoeialcompoundsandtheirformulationsbyUV Vis spectrophotometer
2. SimultaneousestimationofmulticomponentcontainingformulationsbyUV spectrophotometry
3. Experiments based on, PC, TLC & HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry.
7. Handling of laboratory animals.
8. Various routes of drug administration.
9. Techniques of blood sampling, anesthesia and euthanasia of experimental animals.
10. Functional observation battery tests (modified Irwin test)
11. Evaluation of CNS stimulant, depressant, anxiogenics and anxiolytic, anticonvulsant activity.
12. Evaluation of analgesic, anti-inflammatory, local anesthetic, mydriatic and miotic activity.
13. Evaluation of diuretic activity.
14. Evaluation of antiulcer activity by pylorus ligation method.
15. Oral glucose tolerance test.
16. Isolation and identification of DNA from various sources (Bacteria, Cauliflower, onion, Goat liver).
17. Isolation of RNA from yeast
18. Estimation of proteins by Braford/Lowry's in biological samples.
19. Estimation of RNA/DNA by UV Spectroscopy
20. Gene amplification by PCR.
21. Protein quantification Western Blotting.
22. Enzyme based in-vitro assays (MPO, AChEs, α amylase, α glucosidase).
23. Cell viability assays (MTT/Trypan blue/SRB).
24. DNA fragmentation assay by agarose gel electrophoresis.
25. DNA damage study by Comet assay.
26. Apoptosis determination by fluorescent imaging studies.
27. Pharmacokinetic studies and data analysis of drugs given by different routes of administration using softwares
28. Enzyme inhibition and induction activity
29. Extraction of drug from various biological samples and estimation of drugs in biological fluids using different analytical techniques (UV)
30. Extraction of drug from various biological samples and estimation of drugsin biological fluids using different analytical techniques (HPLC).

REFERENCES:

1. CPCSEA, OECD, ICH, USFDA, Schedule Y, EPA guidelines,
2. Fundamentals of experimental Pharmacology by M.N.Ghosh
3. Handbook of Experimental Pharmacology by S.K. Kulkarni.
4. Drug discovery and Evaluation by Vogel H.G.

5. Spectrometric Identification of Organic compounds - Robert M Silverstein,
6. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler,Timothy A. Nieman,
7. Vogel‘s Text book of quantitative chemical analysis - Jeffery, Bass Mendham, Denney,
8. Basic Cell Culture protocols by Cheril D. Helgason and Cindy L.Mille
9. Basic Cell Culture (Practical Approach) by J. M. Davis (Editor)
10. Animal Cell Culture: A Practical Approach by John R. Masters (Editor)
11. Practical Manual of Experimental and Clinical Pharmacology by Bikas Medhi(Author), Ajay Prakash (Author) Jaypee brothers’ medical publishers Pvt. Ltd

COURSE OUTCOMES:

1. The subject is designed to strengthen the basic knowledge in the field of pharmacology and to
2. impart recent advances in the drugs used for the treatment of variousdiseases.
3. In addition, this subject helps the students to understand the concepts of drug action an mechanisms involved Understand the adverse effects.
4. Contraindications and clinical uses of Explain the mechanism of drug actions at cellular and molecular level.
5. Discuss the pathophysiology and pharmacotherapy of certain diseases Objectives Upon completion of the course the student shall be able to : drugs used in treatment of diseases

CO-PO MAPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1	1	2	1	1	2	1	1
CO2	3	3	3	2	1	1	2	1	1	1	2	1
CO3	3	3	3	3	1	1	1	1	1	1	2	1
CO4	2	2	3	2	2	1	1	1	2	1	1	1
CO5	2	1	3	1	1	1	1	1	2	1	1	1

SECOND SEMESTER

Course Code	Course Title	No of Hours Per week	No of Credits
MPL201T	AdvancedPharmacology–II	04	04
Sessional Marks: 15 End Semester Examination Marks: 75		Continuous mode:10 Totalmarks:100	

OBJECTIVES:

1. Upon completion of the course the student shall be able to:
2. Explain the mechanism of drug actions at cellular and molecular level
3. Discuss the Pathophysiology and pharmacotherapy of certain diseases
4. Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases

COURSE CONTENT:

UNIT- I

Endocrine Pharmacology

Molecular and cellular mechanism of action of hormones such as growth hormone, prolactin, thyroid, insulin and sex hormones, Anti-thyroid drugs, Oral hypoglycemic agents, Oral contraceptives, Corticosteroids. Drugs affecting calcium regulation.

UNIT-II

Chemotherapy

1) Cellular and molecular mechanism of actions and resistance of antimicrobial agents such as ß-lactams, aminoglycosides, quinolones, Macrolide antibiotics. Antifungal, antiviral, and anti-TB drugs.
2) Drugs used in Protozoal InfectionsDrugs used in the treatment of HelminthiasisChemotherapyofcancer.

Unit III

Immunopharmacology :

Cellular and biochemical mediators of inflammation and immune response. Allergic or hypersensitivity reactions.

Pharmacotherapy of asthma and COPD.

Immunosuppressants and Immunostimulants

UNIT-IV

GIT Pharmacology

Antiulcer drugs, Prokinetics, anti-emetics, anti-diarrheals and drugs for constipation and irritable bowelsyndrome

UNIT-V

Pharmacology of Free radicals

Generation of free radicals, role of free radicals in etiopathology of various diseases such as diabetes, neurodegenerative diseases and cancer.
Protective activity of certain important antioxidants.
Recent Advances in antioxidant treatment of Alzheimer's disease, Parkinson's disease, Cancer, Diabetes mellitus

REFERENCES:

1) The Pharmacological basis of therapeutics- Goodman and Gill man's
2) Principles of Pharmacology. The Pathophysiologic basis of drug therapy by David E Golan et al.
3) Basic and Clinical Pharmacology by B.G -Katzung
4) Pharmacology by H.P. Rang and M.M. Dale.
5) Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.
6) Text book of Therapeutics, drug and disease management by E T. Herfindal and Gourley.
7) Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B.C.Yu.
8) Handbook of Essential Pharmacokinetics, Pharmacodynamics and Drug Metabolism for Industrial Scientists
9) Robbins & Cortan Pathologic Basis of Disease, 9th Ed. (Robbins Pathology)
10) A Complete Textbook of Medical Pharmacology by Dr. S.K Srivastava published by APC Avichal Publishing Company.
11) KD.Tripathi. Essentials of Medical Pharmacology
12) Principles of Pharmacology. The Pathophysiologic basis of drug Therapy by David E Golan, Armen H, Tashjian Jr, Ehrin J,Armstrong, April W, Armstrong, Wolters, Kluwer- Lippincott Williams & Wilkins Publishers

COURSE OUTCOMES:

1. The subject is designed to strengthen the basic knowledge in the field of pharmacology
2. Toimpart recent advances in the drugs used for the treatment of various diseases.
3. In addition, this subject helps the students to understand the concepts of drug action an mechanisms involved Understand the adverse effects.
4. Contraindications and clinical uses of Explain the mechanism of drug actions at cellular and molecular level.
5. Discuss the pathophysiology and pharmacotherapy of certain diseases Objectives Upon completion of the course the student shall be able to: drugs used in treatment of diseases

CO-PO MAPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	3	3	1	1	3	1	1	1	3
CO2	3	3	2	2	2	3	2	1	1	1	2	2
CO3	2	3	1	1	2	2	2	2	1	1	1	3
CO4	2	2	1	1	2	2	2	1	1	1	3	1
CO5	2	2	2	1	1	1	1	2	2	1	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
MPL202T	PharmacologicalAndToxicological ScreeningMethods-II	04	04
Sessional Marks: 15 End Semester Examination Marks: 75		Continuous mode:10 Totalmarks:100	

OBJECTIVES:

1) Upon completion of the course, the student shall be able to,
2) Explain the various types of toxicity studies.
3) Appreciate the importance of ethical and regulatory requirements for toxicity studies.
4) Demonstrate the practical skills required to conduct the preclinical toxicity studies.

COURSE CONTENT:

UNIT- I

Basic definition and types of toxicology (general, mechanistic, regulatory and descriptive)
Regulatory guidelines for conducting toxicity studies OECD, ICH and EPA. OECD principles of Good laboratory practice (GLP).
History, concept and its importance in drug development

UNIT-II

Acute, sub-acute and chronic- oral, dermal and inhalational studies as per OECD guidelines.
Acute eye irritation, skin sensitization, dermal irritation & dermal toxicity studies. Test item characterization- importance and methods in regulatory toxicology studies.

Unit III

Reproductive toxicology studies.
Male reproductive toxicity studies, female reproductive studies (segment I and segment III),Teratogenecity studies (segment II)
Genotoxicity studies (Ames Test, in vitro and in vivo Micronucleus and Chromosomal aberrations studies),In vivo carcinogenicity studies

UNIT-IV

IND enabling studies (IND studies)
Definition of IND, importance of IND, industry perspective, list of studies needed for INDsubmission.Safety pharmacology studies-origin,concepts and importance of safety pharmacology. HERG assay.

UNIT-V

Toxicokinetics

Toxicokinetic evaluation in preclinical studies, Importance and applications of toxicokinetic studies. Alternative methods to animal toxicity testing- US FDA, ECVAM, CAAT and OECD approved methods.

REFERENCES:

1) Hand book on GLP, Quality practices for regulated non-clinical research
2) and development (http://www.who.int/tdr/publications/documents/glphand book. pdf).
3) Schedule Y Guideline: drugs and cosmetics (second amendment) rules,2005, ministry of health and family welfare (department of health) New Delhi

4) Drugs from discovery to approval by Rick NG.
5) Animal Models in Toxicology, 3rd Edition, Lower and Bryan
6) OECD test guidelines.
7) Principles of toxicology by Karen E. Stine, Thomas M. Brown.
8) Guidance for Industry M3(R2) Nonclinical Safety Studies for the Conduct of Human ClinicalTrials and Marketing Authorization for Pharmaceuticals (http://www.fda.gov/downloads/drugs/guidancecomplianceregulatoryinformation/guidances/ucm073246.pdf)

COURSE OUTCOMES:

1) Explain the basics and the types of toxicology&Describe the regulatory guidelines for conducting toxicological studies
2) Explain various toxicity studies as per OECD guidelines
3) Describe special toxicity studies & Describe in detail about various methods employed in drugdiscovery and development
4) Explain the concept of Safety pharmacology studies
5) Explain the Importance and applications of toxicokinetics& Explain Alternative methods to animal toxicity testing.

CO-PO MAPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	1	2	1	3	2	1	1
CO2	3	2	2	2	2	1	2	1	2	1	1	2
CO3	3	1	3	1	2	1	2	1	2	1	1	1
CO4	2	1	2	2	2	2	1	2	1	2	1	2
CO5	2	1	1	3	2	3	1	1	1	1	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
MPL204T	ClinicalResearchAndPharmacovigilance	04	04
Sessional Marks: 15			**Continuous mode:10**
End Semester Examination Marks: 75			**Totalmarks:100**

COURSE OBJECTIVES

1. Upon completion of the course, the student shall be able to,
2. Explain the regulatory requirements for conducting clinical trial
3. Demonstrate the types of clinical trial designs
4. Explain the responsibilities of key players involved in clinical trials
5. Execute safety monitoring, reporting and close-out activities
6. Explain the principles of Pharmacovigilance
7. Detect new adverse drug reactions and their assessment
8. Perform the adverse drug reaction reporting systems and communication in Pharmacovigilance

COURSE CONTENT

1.Regulatory Perspectives of Clinical Trials:

Origin and Principles of International Conference on Harmonization - Good Clinical Practice(ICH-GCP) guidelines

Ethical Committee: Institutional Review Board, Ethical Guidelines for Biomedical Research and Human Participant- Schedule Y, ICMR

Informed Consent Process: Structure and content of an Informed Consent Process Ethical principles governing informed consent process.

2. Clinical Trials: Types and Design

Experimental Study- RCT and Non RCT

Observation Study: Cohort, Case Control, Cross sectional

Clinical Trial Study Team Roles and responsibilities of Clinical Trial Personnel: Investigator, Study Coordinator, Sponsor, Contract Research Organization and its management

3. Clinical Trial Documentation

Guidelines to the preparation of documents, Preparation of protocol, Investigator Brochure, Case Report Forms, Clinical Study Report Clinical Trial Monitoring-Safety Monitoring in CT Adverse Drug Reactions: Definition and types. Detection and reporting methods. Severity and seriousness assessment. Predictability and preventability assessment, Management of adverse drug reactions; Terminologies of ADR.

4. Basic aspects, terminologies and establishment of pharmacovigilance

History and progress of pharmacovigilance. Significance of safety monitoring. Pharmacovigilance in India and international aspects, WHO international drug monitoring programme, WHO and Regulatory terminologies of ADR, evaluation of medication safety, establishing pharmacovigilance centres in hospitals, industry and national programmes related to pharmacovigilance. Roles and responsibilities in pharmacovigilance.

5. Methods, ADR reporting and tools used in Pharmacovigilance

International classification of diseases, International Non-proprietary names for drugs, Passive and Active surveillance, Comparative observational studies, Targeted clinical investigations and Vaccine safety surveillance. Spontaneous reporting system and Reporting to regulatory authorities, Guidelines for ADRs reporting. Argus, Aris G Pharmacovigilance, VigiFlow,Statistical methods for evaluating medication safety data.

6.Pharmaco epidemiology.

Study methodology, measurement of treatments and outcomes, sources of bias and control ofconfounding, techniques to reduce bias and confounding.

REFERENCES

1. Central Drugs Standard Control Organization - Good Clinical Practices, Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health, 2001.
2. International Conference on Harmonization of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonized Tripartite Guideline. Guideline for Good Clinical Practice. E6; May 1996.
3. Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi.
4. Textbook of Clinical Trials - David Machin, Simon Day & Sylvan Green. John Wiley and Sons, March 2005.
5. Clinical Data Management – R.K. Rondels, S.A. Varley & C.F. Webbs. 2nd ed. Wiley Publications, Jan 2000.
6. Handbook of Clinical Research - Julia Lloyd & Ann Raven. Churchill Livingstone.
7. Principles of Clinical Research - Giovanna di Ignazio & Di Giovanna and Haynes.
8. Relevant Research and Review articles and guidelines

COURSE OUTCOMES

1. Explain the regulatory requirements for conducting clinical trial
2. Describe in detail about various types of clinical trial designs & Explain the responsibilities of key players involved in clinical trials
3. Describe the documentational requirements for Clinical trials
4. Explain Adverse drug reaction and its management &Describe basic concepts, and establishment of Pharmacovigilence
5. Explain ADR reporting, methods and tools used in Pharmacovigilence
6. Describe Pharmacoepidemiology, pharmacoeconomics and safety pharmacology

CO-PO MAPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	3	2	2	3	2	3	2	1
CO2	3	2	3	2	3	2	1	1	2	2	2	1
CO3	3	2	3	2	3	2	1	2	2	2	1	1
CO4	2	2	2	1	3	3	1	2	2	1	1	1
CO5	2	1	1	1	2	1	1	2	2	1	1	1
CO6	1	1	1	1	1	1	1	1	1	1	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
MPL205P	**PharmacologyPractical–II**	04	04
Totalmarks:150			

COURSE CONTENT

1. To record the DRC of agonist using suitable isolated tissues preparation.
2. To study the effects of antagonist/potentiating agents on DRC ofagonist using suitable isolated tissue preparation.
3. To determine to the strength of unknown sample by matching bioassay by using suitable tissue preparation.
4. To determine to the strength of unknown sample by interpolation bioassay by using suitable tissue preparation.
5. To determine to the strength of unknown sample by bracketing bioassay by using suitabletissue preparation.
6. To determine to the strength of unknown sample by multiple point bioassay by using suitable tissue preparation.
7. Estimation of PA2 values of various antagonists using suitable isolated tissue preparations.
8. To study the effects of various drugs on isolated heart preparations
9. Recording of rat BP, heart rate and ECG.
10. Recording of rat ECG
11. Drug absorption studies by averted rat ileum preparation.
12. Acute oral toxicity studies as per OECD guidelines.
13. Acute dermal toxicity studies as per OECD guidelines.
14. Repeated dose toxicity studies- Serum biochemical, haematological, urine analysis, functional observation tests and histological studies.
15. Drug mutagenicity study using mice bone-marrow chromosomal aberration test.
16. Protocol design for clinical trial.(3 Nos.)
17. Design of ADR monitoring protocol.
18. In-silico docking studies. (2 Nos.)
19. In-silico pharmacophore based screening.
20. In-silico QSAR studies.
21. ADR reporting

REFERENCES

1. Fundamentals of experimental Pharmacology-by M.N.Ghosh
2. Hand book of Experimental Pharmacology-S.K.Kulakarni
3. Text book of in-vitro practical Pharmacology by Ian Kitchen
4. Bioassay Techniques for Drug Development by Atta-ur-Rahman, Iqbal choudhary and William Thomsen
5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel andAndrewB.C.Yu.
6. Handbook of Essential Pharmacokinetics, Pharmacodynamics and Drug Metabolism
7. For Industrial Scientists

COURSE OUTCOMES:

1. This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development.
2. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines.
3. Basic knowledge of various in-vitro and in-vivo preclinical evaluation processes Appraise the regulations and ethical requirement for the usage of Objectives Upon completion of the course the student shall be able to, Describe the various animals used in the drug discovery process and experimental animals.

4. Good laboratory practices in maintenance and handling of experimental Describe the various newer screening methods involved in the drug animals
5. Appreciate and correlate the preclinical data to humans discovery process

CO-PO MAPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1	1	2	1	1	2	1	1
CO2	3	3	3	2	1	1	2	1	1	1	2	1
CO3	3	3	3	3	1	1	1	1	1	1	2	1
CO4	2	2	3	2	2	1	1	1	2	1	1	1
CO5	2	1	3	1	1	1	1	1	2	1	1	1

Course Code	Course Title	No of Hours Per week	No of Credits
MPA203T	QualityControlAndQualityAssurance	04	04
Sessional Marks: 15			**Continuous mode:10**
End Semester Examination Marks: 75			**Totalmarks:100**

COURSE OBJECTIVES

1. At the completion of this subject it is expected that the student shall be able to know
2. The cGMP aspects in a pharmaceutical industry
3. To appreciate the importance of documentation
4. To understand the scope of quality certifications applicable to Pharmaceutical industries
5. To understand the responsibilities of QA & QC departments

COURSE CONTENT

1. Concept and Evolution of Quality Control and Quality Assurance

Good Laboratory Practice, GMP, Overview of ICH Guidelines - QSEM, with special emphasis on Q-series guidelines.

Good Laboratory Practices: Scope of GLP, Definitions, Quality assurance unit, protocol for conduct of non-clinical testing, control on animal house, report preparation and documentation.

2. cGMP guidelines according to schedule M, USFDA (inclusive of CDER and CBER) Pharmaceutical Inspection Convention (PIC), WHO and EMEA covering: Organization and personnel responsibilities, training, hygiene and personal records, drug industry location, design, construction and plant lay out, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination and Good Warehousing Practice. CPCSEA guidelines.

3. Analysis of raw materials, finished products, packaging materials, in process quality control (IPQC), Developing specification (ICH Q6 and Q3)

Purchase specifications and maintenance of stores for raw materials. In process quality control and finished products quality control for following formulation in Pharma industry according to Indian, US and British pharmacopoeias: tablets, capsules, ointments, suppositories, creams, parenterals, ophthalmic and surgical products (How to refer pharmacopoeias), Quality control test for containers, closures and secondary packing materials.

4. Documentation in pharmaceutical industry: Three tier documentation, Policy, Procedures and Work instructions, and records (Formats), Basic principles- How to maintain, retention and retrieval etc. Standard operating procedures (How to write), Master Formula Record, Batch Formula Record, Quality audit plan and reports. Specification and test procedures, Protocols and reports. Distribution records. Electronic data

5.Manufacturing operations and controls: Sanitation of manufacturing premises, mix-ups and cross contamination, processing of intermediates and bulk products, packaging operations, IPQC, release of finished product, process deviations, charge-in of components, time limitations on production, drug product inspection, expiry date calculation, calculation of yields, production record review, change control, sterile products, aseptic process control, packaging.

REFERENCES

1. Quality Assurance Guide by organization of Pharmaceutical Procedures of India, 3rd revised edition, Volume I & II, Mumbai, 1996.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol.69, Marcel Dekker Series, 1995.
3. Quality Assurance of Pharmaceuticals- A compedium of Guide lines and Related materials Vol I & II, 2nd edition, WHO Publications, 1999.
4. How to Practice GMP's – P P Sharma, Vandana Publications, Agra, 1991.
5. The International Pharmacopoeia – vol I, II, III, IV & V - General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excepients and Dosage forms, 3rd edition, WHO, Geneva, 2005.
6. Good laboratory Practice Regulations – Allen F. Hirsch, Volume 38, Marcel Dekker Series, 1989.
7. ICH guidelines
8. ISO 9000 and total quality management

9. The drugs and cosmetics act 1940 – Deshpande, Nilesh Gandhi, 4th edition, SusmitPublishers, 2006.
10. QA Manual – D.H. Shah, 1st edition, Business Horizons, 2000.
11. Good Manufacturing Practices for Pharmaceuticals a plan for total quality control – Sidney H. Willig, Vol. 52, 3rd edition, Marcel Dekker Series.

COURSE OUTCOMES

1. Understand and differentiate quality control and quality assurance &Learn good laboratory practices for non clinical laboratory
2. Discuss GMP guidelines by various regulated countries &Learn pharmacopoeal guidelines about in process quality control testing
3. Appreciate the need of documentation in pharmaceutical industry &Overview of CTDs and their requirements in regulated markets
4. Learn the quality assurance aspects of manufacturing and process control
5. Discuss about intellectual property rights and their scope in pharmaceutical industry

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	3	2	2	3	2	3	2	2
CO2	3	2	2	2	3	2	1	1	1	2	2	1
CO3	3	3	3	2	2	1	1	2	1	1	1	1
CO4	2	2	2	1	3	3	1	2	2	1	1	1
CO5	2	1	1	1	2	1	1	2	2	1	1	1

THIRD SEMESTER

Course Code	Course Title	No of Hours Per week	No of Credits
MPL 301 T	**Research Methodology & Biostatistics**	04	04
Sessional Marks: 15			**Continuous mode:10**
End Semester Examination Marks: 75			**Totalmarks:100**

COURSE CONTENT

1.General Research Methodology: Research, objectives, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

2.Biostatistics: Definition, applications, sample size, importance of sample size, factors influencing sample size, drop outs, statistical tests of significance, Spearman correlation, regression analysis, null hypothesis, P values, degrees of freedom, interpretation of P values.

3.Parametric tests -students "t" test, ANOVA non-parametric tests - chi square test, Sign test, Signed rank test, wilcoxon rank-sum test.

4.Medical and Human Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, conflicts between autonomy and beneficence/non- maleficence, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.

5. CPCSEA guidelines for laboratory animal facility: Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anesthesia, euthanasia, physical facilities, environment, record keeping, SOPs, personnel and training, transport of lab

COURSE OUTCOMES

1. Learn general research methodology & Understand the basic concepts of biostatistics
2. Learn different parametric and non-parametric tests
3. Understand the functions of ethics committees in medical research
4. Learn the guidelines for developing animal facilities & Explain the guidelines and importance of medical research
5. Learn the guidelines for the experimentation on animalUnderstand the genesis of bioethics with special reference toHelsinkldeclaration

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	3	2	3	3	2	3	2	3
CO2	2	3	2	2	3	3	1	1	3	2	2	2
CO3	3	1	1	2	2	1	2	3	1	2	3	1
CO4	1	2	2	1	1	3	1	1	2	3	2	3
CO5	2	1	1	1	2	1	1	2	2	1	1	1

SRI VENKATESWARA UNIVERSITY: TIRUPATI

SVU COLLEGE OF PHARMACEUTICAL SCIENCES

DEPARTMENT OF PHARMACY

Course

M. PHARMACY PHARMACEUTICS

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

Amended as per NEP-2020

M. PHARMACY PROGRAMME
Choice based credit system (CBCS) Pattern

(Pharmaceutics)

About the Department

The Pharmacy course was started in 2006 in the department of Biochemistry. The Pharmacy department was established in 2016, to promote advanced science and research in pharmaceutical sciences and to cater to the needs of the student community of A.P. in general and of the Rayalaseema region. The courses offered by the department are M.Pharmacy in 2006, B.Pharmacy in 2013 and PhD in 2015 and these are self supporting courses. Department has basic research facilities which include equipment like Centrifuges Spectrophotometers and required for carrying out research.

Vision

- To impart quality and value embedded education and research in Pharmaceutical Sciences.
- To create technologically superior and ethically strong global manpower, in the arena of Pharmacy Profession.
- Carving the youth as dynamic, competent, valued and knowledgeable Professionals of Pharmacy field.

Mission

- Transforming Students into Full-fledged Pharmacists and participate actively in the field of Pharmacy.
- Promoting Quality Research in Emerging Areas of Pharmaceutical Sciences.
- To instill scientific zeal and develop skilled human resource to meet contemporary challenges in Pharmacy Profession.
- To facilitate young adult learners with opportunities to hone their ethics and leadership potential.
- Imparting technical education that encourages Independent thinking, develops strong domain of knowledge, hones contemporary skills and Positive attitudes towards holistic growth of young minds.
- Evolving the Institution into a Center of Academic and Research Excellence in Pharmaceutical Education and lead the field of pharmaceutical sciences and pharmacy practice with the mission of strengthening the healthcare of the country.

Programme Specific Outcomes

At the end of successful completion of programme, a Post graduate will

- Have adequate knowledge and scientific information regarding basic principles of Pharmaceutical & Medicinal Chemistry, Pharmaceutics including Cosmeticology.
- Be able to develop and assure the quality of various pharmaceutical dosage forms including those of herbal origin as per standards of official books, WHO and other regulatory agencies like USFDA, MHRA etc.
- Be able to apply the knowledge and skill gained from various subjects and the aptitude developed throughout the course of the program in performing a job either independently or as a member of a team in various fields of pharmacy profession.
- Be able to perform research on various medical aspects and implement the Pharmaceutical knowledge in formulating the best suitable dosage form to provide high quality medicines to the society.
- Render the services to the public by providing patient centric effective treatments to curb the therapeutic issues with the required medicines and explain the effects of the drugs by analyzing the scientific literature for improving their health and well-being.

Programme Objectives

- To uphold all laws, regulations, safety and ethical standards that apply to the experimental procedures of the pharmaceutical formulations
- To Provide a practical knowledge of the basic pharmaceutical sciences and the skill, acquire to deal with problems in pharmaceutical field
- To To update the knowledge through continuous learning to face the challenges for better services to the community.
- Acquire practical knowledge in various analytical techniques
- To prepare the students in teamwork, lifelong learning and continuous improvement

Programme Outcomes

After the completion of the M.Pharm Pharmaceutics programme the students will be able to,

- Produce Pharmacy graduates with strong basics and high technical knowledge to cater the various areas of Pharmaceutical industry.
- Develop an understanding for the need of pharmaceutical sciences and technology towards giving quality life to people in society through the quality of medicines.
- Apply the knowledge and skills gained through education to gain recognition in professional course and society.
- Impart knowledge and skills on criteria for selection of drugs, dose calculations, dose adjustments by applying biopharmaceutical theories, pharmacokinetic and bioequivalence models which gives technical skill knowledge in In-vitro and In-vivo studies using computer simulations.
- Act efficiently as a leader in the diverse areas of the profession to demonstrate the ability to plan and implement professional activities.
- Provide a practical knowledge of the basic pharmaceutical sciences and the skill, acquire to deal with problems in pharmaceutical field
- Develop ability for in-depth information and critical thinking in order to identify, formulate and solve the issues related to Pharmaceutical Industry, Regulatory Agencies, Hospital Pharmacy & clinical Pharmacy for better services to the community.
- Identify the goals and regulations involved in the drug discovery and development, manufacture, distribution and sale of medicines and develop problem-based learning approach and analytical thinking in his/her academic and professional life.
- To update the knowledge through continuous learning to face the challenges for better services to the community.
- Design and develop process to perform experiments in various pharmaceutical areas like Pharmacognosy, Pharmaceutical Chemistry including Analytical Chemistry, Pharmaceutical Biotechnology, Pharmacology, Formulation and Development.
- Fill the gap with other health care communities to provide innovative solutions for the purpose of maintain public health.
- Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

Programme Educational Objectives

- To provide students with a strong and well defined concepts in the¬ various fields of pharmaceutical sciences viz., Pharmaceutics, Pharmaceutical chemistry, Pharmacognosy, Pharmacology and Pharmacy Practice according to the requirement of pharmaceutical industries, community and hospital pharmacy.
- To develop a sense of teamwork and awareness amongst students¬ towards the importance of interdisciplinary approach for developing competence in solving complex problems in the area of Pharmaceutical Sciences.
- To encourage the students to participate in life-long learning¬ process for a highly productive career and to relate the concepts of Pharmaceutical Sciences towards serving the cause of the society

STRUCTURE OF COURSES
MASTER OF PHARMACY
TABLE –1: COURSE OF STUDY FOR M. PHARM

I SEMESTER						
Course code	**Course**	**Credit hours**	**Credit points**	**Hrs/wk**	**Marks**	**Core/Elective**
MPL101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100	Core
MPL102T	Advanced Pharmacology-I	4	4	4	100	Core
MPL103T	Pharmacological and Toxicological Screening Methods-I	4	4	4	100	Core
MPL104T	Cellular and Molecular Biology	4	4	4	100	Core
MPL105P	Pharmacology Practical I	12	6	12	150	
	Seminar/Assignment	7	4	7	100	
Total		**35**	**26**	**35**	**650**	
II SEMESTER						
Course code	**Course**	**Credit Hours**	**Credit points**	**Hrs/wk**	**Marks**	**Core/Elective**
MPL201T	Advanced Pharmacology II	4	4	4	100	Core
MPL202T	Pharmacological and Toxicological Screening Methods-II	4	4	4	100	Core
MPL204T	Clinical Research and Pharmacovigilance	4	4	4	100	Core
-	**Elective**	4	4	4	100	

MPL205P	Pharmacology Practical II	12	6	12	150	
	Seminar/Assignment	7	4	7	100	
Total		**35**	**26**	**35**	**650**	
ELECTIVES OFFERED						

SRI VENKATESWARA UNIVERSITY

Course code	Course	Credit Hours	Credit points	Hrs/wk	Marks	Core/Elective
MPH 203T	Computer Aided Drug Delivery System	4	4	4	**100**	Elective
MPC 203T	Computer Aided Drug Design	4	4	4	**100**	Elective
MPA 203T	Quality Control & Quality Assurance	4	4	4	**100**	Elective
MPH 204T	Cosmetic & Cosmeceuticals	4	4	4	**100**	Elective
MPL 203T	Principles of Drug Discovery	4	4	4	**100**	Elective

TABLE 2: COURSE OF STUDY FOR M. PHARM - PHARMACEUTICS

I SEMESTER						
Course code	**Course**	**Credit hours**	**Credit points**	**Hrs/wk**	**Marks**	**Core/Elective**
MPH101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100	Core
MPH102T	Drug Delivery System	4	4	4	100	Core
MPH103T	Modern Pharmaceutics	4	4	4	100	Core
MPH104T	Regulatory Affairs	4	4	4	100	Core
MPH105P	Pharmaceutics Practical I	12	6	12	150	
	Seminar/Assignment	7	4	7	100	
	Total	**35**	**26**	**35**	**650**	
II SEMESTER						
Course code	**Course**	**Credit Hours**	**Credit points**	**Hrs/wk**	**Marks**	**Core/Elective**
MPH201T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	4	4	4	100	Core
MPH202T	Advance Bio Pharmaceutics and Pharmacokinetics	4	4	4	100	Core
MPH 204T	Cosmetic & Cosmeceuticals	4	4	4	100	Core
-	**Elective**	4	4	4	100	

MPH205P	Pharmaceutics Practical II	12	6	12	150	
	Seminar/Assignment	7	4	7	100	
Total		**35**	**26**	**35**	**650**	

ELECTIVES OFFERED						
Course code	**Course**	**Credit Hours**	**Credit points**	**Hrs/ wk**	**Marks**	**Core/Elective**
MPH 203T	Computer Aided Drug Delivery System	4	4	4	**100**	Elective
MPC 203T	Computer Aided Drug Design	4	4	4	**100**	Elective
MPA 203T	Quality Control & Quality Assurance	4	4	4	**100**	Elective
MPL 204T	Clinical Research & Pharmacovigilance	4	4	4	**100**	Elective
MPL 203T	Principles of Drug Discovery	4	4	4	**100**	Elective

TABLE –3: COURSE OF STUDY FOR M. PHARM III SEMESTER (COMMONFOR ALL SPECIALIZATIONS)

Course code	**Course**	**Credit Hours**	**Credit points**	**Marks**
MRM 301T	Research Methodology and Biostatistics*	4	4	100
-	Journal club*	2	2	50
-	Research Proposal Presentation*	8	4	100
-	Viva Voce*	1	1	25
Total		15	11	275

*Non University Examination

TABLE – 4: COURSE OF STUDY FOR M. PHARM. IV SEMESTER (COMMONFOR ALL SPECIALIZATIONS)

Course code	**Course**	**Credit Hours**	**Credit points**	**Marks**
-	Thesis Evaluation	40	20	500
-	Research work and Colloquium	10	10	250
Total		50	30	750

FIRST SEMESTER

Course Code	Course Title	No of Hours Per week	No of Credits
MPA 101T	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	04	04
Sessional Marks: 15		Continuous mode:10	
End Semester Examination Marks: 75		Totalmarks:100	

OBJECTIVES:

After completion of course student is able to know about chemicals and excipients. The analysis of various drugs in single and combination dosage forms. Theoretical and practical skills of the instruments

COURSE CONTENT:

UNIT- I

UV-Visible spectroscopy: Theory, Laws, Instrumentation associated with UV- Visible spectroscopy, Choice of solvents and solvent effect and Applications of UVVisible spectroscopy, Difference/ Derivative spectroscopy.

a. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier -Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation.

b. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence (Characterestics of drugs that can be analysed by fluorimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer. c. Flame emission spectroscopy and atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

UNIT-II

1HNMR spectroscopy Principle, Instrumentation, Solvent requirement in 1HNMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Applications of 1HNMR spectroscopy. Brief outline of principles of 13C NMR.

Unit III

Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.

UNIT-IV

Chromatography: Principle, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: a. High Performance Thin Layer Chromatography. b. Gas chromatography c. High Performance Liquid chromatography d. Ultra-High Performance Liquid chromatography e. LC-MS f. Affinity chromatography

UNIT-V

a. Electrophoresis: Principle, Instrumentation, working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing. b. X ray Crystallography: Production of X rays, Different X ray methods, Bragg ‘s law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X- ray diffraction.

UNIT-VI

a. Immunoassays: Principles, procedures and types of RIA, ELISA b. Thermal techniques: Principle, instrumentation and pharmaceutical applications of DTA, DSC, TGA.

REFERENCES:

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.

2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A.Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers. 4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II,
4 th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol 11, Marcel. Dekker Series
8. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi.
9. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley & Sons, 1982

COURSE OUTCOMES:

1. Explain the importance of modern instrumentation in pharmaceutical analysis.Describe the fundamental principles and applications of spectroscopic techniques Viz., UV- Visible, IR,Students also able to demonstrate and use flame photometry, nepheloturbidometry
2. To determine the structural and functional group identification by using NMR-C13 and H1
3. Qualitative and quantitative identification of compound by Mass spectroscopy using different ionization technique
4. The chromatographic techniques for qualitative and quantitative analysis of pharmaceutical compounds.
5. The electrophoresis techniques and their applications in pharmaceutical industry.
6. Principle procedures involved in immunoassay and pharmaceutical applications: RIA, ELISA. DTA, DSC, TGA.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	3	2	1	2	1	2	3	1	2	1
CO2	3	1	2	3	2	2	1	2	3	3	2	2
CO3	1	1	2	1	3	1	2	3	1	3	1	2
CO4	3	2	3	2	1	2	3	3	1	1	2	1
CO5	3	2	3	2	1	2	3	2	1	3	1	2
CO6	2	1	2	3	1	2	3	1	2	1	2	1

Course Code	Course Title	No of Hours Per week	No of Credits
MPH 102T	DRUG DELIVERY SYSTEM	04	04
Sessional Marks: 15		Continuous mode:10	
End Semester Examination Marks: 75		Totalmarks:100	

OBJECTIVES:

Upon completion of the course, student shall be able to understand

- The various approaches for development of novel drug delivery systems.
- The criteria for selection of drugs and polymers for the development of delivering system
- The formulation and evaluation of Novel drug delivery systems.

COURSE CONTENT:

Unit I

1. a. Sustained Release (SR) and Controlled Release (CR) formulations: Introduction & basic concepts, advantages/ disadvantages, factors influencing, Physicochemical & biological approaches for SR/CR formulation, Mechanism of Drug Delivery from SR/CR formulation. b. Rate Controlled Drug Delivery Systems: Principles &Fundamentals, Types; Activation Modulated Drug Delivery Systems: Mechanically activated, pH activated, Enzyme activated, and Osmotic activated Drug Delivery Systems: Feedback regulated Drug Delivery Systems: Principles & Fundamentals.

UNIT-II

a) Gastro-Retentive Drug Delivery Systems: Principle, concepts, advantages and disadvantages, Modulation of GI transit time approaches to extend GI transit.

b) Buccal Drug Delivery Systems: Principle of muco adhesion, advantages and disadvantages, mechanism of drug permeation, Methods of formulation and its evaluations.

c) Polymers: introduction, definition, classification, Molecular weight averages, Molecular weight determination from viscosity, Polymers as thickening agent, Preparation of polymer solution, Polymers in the solid state, Fabrication technology, and applications.

Unit III

a) Occular Drug Delivery Systems: Barriers of drug permeation, Methods to overcome barriers.

b) Transdermal Drug Delivery Systems: Structure of skin and barriers, Penetration enhancers, Formulation and evaluation of Transdermal Drug Delivery Systems.

UNIT-IV

Protein and Peptide Delivery: Barriers for protein delivery. Formulation and Evaluation of Delivery systems of proteins and other macromolecules. Vaccine delivery systems: Vaccines, uptake of antigens, single shot vaccines, mucosal and transdermal delivery of vaccines

UNIT-V

Protein and Peptide Delivery: Barriers for protein delivery. Formulation and Evaluation of Delivery systems of proteins and other macromolecules. Vaccine delivery systems: Vaccines, uptake of antigens, single shot vaccines, mucosal and transdermal delivery of vaccines

UNIT-VI

Dosage Form for Personalized Medicine: Introduction, Definition, Pharmacogenetics, Categories of Patients for Personalized Medicines, Customized drug delivery systems, A brief note on Bio electronic Medicines, 3D printing of pharmaceuticals, Tele pharmacy.

REFERENCES:

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.

2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker,Inc., New York, 1992. 3. Encyclopedia of controlled delivery, Editor- Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York! Chichester/Weinheim

4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P.Vyas and R.K.Khar, Controlled Drug Delivery - concepts and advances, Vallabh rakashan, New Delhi, First edition 2002.

JOURNALS

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian drugs (IDMA)
3. Journal of controlled release (Elsevier Sciences) desirable
4. Drug Development and Industrial Pharmacy (Marcel & Decker) desirable.

COURSE OUTCOMES:

1. To understand criteria for selection of drugs, polymers, development and evaluation of novel drug delivery systems.
2. Understand the concepts and applications of Novel Drug Delivery Systems.
3. Apply knowledge in developing various novel formulations as per requirements.
4. Analyze various evaluation parameters for oral, parenteral, topical etc. drug delivery systems.
5. Evaluate the drug polymer compatibility studies
6. Formulate industrially feasible, cost-effective strategy for development of new dosage forms.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	3	1	2	3	2	1	3	1	3
CO2	1	2	3	1	2	1	2	3	2	3	2	2
CO3	2	2	2	1	2	1	2	3	1	2	1	2
CO4	3	2	1	2	3	2	1	2	3	1	3	2
CO5	1	2	1	2	1	3	1	2	3	3	1	2
CO6	2	1	2	3	2	1	2	3	2	3	2	3

Course Code	Course Title	No of Hours Per week	No of Credits
MPH 103T	MODERN PHARMACEUTICS	04	04

Sessional Marks: 15 **Continuous mode:10**
End Semester Examination Marks: 75 **Totalmarks:100**

OBJECTIVES:

Upon completion of the course, student shall be able to understand

- The elements of preformulation studies.
- The Active Pharmaceutical Ingredients and Generic drug Product development
- Industrial Management and GMP Considerations.
- Optimization Techniques & Pilot Plant Scale Up Techniques
- Stability Testing, sterilization process & packaging of dosage forms.

COURSE CONTENT:

1. a) Preformulation Concepts – Drug Excipient interactions - different methods, kinetics of stability, Stability testing.

b) Theories of dispersion: Emulsion and Suspension, SMEDDS. Its formulation and evaluation.

c) Preparation and stability of large and small volume parenteral – physiological and formulation consideration, Manufacturing and evaluation.

2. Optimization techniques in Pharmaceutical Formulation: Concept and parameters of optimization, Optimization techniques in pharmaceutical formulation and processing. Statistical design, Response surface method, Contour designs, Factorial designs and application in formulation development.

3. Validation: Introduction to Pharmaceutical Validation, Scope &merits of Validation, Types of Validation, Government regulation, Manufacturing process Model, URS,DQ,IQ,OQ&P.Q.of facilities. Validation and calibration of Master plan, ICH & WHO guidelines for calibration and validation of equipment, Process Validation of Tablets, Capsules, Parenterals.

4. a) cGMP & Industrial Management: Objectives and policies of current good manufacturing practices, layout of buildings, services, equipment and their maintenance.

b) Production management: Production organization. Materials management: handling and transportation, inventory management and control, production and planning control, Sales forecasting, budget and cost control, industrial and personal relationship. Concept of Total Quality Management.

5. a) Compression and compaction: Physics of tablet compression, compression and consolidation, effect of friction, distribution of forces, compaction profiles.

b) Study of consolidation parameters; Diffusion parameters, Dissolution parameters and Pharmacokinetic parameters, Heckel plots, Similarity factors – f2 and f1, Higuchi and Peppa's plot.

REFERENCES

1. Theory and Practice of Industrial Pharmacy By Lachmann and Libermann
2. Pharmaceutical dosage forms: Tablets Vol. 1-3 by Leon Lachmann.
3. Pharmaceutical Dosage forms: Disperse systems, Vol, 1-2; By Leon Lachmann.
4. Pharmaceutical Dosage forms: Parenteral medications Vol. 1-2; By Leon Lachmann.
5. Modern Pharmaceutics; By Gillbert and S. Banker.
6. Remington's Pharmaceutical Sciences.
7. Advances in Pharmaceutical Sciences Vol. 1-5; By H.S. Bean & A.H. Beckett.
8. Physical Pharmacy; By Alfred martin
9. Bentley's Textbook of Pharmaceutics – by Rawlins.
10. Good manufacturing practices for Pharmaceuticals: A plan for total quality control, Second edition; By Sidney H. Willig.
11. Quality Assurance Guide; By Organization of Pharmaceutical producers of India.
12.Drug formulation manual; By D.P.S. Kohli and D.H.Shah. Eastern publishers, New Delhi.
13. How to practice GMPs; By P.P.Sharma. Vandhana Publications, Agra.
14. Pharmaceutical Process Validation; By Fra. R. Berry and Robert A. Nash.

15. Pharmaceutical Preformulations; By J.J. Wells.
16. Applied production and operations management; By Evans, Anderson, Sweeney and Williams.
17. Encyclopedia of Pharmaceutical technology, Vol I – III.

COURSE OUTCOMES:

1. After successful completion of this course students will be able to: Describe the physiochemical properties important for formulation of solid, liquid and sterile dosage forms.
2. Interpret formulation data and subsequent analysis data towards choice of the most relevant formulations.
3. Produce pharmaceutical formulations from known reference sources in a quality that is suitable for patient use.
4. Explain the concept and importance of testing of product performance, and the ability to interpret such data.
5. Describe the principles of sterile production and explain why quality assurance and validation of critical steps in the production process are of particular importance.
6. Develop cosmetics and with desired Safety, stability, and efficacy.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	3	1	2	3	1	2	1	2
CO2	2	1	2	1	2	3	1	2	3	1	1	1
CO3	1	2	1	2	1	2	3	1	2	3	1	3
CO4	3	2	2	2	1	2	1	3	1	3	2	1
CO5	2	1	2	1	2	1	1	3	1	3	1	3

Course Code	Course Title	No of Hours Per week	No of Credits
MPH 104T	REGULATORY AFFAIRS	04	04
Sessional Marks: 15		Continuous mode:10	
End Semester Examination Marks: 75		Totalmarks:100	

OBJECTIVES:

Upon completion of the course, it is expected that the students will be able to understand

- The Concepts of innovator and generic drugs, drug development process
- The Regulatory guidance's and guidelines for filing and approval process
- Preparation of Dossiers and their submission to regulatory agencies in different countries
- Post approval regulatory requirements for actives and drug products
- Submission of global documents in CTD/ eCTD formats
- Clinical trials requirements for approvals for conducting clinical trials
- Pharmacovigilance and process of monitoring in clinical trials.

COURSE CONTENT:

UNIT-I

Documentation in Pharmaceutical industry: Master formula record, DMF (Drug Master File), distribution records. Generic drugs product development: Introduction, Hatch Waxman act and amendments, CFR (CODE OF FEDERAL REGULATION), in-vitro drug product performance.

UNIT-II

Regulatory requirement for product approval: API, biologics, novel therapies, obtaining NDA, ANDA for generic drugs, ways and means of US registration for foreign drugs.

UNIT-III

CMC, post approval regulatory affairs: Regulation for combination products and medical devices.CTD and ECTD format, industry and FDA liaison. ICH - Guidelines of ICHQ, S E, M Regulatory requirements of EU, MHRA, TGA and ROW countries.

UNIT-IV

Non clinical drug development: Global submission of IND, NDA, ANDA. Investigation of medicinal products dossier, (IMPD) and investigator brochure (IB).

UNIT-VI

Clinical trials: Developing clinical trial protocols. Institutional review board/ independent ethics committee Formulation and working procedures, informed Consent process and procedures. HIPAA- new, requirement to clinical study process, pharmacovigilance, safety monitoring in clinical trials.

REFERENCES

1. Theory and Practice of Industrial Pharmacy By Lachmann and Libermann
2. Pharmaceutical dosage forms: Tablets Vol. 1-3 by Leon Lachmann.
3. Pharmaceutical Dosage forms: Disperse systems, Vol, 1-2; By Leon Lachmann.
4. Pharmaceutical Dosage forms: Parenteral medications Vol. 1-2; By Leon Lachmann.
5. Modern Pharmaceutics; By Gillbert and S. Banker.
6. Remington's Pharmaceutical Sciences.
7. Advances in Pharmaceutical Sciences Vol. 1-5; By H.S. Bean & A.H. Beckett.
8. Physical Pharmacy; By Alfred martin
9. Bentley's Textbook of Pharmaceutics – by Rawlins.
10. Good manufacturing practices for Pharmaceuticals: A plan for total quality control, Second edition; By Sidney H. Willig.

COURSE OUTCOMES:

1. After successful completion of this course students will be able to:
2. Take independent responsibility for the development of novel drug and generic drug along with their drug products, from concepts to clinics.
3. Independently initiate and carry out proper actions between regulatory authorities and the marketing application authorization applicant/holder.
4. Critically examine and evaluate scientific data and conclusions intended for regulatory review
5. Enable improvement of the regulatory environment by implementing and upholding good regulatory practices.
6. Knowledge on developing clinical trial protocols, ethics committee, monitoring clinical trials and pharmacovigilance.
7. Knowledge on procedures for registration of Indian drug products in overseas market, CTD.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	3	12	1	2	2	3	2	3
CO2	2	2	1	2	2	1	2	3	1	1	2	1
CO3	1	1	2	1	2	1	3	1	2	3	1	3
CO4	2	1	2	1	2	3	1	2	3	1	3	2
CO5	2	3	1	2	3	1	3	2	3	1	2	1
CO6	3	2	1	1	2	1	2	3	1	2	1	2

Course Code	Course Title	No of Hours Per week	No of Credits
MPH 105P	Pharmaceutics Practical-I	04	04

Sessional Marks: 15 **Continuousmode:10**
End Semester Examination Marks: 75 **Totalmarks:100**

OBJECTIVES:

1. After completion of course student is able to know about chemicals and excipients. The analysis of various drugs in single and combination dosage forms.
2. The criteria for selection of drugs and polymers for the development of delivering system
3. The Active Pharmaceutical Ingredients and Generic drug Product development
4. Preparation of Dossiers and their submission to regulatory agencies in different countries
5. Clinical trials requirements for approvals for conducting clinical trials

COURSE CONTENT:

1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on PC, TLC & HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry
7. To perform In-vitro dissolution profile of CR/ SR marketed formulation
8. Formulation and evaluation of sustained release matrix tablets
9. Formulation and evaluation osmotically controlled DDS
10. Preparation and evaluation of Floating DDS- hydro dynamically balanced DDS
11. Formulation and evaluation of Mucoadhesive tablets.
12. Formulation and evaluation of trans dermal patches.
13. To carry out preformulation studies of tablets.
14. To study the effect of compressional force on tablets disintegration time.
15. To study Micromeritic properties of powders and granulation.
16. To study the effect of particle size on dissolution of a tablet.
17. To study the effect of binders on dissolution of a tablet.
18. To plot Heckal plot, Higuchi and peppas plot and determine similarity factors.

COURSE OUTCOMES:

1. Qualitative and quantitative identification of compound by Mass spectroscopy using different ionization technique
2. Formulate industrially feasible, cost-effective strategy for development of new dosage forms.
3. Interpret formulation data and subsequent analysis data towards choice of the most relevant formulations.
4. Independently initiate and carry out proper actions between regulatory authorities and the marketing application authorization applicant/holder.
5. Knowledge on developing clinical trial protocols, ethics committee, monitoring clinical trials and pharmacovigilance.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	3	2	1	2	3	1	2	1	2
CO2	2	1	2	3	1	2	3	1	3	1	2	1
CO3	1	2	1	2	3	1	2	1	2	3	2	3
CO4	2	1	3	1	2	3	1	2	3	1	2	1

CO5	1	2	2	1	2	3	1	3	3	1	3	2

Course Code	Course Title	No of Hours Per week	No of Credits
MPH	**SEMINARS AND ASSIGNMENT**	**07**	**04**
Total marks: 100			

OUTCOMES:

1. 1.Description of key goals to be accomplished by the assignment
2. Introduce students to different types of scholarly sources and how to access them
3. Explore an appreciation of the self in relation to its larger diverse social and academic contexts.

SECOND SEMESTER

Course Code	Course Title	No of Hours Per week	No of Credits
MPH 201T	**MOLECULAR PHARMACEUTICS (NANO TECH AND TARGETED DDS)**	04	04
Sessional Marks: 15		**Continuous mode:10**	
End Semester Examination Marks: 75		**Total marks:100**	

OBJECTIVES:

Upon completion of the course student shall be able to understand

1. The various approaches for development of novel drug delivery systems.
2. The criteria for selection of drugs and polymers for the development of NTDS
3. The formulation and evaluation of novel drug delivery systems.

COURSE CONTENT:

Unit I

Targeted Drug Delivery Systems: Concepts, Events and biological process involved in drug targeting. Tumor targeting and Brain targeting.

Unit II

Targeting Methods: Introduction, types, preparation evaluation. Nano Particles & Liposomes, Niosomes.

Unit III

Micro Capsules / Micro Spheres: Types, preparation and evaluation, and applications of Monoclonal Antibodies:Aquasomes, Phytosomes, Electrosomes.

Unit IV

a) Pulmonary Drug Delivery Systems:Types, Preparation and Evaluation of Aerosols, propellents, Containers, Types, preparation and evaluation.

b) Intra Nasal Route Delivery systems; Types, preparation and evaluation.

Unit V

Nucleic acid based therapeutic delivery system: Gene therapy, introduction (ex-vivo & in-vivo gene therapy). Potential target diseases for gene therapy (inherited disorder and cancer). Gene expression systems (viral and nonviral gene transfer). Liposomal gene delivery systems and its Biodistribution and Pharmacokinetics. Knowledge of therapeutic antisense molecules and aptamers as drugs of future.

REFERENCES:

1.Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded,Marcel Dekker, Inc., New York, 1992.

2. S.P.Vyas and R.K.Khar, Controlled Drug Delivery - concepts and advances, VallabhPrakashan, New Delhi, First edition 2002.

3. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, NewDelhi, First edition 1997 (reprint in 2001)..

Course outcomes:

1.Basics of medical devices and IVDs, process of development, ethical and quality considerations harmonization initiatives for approval and marketing of medical devices and IVDs regulatory approval process for medical devices and IVDs in India, US, Canada, EU, Japan and ASEAN clinical evaluation and investigation of medical devices and IVDs.

2. The various approaches for development of novel drug delivery systems.

3. The criteria for selection of drugs and polymers for the development of NTDS

4. The formulation and evaluation of novel drug delivery systems.

5.Development and validation of the UV spectroscopic analytical method of drug.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	1	2	3	1	2	3	1	3
CO2	3	2	1	2	1	3	3	2	2	1	1	1
CO3	2	2	2	3	1	2	1	3	1	2	1	2
CO4	3	2	1	2	1	2	3	1	2	1	2	1
CO5	2	1	1	2	3	3	3	2	2	3	1	3

Course Code	Course Title	No of Hours Per week	No of Credits
MPH 202T	**ADVANCE BIO PHARMACEUTICS AND PHARMACOKINETICS**	04	04
Sessional Marks: 15 Continuous mode:10 **End Semester Examination Marks :75 Total marks:100**			

Objectives:

Upon completion of this course it is expected that students will be able to understand,

1. The basic concepts in biopharmaceutics and pharmacokinetics.
2. The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
3. The critical evaluation of biopharmaceutic studies involving drug product equivalency.
4. The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
5. The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic

Course Content:

Unit I

Drug Absorption from the Gastrointestinal Tract: Gastrointestinal tract, Mechanism of drug absorption, Factors affecting drug absorption, Formulation and Physicochemical factors. pH–partition theory of drug absorption. Dissolution rate, Dissolution process, Noyes–Whitney equation, Factors affecting the dissolution rate, Formulation and processing factors.

Gastrointestinal absorption: role of the dosage form, Solution (elixir, syrup and solution) as a dosage form, Suspension as a dosage form, Capsule as a dosage form, Tablet as a dosage form, Dissolution methods, Correlation of invivo data with in vitro dissolution data. Transport model: Permeability, Solubility, Charge State, Properties of the Gastrointestinal Tract (GIT), pH Microclimate, Intracellular pH Environment, Tight-Junction Complex, Oral Absorption enhancers.

Unit II

Biopharmaceutic considerations in drug product design and In Vitro Drug Product performance: Introduction, biopharmaceutic factors affecting drug bioavailability, rate- limiting steps in drug absorption, physicochemical nature of the drug formulation, factors affecting drug product performance, in vitro: dissolution and drug release testing, compendial methods of dissolution, alternative methods of dissolution testing, meeting dissolution requirements, problems of variable control in dissolution testing, performance of drug products, dissolution profile comparisons, drug product stability, considerations in the design of a drug product.

Unit III

a) Drug Product Performance, In Vivo: Bioavailability and Bioequivalence: drug product performance, purpose of bioavailability studies, relative and absolute availability, methods for assessing bioavailability, bioequivalence studies, design and evaluation of bioequivalence studies, study designs, crossover study designs, evaluation of the data of bioequivalence example, study submission and drug review process. Biopharmaceutics classification system and methods.

b) Permeability: In-vitro, in-situ and In-vivo methods. generic biologics (biosimilar drug products), clinical significance of bioequivalence studies, special concerns in bioavailability and bioequivalence studies, generic substitution, Bio waivers.

Unit IV

Pharmacokinetics: Basic considerations, pharmacokinetic models, compartment modeling: one compartment model- IV bolus, IV infusion, extra-vascular; two compartment - model in brief, Non-linear pharmacokinetics: causes of non-linearity, Michaelis – Menten equation, estimation of Km and Vmax.
Drug interactions: introduction, the effect of protein binding interactions, the effect of tissue- binding interactions, cytochrome p450-based drug interactions, drug interactions linked to transporters. Drug interactions involving digoxin, warfarin, theophylline.

Unit V
a) Application of Pharmacokinetics: Modified-Release Drug Products, Targeted Drug Delivery Systems and Biotechnological Products. Introduction to Pharmacokinetics and pharmacodynamic drug interactions. Pharmacokinetics and pharmacodynamics of biotechnology drugs.
b) Chrono Therapeutic Drug Delivery System: Introduction, classification, physiology of circadian rhythmicity, circadian rhythm changes in cardiac and liver diseased conditions. Chronopharmacokinetics of anti-hypertensives and anti-asthmatics.

Books recommended:

REFERENCES
1. Biopharmaceutics and Clinical Pharmacokinetics by Milo Gibaldi, 4th edition,Philadelphia, Lea and Febiger, 1991
2. Biopharmaceutics and Pharmacokinetics, A. Treatise, D .M. Brahmankar and Sunil B. aiswal., VallabPrakashan, Pitampura, Delhi
3. Applied Biopharmaceutics and Pharmacokinetics by Shargel. Land YuABC, 2ndedition, Connecticut Appleton Century Crofts, 1985
4. Textbook of Biopharmaceutics and Pharmacokinetics, Dr. Shobha Rani R. Hiremath,Prism Book
5. Pharmacokinetics by Milo Gibaldi and D. Perrier, 2nd edition, Marcel Dekker Inc.,New York, 1982
6. Current Concepts in Pharmaceutical Sciences: Biopharmaceutics, Swarbrick. J, LeaandFebiger, Philadelphia, 1970
7. Clinical Pharmacokinetics, Concepts and Applications 3rd edition by MalcolmRowland and Thom~ N. Tozer, Lea and Febiger, Philadelphia, 1995
8. Dissolution, Bioavailability and Bioequivalence, Abdou. H.M, Mack PublishingCompany, Pennsylvania 1989
9. Biopharmaceutics and Clinical Pharmacokinetics, An Introduction, 4th edition,revised and expande by Robert. E. Notari, Marcel Dekker Inc, New York and Basel,1987.
10. Biopharmaceutics and Relevant Pharmacokinetics by John. G Wagner and M.Pemarowski, 1st edition, Drug Intelligence Publications, Hamilton, Illinois, 1971.
11. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G.Boylan, Marcel Dekker Inc, New York, 1996.
12. Basic Pharmacokinetics,1 stedition,Sunil S JambhekarandPhilip J Breen,pharmaceutical press, RPS Publishing,2009.
13. Absorption and Drug Development- Solubility, Permeability, and Charge State, Alex Avdeef, John Wiley & Sons, Inc,2003.

Course Outcomes:

The basic concepts in biopharmaceutics and pharmacokinetics.

1. The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
2. The critical evaluation of biopharmaceutic studies involving drug product equivalency.
3. The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
4. The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic
5. Understand the concept of linear and non-linear pharmacokinetics.
6. Study the concept of quality control, quality assurance & total quality controls.
7. CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	3	2	3	3	2	1	1
CO2	1	2	1	2	3	1	2	3	1	3	1	3
CO3	1	2	3	1	2	1	2	3	3	2	2	1
CO4	2	1	1	2	3	1	1	1	2	1	1	2
CO5	1	1	3	1	1	3	1	1	2	1	2	1

Course Code	Course Title	No of Hours Per week	No of Credits
MPH 204T	COSMETICS & COSMECEUTICALS	04	04
Sessional Marks: 15 Continuous mode:10 End Semester Examination Marks: 75		Total marks:100	

Objectives:

Upon completion of the course, the students shall be able to understand

1. Key ingredients used in cosmetics and cosmeceuticals.
2. Key building blocks for various formulations.
3. Current technologies in the market
4. Various key ingredients and basic science to develop cosmetics and cosmeceuticals
5. Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy

Course Content:

Unit I

Cosmetics – Regulatory: Definition of cosmetic products as per Indian regulation. Indian regulatory requirements for labeling of cosmetics. Regulatory provisions relating to import of cosmetics, Misbranded and spurious cosmetics. Regulatory provisions relating to manufacture of cosmetics – Conditions for obtaining license, prohibition of manufacture and sale of certain cosmetics, loan license, offences and penalties.

Unit II

Cosmetics - Biological aspects: Structure of skin relating to problems like dry skin, acne, pigmentation, prickly heat, wrinkles and body odor. Structure of hair and hair growth cycle. Common problems associated with oral cavity. Products for Cleansing and care for face, eye lids, lips, hands, feet, nail, scalp, neck, body and under-arm.

Unit III

Building blocks for different product formulations of cosmetics/cosmeceuticals: Surfactants – Classification and application. Emollients, rheological additives: classification and application. Antimicrobials, preservatives, their merits and demerits. Factors affecting preservative efficacy. Building blocks for formulation of a moisturizing cream, vanishing cream, cold cream, shampoo and toothpaste, Soaps and syndet bars. Perfumes; Classification of perfumes. Perfume ingredients listed as allergens in EU regulation. Controversial ingredients: Parabens, formaldehyde liberators, dioxane.

Unit IV

Design of cosmeceutical products: Sunscreens- classification and regulatory aspects. Addressing dry skin, acne, sun-protection, pigmentation, prickly heat, wrinkles, body odor, dandruff, dental cavities, bleeding gums, mouth odor and sensitive teeth through cosmeceutical formulations.

Unit V

Herbal Cosmetics: Herbal ingredients used in Hair care, skin care and oral care. Review of guidelines for herbal cosmetics by private bodies like cosmos with respect to preservatives, emollients, foaming agents, emulsifiers and rheology modifiers. Challenges in formulating herbal cosmetics.

REFERENCES

1. Harry's Cosmeticology. 8th edition.

2. Poucher'sperfumecosmeticsandSoaps,10th edition.

3. Cosmetics - Formulation, Manufacture and quality control, PP. Sharma,4th edition

4. Handbook of cosmetic science and Technology A.O.Barel, M.Paye and H.I. Maibach. 3 rd edition

5. Cosmetic and Toiletries recent suppliers catalogue.

6. CTFA directory.

Course Outcomes:

Key ingredients used in cosmetics and cosmeceuticals.

1. Key building blocks for various formulations.

2.Various key ingredients and basic science to develop cosmetics and cosmeceuticals.

3.Scientific knowledge to develop cosmetics and with desired Safety, stability, and efficacy.

4.Learn formulation, manufacture & evaluation of baby cosmetics like baby oils, powders etc.

5.Understand formulation of manicure products like nail lacquer, remover etc.

6. Explain the concept of cosmeceuticals, history, difference between cosmetics & cosmeceuticals & cosmeceutical agents.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	2	3	1	2	3	1	2	1
CO2	1	2	3	1	2	3	2	2	1	1	3	2
CO3	2	1	2	1	2	3	1	2	3	2	1	1
CO4	3	2	1	2	3	1	2	3	1	2	1	2
CO5	2	1	2	3	1	2	3	1	3	1	3	1

Course Code	Course Title	No of Hours Per week	No of Credits
MPH 205P	**PHARMACEUTICS PRACTICAL II**	**04**	**04**
Sessional Marks: 15	**Continuous mode:10 End Semester**		
Examination Marks: 75	**Total marks:100**		

OBJECTIVES:

1. The various approaches for development of novel drug delivery systems.
2. The criteria for selection of drugs and polymers for the development of NTDS
3. The critical evaluation of biopharmaceutic studies involving drug product equivalency.
4. The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic
5. Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy.

Course contents

1. To study the effect of temperature change, non solvent addition, incompatible polymer addition in microcapsules preparation.

2. Preparation and evaluation of Alginate beads

3. Formulation and evaluation of gelatin /albumin microspheres

4. Formulation and evaluation of liposomes/niosomes

5. Formulation and evaluation of spherules

6. Improvement of dissolution characteristics of slightly soluble drug by Solid dispersion technique.

7. Comparison of dissolution of two different marketed products /brands

8. Protein binding studies of a highly protein bound drug & poorly protein bound drug

9. Bioavailability studies of Paracetamol in animals.

10. Pharmacokinetic and IVIVC data analysis by Winnoline R software

11. In vitro cell studies for permeability and metabolism

12. DoE Using Design Expert® Software

13. Formulation data analysis Using Design Expert® Software

14. Quality-by-Design in Pharmaceutical Development

15. Computer Simulations in Pharmacokinetics and Pharmacodynamics

16. Computational Modeling of Drug Disposition

17. To develop Clinical Data Collection manual

18. To carry out Sensitivity Analysis, and Population Modeling.

19. Development and evaluation of Creams

20. Development and evaluation of Shampoo and Toothpaste base

21. To incorporate herbal and chemical actives to develop products

22. To address Dry skin, acne, blemish, Wrinkles, bleeding gums and dandruff.

Course outcomes:

1. Development and validation of the UV spectroscopic analytical method of drug.
2. The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
3. The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic
4. The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic
5. Explain the concept of cosmeceuticals, history, difference between cosmetics & cosmeceuticals & cosmeceutical agents.
6. CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	3	1	2	3	1	2	3	1	1
CO2	2	3	2	1	3	2	1	2	3	1	3	1
CO3	3	1	2	3	2	1	2	3	2	1	1	2
CO4	1	2	1	2	1	2	3	1	2	2	2	2
CO5	2	1	2	1	2	1	3	2	1	3	1	3

Course Code	Course Title	No of Hours Per week	No of Credits
MPH	**SEMINAR/ASSIGNMENT**	**07**	**04**
Total marks:100			

OUTCOMES:

1. Provide students with preliminary skills to do further research in the field of international relations
2. Teach students to break down a piece of writing into its component parts and analyze the arguments.
3. Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.

ELECTIVES

Course Code	Course Title	No of Hours Per week	No of Credits
(MPH 203T)	COMPUTER AIDED DRUG DELIVERY SYSTEMS	04	04
Sessional Marks: 15 Continuous mode:10 End Semester Examination Marks: 75 Total marks:100			

SCOPE

The subject is designed to impart knowledge on the current state of the art techniques involved in computer assisted drug design.

OBJECTIVES

1. At completion of this course it is expected that students will be able to understand
2. Role of CADD in drug discovery
3. Different CADD techniques and their applications
4. Various strategies to design and develop new drug like molecules.
5. Working with molecular modelling softwares to design new drug molecules
6. The in silico virtual screening protocols

Course Content:

Unit I

a. Introduction to Computer Aided Drug Design (CADD) History, different techniques and applications. Quantitative Structure Activity Relationships: Basics History and development of QSAR: Physicochemical parameters and methods to calculate physicochemical parameters: Hammett equation and electronic parameters (sigma), lipophilicity effectsand parameters (log P, pi-substituent constant), steric effects (Taft steric and MR parameters) Experimental and theoretical approaches for the determination of these physicochemical parameters.

Unit II

Quantitative Structure Activity Relationships: Applications Hansch analysis, Free Wilson analysis and relationship between them, Advantages and disadvantages; Deriving 2D- QSAR equations.3D-QSAR approaches like COMFA and COMSIA.

QSAR statistical methods: regression analysis and partial least square analysis.

Unit III

Molecular Modelling and Docking

1. Molecular and Quantum Mechanics in drug design. Energy Minimization Methods: comparison between global minimum conformation and bioactive conformation
2. Methods to derive three-dimensional structure of protein : X-Ray Crystallography, NMR, homologous modeling.
3. Molecular docking and drug receptor interactions: Rigid docking, flexible docking, manual docking and extra-precision docking. Agents acting on enzymes such as DHFR, HMG-Co A reductase and HIV protease, choline esterase (AchE&BchE)

Unit IV

Molecular Properties and Drug Design

1. Prediction and analysis of ADMET properties of new molecules and its importance in drug design.
2. De novo drug design: Receptor/enzyme-interaction and its analysis, Receptor/enzyme cavity size prediction, predicting the functional components of cavities, Fragment based drug design.

Unit V

Pharmacophore Mapping and Virtual Screening

1. Concept of pharmacophore, pharmacophore mapping,identification of Pharmacophore features and Pharmacophore modeling; Conformational search used in pharmacophore mapping.
2. Virtual Screening Techniques

3. Drug-likeness screening, Similarity based methods and Pharmacophore based screening, structure based in-silico virtual screening protocols.

REFERENCES

1. Computational and structural approaches to drug discovery, Robert MStroud and Janet. F Moore, RCS Publishers.
2. Introduction to Quantitative Drug Design by Y.C. Martin, CRC Press,Taylor& Francis group..
3. Drug Design by Ariens Volume 1 to 10, Academic Press, 1975, ElsevierPublishers.

4. Principles of Drug Design by Smith and Williams, CRC Press, Taylor &Francis.

5. The Organic Chemistry of the Drug Design and Drug action by Richard B.Silverman, Elsevier Publishers.
6. Medicinal Chemistry by Burger, Wiley Publishing Co.

7. An Introduction to Medicinal Chemistry –Graham L. Patrick, OxfordUniversity Press.

8. Wilson and Gisvold's Text book of Organic Medicinal and PharmaceuticalChemistry, Ippincott Williams & Wilkins.

9. Comprehensive Medicinal Chemistry – Corwin and Hansch, PergamonPublishers.

10. Hugo Kubiny. QSAR: Hansch Analysis and Related Approaches. Methods and Principles in Medicinal Chemistry. Publisher Wiley-VCH
11. Klaus Gubernator, Hans-Joachim Böhm. Structure-Based Ligand Design. Methods and Principles in Medicinal Chemistry. Publisher Wiley-VCH
12. Abby L . Parrill. M . Rami Reddy. Rational Drug Design. Novel Methodology and Practical Applications. ACS Symposium Series; American Chemical Society: Washington, DC, 1999.
13. J. Rick Turner. New drug development design, methodology and, analysis. John Wiley & Sons,Inc.,NewJersey.

Course Outcomes:

1. History of Computers in Pharmaceutical Research and Development
2. Computational Modeling of Drug Disposition
3. Computers in Preclinical Development
4. Optimization Techniques in Pharmaceutical Formulation
5. Computers in Market Analysis
6. CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	3	1	2	3	1	2	1	2
CO2	2	1	2	1	2	3	1	2	3	1	2	2
CO3	1	2	1	2	1	2	3	1	2	3	2	3
CO4	3	2	2	2	1	2	1	3	1	3	1	2
CO5	2	1	2	1	2	1	1	2	3	1	1	3

Course Code	Course Title	No of Hours Per week	No of Credits
(MPC 203T)	COMPUTER AIDED DRUG DESIGN	04	04
Sessional Marks: 15 Continuous mode:10			
End Semester Examination Marks: 75		Total marks:100	

This course is designed to impart knowledge and skills necessary for computer Applications in pharmaceutical research and development who want to understand the application of computers across the entire drug research and development process. Basic theoretical discussions of the principles of more integrated and coherent use of computerized information (informatics) in the
drug development process are provided to help the students to clarify the concepts

OBJECTIVES

1. Upon completion of this course it is expected that students will be able to understand,
2. History of Computers in Pharmaceutical Research and Development
3. Computational Modeling of Drug Disposition
4. Computers in Preclinical Development
5. Optimization Techniques in Pharmaceutical Formulation
6. Computers in Market Analysis
7. Computers in Clinical Development
8. Artificial Intelligence (AI) and Robotics
9. Computational fluid dynamics(CFD)

Course Content:

Unit I

a. Computers in Pharmaceutical Research and Development: A General Overview: History of Computers in Pharmaceutical Research and Development. Statistical modeling in Pharmaceutical research and development: Descriptive versus Mechanistic Modeling, Statistical Parameters, Estimation, Confidence Regions, Nonlinearity at the Optimum, Sensitivity Analysis, Optimal Design, Population Modeling.
b. Quality-by-Design in Pharmaceutical Development: Introduction, ICH Q8 guidelines, Regulatory and industry views on QbD, Scientifically based QbD - examples of application.

Unit II

Computational Modeling of Drug Disposition: Introduction,Modeling Techniques: Drug Absorption, Solubility, Intestinal Permeation, Drug Distribution
Drug Excretion, Active Transport; P-gp, BCRP, Nucleoside Transporters, hPEPT1, ASBT, OCT, OATP,BBB-Choline Transporter.

Unit III

Computer-aided formulation development: Concept of optimization, Optimization parameters, Factorial design, Optimization technology & Screening design. Computers in Pharmaceutical Formulation: Development of pharmaceutical emulsions, microemulsion drug carriers. Legal Protection of Innovative Uses of Computers in R&D, The Ethics of Computing in Pharmaceutical Research, Computers in Market analysis.

Unit IV

Computer-aided biopharmaceutical characterization: Gastrointestinal absorption simulation. Introduction, Theoretical background, Model construction, Parameter sensitivity analysis, Virtual trial, Fed vs. fasted state, In vitro dissolution and in vitro- invivo correlation, Biowaiver considerations.

Unit V

Computer Simulations in Pharmacokinetics and Pharmacodynamics: Introduction, Computer Simulation: Whole Organism, Isolated Tissues, Organs, Cell, Proteins and Genes. Computers in Clinical Development: Clinical Data Collection and Management, Regulation of Computer Systems.

REFERENCES

1. Computer Applications in Pharmaceutical Research and Development, Sean Ekins, 2006, John Wiley & Sons.
2. Computer-Aided Applications in Pharmaceutical Technology, 1st Edition, Jelena Djuris, Woodhead Publishing
3. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G.Boylan, Marcel Dekker Inc, New York, 1996.

Course Outcomes:

1. To utilize various molecular modeling softwares in the design of novel drug-like molecules.
2. To apply the various softwares for physicochemical property prediction.
3. To understand how current drugs were developed by using pharmacophores modeling and docking technique.
4. Computers in Clinical Development
5. Artificial Intelligence (AI) and Robotics
6. Computational fluid dynamics(CFD)
7. CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	3	2	1	2	3	1	2	1	2
CO2	2	1	2	3	1	2	3	1	3	2	3	1
CO3	1	2	1	2	3	1	2	1	2	3	2	3
CO4	2	1	3	1	2	3	1	2	3	1	2	1
CO5	1	2	2	1	2	3	1	3	3	1	3	2

Course Code	Course Title	No of Hours Per week	No of Credits
(MPL 203T)	PRINCIPLES OF DRUG DISCOVERY	04	04
Sessional Marks: 15 Continuous mode:10			
End Semester Examination Marks: 75		Total marks:100	

SCOPE : The subject imparts basic knowledge of drug discovery process. This informationwill makethe student competent in drug discovery process.

OBJECTIVES

1. Upon completion of the course, the student shall be able to,
2. Explain the various stages of drug discovery.
3. Appreciate the importance of the role of genomics, proteomics and bioinformatics indrug discovery
4. Explain various targets for drug discovery.
5. Explain various lead seeking method and lead optimization
6. Appreciate the importance of the role of computer aided drug design in drug discovery

Course Content:

Unit I

An overview of modern drug discovery process:

Target identification, target validation, lead identification and lead Optimization. Economics of drug discovery. Target Discovery and validation- Role of Genomics, Proteomics and Bioinformatics. Role of Nucleic acid microarrays, Protein microarrays, Antisense technologies, siRNAs, antisense oligonucleotides, Zinc finger proteins. Role of transgenic animals in target
validation.

Unit II

Lead Identification- combinatorial chemistry & high throughput screening, in silico leaddiscovery techniques, Assay development for hit identification.
Protein structure
Levels of protein structure, Domains, motifs, and folds in protein structure. Computational prediction of protein structure: Threading and homology modeling methods. Application ofNMR and X-ray crystallography in protein structure prediction.

Unit III

Rational Drug Design

Traditional vs rational drug design, Methods followed in traditional drug design, High throughput screening, Concepts of Rational Drug Design,Rational Drug Design Methods: Structure and Pharmacophore based approaches Virtual Screening techniques: Drug likenessscreening, Concept of pharmacophore mapping and pharmacophore based Screening

Molecular docking: Rigid docking, flexible docking, manual docking; Docking basedscreeningDe novo drug design.

Quantitative analysis of Structure Activity Relationship

History and development of QSAR, SAR versus QSAR, Physicochemical parameters, Hanschanalysis, Fee Wilson analysis and relationshipbetween them.

Unit IV

QSAR Statistical methods – regression analysis, partial least square analysis (PLS) andother multivariate statistical methods. 3D-QSAR approaches like COMFA and COMSIA Prodrug design-Basic concept, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action.

Rationale of prodrug design and practical consideration of prodrug design.

REFERENCES

1. MouldySioud. Target Discovery and Validation Reviews and Protocols: Volume 2Emerging Molecular Targetsand Treatment Options. 2007 Humana Press Inc.
2. Darryl León. Scott MarkelIn. Silico Technologies in Drug Target Identification andValidation. 2006 by Taylor and Francis Group, LLC.
3. Johanna K. DiStefano. Disease Gene Identification. Methods and Protocols. Springer NewYork Dordrecht Heidelberg London.
4. Hugo Kubiny. QSAR: Hansch Analysis and Related Approaches. Methods and Principlesin Medicinal Chemistry. Publisher Wiley-VCH
5. Klaus Gubernator, Hans-Joachim Böhm. Structure-Based Ligand Design. Methods andPrinciples in Medicinal Chemistry. Publisher Wiley- VCH
6. Abby L . Parrill. M . Rami Reddy. Rational Drug Design. Novel Methodology and Practical Applications. ACS Symposium Series
7. American Chemical Society: Washington,DC, 1999.
8. J. Rick Turner. New drug development design, methodology and, analysis. John Wiley &Sons, Inc., New Jersey

Course Outcomes:

1. The students would appreciate the knowledge on the basics of drug discovery.
2. They would have better understanding on the various stages of drug discovery.
3. They would have studied the importance of the role of genomics, proteomics and bioinformatics in drug discovery.
4. They would have studied on the various targets for drug discovery.
5. They would have better understanding on the lead seeking method and lead optimization
6. They would have learnt the importance of the role of computer aided drug design in drug discovery.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	3	2	1	2	3	1	2	1	2
CO2	2	1	2	3	1	2	3	1	3	1	3	1
CO3	1	2	1	2	3	1	2	1	2	3	2	3
CO4	2	1	3	1	2	3	1	2	3	2	2	3
CO5	1	2	2	1	2	3	1	3	3	1	3	1

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Institute of Advanced Study in Education- IASE



Course

Bachelor of Education (B.Ed)

Choice Based Credit System (CBCS)

Academic Year 2023 – 24

About the Institution:

- The Institute of Advanced Study in Education (IASE) S.V University was established in 1998, as per New Education Policy - 1986, under the centrally sponsored scheme of Teacher Education by the Ministry of Human Resource Development (MHRD) Govt. of India during IX plan. The main purpose of establishing IASE is to uplift the Department of Education as IASE, to improve the quality of Teacher Education and Secondary Education. To achieve the above objectives the Institute was conducted Pre-Service and In-service Teacher Training Programmes. It was also conducted workshops on Secondary School Curriculum, Guidance and Counseling at Intermediate level. The overall leadership was provided by the Principal and Faculty members in an effective manner. Almost 23 batches of students were successfully completed. Nearly 2300 students were awarded degree. Till 2014-15 the B.Ed course was run as one year programme. After 2015 onwards it was offered as Two year programme. The Curriculum was structured as per NCTE norms. Nearly 80% students were getting jobs in DSC. Some students were getting jobs in private corporate schools and some are getting jobs in other organizations (TTD, Police department etc). A good number of Extension activities, Awareness programmes on Right to Education Act, Stress Management, Study skills etc. were conducted. The institution is extending its services to High school students, Teachers, Head masters, DIETS in terms of In-Service training. To update administrative skills the Staff are encouraged to attend and share their expertise through Seminars, Conferences, Workshops and Faculty development programmes. Future vision of IASE is to offer courses like Integrated B.Ed., B.Ed Special Education and Diploma in Primary Education.

Vision

- To create Teachers for elementary, secondary and higher education holistically to train the future generations of the Country.

Mission

- The department creates environment to train the teachers in leadership roles as caring teachers, professional experts. Training teachers in communication skills to communicate clearly and effectively, to solve problems, use effective education tools to meet the global standards.
- The main purpose of establishing IASE is to uplift the Department of Education as IASE, to improve the quality of Teacher Education and Secondary Education.

PROGRAMME OUTCOMES

On successful completion of the two-year B.Ed. programme, pupil teachers will be able to develop-

- Teaching competency: Know, select and use of learner-centered teaching methods, understanding of paradigm shift in conceptualizing disciplinary knowledge in school curriculum, necessary competencies for organizing learning experiences, select and use of appropriate assessment strategies for facilitating learning
- Pedagogical skills: Applying teaching skills and dealing with classroom problems.

- Teaching through Nonconventional Modes: Evolving a system of education which enhances the potential of every learner to acquire, retain and transform knowledge leading to wisdom society through creative, experiential and joyful modes of learning.
- Integration of Artificial Intelligence in Education: Transform the educational landscape by providing open access to quality, value based and socially relevant education to all by harnessing the disruptive potential of AI.
- Critical Thinking: Analysis of Curriculum, construction of blue print, selecting appropriate teaching strategies according to needs of students and conducting action research to solve classroom problems.
- Effective Communication: Presenting seminar before peer students and teachers and practicing communication skills through various linguistic activities and applying it for better classroom communication.
- Sensitivity towards Inclusion: Identifying the diversities and dealing it in inclusive classrooms environment, guidance and counselling programmes for disabled students.
- Content Analysis: Analyses the text-books and syllabus.
- Effective Citizen Ethics: Understand different values, morality, and social service and accept responsibility for the society.
- Self-directed Learning: Preparing scripts for seminars, lesson plans and online content.
- Social Resilience: Understand about social entities and enable to tolerate absorb, cope up with adverse conditions of life.
- Physical Development: Practice yoga, self-defence, sports and scouting-guiding.
- Team Work: Enable to work as a member or leader in diverse teams and in multi-disciplinary settings by following the principles of collaborative learning, cooperative learning and team teaching.

PROGRAMME SPECIFIC OUTCOMES

- Enable to comprehend the development in physical, cognitive, social and emotional areas, contemporary issues and educational policies of education system in India, teaching-learning methods, strategies, epistemological basis of education, school management, professional ethics and observation of school activities by school internship.
- Understand the individual differences among students, measuring the attainment, evaluating progress, and assessing learning abilities, guidance programmes and administering psychological tools, ICT based Communication and teaching and lesson planning.

- Practice teaching in Schools, inculcate the real experiences of classroom teaching and online teaching for remote areas' students by using ICT and its different tools and software.
- Understand the classroom diversities and enable them to deal with diverse learners in inclusive
- classroom setup, education for human rights and women empowerment, environmental education and developing online content.

SEMESTER -I

COURSE OUTCOMES

Course-I

PHILOSOPHICAL FOUNDATIONS OF EDUCATION

Objectives

To enable the student teachers to

1. Understand the concepts of Education and Philosophy
2. Understand the Indian Philosophical thought on Education
3. Understand the Implications of various western schools of thought on Education
4. Understand the implications made by recent thinkers on education.
5. Appreciate the nobility of teaching as a profession.

Course Content

Unit-1: Introduction to Philosophy and Education

1.1 Concept and Scope of Philosophy

1.2 Concept and Scope of Education

1.3 Types and Functions of Education

1.4 Relationship between Philosophy and Education.

1.5 Philosophy and aims of Education

Unit-2: Indian Education: Historical Perspective

2.1 Education during Ancient Period (Vedic Education, Buddhist Education and Jains)

2.2 Education during Medieval Period (Including Islamic Education)

2.3 Education during Modern Period (Pre-Independent and Post Independent era)

i. Rabindranath Tagore

ii. Sri Aurobindo Gosh

iii. Mohandas Karamchand Gandhi

iv. Jiddu Krishna Murthy

v. Dr.BR.Ambeddkar

vi Moulana Abdul Kalam Azad

Unit-3: Eastern Systems and Western Schools of Philosophy

3.1 Eastern Systems of Philosophy

i. Sankhya ii. Yoga iii. Nyaya iv. Vedanta

3.2 Western Schools of Philosophy

i. Idealism ii. Naturalism iii. Pragmatism iv. Existentialism

Unit-4: Value Education

4.1 Concept of Value

4.2 Classification of Values

4.3 Value Crisis

4.4 Approaches to inculcate Values

4.5 Values and Harmonious Life

Unit-5: Teaching as a Profession

5.1 Teacher: Professional Competencies and Commitments

5.2 Teacher as a Nation Builder

5.3 Teacher as a Creator and Facilitator of Knowledge

5.4 Professional ethics of teachers

5.5 Teacher and the Future Society.

CO-Po Attainment in outcome based Education

Course Name-PHILOSOPHICAL FOUNDATIONS OF EDUCATION

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Understand the concepts of Education and Philosophy
2	CO_2	Understand the Indian Philosophical thought on Education
3	CO_3	Understand the Implications of various western schools of thought on Education
4	CO_4	Understand the implications made by recent thinkers on education.
5	CO_5	Appreciate the Mobility of teaching as a profession.

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO1	3	2	-	-	-	3	2	3	-	-	-	2
CO2	3	2	2	-	-	3	3	3	-	2	-	3
CO3	3	3	1	-	-	2	2	3	-	1	-	2
CO4	3	3	2	-	-	3	2	3	-	-	-	2
CO5	3	2	2	3	3	3	2	3	2	2	-	3
PO Attainment	15	12	07	03	03	14	11	15	02	05	-	12

Course-II

PERSPECTIVES IN CHILD DEVELOPMENT

Objectives

To enable the student teachers to

1. Compare relative merits and applications of different Approaches of Human Development
2. Recognize that childhood is a period of socialization and how socialization practices affect their development
3. Critically analyze developmental variations among children placed and exposed to different socio-cultural contexts
4. Appreciate the process of development with special focus on childhood and adolescence
5. Recognize that adolescence as a period of transition and threshold of adulthood

Course Content

Unit-1: Approaches of Human Development

1.1 Concept of Growth, Development and Maturation

1.2 Principles of Development

1.3 Stages of Growth and Development (Infancy Childhood, Adolescence)

1.4 Dimensions of Growth and Development (Physical, Cognitive, Emotional, Social, Moral, language)

1.5 Longitudinal and cross sectional approaches of understanding development

Unit-2: Theories of Development

2.1 Cognitive theory of Development (Piaget‟s)

2.2 Psycho-social theory of development (Erikson).

2. 3 Theory of Moral Development (Kohlberg‟s).

2. 4 Theory of psycho- sexual development (Freud).

2. 5 Theory of Emotional Development (Goldstein).

Unit-3: Childhood as a period of Socialization

3.1 Characteristics of childhood – developmental tasks.

3.2 Child development – Physical, cognitive, social, emotional, moral and language development during childhood.

3.3 Child in different socio-cultural contexts.

3.4 Process of socialization – conflicts resolution and social development.

3.5 Stages of Social development – Isolated play, parallel play and social play.

Characteristics of socially matured person.

Unit-4: Adolescence as a period of transition

4.1 Characteristics and needs in Adolescence

4.2 Genesis of problems during adolescence-Physical, cognitive, emotional, social, moral and language development

4.3 Adolescent Groups – Gangs

4.4 Mechanisms of adjustment with special reference to defense mechanisms and holistic development

4.5 Leadership: Types of Leadership, Development of Leadership qualities in adolescents and its educational implications.

Unit-5: Individual Differences

1.1 Dimensions of Individual differences-cognitive abilities, interests, aptitude, creativity, personality and values

1.2 Theory of multiple intelligence (Gardner) – Implications for understanding differences in children

1.3 Difference in children based on learning styles and socio cultural context (home language and Instructional language)

1.4 Individual differences based on cognitive abilities – learning difficulties, slow learners and intellectually challenged, intellectual giftedness - implications for catering to individual variations in view of "differences" rather than "deficits" perspective.

1.5 Fostering creativity among children

CO-Po Attainment in outcome based Education

Course Name-PERSPECTIVES IN CHILD DEVELOPMENT

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Compare relative merits and applications of different Approaches of Human Development
2	CO_2	Recognize that childhood is a period of socialization and how socialization practices affect their development

3	**CO_3**	Critically analyze developmental variations among children placed and exposed to different socio-cultural contexts
4	**CO_4**	Appreciate the process of development with special focus on childhood and adolescence
5	**CO_5**	Recognize that adolescence as a period of transition and threshold of adulthood

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO 1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO 4** D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO 7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO 11** ProgrammeManagement	**PO_{12}** LifelongLeering
CO_1	3	2	3	1	1	3	-	3	3	3	-	3
CO_2	3	3	3	-	2	3	3	3	3	3	-	2
CO_3	3	3	3	1	1	2	3	3	3	3	-	2
CO_4	3	3	3	2	1	3	2	3	2	3	-	3
CO_5	3	3	3	3	2	3	3	3	2	3	-	3
PO Attainment	15	14	15	07	07	14	11	15	13	15	-	13

Course-III

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) FOR ENRICHING TEACHING AND LEARNING

Objectives

To enable the student teachers to

1. explain the concept of educational technology
2. explain the concept of ICT in education
3. appreciate the influence of ICT for improving the professional competencies
4. comprehend communicative skills and effective classroom interaction
5. use different approaches of ICT integration in education

Course Content

Unit-1: Information and Communication Technology (ICT)

1.1 Educational Technology – Concept, Growth, Objectives, Characteristics, Advantages, Challenges and Impact

1.2 Information Technology - Knowledge Explosion, Preservation and Retrieval

1.3 Communication – Concept, Elements, Process, Barriers & Types – Teaching as Communication - Communication Technology – Its application in Education

1.4 Instructional Media and Aids – Aural, Print, Visual and multimedia

1.5 Concept, Importance, Characteristics and Scope of Information and Communication Technology (ICT)

Unit-2: ICT in Education

2.1 Knowledge Acquisition and Multi-sensory approach

2.2 Classroom Communication and Communicative Skills for Teachers and Students - Flanders Interaction Analysis Category System

2.3 Individualized Instruction – Concept, Need, Principles and Techniques

2.4 Programmed Learning - Principles, Types, modes of presentation, development, application and role of teacher

2.5 Changing roles of the learner and the teacher in ICT-Integration and Challenges

Unit-3: Computer Fundamentals and Applications

3.1 Types, Characteristics and features of Computers

3.2 Components of Computers – Hardware, Software, Memory and Maintenance of computers

3.3 Operating Systems - DOS, Windows and Macintosh and Mobile Apps for Teaching

3.4 Software for Word Processing, Presentation, Statistical & Graphical, Page

Layout, multimedia and webpage creator

3.5 Concept, Applications and Challenges of Computer networks, Internet, E-mail and Digital Space

Unit-4: ICT Enriched Learning Experiences

4.1 Application of ICT for Enriching Classroom Experiences

4.2 Application and use of Multimedia Educational Software for classroom situations

4.3 Use of Internet based media for teaching and learning enrichment - Acknowledgement

4.4 Project based learning using computers, Internet and Activities

4.5 Collaborative learning using group discussion, projects, field visits, blogs, etc.

Unit-5: Application of Computers in Education

5.1 Computer as a learning tool – Concept of E-learning

5.2 Web 2.0 Technologies-characteristics, types and examples

5.3 Virtual Classroom, Smart Boards, Tools and Opportunities

5.4 Open Educational Resources – Concept and Significance

5.5 Critical issues in Internet usage – Authenticity, Addiction, Plagiarism, Ethical and Legal Standards

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CO-Po Attainment in outcome based Education

Course Name-INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) FOR ENRICHING TEACHING AND LEARNING

Course Outcome

Sl.No	Course Number	Co’s Description
1	CO_1	Explain the concept of educational technology
2	CO_2	Explain the concept of ICT in education
3	CO_3	Appreciate the influence of ICT for improving the professional competencies

4	**CO_4**	Comprehend communicative skills and effective classroom interaction
5	**CO_5**	Use different approaches of ICT integration in education

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO4** D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO_{12}** LifelongLeering
CO_1	3	2	2	1	2	2	2	3	-	3	-	3
CO_2	3	3	3	2	3	3	2	3	2	3	1	3
CO_3	3	2	3	2	3	2	2	3	2	3	2	3
CO_4	3	3	3	3	3	3	2	3	2	3	1	3
CO_5	3	2	3	2	3	2	2	3	2	3	1	2
PO Attainment	15	12	14	10	14	12	10	15	8	15	5	14

Course-IV

PEDAGOGY OF MATHEMATICS

Objectives

To enable the student teachers to

1. develop insight into the meaning, nature, scope and objectives of mathematics education
2. appreciate the role of mathematics in day to day life
3. understand history, development of mathematics and the contributions of Indian mathematicians to mathematics
4. understand aims and objectives of different branches of mathematics
5. Identify the role of branches of mathematics and their implications on the society.

Course Content

Unit-1: Meaning, Nature, and Scope of Mathematics

1.1 Meaning, Nature, and scope of mathematics.

1.2 History of Mathematics with special emphasis on teaching of mathematics.

1.3 Contributions of Indian Mathematicians

a) Aryabhatta b) Brahmagupta c) Varahamihira d) Bhaskaracharya e) SrinivasaRamanujan.

1.4 Contributions of Western Mathematicians

a)Euclid b)Pythagoras c) Renedescarte d) Geroge Cantor.

1.5 Correlation of Mathematics with other school subjects and with other branches of mathematics.

Unit-2: Aims and objectives of Teaching Mathematics

2.1 Need for establishing general objectives for teaching mathematics.

2.2 Aims, Values and general objectives of teaching mathematics.

2.3 Specific objectives and teaching points of various content areas in different branches of secondary school mathematics.

2.4 Recommendations of various Educational Committees and Commissions as regards to Aims and Objectives of Teaching Mathematics.

2.5 Meaning and Concept of Academic Standards of CCE.

2.6 Linking Blooms Taxonomy with Academic Stands.

Unit-3: Methods, Approaches and Strategies in Teaching and Learning of Mathematical Concepts

3.1 Nature of Concepts, types of Concepts, Concept Formation and concept assimilation; distinguishing and stating necessary and sufficient conditions in the process of teaching concepts. Comparing and contrasting. Giving counter

example and non example in teaching concepts. Planning and implementation strategies in teaching concepts.

3.2 Creating awareness among student teachers on various concepts of Arithmetic, Algebra, Geometry, Trigonometry and Probability and Statistics from classics VI to X.

3.3 Methods of Teaching Mathematics: Inductive and Deductive : Analytic and Synthetic: Laboratory. Heuristic, Project Method and Activity Based Teaching.

3.4 Problem solving- Stages and Steps in problem solving; Discovering or Exploring various options for solving a given problem in Algebra, Arithmetic, Geometry, Trigonometry, Probability and Statistics.

3.5 Concept Attainment Model of Jerome Bruner.

Unit-4: Planning for Teaching – Learning Mathematics

4.1 Microteaching: Concept, Definition, Microteaching cycle, Components of Microteaching, Merits and Limitations.

4.2 Microteaching Skills: Introducing a lesson, Explaining a Concept, Stimulus Variation, Illustrating with Examples, Probing Questioning, Reinforcement, Structuring Classroom Questions, and Blackboard writing.

4.3 Planning of Instruction: Unit plan, Period plan based on Blooms Taxonomy and academic standards.

4.4 Technology Integrated Lesson-Planning the Lesson by digital technology.

Unit-5: Learning Resources in Mathematics

1.1 Mathematics Text Book – Importance and Criteria of good Mathematics text book.

1.2 A Critical Analysis of existing Secondary School Mathematics Text Books.

1.3 Audio, Visual and Multimedia resources – Selection and designing.

5.4 On line Resources – ICT based Pedagogical tools.

5.5 Using community resources for mathematics learning. Visits, mathematical field trips and excursions.

5.6 Handling hurdles in utilizing resources.

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF MATHEMATICS

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Develop insight into the meaning, nature, scope and objectives of mathematics education
2	CO_2	Appreciate the role of mathematics in day to day life
3	CO_3	Understand history, development of mathematics and the contributions of Indian
4	CO_4	Understand aims and objectives of different branches of mathematics
5	CO_5	Identify the role of branches of mathematics and their implications on the society.

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO 1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO** 4 D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO** 7 Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO** 11 ProgrammeManagement	**PO_{12}** LifelongLeering
CO_1	3	3	2	2	3	2	2	3	3	3	1	3
CO_2	3	3	3	2	3	2	2	3	3	3	1	3
CO_3	3	3	1	2	2	2	2	3	2	3	1	3
CO_4	3	3	3	3	3	1	3	3	3	3	1	3
CO_5	3	3	2	2	3	2	2	3	3	3	1	3
PO Attainment	15	15	11	11	14	09	11	15	14	15	05	15

Course-IV

PEDAGOGY OF SOCIAL SCIENCES

Objectives

To enable the student-teachers to

1. understand the meaning and scope of Social Sciences
2. develop general and specific aims of teaching social sciences
3. inculcate values through teaching of Social Sciences
4. understand major concepts and develop critical thinking through teaching inter disciplines of Social Sciences
5. acquire knowledge on different strategies and approaches of teaching and developing skills in connection of resources.

Course Content

Unit-1: Social Sciences as an integrated area of Study

1.1 Meaning, Nature and Scope of Natural and Social Sciences

1.2 Distinction between Natural and Social Sciences

1.3 Meaning, History, Nature, Scope and Development of Social Studies

1.4 Distinction between social sciences and social studies

1.5 Understanding society through various social sciences

Unit-2: Aims Objectives and Academic Standards of Social Sciences

2.1 Major aims and objectives of teaching Social Sciences

2.2 Bloom's taxonomy of Educational Objectives

2.3 Academic Standards and Learning outcomes of teaching Social Sciences

2.4 Recommendations of NPE 1986, NCF 2005, APSCF 2011

2.5 Values of Teaching Social Sciences

Unit-3: Approaches, Methods, Strategies and Techniques of Teaching Social Sciences

3.1 Meaning, need and significance of various approaches, methods, strategies and techniques of Teaching Social Sciences

3.2 Teacher Centered Approaches – Lecture, Lecture-demonstration, Source and Supervisory Study

3.3 Learner centered approaches –Project, Problem Solving, Discussion, Inductive and Deductive, Observation, Constructivist Approach

3.4 Strategies / Techniques - Brain Storming, Team Teaching, Mind Mapping, Questioning

3.5 Activities – Dramatization, Role play, Field Trips, Social Science Clubs,

Exhibitions

Unit-4: Planning in Teaching Social Sciences

4.1 Microteaching – Meaning, Concept and Steps

4.2 Microteaching Skills - Introduction, Explanation, Questioning, Reinforcement, Stimulus Variation

4.3 Year Plan and Unit Plan

4.4 Need and Importance of Lesson Planning (Period Planning)

4.5 Technology Integrated Lesson Planning

Unit-5: Teaching Learning Resources in Social Sciences

5.1 Community Resources – Human and Material

5.2 Social Science Library, Laboratory and Museum

5.3 Need and Significance of Current and Controversial issues in teaching social sciences

5.4 Handling hurdles in utilizing resources

5.5 Professional Development of Social Sciences Teacher

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF SOCIAL SCIENCES

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Understand the meaning and scope of Social Sciences
2	CO_2	Develop general and specific aims of teaching social sciences
3	CO_3	Inculcate values through teaching of Social Sciences
4	CO_4	Understand major concepts and develop critical thinking through teaching inter disciplines of Social Sciences
5	CO_5	Acquire knowledge on different strategies and

		approaches of teaching and developing skills in connection of resources.

CO-PO Mapping Matrix/ Programme Articulation Matrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Team work	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO_1	3	2	3	2	2	3	2	3	3	3	2	3
CO_2	3	3	3	2	2	3	2	3	3	3	2	3
$CO2_3$	3	3	2	2	2	3	2	3	3	3	2	3
CO_4	3	3	2	2	2	3	2	3	3	3	2	3
CO_5	3	3	3	3	2	3	2	3	3	3	2	3
PO Attainment	15	14	13	11	10	15	10	15	15	15	10	15

Course-IV

PEDAGOGY OF BIOLOGICAL SCIENCES

Objectives

To enable the student-teachers to

1. develop an insight on the meaning, scope, nature and aims of biological science
2. identify and relate everyday experiences with the learning of biological science
3. integrate the knowledge of biological science with other school subjects
4. facilitate the development of scientific attitude in the learners of biological science
5. develop competencies for teaching and learning biological science through

Herbarium and Constructivist approaches

Herbarium and Constructivist approaches

Course Content

Unit-1: Introduction to Science

1.1. Meaning and Functions of Science

1.2. Nature and Scope of Science

1.3. Structure of Science

1.4. Branches of Science

1.5 History of Biological Science

Unit-2: Aims and Values of Biological Science

2.1. Aims of Teaching Biological Science

2.2. Values of Teaching Biological Science

2.3. Competences of a Biological Science Teacher

2.4. Correlation of Biological Science with other school Subjects

Unit-3: Objectives of Teaching Biological Science

3.1. Meaning and Importance of objectives

3.2. Revised Blooms Taxonomy of Educational Objectives.

3.3. Instructional Objectives and specifications with examples

3.4. Academics Standards mentioned in the school biological science text

Book published by government of Andhra Pradesh

Unit-4: Methods and Techniques of Teaching Biological Science

4.1 Micro Teaching Techniques

4.2 Lecture Method, lecture Demonstration Method, and Laboratory Method

4.3 Scientific Method (Inductive and Deductive Method)

4.4 Project Method

Unit-5: Planning for Teaching Biological Science

5.1 Year Plan

5.2 Lesson Plan

5.3 Period Plan (Herbartian and Constructivist approach and CCE Model)

5.4 Learning Experiences

5.5 Planning ICT Applications in Learning Biology.

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF BIOLOGICAL SCIENCES

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Develop an insight on the meaning, scope, nature and aims of biological science
2	CO_2	Identify and relate everyday experiences with the learning of biological science
3	CO_3	Integrate the knowledge of biological science with other school subjects
4	CO_4	Facilitate the development of scientific attitude in the learners of biological science
5	CO_5	Develop competencies for teaching and learning biological science through

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Team work	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO_1	3	3	3	1	2	1	3	3	2	3	-	3
CO_2	3	3	3	3	3	3	3	3	3	3	-	3
CO_3	3	3	3	3	2	3	3	3	2	3	-	3
CO_4	3	3	3	3	3	2	3	3	1	3	-	3
CO_5	3	3	3	3	3	1	1	3	1	3	-	3
PO Attainment	15	15	15	13	13	10	13	15	09	15	-	15

Course-V

PEDAGOGY OF PHYSICAL SCIENCES

Objectives

To enable the student-teachers to

1. Know the nature of science, structure, value and correlation with other school subjects.
2. Draw the attention on development of science and the contributions of western and Indian scientists.
3. Understand the aims and objectives of teaching physical sciences.
4. Develop the skill of organizing science curriculum and critique on the present secondary school physical sciences curriculum.
5. Organize the content into plan of action and practice the micro and macro teaching skill.

Course Content

Unit-1: Introduction to Science and Physical Sciences

1.1 Science and Physical Sciences – Meaning, Nature, Scope and Importance

1.2 Structure of Science – Syntactic Structure (Process of Science – Domain of Inquiry), Substantive Structure - Product of Science-Facts, Concepts, Theories, Laws and Principles – characteristics in the context of Physical sciences (citing examples)

1.3 Values of Learning Physical Sciences

1.4 Correlation of Physical Sciences with Mathematics, Biological Sciences, Social Studies, Languages, Fine Arts, Environment, Health, Development, Peace and Equity

1.5 Analysis of selected concepts of Physics and Chemistry from 6-10 classes

Unit-2: Development of Science - Physical Sciences

2.1 Milestones in the Development of Sciences – Physics and Chemistry

2.2 Contributions of Western and Indian Scientists

2.3 Landmarks, Status and Development Indian Science and Technology

2.4 Physical Science and Human Life

2.5 Rationale in Inspiring Students to study Physical Science

Unit-3: Aims. Objectives and competencies of Teaching Physical Sciences

3.1 Aims and Objectives of Teaching Physical Sciences

3.2 Taxonomy of Educational Objectives – Bloom, Krathwohl, Simpson, et al –

Revised Bloom's Taxonomy and Higher Order ThinkingSkills

3.3 Instructional Objectives of Teaching Physical Sciences

3.4 Behavioral or Specific Objectives of Teaching Physical Sciences

3.5 Competencies for Teaching of Physical Sciences

Unit-4: Approaches, Methods and Techniques of Teaching Physical Sciences

4.1 Concept of Teaching with special reference to Physical Science – Approaches and Methods – Student Participation in Learning

4.2 Teacher-centered Methods - Lecture, Lecture-cum-Demonstration, Historical

4.3 Student-centered Methods - Heuristic, Project, Scientific and Laboratory (Illustration of each method by taking examples from specific contents of Physics and Chemistry)

4.4 Modern Teaching Techniques - Brainstorming, Team Teaching and Models of Teaching – Concept Attainment Model and Enquiry TrainingModel

4.5 Microteaching - Concept and Meaning, Skills of Microteaching, Practice of Microteaching Skills

Unit-5: Planning for Teaching Physical Sciences

5.1 Importance of Planning for Teaching

5.2 Year Plan

5.3 Unit Plan

5.4 Period Plan (Lesson Plan) – Herbertian Steps vs. Constructivist Approach

5.5 Teaching Strategies and Academic Standards, CCE model period plan for classroom teaching

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF PHYSICAL SCIENCES

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Know the nature of science, structure, value and correlation with other school students
2	CO_2	Draw the attention on development of science and the

		contributions of western and Indian scientists.
3	**CO_3**	Understand the aims and objectives of teaching physical sciences.
4	**CO_4**	Organize the content into plan of action and practice the micro and macroteaching skill
5	**CO_5**	Organize the content into plan of action and practice the micro and macro

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO 1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO 4** D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO 7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO 11** ProgrammeManagement	**PO_{12}** LifelongLeering
CO_1	3	3	3	3	3	2	1	3	2	1	1	1
CO_2	3	3	3	3	2	3	1	3	1	1	1	2
CO_3	3	3	2	2	2	2	1	3	2	1	1	2
CO_4	3	3	3	3	3	3	3	3	3	3	3	1
CO_5	3	3	3	3	3	3	2	3	3	3	3	3
PO Attainment	15	15	14	14	13	13	08	15	11	09	09	09

Course-V

PEDAGOGY OF ENGLISH

Objectives

To enable the student-teacher to

1. understand the place of English Language Teaching in India
2. understand the different roles of language
3. understand the importance of home language, school language and the role of mother tongue in education.
4. understand different skills of English language
5. identify different Methods, Approaches and Techniques needed for teaching different skills of ELT in the Indian context

Course Content

Unit-1: Introduction to ELT

1.1 Meaning, nature and scope of ELT

1.2 Status of English Language in the global and Indian contexts

1.3 Aims and Objectives of Teaching English in India

1.4 Language and Education Policy in India

1.5 Teaching English in Bilingual/Multi-lingual contexts

Unit-2: Methods and Approaches in ELT

2.1 Method, Approach and Technique

2.2 Grammar Translation Method, Direct Method, Bilingual Method and Dr. West‟s Method

2.3 Oral, Situational and Structural Approaches

2.4 Communicative Language Teaching

2.5 Micro skills in ELT

Unit-3: Listening and Speaking Skills

3.1 Types and Sub-skills of Listening

3.2 Techniques of and materials for teaching Listening

3.3 Sub-skills of Speaking

3.4 Techniques of and materials for teaching Speaking

3.5 Activities to develop Listening and Speaking skills.

Unit-4: Reading and Writing Skills

4.1 Types and Sub-skills of Reading; Methods of Teaching Reading

4.2 Reading and Reflecting on text

4.3 Mechanics of Writing

4.4 Sub-skills and techniques of Writing

4.5 Activities to develop Reading and Writing skills.

Unit-5: Developing integrated skills and use of ICT in English Language Teaching

5.1 Teaching of Prose

5.2 Teaching of Poetry

5.3 Use of Multi-media in ELT

5.4 Online resources for ELT

5.5 ELT and Social Networking

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF ENGLISH

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Understand the place of English Language Teaching in India
2	CO_2	Understand the different roles of language
3	CO_3	Understand the importance of home language, school language and the role ofmother tongue in education
4	CO_4	Understand different skills of English language
5	CO_5	Identify different Methods, Approaches and Techniques needed for teaching different skills of ELT in the Indian context

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO1	3	2	3	2	2	3	2	3	2	3	2	3
CO2	3	3	2	2	3	2	2	3	2	3	2	3
CO3	3	3	3	3	3	3	2	3	1	3	2	3
CO4	3	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	3	3	3	3	2	3	2	3	3	3
PO Attainment	15	14	14	13	14	14	11	15	09	15	12	15

Course-V

PEDAGOGY OF TELUGU

భాషా విద్య (తెలుగు)

లక్ష్యాలు:

రెండేళ్ళ శిక్షణ పూర్తి చేసుకున్న ఛాత్రోపాధ్యాయులు:

1) సమాజంలో భాష పాత్రను అర్థం చేసుకుంటారు, ప్రాధాన్యతను గుర్తిస్తారు.
2) భాషకు, సాహిత్యానికి మధ్య గల సంబంధాన్ని గుర్తిస్తారు.
3) వివిధ భాషా రూపాలను ప్రశంసిస్తారు, సొంతం చేసుకుంటారు.
4) భాషల మధ్య అనువాదం యొక్క ప్రాధాన్యతను గుర్తించి తమ విద్యార్థులను అనువాదం చేయమని ప్రోత్సహిస్తారు.
5) సాహిత్య, శాస్త్ర, భాషా గ్రంథాలను సంప్రదిస్తారు, ప్రశంసిస్తారు, విశ్లేషిస్తారు.
6) సందర్భానుగుణ భాషాప్రయోగాన్ని అలవర్చుకుంటారు, తమ విద్యార్థులకు అలవరుస్తారు.
7) పిల్లల భాష -ఇంటి భాష, జన వ్యవహార భాషలను ప్రశంసిస్తారు.
8) భాషా బోధన - అభ్యసన పై భారతీయ - ప్రాచ్చాత్య దృక్పథాలను తులనాత్మకంగా అనుగుణంగా పరిశీలిస్తారు.

I. భాష, సమాజం భావనలు

భాష మరియు సమాజం - సమాజంలోని వివిధ వర్గాల భాష- భాష మరియు లింగ వివక్ష - భాష మరియు అస్తిత్వం - భాష మరియు సాధికారత, సామాజిక విధులు.

భాష వివిధ భావనలు

గృహ భాష (ఇంటి భాష) వైయక్తిక, కుటుంబ భాషలు- పరిసరాల్లోని-భాషలు - పాఠశాల్లో భాష-పాఠశాలేతర వ్యవహారాల్లో భాష -పిల్లల భాష - తెలుగు వాచకాల్లో భాష - భాషేతర వాచకాల్లో భాష-ఒక పాఠ్యాంశంగా భాష మాధ్యమ భాష (ప్రాధాన్యత, పరిమితులు)-భాష మరియు మాధ్యమ భాషల మధ్యగల సంబంధాలు.

భాషావిద్య- రాజ్యాంగ అధికరణాలు - నిబంధనలు, సిఫార్సులు

భారత రాజ్యాంగం అధికరణాలు 343 - 351, 350 (A)
ముదలియార్ కమీషన్ (1952), కొఠారి విద్యాసంఘం (1964-66)
జాతీయ విద్యావిధానం (1986) కార్యచరణ పథకం (1992)
జాతీయ విద్యా ప్రణాళిక చట్రం (2005) సిఫార్సులు
ఇతర కమిటీలు - కమీషన్ల సిఫార్సులు - అధికార భాష - త్రిభాషా సూత్రం.

భాషా విద్య (తెలుగు)

లక్ష్యాలు:

రెండేళ్ళ శిక్షణ పూర్తి చేసుకున్న ఛాత్రోపాధ్యాయులు:

1) సమాజంలో భాష పాత్రను అర్థం చేసుకుంటారు, ప్రాధాన్యతను గుర్తిస్తారు.
2) భాషకు, సాహిత్యానికి మధ్య గల సంబంధాన్ని గుర్తిస్తారు.
3) వివిధ భాషా రూపాలను ప్రశంసిస్తారు, సొంతం చేసుకుంటారు.
4) భాషల మధ్య అనువాదం యొక్క ప్రదాన్యతను గుర్తించి తమ విద్యార్థులను అనువాదం చేయమని ప్రోత్సహిస్తారు.
5) సాహిత్య, శాస్త్ర, భాషా గ్రంధాలను సంప్రదిస్తారు, ప్రశంసిస్తారు, విశ్లేషిస్తారు.
6) సందర్భానుగుణ బాషోపయోగాన్ని అలవర్చుకుంటారు, తమ విద్యార్థులకు అలవరుస్తారు.
7) పిల్లల భాష -ఇంటి భాష, జన వ్యవహార భాషలను ప్రశంసిస్తారు.
8) భాషా బోధన - అభ్యసన పై భారతీయ - ప్రాశ్చాత్య దృక్పదాలను తులనాత్మకంగా అనుగుణంగా పరిశీలిస్తారు.

I. భాష, సమాజం భావనలు

భాష మరియు సమాజం - సమాజంలోని వివిధ వర్గాల భాష- భాష మరియు లింగ విపక్ష - భాష మరియు అస్తిత్వం - భాష మరియు సాధికారత, సామాజిక విధులు.

భాష వివిధ భావనలు

గృహ భాష (ఇంటి భాష) వైయక్తిక, కుటుంబ భాషలు- పరిసరాల్లోని-భాషలు - పాఠశాలల్లో భాష-పాఠశాలేతర వ్యవహారాల్లో భాష -పిల్లల భాష - తెలుగు వాచకాల్లో భాష - భాషేతర వాచకాల్లో భాష-ఒక పాఠ్యాంశంగా భాష మాధ్యమ భాష (ప్రాధాన్యత, పరిమితులు)-భాష మరియు మాధ్యమ భాసల మధ్యగల సంబంధాలు.

భాషావిద్య- రాజ్యాంగ అధికరణాలు - నిబంధనలు, సిఫార్సులు

భారత రాజ్యాంగం అధికరణాలు 343 - 351, 350 (A)
ముదలియార్ కమీషన్ (1952), కొఠారి విద్యాసంఘం (1964-66)
జాతీయ విద్యావిధానం (1986) కార్యచరణ పథకం (1992)
జాతీయ విద్యా ప్రణాళిక చట్రం (2005) సిఫార్సులు
ఇతర కమిటీలు - కమీషన్ల సిఫార్సులు - అధికార భాష - త్రిభాషా సూత్రం.

CO-Po Attainment in outcome based Education

Course Name- Pedagogy of Telugu

Course Outcome

Sl. No	Course Number	Co's Description
1	CO_1	సమాజంలో భాష పాత్రను అర్థం చేసుకుంటారు, ప్రాధాన్యతను గుర్తిస్తారు.
2	CO_2	భాషకు, సాహిత్యానికి మధ్య గల సంబందాన్ని గుర్తిస్తారు.
3	CO_3	వివిధ భాషా రూపాలను ప్రశంసిస్తారు, సాంతం చేసుకుంటారు..
4	CO_4	భాషల మద్య అనువాదం యొక్క ప్రదాన్యతను గుర్తించి తమ విద్యార్థులను అనువ చేయమని ప్రొత్సహిస్తారు.
5	CO_5	సాహిత్య, శాస్త్ర, భాషా గ్రంధాలను సంప్రదిస్తారు, ప్రశంసిస్తారు, విశ్లేషిస్తారు.

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO 1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO 4** D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO 7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO 11** ProgrammeManagement	**PO_{12}** LifelongLeering
CO_1	3	3	3	2	2	3	1	3	-	3	1	2
CO_2	3	3	2	2	2	2	-	3	-	3	1	1
CO_3	3	3	2	1	2	2	-	3	-	3	2	2

CO_4	3	3	3	3	3	3	1	3	-	3	1	1
CO_5	3	3	3	3	3	3	1	3	1	3	1	1
PO Attainment	15	15	13	11	12	13	03	15	01	15	06	07

SEMESTER-II

Course-VI

SOCIOLOGICAL FOUNDATIONS OF EDUCATION

Objectives

To enable the student-teachers to

1. understand the sociological basis of Education
2. understand the impact of culture and socialization on Education
3. sensitize the student teacher about the impact of Education on the quality of life
4. understand the preamble of the constitution in the light of Education
5. organize various programmes to achieve national integration and international Understanding

Course Content

Unit-1: Sociology and Education

1.1 Meaning, nature and scope of sociology

1.2 Relationship between sociology and Education

1.3 Agencies of socialization (Family, peer group, school, Media, Religion

1.4 Role of Teacher in Socialization process

1.5 Impact of Socialization on Education

Unit-II: Culture and Education

2.1 Meaning and definitions of culture

2.2 Characteristics of culture

2.3 Dimensions of culture, cultural lag, cultural pluralism

2.4 Impact of culture on Education

2.5 Role of Education in preservation, transmission and promotion of culture

Unit-III: Social Change and Education

3.1 Meaning and factors responsible for Social change

3.2 Concept and attributes of Modernization

3.3 Social stratification, Social Mobility and Education

3.4 Education as a facilitator for social change

3.5 Social Networking its implications on social cohesion and education

Unit-IV: Democracy and Education

4.1 Concept and Principles of Democracy

4.2 Equality and equity in Education

4.3 Preamble of the Constitution in relation to Education

4.4 Role of Education in strengthening democracy and democratic citizenship

Teacher as a democrat

Unit-V: Education and National Integration

5.1 Concept, Need for National Integration

5.2 Education as an instrument for national integration

5.3 Programmes to promote National Integration and International understanding,

5.4 Peace education in schools

5.5 Social Crisis and its Management

CO-Po Attainment in outcome based Education

Course Name-SOCIOLOGICAL FOUNDATIONS OF EDUCATION

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Understand the sociological basis of Education
2	CO_2	Understand the impact of culture and socialization on Education
3	CO_3	Sensitize the student teacher about the impact of Education on the quality of life
4	CO_4	Understand the preamble of the constitution in the light of Education
5	CO_5	Organize various programmes to achieve national integration and international

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO1	3	2	3	2	1	3	2	3	2	2	2	3
CO2	3	2	3	3	3	3	3	3	3	2	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	2	3	3	3	3	3	3	3	2	3	3
CO5	3	2	3	3	3	3	3	3	3	2	3	3
PO Attainment	15	11	15	14	13	15	14	15	14	11	14	15

Course-VII

LEARNING AND TEACHING

Objectives

To enable the student-teachers to

1. To be aware of the process of learning and information processing
2. To gain an understanding of different theoretical perspectives on learning
3. To reflect on their own implicit understanding of the nature and kinds of learning
4. To explore the possibilities of designing learning environment and experiences at school
5. To appreciate the critical role of learner differences and social contexts in making meanings and drawing implications for schools and teachers

Course Content

Unit-1: Process of Learning

1.1 Concept of learning, types of learning and factors influencing learning

1.2 Learning process: Attention, sensation, perception, and concept formation

1.3 Memory & forgetting: concept, types of memory, applicability to learning and strategies for better management of memory.

1.4 Transfer of learning: concept, theories and types(Horizontal and Vertical)

1.5 Role of motivation in learning; methods of improving motivation

Unit-2: Behaviorist Perspectives of Learning

2.1 Trial and error - Thorndike, Laws of learning, concept and principles and classroom implications

2.2 Classical Conditioning - Pavlov, concept and principles and classroom implications

2.3 Operant Conditioning – Skinner, concept and principles and classroom implications

2.4 Compare these perspectives in terms of their merits and applicability to classroom learning

Unit-3: Cognitive and Humanist Perspectives of Learning

3.1 Cognitive perspectives of learning (insight learning – Kohler, Discovery learning - Bruner, Developmental theory of learning - Piaget, Social Learning - Bandura, Social constructivism – Vygotsky)

3.2 Humanist perspectives of learning (Learner centered approach – Rogers)

Unit-4: Teaching Process

4.1 Concept of teaching, teaching as a profession and teacher as a professional,

teaching as an art and science

4.2 Distinction between Instruction, training and teaching

4.3 Phases of teaching: planning, execution and reflection

4.4 Role of teacher in teaching learning process: teacher as a model, facilitator, negotiator, co-learner, reflective practitioner and classroom researcher

4.5 Functions of a teacher in classroom, school and community

Unit-5: Learning Environment and Learning Engagement

5.1 Meaning of learning environment and learning engagement

5.2 Creating positive and productive environment for learning - creation of emotionally safe learning environment to increase learning

5.3 Development of emotional intelligence

5.4 Role of culture in the educative process, creating culturally responsive learning environment, create cultural congruity between home and school

5.5 Assisted performance, supervised discussion and reciprocal teaching as strategies to enhance motivation and learning

Co-Po Attainment in outcome based Education

Course Name-LEARNING AND TEACHING

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	To be aware of the process of learning and information processing
2	CO_2	To gain an understanding of different theoretical perspectives on learning
3	CO_3	To reflect on their own implicit understanding of the nature and kinds of learning
4	CO_4	To explore the possibilities of designing learning environment and experiences at school

5	**CO_5**	To appreciate the critical role of learner differences and social contexts in making meanings and drawing implications for schools and teachers

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO 1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO** 4 D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO** 7 Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO** 11 ProgrammeManagement	**PO_{12}** LifelongLeering
CO_1	3	2	3	2	1	3	2	3	2	2	2	3
CO_2	3	2	3	3	3	3	3	3	3	2	3	3
CO_3	3	3	3	3	3	3	3	3	3	3	3	3
CO_4	3	2	3	3	3	3	3	3	3	2	3	3
CO_5	3	2	3	3	3	3	3	3	3	2	3	3
PO Attainment												

Course-VIII

CLASSROOM MANAGEMENT LEADERSHIP AND ACTION RESEARCH

Objectives

To enable the student-teachers to

1. understand the importance of classroom organization
2. understand the importance of classroom Management
3. develop ability to face the problems in managing the classroom.
4. understand the role of leadership of a teacher
5. undertake different action research projects to improve professional practices

Course Content

Unit-1: Classroom Organization

1.1 Classroom organization – Meaning and purpose

1.2 Classroom Seating Arrangement for different purposes

1.3 Technology integration – OHP/ LCD, Smart board, Chalk board, White board, Display boards, multimedia, E-Classroom.

1.4 Characteristics of Classroom Environment - Learner friendly and inclusive

1.5 Management and maintenance of physical and material resources to optimize access to learning; Sharing of resources – School Complex

Unit-2: Classroom Management

2.1 Classroom management – concept, need and approaches .

2.2 Managing with different types of students – Leader, Follower, passive

2.3 Classroom behavior management – problems, mistakes, disciplinary practices, corporal punishments, classroom rules, routines and regulations.

2.4 Violation of rights of children – legal consequences.

2.5 Strategies to manage behavior problems- preventive, supportive and corrective.

2.6 Time management in a classroom – Allocated time, instructional time, engaged time and Academic learning time.

Unit-3: Role of Teacher in School Functions

3.1 Teacher as a facilitator of learning

3.2 Perspective planning and coordination with authorities for support.

3.3 Accountability and self assessment of teachers and feedback mechanisms.

3.4 Conducive school environment – team work, transparency, self esteem among head teacher, teachers, students.

Unit-4: Teacher as a Leader

4.1 Concept, Nature and Characteristics of a Leader

4.2 Types of Leadership

4.3 Strategies to develop leadership qualities

4.4 Role of a teacher as a leader in managing classroom dynamics

Unit-5: Action Research in Education

5.1 Action Research – Meaning, Need and Scope

5.2 Steps in Action Research

5.3 Action Research Cycle

5.4 Action Research Problem Areas – Student, Classroom, School, Teacher, Administration, etc.

Co-Po Attainment in outcome based Education

Course Name-CLASSROOM MANAGEMENT LEADERSHIP AND ACTION RESEARCH

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Understand the importance of classroom organization and classroom Management
2	CO_2	Develop ability to face the problems in managing the classroom.
3	CO_3	Understand the role of leadership of a teacher
4	CO_4	Develop the Leadership Qualities in Student Teacher
5	CO_5	Undertake different action research projects to improve professional practices

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO$_1$ Knowledge	**PO**$_2$ Analysis	**PO**$_3$ Investigation	**PO**$_4$ D Design evelopment	**PO**$_5$ ModernTools	**PO**$_6$ Society	**PO**$_7$ Environment	**PO**$_8$ Ethics	**PO**$_9$ Teamwork	**PO**$_{10}$ Communication	**PO**$_{11}$ ProgrammeManagement	**PO**$_{12}$ LifelongLeering
CO$_1$	3	-	-	-	2	-	-	-	2	2	-	2
CO$_2$	3	2	3	2	2	-	-	-	2	2	-	2
CO$_3$	3	2	3	2	2	-	-	-	2	2	-	2
CO$_4$	2	3	2	1	2	-	-	-	2	2	-	1
CO$_5$	3	2	3	3	2	-	-	-	3	3	-	2
PO Attainment	14	09	11	08	10	-	-	-	11	11	-	09

Course-IX

ART EDUCATION

Objectives

To enable the student-teachers to

1. integrate Art with Education and become better communicator.
2. develop creative thinking through different Art forms.
3. realize that liberal arts help in making better professionals.
4. understand Art as a medium of expression.
5. understand the role of Art as a medium of Education.

Course Content

Unit-1: Art and Aesthetics

1.1 Aesthetics – as a branch of Philosophy.

1.2 Aesthetics – its meaning, dimensions and constituents.

1.3 Art as a form of Aesthetics.

1.4 Indian Art and Rasa principle.

1.5 Importance of Arts in Education

Unit-2: Art and Education

2.1 Art as a medium of education.

2.2 Art as a unifying principle in education.

2.3 Art and Society.

2.4 Art and Human development.

2.5 Art for self- expression, keen observation, and sense of appreciation.

Unit-3: Place of Visual Art and Performing Arts in Teaching

3.1 Different forms of visual and performing Arts.

3.2 Teaching as an Art.

3.3 Drama as a form of Teaching.

3.4 Identification of local Art forms and their integration to teaching – learning.

3.5 Evaluation strategies; assessing the different forms of Art.

Unit-4: Contributions made by Contemporary thinkers on Art and Education

4.1 Rabindranath Tagore

4.2 A.K. Coomara Swamy

4.3 Herbert Read

4.4 Elliot Eisener

Unit-5: Art and Craft in Education

5.1 Art in Craft

5.2 Craft in Art

5.3 Traditional Craft and their relevance to Education

5.4 Local Craft and their place in SUPW

5.5 Indian Festivals and its Artistic significance

CO-Po Attainment in outcome based Education

Course Name-ART EDUCATION

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Integrate Art with Education and become better communicator.
2	CO_2	Develop creative thinking through different Art forms.
3	CO_3	Realize that liberal arts help in making better professionals.
4	CO_4	Understand Art as a medium of expression.
5	CO_5	Understand the role of Art as a medium of Education.

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO1	3	3	1	3	2	3	2	3	3	2	3	2
CO2	3	2	1	2	2	3	2	3	3	2	3	3
CO3	1	2	1	2	1	2	2	3	2	2	2	1
CO4	3	2	2	2	2	2	2	2	2	2	2	2
CO5	3	2	1	2	2	3	2	2	2	2	2	2
PO Attainment	13	11	06	11	09	13	10	13	12	10	12	10

SEMESTER-III

Course-X

PEDAGOGY OF MATHEMATICS

Objectives

To enable the student-teachers to

1. Appreciate Mathematics as a tool to engage the mind of the student
2. Appreciate mathematics to strengthen the students resource
3. See mathematics as something to talk about to communicate through to discuss among themselves to work together on.
4. Construct appropriate assessment tools for evaluating mathematics learning.
5. Stimulate curiosity, creativity and inventiveness of mathematics

Course Content

Unit-1: Mathematics Curriculum:

1.1 Meaning and objectives of curriculum

1.2 Principles for designing and Organizing Curriculum

1.3 Approaches for Organizing Curriculum

1.4 Meaning of syllabus and difference between syllabus and curriculum

1.5 Recommendations and critical appraisal of NCFSE- 2005, APSCF – 2011 and other commissions on Mathematics curriculum.

1.6 Discussion of important concepts, principles and processes from the topics of the branches as specified below.

i. Arithmetic: Development of number system, Ratio and Proportion, Percentages and other topics based on them.

ii. Algebra: Sets and Operations on them, Systems of Linear Equations and their graphical solutions, Quadratic Equations, theory of Indices and Logarithms, Reminder and factor theorems.

iii. Probability and Statistics: Basic concepts of Probability, Representation of data, Measures of Central Tendencies.

vi. Geometry: Theoretical, Practical and Co-ordinate Geometry, Distance formula, section formula.

Menstruation; Areas and Volumes

v. Trigonometry: Trigonometrical Ratios, Identities. Composite Angles, Multiple and Sub multiple angles, Heights and Distances.

Unit-2: Language and Aesthetic sense of Mathematics

2.1 Aesthetic Sense in Mathematics; three aesthetic experience variables identified

by Brikhoof and their relation.

2.2 Co-existence of Precision and beauty in Mathematics- order pattern, structure and symmetry

2.3 Recreational Mathematics – Mathematical games, puzzles, and riddles.

2.4 Language of Mathematics

Unit-3: Assessment and Evaluation

3.1 Testing of Mathematical abilities of children

3.2 Meaning of Assessment, measurement and evaluation in mathematics

3.3 Achievement test in mathematic- Arithmetic, Algebra, and Geometry.

3.4 Speed test in Mathematics - Arithmetic, Algebra, and Geometry.

3.5 Preparation of test items – Precautions to be taken while preparing test items in different branches of mathematics

3.6 Concept of CCE and measurement of different behavioral changes like interest attitude, and aptitude in learning mathematics.

Unit-4: Mathematics for all

4.1 Speed and accuracy in Mathematics

4.2 Understanding Learners – Gifted slow, backwardness and dyscalculia

4.3 Activities enriching Mathematics learning- Mathematical Clubs, fairs and its activities, Olympiad, Recreational activities

4.4 Mathematic Laboratory and its effective use

4.5 Teaching learners with special needs - Co-operative learning, Peer learning, Reciprocal learning – Breur, using technology to meet diverse needs of learners.

Unit-5: Professional Development in Mathematics Teacher

5.1 In-service programmes for Mathematics Teacher

5.2 Mathematics Teachers Associations – Role, and Uses

5.3 Journals and other resource material in Mathematics Education

5.4 Professional Growth – Participation in conferences/Seminars/ Workshops and E-Learning

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF MATHEMATICS

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Appreciate Mathematics as a tool to engage the mind of the student
2	CO_2	Appreciate mathematics to strengthen the students resource
3	CO_3	. See mathematics as something to talk about to communicate through to discuss among themselves to work together on.
4	CO_4	. Construct appropriate assessment tools for evaluating mathematics learning
5	CO_5	. Stimulate curiosity, creativity and inventiveness of mathematics

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO 1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO 4** D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO 7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO 11** ProgrammeManagement	**PO_{12}** LifelongLeering
CO_1	3	2	2	1	3	3	2	3	3	3	2	3

CO_2	3	3	1	1	2	1	1	3	2	2	2	2
CO_3	3	3	2	2	3	2	2	3	3	3	2	2
CO_4	3	3	1	1	2	2	2	3	3	2	2	2
CO_5	3	3	1	1	3	2	1	3	3	2	2	2
PO Attainment	15	14	07	06	13	10	8	15	14	12	10	11

Course-X

PEDAGOGY OF SOCIAL SCIENCES

Objectives

To enable the student teachers to

1. understand the teaching and learning of geography, economics, history, political science and identify the difference among them
2. understand the importance of social science curriculum and its organization
3. understand various teaching aids for social sciences
4. understand the assessment process through CCE
5. sensitize and equip teachers to handle social issues and concerns in a responsible manner

Course Content

Unit-1: Teaching and Learning of Geography and Economics

1.1 Fundamental concepts of Geomorphology - Latitudes, longitudes, earth movements, climatology, temperature, pressure, wind, humidity; Hydrology and Oceanography – Hydrological Cycle, Ocean and Ocean deposits

1.2 Indian Geography-Political divisions, Rivers and Landforms

1.3 Meaning, Nature and Scope of Economics; Key concepts in Economics

1.4 Classification of Economic Systems

1.5 Teaching strategies of geography and economics

Unit-2: Unit-VII: Teaching Learning of History and Political Science

2.1 Periodisation of World History, Indian History – Ancient, Medieval, Modern and Contemporary society with special reference to Secondary School Social Studies Textbooks

2.2 Capitalism, Democracy and Citizenship – American and French Revolutions

2.3 Nature and Scope of Political Science; Key concepts and current trends

2.4 Indian Constitution – Fundamental Rights and Duties; Organs of Government-Legislature, Executive and Judiciary

2.5 Teaching Strategies of Teaching History and Political Science

Unit-3: Social Science Curriculum

3.1 Curriculum – Meaning, Nature and Scope

3.2 Principles of Social Sciences Curriculum Construction

3.3 Approaches of organizing social studies curriculum – concentric, spiral, chronological, topical and correlation

3.4 Qualities and Characteristics of Good Social Science Textbook

3.5 Analysis of Social Science Textbook of State Board and CBSE

Unit-4: Teaching Learning Material in Social Sciences

4.1 Need and significance of Teaching Learning Material in Teaching Social Sciences

4.2 Globe and Maps – Types of Maps – Map Language, Map Reading and Map Making

4.3 Charts and Graphs – Types of Charts – Chronology, Tabular, Diagrammatic and Pictorial; Types of Graphs – Bar, Pie, Line and Pictorial

4.4 Models – Working, Still and Diorama

4.5 Objects, Specimens and Scrap book

Unit-5: Evaluation in Learning Social Sciences

5.1 Meaning, Nature and Characteristics of Evaluation

5.2 Forms of Evaluation

5.3 Quantitative and Qualitative Tools of Evaluation in Social Sciences

5.4 CCE Model of assessment in social sciences

5.5 Analysis and Interpretation of test scores

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF SOCIAL SCIENCES

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Understand the teaching and learning of geography, economics, history, political science and identify the difference among them
2	CO_2	Understand the importance of social science curriculum and its organization
3	CO_3	Understand various teaching aids for social sciences
4	CO_4	Understand various teaching aids for social sciences
5	CO_5	Understand the assessment process through CCE

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO1	3	3	3	2	3	3	2	3	3	2	2	3
CO2	3	3	3	3	3	3	3	3	3	2	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	3	3	3	3	3	3	2	3	3
PO Attainment	15	15	15	14	15	15	15	15	15	11	14	15

Course-X

PEDAGOGY OF BIOLOGICAL SCIENCES

Objectives

To enable the student-teachers to

1. Understand the curriculum development issues in biological science
2. Identify the role and use of laboratory, ICT, and TLM in the teaching of biological science teaching effectively
3. Develop the skill of writing lesson plan period plan
4. Develop micro teaching skills
5. Develop the skill of constructing test papers

Course Content

Unit-1: Biological Science Curriculum and Textbooks

1.1 Meaning and Definitions of curriculum

1.2 Principles of Curriculum Construction

1.3 Organizational Approaches of Curriculum: Logical, Psychological,

1.4 Topical concentric and spiral

1.5 Steps involved in the development of science curriculum

1.6 Basic Criteria of Validity of a Science Curriculum context, - Cognitive, Process, Historical, Environmental Science and Ethical Validity

1.7 Curriculum at upper Primary, Secondary and Higher secondary stages.

1.8 National Curriculum Framework, 2005 – Position paper on Science

1.9 Andhra Pradesh State Curriculum Framework 2011- Science

1.10 Qualities of good biological science text books

1.11 Analysis of Secondary School Biological Science text book

Unit-2: Biological Science Laboratory

2.1 Importance of practical work in Biological Science

2.2 Planning of science laboratories, Lecture cum laboratory, all-purpose laboratory, mobile science laboratory

2.3 Procurement, care and maintenance of laboratory equipment

2.4 First Aid

Unit-3: Teaching Learning Materials

3.1 Edgar Dale's Cone of experience

3.2 Audio, visual Instructional aids

3.3 Activity aids (Aquarium, Vivarium, Terrarium, Herbarium), Electronic Teaching Aids

3.4 Improvisation of Teaching aids

Unit-4: Resources for Teaching Biological Science

4.1 Science Kit

4.2 Science library

4.3 Science club

4.4 Science exhibition and science fair

4.5 Science Museum

4.6 Community Resource

Unit-5: Evaluation in Biological Science

5.1 Concept of test, measurement and evaluation

5.2 Evaluation- meaning, types, Process, and tools

5.3 Qualities of a Good test and types of tests

5.4 Preparation of Continuous Comprehensive Evaluation (CCE) Record

5.5 Analysis and interpretation of test scores.

5.6 Assessment of performance of the student, electronic assessment

5.7 Preparation of portfolio

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF BIOLOGICAL SCIENCES

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Understand the curriculum development issues in biological science
	CO_2	. Identify the role and use of laboratory, ICT, and TLM in the teaching of biological science teaching effectively
3	CO_3	Develop the skill of writing lesson plan period plan
4	CO_4	Develop teaching skills

5	**CO_5**	Develop the skill of constructing test papers

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO 1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO 4** D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO 7** Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO 11** ProgrammeManagement	**PO_{12}** LifelongLearning
CO_1	3	2	3	1	2	2	3	3	2	2	-	2
CO_2	3	3	3	3	2	2	3	3	2	3	-	3
CO_3	3	3	3	3	3	1	2	3	3	3	-	3
CO_4	3	3	3	3	3	1	2	3	3	3	-	3
CO_5	3	3	3	3	3	2	1	3	3	3	-	2
PO Attainment	15	14	15	13	13	08	11	15	13	14	-	13

Course-XI

PEDAGOGY OF PHYSICAL SCIENCES

Objectives

To enable the student-teachers to

1. understand the importance of physical science curriculum and its organization
2. develop the skill, procurement and maintenance of the science laboratory.
3. equip the resources for effective teaching of physical sciences.
4. utilize the applications of science and technology on society.
5. construct the achievement test on CCE model and analyze the results

Course Content

Unit-1: Science Curriculum and Textbooks

1.1 Curriculum - Concept and Meaning, Principles of Curriculum Construction

1.2 Different Approaches of Curriculum Organization: Concentric, Topical, Psychological & Logical – Learner Centered curriculum

1.3 Curriculum organization in terms of NCF-2005, RTE-2009, NCFTE-2009, APSCF-2011

1.4 Characteristics of a Good Physical Sciences Text Book

1.5 Learning Resources for Physical Science – Exploring alternative resources

Unit-2: Instructional Material for Physical Sciences Teaching

2.1 Importance of Practical Work in Physics and Chemistry

2.2 Planning and Organization of Science Laboratories, Procurement and Care of Laboratory Equipment, Registers, Safety and First-Aid – Conduct of Laboratory experiments

2.3 Development of Improvised Apparatus for concrete and abstract concepts

2.4 ICT and multimedia resources for teaching Physical Sciences - Simulated computer based laboratory activities

2.5 Self Learning Material (SLM) – Characteristics and Functions - Preparation of Self Learning Material on one lesson – Analysis of its Effectiveness by Classroom Discussion and Preparation of SLM by each student for their classroom use

Unit-3: Lifelong Physical Sciences Learning

3.1 Science Clubs, Science Exhibition, Science Museums, Science Fairs and Olympiads

3.2 Role of Government and Non-Governmental Organizations in the Propagation of Science

3.3 Utilizing Knowledge Resources – Identification of online and offline resources – context and challenges in Utilization

3.4 Science Communication in India – DST-NCSTC Network – National Children Science Congress, National Teachers Science Congress, Initiative for Research and Innovation in Science

3.5 Development of Scientific Temper and encouraging and inspiring students to choose science as career and to become scientists

Unit-4: Professional Development of Physical Sciences Teachers

4.1 Professional development of Physical Sciences Teachers

4.2 Participation in Seminars, Conferences, Workshops and In-service Training Programmes

4.3 Membership in Professional Organisations; Teachers as a community of learners

4.4 Role of reflective practices in professional development of physical science teachers

4.5 Teacher as a researcher: Action Research in Physical science - Learning to understand how children learn science

Unit-5: Evaluation in Physical Science

5.1 Evaluation of Learning Outcomes in Physical Sciences

5.2 Qualities of a good test - Written and Practical

5.3 Planning, Preparation and Conduct of Achievement Test in CCE model

5.4 Evaluation of Responses, Scoring and Tabulati

5.5 Analysis and Interpret

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF PHYSICAL SCIENCES

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	. understand the importance of physical science curriculum and its organization
2	CO_2	develop the skill, procurement and maintenance of the science laboratory
3	CO_3	equip the resources for effective teaching of physical sciences

4	**CO_4**	utilize the applications of science and technology on society
5	**CO_5**	construct the achievement test on CCE model and analyze the results

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO4** D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO7** Environment	**PO_8** Ethics	**PO_9** Teamwork	**PO_{10}** Communication	**PO11** ProgrammeManagement	**PO_{12}** LifelongLeering
CO_1	3	3	3	2	3	3	2	3	3	2	3	2
CO_2	3	3	3	2	3	3	1	3	3	2	2	2
CO_3	3	3	3	3	3	2	1	3	3	2	2	2
CO_4	3	3	3	3	3	3	1	3	3	2	2	2
CO_5	3	3	3	3	3	3	1	3	2	2	2	2
PO Attainment	15	15	15	13	15	14	06	15	14	10	11	10

Course-XI

PEDAGOGY OF ENGLISH

Objectives

To enable the student-teachers to

1. get acquaintance with skills of communication for classroom teaching
2. develop creativity among learners
3. use multilingualism as a strategy in the classroom situation
4. understand the basics of English grammar
5. develop the skills of presentation of vocabulary

Unit-1: Language across Curriculum

1.1 Need for Communication

1.2 Communication for classroom teaching

1.3 Classroom interaction patterns

1.4 Interpersonal skills

1.5 Individual/Pair/Group activities

Unit-2: Teaching of Grammar

2.1 Need and importance of teaching Grammar

2.2 Types of Grammar and Techniques of Teaching Grammar

2.3 Using Authentic materials to teach Grammar

2.4 Grammar Games and the related activities

2.5 Remedial teaching in Grammar

Unit-3: Teaching Vocabulary, Study and Reference skills

3.1 Selecting and Grading vocabulary items

3.2 Techniques of teaching vocabulary

3.3 Vocabulary games

3.4 Techniques of teaching Study Skills: Note-making/Note-taking/Mind mapping/Brain-storming

3.5 Techniques of teaching Reference Skills: Dictionary, Thesaurus, Encyclopedia and Bibliographies

Unit-4: Introduction to Phonetics

4.1 Vowels and Diphthongs

4.2 Consonants

4.3 Stress

4.4 Intonation

4.5 Techniques of using Language Laboratory

Unit-5: Language Assessment and Evaluation

5.1 Concept of Evaluation and Characteristics of a good test in English

5.2 Progress and assessment of development of language skills; CCE; techniques of evaluation – oral and written; self evaluation; peer evaluation; group evaluation.

5.3 Typology of questions: activities and tasks reflecting - problem solving, creative and critical thinking and enhancing imagination.

5.4 Preparing tests for different skills of language – Listening, speaking, reading, writing, study skills and reference skills

5.5 Preparation of Scholastic Achievement Test (SAT) giving weightages to objectives and learning expriences.

CO-Po Attainment in outcome based Education

Course Name-PEDAGOGY OF ENGLISH

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Get acquaintance with skills of communication for classroom teaching
2	CO_2	develop creativity among learners
3	CO_3	use multilingualism as a strategy in the classroom situation
4	CO_4	understand the basics of English grammar
5	CO_5	develop the skills of presentation of vocabulary

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO1	3	3	2	3	3	3	2	3	3	3	2	3
CO2	3	3	2	2	3	2	1	3	3	3	3	3
CO3	3	3	3	2	3	2	1	3	3	3	2	3
CO4	3	3	3	3	3	3	1	3	3	3	3	3
CO5	3	3	3	3	3	2	1	3	3	3	3	3
PO Attainment	15	15	13	13	15	12	06	15	15	15	13	15

భాషావిద్య (తెలుగు)

లక్ష్యాలు:

రెండేళ్ళ శిక్షణ పూర్తి చేసుకున్న ఛాత్రోపాధ్యాయులు:

1) పద్యం, గద్యం, వ్యాకరణం, వ్యాసం, కథ నాటిక మున్నగు ప్రక్రియల బోధనను సమర్థంగా నిర్వహించగలరు.
2) పాఠ్యబోధనకు అనువైన వ్యూహాలు, బోధన సామాగ్రిని ఎంపిక చేసుకుంటారు.
3) విద్య ప్రణాళిక, విషయ ప్రణాళిక, పాఠ్యపుస్తకాల మధ్యగల సంబంధాలను అవగతం చేసుకుంటారు.
4) భాషా మూల్యాంకనం భావనలను అర్థం చేసుకొని, తమ విద్యార్థుల పై లబ్ధిని వివిధ మూల్యాంకన విధానాల్లో అంచనావేస్తారు.
5) భాషాభ్యసనం/బోధనల్లో భాషా ప్రయోగశాల, కంప్యూటర్ల ప్రాధాన్యతను గుర్తిస్తారు. తమ బోధనలో వినియోగిస్తారు.
6) తెలుగు భాషాసాహిత్యాలు, ప్రజల సంస్కృతి వారసత్వాల ఎడ స్పృహను పెంపొందించుకొని తమ విద్యార్థులలో సంస్కృతిస్పృహను పెంపొందిస్తారు.

I. భాష - సాహిత్యం - సౌందర్య శిల్పము

భాష - ఆలోచనలు-సృజనాత్మకత

భాష వివిధ సాహిత్య ప్రక్రియలు - లక్షణాలు (1వ తరగతి నుండి 10వ తరగతి తెలుగు ప్రథమ ద్వితీయ భాషా పాఠకాల్లో పరిచయమైన ప్రక్రియలు)

పద్యప్రక్రియలు - ఇతిహాస కవిత - పురాణ కవిత - కావ్యకవిత - ఆధునిక పద్యం

వచన ప్రక్రియలు - గద్యం - లేఖ - వ్యాసం - సంపాదకీయం - జీవిత చరిత్ర, ఆత్మకథ - దినచర్య - యాత్రాకథనం - కథానిక

నాటక ప్రక్రియలు - సంభాషణ - నాటిక

బాల సాహిత్యం - భావ కవిత్వం - అభ్యుదయ కవిత్వం - విప్లవ కవిత్వం - స్త్రీవాద సాహిత్యం - దళిత వాద సాహిత్యం -మైనారిటీ వాద సాహిత్యం, జాతీయోద్యమ కవిత్వం - అంధ్రోద్యమ కవిత్వం - శాస్త్ర సాహిత్యం.

ఇతర ప్రధాన ప్రక్రియలు - నవల, నవలిక ఇత్యాదులు

తెలుగు సాహిత్య చరిత్రలో ప్రముఖ రచయితలు - కవులు - కవయిత్రులు

II. **భాషాసాహిత్యాలు - బోధనాప్రక్రియలు:**

గద్య బోధన - వాచకబోధన - ఉపవాచక బోధన -పద్యబోధన-సంభాషణ/నాటక బోధన-వ్యాకరణ బోధన-వ్యాస రచన బోధన- కథా బోధన.

(యూనిట్ - III లో పొందుపరచిన పద్ధతులు అన్వయం చేసుకోవాలి)

- భాషా సాహిత్యాల బోధనలో ప్రాధాన్యతలు - భాష - పరిసరాలు విద్యార్థుల అనుభవాలు ఆసక్తులతో సమన్వయం.
- ప్రశంసా శక్తిని, సృజనాత్మకతలను పెంపొందించుటకు ప్రకియల బోధన

III. **భాషాభ్యసనం, బోధన ప్రణాళికలు, బోధన సామాగ్రి నిర్మాణం.**

* **విద్యా ప్రణాళికలు:**

విద్యా ప్రణాళికల్లో తెలుగు భాషా స్థానం (మాతృభాషగా మాధ్యమ భాషగా)

డిజిటల్ మాధ్యమాలు:

* పాఠ్యపుస్తకం- నిర్మాణం - లక్షణాలు.
* తగరతి బోధన ప్రణాళికలు - వార్షిక పథకం - సమగ్ర పాఠ్యపథకం - దైనిక పాఠ్యపథకం. ఆవశ్యకత- మౌళిక భావనలు - తయారీలో మెలకువలు.
* భాషా సహ పాఠ్య కార్యక్రమాలు - భాషా క్రీడలు - రచనా క్రీడలు - భాషణ క్రీడలు - భాషా సాహిత్య యాత్రలు - సాహిత్య సభలు.

* **గ్రంథాలయాలు** : పరామర్శ గ్రంథాలు - నిఘంటువులు - విజ్ఞాన సర్వస్వాలు-మూల గ్రంథాలు-వినియోగం.
* **భాషా బోధనాభ్యసన ఉపకరణాలు:** భాషా ప్రయోగ శాల - కంప్యూటర్లు, దృశ్యశ్రవ్య, శ్రవ్య దృశ్య - ద్విమితీయ, త్రిమితీయా ఉపకరణాలు.
* **మాధ్యమాలు:** అచ్చుమాధ్యమాలు-దృశ్యమాధ్యమాలు (ప్రింట్ అండ్ విజువల్ మీడియా)

IV. **భాషాభ్యసనం - బోధన - ఆధునిక ధోరణులు.**

* కార్యక్రమయుత బోధన - బృంద బోధన, నియోజనాల బోధన (వ్యక్తి పద్ధతి) కంప్యూటర్ సహాయక బోధన/ అభ్యసనం-లోపనివారణ - బోధన కృత్యాధార బోధన, స్వయం అధ్యయనం పర్యావేక్షణాత్మక అధ్యయనం - మౌలిక భావనలు - పరిమితులు.

భాషా సాహిత్య కృషిలో వివిధ సంస్థలు :

తెలుగు అకాడమీ - ఆంధ్రసాహిత్య పరిషత్ (కాకినాడ), వేటపాలెం గ్రంథాలయం -సి.పి. బ్రౌను అకాడమీ, కడప-తెలుగు విశ్వవిద్యాలయం, తిరుపతి ప్రాచ్యలిఖిత పుస్తక భాండాగారము ఆంధ్రప్రదేశ్ సాహిత్య అకాడమీ, లలిత కళా అకాడమీ, నాటక అకాడమీలు, తదితర సంస్థలు

V. **భాషాభ్యసనం - బోధన - మూల్యాంకనం:**

మూల్యాంకనం - పరీక్ష - నికష - పరిగణన, భావనలు- సామర్థ్యాధారిత మూల్యాంకనం - నిరంతర సమగ్ర మూల్యాంకనం- రూపణ మూల్యాంకనం - సంకనల మూల్యాంకనం - లోప నిర్ధారణ మూల్యాంకనం ప్రాగ్నస్టిక్ మూల్యాంకనం మూల్యాంకనానికి ప్రశ్నపత్రాలు - ప్రశ్నల తయారీ- వివిధ ప్రశ్నారూపాలు, ప్రశ్నల లక్షణాలు - మెలకువలు- పాఠాంత నికషలు - అంతర్గత మూల్యాంకనం - బాహిర మూల్యాకనం, విద్యార్థులు/అభ్యాసకుల స్వీయ మూల్యాంకనం- మూల్యాంకనం - భాషా కౌశల నికషలు - శ్రవణ నికష - పఠన నికష - భాషణ నికష - లేఖన నికష - అభిరుచి నికష-అసక్తి నికష - సృజనాత్మక నికష, ప్రశంసానికష, భాషా స్నేహ నికష - నిర్మాణం - విశ్లేషణ - మెలకువలు - మాదిరి సమాధాన పత్రాలు- ప్రశ్నపత్రాల సమాధానాలను పరిచూచుట - ఫలితాల నివేదన -గ్రేడింగ్ - ఫలితాల వ్యాఖ్యానం

బోధన సంబంధ కృత్యాలు:

1. ఏవేని మూడు స్థానిక వార్తాపత్రికల్లోని – సంపాదకీయ వ్యాసాలు, వార్తా వ్యాఖ్యలను సమీక్షించి, ముఖ్యభావనలను, భాషా లక్షణాలను క్రోడీకరించి, వ్యాసరూపంలో నివేదిక తయారు చేయుట.
2. నచ్చిన ఒక కవి/రచయితల ఒక కవిత/కథను ప్రశంసిస్తూ రాయుట.
3. కార్యక్రమయుత బోధనపై ఒక పాఠం సిద్ధం చేయించుట.
4. బాలల పత్రికలు – భాషాభ్యసనానికి వాటి తోడ్పాటుపై పిల్లల అభిప్రాయ సేకరణ.
5. స్థానిక భాషా విశేషాలు – జాతీయాలు – సామెతలు – పొడుపు కథలు – సేకరణ.

పరామర్శ గ్రంథాలు:

కోర్సు V నందు పొందుపరచబడినవి.

Co-Po Attainment in outcome based Education

Course Name- Pedagogy of Telugu

Course Outcome

Sl. No	Course Number	Co's Description
1	CO_1	పద్యం, గద్యం, వ్యాకరణం, వ్యాసం, కథ నాటిక మున్నగు ప్రక్రియల బోధనను నిర్వహించ్తారు.
2	CO_2	పాఠ్యబోధనకు అనువైన వ్యూహాలు, బోధన సామాగ్రిని ఎంపిక చేసుకుంటారు.
3	CO_3	విద్య ప్రణాళిక, విషయ ప్రణాళిక, పాఠ్యపుస్తకాల మధ్యగల సంబంధాలను అవగతం చేసుకుంటారు.
4	CO_4	భాషా మూల్యంకనం భావనలను అర్థం చేసుకొని, తమ విద్యార్థుల ఉప లబ్ధిని వివిధ మూల్యాంకన విధానాల్లో అంచనావేస్తారు.
5	CO_5	భాషాభ్యాసనం/బోధనల్లో భాషా ప్రయోగశాల, కంప్యూటర్ల ప్రధాన్యతను గుర్తిస్తారు. తమ బోధనలో వినియోగిస్తారు.

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO$_1$ Knowledge	**PO**$_2$ Analysis	**PO**$_3$ Investigation	**PO**$_4$ D Design evelopment	**PO**$_5$ ModernTools	**PO**$_6$ Society	**PO**$_7$ Environment	**PO**$_8$ Ethics	**PO**$_9$ Teamwork	**PO**$_{10}$ Communication	**PO**$_{11}$ ProgrammeManagement	**PO**$_{12}$ LifelongLeering
CO$_1$	3	3	3	2	2	3	1	3	-	3	1	2
CO$_2$	3	3	2	2	2	2	-	3	-	3	1	1
CO$_3$	3	3	2	1	2	2	-	3	-	3	2	2
CO$_4$	3	3	3	3	3	3	1	3	-	3	1	1
CO$_5$	3	3	3	3	3	3	1	3	1	3	1	1
PO Attainment	15	15	13	11	12	13	03	15	01	15	06	07

Course-XII

LEARNING ASSESSMENT

Objectives

To enable the student-teachers to

1. Understand the nature of assessment and evaluation and their role in teachinglearning process.
2. Understand the perspectives of different schools of learning on learning assessment
3. Realize the need for school based and authentic assessment
4. Examine the contextual roles of different forms of assessment in schools
5. Understand the different dimensions of learning and the related assessment procedures, tools and techniques

Course Content

Unit-1: Perspectives on Assessment and Evaluation

1.1 Meaning of Assessment, Measurement, Tests, Examination, Appraisal, and Evaluation and their interrelationships

1.2 Purpose(s) and principles of Assessment, characteristics of quality assessment

1.3 Current thinking about learning based on Behaviorist, Cognitivist and Constructivist learning theories and their implications for classroom assessmentchanging the culture of classroom assessment

1.4 Classification of assessment: based on *purpose* (prognostic, formative, diagnostic and summative), *scope* (teacher made, standardized), *attribute measured* (achievement, aptitude, attitude, etc.), *nature of information gathered* (qualitative, quantitative), *mode of response* (oral and written; selection and supply), *nature of interpretation* (self-referenced, norm-referenced, criterionreferenced) and *context* (internal, external)

1.5 Policy perspectives on examinations and evaluation: Recommendations in National Policies of Education and curriculum frameworks- continuous and comprehensive assessment

Unit-2: Formative and Summative Assessment

2.1 Formative Assessment (FA) meaning, purpose, essential elements (formative assessment in practice), major barriers to wider use of FA, role of students and teachers in formative assessments,

2.2 Observation, questioning, reflection on learning as strategies for using assessment in the process of learning;

2.3 Use of Projects, Assignments, Work sheets, Practical work, Performance-based activities and Reports as assessment devices; Self, Peer and Teacher assessments- use of rubrics,

2.4 Summative assessment: meaning, purpose, summative assessment in practice, use of teacher-made and standardized test

2.5 Aligning formative and summative assessments

Unit-3: Tools of Assessment

3.1 Assessment of cognitive learning: understanding and application; thinking skills –convergent, divergent, critical, problem solving, and decision making;

3.2 Selected-Response Assessment: Multiple Choice, Binary Choice, and Matching and Constructed Response Assessment: Completion, Short-Answer, and essay Items as tools-nature, advantages and limitations, guidelines for their construction and scoring

3.3 Assessment of affective learning: attitude and values, interest, self-concept; tools and procedures for their assessment; observation, interview, rating scales, check-lists, inventories as tools/techniques, their uses and preparation

3.4 Assessment of Performance/ project-based assessment- meaning, characteristics, scope; using rubrics to grade a performance-based assessment

3.5 Portfolios: meaning, types, purposes, guidelines for portfolio entries and assessing portfolios

Unit-4: Planning, Construction, Administration and Reporting of assessment

4.1 Planning: Deciding on what, why and how to assess- difference between instructional, learning and assessment objectives, stating of assessment objectives , deciding on the nature and form of assessment - oral tests and written tests; open book examination; weightage to content, objectives, allocation of time; Preparation of a blue print

4.2 Construction/selection of items: writing test items/questions, reviewing and refining the items, assembling the test items; writing test directions and guidelines for administration (if any), Scoring procedure – manual and electronic; Development of Rubrics

4.3 Administration, item analysis and determining item and test characteristics; Item response analysis, ascertaining student needs, identifying student interests and feeding forward for improving learning

4.4 Analysis and Interpretation of Students‟ Performance

Processing test data: graphical representations; calculation of measures of

central tendency and variability, and derived scores- percentiles, percentile rank, percentage score, grade point averages, z-scores; and Frame of reference for interpretation of assessment data: norm-referenced, criterion-referenced and self-referenced ie., relative and absolute interpretation;

4.6 Reporting Student Performance – content and formats; Progress reports, Cumulative records, Profiles, and Open house; Using feedback for reporting to different stakeholders – students, parents, and administrators

4.7 Use of Feedback for teachers‟ self-improvement and curriculumrevision

Unit-5: Issues, Concerns and Trends in Assessment and Evaluation

5.1 Existing Practices*:* Class/Unit tests, half- yearly and annual examinations, Board examinations and Entrance tests, State and National achievement surveys; Management of assessment and examinations; Use of question bank

5.2 Issues and Problems: Marking Vs Grading, Non-detention policy, Objectivity Vs Subjectivity; Impact of entrance test and public examination on teaching and learning – the menace of coaching.

5.3 Trends in assessment and evaluation*:* Online examination, Computer-based examination and other technology based examinations, Standards- based assessment – international practices

CO-Po Attainment in outcome based Education

Course Name-LEARNING ASSESSMENT

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Understand the nature of assessment and their role in teachinglearningprocess
2	CO_2	Develop assessment tasks and tools to access learners performance
3	CO_3	Analyze , Manage and Interpret assessment data
4	CO_4	Analyze the reporting procedures of learners performance in schools
5	CO_5	Understand the policy prospective on examinations and evaluation and their implementation practices

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO1	3	-	-	-	2	-	-	-	2	2	-	2
CO2	3	2	3	2	2	-	-	-	2	2	-	2
CO3	3	2	3	2	2	-	-	-	2	2	-	2
CO4	2	3	2	1	2	-	-	-	2	2	-	1
CO5	3	2	3	3	1	-	-	-	1	3	-	2
PO Attainment	14	09	11	08	09	-	-	-	09	11		09

Course-XIII

UNDERSTANDING THE SELF

Objectives

To enable the student-teachers to

1. understand that any Self is a human resource to exercise all the resources: cognitive, affective and psychomotor resources.
2. make them realize that the Self does not have independent existence but related to Nature, other selves and the „Unknown‟ causing it and this great design of the Universe.
3. make the student-teacher perform one's function to the possible extent as any part of the Nature is silently doing so; thereby developing self-actualization and selfesteem.
4. realize that one is responsible as a person and as a teacher for the integrated development of oneself and one's pupils: Physical, cognitive, social, emotional, aesthetic, moral, and spiritual developments.
5. realize the commonness and uniqueness prevalent in Nature and human nature and feel equality as the reality and contribute to the furtherance of evolution at mental level.

Course Content

Unit-1: Self as a human resource:

1.1 Cognitive resources of the self: Self-critical awareness about one‟s abilities and opportunities to develop independent thinking-critical thinking and creative thinking, decision making and problem solving and develop them as skills.

1.2 Affective resources: Feelings of love, joy, appreciation; emotions like fear, anger, jealousy, affection, happiness to be understood both as assets and threats or limiting factors.

1.3 Sensitize the ability to identify the structural and functional commonality of the human body except the organs of reproduction and allied features of the human kind.

1.4 Empathic understanding of geographical, climatic and genetic conditions causing physical differences.

Unit-2: Self in relation to social identities:

2.1 Self-critical awareness of the causes for one‟s positive and negative relations with the people based on caste, class, language, religion, nation, region etc.,

2.2 Self-critical understanding of the basic realities of the man- made divisions over the time-scale.

2.3 Critical understanding of the Nature‟s necessity of gender difference for the onset and continuity of human race.

2.4 Critical understanding of the basic realities of cultural differences across the time-scale and across the globe.

Unit-3: Self (person) as a part of the Nature:

3.1 Nature, harmony in existence and co-existence

3.2 Dependence of Self on the Nature for the very life; dependence of self on other selves for comfortable living.

3.3 Responsibility of self towards conservation, protection and enrichment of plant and animal life.

3.4 Responsibility of self towards other human beings in the family, society, and people across the globe.

Unit-4: Self in relation to profession:

4.1 Self-critical awareness of teaching competency: adequacy of subject matter knowledge, professional skills, and effective communication to the students.

4.2 Self-critical awareness of one‟s attitudes towards students, teaching, teaching material , interest in students and subject and one‟s aptitude in the inculcation of interest in students and in tapping their abilities to realize the values identified in the lesson.

4.3 Self-critical awareness of suitability of one‟s role being performed contextually to enrich learners‟ capabilities and guiding them for self-actualization while interacting.

4.4 Self-critical awareness of involvement in team work with colleagues, head of the institution parents of learners and management for the development of the learners.

Unit-5: Self- development through self-learning (Self-knowledge):

5.1 Development of self and social identities in the learners to enrich human resources and self-esteem; Realistic understanding of any self as depending on the source of the whole existence for spiritual awakening free of any religious identity.

5.2 Objective view of beliefs, prejudices and stereotypes to liberate from irrational tendencies.

5.3 Understanding human roots in animal and possibility of heights in the divinity through the philosophers like Swamy Vivekananda, Sri Aurobindo and J. Krishnamurti to awaken oneself to Truth, beauty and goodness both inside and

outside.

5.4 Yogic practices for physical, mental and spiritual health and to lay the seeds or foundations for Self-realization.

CO-Po Attainment in outcome based Education

Course Name- Understanding the Self

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	understand that any Self is a human resource to exercise all the resources: cognitive, affective and psychomotor resources
2	CO_2	make them realize that the Self does not have independent existence but related toNature, other selves and the „Unknown" causing it and this great design of theUniverse.
3	CO_3	make the student-teacher perform one's function to the possible extent as any part of the Nature is silently doing so; thereby developing self-actualization and selfesteem
4	CO_4	realize that one is responsible as a person and as a teacher for the integrated development of oneself and one's pupils: Physical, cognitive, social, emotional, aesthetic, moral, and spiritual developments.
5	CO_5	realize the commonness and uniqueness prevalent in Nature and human nature and feel equality as the reality and contribute to the furtherance of evolution at mental level.

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO_1	3	3	2	1	1	2	3	3	2	2	-	3
CO_2	2	3	2	1	1	2	2	-	2	1	-	-
CO_3	3	3	3	2	-	3	3	2	2	2	-	2
CO_4	3	3	-	1	1	2	2	2	1	2	1	2
CO_5	2	3	2	2	-	2	2	3	2	2	-	3
PO Attainment	13	15	09	07	03	11	12	10	09	09	01	10

SEMESTER-IV

Course-XIV

CONTEMPORARY INDIA AND EDUCATION

Objectives

To enable the student-teachers to

1. Understand and Contextualize ideals of the Constitution of India;
2. Appreciate humanistic agenda of the Constitution on India;
3. Value and recognize the role of education in realizing the ideals of the Constitution;
4. Develop critical awareness about the issues of education that are coming in the way of realization of the values of the Constitution;
5. Understanding and develop positive attitudes towards various forms of exclusion;

Course Content

Unit-1 Normative Vision of Indian Education: Indian Constitution

1.1 Constitution of India Basic Features

i. Fundamental Rights

ii. Directive principles of state policy

iii. Federal Structure

1.2 Preamble of the Constitution : The ideals

i. Sovereign Nation

ii. Democratic and Secular polity

iii. Liberty equality & fraternity

iv. Justice: Social, Economic and political

Unit- 2 Education as Fundamental Right

2.1 Human Rights; Meaning Nature , and Classification;

2.2 Right of Children : International convention and Indian Constitution; Education as Fundamental Right of Children-2009

2.3 Issues in Implementing RTE-2009: A critical understanding

i. Issues that affect and negate the children‟s right to education (Child Labor: Street children, abandoned and orphans)

ii. Differently abled children: Attitude towards the girl child and her participation in schooling, punishment, abuse and violence in Schools).

Unit-3 Contemporary Indian Schooling: Concerns and Issues

3.1 Equality of Educational Opportunity : Meaning and nature : Forms of inequality : Religion, Regional, Caste, Gender and other marginalized groups.

3.2 Inequality in Schooling: Public – Private schools , Rural – urban schools, Masselite schools , single teacher schools and many other forms of in-equal school systems. Critical understanding of Paradox of Equal opportunity and in-equal schooling: positive discrimination; concept and issues and policy interventions.

3.3 Schooling: Quality concerns and issues

i. Universal access

ii. Universal Enrollment

iii. Universal retention

iv. Universal success

Unit-4 Understanding Exclusion in schooling

4.1 Exclusion: Meaning and Nature

4.2 Forms of Exclusion: a) physical / Psychological Exclusion

4.3 Different types of differently abled children: Nature of problems and their impact on learning

4.4 Measure to address the issue of learning of differently abled children and professional preparedness of Institutions;

4.5 Socio-cultural and economic exclusion: Understanding different forms of socioculture and economic exclusion in schooling – Caste, Class, Gender, Minority, and other Marginalized sections of the society.

Unit- 5 Secondary Education: Concerns and Issues

5.1 Secondary School stage: its linkages with primary and higher secondary stages of education;

5.2 Aims of Secondary School Stages of Education

5.3 Universalisation of Secondary School stages of Education: Its Status

i. Quantitative expansion , Qualitative consolidation and Equity perspective – A sociological understanding;

ii. Issues in Secondary school stages of Education :Privatization, Vocationalization

iii. Reforms in Secondary School Stages Education: Curricular , Pedagogical and Examinations;

5.4 Rashtriya Madhyamika Shiksha Abhiyan (RMSA): Goals and policy intervention for Quality Secondary School Stages of Education

CO-Po Attainment in outcome based Education

Course Name-CONTEMPORARY INDIA AND EDUCATION

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Understand and Contextualize ideals of the Constitution of India
2	CO_2	Appreciate humanistic agenda of the Constitution on India;
3	CO_3	Value and recognize the role of education in realizing the ideals of theConstitution;
4	CO_4	Develop critical awareness about the issues of education that are coming in theway of realization of the values of the Constitution
5	CO_5	Understanding and develop positive attitudes towards various forms of exclusion

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO 1 Knowledge	**PO_2** Analysis	**PO_3** Investigation	**PO** 4 D Design evelopment	**PO_5** ModernTools	**PO_6** Society	**PO** 7 Environment	**PO_8** Ethics	**PO_9** Team work	**PO_{10}** Communication	**PO** 11 ProgrammeManagement	**PO_{12}** LifelongLeering
CO_1	3	2	-	2	2	3	2	3	2	2	-	1
CO_2	3	2	-	2	2	3	-	3	2	2	-	1
CO_3	3	3	1	2	2	3	2	3	2	2	2	2

CO_4	3	2	1	1	2	3	2	3	2	-	2	2
CO_5	2	2	1	1	2	2	1	3	2	2	1	2
PO Attainment	14	11	03	08	10	14	09	15	10	08	05	08

Course-XV

GENDER, SCHOOL AND SOCIETY

Objectives

To enable the student-teachers to

1. understand the gender related issues
2. develop sociological perspectives about the impact of culture. Tradition, Socialization, division of labour on gender aspects
3. create an awareness about the impact of gender on Education
4. understand the dynamics of gender perspectives and sensitization
5. create the knowledge regarding equality and its relationship to women education

Course Content

Unit-1: Basics of Gender

1.1 Concept, Meaning, Scope of gender,

1.2 The difference between sex and Gender - Gender discrimination

1.3 The characteristics of patriarchal system and its impact on Women‟sstatus

1.4 The need and importance of Women‟s Education – its benefits

Unit-2: Factors affecting gender Discrimination

2.1 Factors influencing gender differences and practices- inequality in ratio, female infanticide, feticide, crime, violence.

2.2 Religious, Physical, Sociological, Economic, Political, Legal, employment, Psychological etc **.**

2.3 Sociolisation process and its impact on decision making Women / Girls Education

2.4 Rural / Urban /Tribal Societies in relation to girls Education

2.5 Women and Girls status at present in our Society

Unit-3: Historical Perspectives and changing status of Women

3.1 Epic . Vedic age – Kaikeyi, Sathyabhama, Gargi, Maitreyi, Lopamudra etc.

3.2 Medieval age – Rami Lakshmi Bai, Chennamma, Rudramadevi.

3.3 British Age – Victoria, Elizebeth, Noorjahan

3.4 Present Age – Indira Gandhi, Sushma Swaraj, Bandaranayake, Kiranbedi, Kalpana Chawala, Prathibapatil, Meerakumar.

Unit-4: Legal issues of Gender

4.1 Women’s Rights

4.2 Legal Provisions

4.3 Equality of Sexes

4.4 Education and division of Labour – Home, School, Society, work place

Unit-5: Gender and Education

5.1 Educational provisions specially meant for girls Education

5.2 Emerging trends in the field of girls Education – Reservations

5.3 Gender as an influencing factor in course choices

5.4 Women empowerment through girls education – its need – National Development

CO-Po Attainment in outcome based Education

Course Name-GENDER, SCHOOL AND SOCIETY

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	understand the gender related issues
2	CO_2	develop sociological perspectives about the impact of culture. Tradition, Socialization, division of labour on gender aspects
3	CO_3	create an awareness about the impact of gender on Education
4	CO_4	understand the dynamics of gender perspectives and sensitization
5	CO_5	create the knowledge regarding equality and its relationship to women education

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Team work	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO_1	3	2	2	2	2	3	2	3	2	2	1	3
CO_2	2	2	2	3	2	3	2	3	1	2	2	3
CO_3	3	2	1	2	2	3	2	3	3	2	1	3
CO_4	3	2	1	1	1	3	2	3	3	2	2	1
CO_5	3	2	1	2	1	3	2	3	3	2	1	2
PO Attainment	14	10	07	10	08	15	10	15	12	10	07	11

Course-XVI

INCLUSIVE EDUCATION

Objectives

To enable the student-teachers to

1. Acquire knowledge about the concept of inclusive education for different types of special needs children.
2. Able to identify the different types of special needs children and their characteristics.
3. Develop understanding in identification and assessment of children with special needs.
4. Critically evaluate the policy perspectives emerged at national and international levels for empowering children with special needs.
5. To develop the required skills for teaching children with special needs in regular schools.

Course Content

Unit-1: Concept of Inclusive Education

1.1 Inclusive Education – concept, meaning, definition and importance.

1.2 Concept of Impairment, Disability and Handicap

1.3 Concept of Special Education, Integrated Education, Mainstreaming and Inclusive Education

1.4 Need for Inclusive Education in India for children with special needs.

Unit-2: Types and Characteristics of Children with Special Needs

2.1 Concept, types and characteristics of different types of children with special learning needs:

2.2 Children with Physical challenges– Visual, Hearing, Loco-motor and Neurological.

2.3 Children with Intellectual challenges – Gifted, Mentally Challenged, Autism (ASD) and Learning Difficulties (LD).

2.4 Children with Emotional and Behavioral deviations with special reference to ADHD and Juvenile Delinquency.

2.5 Children with Socio- cultural deviations (SC, ST, Minorities) and Linguistic Minorities.

Unit-3: Identification, Assessment and Educational Provisions

3.1 Identification, assessment and education of Children with physical challenges – Visual, Hearing, Loco-motor and Neurological.

3.2 Identification, assessment and education of Children with Intellectual challenges – Gifted, Mentally Challenged, Autism, Learning Difficulties (LD).

3.3 Identification, assessment and education of Children with Emotional and Behavioral deviations with special reference to ADHD and Juvenile Delinquency.

3.4 Identification, assessment and education of Children with Socio- cultural deviations and Linguistic minorities.

3.5 Challenges and prospects in Identification and assessment of children in inclusive education.

Unit-4: Policy Perspectives for Children with Special Needs

4.1 International Legislations –Salmanca Declaration, UNESCAP, UNCRPD

4.2 National Legislations – NPE-1986, PoA-1992, RCI Act-1992, PWD Act-1995 with latest amendments , National Trust Act-1999, RTE Act-2009

4.3 Government schemes and provisions – SSA, RMSA with special reference to the provisions and activities aimed at meeting the needs of children with special learning needs.

Unit-5: Educating Children in Inclusive Classrooms

5.1 Need for creation of physical, psychological, sociological barriers free environment within and outside the classroom

5.2 Assistive devices and technologies required for education of children with special needs in inclusive classroom

5.3 Need for parent and community involvement to promote positive behaviours and social competence in children with special learning needs

5.4 Need for multi-disciplinary approach to address the educational needs of children with special learning needs

5.5 Challenges and prospects in providing education in inclusive classrooms.

CO-Po Attainment in outcome based Education

Course Name- Inclusive Education

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	Acquire knowledge about the concept of inclusive education for different types of special needs children
2	CO_2	Able to identify the different types of special needs children and their characteristics.
3	CO_3	Develop understanding in identification and assessment of children with special needs
4	CO_4	Critically evaluate the policy perspectives emerged at national and international levels for empowering children with special needs
5	CO_5	To develop the required skills for teaching children with special needs in regular schools

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO$_1$ Knowledge	**PO**$_2$ Analysis	**PO**$_3$ Investigation	**PO**$_4$ D Designevelopment	**PO**$_5$ ModernTools	**PO**$_6$ Society	**PO**$_7$ Environment	**PO**$_8$ Ethics	**PO**$_9$ Teamwork	**PO**$_{10}$ CommunicationProgrammeManagement	**PO**$_{11}$	**PO**$_{12}$ LifelongLeering
CO$_1$	3	2	2	2	1	3	1	3	2	1	2	2
CO$_2$	3	2	3	2	2	3	2	3	1	2	2	1
CO$_3$	3	1	1	1	2	3	1	3	1	1	1	1
CO$_4$	3	2	1	1	1	3	1	3	1	0	1	1
CO$_5$	3	3	2	1	1	3	1	3	1	1	1	1
PO Attainment	15	10	09	07	07	15	06	15	06	05	07	06

Course-XVII

ENVIRONMENTAL EDUCATION

Objectives

To enable the student-teachers to

1. recognizes the concept and importance and participate in various activities of swatch bharath
2. recognizes the need and importance of environmental education.
3. identify the factor responsible for environmental degradation and environmental pollution
4. develop strategies to curb out environmental degradation in their house and locality.
5. recognizes the role of government and non government agencies in reducing the environmental issues faced by mankind.

Course Content

Unit-1: Swatch Bharath- an Environmental Awakening

1.1 Meaning, concept, definition of Swatch Bharath

1.2 Evolution of the concept of Swatch Bharath, objectives, its campaign and execution.

1.3 Integration of Swatch Bharath campaign with educational institutions

1.4 Strategies to implement the Swatch Bharath campaign in schools and other educational institutions.

Unit-2: Objectives, Scope and Nature of Environmental Education

2.1 Meaning, importance, definition, characteristics and objectives of environmental education

2.2 Importance, objectives, scope and guiding principles of environmental education.

2.3 Factors of degradation of environment – adverse socio –economic impacts of degradation of environment.

2.4 Types of pollution: Land, Air, Water, Noise, and Radiation

2.5 Green house effect - Ozone layer depletion.

2.6 Importance of need and scope of environmental conservation and regeneration.

2.7 Impact of industry/mining/transport on environment

Unit-3: Environmental Management and Protection

3.1 Need for environmental management – functions and characteristics of environmental management

3.2 Dimensions of environmental management. Factors responsible for flora and

fauna extinction

3.3 Measures to conserve flora and fauna.- causes for forest fire- measures of prevention

3.4 Major environmental problems in India – Environmental protection and polices in India

3.5 Need and objectives of conservation – Environmental conservation measures taken in India, waste management, alternative sources of energy, organic farming, rain water harvesting, community participation in nature resource management, water and forests.

3.6 Constitutional amendments made and Environmental laws,

Unit-4: Environmental Movements and Developments

4.1 Environmental movements in India: Silent Valley movement, Chipko movement, Narmada Bachao, Andolan, National Test Range at Balipal, Orissa.

4.2 Conditions for achieving the goals of sustainable development

4.3 Strategies for sustainable development in India

4.4 The Stockholm conference 1972 – Brundtland commission 1983 –Nairobiconference 1982 – The Rio Summit 1992

4.5 The Rio Declaration at the earth charter – Major achievements of the Rio Summit – Main features of the Rio Declaration

4.6 Kyoto conference and part on Global Warming 1997.

Unit-5: Environmental Education in the School Curriculum and Means to Sensitize the Students

5.1 Environmental education at Primary, Secondary and Higher Education level

5.2 Major constraints for its implementation at these levels.

5.3 Teacher‟s role – national resource center for environmental education.

5.4 Characteristics of good teaching method.

5.5 Seminar, Workshop, Problem–solving, Field trips and Surveys, Projects, Exhibition and other methods.

5.6 Relative efficiency of teaching methods, Role of IT and media in environment and human health.

CO-Po Attainment in outcome based Education

Course Name- Environmental Education

Course Outcome

Sl.No	Course Number	Co's Description
1	CO_1	recognizes the concept and importance and participate in various activities of swatch bharath
2	CO_2	Recognizes the need and importance of environmental education.
3	CO_3	Develop the strategies to curb our environmental degradation in their house and locality
4	CO_4	Recognize the role of teacher in a school in promoting the environmental awareness among the children
5	CO_5	Develop strategies to sensitize the students regarding the environmental problems faced in a country

CO-PO MappingMatrix/ProgrammeArticulationMatrix:

	PO1 Knowledge	**PO2** Analysis	**PO3** Investigation	**PO4** D Design evelopment	**PO5** ModernTools	**PO6** Society	**PO7** Environment	**PO8** Ethics	**PO9** Teamwork	**PO10** Communication	**PO11** ProgrammeManagement	**PO12** LifelongLeering
CO1	2	1	2	2	-	3	3	3	2	2	2	3
CO2	3	-	-	-	2	3	3	2	-	2	-	2
CO3	3	3	3	3	3	3	3	1	2	2	2	3
CO4	3	2	-	-	2	3	3	-	2	2	-	2
CO5	3	3	3	3	3	3	3	2	-	2	-	2
PO Attainment	14	09	08	08	10	15	15	08	06	10	-	12

B.Tech. Program Regulations

Scheme of Instruction & Syllabus



DEPARTMENT OF CHEMICAL ENGINEERING

S V UNIVERSITY COLLEGE OF ENGINEERING

TIRUPATI- 517502

About the Department

Department is ranked 17 in top 20 National Universities in Chemical Engineering based on publication output (122 papers ,973 citations) as per "measures of performance of Universities in India: An Analysis of the Publication output in Science and Technology CSIR – National Institute of Science and Technology and Development Studies, New Delhi,2011. Department of Chemical Engineering, established in 1977, offers an undergraduate and a postgraduate course in chemical engineering, besides providing research guidance leading to a doctoral degree. The curriculum is regularly revised to incorporate newer subjects and the present curriculum is well balanced to meet the requirements of the industry and higher learning institutions. Three elective courses on advance topics are offered at the undergraduate level. One general and three electives in one of the following streams bioprocess engineering/high polymer engineering/energy engineering, are taught at postgraduate level. The laboratories of this department are well equipped with facilities to conduct about 100 experiments, at undergraduate and postgraduate level. Project work/dissertation on process analysis/design/core soft/experimental themes is to be submitted by undergraduates as a part of the curriculum. Postgraduate dissertations based on experimental or modelling and simulation study over a period of 1 year are prescribed. Students have been performing consistently well in GATE and recruitment tests conducted by various organizations. On an average 30% secure admission into M.Tech program of IIT's and IISc Bangalore, 45% are placed in the campus recruitments and the balance joins NIT's, other universities, civil services and higher education. All India first rank was bagged by a student of this department in GATE 2009.

THE VISION

- To be a world class department of chemical engineering in effective teaching and knowledge creation which is seamlessly integrated with bordering sciences and is committed to ignite and propel young minds with passion for originality, innovation and excellence.

THE MISSION

- To train technically competent and socially aware chemical engineers through innovative and rigorous educational programs to meet technological needs of the society
- To encourage self-learning, problem solving, inquisitiveness and team work among students.
- To enable students to develop capabilities needed to perform in multidisciplinary environment.
- To promote industry- institute interaction to nurture collaborative and applied research programs
- To help students develop a well-rounded personality with qualities of innovative thinking, leadership, entrepreneurship and ethical mind.
- To create amiable ambience of academics for intellectual pursuit and innovative research

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
REGULATIONS – 2020 (R-20)
For B.Tech – Regular / Lateral Entry / Hons / Major-Minor

Henceforth, these shall be known as Regulations **R-20** and shall be applicable from the batch admitted in the academic year 2020-2021 through the State level EAMCET and ECET. They shall be applicable to B.Tech Lateral Entry admitted in 2021-2022 at the second year level (for Second, Third and Fourth years of study).

1 **System**

The system is a flexible Choice Based Credit System (CBCS) permitting students

a) To choose electives from a wide range of courses offered by the Institute or on-line platforms
b) To undergo additional courses
c) To adopt an inter-disciplinary approach

2 **Programs**

The University offers Regular B.Tech programs in

i) Chemical Engineering (ChE)
ii) Civil Engineering (CE)
iii) Electrical & Electronics Engineering(EEE)
iv) Electronics & Communication Engineering (ECE)
v) Mechanical Engineering (ME)
vi) Computer Science & Engineering (CSE)

In addition, meritorious students will have the option to choose B.Tech (Honours) or B.Tech (Major-Minor), both with extra courses and credits, in addition to those prescribed for B.Tech (Regular). Different Major-minor combinations are offered by the Institute subject to certain conditions specified herein this document

3 **Duration**

ALL PROGRAMS ARE OF FOUR YEARS DURATION, each academic year consisting of two semesters, making a total of 8 semesters.

Each semester shall consist of 18 weeks with a typical academic work of 30 hours / week of instruction, equivalent to 90 instruction days. Number of instruction days may be reduced, when necessary, with an increased number of instruction hours per week per course

4 **Instruction**

Instruction is imparted in the following format

i) Basic Courses in Sciences and Basic Engineering to form the conceptual base
ii) Professional Core Courses intended knowledge development and enhancement in the chosen discipline of study.
iii) Elective Courses, both Professional and Open, intended to (a) to provide extended knowledge in the discipline of study, (b) to provide a broadened scope in the same discipline, (c) to enable an exposure to some other disciplines and (d) to enhance students' proficiency/skill.
iv) Audit Courses intended to provide awareness of the contemporary societal issues

5 Course Code

Each course shall be identified by an alpha-numeric course code, consisting of 2 alphabets followed by three numerals. XXxyy

XX denotes the department which offers the course.

x denotes the semester in which the course is offered

yy denotes a serial number assigned by the course offering department

CE : Civil Engineering	CO : Commerce
CH : Chemical Engineering	CY : Chemistry
CS : Computer Science and Engineering	EO : Economics
EC: Electronics and Communication Engineering	EN : English
EE : Electrical and Electronics Engineering	MA : Mathematics
ME : Mechanical Engineering	PH : Physics
	HU : Humanities
	BO: Biological Sciences
	MG : Management

6 Scheme of Instruction & Syllabus

6.1 A Board of Studies (Pass) of each department, constituted by the University, with experts from internal and external academic departments , industry, society, alumni and students shall formulate the Scheme of Instruction and Evaluation of a program and the detailed syllabus content of the courses.

6.2 All the Boards of Studies (Pass) shall together formulate the scheme of instruction and examinations, and detailed syllabi for all the courses of the First and Second Semesters which shall be mostly common for all the branches of study

7 Attendance Requirement

7.1 A student is required to complete the study of the Program satisfying the attendance requirements in all the Semesters within a maximum period of eight academic years from the year of admission to become eligible for the award of B.Tech degree, failing which he/she forfeits his/her admission.

7.2 A student shall be detained in a Semester if he/she fails to satisfy the attendance requirements given below:

i) Attendance in Audit Courses shall not be considered for calculation of academic requirements

ii) A student shall attend a minimum of 50 percent of the hours of instruction taken by the teacher, in each course (Theory + Tutorial)

iii) A student shall attend a minimum of 75 percent of total instruction hours conducted during that semester – Theory + Tutorial + Practical

iv) However, a committee, headed by the Principal, can condone shortage of attendance, due to ill health of the student, up to 10 percent (65 – 75 %) for those students, who attend a minimum of 65 percent of total instruction hours with a minimum 50 percent in each course.

v) A student who fails to satisfy the attendance requirements specified in clauses 7.2 (i, ii, iii) shall be detained and will have to repeat that Semester in the subsequent academic years with the written permission of the Principal subject to the clause 7.1

vi) A student shall not be permitted to study any semester more than three times during the entire Programme of study

vii) A student who satisfies the attendance requirements specified in either of the clauses 7.2 (ii or iii) in any semester may be permitted to repeat that semester cancelling the previous attendance and sessional marks of that semester with the written permission of the Principal. However, this facility shall not be extended to any student more than twice during the entire Programme of study as specified in clause 7.1

8 **Credit -**

This is the unit by which the course work is measured. It determines the number of hours of instructions required per week. It is a weightage index, used in the computation of Grade Point Average, indicative of the student performance.

Theory / Tutorial …. 1 hr /week …. 1 credit

Practical … 2 hr/week …. 1 credit

Credit requirement for the Award of Degree : Successful performance in

B.Tech (Regular)	160 credits
B,Tech (Lateral Entry)	123 credits (II, III & IV years only)
B,Tech (Honors)	160 + 20 additional credits in the same discipline
B.Tech (Major-Minor)	160 (Major discipline) + 20 credits in another (Minor) discipline

9 **Examination – Evaluation**

9.1 Evaluation shall be carried out through Internal Tests and Semester End Examination.

9.2 For each theory course, there shall be two sessional tests. Each test is of two hours duration

carrying 40 marks. Internal Test I will be conducted around the middle of the semester, on 50 % of the course content. Internal Test II will be at the end of the semester on the second 50% of the course syllabus.

It is mandatory for a student to attend both the sessional tests in each theory course. The weighted average of the marks secured in two tests is awarded as sessional marks. A weightage of 0.8 shall be assigned for the better performance of the two tests whereas for the other test it shall be 0.2. If a student is absent for any of the internal tests for whatsoever reason, the marks awarded for that test shall be zero.

Students are permitted to verify their internal test scripts after valuation.

The valuation and verification of answer scripts of Sessional Tests shall be completed within fifteen days after the conduct of the respective Sessional Tests.

9.3End-Semester Examination is of 3 hours duration carrying 60 marks. It shall be conducted after the last working day of the semester covering the entire syllabus prescribed for that course.

The question paper for end-semester examination shall be set by an external paper setter. The Chairman, BoS shall recommend a panel comprising at least six external paper setters for each theory course to the University. The University shall arrange for setting the question paper by appointing one external paper setter from that panel

Model Question Paper for each theory course shall be prepared by the concerned teacher within 30 days from the commencement of the Semester and the same shall be forwarded to the Controller of Examinations through the Chairman, BOS concerned.

Two questions shall be set from each unit of the syllabus, out of which one question shall be answered by the student. Each question of the unit carries a maximum of 12 marks.

However, the Chairman, BoS shall accord exception in question paper format, if necessary. The question papers shall assess the understanding of the concepts and their applications in solving problems and at least 50% of the questions shall be numerical. Further, the question papers of design-oriented courses shall assess the abilities of analysing and evaluating design alternatives

The valuation of End-Semester Examination answer scripts shall be arranged by the Controller of Examinations as per the University procedures in vogue.

9.4 For each practical course except project work, the sessional marks for a maximum of 40 shall be awarded based on the continuous assessment of practical work by the teacher concerned. An End-Semester Examination of 3 hours duration carrying 60 marks shall be conducted by two examiners, one external and one internal appointed by the Principal. The Principal shall appoint the external examiner from among the panel of examiners

recommended by the Chairman, BoS concerned. He shall appoint the internal examiner nominated by the Head of the Department concerned

9.5For Project work, the guide shall assess the progress of project work continuously and award marks for a maximum of 40. A committee consisting of one external examiner and two internal examiners from the department shall value the project work and conduct viva-voce for a maximum of 60 marks.The Principal shall appoint the external examiner from among the panel of examiners recommended by the Chairman, BoS concerned. He shall appoint the internal examiner nominated by the Head of the Department concerned.

10 Course Performance

10.1 In each semester, every student who satisfies the attendance requirements has to register for the semester-end examination, failing which he/she shall not be promoted to the next semester. Any such student who has not registered for the semester-end examination in a semester shall repeat that semester in the next academic year with the written permission of the Principal.

10.2 To pass a course in the program, a student has to secure a minimum of 40% of maximum marks in the semester-end examination and a minimum Grade of P overall (both sessional and semester-end examination marks put together). A student obtaining Grade F shall be considered failed and shall be required to reappear for the semester-end examination. A student shall not be allowed to reappear for the semester-end examination in a course which he/she has already passed the course to improve the score

10.3 A student who has failed in a course shall be allowed to reappear for the semester-end examination as and when it is conducted in the normal course. The Sessional Marks obtained by the student shall be carried over for declaring the results

10.4 semester-end examination in any course of a particular regulation shall be conducted three times. Thereafter, the students who failed in that course shall take the semester-end examination in the equivalent papers of the subsequent regulation, suggested by the Chairman, BoS concerned.

10.5 Instant supplementary semester end examinations shall be conducted after announcement of IV year results for outgoing students in courses listed for IV year to save an year of time for outgoing students

11 Promotion Rules

11.1Astudentshallbepromotedfromfirstyeartosecondyearifhefulfilstheminimum attendance requirements.

11.2A student will be promoted from II year to III year if he fulfils the academic requirementof40%ofcreditsuptoeitherIIyearI-SemesterorIIyearII-Semesterfrom all the examinations, whether or not the candidate takes the examinations and secures prescribed

minimum attendance in II year II semester.

11.3 A student shall be promoted from III year to IV year if he fulfils the academic requirementsof40%ofthecreditsuptoeitherIIIyearIsemesterorIIIyearIIsemester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester

12 **Student Performance - Grading and Grade Points**

12.1 Letter Grade – Grade Point

Letter Grade is an index of the performance of students in a said course.
Grade Point is a numerical weight allotted to each letter grade on a 10-point scale

Letter Grade	**Range of Marks (Internal + End-Sem)**	**Grade Point**
O (Outstanding)	**91 – 100**	**10**
A+ (Excellent)	**81 – 90**	**9**
A (Very Good)	**71 – 80**	**8**
B+ (Good)	**61 – 70**	**7**
B (Above Average)	**51 – 60**	**6**
C (Average)	**41 – 50**	**5**
P (Pass)	**40**	**4**
F (Fail)	**<40**	**0**
Ab (Absent)	**-**	**0**

A student obtaining Grade F or Absent for a semester end examination shall be considered failed in that course and he / she shall have to reappearin the Semester- end examination as and when it is conducted in the normal course. .

12.2 Grade Point Average

Semester Grade Point Average **(SGPA)**: It is a measure of student's performance in a semester.

Cumulative Grade Point Average **(CGPA)**: It is a measure of overall performance of a student over all semesters.

Computation of SGPA and CGPA

SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses and the sum of the number of credits of all the courses in the semester.

$$\textbf{SGPA } (S_i) = \sum_{i=1}^{N} (C_i \times G_i) / \sum_{i=1}^{N} C_i$$

where C_i is the number of credits of the ith course, G_i is the grade point scored in the ith course and N is the number of courses in the semester

$$\textbf{CGPA} = \sum_{i=1}^{M} (C_i \times S_i) / \sum_{i=1}^{M} C_i$$

where S_i is the SGPA of the ith semester, C_i is the total number of credits in that semester and M is the number of semesters.

SGPA and CGPA shall be rounded off to two decimal points and reported in the transcripts.

12.3 Award of Class:

After a student has satisfied the requirements prescribed for the completion of the programandiseligiblefortheawardofB.Tech.degree,he/sheshallbeplacedinone of the following:

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

Equivalent percentage is (CGPA – 0.5) multiplied by 10.

13 **MOOCs (Online courses)**

Certain prescribed courses will have to be pursued on Online platforms. This is recommended to encourage students to tap these resources and to prepare them for self-study.

1) **A**ll open elective courses are to be successfully completed on SWAYAM online portal of Government of India

2) Courses offered by the concerned Department as Program Core / Program Elective / Audit courses shall not be opted as open elective.

3) A student is free to opt for any course relating to (a) Domain Engineering (b) General Engineering (c) management and (d) functional / technical English, in consultation with his / her Department. It should not be a course offered by the Department.

4) Opted course shall carry 3 credits and of 12 or more weeks of duration

5) A student is free to enrol and complete an online course from III semester to VII semester of his / her B.Tech program, under permission of the concerned Head of the Department.

(6) Head of the Department concerned shall make arrangement for collection and consolidation of performance certificates in online courses for onward transmission to the University.

14 Summer Internship

All students shall have to undergo Internship during summer vacation breaks, of a duration of 6 weeks after 4th or 6th semester. They shall submit a certificate from the organization concerned and present a seminar on the internship in the beginning of seventh semester for its assessment and inclusion in the 7th semester Marks Statement..

15 Gap Year

Gap year(s) shall be availed by the student himself/herself who wants to pursue entrepreneurship by taking a break of one year at any time after completing II year of study. A committee shall be constituted to evaluate the proposal submitted by the student and to decide on permitting the student to avail the Gap Year. Students shall be permitted to re-join the succeeding year from the date of commencement of class work and shall be under the academic regulations in force at that time

Gap year may be extended by another year (i.e. a total of two years) and shall not be counted for the maximum period of eight academic years for the completion of the program

16 Ranks & Awards

16.1 Ranks shall be awarded in each branch of study on the basis of Cumulative Grade Point Average (CGPA) for the top three students.

16.2 The students who have become eligible for the award of the degree by passing regularly all the eight Semesters shall only be considered for the award of ranks.

16.3 Award of prizes, scholarships and other honors shall be according to the rank secured by the student and in conformity with the desire of the Donor.

17 Grievance Redressal Committee

The Principal shall constitute a Grievance Redressal Committee of three Professors from the faculty of the college for a period of two years. The senior most among them shall be convener of the committee who receives the grievances from the students and places the same before the committee for its consideration. The committee shall submit its redressal recommendations to the Principal for his consideration

18 Amendment to Regulations

Sri Venkateswara University reserves the right to amend the regulations at any time in future without any notice. Further, the interpretation of any of the clauses of the regulations entirely

rests with the University

B.Tech (Honors) Program

Additional Regulations for B.Tech (Honours) Program

H1 Students of a Department/Discipline are eligible to opt for B.Tech (Honors) Program offered by the same Department/Discipline, to be completed within the stipulated period of 4 years.

H2 A student shall be permitted to register for B.Tech (Honours) at the beginning of IV semester, provided that the student has acquired a minimum of 8.25CGPA up to the end of II semester without any backlogs.

A student will have to consistently perform and at any later point of time, if his/her overall CGPA falls below 8.25, his/her registration for B.Tech (Honours) will be cancelled and such students will continue with the regular Program.

The credits earned in additional courses till that time will be treated as extra credits.

H3 Students can select additional and advanced courses offered by their respective department in which they are pursuing the degree and get an honors degree in the same discipline.

H4 In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shal learn20 additional credits to be eligible for the award of B.Tech(Honours)degree. This is in addition to the credits essential for obtaining the Under-Graduate Degree in Major Discipline (i.e. 160credits).

H5 Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be discipline-specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies

H6 It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.

*****

B.Tech (Major-Minor) Program

Additional Regulations for B.Tech (Major-Minors) Program

MM1 Students who are desirous of pursuing their special interest areas other than the chosendisciplineofEngineeringmayoptforadditionalcoursesinanother specified engineering discipline from among the combinations offered by the Institute.

Such a program is referred to as B.Tech (Major) in discipline A and Minor in discipline B.

MM2 Combinations will be decided, based on the compatibility, relevance, and the trend in technology, by the Boards of Studies of the participating Disciplines of Engineering. The list of combinations may alter from time to time.

MM3 A student shall be permitted to register for B.Tech(Major-Minors)at the beginning of IV semester, provided the student has acquired a minimum of 8.25CGPA upto the end of II semester without any backlogs.

A student will have to consistently perform and at any later point of time, if his/her overall CGPA falls below 8.25, (both major and minor combined) his/her registration for B.Tech (Major-Minor) will be cancelled and such students will continue with the regular major program.

The credits earned in additional courses till that time will be treated as extra credits.

MM4 The students registered for B.Tech (Major-Minors) shall have to successfully complete 160 credits (in the major discipline) and 20 additional credits (in the minor discipline) subject to clause **MM3**.

MM5 Scheme for 160 credits in the major discipline shall be the same as that ofB.Tech regular program. For the additional 20 credits, BOS of the minor degree component shall prescribe the courses, in consultation with the Chairperson, BOS of the major discipline

MM6 Of the 20 additional Credits to be acquired in the minor discipline, 16 credits shall be earned by undergoing specified four courses listed, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be minor discipline-specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board ofstudies

MM7 Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor's degree.

PROGRAM OUTCOMES

A graduate of this Department after successful completion of B.Tech, will be able

- To integrate and apply concepts of mathematics, physics, chemistry and biology to real life situations.
- To apply principles of conservation, thermodynamics, transport processes, reaction engineering and process control to analyze and design process equipment.
- To develop mathematical models of chemical engineering systems.
- To demonstrate computational abilities and use of software tools in design & simulation of process and equipment.
- To apply techniques of optimization to improve the performance of chemical processes.
- To analyze equipment and processes for retrofitting and debottlenccking.
- To conduct energy audit and suggest strategies for its conservation.
- To incorporate effective measures for environmental protection and sustainability into chemical process design.
- To participate in laboratory scale process development and scale up or scale down of processes.
- To communicate effectively in both verbal and written forms.
- To adapt to changing scenario and circumstances, with self confidence.
- To succeed in competitive examinations like GATE, UPSC

PROGRAM EDUCATIONAL OBJECTIVES

The Department of Chemical Engineering offers B.Tech (Chemical Engineering) program with the following objectives of enabling its graduates.

- To seek career as Chemical engineers in traditional Chemical industries and also in areas of manufacture of newer materials, pharmaceuticals and biological, environmental remediation and development of renewable energy sources.

- To pursue higher qualification in Chemical Engineering or a related discipline, with a view to become a researcher or an academician.

- To be able to synthesize a chemical process from simple and even complex chemistry and to translate any chemical process from conceptual to commercial stage.

- To possess good breadth in scientific and engineering knowledge so as to understand, analyze and to offer novel solutions to problems arising in today's rapidly changing increasingly technological global society.

- To be socially conscious chemical engineers through their sensitivity towards impact on environment, energy, security and sustainability.

DEPARTMENT OF CHEMICAL ENGINEERING
SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
R-20- Scheme of Instruction effective from the academic year 2020-2021

I-Semester (First Year)

Course Code	Category	Course Title	Scheme of Instruction,Hrs/Week				Credits	Scheme of Evaluation, Marks		Total Marks
			L	T	P	Total		Internal	End Sem	
MA101	Basic Sci.	Mathematics – I	3	1	-	4	4	40	60	100
CY102	Basic Sci.	Chemistry for Chemical Engg.-1	3	1	-	4	4	40	60	100
EN103	Humanities	English	2	-	-	2	2	40	60	100
EE104	Basic Engg.	Basic Electrical and Electronics Engineering	3	1	-	4	4	40	60	100
ME105	Basic Engg.	Engineering Graphics and Design	2	-	3	3	3.5	40	60	100
EN106	Humanities Lab	English Communication Lab	-	-	3	3	1.5	40	60	100
		TOTAL	**13**	**3**	**6**	**2**	**19**	**360**	**640**	**1000**

DEPARTMENT OF CHEMICAL ENGINEERING
SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI-517502
R-20 – Scheme of Instruction effective from the academic year 2020-2021
II Semester (First Year)

Course Code	Category	Course Title	Scheme of Instruction,Hrs/Week				Credits	Scheme of Evaluation, Marks		Total Marks
			L	T	P	Total		Internal	End Sem	
MA 201	Basic Sci.	Mathematics – II	3	1	-	4	4	40	60	100
PY 202	Basic Sci.	Engineering Physics	3	1	-	4	4	40	60	100
CS 203	Basic Engg.	Program for Problem Solving	2	1	-	3	3	40	60	100
CY 204	Basic Sci.	Chemistry for Chemical Engg.-II	3	1	-	4	4	40	60	100
ME 205	Basic Engg. Lab	Workshop/Manufacturing Practices	-	0	3	3	1.5	40	60	100
CS 206	Basic Engg. Lab	Program for Problem Solving Lab	-	0	3	3	1.5	40	60	100
CE 207	Audit	Environmental Science	4	0	-	4	0	40	60	100
		TOTAL	**15**	**4**	**6**	**25**	**18**	**360**	**540**	**900**

DEPARTMENT OF CHEMICAL ENGINEERING
SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI-517502
R-20 – Scheme of Instruction effective from the academic year 2020-2021
III Semester (Second Year)

Course Code	Category	Course Title	Scheme of Instruction, Hrs/Week				Credits	Scheme of Evaluation, Marks		Total Marks
			L	T	P	Total		Internal	End Sem	
MA301 B	BSC	Mathematics – III	3	0	0	3	3	40	60	100
CH302E	ESC	Engineering and Solid Mechanics	3	0	0	3	3	40	60	100
HS303C	HSS	Managerial Economics and Accountancy	3	0	0	3	3	40	60	100
CH304C	PCC	Chemical Process Calculations	3	0	0	3	3	40	60	100
CH305C	PCC	Momentum Transfer	3	0	0	3	3	40	60	100
CH306C	PCC	Chemical Engineering Thermodynamics – I	3	0	0	3	3	40	60	100
CH307L	PCC Lab	Momentum Transfer Lab	0	0	3	3	1.5	40	60	100
CH308L	PCC Lab	Analysis Lab	0	0	3	3	1.5	40	60	100
CH309S	SOC	Computer Skills	1	0	2	3	2	40	60	100
MC310A	MC	Constitution of India	2	0	0	2	0	0	100	100
		TOTAL	**20**	**0**	**8**	**28**	**23**	**360**	**640**	**1000**

			L	T	P	Total		Internal	End Sem	
CH401B	BSC	Mathematics – IV	3	0	0	3	3	40	60	100
CH402C	PCC	Particle and Fluid Processing	3	0	0	3	3	40	60	100
CH403C	PCC	Chemical Engineering Thermodynamics – II	3	0	0	3	3	40	60	100
CH404C	PCC	Heat Transfer	3	0	0	3	3	40	60	100
CH405C	PCC	Mass Transfer Operations – I	3	0	0	3	3	40	60	100
CH406C	PCC	Chemical Technology	3	0	0	3	3	40	60	100
CH407L	PCC Lab	Particle and Fluid Processing Lab	0	0	3	3	1.5	40	60	100
CH408L	PCC Lab	Heat Transfer Lab	0	0	3	3	1.5	40	60	100
CH409S	SOC	Python Programming	1	0	2	3	2	40	60	100
		TOTAL	**19**	**0**	**8**	**27**	**23**	**360**	**540**	**900**

DEPARTMENT OF CHEMICAL ENGINEERING

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI-517502

R-20 – Scheme of Instruction effective from the academic year 2020-2021

IV Semester (Second Year)

DEPARTMENT OF CHEMICAL ENGINEERING
SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI-517502
R-20 – Scheme of Instruction effective from the academic year 2020-2021

V Semester (Third Year)

L – Lecturers; T. – Tutorials; P – Practicals

S. No	Course Code	Category	Course Title	Scheme of Instruction, Hrs/Week				Credits	Scheme of Evaluation, Marks		Total Marks
				L	T	P	Total		Internal	End Sem	
1	CH501C	PCC	Mass Transfer Operations -II	3	0	0	3	3	40	60	100
2	CH502C	PCC	Chemical Reaction Engineering-I	3	0	0	3	3	40	60	100
3	CH503C	PCC	Process Dynamics And Control	3	0	0	3	3	40	60	100
4	CH504C	PCC	Material Science	2	0	0	2	2	40	60	100
5	CH505E	ESC	Industrial Management	2	0	0	2	2	40	60	100
	CH506C	PEC	Professional Elective-I	3	0	0	3	3	40	60	100
6	CH507L	PCC Lab	Mass Transfer Operations Lab	0	0	3	3	1.5	40	60	100
7	CH508L	PCC Lab	Process Dynamics & Control Lab	0	0	3	3	1.5	40	60	100
8	CH509S	SOC	Computational Techniques Lab	1	0	2	3	2	100	--	100
10	MC510A	MC	Universal Human Values	2	0	0	2	0	100	--	100
11	CH511I	Community Service Project (CSP) after second year (To be evaluated during V semester) with duration greater than 45 hours.		0	0	0	0	1.5	100	0	100
	TOTAL			**19**	**0**	**8**	**27**	**22.5**	**620**	**480**	**1100**

Category	CREDITS
Engineering Science Course – ESC	02
Professional Elective Course -PEC	03
Professional Core Course-PCC	14
Skill Oriented Course – SOC	02
Community Service	1.5
TOTAL CREDITS	**22.5**

DEPARTMENT OF CHEMICAL ENGINEERING
SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI-517502
R-20 – Scheme of Instruction effective from the academic year 2020-2021

VI Semester (Third Year)

L – Lectures; T – Tutorials; P – Practicals

Category	CREDITS
Professional Core Course-PCC	10.5
Professional Elective Course -PEC	03
Open Elective Course - OEC	06
Skill Oriented Course- SOC	2
TOTAL CREDITS	**21.5**

S. No	Course Code	Category	Course Title	Scheme of Instruction, Hrs/Week				Credits	Scheme of Evaluation, Marks		Total Marks
				L	T	P	Total		Internal	End Sem	
1	CH601C	PCC	Chemical Reaction Engineering -II	3	0	0	3	3	40	60	100
2	CH602C	PCC	Transport Phenomena	3	0	0	3	3	40	60	100
3	CH603C	PCC	Plant Design & Process Economics	3	0	0	3	3	40	60	100
4	CH604C	PEC	Professional Elective-II	3	0	0	3	3	40	60	100
5	CH605C	OEC	Open Elective – I (Through MOOCs)	3	0	0	3	3	100	--	100
6	CH606C	OEC	Open Elective – II (Through MOOCs)	3	0	0	3	3	100	--	100
7	CH607L	PCC Lab	Reaction Engineering Lab	0	0	3	3	1.5	40	60	100
8	CH608S	SOC	Simulation Lab	1	0	2	3	2	100		100
9	MC609A	MC	Professional Ethics in Engineering	2	0	0	2	0	100		100
10		Summer Internship with duration of 4 to 6 weeks (To be evaluated during VII semester)									
	TOTAL			**21**	**0**	**5**	**26**	**21.5**	**600**	**300**	**900**

VII Semester (Fourth Year)

S. No.	Course Code	Category	Course title	Scheme of Instruction, Hr/Week				Credits	Scheme of Evaluation, Marks		Total Marks
				L	T	P	Total		Internal	External	
1	CH701C	PCC	Process Equipment Design & Drawing	0	0	3	3	1.5	40	60	100
	CH702C	PCC	Optimization Techniques	3	0	0	3	3	40	60	100
2	CH703C	PEC	Professional Elective-III	3	0	0	3	3	40	60	100
3	CH704C	PEC	Professional Elective – IV	3	0	0	3	3	40	60	100
4	CH705C	PEC	Professional Elective – V	3	0	0	3	3	40	60	100
5	CH706C	OEC	Open Elective – III (Through MOOCs)	3	0	0	3	3	100	--	100
6	CH707C	OEC	Open Elective – IV (Through MOOCs)	3	0	0	3	3	100	--	100
7	CH708S	SOC	Internet of Things and applications	1	0	2	3	2	100	-	100
9	CH708I	Summer Internship with duration of 4 to 6 weeks (To be evaluated during VII semester)		-	-	-	-	3	100	-	100
	TOTAL			**19**	**0**	**5**	**24**	**24.5**	**600**	**300**	**900**

L – Lectures; T – Tutorials; P – Practicals

Category	CREDITS
Professional Core Course-PCC	4.5
Professional Elective Course -PEC	09
Open Elective Course – OEC	06
Skill Oriented Course – SOC	02
Internship	03
TOTAL CREDITS	**24.5**

DEPARTMENT OF CHEMICAL ENGINEERING
SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI-517502
R-20 – Scheme of Instruction effective from the academic year 2020-2021

VIII Semester (Fourth Year)

L – Lectures; T – Tutorials; P – Practicals

S .No	Category	Course Code	Course title	Scheme of Instruction, Hr/Week				Credits	Scheme of Evaluation, Marks		Total Marks
				L	T	P	Total		Internal	External	
1	Major Project	CH801P	Project-Work and Internship	0	0	24	24	12	40	60	100
	TOTAL			**0**	**0**	**24**	**24**	**12**	**40**	**60**	**100**

Total:

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	19	18	23	23	22.5	21.5	24.5	12	163.5

Professional Elective- List of Subjects:

Professional Elective-I:	Industrial Safety & Hazard Analysis
	Energy Engineering
	Industrial Effluent Treatment
Professional Elective-II:	Process Instrumentation
	Polymer Science & Engineering
	Bio Process Engineering
Professional Elective-III	Petroleum Refining Processes
	CO_2 Capture and Utilization
	Water Conservation & Management
Professional Elective-IV	Fluidization Engineering
	Fuel Cell Systems
	Fundamentals of Nanotechnology
Professional Elective-V	Process Modelling & Simulation
	Computational Fluid Dynamics
	Membrane Separations

I Semester **MA101 MATHEMATICS –I**

(I Semester-Common for all branches)

Instruction:3(L) +1(T) /week **Credits:4** **Assessment:40+60**

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particular integrals-homogeneous differential equations with variable coefficients-method of parameters-simulation equations.

UNITII

Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of derivatives and integrals-derivatives of transforms-integrals of transforms.

UNITIII

Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNITIV

Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNITV

Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/ReferenceBooks

1. BSGrewal,HigherEngineeringMathematics,40thEdition,KhannaPublications,2007.
2. MKVenkataraman,EngineeringMathematics,NationalPublishingCompany,Chennai.
3. BVRamana,HigherEngineeringMathematics,6thReprint,TataMcGraw-Hill,2008.
4. BaliandIyengar,EngineeringMathematics,6thEdition,LaxmiPublications, 2006.

CourseOutcomes: Attheendofthecourse,studentswillbeableto

1. analyzedifferentialequationsandsolve them
2. applydifferentialequationstoengineering problems.
3. Usetransformation toconvertonetypeintoanothertypepresumablyeasierto solve.
4. useshifttheoremstocomputetheLaplacetransform,inverseLaplace transformandthe solutions of second order, linear equations with constant coefficients.
5. solvean initial value problem for an nth orderordinarydifferential equation using theLaplace transform.
6. expandfunctionsaspowerseriesusingMaclaurin'sandTalor's series
7. optimizetheproblemsrelatedtoOR,Computerscience,Probabilityand Statistics
8. drawanapproximateshapebythestudyofsomeofitsimportantcharacteristicssuchas symmetry, tangents, regions enclosing curve tracing method to find length, area, volume.
9. usemultipleintegralinevaluatingareaandvolumeofanyregionboundedbythegiven curves.

Mapping of Course Outcomes with Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**											
CO2		**2**			**2**							
CO3			**3**	**1**								
CO4			**1**									
CO5					**3**	**2**						

I&II Semesters CY101/CY202ENGINEERINGCHEMISTRY

(ISemester-CY101forCivil&MechanicalEngg) (II Semester -CY 202 for EEE, ECE & CSE)

Instruction:3(L) +1(T) /week Credits: 4 Assessment:40+60

UNIT I

Atomicandmolecularstructure(12lectures)

Postulates of quantum chemistry. Schrodinger equation. Particle in a box solutions, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomics, Pi-molecular orbitals of butadiene and benzene. Band structure of solids and the role of doping on band structures

UNITII

Spectroscopictechniquesandapplications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclearmagnetic resonance and magnetic resonance imaging, surface characterization techniques.

UNITIII

Chemicalequilibria,Intermolecularforcesandpotentialenergysurfaces

Use of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropyandfreeenergies.Freeenergyandemf.Cellpotentials,theNernstequationandapplications.

Use of free energy considerations in metallurgy through Ellingham diagram. Equations of state of real gases and critical phenomena.

UNITIV

Periodicproperties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atomsin the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular

geometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNITV

Stereochemistry,Organicreactionsandsynthesisofadrugmolecule

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations andsymmetryandchirality,enantiomers,diastereomers,opticalactivity,absoluteconfigurationsand conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings Synthesis of a commonly used drug molecule.

Reference/Textbooks

1. Universitychemistry,byB.H.Mahan
2. Chemistry:PrinciplesandApplications,byM.J.SienkoandR.A.Plane
3.Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. EngineeringChemistry(NPTELWeb-book),byB.L.Tembe,KamaluddinandM.S.Krishnan
5. PhysicalChemistrybyP.W.Atkins
6. OrganicChemistry:StructureandFunctionbyK.P.C.VolhardtandN. E.Schore,5thEd.
7. Principlesofphysicalchemistry,Puri,SharmaandPattania

CourseOutcomes: Attheendofthecourse,studentswillbeableto

1. analyzemicroscopicchemistryintermsofatomicandmolecularorbitalsandintermolecular forces.
2. rationalizebulkpropertiesandprocessesusingthermodynamic considerations.
3. distinguishtherangesoftheelectromagneticspectrumusedforexcitingdifferent molecular energy levels in various spectroscopic techniques
4. rationalizeperiodicpropertiessuchasionizationpotential,electronegativity,oxidationstates and electronegativity.
5. listmajorchemicalreactionsthatareusedinthesynthesisof molecules.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1				2	2					1
CO2		1		2		1	1					
CO3		2			1		2					2
CO4				1	1		2					
CO5	1			1	2		1					

I&IISemesters **EN103/EN203ENGLISH**

(I Semester - EN 103forChE,CE& ME)

(IISemester-EN203forEEE,ECE&CSE)

Instruction:2(L) **Credits: 2** **Assessment:40+60**

UNIT IVocabulary Building

The concept of Word Formation- Root words from foreign languages and their use in English- Acquaintance with prefixes and suffixes from foreign languages in English form derivatives- Synonyms, antonyms, and standard abbreviations.

UNITIIBasicWriting Skills

Sentence Structures – Use of phrases and clauses in sentences –Importance of proper punctuation - Creating coherence – Organizing principles of paragraphs in documents -Techniques for writing precisely

UNITIIIIdentifyingCommonErrorsinWriting

Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article -Prepositions - Redundancies -Clichés

UNITIVNatureandStyleofsensibleWriting

Describing - Defining - Classifying –Providingexamples or evidence – Writingintroductionandconclusion

UNITVWritingPractices

Comprehension-PrécisWriting–EssayWriting

Reference/Textbooks:

1. PracticalEnglishUsage.MichaelSwan.OUP.1995.
2. RemedialEnglishGrammar.F.T.Wood. Macmillan.2007
3. OnWritingWell.WilliamZinsser.HarperResourceBook.2001
4. StudyWriting.LizHamp-LyonsandBenHeasly.CambridgeUniversityPress.2006.
5. CommunicationSkills.SanjayKumarandPushpalata.OxfordUniversityPress.2011.
6. ExercisesinSpokenEnglish.Parts.I-III.CIEFL,Hyderabad.OxfordUniversityPress

CourseOutcomes: Attheendofthecourse,studentswillbeableto

1. learntheelements ofgrammar andcomposition ofEnglishLanguage.
2. LearnliterarytextssuchasShortstoriesandprose passages.
3. maintainlinguisticcompetencethroughtraininginvocabulary,sentencestructuresand pronunciation.
4. developcommunicationskillsbycultivatingthehabitofreadingcomprehension passages.
5. developthelanguageskillslikelistening,speaking,readingand writing.

Makeuseofself-
instructedlearnerfriendlymodesoflanguagelearningthroughcompetence

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									
CO2	2		2	2								
CO3		1		2	2							
CO4			2	2	3							
CO5		1	1	2								

I Semester EE104BASICELECTRICALANDELECTRONICSENGG.

(ISemester–forChE,CE&ME)

Instruction:3(L) +1(T) /week Credits: 4 Assessment:40+60

Unit-I

ElectricDCCircuits:Kirchhoff'sVoltage&Currentlaws,SuperpositionTheorem,Star –Delta Transformations.
ACCircuits:ComplexrepresentationofImpedance,Phasordiagrams,Power&PowerFactor, Solution of Single Phase Series & Parallel Circuits. Solution of Three Phase circuits and Measurement of Power in Three Phase circuits.

Unit-II

SinglePhaseTransformers:PrincipleofOperationofaSinglephaseTransformer,EMFequation, regulation and Efficiency of a single phase transformer.
DCMachines:PrincipleofOperation,Classification,EMFandTorqueequations,Characteristicsof Generators and Motors

UNIT-III

ThreePhaseInductionMotor:PrincipleofRotatingMagneticField,PrincipleofOperationof3- φI.M., Torque-Speed Characteristics of 3-φ I.M.

UNIT-IV

p-njunctionoperation,diodeapplications,Zenerdiodeas regulator.
Transistorandapplications:Introductiontotransistors,BJTCharacteristics,biasingand applications

UNIT-V

IntegratedCircuits:Operationalamplifiers,Applications:adder,subtractor,Integratorand Differentiator.
Digital Circuits: logic gates, Combinational Logic circuits, Flip-Flops, countersandshiftregisters,Laboratorymeasuringinstruments:digital multi-meters and Cathode Ray Oscilloscopes (CRO's).

Textbooks:

1. ElectricalTechnologyby EdwardHughes

2. BasicElectricalEngineeringbyNagrathandKothari

CourseOutcomes:Attheendofthecourse,studentswillbeableto

1. understandthebasicconceptsofD.C.singlephaseand3-phasesupplyandcircuitsandsolve basic electrical circuit problems
2. understandthebasicconceptsoftransformersandmotorsusedasvariousindustrialdrives

3. understandtheconceptofpowerfactorimprovementforindustrialinstallationsandconceptsof most economical power factor
4. understandtheoperationandcharacteristicsofdiodes,transistors,integratedcircuitsanddigital circuits.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1		2							
CO2	2		2									
CO3		1		2	2							
CO4			2	1	2							
CO5			2	2	1							

I&IISemesters

ME105/ME205ENGINEERINGGRAPHICSANDDESIGN

(I Semester - ME105 for ChE, CE & ME)
(IISemester-ME205forEEE,ECE&CSE)

Instruction: 2(L) +3 (Drg) /weekCredits: 3.5 **Assessment:40+60**

Unit IIntroduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments,lettering,ConicsectionsincludingtheRectangularHyperbola(Generalmethodonly);Cycloid,Epi-cycloid,Hypo- cycloid and Involutes.

UnitII

Scales-Scales–construction ofPlain&DiagonalScales.

Projectionsofpoints,lines-ProjectionsofPointsandlinesinclined tobothplanes, including traces;

UnitIII

Question Paper
Modular–4questionsfrom
Units I t0 IV, 15 marks each

Projectionsofplanes

Projectionsofplanes(Regularsurfacesonly)inclinedPlanes-AuxiliaryPlanes

ProjectionsofRegularSolids(Simplesolids–cylinder,cone,prism&pyramid)thoseinclined to

both the Planes-Auxiliary Views

UnitIV

IsometricProjections&Orthographicprojections

Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale. Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric

Views to Orthographic Views and Vice-versa, Conventions.

UnitVIntroduction to CAD

CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.;

Text/ReferenceBooks:

1. Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
3. AgrawalB.&AgrawalC.M.(2012),EngineeringGraphics,TMHPublication
4. Narayana,K.L.&PKannaiah(2008),TextbookonEngineeringDrawing,ScitechPublishers
5. Correspondingsetof)CADSoftwareTheoryandUserManuals

CourseOutcomes: Attheendofthecourse,thestudentwillbeableto

1. makeadistinctionbetweenfirstangleprojectionandthirdangleprojectionof drawing.
2. drawhyperbola,parabola,InvolutesandCycloidalcurves.
3. drawsectionsofsolidsincludingcylinders,cones,prismsand pyramids.
4. drawprojectionsoflines,planes,solidsandsectionsofsolids.
   draworthographicprojectionsoflines,planes, and solids.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1			1	1					
CO2	2	1				1	1					
CO3		2		2		2						1
CO4			1	2			1					
CO5		1		2		3						

I&IISemesters EN106/EN206ENGLISHCOMMUNICATIONLAB

(I Semester - EN 106 for ChE, CE & ME) (IISemester- EN206forEEE,ECE&CSE)

Instruction:0(L)+3(Lab)/week Credits:1.5 Assessment:40+60

Listening Comprehension -Pronunciation, Intonation, Stress and Rhythm -Common Everyday Situations: Conversations and Dialogues -Communication at Workplace -Interviews -Formal Presentations

Reference/TextBooks:

1. PracticalEnglishUsage.MichaelSwan.OUP.1995.
2. RemedialEnglishGrammar.F.T.Wood. Macmillan.2007
3. OnWritingWell.WilliamZinsser.HarperResourceBook. 2001
4. StudyWriting.LizHamp–LyonsandBenHeasly.CambridgeUniv.Press.2006
5. CommunicationSkills.SanjayKumarandPushpalata.OxfordUniv. Press.2011
6.ExercisesinSpokenEnglish.PartsI-III.CIEFL,Hyderabad.OxfordUniv.Press

CourseOutcomes:

Thestudentwillacquirebasicproficiencyin Englishincludingreadingandlisteningcomprehension, writing and speaking skills.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									
CO2	2		2	2								
CO3		1		2	2							
CO4			2	2	3							
CO5		1	1	2								

II Semester MA201MATHEMATICSII

(IISemester-forallbranches)

Instruction:3(L) +1(T) /week Credits: 4

Assessment:40+60 Unit I

Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors –Canley-Hamilton theorem-quadratic forms-diagonalization.

UnitII

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals- Green's, Stokes's and Gauss Divergence theorems and its applications.

UnitIII

Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

UnitIV

Special Functions I: Gamma and Beta functions-series solutions of differential equations-ordinary points.

UnitV

Special Functions II: Bessel function-recurrence formulae-generating function for $J_n(X)$-Lengender polynomials-recurrence formulae-generating function for $P_n(X)$ - Rodriguez's formula -orthogonality of Lengender polynomials.

Text/ReferenceBooks

1. BSGrewal,HigherEngineeringMathematics,40th Edition,KhannaPublications,2007.
2. MKVenkataraman,EngineeringMathematics,NationalPublishingCompany,Chennai.
3. BVRamana,HigherEngineeringMathematics,6th Reprint,TataMcGraw-Hill,2008.
4. BaliandIyengar,EngineeringMathematics,6th Edition,LaxmiPublications, 2006.

CourseOutcomes: Attheendofthecourse,studentswillbeableto

1. useranksofmatricesto decidewhetherthesystem oflinearequationsisconsistentornot
2. useCayley-Hamiltontheoremtofindinversesorpowersofmatrices.
3. useEigenvaluesandvectorstoreduceQuadraticformstonormal form.
4. to analyze motion problems from real lines to curves and surfaces in 3-D and use tools such as divergence and curl of vector and gradient, directional derivatives that play significant roles in many applications.
5. useGreen'stheoremtoevaluatelineintegralsalongsimpleclosedcontoursonthe plane
6. useStokes'theoremto giveaphysical interpretation ofthe curl of avectorfield
7. use the divergence theorem to give a physical interpretation of the divergence of a vector field.
8. find the Fourier Series to representa function as a series of constants times sine and cosinefunctions of different frequencies in order to observe periodic phenomenon.
9. Evaluatecertainimproperintegralstomakethemsimplewithintroductionof Gammaand Beta functions.
10. study certain special functions that arise in solving certain ordinary differential equations tomodel many physical phenomena.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2		2	1						
CO2	1	1		2	2							
CO3		1		2	2							
CO4		2		2	2							
CO5		1	2	2								

II Semester **PY202ENGINEERINGPHYSICS**

(IISemester-forChE,CE&ME)

Instruction:3(L) +1(T) /week **Credits: 4** **Assessment:40+60**

UNIT IWave Optics

Interference: Huygen`s Principle-Principle of Superposition-Interference of Light-Young`s double slit experiment- -Newton's Rings.

Diffraction: FraunhoferDiffractionataSingleSlitandaCircularAperture-PlaneDiffractiongrating – Resolving Power-Rayleigh`s Criterion-Resolving power of Grating and Microscope.

Lasers : Introduction – Spontaneous and Stimulated Emission of Radiation – Population Inversion – Types of Lasers – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNITIIMechanicsofRigidBody

RigidBody-RotationalMotionandKinematics Relations-KineticEnergy andAngularMomentum of a Rotating Body-Equation of Motion of a Rigid body (Torque of a Rigid Body)-Combined Translation and Rotational Motion of a Rigid Body- Body Rolling on an inclined Plane.

MechanicsofContinuousMedia

Elasticity, Stress and Strain- Hook`s Law and Behaviour of Wire Under Load- Elastic Constants-Relation Between Elastic Modulii-Types of Supports, Beams and Loads-Different types of Bending-Cantilever with an End Load. Ultrasonic Waves - Sound Absorption and Reverberation -Sabine Formula - Acoustics of Buildings.

UNITIIIElectromagnetismandmagneticpropertiesofMaterials

Laws of Electrostatistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws-Maxwells Equations – Polarization - Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization - Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and Hesteresis, Applications of ferromagnetic materials.

UNITIVQuantumMechanics

Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – DavisonandGermerExperiment –G.P.ThomsonExperiment–Heisenberg'sUncertaintyPrinciple– Schrödinger'sTimeIndependentandTimeDependentWaveequation–SignificanceofWave

Function–ElectroninanInfiniteSquarePotentialWell–ProbabilityDensitiesandEnergyLevels.

UNITVNanoPhysicsandNanotechnology

Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C^{60} (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials.

TextBooks/ReferenceBooks:

1. R.K.GaurandS.L.Gupta``EngineeringPhysics"SultanandChandPub.,New Delhi
2. S.L.GuptaandSanjeevGupta`UnifiedPhysics`Vol.IJaiPrakashNath&Co.,Meerut.
3. HitendraK.MalikandA.K.Singh``EngineeringPhysics"TataMCGrawHillEducationPvt.Ltd., New Delhi
4. M.N.AvadhanuluandP.G.Kshirsagar``ATextbookofEngineeringPhysics``S.Chandand Company Pvt.Ltd., New Delhi
5. B.LTheraja,"Modernphysics",S.Chand& Company.
6. V.Raghavan "MaterialScience",TataMcGrawHillPublications.
7. M.S.RamachandraRaoandShubraSingh,``NanoscienceandNanotechnology`` Wiley India Pvt.Ltd, New Delhi

CourseOutcomes: Attheendofthecourse,studentswillbeableto

1. Develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
2. understand the quantum mechanics and ultimately the quantum behavior of charged particles when they are in motion.
3. identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems
4. apply the basic principles of Mechanics of rigid body and continuous media and their applicationsunderstand the principles in electrostatics and electromagnetics and magnetic properties of materials.
5. understand size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
6. thinkandparticipatedeeply,creatively,andanalyticallyinemergingareasofengineering technology.
7. Learnthebasicsofinstrumentation,designoflaboratorytechniques,measurement,data acquisition, interpretation, and analysis.
8. providemultidisciplinaryexperiencesthroughoutthecurriculum.

OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3									2		
CO 2	2									3		
CO 3	1			3								
CO 4		3								3		
CO 5					2							3

I&IISemesters

CS103/CS203 PROGRAMMING FOR PROBLEM SOLVING

(ISemester–CS103forEEE,ECE&CSE) (II Semester –CS 203 for ChE, CE & ME)

Instruction:3(L) +1(T) /week **Credits: 4** **Assessment:40+60**

Course Objectives:

1. Toacquireproblemsolvingskills
2. Tobeabletodevelopflowchartsandalgorithmsforthegivenproblem
3. TolearnhowtowritemodularprogramsinC
4. Toenabletousearrays,pointers,stringsandstructuresinsolvingproblems.
5. To explain the difference between object-oriented programming and procedural programming.
6. Tounderstandprinciplesofobject-oriented programming.

UNIT-I

Problem Solving : Problem solving techniques, Computer as a problem solving tool, Programming Languages – Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements: Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements:while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continuestatements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions, Passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, Accessing structures, Nested structures, Arrays of structures, Structures containing arrays,Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.

UNITV

Introduction to Object-Oriented Programming (OOP): NeedforOOP, PrinciplesofOOP,Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

CourseOutcomes: Attheendofthecourse,studentwillbeableto

1. DevelopandtestprogramsinCandcorrectsyntaxandlogical errors.
2. Implementconditionalbranching,iterationand recursion.
3. Decomposeaproblemintofunctionsandsynthesizeacomplete program.
4. Usearrays,pointers,stringsandstructurestoformulatealgorithmsandprograms
5. Usefilestoperformread andwriteoperations.
6. Handleprogrammingassignmentsbasedonclass,abstraction,encapsulation,overloadingand inheritance.

TextBooks

1. AshokNKamthane,AmitAshokKamthane,ProgramminginC,3rdEdition,Pearson Education, 2019.
2. ScheldtH,C:TheCompleteReference,4thEdition,TataMcGraw-Hill,2002.
3. R.G.Dromey,HowtosolveitbyComputer,PearsonEducation,2019.
4. Hanly J R &Koffman E.B, “Problem Solving and Program design in C”, Pearson Education, 2019.
5. HerbertSchildt,TheCompleteReferenceC++,4thEdition,TataMcGraw-Hill.

ReferenceBooks

1. CProgramming-AProblemSolvingApproach,Forouzan,Gilberg,Cengage.
2. ProgrammingwithC,Bichkar,UniversitiesPress.
3. ProgramminginC,ReemaThareja,OXFORD.
4. CbyExample,NoelKalicharan, Cambridge.
5. TheC++ProgrammingLanguage,BjarneStroustrup,3rdEdition,PearsonEducation.
6. Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	2	1		3			2			2		2
CO 2	2	3	2		3					2		
CO 3		2	1								3	
CO 4		3										
CO 5			3									

I&IISemesters

CE104/CE 204 ENGINEERINGMECHANICS

(I Semester –CE 104 for EEE)(IISemester–CE204forCE&ME)

Instruction:3(L)+1(T)/week Credits:4 Assessment:40+60

UNITI

STATICS:Basic concepts – System of force, Concurrent and non-concurrent coplanar and non-coplanar forces – Resultant – Moment of force and its application – Couples and resultant of force systems – Equilibrium of systems of forces – Free body diagrams, Equations of equilibrium of coplanar systems and spatial systems.

UNITII

Analysis ofplane trusses: Types ofsupports – Types oftrusses – Analysis oftrusses using method of joints and method of sections.

UNITIII

CENTRE OF GRAVITY AND MOMENTS OF INERTIA: Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite areas (rolled and built up sections) – Radius of gyration of areas.

UNITIV

SIMPLE STRESES AND STRAINS: Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-strain diagram for mild steel – Working stress – Factor of safety.

Lateral strain – Poisson's ratio and volumetric strain – Elastic moduli and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses.

UNITV

STRAIN ENERGY: Gradual, sudden and impact loading – Endurance limit principles of virtual work and its applications.

TEXTBOOKS:

1. GhoseD.N.–AppliedMechanicsandStrengthofMaterials.
2. Timoshenko&Young–Engineering Mechanics.
3. JunarkarSB–MechanicsofStructures–Vol.I.
4. JunarkarSB–Elements ofApplied Mechanics.

CourseOutcomes: Attheendofthecourse,studentwillbeableto

1. applythebasicknowledgeofforce system.
2. knowthetypes ofsupports occurin civilengineering structures
3. knowthegeometricalpropertiesofdifferent crosssections.
4. understanddifferenttypesofstressesandstrains,elasticconstants.
5. understandthebehaviorofdifferentinternalforcesunderdifferenttypesofloading.
6.
7. **MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**
CO 1		3										
CO 2		3										
CO 3		3							2			1
CO 4									3			1
CO 5			3						1			

I&IISemesters

ME105/ME205 WORKSHOP/MANUFACTURING PRACTICE

(ME105forEEE,ECE&CSE) (ME 205 for ChE,CE& ME)

Instruction:0(L) +3 (lab)/week Credits: 1.5 Assessment:40+60

Workshop Practice:Five practices among

1.Machineshop 2.Fittingshop 3.Carpentry 4.Electricalwiring

5. Welding shop 6.Casting 7.Smithy 8.Plasticmoulding&GlassCutting

Examinationscouldinvolvetheactualfabrication ofsimplecomponents,utilizingoneor More of the techniques covered above.

DetailedContents

1. ManufacturingMethods-casting,forming,machining,joining, advanced manufacturing methods
2. CNCmachining,Additivemanufacturing
3. Fittingoperations&powertools.
4. Electrical&Electronics
5. Carpentry
6. Plasticmoulding.Glasscutting
7. Metalcasting.
8. Welding(arcwelding&gaswelding),brazing

Theabovecoursecontentislearntbyonlinevideos/pptpresentations.

Text/ReferenceBooks:

1. HajraChoudhuryS.K.,HajraChoudhuryA.K.andNirjharRoyS.K.,Elementsof Workshop Technology", Vol. I 2008and Vol. II 2010, Media promoters and Publishers private limited, Mumbai.
2. KalpakjianS.andStevenS.SchmidManufacturingFngineeringandTechnology", 4th edition, PearsonEducationIndiaEdition,2002.

3. GowriP.HariharanandA.SureshBabu,ManufacturingTechnology–I”Pearson Education,2008.
4. RoyA.Lindberg,ProcessesandMaterialsofManufacture”,4th edition,PrenticeHall India,1998.

5. RaoP.N.,"ManufacturingTechnology",Vol.I&II,TataMcGrawHillHouse,2017

LaboratoryOutcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- Theywillalsogetpracticalknowledgeofthedimensionalaccuraciesanddimensional tolerances possible with different manufacturing processes.
- Byassemblingdifferentcomponents,theywillbeabletoproducesmalldevicesoftheir interest.

Course Outcomes : Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricatecomponents using different materials.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	2		3									2
CO 2	2		3									
CO 3	2		3									
CO 4	2		3									
CO 5	2		3									

I &IISem

CS106/CS206PROGRAMMINGFORPROBLEMSOLVINGLAB

(CS106forEEE,ECE&CSE) (CS 206 for ChE, CE & ME)

Instruction:0(L)+3(Lab))/weekCredits: 1.5 Assessment:40+60

Course Objectives:

1. Toprovide exposureto problem-solvingthrough programming
2. TotrainthestudentontheconceptsoftheC-Programming language

ThefollowingprogramsshallbedevelopedandexecutedinProgrammingLanguage C.

1. Programsonconditionalcontrolconstructs.
2. Programsoniterativestatements(while,do-while, for).
3. Programsonrecursiveprocedures
4. Programsonarrays,matrices(singleandmulti-dimensionalarrays).
5. Programsusinguserdefinedfunctions,demonstratingparameterpassingmethodsviz.call by value and call by reference.
6. Programsusingdifferentlibraryfunctionsviz.ctype.h,math.h,stdio.h,stdlib.h,string.h,conio .h and pre-processor directives.
7. Programsusingpointers(intpointers,charpointers)andpointerarrays.
8. Programsonstructuresandunions
9. ProgramsonFileProcessing.
10. ProgramsonPointerstostructuresandSelf-referentialstructures

CourseOutcomes: AfterCompletionofthiscoursethestudentwouldbeableto

1. DeveloptheCcodeforthegiven algorithm.
2. Understand,debugandtracethe executionofprogramswritteninC language.

ReferenceBooks:

1.ScheldtH,C:TheCompleteReference,4thEdition,TataMcGraw-Hill,2002.
2.HanlyJR&KoffmanE.B,"ProblemSolvingandProgramdesigninC",PearsonEducation,2019.
3.R.G.Dromey,HowtosolveitbyComputer,PearsonEducation, 2019.
4.BehrouzA.Forouzan&RichardF.Gilberg,ComputerScience:AStructuredProgrammi
ng Approach Using C, Third Edition, Cengage Learning

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3										
CO 2	2		3									
CO 3	2	3	2									
CO 4	2		3									
CO 5	2	3										

CE107/CE207 **ENVIRONMENTALSCIENCE** ***Audit Course***

(CE107forEEE,ECE&CSE) ***NoUniv.Exam***

(CE207forChE,CE&ME)

Instruction:4(L) **Credits: 0(Zero)**

Assessment:40+60 UNIT I

EnvironmentalStudiesandNaturalResources

Definition, Scope and importance of Environment, Environmental studies, Need for publicawareness

ComponentsofEnvironment-Atmosphere,Hydrosphere,Lithosphere.

Renewableand**Non-RenewableResourcesandassociatedproblems**

Waterresources:Useandoverutilizationofsurfaceandgroundwater,floods,drought,conflictsover water, dam benefits and problems.

Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.

Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused agriculture and overgrazing, effects ofmodern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.

Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

Roleofanindividualinconservationofnatural resources.

UNITII

EcosystemandBiodiversity

Ecosystem - Concept of an ecosystem, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

Introduction,types,characteristicfeatures,structureandfunctionofthefollowingecosystem.

(a)Forestecosystem.(b)Grasslandecosystem
(c)Desertecosystem.(d)Aquaticecosystem(ponds,streams,lakes,rivers,oceans,estuaries)

Biodiversityanditsconservation:

Definition,geneticspeciesandecosystemdiversity,BiogeographicallyclassificationofIndia.

Valueofbiodiversity:consumptiveuse,productiveuse,social,ethical,aestheticand optionvalues, Biodiversity at global, National and local levels, India as a mega-diversity nation.

Hot-spotsofbiodiversity,Threatstobiodiversity:habitatloss,poachingofwildlife,man –wildlife conflicts, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT–III

EnvironmentalpollutionandGlobalEffects

Definition,Causes,Effects,andcontrolmeasuresof(a)Airpollution(b)Waterpollution(c)Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards

SolidwasteManagement:Causes,effectsandcontrolmeasuresofurbanandindustrialwastes.

Role of an individual in prevention of pollution.

Pollutioncasestudies.

Disastermanagement:Floods,earthquakes,cyclone,landslides,Tsun

ami. Climate change-Global warming, Acid rain, Ozone

depletion.

UNIT–IV

EnvironmentIssuesandManagement

- Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, WaterBorne Diseases.
- Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms
- Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcementof Environmental legislation.

UNIT–V

SocialIssuesandtheEnvironment

- Populationgrowth,PopulationExplosion,PopulationControl,WomenandChildwelfare.
- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rainwaterharvesting,watershedmanagement,Wastelandreclamation,HumanRights,Value education, Environmental ethics- Issues and possible solution.
- Roleofinformation Technologyin EnvironmentandHuman Health.

TextBooks/ReferenceBooks:

1. AnubhaKaushik&CPKaushik,Environmentalstudies,NewageInternationalPublishers,2008
2. BennyJoseph,Environmentalstudies,TataMcGraw-HillPublishers,2005
3. MChandraSekhar,EnvironmentalScience,Hi-TechPublishers, 2004
4. Keerthinarayana and Daniel Yesudian,Principles of Environmental Sciences and Engineering , Hi-Tech Publishers, 2005
5. AmalK.Datta,IntroductiontoEnvironmentalScienceandEngineering, Oxford&IBH Publishing Co.Pvt.Ltd, 2000
6. SanthoshkumarGarg,RajeshawriGargandRajniGarg,EcologicalandEnvironmentalstudies, Khanna publishers, 2006
7. GilbertM,IntroductiontoEnvironmentalEngineeringandScience, MastersPublicationby Prentice –Hall of India Private Ltd., 1991
8. William PCunninghamand MaryAnn Cunningham, Principles of Environmental Science,Tata McGraw Hill Publishing Co.Ltd, 2002

CourseOutcomes:

Attheendofthecourse,studentswillbe ableto

1. acquireknowledgein
    - diversecomponentsofenvironmentandnaturalresources

- ecosystemandbiodiversity&itsconservation methods
- populationgrowth andhuman health
- greentechnology

2. identifyandresolvetheissuesrelatedtosourcesofdifferenttypesof pollutions
3. providesolutionstoindividuals,industriesandgovernmentforsustainabledevelopmentofnatu ral resources
4. applyenvironmentalethicsinprotectionofdiversified ecosystems.

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2						3					2
CO 2	3						2					1
CO 3	1						3					
CO 4							3					
CO 5	2						2					

B. Tech. III semester Chemical Engineering

MA 301 B **MATHEMATICS – III**

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Objectives:

1. This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables.
2. To understand power series and expansion of analytic function.
3. To understand Laurent Series, poles, singular points, Residue theorem and its applications.
4. The aim is to analyze the solutions of partial differential equations.
5. To discuss the boundary value problems, one dimensional wave equation, heat equation and Laplace Equation.

UNIT - I

Complex analysis - I: Analytical functions - Cauchy-Reimann equations – Construction of Analytic functions- Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT - II

Complex analysis - II**:** Taylor's and Laurents' series- Transformations- Conformal mapping - Bilinear transformations - Transformation of 1/z, z^2, sin z and cos z.

UNIT - III

Complex Analysis –III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals

UNIT - IV

Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Legranges' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT- V

Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

Text Books:

1. Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
3. Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
4. Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
5. Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

COURSE OUTCOME:

1	Applying various statistical models and methods for drawing conclusions and making decisions under uncertainty in engineering contexts
2	Apply statistical and numerical methods in various computer science related projects, seminars and research
3	Apply the knowledge of iterative methods to solve algebraic and transcendental equations, simultaneous linear equations, ODE (ordinary differential equations)
4	Acquire knowledge of finite differences, interpolation, numerical differentiation and numerical integration
5	Demonstrate a basic knowledge of the techniques for accurate and efficient solution of models based on linear and nonlinear systems of equations, ordinary differential equations and partial differential equations.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3			2							
CO2		3			2							
CO3		3			2							
CO4		3			2							
CO5		3			2							

CH302E **ENGINEERING AND SOLID MECHANICS** III semester

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Objectives:

1. The course is designed to give fundamental knowledge of mechanics of deformable solids including stress, strain, stress – strain relations.
2. Theories of failure and energy methods.

Unit I :

Introduction, Point Kinematics: Moving point in various coordinate systems (Cartesian,Cylindrical, Path)

Rigid body kinematics: Translation and rotation, relative motion, angular velocity, General motion of a rigid body, General relative motion

Unit II :

Equivalent force systems, Resultant forces, Linear and Angular Momentum, Laws of motion(Euler's Axioms), Free Body Diagrams, Dynamics of point mass models of bodies.

Equilibrium of rigid bodies, distributed forces, Analysis of structures: Trusses, Forces in

Unit III :

Beams: Shear Force and Bending Moment

Unit IV :

Frictional forces, Laws of Coulomb friction, impending motion

Inertia tensor, Principal Moments of Inertia, Moment of momentum relations for rigid bodies,Euler's Equations of Motion

Unit V :

State of stress at a point, equations of motion, principal stress, maximum shear stress, Concept of strain, strain displacement relations, compatibility conditions, principal strains, transformation of stress/strain tensor, state of plane stress/strain.

Uniaxial stress and strain analysis of bars, thermal stresses, Torsion of circular bars and thinwalled members, Bending of straight/curves beams, transverse shear stresses, deflection of beams, Buckling of columns

TEXT BOOKS :

1. Engineering Mechanics, Strength of Materials and Elements of Structural Analysis – C.Venkataramaiah&A.V.NarasimhaRao

REFERENCES :

1. Strength of Materials – I.B.Prasad.
2. Strength of Materials – S.S.Bhavikatti.
3. Mechanics of Structures Vol. I --- S.B. Junnarkar
4. Strength of Materials part - I ----Stephen Timoshenko.

Course Outcomes :

At the end of this course students will be able to

1. Learn about the elastic and plastic behavior of material and evaluate stress invariants, principal stresses and their directions.
2. Euler's Axioms, Free Body Diagrams, Dynamics of point mass models of bodies.
3. Shear Force and Bending Moment
4. Principal Moments of Inertia, Moment of momentum relations for rigid bodies,Euler's Equations of Motion.
5. Concept of strain, strain displacement relations, compatibility conditions, Uniaxial stress and strain analysis of bars.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	2	1		2								
CO 2	2	1	2									
CO 3		1		2	2							
CO 4			2	2	1	1						
CO 5			1	1	2							

HS303C MANAGERIAL ECONOMICS AND ACCOUNTANCY III Semester

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Detailed Syllabus:

Unit -I

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR,NPV,IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage, Income tax leverage.

Unit -II

Depreciation and methods of calculating depreciation (straight line, sum of the years digit method, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

Unit -III

Inflation: Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

Unit -IV

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

Unit -V

Cost Accounting: Introduction, Classification of costs, Methods of costing, Techniques of costing, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

Reading Text Books:

1. Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw Hill Education, 1996.
2. Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
3. A.N.Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
4. Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
5. Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition, Vikas Publication, 2012.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand Macro Economic environment of the business and its impact on enterprise.
CO2	Identify various cost elements of the product and its effect on decision making.
CO3	Understand the concepts of financial management and smart investment.
CO4	Prepare the Accounting records and interpret the data for Managerial Decisions.

Mapping of course outcomes with program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-		2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-
CO3	-	1	-	-	-	-	-	-	-	-	3	-
CO4	2	-	-	-	-	-	-	-	-	-	3	-

CH304C **CHEMICAL PROCESS CALCULATIONS**

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Educational Objectives:

1. To understand different representations of mixture compositions and reaction stoichiometry.

2. To understand the ideal gas law and its applications.

3. To learn the concepts of vapor pressure and different representations of vapor presence in gas mixtures.

4. To understand and to apply the law of conservation of mass.

5. To understand and to apply the law of conservation of energy.

6. To analyze combustion operations, from material and energy perspective.

UNIT – I:

Basic concepts – Units & Dimensions - Graphical integration and differentiation - use of log-log, semi-log and triangular graphs, conversion of units.

Stoichiometric and composition relations - Stoichiometric relation, basis of calculation, method of expressing composition of mixture and solutions, density and specific gravity.

Behavior of ideal gases: Ideal gas law and applications, gaseous mixtures, gases in chemical reactions.

UNIT - II:

Mass balance without chemical reaction – Formulation – Mass balance calculations for unit operations like distillation, absorption, extraction, crystallization (single solute systems), drying, evaporation

UNIT - III:

Mass balance with chemical reaction – Mass balance calculations for processes involving reactions – Mass balance calculations for systems involving recycle, purge and bypass

UNIT - IV :

Vapor pressure - Concept of vapor pressure, liquefaction and liquid state, vaporization, boiling point, effect of temperature on vapor pressure, vapor pressure plots, vapor pressure of immiscible liquids and solutions, Raoult's law and its limitations.

Humidity and saturation: Relative and percent saturation, dew point, wet and dry bulb temperatures, Humidity charts

UNIT - V:

Energy balance

Thermophysics- Concepts of energy, energy balance equation, heat capacity of gases, liquids and mixtures in energy balance problems, Kopp's rule, latent heat - heats of fusion and vaporization, Trouton's ratio, Kistyakowski equation.

Thermochemistry - Heats of formation, combustion and reaction, Hess law, Calculation of heat of reaction from heat of formation / combustion data, Effect of temperature and pressure on heat of reaction, Adiabatic reaction temperature

fuels & combustion- Heating value, Theoretical and actual flame temperatures

TEXT BOOK:

1. Chemical Process Principles part - I, Material and Energy Balances by Hougen, O.A., Watson, K.M. and Ragatz, R.A. John Wiley and sons, 2nd ed.
2. Chemical Process Calculations - David Himmelblau

REFERENCES:

1. Stoichiometry (3 rdedition) - Bhatt and Vora , tata-McGraw-Hill Publication.
2. Elementary Principles of Chemical Process , 3 rd edition – Richard M.Felder& Ronald W.Rousseau, Wiley – Eastern
3. Process Calculations by K.V.Narayanan and Lakshmi Kutty.

Course Outcomes:

1. To understand the dimension-unit systems and their inter relationships, to be able to represent mixture compositions in different forms and to be able to make calculations using reaction stoichiometry.
2. To be able to make mass balance calculations for different operations, without

   reaction, its mathematical form and its application to different operations and reactions.
3. To be able to make mass balance calculations for different operations, with reaction , its mathematical form and its application to different operations and reactions.
4. To have learnt the significance of vapor pressure and its dependence and to have learnt different representations of partial saturation and to apply ideal gas law in conjunction with variation in levels of saturation.
5. To be able to estimate parameters like oxygen requirement, flue gas analysis, energy released and flame temperatures.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1									
CO2	1			2	2							
CO3			2	3		1						
CO4		1		2								
CO5			2	2	1							

CH305C **MOMENTUM TRANSFER**

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Educational Objectives :

1. To learn dimensional analysis, fluid statics and its applications.
2. To understand the important phenomena observed in flowing fluids, basic quantitative laws and equations of fluid flow.
3. To form a firm idea of the flow of impressible and impressible fluid flow through pipes and in thin layers.
4. To understand the flow past solid surfaces, through packed bed and in fluidized beds and able to learn the settling characteristics of particles through fluids.
5. To learn the working and performance of pumps and impressors, valves and able to understood the instruction and operation of flow measuring devices.

UNIT - I:

Introduction: Units, Dimensions and Dimensional analysis, Fluid statics and its applications.

UNIT - II:

Fluid flow phenomena, kinematics, of flow, velocity field - streamlines - irrotational flow - Newton's law of viscosity - Non-Newtonian fluids - Laminar and turbulent flows,

Basic equations of fluid flow - continuity equation - Bernoulli's equation and its applications.

UNIT - III:

Flow of incompressible fluids in conduits and thin layers - Laminar and turbulent flows in pipes and closed channels - Universal velocity distribution - friction factor, effect of fittings and valves. Flow of compressible fluids - continuity equation, mechanical and total energy balances, velocity of sound, ideal gas equation, stagnant temperature.

UNIT - IV:

Flow pas immersed bodies, drag force and drag coefficient, friction in flow through bed of solids - motion of particles through fluids - free and hindered settling - Mechanism and pressure drop of fluidization and its applications - fundamental concepts of two – phase, gas liquid flow.

UNIT - V:

Transportation and metering of fluids, fluid moving machinery - classification and performance of pumps and compressors - selection and specifications - measurement of flowing fluids, storage and handling.

TEXT BOOKS:

1. Unit operations of Chemical Engineering (7th ed) Warren L.McCabe, Juliane Smith and Peter Harriott, McGraw Hill.

REFERENCES:

1. 1. Chemical Engineering Vol.I by Coulson and Richardson, Pergamon Press.
2. Solved Examples in Chemical Engineering by G.K.Roy
3. "Fluid Mechanics" 2nd edition by Noel de Nevers, Mc Graw Hill

Course Outcomes:

1. To be able to perform dimensional analysis of fluid flow problems and develop pressure drop equations for fluid static equipments in which fluid is at rest.
2. To have the knowledge on different types of flow regions in fluid flow, rheological properties of fluids, turbulence and boundary layers.
3. To be able to carry out macroscopic mass, momentum and energy balance to solve engineering problems related to fluid flow and to analyze flow past solid surface, through packed bed and in fluidized beds.
4. Determine the minimum fluidization velocity andterminal velocity of the fluid in Stokes and Newton's law regions.
5. The analysis of fluid flow measuring devices like Orifice meter, Venturimeter, Rotameter and Pitot tube, the construction and working of Centrifugal and reciprocating pumps. And also give the knowledge on different types of valve, selection of pipe and fittings.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	1									
CO2	1			2	2							
CO3			2	3		1						
CO4		1		2								
CO5			2	2	1							

CH306C CHEMICAL ENGINEERING THERMODYNAMICS –I

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Educational Objectives:

1. To understand the concepts of energy, forms of energy, equilibrium and reversibility

2. To learn and apply the first law of thermodynamics

3. To understand the P-V-T behavior of pure fluids

4. To learn the concept of entropy and to apply second law of thermodynamics

5. To study the feasibility of processes

6. To learn thermodynamic analysis of refrigeration and different flow processes

UNIT - I:

Introduction – Scope, Dimensions and Units – Mass, mole, volume, force, temperature, pressure, work, energy, heat, internal energy.

The first law of thermodynamics, Energy balance for closed systems, Thermodynamic state and state functions, equilibrium, The phase rule, The reversible process, enthalpy, heat capacity, Mass and energy balances for open systems, Energy balances for steady state flow processes

UNIT - II:

Volumetric properties of pure substances: P-V-T behaviour, Virial expressions, The ideal gas, Applications of Virial equations , Cubic equations of state - vander walls and Redlich - Kwongg equations, Theorem of corresponding states, generalized correlation – Pitzer correlation.

UNIT - III:

Heat effects – Sensible and latent heat effects, Heats of formation , combustion and reaction, Temperature dependence, heat effects of industrial reactions .

UNIT - IV:

Second law – Statement, Heat engine, Thermodynamic Temperature scale, concept of entropy, mathematical statement of second law, Entropy changes of an ideal gas, Calculation of ideal work and lost work The Third Law of Thermodynamics

UNIT - V:

Refrigeration: The Carnot refrigerator, The vapor compression cycle, choice of refrigerant, cascade systems, absorption refrigeration, Heat pump, Liquefaction process.Thermodynamics of flow processes- Duct flow of Compressible fluids – turbines – compression process.Production of power from heat– The steam power plant, Internal combustion engines, Jet engines

TEXT BOOK:

1. J.M.Smith , H C Van Ness and M.M.Abbott - Introduction to Chemical Engineering

Thermodynamics 6th ed. Tata McGraw-Hill Publishing Company .

REFERENCES:

1. Chemical Engineering Thermodynamics by Thomas E.Daubert

2. Chemical Engineering Thermodynamics, YVC Rao, University publications.

Course Outcomes:

1. To have learnt the fundamental ideas about energy, equilibrium and reversibility. To be able to apply first law to estimate heat and work effects in closed, open and flow systems.

2. To understand PV and PT phase diagrams, ideal gas law and its applications. To be able to estimate heat and work effects for different processes – isothermal, isobaric, isometric, and adiabatic processes.
3. To be to apply second law of thermodynamics to estimate efficiency of a cycle. To have understood the concept of entropy and its estimation.
4. To have learnt different refrigeration cycles and also to be able to calculate their COP.

5. To have learnt the thermodynamic analysis of flow processes.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1							1			1
CO2		2		1		1			1			1
CO3		1					1		1			
CO4	1	1							1			1
CO5		1				1	1		1			1

CH307L MOMENTUM TRANSFER LABORATORY

Instruction Hours/Week: 3(P) Credits: 1.5 Assessment : 40 + 60

Any 10/12 experiments on

Flow Through Straight Pipe, Frictional losses Due To Fittings, Venturi meter , Orifice meter, Flow Through Helical Coil, Characteristics Of Centrifugal Pump, Flow Through Annulus, Frictional Loss Due To Sudden Expansion, Bernoulli's Experiment, Flow Through Packed Bed, Fluidization.

CH308L ANALYSIS LABORATORY

Instruction Hours/Week: 3(P) Credits: 1.5 Assessment : 40 + 60

10 / 12 experiments from

Chemical Analysis - Water(Hardness & total chlorides), Estimation Of Chromium, Analysis of Bleaching Powder, Estimation Of Phenol, Estimation Of Sugars, Analysis Of Vegetable Oils, Analysis Of Soda Ash, Analysis Of Pyrolusite, Analysis of Urea

Instrumental Analysis - .Flurometer, Refractometer, Polarimeter, Conductometric Titration, Viscosity And Flash Point Determination, .Measurement Of pH, Colourimeter, Potentiometric Titration, Fuel Characterization-Calorific Value, Flash And Cloud Points.

CH309S COMPUTER SKILLS

Instruction Hours/week: 1(L) + 2(P) Credits :2 Assessment : 40 + 60

Course Educational Objective (CEOs)

1. Identify basic terms, concepts, and functions of computer system components.
2. To enable the student to use MSWORD.
3. To acquaintwith MSEXCEL and MSPOWERPOINT
4. To familiarizewith browsing the INTERNET and EMAIL

- MS WORD: Text Basics, Text Formatting and saving file, working with Objects.
- MS WORD: Header & Footers, Working with bullets and numbered lists, Tables.
- MS WORD: Styles and Content, Merging Documents, Sharing and Maintaining Document
- MS WORD: Sharing and Maintaining Document, : Proofing the document, Printing
- MS EXCEL: Introduction to Excel, Formatting excel work book
- MS EXCEL: Perform Calculations with Functions, Sort and Filter Data with Excel
- MS EXCEL: Create Effective Charts to Present Data Visually,Analyze Data Using PivotTables and Pivot Charts,Protecting and Sharing the work book
- MS EXCEL: Use Macros to Automate Tasks, Proofing and Printing, Preparation of various data collection forms, Mathematical Calculations using Spreadsheet
- MS POWER POINT: Setting Up PowerPoint Environment, Creating slides and applying themes,Working with bullets and numbering,Working with Objects,Slide show option and print
- INTERNET AND EMAIL: What is Internet, Types of internet networks , Receiving Incoming Messages , Sending Outgoing Messages, Email addressing , Email attachments, Browsing, Search engines , Text chatting, Job Searching.

Course Outcomes (COs)

After completion of the course the student will:

a) The study and use of MS WORD, MS EXCEL , POWER POINT AND Google Forms with their utilization in Chemical engineering project works and personal works

MC310A **CONSTITUTION OF INDIA**

Instruction Hours/Week: 2(L) Credits: 0 Assessment: 0 + 100

Course Objectives: Students will be able to

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.

2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in

the early years of Indian nationalism.

3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution

Unit-I

History of Making of the Indian Constitution: History

Drafting Committee, (Composition & Working)

Philosophy of the Indian Constitution: Preamble

Salient Features

Unit-II

- **Contours of Constitutional Rights & Duties:**
- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit-III

- **Organs of Governance:**
- Parliament
- Composition
- Qualifications and Disqualifications

- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

Unit-IV

- **Local Administration:**
- District's Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.
- Pachayati raj: Introduction, PRI: ZilaPachayat.
- Elected officials and their roles, CEO ZilaPachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

Unit-V

- **Election Commission:**
- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.

Institute and Bodies for the welfare of SC/ST/OBC and women

Text Books/References:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes:

Students will be able to:

a) Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
b) Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

c) Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
Discuss the passage of the Hindu Code Bill of 1956.

B. Tech. IV semester Chemical Engineering

CH401B **MATHEMATICS - IV**

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Objectives:

1. This course aims at providing the student with the knowledge on Various numerical methods for solving equations, interpolating the polynomials.
2. Evaluation of Finite Differences And Difference Equations**.**
3. To acquaint the students with different types of numerical methods to solve transcendental equations, derivatives and integrals.
4. To provide suitable and effective methods called Numerical Methods, for differential equations.
5. Evaluation of iterative methods and Finite Difference approximation to derivatives, solutions of Laplace, Poisson equations by iterative methods.

Unit I :

Curve fitting by the method of least squares, Fitting of (i) Straight line (ii) Second degree parabola (iii) Exponential curves, Solutions of Algebraic & Transcendental Equations: Determination of roots of non - linear equations by iterative methods - Falsi position method - bisection method - Newton Raphson method - Multiple roots by Newton Raphson method - Complex roots by Mueller's method.

Solution Of Linear And Non-Linear Algebraic Equations - iterative methods - Gauss elimination with pivotal condensation - Gauss Seidal& Jacobi iterative methods.

Unit-II :

Numerical Interpolation, Integration & Differentiation - Newton's forward& backward interpolation formula - Lagrange's interpolation formula. Numerical differentiation with forward and backward differences, Numerical Integration with Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule andRomberg method.

UNIT - III:

Solution Of Ordinary & Partial Differential Equations - Taylor series method - Euler's method - Euler's modified method - Runge Kutta second & fourth order methods - Runge Kutta Gill method - Milne's predictor and corrector methods for first order equations.

Finite Difference approximation to derivatives, solutions of Laplace, Poisson equations by iterative methods.

UNIT - IV:

Random variables, Discrete and Continuous distributions, expectation, variance. Distributions: Binomial, Poisson, Normal and Exponential Properties and applications.

Correlation: curve fitting by method of least squares - Linear, Quadratic and Exponential fitting – Correlation – Rank, Correlation - Regression analysis - Multiple correlation.

UNIT - V:

Testing of Hypothesis –Null and alternate hypothesis, level of significance and critical region-Z-test for single mean and difference of means, single proportion and difference of proportions - t-test for single mean and difference of means - F-test for comparison of variances, Chi-square test for goodness of fit

TEXT BOOK:

1. Higher Engineering Mathematics – B.S.Grewal.
2. Numerical methods by E. Balagurusamy, Tata McGraw-Hill Publishing Co.
3. Numerical Methods for Scientific and Engineering Computation 3rd edition by Jain, New Age International.
4. S P Gupta, Statistical Methods, 38th Edition, Sultan Chand & Sons Educational Publishers, 2009.
5. K V Iyengar et al, Probability and Statistics 2nd Edition, S. Chand & Company Ltd, 2010.
6. S. C. Gupta and V K Kapur, Fundamentals of Applied Statistics, 3rd Edition, Sultan Chand & Sons Educational Publishers.

Course Outcomes: At the end of the course, students will be able to

1. After the completion of course, students will be able to apply numerical methods to solve all type of equations.
2. Derive interpolating polynomials using interpolation formulae.
3. Solve integral equations numerically.
4. Analyse the data and develop skills to solve Algebraic & Transcendental Equations.
5. Derive numerical methods solution of differential equations.To find the Solution of Linear And Non-Linear Algebraic Equations.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1		3			2							
CO2		3			2							

CO3		3			2							
CO4		3			2							
CO5		3			2							

CH402C PARTICLE AND FLUID PROCESSING

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Educational Objectives :

1. To develop understanding of solids, their characterization, solid handling and mixing.
2. To develop understanding of the principles of communition, milling and size reduction operations.
3. To understand separation of solid mixtures.
4. To understand the different techniques of separation of solid-liquid mixtures.
5. To understand on methods and effect of agitation and mixing of liquids.

Syllabus:

UNIT - I: Characterization of particulate masses

Properties, handling and mixing of particulate solids: characterization of solid particles, properties of particulate masses, storage, transportation and mixing of solids, types of mixers, mixers for cohesive solids, mixers for free flowing solids.

UNIT - II: Size reduction

Principles of comminution, computer simulation of milling, Operations size reduction equipment - crushers, grinders, ultra fine grinders, cutting machines, equipment and operation.

UNIT - III: Mechanical separations -I

Screening, screening equipment, Separations based on motion of particles through fluids, gravity settling processes and centrifugal settling processes, Gas cleaning. Flotation

UNIT – IV:Mechanical separations-II

Filtration – Cake filters - Centrifugal filters, principles of cake filtration and clarifying filters, liquid clarification, principles of clarification, cross flow filtration,

UNIT - V:

Agitation and mixing of liquids: agitation of liquids, circulation velocities, power consumption in agitated vessel, blending and mixing - suspension of solid particles, dispersion operation.

TEXT BOOK:

1. Unit operations of Chemical Engineering (5th ed) Warren L.McCabe, Juliane Smith and Peter Harriott, McGraw Hill.

REFERENCE:

1. Chemical Engineering Vol.I&II, Coulson and Richardson , Pergamon Press.

2. Mechanical Operations for Chemical Engineers by Narayanan & Bhattacharya, Khanna Publishers

Course Outcomes :

1. To be able to determine the Volume surface mean diameter, mass mean diameter, number of particles and types of mixers.
2. To have the knowledge of different types of Crushers, grinders, ultrafine grinders, cutters, to be able to find the power requirement using three crushing laws.
3. To be able to calculate the screening effectiveness .To have understood settling processes and flotation technique.
4. To develop the rate equations for constant pressure and constant volume filtration techniques and also to solve the problems related to these techniques.To have acquired the construction and operation of different filtration, settling and clarifying equipment.
5. To understand the functioning of agitated vessels and to calculate the power consumption.To have the knowledge on different types of turbines, blending and mixing.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1									1			1
CO2						1	1		1			1
CO3						1	1	1	1			1
CO4						1	1	1	1			1
CO5		1			1				1			1

CH403C CHEMICAL ENGINEERING THERMODYNAMICS - II

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Educational Objectives :

1. To develop frame work to estimate thermodynamic properties of fluids

2. To systematize the synthesis of mixture properties from pure component properties

3. To develop equilibrium criterion and examine its various forms

4. To study phase equilibria

5. To study chemical reaction equilibria

Syllabus

Unit I :
Thermodynamic properties of fluids
Property relations for homogeneous phases - Residual properties - Two phase systems - Thermodynamic diagrams - Tables - Properties from virial equations - Properties from equations of state - Properties from Pitzer-type correlations

UNIT – II :
Solution thermodynamics
Fundamental property relations - Chemical potential as a criterion for phase equilibrium - Partial properties -Ideal gas mixtures - Fugacity and fugacity coefficient for pure species and component in solutions - Ideal solutions - Excess properties, Liquid phase properties from VLE data, models for excess Gibb's energy, property changes of mixing.

UNIT – III
VLE at low to moderate pressures
Nature of equilibrium - Phase rule, Duhem's theorem, qualitative behaviour, the gamma/phi formulation of VLE, Dewpoint and bubble point calculations, flash calculations.

UNIT – IV
Topics in Phase Equilibria:
VLE from cubic equations of state, VLE from k-value correlations - Equilibrium and stability - liquid-liquid equilibrium (LLE), vapor-liquid-liquid equilibrium (VLLE)

UNIT - V:

Chemical reaction equilibria

Reaction coordinate - application of equilibrium criterion to chemical reactions - standard Gibb's energy change and the equilibrium constant - effect of temperature on equilibrium constant - Evaluation of equilibrium constant - relation to composition - equilibrium conversion for single reactions - phase rule and Duhem's theorem for reacting systems.

TEXT BOOK:

1. J.M.Smith and H C Van Ness, Introduction to Chemical Engineering Thermodynamics

5th ed. McGraw Hill 1996.

2. Chemical Engineering Thermodynamics, YVC Rao, University publication

REFERENCES:

1. Chemical Engineering Thermodynamics by Thomas E.Daubert

Course Outcomes :

1. To be able to develop and use expressions for property estimation. To be able to calculate property values from equations of state.
2. To have learnt the concepts of residual, excess, partial molar properties and property changes of mixing**.** To have understood concepts of ideal solutions, fugacity and activity coefficient.
3. To be able to use modified forms of Raoult's law for non-ideal systems, Dewpoint and bubble point calculations.
4. To be able to make phase equilibrium calculations using Raoult's law. To have learnt the concepts of LLE and VLLE.
5. To have learnt the concept of equilibrium constant and its calculation. To be able to estimate equilibrium conversion of single and simple multiple reactions.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	1									
CO2	1			2	2							
CO3			2	3		1						
CO4		1		2								
CO5			2	2	1							

CH404C **HEAT TRANSFER**

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Educational Objectives :

1. To understand different modes of heat transfer and their characterization
2. To understand the transfer mechanism of heat in fluids with and without phase change
3. To learn the principles of radiation heat transfer
4.. To design heat exchange equipment
5. To understand the principles of evaporation and the working of equipment and to learn the principles of crystallization

Unit I : Heat transfer by conduction

Fourier's law - one dimensional steady state conduction- compound resistances in series - plain wall, cylinder, sphere - critical thickness of insulation - Unsteady state heat conduction - one dimensional, semi infinite solid, infinite slab – lumped hat capacity systems

Unit II : Principles of Heat Flow

Principles of heat flow in fluids – heat exchange equipment – parallel and countercurrent flow – energy balances – calculation of overall heat transfer coefficient – log mean temperature difference – single and multiple heat exchangers – correction for LMTD – Fouling Factors – Effective Coefficients for Unsteady State conduction – NTU & Effectiveness Methods.

Unit III : Heat transfer to fluids with out phase change

Concept of hydrodynamic and thermal boundary layers – Forced Convection in laminar flow over plates and in tubes – correlations for heat transfer in turbulent flow – Dimensional Analysis – Heat Transfer at High velocities

Analogy between heat and momentum transfer – Reynold's, Prandtl and Colburn analogies – Transfer in Transition region

Transfer to liquid metals - Natural Convection – Heat transfer over vertical plates and tubes, horizontal plates and tubes

Unit IV : Heat transfer to Fluids With Phase Change & Radiation

Heat transfer from condensing vapors - drop wise and film wise condensation - Nusselt assumptions and derivation of Nusselt equation – Condensation of superheated vapors - effect of non-condensable gases on rate of condensation - heat transfer to boiling liquids

Fundamentals of Radiation heat transfer – laws of black body radiation – radiation between surfaces – view factors – radiant heat exchange between black and non-black surfaces – combined heat transfer by conduction, convection and radiation – radiation shields

Unit V : Condensers & Evaporators

Condensers - boiler and calandria - heat transfer in agitated vessels, heat transfer in packed beds - scraped surface exchangers – Plate Type Heat exchangers – Extended Surfaces
Evaporation : types of evaporators – capacity and economy of evaporators - material and energy balances in single effect evaporators - multiple effect evaporators – methods of feeding

Text book

1. Unit Operations of Chemical Engineering by Warren L.McCabe and Julian C.Smith

Reference Book

1. Heat Transfer by J.P.Holman, McGraw-Hill Publications

Course Outcomes :

1. To be able to calculate the heat transfer flux in one-dimensional heat conduction .To have learnt the concepts of turbulence, boundary layer and analogies.

2. To have understood the construction and flow patterns in heat exchange equipment.

3. To be able to calculate heat flux in natural convection. To be able to estimate heat flux in forced convection.

4. To have understood the concepts of black body, view factors and to be able to calculate radiation heat flux. To be able to handle conduction-convection conduction-convection-radiation heat transfer.

5. To be able to design heat exchangers and condensers. To have understood the functioning of evaporators.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	**1**	**1**	**1**	**1**	**1**	**1**						**1**
CO2		**1**	**1**	**2**		**1**	**2**					
CO3					**1**	**1**						
CO4				**1**				**1**	**1**			
CO5										**1**		

CH405C MASS TRANSFER OPERATIONS – I

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Educational Objectives:

1. To understand the mechanisms of mass transfer – diffusive and convective transport
2. To synthesize the overall resistance for transfer from individual phase resistances
3. To develop the frame work for the design of equipment for staged and continuous contacting devices
4. To learn the construction, operation and inoperable conditions in gas-liquid contacting devices
5. To understand the equilibrium considerations in the operations – absorption/drying/humidification

UNIT - I:

Introduction: Scope of Mass Transfer Operations - Classification of Mass Transfer Operations - Choice of Separation method - Methods of conducting Mass Transfer Operations - design principles.

Diffusion In Fluids : Molecular diffusion - The equation of continuity - Steady state molecular diffusion of Fluids at rest and in laminar flow - Diffusivity of gases and liquids - Applications of molecular diffusion.

Eddy Diffusion - Mass transfer coefficients - Mass transfer coefficients in laminar flow and turbulent flow - mass transfer theories - Mass, Heat and Momentum Transfer Analogies - Mass Transfer data for simple situations.

UNIT - II:

Inter Phase Mass Transfer: Equilibrium – Overall mass transfer coefficients – gas phase & liquid phase controlled situations

Equipment for gas-liquid contact – Description of continuous and stage wise contact equipment – packing for packed columns liquid distribution – mass transfer coefficients in packed columns - inoperable conditions – stage , ideal stage, Point, plate and column efficiency – comparison of plate and packed columns

UNIT - III

Gas Absorption: Equilibrium solubility of gases in liquids - choice of solvent for absorption- Co-current and Counter current flow (one component transferred) – material balance, Minimum liquid - gas ratio for absorbers, Dilute gas mixtures, Absorption factor – Kremser-Brown equations - Determination of number of transfer units and height of transfer unit

UNIT - IV:

Humidification Operations: Vapor - liquid Equilibrium and Enthalpy for a pure substance - vapor gas mixtures, Air-water system - Adiabatic saturation curves, wet bulb temperature – Psychrometric charts – humidification and dehumidification – Operating lines and design of packed humidifiers, dehumidifiers - cooling towers - spray chamber - Evaporative cooling.

UNIT - V:

Drying : Equilibrium - Insoluble solids - Soluble solids - Drying Operations - Batch Drying - Mechanisms of Batch Drying-Thorough Circulation Drying - Continuous Drying -Equipment - Rate of drying

TEXT BOOK:

1. Mass Transfer Operations - Robert E.Treybal (3rd Ed.) McGraw Hill, Kogakusha.

REFERENCE :

1. Principles of Mass transfer and Separation Processes – B. K.Datta - PHI

Course Outcomes :

1. To be able to calculate the flux in cases involving diffusive transfer. To appreciate the contribution of turbulence to transfer and to calculate coefficients and from them, the flux.
2. To be able to differentiate different representations of resistances and to properly integrate them to obtain the overall resistance. To be able to estimate the process parameters like solvent requirement, number of theoretical stages, height and diameter of columns.
3. To understand equilibrium relevant to absorption and to calculate the number of stages, number and height of transfer units.
4. To understand the equilibrium concerned to humidification, various methods of conducting the operation and to design a cooling tower.
5. To understand the mechanism of drying operation and to calculate the time of drying.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**	**1**	**1**	**1**	**1**	**1**						**1**
CO2		**1**	**1**	**2**		**1**	**2**					
CO3					**1**	**1**						
CO4				**1**				**1**	**1**			

CO5										**1**		

CH406C CHEMICAL TECHNOLOGY

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Educational Objectives:

1. To know the difference between unit operations and unit processes.
2. To learn principles of different unit operations like screening, filtration, size reduction, mixing.
3. To learn how to draw flow sheet for a process.
4. To know the industrial production of cements, industrial gases, nitrogen, sulphur phosphorous, glass and ceramic industries.
5. To learn the thermodynamic considerations, engineering problems and economic factors in the production.

UNIT - I

Water Technology: Sources of water - methods of treating fresh water - Desalination - Activated Sludge Process

Fuel and Industrial gases: Natural gas, LPG, Carbon dioxide, Hydrogen, Nitrogen and Synthesis gas.

Chlor-Alkali Industry: Manufacture of Soda Ash , Caustic Soda & Chlorine

UNIT - II

Nitrogen Industries - Synthetic Ammonia, Urea, Nitric acid .Phosphorous Industries: Super Phosphate & Triple Super Phosphate, Phosphoric acid

Sulfur and Sulfuric acid

UNIT - III

Cement- Types and manufacture. Pulp And Paper Industry - Methods of pulping, Production of sulphate and sulphite pulp, production of paper - wet process.

Sugar And Starch Industry - Manufacture Of Cane Sugar, Production Of Starch From Maize

UNIT IV

Oils, fats and waxes: Edible oil - extraction of vegetable oils- Hydrogenation of oils - Methods of production of essential oils .

Soaps and detergents- manufacture of soaps, detergents and glycerin

Manufacture of Industrial alcohol, acetone and butanol, acetic acid, vinegar, Penicillin.

UNIT - V

Synthetic fibers: Manufacture of Rayon, Nylon and polyester fibers.

Plastics: Classification-types of synthetic resins and plastics and their manufacture - Thermosetting resins-thermoplastic resins, oil soluble and modified resins-laminated Plastics.

Rubbers: Classification, natural rubber, monomers for synthetic rubber, manufacture of SBR.

TEXT BOOK:

1. Chemical Process Industries by R.N.Shreve and J.A.Brink Jr. McGraw Hill 5th ed.

REFERENCE:

1. Dryden's Outlines of Chemical Technology by Gop al Rao and Marshall sitting. – Boca Raton

Course Outcomes:

1. Able to differentiate unit operations and unit processes. To Know the basic principles of different unit operations. Able to know constituents of petroleum, and the extraction of petroleum compounds petrol, diesel
2. Can understand the raw materials and production of Ammonia, Urea, Phosphorus industries.
3. Can understand the raw materials, pulp and paper industry, reactions involved and the production of sugar, starch.
4. Get knowledge about alcohol, soaps, edible oils, hydrogenation of oils and extraction of vegetable oils.
5. Can understand the difference between paints and varnishes and about the production. Know the classification of plastics, industrial production of plastics and rubbers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	1	1	1									
CO2	1			2	2							
CO3			2	3		1						
CO4		1		2								
CO5			2	2	1							

CH407L PARTICLE AND FLUID PROCESSING LAB

Instruction : 3 hr/ week Credits : 1.5 Assessment 40 + 60

EXPERIMENTS:

1.Sieve Analysis 2.Roll Crusher

3.Ball Mill 4.Rod Mill

5.Pulverizer 6.Cyclone Separator

7.Crystallizer 8.Plate And Frame Filter Press

9.Leaf Filter 10.Hydro Classifier

11.Motion Of Particles Through A Fluid 12.Disk Grinder

CH408L HEAT TRANSFER LABORATORY

Instruction Hours/Week: 3 hr/week Credits: 1.5 Assessment: 40 + 60

Any 8/10 experiments on Double Pipe Heat Exchanger, Heat Transfer through Composite Wall, Thermal Conductivity of Insulating Powder, Heat Transfer from Pin Fin Apparatus, Heat Transfer through Natural Convection, Heat Transfer through Forced Convection, Critical Heat Flux Apparatus, Heat Transfer in Agitated Equipment, Condensation of Steam on Vertical Copper Tube, Radiation heat Transfer.

CH309S **PYTHON PROGRAMMING**

Instruction Hours/Week: 3(L) Credits: 2 Assessment : 40 + 60

Course Objectives:

The objective of the course is to impart to the students:

1. Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. The concepts of Object-Oriented Programming as used in Python.
3. Exposure to various problems solving approaches of computer science in various Domains.
4. Various data structures like lists and dictionaries using python.
5. Introduce Python third- Party Tools for various domains.

UNIT I

Introduction to Python: Features and History of Python, Print and Input Functions, Variables, Keywords, Comments

Types: Numerical Types (int, float, complex), Strings, Boolean, Type Conversion Operators: Arithmetic, Relational, Logical, Bitwise, Assignment, Identity, Membership.

Control Flow: Indentation, if-elif-else, while, for, break, continue, pass, else-with loops.

UNIT II

Functions: Introduction, Required Arguments, Default Arguments, Keyword Arguments, Variable Number of Arguments, Variable Scope and Lifetime, Global Variables, Lambda Functions, Command Line Arguments.

Object-Oriented Programming: Classes and Objects, Built in Class Methods and Attributes, Self, Constructor, Destructor, Inheritance, Data Hiding, Overriding Methods and Overloading Operators.

UNIT III

Data Structures, Files and Exception Handling:

Lists, Nested Lists, List Comprehensions, Tuples and Sequences, Sets, Dictionaries. File I/O: Opening, Closing, Reading and Writing Handling Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block without Exception, The Else Clause, Raising Exceptions, Built-in and User-Defined Exceptions, The FinallyBlock.

UNIT IV

Modules, Packages and Standard Library:

Introduction Modules, Import and From-Import, Packages in Python, Used Defined Modules and Packages, PIP. The Python Standard Library: Numeric and Mathematical Modules, String Processing, Date & Time, Calendar, Operating System, Web Browser.

Python Third- Party Tools:

Survey of The Most Common 3rd Party Packages: Requests, Numpy/Scipy, Matplotlib/ Pyplot, Pandas, Pillow, Flask/Django/Twisted, Pep8, Scikit-Learn/Nltk, Stanford-Corenlp, Bcrypt, Beautiful Soup, and More.

UNIT V

GUI, Graphics and Applications:

GUI Design with Tkinter: Button, Canvas, Check Button, Entry, Frame, Label, List Box, Menu, Menu Button, Message, Radio Button, Scale, Scrollbar, Text Graphics with Turtle: Motion Control, Pen, Colour, Fill, Multiple Turtles, Reset and Clear.

Text Books:

1. ReemaThareja, Python Programming using problem solving approach, First Edition, Oxford University Press, 2017
2. Mark Lutz,Learning Python, fifth Edition, O‟Rielly,2016

Reference Books:

1. Mark Lutz, Programming Python, Fourth Edition, O‟ReillyMedia,2010.
2. John V.Guttag,Introduction to Computation and Programming Using Python with Applicationto Understanding, PHI.

3. Allen Downey, Think Python: How to think like a Computer Scientist, Green TeaPress.
4. Paul Barry,Head First Python: A Brain-Friendly Guide, Second Edition, O‟Reilly.
5. The Python Standard Library,Python 3.6.5 documentation(Web Resource)https://docs.python.org/3/library/.

Course Outcomes

Having successfully completed this course the students will be able to:

a) Understand the structure, syntax, and semantics of the Python language.
b) Interpret the concepts of Object-Oriented Programming as used in Python.
c) Demonstrate proficiency in handling Strings and File Systems.
d) Implement desktop/Web-based applications using the Python programming language.
e) Boost hireability through innovative and independent learning.

f) MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3										
CO 2	2		3									
CO 3	2	3	2									
CO 4	2		3									
CO 5	2	3										

B. Tech. V Semester Chemical Engineering Syllabus

CH501C MASS TRANSFER OPERATIONS – II V semester
Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

COURSE DESCRIPTION:

This course is designed to chemical engineering students to learn the vapor-liquid equilibrium of mixture of components for the separation. Students can learn various equipments used for the continuous separation of components by considering the physical properties of the mixture by distillation process. Based on the solubility of the components students are able to use liquid-liquid equilibrium of the mixtures for their separation. Various methods are used for the extraction of valuable components present in solids. In this course various membrane separation processes are used for separation of mixture of components based on physical properties of components. Can understand the principles of ion exchange and adsorption process.

Course Educational Objectives:

1. To understand VLE and to learn the different types of distillation operations.
2. To understand the design of continuous fractionating columns in distillation operations.
3. To understand LLE and to learn the design of staged columns for liquid-liquid and solid-liquid extraction and also to learn the construction and operation of different equipment for the said operations.
4. To get a fundamental understanding of membrane separations and solid –liquid leaching operations.
5. To understand the mechanism of adsorption and ion exchange processes

UNIT – I : Distillation – I

Vapor- Liquid Equilibrium - P-x-y and t-x-y diagrams – x-y and H-x-y diagrams - ideal solutions - Raoult's Law, positive and negative deviations from ideality, Minimum and Maximum

boiling azeotropes Steam distillation - Flash vaporization - Differential Distillation – batch distillation with reflux.

UNIT – II : Distillation – II

Continuous Fractionation - Binary systems, Multistage towers - The method of Ponchan and Savarit - The method of McCabe-Thiele - Feed tray location, total reflux, minimum reflux ratio, optimum reflux ratio, use of open steam, multiple feeds, partial and total condensers - Packed bed distillation. – Principles of azeotropic and Extractive Distillation.

UNIT - III: Liquid - Liquid Extraction

Liquid Extraction - Fields of usefulness - Liquid Equilibria - Equilateral Triangular coordinates - Rectangular coordinates - Rectangular coordinates on solvent free basis - Systems of three liquids - One pair partially soluble, two pairs partially soluble - Effect of temperature, choice of solvent. Single stage Extraction - Multistage cross current extraction and continuous counter current multistage extraction with out and with reflux - Insoluble liquids – Equipment for solvent extraction - agitated vessels, Emulsions and Dispersions, Mixer - settler cascades, sieve tray towers. Continuous contact (Differential)contactors - Spray towers - packed towers - Mechanically agitated counter current extractors, Rotating Disc contactors, centrifugal Extractors.

UNIT IV: Leaching

Preparation of the solid - Temperature of Leaching - unsteady - state operation - in-place Leaching, Heap leaching, percolation tanks - Counter current multiple contact (the shanks system), percolation in closed vessels, Filter - press leaching Agitated vessels. –Batch settling - Steady - stage (continuous) operation - Leaching during grinding, Agitated vessel, Thickeners, continuous counter current Decantation, Hydro cyclones, continuous leaching of course solids, classifiers, leaching of vegetable seeds.

Basics of Membrane Separations – classification – capillary and solution diffusion models – retention coefficient – concentration polarization – fouling – membranes (operational requirement – structure and preparation) – components of a typical membrane separation plant – micro filtration – ultrafiltration – reverse osmosis – dialysis – electro dialysis - pervaporation

UNIT – V:Adsorption

Types of adsorption - Nature of Adsorbents - Adsorption equilibrium - single gases and vapors, vapor and gas mixtures, liquids. Adsorption operations - Stage wise operation - Multistage cross current and counter current operation, application of the Freundlich equation, Equipment - Agitated vessels, Fluidized beds, Steady state fixed bed absorbers, adsorption wave, Ion Exchange - Principles of ion exchange, Techniques and applications, Equilibrium Rate of ion exchange.

Text Book:

1. Mass Transfer Operations - Robert E Treybal (3rd ed.) McGraw Hill, Kogakusha.

Reference Books :

1. Bioseparations – Principles and Techniques – B.Sivasankar

2. Principles of Mass transfer and Separation Processes – B. K.Datta - PHI

Course Outcomes:

1. To be able to analyze different phase diagrams – pxy, txy, hxy, bimodal solubility curve and Nxy representations. To be able to calculate flash calculations. To be able to apply Rayleigh's equation (differential distillation).
2. To be able to calculate the number of ideal stages using Ponchon-Savarit and McCabe-Theile procedures. To acquire a fundamental understanding of azeotropic and extractive distillation.
3. To be able to calculate the solvent requirement and number of stages for different contacting patterns like single stage, cross current and countercurrent modes.
4. To be familiar with different constructions of equipment suitable for extraction and leaching.
5. To be able to explain the equilibrium of adsorption and to calculate the material requirement and number of stages for different contacting schemes. To have visualized fixed and moving bed adsorption and regeneration.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3	1	1				2	1			1
CO2	1	2	1	1					1			1
CO3	1		1		1			3	1			1
CO4	1		1		1			3	1			1
CO5	1		1		1			3	1			1

CH502C **CHEMICAL REACTION ENGINEERING – I** V semester

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

COURSE DESCRIPTION:

This course is designed for chemical engineering student to understand the principles of chemical reactions, the mathematical rate equations for various types of reactions occurring in process industries. Various types of reactors used in process industries, rate equations for series and parallel multiple reaction can be discussed. The temperature and pressure effects in various chemical reactions can be discussed.

Course Educational Objectives:

1. To provide knowledge on different types of reactions, reaction rate and mechanism
2. To provide knowledge on collection and analysis of batch reactor data for homogeneous reactions
3. To provide knowledge of different types of ideal reactors and to derive their design equations
4. To teach about different reactor configurations, their selection and performance analysis and to provide a foundation on deriving rate expressions for multiple reactions.
5. To teach about the heat effects during the reaction and finding the rate of reaction

UNIT - I:

Introduction: Performance equation, Classification of Reactions, Variables affecting the rate of reaction, Definition of Reaction rate.

Kineticsof Homogeneous Reaction: Concentration - dependent term of a rate equation - Temperature dependent term of Rate equation, Searching for a mechanism.

UNIT - II:

Interpretation of Batch Reactor Data: Constant - Volume Batch Reactor - Integral method and differential method of Analysis of Data. Variable - Volume Batch Reactor - differential and integral methods of analysis of Data. Temperature and Reaction Rate, the search for a rate equation.

Single Ideal Reactor Design - Ideal Batch Reactor - Steady state mixed flow Reactor - Steady state plug flow Reactor - Space time, Space velocity, holding time in flow systems.

UNIT - III:

Design for Single Reactions: Size comparison of Single Reactions - Batch Reactors - Mixed Vs.Plug flow Reactors - First and Second order Reactions - Variations of Reactant ratio for second order reactions - General graphical procedure. Multiple Reactor systems - plug flow Reactors in series and/ or in parallel, Equal size mixed Reactors in series and/or in parallel, mixed reactors of different sizes in series - reactors of different types in series, Recycle reactor (omit auto catalytic reactions).

UNIT - IV:

Design for Multiple Reactions: Reactions in Parallel - in series - successive first order reactions - first order followed by zero order reaction - zero order followed by first order reaction successive irreversible reactions of different orders. Reversible reactions; series/parallel reactions and applications.

UNIT - V:

Temperature and Pressure Effects: Single Reactions - Heats of Reactions from Thermodynamics, Equilibrium constant from Thermodynamics, General Graphical Design Procedure, Optimum temperature progression. Heat effects, Adiabatic and Non-adiabatic operations, comments and Extensions. Exothermic Reactions in Mixed Reactors - A special problem.

TEXT BOOK:

1. Chemical Reaction Engineering (3rd Ed) Octave Levenspiel.

REFERENCES:

1. Chemical Engineering Kinetics (3rd ed) J M Smith.
2. Elements of Chemical Reaction Engineering (2nd) - H.ScottFoggler

Course Outcomes :

1. To be able to write rate expressions for elementary reactions and to study the temperature dependence of reactions.
2. To be able to apply analytical procedures (integral, differential, fractional life, initial velocity methods) to convert batch reactor data in to kinetic expression.
3. To be able to make performance analysis of multiple reactor systems – PFR in series and parallel, CSTRs in series and in parallel, mixed reactors in series.
4. To be able to analyse multiple reactions – series, parallel and series-parallel. To be able to suggest reaction controls for desired product distribution.
5. To be able to estimate heat effects of industrial reactions. To be able to suggest optimum temperature progression.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1			2			1			3
CO2	1	1	1	1	1	2		1	1			2
CO3	1	1	1	1	1	2		1	1			1
CO4	1	1	1	1	1	2		1	1			2
CO5	1	1	1	1	1	2		1	1			3

CH503C **PROCESS DYNAMICS AND CONTROL** V semester

Instruction hours /week: 3 (L) Credits: 3 Assessment: 40 + 60

COURSE DESCRIPTION:

This course is designed for chemical engineering students to understand the transfer functions for different types of systems in process industries, able to identify different controller elements used in process industries, can draw the block diagrams for control systems and able to learn the stability of systems in process industries. Frequency response of control systems can be studied. Different types of controller arrangements and controller tuning methods are studied.

Course Educational Objectives:

1. To introduce the fundamental principles of system dynamics and response, with emphasis on process systems
2. To introduce the basic features of different controllers and control elements
3. To develop and analyze feedback control loops for stability
4. To introduce the features of advanced control strategies
5. To train the students in the basic approach of modeling a physical process

UNIT I:

Response of first order systems: Physical examples of first order systems, Response of first order systems in series.

UNIT II:

Higher Order Systems: Characteristics, response and transportation lag, Control systems: controllers and final control elements, Block diagrammatic representation.

UNIT III:

Closed loop transfer functions, Transient response of simple control systems Stability, Routh Criterion.

UNIT - IV:

Root Locus: Transient response from locus, Application of root locus to control systems
Introduction to Frequency Response: control systems design by frequency response.

UNIT - V:

Advanced Control Strategies: Cascade control, feed forward control, ratio control, Smith predictor, internal model control, Controller tuning and process identification, control valves.

TEXT BOOK:

1. Process systems Analysis and process Control by D R Coughanowr, 2nd ed. McGraw Hill.

REFERENCES:

1. Chemical Process Control by G.Stephanopolous, Prentice Hall 1998.

2. Computer Control of Industrial Processes, Emenule, S.Savas, McGraw-Hill, London.

Course Outcomes :

1. To be able to model physical systems/processes like thermometer / level systems / manometer. To have acquired the ability to study the response behavior of systems.
2. To be able to suggest an appropriate controller for an application.To develop feed back control loops and reduce it to single block representation for further analysis.
3. To be able to construct and analyze Routh array.
4. To be able to obtain the locus of roots of a characteristic equation. To be able to make stability analysis-based frequency response (Bode plots) approach.
5. To have learnt the basics of advanced control strategies. To have learnt controller tuning rules.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1	1	1	2				1			1
CO2		1	1	1	2				2			1
CO3		1	1	1	2				2			1
CO4		1	1	1	1				2			1
CO5		1	1	1	1				2			1

CH504C **MATERIAL SCIENCE** V semester

Instruction hours /week: 2 (L) Credits: 2 Assessment: 40 + 60

COURSE DESCRIPTION:

This course is designed to chemical engineering students to understand different types of engineering materials, their physical properties and their structures. The phase diagrams, heat treatment of materials can be studied. Different ceramics, composite and nano material can be studied. The corrosion types in materials can be studied.

Course Educational Objectives:

1) To have fundamental knowledge on engineering materials.
2) To study Phase diagrams and its applications and can learn different Heat treatment processes.
3) To have knowledge on Ceramic and composite materials.
4) To study Corrosion, its nature and its prevention
5) To learn a basic view of Nano materials.

UNIT - I: **ENGINEERING MATERIALS**

Classification - levels of structure - properties Mechanical, thermal, electrical, and magnetic properties) - structure - property relationship. Structure of solids - crystalline and non crystalline state - Inorganic solids - Crystal Imperfections (point defects, line defects and surface imperfections, Grain boundaries).

UNIT - II: **METALS AND ALLOYS**

Elastic and Plastic deformations - Re-crystallization - cold and hot working - creep, fatigue and Fracture. Phase diagrams and their applications - phase rule - completely soluble, partially soluble, Insoluble in solid phase, peritectic phase diagrams. Iron - Iron carbide phase diagram. Heat treatment processes - Annealing - quenching and tempering - Age hardening.

UNIT – III :**CERAMIC PHASES AND THEIR PROPERTIES**

Structure of ceramics - Mechanical and electrical properties. Abrasives - silicon carbide various silicates - structure of quartz - uses. Piezo and Ferroelectric material - $BaTiO_3$.

COMPOSITE MATERIALS - Fiber, particle and Plastic reinforced composites. Whiskers. Porosity - Bulk characteristics. Agglomerated materials - concrete - Asphalt and Asphalt mixtures.

UNIT - IV: **CORROSION**

Definition - Electrochemical principles - Environmental effects - oxidizers, Temperature, Agitation (velocity) and polarization. Passivity. Eight forms of corrosion (brief) - Galvanic, Crevice corrosion, Selective leaching, Erosion and Hydrogen damage. Corrosion of metals and Alloys due to sulfuric, hydrochloric nitric, phosphoric and acetic acids. Corrosion prevention and control - Selection of materials - Design principles - Inhibitors - Alteration of environment - Anodic protection. Inorganic and Metallic coatings. Organic coatings.

UNIT - V: NANOMATERIALS

Evolution of nanotechnology - Electron Microscopy – Priniciples of SEM, TEM, SPM and STM - Manipulation of atoms (manipulator – tweezer – nanodots – self assembly – nanolithography) - Nano materials - Plasma arcing - Chemical Vapor Deposition - Sol gel - Electrodeposition - Ball milling - Applications of Nanomaterials

TEXT BOOKS:

1. Elements of material science by Van Vlack L.R. Addison Wesley Publishing Co.
2. Corrosion Engineering by Mars G.Fontana
3. Nanotechnology : Basic Science and Emerging Trends – Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and BurkhardReguse, Overseas Press

REFERENCES :

1. Material science and Engineering by V.Raghavan.
2. Material Science by William Smith

Course Outcomes:

1. Able to understand classification, properties and the structures of Engineering materials. Able to have knowledge on Crystal imperfections.
2. To learn various deformations regarding Creep, Fracture, Cold and Hot working.Able to understand Phase diagram and its applications. To learn various heat treatment process regarding Annealing, Quenching and Tempering.
3. Able to understand the Mechanical and Electrical properties of Ceramic materials. Able to understand various forms of Composites.
4. Able to learn various forms of Corrosion. Able to have knowledge on Corrosion prevention and control.
5. Able to have knowledge on Evolution of Nanotechnology, Electron Microscope and its applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								1				1
CO2		`1						1	1			
CO3		1						1	1			
CO4						1		1	1			1
CO5	1	1						1	1			1

CH505E **INDUSTRIAL MANAGEMENT** V semester

Instruction hours /week: 2 (L) Credits: 2 Assessment: 40 + 60

COURSE DESCRIPTION:

This course is designed for students to understand the functions of management at various levels of an organization. Plant layout and the factors influencing production are also discussed. Elements of cost, quality control and plant maintenance are also discussed.

Course Objectives:

1. To understand the concept of management, administration, organization, objectives, nature, scope, role, responsibilities & approaches of a management.
2. Enable the students to be educated with planning/production and plant layouts, studying about strategies of material handling and equipment's, selection of site locations andStudy PPC through PERT/CPM.
3. Able to familiarize the basic cost concepts, allocation and control of various costs and methods of costing, purchasing, inventory control systems, EOQ models, etc.
4. Understand the concept of control charts, TQM concepts towards improvement of quality through quality improvement techniques.
5. Gain personal and professional insight intoplant Maintenance in an Industry, personnel management, exposure to the industrial relations and related aspects prevailing in industries and various Labor Legislations applicable to businesses.

UNIT:I

Administration, Management and Organisation, Scientific management, functions of management, principles of management, types of organization/Principles for organization, enterpreneurship - Concept, need development of enterpreneual talents, pitfalls and steps for successful enterpreneurship.

UNIT - II:

Plant location, location factors, plant layout, objectives, types of lay outs, material handling, objectives, equipment and factors influencing their selection.

Production planning and control - objectives and functions, types of production systems - project scheduling: Introduction to PERT/CPM Techniques,

Marketing management – introduction and functions.

UNIT - III:

Elements of cost - methods of allocation of overhead charges - outlines of financial cost and cost accounting - methods of costing and control - sources of finance.

Purchasing - objectives, source selection and vendor rating - stores management - inventory management, basic EOQ model and inventory control systems – ABC Analysis

UNIT - IV:

Quality – Control charts – Control charts for Variables (X and R charts) – Control charts for attributes (p and C charts only) - acceptance sampling plans(single sampling only) - OC curve and its characteristics – Reliability - Total Quality Management - Quality costs – Quality Circles – Six-sigma concept – Quality improvement techniques – Introduction to ISO-9000

UNIT - V:

Plant Maintenance – need and Objectives – types of maintenance – safety in industries – principles of accident prevention in chemical industries

Personnel Management - functions - role of personnel manager -concepts of job evaluation and merit rating- Factories act - Industrial disputes - Collective bargaining - labor participation in management .

Text Books:
1. Management for business and industry - Claude S George Jr.
2. Industrial Engineering and Management - O.P.Khanna

Reference Books:
1. Production Control - Moore
2. Production -operation Management - Adam &Eberts.
3. Operations management - Joseph G. Marks.

Course Outcomes:

1. Understand the evolutionary development of management thought, general principles of management and conceptof entrepreneurship.
2. Able to identify and design plant location, plant layout, material handling systems and apply forecasting and PPC techniques to production systems.
3. To realize the importance of significance of quality, manage quality improvement teams and identify requirements of quality improvement programs for various industries.
4. Able to construct an operating characteristic curve for various sampling plans, construct and interpret various charts and apply quality improvement techniques in real world situations.
5. Understand the philosophy and basic concepts of quality improvement, design, use, and interpret control charts for variables, attributes, and quality improvement techniques.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	1									
CO2	1			2	2							
CO3			2	3		1						
CO4		1		2								
CO5			2	2	1							

V Semester Chemical Engineering Electives Syllabus

CH506C **INDUSTRIAL SAFETY& HAZARD ANALYSIS** V semester
Instruction hours /week : 3 Credits : 3 Assessment: 40+ 60

Course Description:

This course is designed to chemical engineering students to understand the importance of safety in process industries. Various government regulations to be followed in process industries can be learned. Safety measure to be taken when any accident took place in process industries and various software techniques to identify the range of damage to the process industries are studied.

Course Objectives

1. To learn about accident and loss statistics, safety concepts
2. To educate about industrial hygiene, evaluation and control of toxic releases
3. To give knowledge about fire and explosions, prevention methods and designs
4. To know about relief systems like types, relief sizing for different services
5. To educate about hazards identification and different hazop studies.

UNIT – I

Introduction: Safety concepts and programs, Engineering ethics – Accident and loss statistics – Acceptable risk public perceptions – Nature of the accident process and inherent safety.

Toxicology: Methods of entry of toxins in to biological organisms and their effects – Elimination of toxicants from Biological organisms – Toxicological studies – Thresh hold limits – models for dose and response curves.

Unit – II

Industrial Hygiene: Government regulations – process safety and risk management. Plan – Industrial hygiene identification, evaluation and control toxic release and dispersion models; important source models dispersion models of puff with no wind and wind pubb with no wind and with source on ground - pasquill – Gifford model – worst case conditions – effect of release momentum and Buoyancy and release mitigation.

Unit – III

Fires and Explosions : The fire triangle – distinction between fires and explosions – definitions – Flammability characteristics of liquids and vapors – Flam mobility diagram ignition energy – Auto ignition and adiabatic compression – ignition sources – sprays and mists - explosions and their characteristics – damage to people and property – fires explosion - prevention methods and designs.

Unit – IV

Relief concepts – definitions – location of relieves – Relief types, scenarios data for sizing and relief systems relief-sizing for liquid and gas services – rupture disc relieves – two-phase flow during run away reaction relieves – deflagration venting for dust and vapor explosions – venting for fires external to process vessels – venting for thermal expansion of process fluids.

Unit – V

Hazard Identification - Check lists – Surveys HAZOP and HAZAN Studies – safety reviews – Review of probability theory – Event trees – Fault trees – QRA and LOPA analysis – Accident Investigations with typical case histories.

Text Book:-

D.A. Crowl and J.F.Louvar – Chemical process safety (Fundamentals with applications) Printice Hall (2002)

References:-

1. H.H.Faweett and W.S.Wood – Safety and accident prevention in chemical operations, 2nd edn, John wiley and sons, 1982.
2. Coulsion and Richardson – Chemical Engineering – R.K.Sinnot, Vol-6, Butterworth – Heinmann Ltd., 1996.

Course Outcomes: At the end of the course, student will be able to

1. Knows about different types of accidents and loss statistics, risk to public life and safety measures to be taken
2. Is able to understand about government regulations of industrial hygiene , identification of hygiene evaluation and control of toxic releases
3. Able to learn difference between fire and explosion, flammability characteristics of liquids and vapors
4. Knows about relief definition, types, relief sizing for liquid and gas services and about rupture disc relieves
5. Have knowledge about hazard, surveys of hazard and different hazop studies and Can understand QRA and LOPA analysis, event trees, fault trees, accident investigations

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1									
CO2	1			2	2							
CO3			2	1		1						
CO4		1		2								
CO5			2	2	1							

CH506C **ENERGY ENGINEERING** V semester

Instruction hours /week : 3 Credits: 3 Assessment: 40+ 60

Course Description:

This course is designed to chemical engineering students to understand the energy consumption at various sectors and to identify various sources of alternative energy. Students can identify various techniques for renewable energy sources.

Course Educational Objectives:

1. To understand the present situation of energy supply and consumption rate in the world and India.
2. Make the students to have knowledge on alternative energy sources like solar energy,nuclear energy resources, and hydrogen energy and non-conventional energies like gobar gas plants, wind energy, ocean energy and geothermal energy.
3. To understand the importance of fuel cell and their working
4. To understand the renewable energy sources like wind energy.
5. Students will learn principles of conservation and audit,to get knowledge on economic concept of energy.

UNIT - I:

Scenario – Energy Consumption as a measure of prosperity – World energy future – Energy consumption (world & India) Energy Sources and its availability

Fossil fuels - Coal and coke - Occurrence, preparation, classification

Petroleum and natural gas - Constitution, occurrence, sources and production.

Processed fuels - Water gas, Producer gas, Refinery gas, LPG.

UNIT - II:

Solar energy– Solar radiation at earth's surface – Solar energy collectors – Flat plate collectors, Concentrating collectors, non concentrating collectors Storage systems – Solar pond, extraction of thermal energy, applications . Applications of Solar Energy and conversion methods.

UNIT - III:

Chemical energy sources – Fuel Cells – Classification – Types – Applications

Nuclear energy – Uranium as Energy source, types of reactors – sources in India, Nuclear Fuel Complex

Hydrogen energy – Introduction – Storage – Transportation – Utilization of Hydrogen gas – Hydrogen as an alternative fuel

UNIT - IV:

Other non-conventional energy sources – Gobar gas plants - Principle, construction and working – KVIC Plant - Impact on rural development -

Wind energy - Introduction – Wind energy conversion system – classification - advantages & disadvantages – applications – storage

Ocean energy – Ocean Thermal electric conversion – open cycle, closed cycle – Utilization

Geothermal energy – Introduction – Geothermal sources – hydrothermal sources – advantages & disadvantages – applications

UNIT – V :

Energy conservation - Economic concept of energy – Principles of conservation and audit – cogeneration – heat recuperators – regenerators – heat pipe – heat pump

REFERENCE:

1. Conventional Energy Technology – Fuels an Chemical Energy by S.B.Pandya, TMH
2. Energy Resources, Demand and Conservation (with special reference to India) by ChamanKashkari, TMH (1975).
3. Solar Energy Utilization, G.D.Rai, Khanna Pub. (1984).
4. Non-conventional Energy Sources G.D.Rai, Khanna publications.
5. Energy Conservation and Utilization by JerroldH.Krentz, Allyn and Bacur Inc1976.
6. Elements of Energy Conservation by Rused C.K, McGraw-Hill

Course outcomes

1. Students will be able to understand present situation of energy resources
2. Students will be able to get knowledge on solar energy collectors ,Students will come to know applications of solar energy and conversion methods .
3. Able to understand utilization of Hydrogen energy, Have the knowledge on fuel cells
4. Able to implement principles and working knowledge of Gobar plants, Will have the knowledge on wind energy and its applications, Acquired knowledge on ocean thermal electric conversion.
5. Acquired basic knowledge on economic concept of energy and principles of conservation and audit.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					1		1	1	1			1
CO2					1							1
CO3					1		1		1			1
CO4					1		1		1			1
CO5					1				1			1

CH506C **INDUSTRIAL EFFLUENT TREATMENT** V semester
Instruction: 3 hr/week Credits: 3 Assessment: 40+ 60

Course Description:

This course is designed for chemical engineering students to understand the various laws for the protection of environment. Types of pollutions, causes for pollution and different methods used for the mitigation of pollution can learn by the students.

Course Educational Objectives:

1. Develop and apply high performance structural materials ,systems and Improve the reliability, performance, and disaster-resistance of water supplies, treatment processes, and distribution systems
2. Create new engineering materials to improve the performance of infrastructure and Characterize and mitigate natural and man-made hazards
3. Improve fundamental knowledge of the inter-relationships between the built environment and natural systems
4. Develop the technological innovations needed to safeguard, improve, and economize infrastructure and society
5. Pursue lifelong learning through continuing education and/or advanced degrees in environmental engineering or other related fields.

UNIT - I:

INTRODUCTION TO ENVIRONMENT - Environmental pollution - causes and effects - Legislation for environmental pollution control - water act 1974 and clean air act 1981.Waste water sources - domestic, municipal and industrial - characterization - treatment requirements, Analysis of pollutants.

UNIT - II:

WASTE WATER TREATMENT - Removal of BOD- biological treatment- activated sludge process, aerobic and anaerobic processes, Neutralization and clarification, etc., special separations such as adsorption, ion exchange, reverse osmosis, electro dialysis.

UNIT - III:

POLLUTION CONTROL FOR SPECIFIC POLLUTANTS – Removal of Chromium, phenolic effluents, particulate matter, sulfur dioxide, oxides of nitrogen, Pollution control aspects of fertilizer industries, petroleum refinery and petrochemical units and miscellaneous industries.

UNIT -IV:

AIR POLLUTION - Types of pollutants and their effect on vegetation and materials - meteorological factors - air quality - control methodologies for air pollution, Solid waste management - Characteristics of municipal solid waste and hazardous materials - collection and transportation - treatment methods - land filling, incineration - recovery and disposal.

UNIT - V :

HAZARD WASTE TREATMENT: Types - Sources, properties of hazardous waste. Primary, secondary & tertiary treatment for liquid wastes, treatment of gaseous wastes. Conventional/modern unit operations for separations, bio-remediation.Physico chemical and biological treatment. Case studies; CN, HCN, phenolics.

REFERENCES:

1. S.P. Mahajan ,Pollution Control in process Industries Tata McGraw Hill
2. E.B.Beseheivre, M.Schwartz, Treatment of Industrial Wastes McGraw Hill.
3. Pollution control in Process Industries, Mahajan byC.S.Rao Wiley Eastern Ltd., (1992).
4. Environmental pollution control Engg by C.S.Rao Wiley Eastern.
5. Industrial Effluent Treatment Vol.1 J.K.Walters and A.Wint.
6. Industrial Effluent Treatment Vol.2 J.K.Walters&A.Wint Applied Science publishing Ltd. London.
7. Treatment of Hazardous wastes Noyes Data corp. NJ (1983).

COURSE OUTCOMES:

1. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability.
2. An ability to recognition of the water treatment processes and control methodologies for air pollution. An ability to use different techniques for hazard waste treatment. Able to understand about removal of BOD, Chromium and Particulate matter.
3. An ability to know about the main sources of different types of pollutions and control methods, Student can reach to reduce the pollution control aspects of fertilizer industries, petroleum refineries.
4. An ability to know types of air pollution and their effect on vegetation, control methodologies for air pollution. Characteristics of municipal solid waste, its treatment methods.
5. An ability to apply knowledge of biological treatment methods and case studies for hazard waste treatments like CN, HCN and heavy metals. An ability to design the equipment for removal of particulate matter from effluent gases.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1						1	1	1			
CO2	1				1			1	1			
CO3	1				1			1	1			
CO4	1				1			1	1			
CO5	1				1			1	1			

CH507L MASS TRANSFER OPERATIONS LAB V Semester

Instruction : 3hr/ week Credits:1.5 Assessment: 40 + 60

1. Diffusion In Still Air
2. .Diffusion Through Porous Wall

3. Surface Evaporation
4. Wetted Wall Column
5. Vapour- Liquid Equilibrium
6. Liquid-Liquid Equilibrium
7. Humidification/Dehumidification in Packed Column
8. Continuous Drying
9. Differential Distillation
10. Absorption in Bubble Column
11. Spray Extraction Column
8. Ion-Exchange Column
12. Absorption in Packed Tower

CH508L PROCESS DYNAMICS AND CONTROL LAB V Semester

Instruction hours /week : 3 (P) Credits: 1.5 Assessment: 40 + 60

1. Characteristics of Control Valves
2. Dynamics of Liquid Filled Manometer
3. Dynamics of Mixing Process
4. Study of Two Interacting Liquid Level Systems
5. Characterization of Liquid Level System
6. Dynamics of Stirred Tank with Heat Transfer
7. Study of Temperature Control Loop
8. Characteristics of I/P Converter
9. Response of Pressure Vessels
10. Dynamics of Thermometer

CH509S COMPUTATIONAL TECHNIQUES LAB V Semester

Instruction : 3hr/ week Credits: 2 Internal Assessment: 100

Exposure to MAT Lab with the following

1. Euler's Method

2. Runge-Kutta Fourth Order Method
3. Regular Falsi Method
4. Newton Raphson Method
5. Newton Raphson Multiple Roots Method
6. Newton Forward Interpolation Method
7. Newton Backward Interpolation Method
8. Lagranges Interpolation Method
9. Jacobi Iteration Method
10. Gauss-Siedel Iteration Method

MC510A Universal Human Values V Semester
Instruction: Hours/Week: 2L Credits: 0 Internal Assessment: 100

Pre-requisites/co-requisites: None.

COURSE DESCRIPTION:

The methodology of this course is universally adaptable, involving a systematic and rational study of the human being vis-à-vis the rest of existence. It is free from any dogma or value prescriptions. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with and within the student himself/herself finally.

COURSE OBJECTIVES:

1. To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. To understand (or developing clarity) the harmony in the human being, family, society and nature/existence.
3. To strengthen self-reflection and to develop commitment and courage to act.
4. To understand social responsibility of an engineer.
5. To appreciate ethical dilemma while discharging duties in professional life.

COURSE CONTENT:

UNIT I: Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT II: Understanding Harmony in The Human Being - Harmony in Myself! :
Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility (Sukh and Suvidha). Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.

UNIT III: Understanding Harmony in The Family and Society- Harmony in Human-Human Relationship: Understanding harmony in the Family - the basic unit of human interaction. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness (Ubhay-tripti); Trust **(Vishwas)** and Respect **(Samman)** as the foundational values of relationship. Understanding the

meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution (Samadhan), Prosperity (Samridhi), fearlessness (**Abhay**) and co-existence as comprehensive Human Goals.Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha) - from family to world family.

UNIT IV: Understanding Harmony in The Nature and Existence - Whole Existence as Coexistence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature.Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V: Implications of The Above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct.Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations.

COURSE OUTCOMES: On completion of this course, the students will be able to

1. To become more aware of themselves, and their surroundings (family, society, nature)
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the role of a human being in ensuring harmony in society and nature.
4. To become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

TEXT BOOKS:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.
2. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan VidyaPrakashan, Amarkantak, 1999.

REFERENCE BOOKS:

1. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
2. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
3. Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
4. A Nagraj, 1998 Jeevan VidyaekParichay, Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. E G Seebauer& Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
8. M Govindrajan, S Natrajan& V. S Senthilkumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.
9. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
10. India Wins Freedom - Maulana Abdul Kalam Azad.

Relevant CDs, Movies, Documentaries & Other Literature:

1. value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story.

B. Tech. VI Semester Chemical Engineering Syllabus

CH601C CHEMICAL REACTION ENGINEERING – II VI Semester
Instruction hours /week: 3 (L) Credits: 3 Assessment: 40 + 60

COURSE DESCRIPTION:

This course is designed to chemical engineering students to understand the reasons for non-ideality of reactor used in process industries, can able to identify the types of reactions occurring and the rate controlling mechanism in solid-fluid reactions. Types of catalysts and mechanism of catalyst in chemical reactions can be identified. Adsorption phenomena and types of adsorption isotherms can be studied.

Course Educational Objects:

1. To develop a general methodology of combining reaction chemistry and chemical engineering concepts,
2. To optimize variety of systems where modeling or engineering of reactions is needed.
3. To understand the suitability and performance characteristics of different types of reactors like packed bed reactors mixed reactors
4. To teach various types of flows like Ideal flow, Non-Ideal flow and mixing of fluids
5. To understand the mechanism of solid Catalyzed reactions and fluid –fluid reactions

UNIT - I: Non Ideal Flow

Residence time Distribution of fluid in Vessels - E curve, the age distribution of fluid leaving in Vessel, Experimental methods, the F curve the C curve Relations among F, C and E curves, mean time for closed vessels, useful mathematical tools, ways of using Age distribution information. Conversion directly from Tracer information - linear process. Models for Non ideal flow - Segregation model, Dispersion Model, Tanks in series Model, Diagnosing ills of operating Equipment. Chemical reaction and dispersion.Mixing of fluids - self mixing of a single fluid and Mixing of two miscible fluids.

UNIT - II: Heterogeneous processes, catalysis and adsorption:

Heterogeneous Processes - Global Rates of Reaction, types of heterogeneous reactions. Catalysis - The nature of catalytic reactions, the mechanism of catalytic reactions.

Adsorption - Physical adsorption and Chemical Adsorption. Adsorption Isotherms, Rates of Adsorption. Solid catalysis - Determination of physical properties - Surface Area, Void volume, solid density, pore volume distribution.Classification of catalysts - Catalyst preparation - promoters and inhibitors, Catalyst deactivation.

UNIT - III : Solid - Catalyzed Reactions:

The Rate Equation Rate of Adsorption, Desorption, Surface Reaction, Rate of equations in terms of Fluid - phase concentrations at the catalyst surface - film resistance controls, surface phenomenon controls, Qualitative analysis of rate equation, qualitative predictions from Active - site theory, Quantitative interpretation of kinetic data, pore diffusion resistance important, diffusion in single cylindrical pores, diffusion porous catalysts, heat effects during reaction, combination of resistances for isothermal particles. Experimental methods

for finding rates - Comparison of Experimental Reactors, Determination of controlling resistances and the rate equation.

UNTI - IV : Fluid- Fluid Reactions:

The rate equation, kinetic regimes for Mass Transfer and Reaction, Rate equations for instantaneous fast, slow, intermediate and infinitely slow reactions. Hatta number and enhancement factor for first order reactions, tower reactor design.

UNIT - V : Fluid particle non-catalytic reactions;

Selection of a model - unreacted core model for spherical particles of unchanging size - diffusion through gas film controls - diffusion through ash layer controls - chemical reaction controls - rate of reaction for shrinking spherical particles - chemical reaction controls - gas film diffusion controls - determination of the rate - controlling step - application to design.

Text Books:

1. Levenspiel O Chemical Reaction Engineering 3rd ed. John Willey
2. 2. Smith J.M. Chemical Engineering Kinetics 3rd ed. McGraw Hill Newyork

Reference Books:

1. Elements of Chemical Reaction Engineering by H Scott Fogler, 2nd ed. PHI 1992

Course Outcomes:

1. Residence time Distribution of fluid in Vessels, the F curve the C curve Relations. Formulate a residence time distribution from tracer experiment results and use it to predict conversion in a non-ideal reactor.
2. Write reaction rate equations for common types of homogeneous and heterogeneous reactions. Physical adsorption and Chemical Adsorption.
3. Identify the mechanisms involved in a heterogeneous reaction and formulate an effective rate equation.
4. Calculate the impact of changing solid (or fluid) properties on the conversion of a heterogeneous reaction.
5. Fluid particle non-catalytic reactions.Unreacted core model for spherical particles, chemical reaction controls.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	1		1	1	1			2
CO2	1		2	2	2				2			2
CO3			2	3		1			1			2
CO4		1	3	2					2			2
CO5			2	2	1				2			2

CH602C **TRANSPORT PHENOMENA** **VI Semester**

Instruction hours /week: 3 (L) Credits: 3 Assessment: 40 + 60

COURSE DESCRIPTION:

This course is designed to chemical engineering students to understand the fluid flow dynamics in different conduits. Students are able to apply the fundamental mass, energy, and momentum balance equations to identify the flow conditions. They can able to apply boundary conditions for any flow system.

Course Educational Objectives

1. Study the fluid dynamics, heat transfer and mass transfer together at the introductory level.
2. Carry out macroscopic mass, momentum and energy balance to solve engineering problems related to fluid and heat flow laminar flow.
3. Give an idea about simple flow problems involving Non-Newtonian models and turbulent flows.
4. Perform dimensional analysis of equation of motion and energy, time smoothed operations.
5. Analyze flow past solid surface, through packed bed and in fluidized beds and they can able to Focus on diffusivity and mechanism of mass transport, diffusion through a stagnant gas film and falling film

UNIT – I : Introduction to momentum transport - Newton's law of viscosity - pressure and temperature dependence of viscosity of liquids and gases, molecular theory of gases. Velocity distributions in laminar flow, shell momentum balances and boundary conditions, flow of a falling film - flow through circular tube and annulus - adjacent flow of two immiscible liquids.

UNIT – II : Equations of continuity and motion - Application of Navier Stokes equation and Euler equation for laminar - steady flow problems, flow through circular tube - falling film with variable viscosity - tangential annular flow of a Newtonian fluid - shape of the surface of a rotating liquid - dimensional analysis of the equation of change - Velocity distribution in turbulent flow, fluctuations and time smoothed quantities - time smoothing of equations of change for an incompressible fluid, empirical expressions for the turbulent momentum flux.

UNIT – III : Inter-phase transport in isothermal systems, Definition of friction factors - friction factors for flow in tube - pressure drop calculations, friction factors for flow around spheres - packed columns. Macroscopic mass, momentum and mechanical energy balances, Estimation of friction loss - pressure rise and friction loss in a sudden expansion, performance of a liquid - liquid ejector - power requirements for pipe line flow.

UNIT – IV : Energy transport by steady state conduction - Thermal conductivity mechanism of energy transport - Fourier's law - effect of temperature and pressure on thermal Conductivity. Temperature distribution in solids and in laminar flow, shell energy balances - boundary conditions, heat conduction with an electrical heat source - viscous heat source - heat conduction through composite wall, addition of resistances - forced convection and free convection. Interphase transport in non-isothermal systems, Heat transfer coefficients - forced convection in tubes and around submerged objects - heat loss by free convection from a horizontal pipe - condensation of pure vapors on a solid surface.

UNIT – V : Diffusivity and mechanism of mass transport, definition of concentration, velocities and mass fluxes - Fick's law of diffusion -temperature and pressure dependence of mass diffusivity, shell mass balances, boundary conditions and applications diffusion through a stagnant gas film - diffusion with heterogeneous and homogeneous chemical reactions. Diffusion into falling - liquid film.

Text Books:

1. Transport Phenomena by R.B. Bird, Warren E. Stewart and Edwin N. Lightfoot, Wiley International Editors, II Edition, Chemical Engineering Series. 2005

Course Out comes:

1. Have the knowledge of derivations of the momentum, heat, mass flux distributions and also velocity, temperature, concentration distributions for various systems.
2. Able to Solve continuity, Navier-Stokes and energy equations to analyze engineering problems related to Newtonian fluid flow laminar flow,Perform dimensionless forms of three transport phenomena.
3. Educate about the formation and calculation of fluid friction in pipes, conduits and around sphere.
4. Know the different types of heat transfer coefficients and performance of liquid – liquid ejector.Have the knowledge of temperature, pressure dependence of viscosity, thermal conductivity and mass diffusivity.
5. Understand the diffusion with homogeneous and heterogeneous chemical reaction.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	2								1
CO2	1	2	3	2	2							1
CO3		2	2	3		1						1
CO4		1	3	2								1
CO5		2	2	2	1							1

CH603C PLANT DESIGN AND PROCESS ECONOMICS VI Semester

Instruction hours / week: 3 hr/week Credits : 3 Assessment : 40 +60

Course Description:

This course is designed for chemical engineering students to understand the concepts of plant design, layout and safety majors to be taken in chemical industries. Students are able identify piping patterns in industries. Can be able to calculate the cash flow patterns by using different methods. Students can learn the various replacement methods used to identify the cost of equipments.

Course Objectives:

1. To understand the general overall design considerations and practical design considerations
2. To understand the plant location ,plant layout, plant operation and control and patent considerations
3. To understand the process design development
4. Gives an idea on time value of money and cash flow patterns
5. It gives an idea on analysis of cost estimation and to determine profitability, alternative investments and replacements

UNIT - I :

Introduction – Chemical Engineering Plant Design-General Overall Design Considerations – Practical Considerations in Design - Engineering Ethics

General Design Considerations – Health and Safety hazards – Loss Prevention – Environmental Protection Plant Location – Plant Layout – Plant Operation and Control – Patent Considerations

UNIT - II :

Process Design Development – Development of Design database – Process Creation – Process Design – Process Flow Diagrams – Piping and Instrumentation Diagrams – Vessel and Piping layout – Equipment Design and Specifications

UNIT - III :

Interest, Time Value of Money, Taxes , and Fixed Charges – Interest – Cost of Capital – Time Value of Money – Cash Flow Patterns – Compounding and Discounting factors – Income taxes – Fixed Charges

UNIT - IV:

Analysis of Cost Estimation – Cash flow for industrial Operations – Factors affecting investment and production costs – capital investment – Estimation of capital investment – Cost Indexes – Cost components in Capital Investment – Methods for estimating capital investment – estimation of revenue – Gross Profit, Net profit and cash flow - contingencies.

UNIT - V:

Profitability, Alternative investments and Replacements – Profitability Standards – Methods for calculating Profitability – Alternative Investments – Replacements – Practical factors in alternative investment and replacement analysis

Text Books:

Plant Design and Economics for Chemical Engineers , 5 th Ed. – Max S.Peters and Klaus D. Timmerhaus and Ronald E.West – McGraw Hill

References :

1. Chemical Engineering Plant Design by Vilbrandt and Dryden, McGraw Hill Intl.
2. Process Engineering Economics by H.E. Schweyer McGraw Hill Co.

Course Outcomes:

1. Students will have knowledge to understand design considerations and engineering ethics. Students able to understand plant location, plant lay out, plant operation and control in a profitable way.
2. Students able to design process flow diagrams, piping and instrumentation diagrams and vessel and piping layout.
3. Students will have the knowledge on interest, time value of money and cash flow patterns useful for cost estimation.
4. Students will have an idea on analysis of cost estimation involves capital investments, estimation of revenue, and cost indexes, students will come to know factors affecting investment and production costs.
5. They will able to find out the alternate investments and replacements, it will also helps the students to understand profitability standards and methods for calculating profitability.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1		1	2			1			1
CO2	1			2	2	1			2			1
CO3			2	3	1	1			1			1
CO4		1		2	1	2			1			1
CO5			2	2	1	1			1			1

Electives Syllabus

CH604C	**PROCESS INSTRUMENTATION**	**VI Semester**
Instruction: 3L	Credits : 3	Assessment : 40 +60

Course Description:

This course is designed to chemical engineering students to understand various instruments used in process industries to measure the parameters like temperature, pressure, level, composition of various mixtures.

Course Educational Objectives:

1. To learn basic structure and characteristics of measuring elements
2. To learn the construction, working and features of instruments suitable for temperature measurement
3. To learn construction and operation of pressure measuring instruments.
4. To learn construction and working of liquid-level measuring instruments.
5. To understand the utilization of different instruments like Refractometers, spectrometers and to give knowledge about recording, indicating, signaling type instrument.

UNIT - I:

Elements of instruments, static and dynamic characteristics, basic concepts of response of first order type instruments,

Temperature Measurement : mercury in glass thermometer, bimetallic thermometer, pressure spring thermometers, static accuracy and response of thermometers, thermoelectric temperature measurement, resistance thermometer bulbs and circuits, radiation receiving elements, radiation, photoelectric and optical pyrometers.

UNIT - II:

Composition Analysis, spectroscopic analysis by absorption, emission, mass and color measurement spectrometers, gas analysis by thermal conductivity, analysis of moisture, gas chromatography, refractometer.

UNIT - III:

Pressure Measurement - liquid column manometers, measuring elements for gauge pressure and vacuum, indicating elements for pressure gauge, measurement of absolute pressure, measurement of pressure in corrosive liquids, static accuracy and response of pressure gauges.

UNIT - IV:

Measurement of Head & Level: Head, density and specific gravity - direct measurement of liquid level, pressure measurement in open vessels, level measurements in pressure vessels, measurement of interface level, density measurement, level of dry materials.

UNIT - V:

Flow Measurement : Measurement of Head flow meters, area flow meters, open channel meters, viscosity meters.

Recording instruments, indicating and signaling instruments, transmission of instrument reading, control center, instrumentation diagram, process analysis.

TEXT BOOK:

1. Industrial Instrumentation by Donald P. Eckman, Wiley Eastern, 1950.

REFERENCE:

1.Principles of Industrial instrumentation by Patranabis, TMH.

Course Outcomes :

1. Can understand the basic for measuring device of temperature
2. Can able to measure the composition of the mixture with different analytical instruments
3. Can understand different instrument for pressure measurement of different liquid and elements of pressure measuring device
4. Can understand the level measurement device in the industries
5. Can understand the flow measuring device and various system of control unit in various plant

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1			1			
CO2						1			1			
CO3						1			1			
CO4						1			1			
CO5						1			1			1

CH604C POLYMER SCIENCE AND ENGINEERING VI Semester

Instructions : 3L Credits: 3 Assessment: 40+ 60

Course Description;

This course is designed for chemical engineering students to understand various types of polymer materials, various methods for the preparation of polymer components

UNIT - I:

Classification of Polymers, Functionality, Mechanisms of Polymerization, Chair Polymerisation - Free radical, Ionic and cationic Polymerisation - Step polymerization methods. Stereoisomerism in Polymers, Chemicals and Geometrical structures in Polymers.Block and Graft Polymers. Molecular weight of Polymers - weight average, number average and viscosity average molecular weight. Principles and calculations for determination of the molecular weights - Osmometry, Ebulliometry, Light scattering, ultracentrifugation, End group Analysis and viscosity methods.

UNIT II:

Thermodynamics of Solubility of polymers.Transition in polymers.Crystallinity in Polymers.Polymer Degradation method.Kinetics of Polymerization Reactions– Free radical, Ionic Polymerization and step polymerization reactions. Derivation of rate equations and related numerical problems.

UNIT-III:

Polymerization Methods - Bulk, solution, suspension and emulsion polymerization. Comparison of Polymerization methods.Fabrication methods - Compounding Injection molding, Extrusion blow, blow extrusion, calendaring, Rotational molding, Thermoforming and vacuum forming.Polymer processing and Rheology: Non-Newtonian flow, Viscosity of Polymer solutions and suspensions, Constitutive, equations; Capillary Rheometer, Couette Rheometer, Cone and Plate Rheometer, Rheometric characterization of polymer solution and melts.

UNIT-IV:

Brief description of individual polymers.Reaction equations, brief process description with a schematic flow sheet, physical properties and uses of the following polymers.

Individual Polymers**:** Thermosets: Phenol Formaldehyde, Urea formaldehyde, Polyester and epoxy resins, Polyrethane. Thermo plastics: Polyethylene, Polypropylene, PVC, Polystyrene, and Co-polymers, PMMA, Polycarbonates.

UNIT-V:

Applications of Polymers: Membrane Separations: Membrane Applications for Polymeric materials, mechanisms of transport and membrane preparation: Biomedical Applications: Artificial organs, Controlled drug delivery, hemodialysis and hemo filtration; Electronics: Electrically conductive polymers, electronic shielding, encapsulation, photonic polymers.

Reference Books:

1. Polymer Science, V.R.Gowariker, M.V.Viswanthan, Jaidev Sridhar, Wiley eastern Ltd, 1988.
2. Plastics engineering – R.J.Crawford, Butterworth Heinemann
3. Rubber and Plastic Technology – R.Chandra and S.Mishra, CBS Publishers
4. Outlines of Polymer Technology: Manufacture of Polymers by R.N.Sinha, Prentice Hall India.
5. J R Fried – Polymer Science and Technology, Prentice Hall of India Pvt., New Delhi, Eastern Economy Edition, 2000.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						1			1			
CO2						1			1			
CO3						1			1			
CO4						1			1			
CO5						1			1			1

CH604C **BIOPROCESS ENGINEERING** **VI Semester**

Instruction: 3L Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed to chemical engineering students to understand the enzyme kinetics for a catalytic actions and industrial applications of enzymes. Students can learn the culture preparation for enzymes, quality control, operating reactors and various product recovery methods.

Course Objectives:

1. To study the mechanism of catalytic action and study production of enzymes
2. To have a view on cell growth
3. To study the operation and cultivation method of cells in bio reactors
4. To have a view on selection and control of bio-reactors
5. To have a knowledge on recovery and purification of products

Unit I :

Enzymes :Introduction – Mechanism of catalytic action – Enzyme kinetics – Immobilized Enzyme systems – Methods and kinetics – large scale production of enzymes – medicinal and industrial utilization of enzymes

Unit II :

Cells : Microbial diversity- naming of cells – cell nutrients – metabolic regulation – transport of small molecules across cellular membrane

Cell Growth – batch growth – Quantifying cell growth – cell growth in continuous culture

Unit III :

Bioreactors – I : Operating considerations : choosing the cultivation method – batch and continuous reactors – immobilized cell systems – Solid State Fermentations

Unit IV :

Bioreactors – II : Selection, Scale-up and Control: Scale up – bioreactor instrumentation and its control – sterilization of Process fluids

Unit V :

Recovery and Purification of Products : Product recovery strategy – separation of insoluble products – cell disruption – separation of soluble products – finishing steps – integration of reactor and separation

Text Book :

1. Bioprocess Engineering – Basic Concepts by Michael L. Shuler and FikretKargi, Prentice Hall of India Pvt. Ltd.,

References :

1. Biochemical Engineering Fundamentals by J.E.BaileyandD.O.Ollis (McGraw-Hill)
2. Biochemical Engineering by S.Aiba, Humphrey and Millis.

Course Outcomes:

1. Able to analyze kinetics of enzymes and immobilized enzyme systems
2. Able to have knowledge on medicinal and industrial utilization of enzymes. Can learn microbial diversity. Have knowledge on cell growth in batch and continuous reactors
3. Able to choose different cultivation methods
4. Have knowledge on bio reactor instrumentation and its control
5. Can understand the strategies of product recovery and separation of soluble and insoluble products

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						1			1			
CO2						1			1			
CO3						1			1		1	
CO4						1			1			
CO5						1			1			

CH607L CHEMICAL REACTION ENGINEERING LAB VI Semester

Instructions / Week : 3 (P) Credits: 1.5 Assessment: 40 + 60

1. Study of Temperature Dependence of Reaction
2. Kinetics Study under Pseudo Behaviour Conditions
3. Kinetics Study in a Mixed Flow Reactor
4. Kinetics Study in Adiabatic Batch Reactor
5. Modeling of a Mixed Flow Reactor
6. Flow Characterization of a Plug Flow Reactor
7. Modeling of a Packed Bed Reactor
8. Residence Time Distribution in Tanks in Series Assembly
9. Kinetics of Saponification in a Batch Reactor
10. Effect of Mass Transfer on Reaction

CH608S SIMULATION LABORATORY VI Semester

Instructions / Week: 1 (L) +2 (P) Credits: 2 Assessment: 100

Objectives:

To introduce students to use of software packages for simulation and also analyzing flow sheets

1. Introduction of Software packages.
2. Setting up models for simulation.
3. Flow sheeting concepts.
4. Steady state simulation for generation of VLE data.
5. Steady state simulation for conversion calculation for single and multiple reactions
6. Steady state simulation for heat and cooling duty of heat exchangers.
7. Simulation of flash column.
8. Steady state simulation for Bubble point and dew point calculations.

MC609A PROFESSIONAL ETHICS IN ENGINEERING VI Semester

Instruction: Hours/Week: **2L:0T:0P** **Credits: 0** **Internal Assesment:100**

Pre-requisites/co-requisites: None.

COURSE DESCRIPTION:

This course is designed to introduce engineering students to the concepts of engineering ethics. It will allow students to explore the relationship between ethics and engineering and apply classical moral theory and decision making to engineering issues encountered in academic and professional careers. It mainly focuses on improving the capacities of leadership /management through training in professional ethics. Codes of ethics have been invoked as a basis for professional engineering licensure. Violations of such ethical codes have led to many well-known tragic engineering failures that endangered human life and jeopardized public welfare. This discipline will doubtless take its place alongside such well-established fields as medical ethics, business ethics, and legal ethics.

COURSE OBJECTIVES:

To enable the students

1. To create an awareness on Engineering Ethics and Human Values.
2. To instill Moral and Social Values and Loyalty and to appreciate the rights of others.
3. To study the moral issues and decisions confronting individuals and organizations engaged in engineering profession.
4. To study the related issues about the moral ideals, character, policies, and relationships of people and corporations involved in technological activity.

UNIT I Human Values:

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II Engineering Ethics:

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moraldilemmas – Moral Autonomy – Kohlberg''s theory – Gilligan's theory – Consensus and Controversy –Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT –III Engineering as Social Experimentation:

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT-IV Safety, Responsibilities and Rights:

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest –

Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) Discrimination.

UNIT V Global Issues:

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct – Corporate Social Responsibility.

COURSE OUTCOMES:

Upon completion of the course, the student should be able to:

1. Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
2. Learn the moral issues and problems in engineering; find the solution to those problems.
3. Learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
4. Gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights.

Grading /Assessment:

(i). Attendance: 20 marks
(ii). Group Activities/Assignments: 20 marks
(iii). Semester End Examination: 60 marks

TEXTBOOKS:

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

B. Tech. VII Semester Chemical Engineering Syllabus

CH701C PROCESS EQUIPMENT DESIGN & DRAWING VII Semester
Instruction/ Week : 3P Credits : 1.5 Assessment : 40 + 60

Introductory topics like PFD &PID , welding symbols, materials of construction, headers and closures, nozzles and supports .

Design calculations and preparation of Engineering drawing of Process equipment like Heat exchangers, Plate Columns, Packed Columns, Evaporator, Reactor, Dryer, Storage Vessels etc.,

CH702C **OPTIMIZATION TECHNIQUES** **VII Semester**

Instruction : 3(L) hr/week Credits : 3 Assessment : 40 + 60

Course Educational Objectives:

1. To teach the best designfinding with the available resources is the goal of design optimization. Many of the design problems in aerospace systems (and also other areas) can be cast as optimization problems.
2. To teach the problems can then be solved using the optimization techniques.
3. One can model the problems well only with a good understanding of the theory behind optimization.
4. In this course we will deal with continuous optimization methods with emphasis upon nonlinear programming.
5. Application of optimization techniques for various operations.

Unit I : Introduction :

Formulation of objective function, fitting models to data, classification of functions, necessary and sufficient conditions for optimum, unimodel& multi model functions, analytical methods, Lagrange multiplier method

Unit II : Numerical methods :

Unimodel functions, Newton, quasi-Newton, secant methods, region elimination methods, polynomial approximation, quadratic and cubic interpolation technique for optimum, multimodel functions, direct methods, random, grid, hooke'snelder and mead methods, powell's technique, indirect methods, gradient and conjugate gradient methods, secant method

Unit III : Linear and Non-Linear Programming :

Review of basic concepts of LP Formulations, simplex method, integer, quadratic, geometric and dynamic programming

Unit IV : Applications- I :

Heat transfer and energy conservation, separation processes, fluid flow systems, reactor design and operation, large scale operations

Unit V : Applications – II

Optimal pipe diameter, optimal residence time for maximum yield in an ideal batch reactor, chemostat, optimization of a thermal cracker using linear programming.

Text Book :

1. Optimization of Chemical Process by T F Edgar and D M Himmelblau, McGraw Hill 1998

References :

1. Reklaitis,G.V., Ravindran A., Ragsdell K.M. Engineering Optimization, John Wiley, NY 1980
2. Bile,W.E., Swain J.J., Optimization and Industrial Experimentation, Inter Science,NY 1980
3. Seinfeld J.H., Lapidus L., Process Modeling, Estimation and Identification, Prentice Hall,Engelwood Cliffs, New Jersey,1974
4. Beveridge,C.S., Schechter,R.S., Optimization Theory and Practice McGraw Hill, NY 1970
5. Plant Design & Economics for Chemical Engineers, 5 th Ed – Max S.Peters, Klaus D.Timmerhaus and Ronald E.West, McGraw Hill

Outcomes:

1. An ability to apply knowledge of mathematics, science, and engineering, An ability to design and conduct experiments, as well as to analyze and interpret data.

2. Become familiar with optimization methods Mathematical modeling of optimization problems

3. Implementation of the algorithms discussed and solve realistic design problems,The student should master most of the issues in numerical optimization

4. Develops ability to obtain data and information necessary to formulate and to solve problems related to Chemical Engineering with or without the support of software8.

5. This course introduces you to the optimization theory and tells you how it can be applied to solve design problems.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		1	1	1				1	1			
CO2		2	1	1				2	1			
CO3		1	1	1		2	1	1	1			
CO4		2	1	1				2	1			
CO5		2	2	1				1	1			

Electives Syllabus

CH703C PETROLEUM REFINING PROCESSES VII Semester

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed for students to understand the origin, composition and physical properties of petroleum. Different treatment methods of crude mixture to get various petroleum products are covered in this course. Various methods to increase the physical properties of petroleum products are also discussed.

Course Objectives:

1. Learn the formation, refining of crude oil and products of refinery.
2. Understand the means of processing data including thermal properties, important products characteristics.
3. Develop skills in drawing neat flow diagrams of different petroleum refining processes. (Cracking/reforming/alkylation/isomerization / hydro cracking etc.,) that are aimed at producing high value/demand products.
4. Identify important testing methods for important petroleum products.
5. Have idea on Indian standards for major petroleum products.

UNIT I :

Origin, Formation and Composition of Petroleum: Origin and Formation of Petroleum, Reserves and Deposits of World, Petro Glimpses and Petroleum Industry in India, Composition of Petroleum

Petroleum Processing Data: Evaluation of Petroleum, Thermal Properties of Petroleum Fractions.

UNIT II:

Important Products – Properties and Test Methods

UNIT III:

Fractionation of Petroleum: Dehydration and Desalting of Crudes, Heating of Crude-Pipe Still Heaters, Distillation of Petroleum, Blending of Gasolines.

UNIT IV:

Treatment Techniques: Fractions-Impurities, Gasoline Treatment, Treatment of Kerosene, Treatment of Lubes, Wax and Purification.

UNIT V:

Thermal and Catalytical Processes: Cracking, Catalytic Cracking, Catalytic Reforming-Introduction and Theory, Naptha Cracking, Coking, Hydrogen Processes, Alkylation, Isomerization Processes, Polymer Gasolines

Asphalt Technology**:** Source of Asphalt , Air Blowing of Bitumen, Upgradation of Heavy Crudes

Text Book

Modern Petroleum Refining Processes by B.K.Bhaskara Rao

Reference Books:

1. Petroleum Refining and Petrochemicals by N.K Sinha
2. Petroleum Refinery Engineering by Nelson, McGraw Hill.

Course Outcomes:

At the end of the course, student will be able to:

1. Describe the formation of crude oil, its refining techniques.
2. Describe the chemical composition and physical properties of crude oil
3. Understand various processes employed in petroleum refinery such that we can meet customer demand in terms of quality & quantity.
4. Demonstrate the different methods available for removal of impurities from crude and products manufacture.
5. Understand, draw and describe the process flow diagrams of various refinery processes like distillation, cracking and reforming etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					1		1	1	1			1
CO2					1							1
CO3					1		1		1			1
CO4					1		1		1			1
CO5					1				1			1

CH703C **CO_2 CAPTURE and UTILIZATION** **VII Semester**

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed for students to understand the uses of CO_2 ,its capture and storage. Various CO_2 capture techniques are covered. CO_2 utilization techniques and various methods for methods for the assessment of CO_2 life cycle are discussed.

Course Educational Outcomes:

1. To learn the carbon capture and storage techniques
2. To learn various technologies available for carbon capture
3. To learn CO_2 storage and its sequestration
4. To learn various utilizations of CO_2
5. To learn the life cycle assessment of CO_2

UNIT-I

Introduction: Global status of CO_2 emission trends, Policy and Regulatory interventions in abatement of carbon footprint, carbon capture, storage and utilization (CCS&U)

UNIT-II

CO_2 capture technologies from power plants: Post-combustion capture, Pre-combustion capture, Oxy-fuel combustion, chemical looping combustion, calcium looping combustion CO_2 capture agents and processes: Capture processes, CO_2 capture agents, adsorption, ionic liquids, metal organic frameworks

UNIT-III

CO_2 storage and sequestration: Geological sequestration methods, Biomimetic carbon Sequestration

UNIT-IV

CO_2 Utilization: CO_2 derived fuels for energy storage, polymers from CO_2, CO_2 based solvents, CO_2 to oxygenated organics, Conversion into higher carbon fuels, High temperature catalysis

UNIT-V

Environmental assessment of CO_2 capture and utilization: Need for assessment, Green chemistry and environmental assessment tools, Life cycle assessment (LCA), ISO standardization of LCA, Method of conducting an LCA for CO_2 capture and Utilization.

Text Books:

1. Carbon dioxide utilization: Closing the Carbon Cycle, Peter Styring, Elsje Alessandra Quadrelli, Katy Armstrong, Elsevier, 2015, 1st Edition.

2. Carbon Capture, Storage and, Utilization: A Possible Climate Change Solution for Energy Industry ,Goel M, Sudhakar M, Shahi RV, TERI, Energy and Resources Institute, 2015, 1st Edition.
3. Carbon Capture and Storage, CO2 Management Technologies, AmitavaBandyopadhyay, CRC Press, 2014, 1st Edition.

Reference Books:

1. Calcium and Chemical Looping Technology for Power Generation and Carbon Dioxide (CO2) Capture, Fennell P, Anthony B, Woodhead Publishing Series in Energy: No. 82, 2015, 1st Edition.
2. Developments in Innovation in Carbon Dioxide Capture and Storage Technology: Carbon Dioxide Storage and Utilization, Mercedes Maroto-Valer M, Vol 2, Woodhead Publishing Series in Energy, 2014, 1st Edition.
3. Fundamentals of Enhanced Oil and Gas Recovery from Conventional and Unconventional Reservoirs, AlirezaBahadori, Elsevier Inc., 2018, 1st Edition.

Online Resources:

1. https://nptel.ac.in/courses/103/107/103107157/
2. https://sequestration.mit.edu/
3. http://www.coal.nic.in/
4. http://moef.gov.in/en/
5. https://mnre.gov.in/
6. https://climate.mit.edu/explainers/carbon-capture
7. https://www.sciencedirect.com/book/9780128130278/fundamentals-of-enhanced-oil-andgas-recovery-from-conventional-and-unconventional-reservoirs#book-info

Course Outcomes: At the end of the course the student will able to

1. Know the **CO_2** capture and its importance
2. Know various capture technologies available for **CO_2** and its storage
3. Know Geological sequestration methods of **CO_2**
4. Know various utilization of **CO_2**
5. Know life cycle assessment of **CO_2**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					1		1	1	1			
CO2				1	1							1
CO3					1		1		2			2

CO4			1		1		1		1			1
CO5					1				1			1

CH703C WATER CONSERVATION AND MANAGEMENT VII Semester

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed for chemical engineering student to understand the importance of water for various applications. Storage of water, quality, water management methods, minimizing the waste of water and different audit methods for the conservation of water in various industries can be studied.

Course Educational Objectives:

1. Able to learn water quality and its storage methods
2. Able to learn water conservation methods at various work places.
3. Able to learn water flow measurement techniques
4. Able to learn water preservation methods and methods to minimize water evaporation techniques.
5. Able to learn water audit methods at various work places.

Unit I: Introduction: water cycle, water storage, water quality.

Unit II: water conservation in homes; water conservation in the work place.

Unit III: water management-water quality, controlling use and quality of water, water flow measurement.

Unit IV: water quality control, testing water salinity, preserving water quality, minimising evaporation, water sanitation.

Unit V: water audits; water conservation in agriculture; water conservation in process industry; water conservation in construction industry; water conservation in service industry.

Course Outcomes: At the end of the course the student will able

1. To know the importance of water and its storage techniques
2. To know water conservation techniques at various levels
3. To know water management at various stages
4. To know water quality and water testing methods
5. To know water conservation audits at various places.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					1		1	1	1			1
CO2					1							1
CO3					1		1		1			1
CO4					1		1		1			1
CO5					1				1			1

CH704C FLUIDIZATION ENGINEERING VII Semester

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed for students to understand various types of fluidization and its application at industrial levels. Types of gas fluidization and terminal velocity of particle are also discussed. Entrainment in fluidized beds and high velocity fluidization are discussed. Various industrial applications of fluidized bed are covered in this course.

Course Objectives:

1. This course focuses on different types of fluidization, their advantages and disadvantages.
2. Analyze the various types of distributors used for fluidized beds and its design.
3. Study the classification of particles, carry over particles in fluidization and pneumatic transport of solids.
4. Give the knowledge of Transport Disengaging Height (TDH) and its significance in entrainment.
5. This course will help to understand elutriation from fluidized beds and Elutriation constants.
6. This subject focus on solid circulation systems for fast fluidized operations and flow patterns of gas-solid mixtures flowing in horizontal and vertical pipes.
7. Educate the industrial applications of fluidized beds and spouted beds with examples.

UNIT- I

Introduction**:** The Phenomenon of fluidization, Liquid like Behavior of a fluidized Bed, Comparison with other Contacting Methods, Advantages and Disadvantages of Fluidized beds for Industrial Operations, Fluidization Quality, Selection of a Contacting Mode for a given Application, Overall Plan.

Fluidization and mapping of regimes.: Fixed beds of particles: Characterization of particles, fixed beds- One size of particles, fixed beds- Solid with a Distribution of sizes, Determination of the effective Spericity from Experiment. Fluidization without Carryover of particles Minimum Fluidizing Velocity,μ_{mf} ,Pressure Drop-verses-Velocity Diagram, Effect of Pressure and Temperature on Fluidized Behavior, Sintering and Agglomeration of Particles at High Temperature.

UNIT-II

Types of Gas Fluidization without carryover – The Geldart classification of particles; Fluidization with carryover particles – Terminal velocity of particles, u_t — Turbulent and Churning Fluidization – Pneumatic Transport of solids – Fast Fluidization – Voidage Diagrams for All Solid Carryover Regimes; The Mapping of Fluidization Regimes.

The Dense Bed: Distributors, Gas Jets, and Pumping Power: Distributor Types – Ideal Distributors – Perforated and Multiorifice Plates – Tuyeres and Caps – Pipe Grids and Spargers; Gas Entry Region of a Bed; Gas Jets in Fluidized Beds; Pressure Drop Requirements across distributors; Design of Gas Distributors Power Consumption.

UNIT – III

Entrainment and Elutriation From Fluidized Beds**:** Freeboard Behavior – Origin of Solids Ejected in to the Freeboard – experimental Findings; Location of the Gas Outlet of a Vessel – Estimation Of the TDH; Entrainment from Tall Vessels: H_f>TDH – Procedure of Zenz et al. [21,8] – The Elutriation Constant Approach – Relationship between **k** and G_s – Experimental Methods for finding **k** and $\mathbf{k}^*$ - Experimental Findings for $\mathbf{k}^*$ - Entrainment from Short Vessels: H_f<TDH – Freeboard – Entrainment Model.

UNIT – IV

High – Velocity Fluidization**:** Turbulent Fluidized Beds – Experimental Findings; Fast Fluidization - Experimental Findings; The Freeboard – Entrainment Model Applied to Fast Fluidization – Design Considerations; Pressure Drop in Turbulent and Fast Fluidization.

Circulation systems**:** Circuits for the Circulation of Solids – Classification of Circulation Loops – Pressure Balance in a Circulation loop; Finding Require Circulation Rates - Circulation Rate for Deactivating Catalysts – Circulation Rate for a Require Heat Removal Rate.

UNIT – V

Industrial Applications of Fluidized Beds**:** Historical Highlights – Coal Gasification – Gasoline from other Petroleum Fractions – Gasoline from natural and Synthesis Gases - Synthesis Reactions – Metallurgical and Other Processes; Physical Operations – Heat exchange – Solidification of a Melt to make Granules – Coating metal objects with plastic – Drying of Solids - Coating of Objects and Growth of Particles – Adsorption; Synthesis Reactions – Phallic Anhydride – Fischer – Tropsch Synthesis – acrylonotrile by the Sohio Process- Maleic anhydride - Other Catalytic Reactions – Comments – Polymerization of Olefins; Cracking of Hydrocarbons – Fluid catalytic Cracking (FCC) – Fluid Cooking and Flexi – Coking – Thermal cracking; Combustion and Incineration – Fluidized Combustion of coal – Incineration of Solid Waste; carbonization and gasification – Gasification of Coal and coke – Activation of Carbon – Gasification of Solid waste; Cacination; Reactions Involving Solids – roasting Sulfide Ores – Silicon for Semiconductor and Solar cell industries - Chlorination and Fluorination of Metal Oxides – Reduction of Iron oxide; Biofluidization.

Text Book :

1. Fluidization Engineering by Diazo Knuizz&D.Leveaspiel John Wiley.

References :

1. Fluidization by Davidson JF &Harison B, Academic Press.
2. Fluidization and Fluid Particle systems Zenz PA &Othmer D F, Reinhold Pub. Co

Course Out comes:

At the end of the course, student will be able to:

1. Know the advantages, disadvantages, and different types of fluidization and can understand the comparison and selection of contacting methods.
2. Determine the minimum fluidization velocity and terminal velocity and able to design gas distributors and calculate power consumption for fluidized beds.
3. Have the knowledge of characterization of particles and determination of effective sphericity from experiment.
4. Experimental findings of entrainment, Estimation of TDH, and determination of elutriation constants and understand the fast fluidization, application of entrainment models to fast fluidization and solid circulation systems for fluidized beds.
5. Have the knowledge of FCC, Combustion and Incineration of coal and Chlorination and Fluorination of Metal Oxides.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1	1	1			1	1			2
CO2			1	1	2			1	2			1
CO3			2	1	1			1	1			1
CO4			1	2	2			1	1			1
CO5			1	1	1			1	1			1

CH704C **FUEL CELL SYSTEMS** **VII Semester**

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed for students to understand the importance of fuel cells, electrochemistry of fuel cells. Working and components of various types of fuel cell are discussed. Applications of fuel cells, technological and economical challenges are also discussed.

Course Educational Objectives:

1. To understand the evolution of electrochemistry and electrode interfaces
2. To get the knowledge of electrochemical technologies and applications
3. Student will learn the learn the fuel cell principles
4. To understand the electro catalysis of fuel cell reactions
5. To study the modeling analysis

UNIT-I

Introduction – Fuel Cells- Relevance and Importance – Historical Highlights - Difference from Batteries – Fuel Choice – Classification

Electrochemistry – Thermodynamic Aspects of Electrochemical(EC) Energy Conversion – Theoretical Efficiency of Heat of a Reaction to Mechanical Energy – Efficiency of EC Energy Conversion – Factors Affecting Efficiency of EC Energy Conversion Electrode Kinetics of EC Energy Conversion

UNIT-II

Alkaline Fuel Cells – Description – Working Principle – Components - Modules – Fuel Cell Stacks – General Performance Characteristics – Advancements – System Issues – Ammonia as AFC Fuel

Molten Carbonate Fuel Cells – General Principle – Cell Components – Mechanisms of Electrode Reactions- Status

UNIT-III

Phosphorus Acid Fuel Cells- Technology- Electrode Materials and Manufacturing – Stacks and Systems

Solid Oxide Fuel Cells – History – Advantages and Limitations- Cell Components – Electrode Materials – Interconnects – Fuel – Configuration and Performance – Environmental Impact – Applications

UNIT-IV

Direct Methanol Fuel Cells – Technology Evolution – The Noble Metal Issue- The Catalyst – Electro-oxidation of Methanol – The Electrolyte – Non Catalytic Aspects – Methanol Cross over to DMFC – catalyst Optimization and Scale up – Engineering Aspects.

UNIT-V

Proton Exchange Membrane Fuel Cells – Basic Scientific aspects- Challenges – Technology Development – Fuel Processing – Modeling Studies of PEMFC Performance – Applications – Challenges to High Temperature Operations – Technological and Economic Challenges

Text Book :

1. Fuel Cell : Principles and Applications – B.Viswanathan and M. AuliceScibioh – Universities Press - 2006

Course outcomes: At the end of the course the student **:**

1. Have the knowledge on electrode and electrolyte interfaces
2. Able to implement various electrochemical technologies
3. Will have an idea on fuel cell principles and able to implement the principles
4. Acquire basic knowledge on electrolysis of fuel cell reactions
5. Will have a good knowledge on modelling analysis of fuel cell systems and Can give particular attention to half cell systems

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1	1	1			1	1			2
CO2			1	1	2			1	2			1
CO3			2	1	1			1	1			1
CO4			1	2	2			1	1			1
CO5			1	1	1			1	1			1

CH704C FUNDAMENTALS OF NANOTECHNOLOGY VII Semester

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed for students to understand the importance of nanomaterials, properties of nanomaterials, various methods for the preparation of nano materials. Various characterization techniques of nanomaterial can be discussed. Application of the nanomaterials in various fields are also discussed.

Course Educational Objectives:

1. To learn the important properties of nanomaterials and future scope of nanotechnology
2. To learn the various methods for the synthesis of nanomaterials
3. To learn various techniques for the characterization of nanomaterials
4. To learn various techniques used in nano materials preparation
5. To learn various applications of the nanomaterials

Unit – I

Introduction: Importance of Nanotechnology emergence of nanotechnology, size range ofnano particles - Thermodynamics and properties of nano scale materials, classification of nano structured materials - Bottom-up and top-down approaches- challenges in nanotechnology. Future of nanotechnology in chemical and Biochemical engineering.

Unit – II

Synthesis of nano particles and processing**:** Methods for creating nano structures – processes for producing ultra fine powders – Mechanical grinding – wet chemical synthesis of nano materials – sol-gel emulsion processes-liquid-solid reactions- Gas phase synthesis of nano materials – Furnace, flame assisted ultra sonic spray pyrolysis – Gas condensation (CVC) – cold plasma methods- particle precipitation aided CVD.

Unit – III:

Characterization of nano systems**:** Sample preparation and characterization techniques of nano structured materials – scanning electron microscopy (SEM) – Transition election microscopy and X-Ray photo electron and Auger electron spectroscopy (XPS, AES) – Scanning tunneling microscopy (STM), atomic force microscopy (AFM) – powder X-ray difractometry (XRD).

Unit – IV:

Special nano materials**:** Carbon fullerences and nanotubes – onions – carbon fullerrence-formation, properties and uses – Porous silicon preparation methods-Nano particles of SiC, alumina and zirconia and their sintering techniques – Wafer preparation, wafer cleaning techniques – lithography – etching – Mechanical attrition and nano composites.

Unit – V:

Nano – Engineering applications**:** Micro electromechanical systems (MEMS) and nano electromechanical systems (NEMS), sensors, microfluidic devices – nano pump – molecular motors – Nano bots – nano medicine – drug delivery systems – catalyis by gold nano particles – wear resistance coatings – weapons – battery and fuel cell electrodes – thermal management – automotive and aerospace components. Environmental impact of nano-particles – ethical, legal and social issues.

Text Books:

1. Introduction to nanotechnology, by Charles P.Poole and Frank Jowens, John wiley (2003)
2. Nanotechnology Research and perspectives, MIT Press (1992)

References:

1.Understanding of Nano science and technology, poori Dutta &Sushmita Gupta, Global vision, New Delhi – (2006)

Course Outcomes: At the end of the course the student will able to

1. Know the importance of nonmaterial in and their properties
2. Know the various methods used for the synthesis of nanomaterials
3. Know various techniques used for the characterization of nanomaterials
4. Know various techniques used for the preparation of special nanomaterials
5. Know the applications of nanomaterials in various fields.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1	1	1			1	1			2
CO2			1	1	2			1	2			1
CO3			2	1	1			1	1			1
CO4			1	2	2			1	1			1
CO5			1	1	1			1	1			1

CH705C PROCESS MODELINGAND SIMULATION VII Semester

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed for students to understand to fundamental laws used for the development of mathematical models for chemical engineering systems. Various examples of chemical engineering systems are discussed for mathematical modeling. Numerical methods are also discussed for solving differential equations. Some of the examples are also discussed for simulation.

Course Educational Objectives:

1. To understand the concepts of model, development of model, algebraic equations and linearization.
2. To educate about the development of model in the field of chemical engineering.
3. To have the knowledge on classification of models with examples.
4. To learn about the numerical methods, computer programming and simulation methods.
5. To acquire abilities to propose, solve and simulate simple chemical process, unit operation and control system models in the chemical industry.

UNIT - I: Mathematical models of Chemical Engineering systems. - Fundamentals - Introduction - Fundamental laws. Principles of formation, review of algebraic, ordinary and partial differential equations, solutions of the above equations.
Linearization, probabilization models, development of models by experiment and statistic, regression and correlation analysis.

UNIT - II: Examples of mathematical models of chemical engineering systems, constant volume CSTRs, two heated tanks, gas phase pressurized CSTR, non-isothermal CSTR.

UNIT - III: Introduction to Matrix models, lumped parameter model, distributed parameter model. Examples of single component vaporizer, batch reactor, reactor with mass transfer, ideal binary distillation column, batch distillation with holdup.

UNIT - IV: Computer simulation, numerical methods, computer programming, iterative convergence methods, numerical integration of ODEs. Discrete even and continuous simulation.

UNIT - V: Computer simulation, examples gravity flow tank, three CSTRs, in series, binary distillation column, batch reactor, VLE, dew point & bubble point calculations, counter current heat exchanger. Simulation in process control.

Text Book:

1. Process Modeling, Simulation and Control for Chemical Engineering by W.L.Luyben, 2nd ed. McGraw Hill (1990).
2. Ramirez, W: Computational Methods in Process Simulation, Butter worths publishers, New York, 1989

3. LorentzeT.Biegler, Ignacio Grossmann and Arthur W.Westerberg – Systematic Methods of Chemical Process Design – Prentice Hall International, 1997

Reference Book:

1. Edgar, T.F; Himmelblau, D.M; Optimisation of Chemical Processes, McGraw-Hill Book Co; New York.
2. Gaikwad R.W. and Dhirendra – Process Modeling and Simulation – Central Techno Publications, Nagpur, 2004
3. Morton M.Denn – Process Modeling – Longman Scientific & Technical , 1987
4. A.W.Westerberg, H.P.Hutchinson, R.L.Motard and P.Winter – Process Flowsheeting – Cambridge University Press, 1985

Course outcomes: At the end of the course the student will able

1. To understand the use of mathematical model, principles of formulation and fundamental laws and develop models by experiment and correlation analysis,
2. To develop mathematical models of chemical engineering systems like two heated tanks, constant volume CSTRs and gas pressurized CSTR.
3. To have the knowledge of different types of models like lumped parameter, distributed parameter and matrix models.
4. To write the computer programming, learn the simulation of numerical methods, iterative convergence methods, and discrete even and continuous methods.
5. Ability to design, manage and operate chemical process simulation, control and instrumentation procedures.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1	1	1			2	1			2
CO2			2	1	2			1	2			1
CO3			1	1	1			2	1			2
CO4			2		2			1	1			1
CO5			1	1	1			1	1			1

CH705C COMPUTATIONAL FLUIDDYNAMICS VII Semester

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed to students to understand the importance of computational fluid dynamics and to develop fluid flow equation with computational fluid dynamics. Mathematical behavior of various partial differential equations is discussed. Discretization and simple computational fluid dynamics techniques are also discussed.

Course Educational Outcomes:

1. To learn the importance of computational fluid dynamics in developing the models in fluid dynamics
2. To learn the classification of partial differential equations
3. To learn the various discretization techniques
4. To learn the generation of grid with suitable boundary conditions
5. To learn simple computational fluid dynamics techniques

Unit I :

Philosophy of CFD – CFD - CFD as a research tool – CFD as a design tool – Examples **Governing Equations of Fluid Dynamics** – Introduction – Models of Flow – The sustainable derivative- Divergence of Velocity – Continuity Equation – Momentum Equation – Energy Equation – Physical boundary conditions – Forms of Governing equations suited to CFD

Unit II :

Mathematical Behaviour of Partial Differential Equations (PDEs) – Classification of quasi linear PDEs – General Method of determining the classification of PDEs – General Behavior of different classes of PDEs

Unit III :

Discretization – Basic aspects – Finite Differences – Difference equations – Explicit and Implicit approaches – Errors and analysis of stability

Unit IV :

Grids with appropriate transformations – General transformation of equations **–** Metrics and Jacobians – Form of governing equations suited to CFD – Stretched grids – boundary fitted coordinate systems – adaptive grids – modern developments in grid generation, finite volume mesh

Unit V :

Simple CFD Techniques - The Lax – Wendroff Technique – MacCormack's technique - Viscous Flows, Conservation form and space marching **–** Relaxation Technique – Aspects of numerical dissipation and dispersion – Alternating – Direction- Implicit technique – Pressure correction technique

Text Book :

1. CFD : The Basics with Applications – John D. Anderson Jr. TMH Publication

Reference

1. Introduction to CFD – PradipNiyogi, S K Chakrabarthy, M K Laha , Pearson Edu.:

Course outcomes: At the end of the course the student will able to

1. Understand the importance of computational fluid dynamics in fluid dynamics
2. Classify the partial differential equations for computational fluid dynamics
3. Use various discretization techniques
4. Apply boundary condition with the generation grids for fluid flow systems
5. Apply computational fluid dynamics techniques for fluid flow systems

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1	1	1			1	1			
CO2			2	1				1	2			1
CO3			1	1	1			2	1			2
CO4			1		2			1	1			1
CO5			1	1	1			1	1			1

CH705C **MEMBRANE SEPARATIONS** **VII Semester**

Instruction Hours/Week: 3(L) Credits: 3 Assessment: 40 + 60

Course Description:

This course is designed for students to understand various membranes separation techniques used for separation of the mixture components into pure components. Various applications of membrane separation processes are also discussed. Equipment for membrane systems and various designs of membrane systems are also discussed.

COURSE OBJECTIVES

1. sTo learn classification and principles of membrane separation processes.
2. To know the applications of membrane separation processes.
3. To get knowledge about ideal separations on capabilities of membrane processes and secondary phenomena occurring in membrane processes.
4. To know about the equipments of membrane processes.
5. To understand the design of membrane systems.

UNIT- I

Introduction to Membrane Separation Processes: Classification of separation process – separating agents – principles of gas permeation, reverse osmosis, ultra-filtration, pervaporation, dialysis, electro-dialysis.

Unit II :

Applications of membrane separation processes - separation of hydrogen or acid gases, Oxygen – nitrogen separation starting from air,- stability of membrane processes for waste water treatment, applications in pulp and paper, electroplating and electro-coating industries – applications in food industry – denaturing of liquid foods , cheese making and whey production.

Unit III :

Ideal separations on capabilities of membrane processes – separation factor, rejection factor, expressions for ideal separation factors

Secondary phenomena in membrane processes: secondary physical and transport phenomena in membrane processes, concentration polarization

Unit IV :

Equipment for membrane processes: Flat sheet, tubular, spiral wound and hollow fiber, membrane modular designs, single entry and double entry separating elements, separation stage, flow configuration.

Unit V:

Design of membrane systems: Design equations for perfect mixing and cross floe configuration, separation stages for gas permeation, reverse osmosis and ultra-filtration. Design equations foe perfect mixing and parallel flow dialyze, simple design equations for electro-dialytic stacks

Reference Books:

1) Membranes in Separation – S.T.Hwang and K.Mammermeyer, Wiley-Interscience, Newyork (1975)

2) Transport Processes and Unit Operations – Christie J.Geankoplis, Prentice Hall of India Pvt.Ltd (2000)

Course Out comes

1. Able to understand overall view of membrane separation processes. Able to learn different processes in reverse osmosis, ultra filtration, dialysis, electro dialysis.
2. have the knowledge on applications of membrane separation processes
3. To have a knowledge on separation factor, expressions for ideal separation factor. to have a knowledge on transport phenomena in membrane processes
4. Able learn knowledge on membrane modular designs, single and double entry separating elements.
5. Can understand design equations for mixing and cross flow configurations. Able to design equation for perfect mixing and parallel flow dialyze. To develop the design equation for electro dialytic stacks

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1	1	1				1	1			
CO2		2	1	1				2	1			
CO3		1	1	1		2	1	1	1			
CO4		2	1	1				2	1			
CO5		2	2	1				1	1			

CH708S INTERNET OF THINGS AND ITS APPLICATIONS VII Semester
Instruction: 1(L) + 2(P) Credits: 2 Assessment: 100

Course Overview:
Internet of Things (IoT) cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support a lot. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different lot solutions. IoT-based applications such as innovative shopping systems, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT-based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course Learning Objectives:
The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student:
1. To understand the fundamentals of Internet of things and protocols.
2. It introduces some of the application areas where Internet of Things can be applied.
3. To build a small low-cost embedded system using Arduino / Raspberry Pi or equivalent boards.
4. To apply the concept of Internet of Things in the real-world scenario.

UNIT I:
Fundamentals of IoT: Introduction to IoT – Characteristics, Sensing, Actuation, Physical Design - Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.

UNIT II:
IOT and M2M: M2M, IoT vs M2M, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Introduction to SDN, SDN and NFV for IoT, IOT system Management with NETCONF-YANG.

UNIT III:
IoT Design Methodology: IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development. Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

UNIT IV:
Data Analytics for IoT: Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time

DataAnalysis.

UNIT V:

Tools for IoT: Chef, Puppet, IOT code generator Case studies: Chef. Puppet – Multi-tier Deployment, NETCONF-YANG.

IOT Applications: IoT applications for industry- Future Factory Concepts, Smart Applications, Smart Cities and Smart Homes. Case Study: Agriculture, Healthcare, Activity Monitoring. Study of existing IoT platforms /middleware, IoT- A, Hydra etc.

Text Book & References:

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.
2. Chef, Puppet, IOT code generator Case studies: Chef. Puppet – Multi-tier Deployment, NETCONF-YANG, Raspberry Pi.
3. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.
4. *Simon Monk, "Programming the Raspberry Pi*: *Getting Started with Python",* McGrawHill, *2013*
5. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	2	3	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**-**

Course Outcomes: Upon completion of this course, students will be able to:

1. Design a portable IoT using Arduino/ equivalent boards and relevant protocols.
2. Develop web services to access/control IoT devices.
3. Deploy an IoT application and connect to the cloud.
4. Analyze applications of IoT in real-time scenario.

CO2	**-**	**-**	3	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**-**
CO3	**-**	**2**	**-**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**--**	**1**
CO4	**-**	**-**	**-**	**-**	**1**	**3**	**3**	**3**	**-**	**-**	**-**	**1**		

CH801P	**Project work and Internship**	**VIII Semester**
Instruction / Week: 24P	Credits: 12	Assessment: 40+60

Definition of topic and scheme of work, execution, documentation and submission.

SRI VENKATESWARA UNIVERSITY: TIRUPATI

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING



Course

B. Tech CIVIL ENGINEERING

Choice Based Credit System (CBCS)

Academic Year 2023-2024

Amended as per NEP-2020

About the Department:

- Established in the year 1959.
- Largest department in the University.
- Well Qualified & Experienced Faculty.
- Meritorious students, Regular conduct of student's activities, Field visits, Internships participation of students in various activities in other Institutions.
- Good Alumni Support
- Faculty actively involved in teaching, research, consultancy and extension programmes and also interaction with outside world.

Vision:

- Vision of the Civil Engineering Department is to produce globally competitive and committed Civil Engineers with ethical values to cater to the needs of the society and strive for sustainable development through research and innovation.

Mission:

- To impart quality education with the support of state-of-art Infrastructure and Faculty.
- To inculcate inquisitiveness, infuse training and research for the societal development.
- To address growing needs of sustainable infrastructure development.
- To provide technical advice and support to the industry.
- To provide awareness of global economic problems and contribute to Nation building.
- To provide entrepreneurial skills for the upliftment of the country.

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

- **PSO1:** Specify, Design, test and evaluate foundations and super structure for residences, public buildings, industries, irrigation structures, transportation amenities and environmental Engineering systems.

- **PSO2:** Development of state of art skills for using modern tools, as entrepreneur in the domain field or in multidisciplinary environment.

PROGRAMME OUTCOMES

POs describe what students are expected to know or be able to do by the time of graduation from the program. Program Outcomes are established as per the process described below.

Program Outcomes of B.Tech in Civil Engineering are:

- To apply knowledge of mathematics, Science, Engineering fundamentals, and engineering specialization for the solution of complex engineering problems.
- To identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- To design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
- To use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
- To create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.
- To apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- To understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- To apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- To function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- To communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- To demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in

multidisciplinary environments.

- To recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- To provide students with the fundamental, technical knowledge and skills in mathematics, sciences and engineering to recognize, analyze and solve complex problems in the areas of Structural, Geotechnical, Hydraulics and Water Resources, Transportation and Environmental engineering.
- To provide students with individual working skills and practical experience and to fulfill their professional duties and communicate effectively in teamwork, ethical thinking, technical leadership, and lifelong learning.
- To make the students responsible professionals to work in various positions in industry or government and/or succeed in graduate or other professional organizations.
- To train the students to become engineers, managers, scientists, researchers and innovators and make substantial contributions to the society.
- To guide the students to use modern tools to solve complex engineering problems
- To make the students to strive for the improvement of the quality of life and improve the standard of living by providing environmental sustainability.

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practica l	Total Instruction	Credits
MA 101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
CY 101	Basic Sci	Engg. Chemistry	3	1	-	4	**4**
EN103	Humanities	English	2	-	-	2	**2**
EE104	Basic Engg	Basic Electrical & Electronics Engineering	3	1	-	4	**4**
ME105	Basic Engg	Engineering Graphics and Design	2	-	3	5	**3.5**
EN 106	Humanities Lab	English Communication Lab	-	-	3	3	**1.5**
		TOTAL	13	3	6	22	**19**

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practica l	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
PY 202	Basic Sci	Engineering Physics	3	1	-	4	**4**
CS 203	Basic Engg	Programming for Problem Solving	2	1	-	3	**3**
CE 204	Basic Engg	Engineering Mechanics	3	1	-	4	**4**
ME 205	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS 206	Basic Engg Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 207	Audit	Environmental Science	4	-	-	4	**0**
		TOTAL	13	3	6	22	**18**

III Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA301B	Basic Sci. Course	Mathematics – III*(Common to all branches)*	3	-	-	3	3
CE302C	Professional Core Course	Strength of Materials	3	-	-	3	3
HS303C	Humanities and Social Science	Managerial Economics and Accountancy *(Common to all branches)*	3		-	3	3
CE304C	Professional Core Course	Surveying	3	-	-	3	3
CE305C	Professional Core Course	Building Materials and Construction Technology	3		-	3	3
CE306C	Professional Core Course	Engineering Geology	3	-	-	3	3
CE 307P	Professional Core Course Lab	Surveying Lab	-	-	3	3	1.5
CE 308P	Professional Core Course Lab	Materials Testing Lab	-	-	2	2	1
CE309S	Skill Oriented Course	Computer Skills	1	-	2	3	2
MC310A	Mandatory Course	Constitution of India*(Common to all branches)*	2	-	-	2	-
		TOTAL	***21***	***-***	***7***	***28***	**22.5**

IV Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA401C	Engineering Sci. Courses	Probability &Statistics *(Common to all branches)*	3	-	-	3	3
CE402C	Professional Core Courses	Concrete Technology and Construction Equipment	3	-	-	3	3
CE403C	Professional Core Courses	Fluid Mechanics and Hydraulic Machines	2	1	-	3	3
CE404C	Professional Core Courses	Structural Analysis	2	1	-	3	3
CE405C	Professional Core Courses	Environmental Engineering -1	3	-	-	3	3
CE406C	Professional Core Courses	Soil Mechanics	2	1	-	3	3
CE407P	Professional Core Lab	Fluid Mechanics and Hydraulic Machines Lab	-	-	3	3	1.5
CE408P	Professional Core Lab	Soil Mechanics Lab	-	-	2	2	1
CE409S	Skill Oriented Course *	Python Programming	1	-	2	3	2
CE410P	Professional Core Lab	Computer Aided Building Drawing	-	-	3	3	1.5
		TOTAL	**17**	**5**	**10**	**37**	**24**

MA 101 MATHEMATICS –I

(I Semester - Common for all branches)

Instruction: 3(L) +1(T) /week Credits:4 Assessment: 40 + 60

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particular integrals-homogeneous differential equations with variable coefficients-method of parameters-simulation equations.

UNIT II

Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of derivatives and integrals-derivatives of transforms-integrals of transforms.

UNIT III

Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNIT IV

Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNIT V

Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/Reference Books

- B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
- M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
- B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
- Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

Course Outcomes: At the end of the course, students will be able to

- analyze differential equations and solve them
- apply differential equations to engineering problems.
- Use transformation to convert one type into another type presumably easier to solve.
- use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.
- solve an initial value problem for an nth order ordinary differential equation using the Laplace transform.
- expand functions as power series using Maclaurin's and Talor's series
- optimize the problems related to OR, Computer science, Probability and Statistics
- draw an approximate shape by the study of some of its important characteristics such as symmetry, tangents, regions enclosing curve tracing method to find length, area, volume.
- use multiple integral in evaluating area and volume of any region bounded by the given curves.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1				2	2					1
CO2		1		2		1	1					
CO3		2			1		2					2
CO4				1	1		2					
CO5	1			1	2		1					
CO6												
CO7												
CO8												
CO9												

CY 101 ENGINEERING CHEMISTRY

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60 UNIT I

Atomic and molecular structure (12 lectures)

UNIT I

Postulates of quantum chemistry. Schrodinger equation. Particle in a box solutions, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomics, Pi-molecular orbitals of butadiene and benzene. Band structure of solids and the role of doping on band structures

UNIT II

Spectroscopic techniques and applicationsPrinciples of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclearmagnetic resonance and magnetic resonance imaging, surface characterization techniques.

UNIT III

Chemical equilibria, Intermolecular forces and potential energy surfacesUse of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cellpotentials, the Nernst equation and applications.

Use of free energy considerations in metallurgy through Ellingham diagram. Equations of state of real gases and critical phenomena.

UNIT IV

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, moleculargeometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNIT V

Stereochemistry, Organic reactions and synthesis of a drug moleculeRepresentations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings Synthesis of a commonly used drug molecule.

Reference/Textbooks

University chemistry, by B. H. Mahan

Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane 3.Fundamentals of Molecular Spectroscopy, by C. N. Banwell

Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

Physical Chemistryby P. W. Atkins

Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Ed.

Principles of physical chemistry, Puri, Sharma and Pattania

Course Outcomes:

At the end of the course, students will be able to

- analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- rationalize bulk properties and processes using thermodynamic considerations.
- distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques

- rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- list major chemical reactions that are used in the synthesis of molecules.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1				2	2					1
CO2		1		2		1	1					
CO3		2			1		2					2
CO4				1	1		2					
CO5	1			1	2		1					

EN 103 ENGLISH

Instruction: 2(L) **Credits: 2**

Assessment: 40 + 60

UNIT I Vocabulary Building

The concept of Word Formation- Root words from foreign languages and their use in English- Acquaintance with prefixes and suffixes from foreign languages in English form derivatives- Synonyms, antonyms, and standard abbreviations.

UNIT II Basic Writing Skills

Sentence Structures – Use of phrases and clauses in sentences –Importance of proper punctuation - Creating coherence – Organizing principles of paragraphs in documents -Techniques for writing precisely

UNIT III Identifying Common Errors in Writing

Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article -Prepositions - Redundancies -Clichés

UNIT IV Nature and Style of sensible Writing

Describing - Defining - Classifying –Providingexamples or evidence –Writingintroductionand conclusion

UNIT V Writing Practices

Comprehension - Précis Writing –EssayWriting

Reference/Textbooks:

- Practical English Usage. Michael Swan. OUP. 1995.
- Remedial English Grammar. F.T. Wood. Macmillan.2007
- On Writing Well. William Zinsser. Harper ResourceBook. 2001
- Study Writing. LizHamp- Lyonsand Ben Heasly. Cambridge University Press. 2006.
- Communication Skills. Sanjay KumarandPushpalata. Oxford University Press. 2011.
- Exercises in Spoken English. Parts.I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcomes : At the end of the course, students will be able to

- learn the elements of grammar and composition of English Language.
- Learn literary texts such as Short stories and prose passages.
- maintain linguistic competence through training in vocabulary, sentence structures and pronunciation.
- develop communication skills by cultivating the habit of reading comprehension passages.
- develop the language skills like listening, speaking, reading and writing.
- Make use of self-instructed learner friendly modes of language learning through competence.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									
CO2	2		2	2								
CO3		1		2	2							
CO4			2	2	3							
CO5		1	1	2								
CO6												

EE104BASIC ELECTRICAL AND ELECTRONICS ENGG.

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

Unit-I

Electric DC Circuits: Kirchhoff's Voltage & Current laws, Superposition Theorem, Star – Delta Transformations.

AC Circuits: Complex representation of Impedance, Phasor diagrams, Power & Power Factor, Solution of Single Phase Series & Parallel Circuits. Solution of Three Phase circuits and Measurement of Power in Three Phase circuits.

Unit-II

Single Phase Transformers: Principle of Operation of a Single phase Transformer, EMF equation, regulation and Efficiency of a single phase transformer.

DC Machines: Principle of Operation, Classification, EMF and Torque equations, Characteristics of Generators and Motors

UNIT-III

Three Phase Induction Motor: Principle of Rotating Magnetic Field, Principle of Operation of 3-φ I.M., Torque-Speed Characteristics of 3-φ I.M.

UNIT-IV

p-n junction operation, diode applications, Zener diode as regulator.

Transistor and applications: Introduction to transistors, BJT Characteristics, biasing and applications

UNIT-V

Integrated Circuits: Operational amplifiers, Applications: adder, subtractor, Integrator and Differentiator.

Digital Circuits: logic gates, Combinational Logic circuits, Flip-Flops, counters and shift registers, Laboratory measuring instruments: digital multi-meters and Cathode Ray Oscilloscopes (CRO's).

Textbooks:

- Electrical Technology by Edward Hughes
- Basic Electrical Engineering by Nagrath and Kothari

Course Outcomes: At the end of the course, students will be able to

- understand the basic concepts of D.C. single phase and 3- phase supply and circuits and solve basic electrical circuit problems
- understand the basic concepts of transformers and motors used as various industrial drives
- understand the concept of power factor improvement for industrial installations and concepts of most economical power factor
- understand the operation and characteristics of diodes, transistors, integrated circuits and digital circuits.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1		1		1			1	
CO2	2	2	2	1		1		1			1	
CO3	2	2	2	1		1		1			1	
CO4	2	2	2	1		1		1			1	

ME 105 ENGINEERING GRAPHICS AND DESIGN

Instruction: 2(L) +3 (Drg) /week Credits: 3.5 Assessment: 40 + 60

Unit I Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments,lettering, Conic sections including the Rectangular Hyperbola (General method only);Cycloid,Epi-cycloid, Hypo-cycloid and Involutes.

Unit II

Scales- Scales– construction of Plain &Diagonal Scales.

Projections of points, lines - Projections of Points and lines inclined to both planes, including traces;

Question Paper Modular – 4 questions from Units I t0 IV, 15 marks each

Unit III

Projections of planes

Projections of planes (Regular surfaces only) inclined Planes-Auxiliary Planes

Projections of Regular Solids (Simple solids – cylinder, cone, prism & pyramid) those inclined to both the Planes-Auxiliary Views

Unit IV

Isometric Projections& Orthographic projections

Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale. Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Unit V Introduction to CAD

CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.;

Text/Reference Books:

- Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
- Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
- Agrawal B. & Agrawal C.M.(2012),Engineering Graphics, TMH Publication
- Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing, Scitech Publishers
- Corresponding set of) CAD Software Theory and User Manuals

Course Outcomes: At the end of the course, the student will be able to

- make a distinction between first angle projection and third angle projection of drawing.
- draw hyperbola, parabola, Involutes and Cycloidal curves.
- draw sections of solids including cylinders, cones, prisms and pyramids.
- draw projections of lines, planes, solids and sections of solids.
- draw orthographic projections of lines, planes, and solids.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1			1	1					
CO2	2	1				1	1					
CO3		2		2		2						1
CO4			1	2			1					
CO5		1		2		3						

EN 106 / EN 206 ENGLISH COMMUNICATION LAB

Instruction: 0(L) +3(Lab) /week Credits: 1.5 Assessment: 40 + 60

Listening Comprehension -Pronunciation, Intonation, Stress and Rhythm -Common Everyday Situations: Conversations and Dialogues -Communication at Workplace -Interviews -Formal Presentations

Reference/Text Books:

- Practical English Usage. Michael Swan. OUP. 1995.
- Remedial English Grammar. F.T. Wood. Macmillan.2007
- On Writing Well. William Zinsser. Harper Resource Book. 2001
- Study Writing. LizHamp– Lyons and Ben Heasly. Cambridge Univ. Press. 2006
- Communication Skills. Sanjay Kumar and Pushpalata. Oxford Univ. Press.2011
- Exercises in Spoken English. PartsI-III.CIEFL, Hyderabad. Oxford Univ. Press

Course Outcomes:

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									

MA 201MATHEMATICS II

(II Semester - for all branches)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

Unit I

Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors –Canley-Hamilton theorem-quadratic forms-diagonalization.

Unit II

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals- Green's, Stokes's and Gauss Divergence theorems and its applications.

Unit III

Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

Unit IV

Special Functions I: Gamma and Beta functions-series solutions of differential equations-ordinary points.

Unit V

Special Functions II: Bessel function-recurrence formulae-generating function for $J_n(X)$-Lengender polynomials-recurrence formulae-generating function for $P_n(X)$ - Rodriguez's formula - orthogonality of Lengender polynomials.

Text/Reference Books

- B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
- M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
- B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
- Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

Course Outcomes: At the end of the course, students will be able to

- use ranks of matrices to decide whether the system of linear equations is consistent or not
- use Cayley-Hamilton theorem to find inverses or powers of matrices.
- use Eigen values and vectors to reduce Quadratic forms to normal form.
- to analyze motion problems from real lines to curves and surfaces in 3-D and use tools such as divergence and curl of vector and gradient, directional derivatives that play significant roles in many applications.
- use Green's theorem to evaluate line integrals along simple closed contours on the plane
- use Stokes' theorem to give a physical interpretation of the curl of a vector field
- use the divergence theorem to give a physical interpretation of the divergence of a vector field.
- find the Fourier Series to represent a function as a series of constants times sine and cosine functions of different frequencies in order to observe periodic phenomenon.
- Evaluate certain improper integrals to make them simple with introduction of Gamma and Beta functions.
- study certain special functions that arise in solving certain ordinary differential equations to model many physical phenomena.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3	3		1			2		3	
CO2	2	3	3		3		1					2
CO3		1				2		2				
CO4	1	3		3				1				
CO5	3		3		2			2				
CO6												
CO7												

CO8												
CO9												
CO10												

PY 202ENGINEERING PHYSICS

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I Wave Optics

Interference: Huygen`s Principle-Principle of Superposition-Interference of Light-Young`s double slit experiment- -Newton's Rings.

Diffraction: Fraunhofer Diffraction at a Single Slit and a Circular Aperture-Plane Diffraction grating – Resolving Power-Rayleigh`s Criterion-Resolving power of Grating and Microscope.

Lasers : Introduction – Spontaneous and Stimulated Emission of Radiation – Population Inversion – Types of Lasers – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNIT II Mechanics of Rigid Body

Rigid Body-Rotational Motion and Kinematics Relations-Kinetic Energy and Angular Momentum of a Rotating Body-Equation of Motion of a Rigid body (Torque of a Rigid Body)-Combined Translation and Rotational Motion of a Rigid Body- Body Rolling on an inclined Plane.

Mechanics of Continuous Media

Elasticity, Stress and Strain- Hook`s Law and Behaviour of Wire Under Load- Elastic Constants-Relation Between Elastic Modulii-Types of Supports, Beams and Loads-Different types of Bending-Cantilever with an End Load. Ultrasonic Waves - Sound Absorption and Reverberation -Sabine Formula - Acoustics of Buildings.

UNIT III Electromagnetism and magnetic properties of Materials

Laws of Electrostatistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws-Maxwells Equations – Polarization - Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization - Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and Hesteresis, Applications of ferromagnetic materials.

UNIT IV Quantum Mechanics

Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P.Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT V NanoPhysics and Nanotechnology

Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C^{60} (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials.

Text Books / Reference Books:

- R.K.Gaur and S.L.Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi
- S.L.Gupta and SanjeevGupta`UnifiedPhysics`Vol.I Jai PrakashNath& Co., Meerut.
- HitendraK.Malik and A.K.Singh ``Engineering Physics" TataMCGraw Hill Education Pvt.Ltd.,New Delhi
- M.N.Avadhanulu and P.G.Kshirsagar ``A Textbook of Engineering Physics`` S.Chand and Company Pvt.Ltd., New Delhi
- B.L Theraja, "Modern physics", S.Chand& Company.
- V. Raghavan "Material Science", Tata McGraw Hill Publications.
- M.S.RamachandraRao and Shubra Singh, ``Nanoscience and
- Nanotechnology`` Wiley India Pvt.Ltd, New Delhi

Course Outcomes: At the end of the course, students will be able to

- Develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
- understand the quantum mechanics and ultimately the quantum behavior of charged particles

when they are in motion.

- identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems
- apply the basic principles of Mechanics of rigid body and continuous media and their applications understand the principles in electrostatics and electromagnetics and magnetic properties of materials.
- understand size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
- think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
- Learnthe basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis.
- provide multidisciplinary experiences throughout the curriculum.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									
CO2	2		2	2								
CO3		1		2	2							
CO4			2	2	3							
CO5		1	1	2								
CO6												
CO7												
CO8												

CS203 PROGRAMMING FOR PROBLEM SOLVING

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Course Objectives:

- To acquire problem solving skills
- To be able to develop flowcharts and algorithms for the given problem
- To learn how to write modular programs in C
- To enable to use arrays, pointers, strings and structures in solving problems.
- To explain the difference between object-oriented programming and procedural programming.
- To understand principles of object-oriented programming.

UNIT-I

Problem Solving : Problem solving techniques, Computer as a problem solving tool, Programming Languages – Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements: Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements: while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continue statements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions,

Passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, Accessing structures, Nested structures, Arrays of structures, Structures containing arrays, Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.

UNIT V

Introduction to Object-Oriented Programming (OOP): Need for OOP, Principles of OOP, Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

Course Outcomes: At the end of the course, student will be able to

- Develop and test programs in C and correct syntax and logical errors.
- Implement conditional branching, iteration and recursion.
- Decompose a problem into functions and synthesize a complete program.
- Use arrays, pointers, strings and structures to formulate algorithms and programs

- Use files to perform read and write operations.
- Handle programming assignments based on class,abstraction, encapsulation, overloading and inheritance.

Text Books

- Ashok N Kamthane, Amit Ashok Kamthane, Programming in C, 3rd Edition, Pearson Education, 2019.
- Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
- R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
- Hanly J R &Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
- Herbert Schildt,The Complete Reference C++, 4th Edition, Tata McGraw-Hill.

Reference Books

- C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
- Programming with C, Bichkar, Universities Press.
- Programming in C, ReemaThareja, OXFORD.
- C by Example, Noel Kalicharan, Cambridge.
- The C++ Programming Language, Bjarne Stroustrup, 3rd Edition, Pearson Education.
- Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1		3			2			2		2
CO2	2	3	2		3					2		
CO3		2	1								3	
CO4		3										
CO5			3									
CO6												

CE 204 ENGINEERING MECHANICS

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

UNIT I

STATICS : Basic concepts – System of force, Concurrent and non-concurrent coplanar and non-coplanar forces – Resultant – Moment of force and its application – Couples and resultant of force systems – Equilibrium of systems of forces – Free body diagrams, Equations of equilibrium of coplanar systems and spatial systems.

UNIT II

Analysis of plane trusses: Types of supports – Types of trusses – Analysis of trusses using method of joints and method of sections.

UNIT III

CENTRE OF GRAVITY AND MOMENTS OF INERTIA: Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite areas (rolled and built up sections) – Radius of gyration of areas.

UNIT IV

SIMPLE STRESES AND STRAINS : Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-strain diagram for mild steel – Working stress – Factor of safety.

Lateral strain – Poisson's ratio and volumetric strain – Elastic moduli and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses.

UNIT V

STRAIN ENERGY: Gradual, sudden and impact loading – Endurance limit principles of virtual work and its applications.

TEXTBOOKS:

- Ghose D.N. – Applied Mechanics and Strength of Materials.
- Timoshenko & Young – Engineering Mechanics.
- Junarkar SB – Mechanics of Structures – Vol. I.
- Junarkar SB – Elements of Applied Mechanics.

Course Outcomes: At the end of the course, student will be able to

- apply the basic knowledge of force system.
- know the types of supports occur in civil engineering structures
- know the geometrical properties of different cross sections.
- understand different types of stresses and strains, elastic constants.
- understand the behavior of different internal forces under different types of loading.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		2			2		1		1	
CO2	2	2		1			1		1		1	
CO3	2	2		1					2		1	
CO4	1	2		2							1	
CO5		2			1		2					

ME 205 WORKSHOP/MANUFACTURING PRACTICE

(ME 105 for EEE, ECE & CSE)

(ME 205 for ChE,CE & ME)

Instruction: 0(L) +3 (lab)/week Credits: 1.5 Assessment: 40 + 60

Workshop Practice: Five practices among

1. Machine shop 2.Fittingshop 3.Carpentry 4.Electrical wiring

1. Welding shop 6.Casting 7.Smithy 8.Plasticmoulding&GlassCutting

Examinations could involve the actual fabrication of simple components, utilizing one or More of the techniques covered above.

Detailed Contents

- ManufacturingMethods-casting,forming,machining,joining, advanced manufacturing methods
- CNC machining, Additive manufacturing
- Fitting operations & power tools.
- Electrical &Electronics
- Carpentry
- Plastic moulding. Glass cutting
- Metal casting.
- Welding(arc welding & gas welding), brazing

The above course content is learnt by online videos/ppt presentations.

Text/ReferenceBooks:

- HajraChoudhury S.K., HajraChoudhury A.K.andNirjharRoy S. K., Elements of WorkshopTechnology", Vol. I 2008and Vol. II 2010, Media promoters and Publishers private limited, Mumbai.
- Kalpakjian S. and Steven S. Schmid ManufacturingFngineeringand echnology",4th edition, PearsonEducationIndiaEdition,2002.
- GowriP.Hariharanand A. SureshBabu, Manufacturing Technology–I" Pearson

Education,2008.

- Roy A. Lindberg, Processes and Materials of th edition, Prentice Hall Manufacture",4 India,1998.
- RaoP.N., "ManufacturingTechnology",Vol. I & II,TataMcGrawHillHouse, 2017

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Course Outcomes : Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricatecomponents using different materials.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		1		1	1						1

CS206 PROGRAMMING FOR PROBLEM SOLVING LAB

Instruction: 0(L) +3 (Lab)) /week Credits: 1.5 Assessment: 40 + 60

Course Objectives:

- To provide exposure to problem-solving through programming
- To train the student on the concepts of the C- Programming language

The following programs shall be developed and executed in Programming Language C.

- Programs on conditional control constructs.
- Programs on iterative statements (while, do-while, for).
- Programs on recursive procedures
- Programs on arrays, matrices (single and multi-dimensional arrays).
- Programs using user defined functions, demonstrating parameter passing methods viz. call by value and call by reference.
- Programs using different library functions viz. ctype.h, math.h, stdio.h, stdlib.h, string.h, conio.h and pre-processor directives.
- Programs using pointers (int pointers, char pointers) and pointer arrays.
- Programs on structures and unions
- Programs on File Processing.
- Programs on Pointers to structures and Self-referential structures

Course Outcomes: After Completion of this course the student would be able to

- Develop the C code for the given algorithm.
- Understand, debug and trace the execution of programs written in C language.

Reference Books:

- Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.

- Hanly J R &Koffman E.B, “Problem Solving and Program design in C”, Pearson Education, 2019.
- R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
- Behrouz A. Forouzan& Richard F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3		2		1		2	1	
CO2	3	3			2			3		2		3

ENVIRONMENTAL SCIENCE

Instruction: 4(L) Credits: 0(Zero)

Assessment: 40 + 60

UNIT I

Environmental Studies and Natural Resources

Definition, Scope and importance of Environment, Environmental studies, Need for public awareness

Components of Environment- Atmosphere, Hydrosphere, Lithosphere.

Renewable and **Non-Renewable Resources and associated problems**

Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dam benefits and problems.

Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.

Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.

Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

Role of an individual in conservation of natural resources.

UNIT II

Ecosystem and Biodiversity

Ecosystem - Concept of an ecosystem, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem.

(a) Forest ecosystem. (b) Grassland ecosystem

(c) Desert ecosystem. (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation:

Definition, genetic species and ecosystem diversity, Biogeographically classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation.

Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT – III

Environmental pollution and Global Effects

Definition, Causes, Effects, and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management: Floods, earthquakes, cyclone, landslides, Tsunami. Climate change-Global warming, Acid rain, Ozone depletion.

UNIT – IV

Environment Issues and Management

- Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, Water Borne Diseases.
- Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms
- Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcement of Environmental legislation.

UNIT – V

Social Issues and the Environment

- Population growth, Population Explosion, Population Control, Women and

Child welfare.

- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rain water harvesting, watershed management, Wasteland reclamation, Human Rights, Value education, Environmental ethics- Issues and possible solution.
- Role of information Technology in Environment and Human Health.

Text Books / Reference Books :

- AnubhaKaushik& C P Kaushik, Environmental studies, New age International Publishers, 2008
- Benny Joseph, Environmental studies, Tata McGraw-Hill Publishers, 2005
- M Chandra Sekhar, Environmental Science, Hi-Tech Publishers, 2004
- Keerthinarayana and Daniel Yesudian, Principles of Environmental Sciences and Engineering , Hi-Tech Publishers, 2005
- AmalK.Datta, Introduction to Environmental Science and Engineering, Oxford & IBH Publishing Co.Pvt.Ltd, 2000
- SanthoshkumarGarg,RajeshawriGarg and RajniGarg, Ecological and Environmental studies, Khanna publishers, 2006
- Gilbert M, Introduction to Environmental Engineering and Science, Masters Publication by Prentice –Hall of India Private Ltd., 1991
- William P Cunningham and Mary Ann Cunningham, Principles of Environmental Science, Tata McGraw Hill Publishing Co.Ltd, 2002

Course Outcomes:

At the end of the course, students will be able to

- acquire knowledge in
  - diverse components of environment and natural resources
  - ecosystem and biodiversity & its conservation methods
  - population growth and human health
  - green technology
- identify and resolve the issues related to sources of different types of pollutions
- provide solutions to individuals, industries and government for sustainable development of natural resources
- apply environmental ethics in protection of diversified ecosystems.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	1	2	1	1	1		
CO2	2	2	2	1		1	1	1	2	1		
CO3	2	2	2	2	1	1	1	2	2	1		
CO4	2	2	2	1	2	1	1	1	1	1		

MA 301B Mathematics – III

Instruction Hours/week : 3(L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination Marks: 60**

Course Educational Objective (CEOs):

1. To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering
2. To provide an overview of probability and statistics to engineers

UNIT I

Complex analysis - I: Analytical functions - Cauchy-Riemann equations – Construction of Analytic functions- Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT II

Complex analysis - II: Taylor's and Laurent's' series- Transformations- Conformal mapping - Bilinear transformations - Transformation of $1/z$, z^2, sin z and cos z.

UNIT III

Complex analysis –III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals

UNIT IV

Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Lagrange's' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT V

Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

Text Books:

1. Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
3. Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
4. Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
5. Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

Course Outcomes (COs):

At the end of the course students will be able to

1. Solve field problems in engineering involving PDEs.
2. Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1		1	1					1	1	
CO2	2	2		1	1					1	1	

CE 302C STRENGTH OF MATERIALS

Instruction Hours/week : 3(L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination Marks:60**

Course Educational Objective (CEOs):

1. To acquire the knowledge about behavior of members subjected to various types of forces on the members.
2. To impart procedure for drawing shear force and bending moment diagrams for beams.
3. To make the student able to analyze flexural stresses in beams due to.
4. To enable the student to apply the concepts of strength of materials in engineering applications and design problems.

UNIT I

SHEAR FORCE AND BENDING MOMENT:

Definition of beam - Types of beams - Concept of shear force and bending moment - S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l, uniformly varying loads and combination of these loads - Point of contra flexure - Relation between S.F, B.M and rate of loading at a section of a beam.

UNIT II

FLEXURAL STRESSES AND SHEAR STRESSES:

Theory of simple bending - Distribution of flexural stresses and shear stresses - Resilience due to flexure and shear. Principal stresses and principal strains - Mohr's circle of stresses.

UNIT III

COMBINED DIRECT AND BENDING STRESSES:

Stresses under the combined action of direct loading and B.M - Core of a section - Circular, rectangular and triangular (solid and hollow) - Determination of stresses in the case of chimneys, retaining walls and dams.

UNIT IV

COLUMNS AND STRUTS:

Introduction – classification of columns – Axially loaded compression members – Euler's crippling load theory – derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – eccentric loading and Secant formula – Prof. Perry's formula.

UNIT V

CYLINDERS:

Thin cylinders subjected to internal fluid pressure - Thick cylinders under internal and external pressure - Compound cylinders.

TEXT BOOKS:

1) Mechanics of Structures Vol.I & Vol.II by S.B.Junnarkar.
2) Analysis of Structures by Vazirani & Ratwani.
3) Strength of Materials Vol.I & Vol.II by Timoshenko.
4) Strength of Materials by Andrew Pytal and Ferdinand L.Singer (Longman).

REFERENCES:

1) Engineering Mechanics by Egor. P. Popov.

Course Outcomes (COs):

After completion of the course the student will be able to:

1) Develop shear force and bending moment diagrams for different load cases.

2) Compute the flexural stresses for different load cases and different cross-sections.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2		1				2	2	2	1
CO2	2	1	2	1	1				2	2	2	1

HS 303C MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction Hours/week : 3(L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination Marks :60**

Course Educational Objective (CEOs):

- To learn the fundamental concepts of economics and analysis methods.
- To study depreciation methods and inflation process and trade policies.
- To acquire knowledge in basic concepts of accounting, principles.
- To learn the techniques for preparing cost sheet.

Unit -I

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR, NPV, IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage, Income tax leverage.

Unit -II

Depreciation and methods of calculating depreciation (straight line, sum of the years digit method, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

Unit -III

Inflation: Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

Unit -IV

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

Unit -V

Cost Accounting: Introduction, Classification of costs, Methods of costing, Techniques of costing, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

TEXT BOOKS:

- Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw Hill Education, 1996.
- Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
- A.N. Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
- Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
- Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition,Vikas Publication, 2012.

Course Outcomes (COs): After the completion of the course the student will be able to:

- Understand Macro Economic environment of the business and its impact on enterprise.
- Identify various cost elements of the product and its effect on decision making.
- Understand the concepts of financial management and smart investment.
- Prepare the Accounting records and interpret the data for Managerial Decisions.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1			2					1	
CO2			1			2					1	
CO3			1			2					1	
CO4			1			2					1	

CE 304C SURVEYING

Instruction Hours/week : 3(L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination Marks :60**

Course Educational Objectives (CEOs):

1. Highlight the purpose of surveying in civil engineering construction,
2. Explain different types of curves, their requirement and curve setting.
3. Formulate survey observations and perform calculations
4. Train on utilization of surveying instruments like EDM, Total station and GPS.

UNIT – I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and dip.

UNIT - II

Levelling and Contouring

Leveling- Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes

Areas - Determination of areas consisting of irregular boundary and regular boundary

(coordinates, MDM, DMD methods), Planimeter.

Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple curve, setting out of simple Curves, Introduction to compound curves. Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curves.

UNIT - V

MODERN SURVEYING INSTRUMENTS:

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, Applications of GPS.

TEXT BOOKS:

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.

2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.

3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and

Practice, Springer -Verlag Publishers, 2001.

REFERENCES:

- Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000.
- Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
- Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun KumarJain - Laxmi Publications (P) ltd., New Delhi.
- Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
- Surveying by Bhavikatti; Vikas publishing house ltd.
- Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. NewDelhi, 2004.
- Surveying and leveling by R. Agor Khanna Publishers 2015.

Course Outcomes (COs):

After completion of the course the student will be able to:

- Identify data collection methods and prepare field notes.
- Measure and layout elevations and relative position of points, understand plans and field notes.
- Ability to design, set out curves and use modern equipment.
- Calculate angles, distances, levels, estimate measurement errors and apply corrections.
- Interpret survey data and compute areas and volumes.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	1		1					1	
CO2	2	1	2	1		1		1			1	
CO3	2	2	1	1		2		1			1	
CO4	2	2	1	1		2		1			1	
CO5	2	2	1	1		2		1			1	

CE 305C BUILDING MATERIALS AND CONSTRUCTION

Instruction Hours/Week: 3(L) Credits : 3

Sessional Marks : 40 **Semester-end Examination Marks**: 60

Course Educational Objective (CEOs):

- To learn and understand the manufacturing, physical and mechanical properties of various construction materials and their testing procedures.
- To study the basic building components.
- To learn the methods to be followed in constructing various components of a building.

UNIT-I

STONES-BRICKS

Stone as building material-Selection of stones for construction-Tests on stones-Qualities of a good building stone-Deterioration of stones-Preservation of stones.

Bricks-composition of good brick earth-Manufacture of bricks-Classification of bricks-Tests for bricks-Absorption, Crushing strength, Hardness, presence of soluble salts, shape and size, soundness, structure-Uses of bricks-Refractories.

UNIT-II

CEMENT-AGGREGATES

Cement ingredients-Setting action of cement-Manufacturing process of ordinary cement
-Types of cement – Field and laboratory tests for cement-storage and uses of cement.

Aggregates-Qualities-classification of aggregates-Testing of Aggregates—Grading of aggregates-classification of sand-Bulking of sand- properties of good sand.

UNIT-III

TIMBER AND OTHER MATERIALS

Timber-Qualities of good timber- Market forms-Industrial timber, Plywood, Veneer-.
Steel -Market forms of steel. Aluminum -properties , alloys of aluminium.

UNIT-IV

CONSTRUCTION ELEMENTS

Types of foundations, Stone Masonry-joints in stone masonry, classification of stone masonry. Brick Masonry-Bonds in brick masonry, types of brick masonry. Lintels- Types of lintels. Roofs and its types. Flooring -types of flooring, timber floors, composite floors. Damp proofing-meaning, causes, effects, materials used for damp proofing, methods of damp proofing.

UNIT-V

OTHER ELEMENTS

Pointing-objects, mortar for pointing, method of pointing, types of pointing. Plastering-requirements of good plaster, methods of plastering. Painting-types of paints, painting on different surfaces failure of paint, defects in painting. Varnishing- characteristics of ideal varnish, ingredients, types, process of varnishing. Distempering-properties, ingredients of a distemper, process of distempering.

Thermal Insulation - insulating materials, thermal insulation of exposed doors, windows, exposed roofs and exposed walls. Acoustics-definition, types of absorbent materials, conditions for good acoustics, methods of sound insulation.

TEXTBOOKS:

- Sushil Kumar "Building Materials and construction", 20th edition, reprint 2015,StandardPublishers
- Dr. B. C. Punmia, Ashok kumar Jain, Arun Kumar Jain, "Building Construction, Laxmi Publications (P) ltd., New Delhi.
- Rangwala S. C. "Engineering Materials", Charotar Publishing House, India.

REFERENCES:

- S. K. Duggal, “Building Materials”, (Fourth Edition)New Age International (P) Limited,
- 2016 National Building Code(NBC) of India
- P C Vergese, “Building Materials”, PHI Learning Pvt.Ltd
- Building Materials and Components, CBRI, 1990,India
- Jagadish. K.S, “Alternative Building Materials Technology”, New Age International,2007.
- M. S. Shetty, “Concrete Technology”, S. Chand & Co. New Delhi.

Course Outcomes (COs):

After completion of the course the student will able to:

- Explain the manufacturing, physical and mechanical properties of various construction materials and their testing procedures.
- Describe the basic building components.
- Apply the methods to be followed in constructing various components of a building.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		1	1		1	2	1	2	1	1	1
CO2	1		1	1		1	2		2	1	1	1
CO3	2	1	1	1		1	2	1	2	1	2	1

CE 306C ENGINEERING GEOLOGY

Instruction Hours/Week : 3(L) Credits : 2

Sessional Marks : 40 **Semester-end Examination Marks**: 60

Course Educational Objective (CEOs):

- To learn various geological parameters.
- To study characteristics of various minerals and their Identification.
- To study the formation and features of rocks and their Identification .
- To learn elements of geological structures.
- To acquire knowledge in preliminary causes for landslides and earth quakes.

UNIT – I

Introduction to geology and its various branches -Role of Earth Sciences in Civil Engineering Operations, Processes acting at the surface of the earth - Volcanism, Geological action of wind, glaciers, rivers and oceans - Application of Earth Science in Civil Engineering Practices, Understanding the earth, internal structure and composition. Weathering, erosion and denudations process on earth material and natural agencies, Geological work of wind, river underground water and glaciers.

UNIT – II

Mineralogy: Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group; Feldspar Group; Kaolin; Asbestos; Carbonate Group ; Gypsum; Mica Group; Ore minerals - Iron ores; pyrite; Chlorite. Study of minerals like Garnet, Olivine, Hornblende, Augite, Calcite, Talc, Kyanite, Bauxite and Clay minerals.

UNIT – III

Petrology: Origin and formation of rocks - Classification of rocks - Igneous, Sedimentary and Metamorphic rocks - Their textures and structures -Study of rocks like Granite, Gabbro, Dolerite, Basalt, Breccia, Conglomorate, Sand stone, Shale, Limestone, Laterite, Quartzite, Schist, Gneiss, Marble, Slate. Definition of rock - Rock forming processes - Geological

classification of rocks - Megascopic study, Chemical and Mineralogical Composition of rock.

UNIT – IV

Structural Geology: Elements of structural geology like strike, dip, outcrop. Study of folds, joints, faults and their importance in civil engineering works. Dykes and sills, common structures and textures - Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance insitu and drift soils, common types of soils, their origin and occurrence in India.

UNIT – V

Geology of dams, reservoirs, tunnels landslides and rock falls. Earthquakes. Groundwater exploration. Rock as construction materials. Site selection for dams and tunnels – analysis of failures in dams and tunnels - Seismic zones of India - Earth quakes, their causes and effects. Seismic waves, Richter scale. Landslides - causes and effects; Tsunami –causes and effects.

TEXT BOOKS:

- A text book of geology By Mukharjee.P.K.
- A Text Book of Engineering Geology - N.Chennakesavulu.
- Engineering and general Geology by Parbin Singh
- Engineering Geology by R.E.Goodman

REFERENCES:

- Principles of Engineering geology and Geotechnics By Krynine & Judd
- Geology for Engineers by Blyth & de freitaus
- Fundamental of Engineering Geology by F.H.Bell.

Course Outcomes (COs):

After completion of the course the student will be able to:

- To apply the geological knowledge to Civil Engineering Constructions, at different stages. The kind of study exposes the geological draw backs, if any.

- To help the site engineers to take suitable precautionary measures to overcome the drawbacks but also to take advantage of the site geology findings wherever possible.
- To take precautionary measures in civil engineering constructions based on geological parameters.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2			1	1		1			1		
CO2	1				1		1					
CO3	1				1		1					

CE 307P SURVEYING LAB

Instruction Hours/week : 3 (P) **Credits : 1.5**

Sessional Marks : 40 **Semester-end Examination Marks: 60**

Course Educational Objective (CEOs):

1. To apply the possess knowledge about survey field techniques
2. To apply the possess knowledge about traverse survey
3. To determine distances, areas of polygons
4. To gain knowledge of modern field measurement tools and techniques

EXERCISE – 1

Measurement of distance by chain, Tape and Area of a polygon by cross staff survey

EXERCISE – 2

Compass traversing and adjustment of closing error by Bowditch method (Graphical method)

EXERCISE – 3

Plane table survey; finding the area of a given boundary

EXERCISE – 4

Fly levelling: Height of the instrument method and rise and fall method.

EXERCISE – 5

Fly levelling; Longitudinal Section and Cross sections of a given road profile.

EXERCISE – 6

Theodolite Survey: Determining the Horizontal and Vertical Angles Finding the distance between two inaccessible points.

EXERCISE – 7

Tachometric survey: Heights and distance problems using tachometric principles.

EXERCISE – 8

Set out simple curve using Perpendicular offsets from long chord and Rankine's deflection angles method.

EXERCISE – 9

Total Station: Determination of area using total station.

EXERCISE – 10

Total Station: Determination of Remote height.

Course Outcomes (COs):

After completion of the course the student will have:

- Ability to use the techniques, skill and surveying equipment for engineering practice.
- Ability to apply mathematics concepts in the field of surveying.
- Ability to develop an understanding of modern surveying equipment

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2			1	1		1			1		
CO2	1				1		1					
CO3	1				1		1					

CE 308P MATERIAL TESTING LAB

Instruction Hours/Week : 2(P) **Credits** : 1

Sessional Marks : 40 **Semester-end Examination Marks**: 60

Course Educational Objective (CEOs):

- To make student understand the fundamental modes of loading of the structures
- To train student in methods for determining mechanical properties of materials.

LIST OF EXPERIMENTS

- Tension and Torsion Test on Mild Steel bar and HYSD bar
- (a) Deflection Test on Simply Supported Beam
- (b) Charpy Impact Test
- Deflection Test on Fixed Beam
- (b) Izod Impact Test
- Compression Test on Wood
- (b) Shear Test on Wood
- Test on Closed coil Helical Spring
- (b) Bending Test on Carriage Spring
- Deflection Test on beam under Uniform Bending
- (b) Bending Test on R.S. Joist
- 7 Sieve Analysis of coarse and fine aggregates
- 8 Bulking of Sand by Volume and Weight methods
- 9 Normal consistency, Initial and Final Setting Times of Cement
- 10 Tests on concrete
- Slump Test
- Compressive Strength of Concrete Cubes
- Compaction Factor Test
- Compressive Strength of Concrete Cylinders
- 11 (a) Specific gravity & Water absorption of Coarse aggregate

- (b) Specific gravity of Cement
- 12 Water absorption and Compressive Strength of Bricks

Course Outcomes (COs):

After completion of the course the student will be able to

- Determine the properties of different building construction materials.
- Analyse the behaviour of different construction materials.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1								1		
CO2	2	1								1		

CE 309S COMPUTER SKILLS

Instruction Hours/week: 2 (P) **Credits :1**

Sessional Marks : 40 **Semester-end Examination Marks: 60**

Course Educational Objectives (CEOs):

1. To learn and use MSWORD.
2. To learn and use MSEXCEL,MSPOWERPOINT
3. To learn and browse the INTERNET and EMAIL

EXERCISE – 1:

MS WORD: Text Basics, Text Formatting and saving file, working with Objects

EXERCISE – 2 :

MS WORD: Header & Footers, Working with bullets and numbered lists, Tables

EXERCISE –3:

MS WORD: Styles and Content, Merging Documents, Sharing and Maintaining Document

EXERCISE –4 :

MS WORD: Sharing and Maintaining Document, : Proofing the document, Printing

EXERCISE –5:

MS EXCEL: Introduction to Excel, Formatting excel work book

EXERCISE –6

MS EXCEL: Perform Calculations with Functions, Sort and Filter Data with Excel

EXERCISE – 7:

MS EXCEL: Create Effective Charts to Present Data Visually, Analyze Data Using PivotTables and Pivot Charts, Protecting and Sharing the work book

EXERCISE – 8:

MS EXCEL: Use Macros to Automate Tasks, Proofing and Printing

EXERCISE – 9:

MS POWER POINT: Setting Up PowerPoint Environment, Creating slides and applying themes, Working with bullets and numbering, Working with Objects, Slide show option and print

EXERCISE – 10:

INTERNET AND EMAIL: What is Internet, Receiving Incoming Messages , Sending Outgoing Messages, Email addressing , Email attachments, Browsing, Search engines , Text chatting, Job Searching.

COURSE OUTCOMES (COs):

After completion of the course the student will be able to:

1. Use MS WORD, MS EXCEL AND POWER POINT in any civil engineering project works and for personal works.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**	**2**								**1**	**1**

MC310A CONSTITUTION OF INDIA

Instruction Hours/Week : 2(L) **Credits : -**

Sessional Marks : 100 **End Semester Examinations Marks : -**

Course Educational Objectives(CEOs): Students will learn:

- To Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Unit-I

History of Making of the Indian Constitution:

History ,Drafting Committee, (Composition & Working)

Philosophy of the Indian Constitution: Preamble Salient Features

Unit-II

Contours of Constitutional Rights & Duties:

- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy

- Fundamental Duties.

Unit-III

Organs of Governance:

- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

Unit-IV

Local Administration:

- District's Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.
- Pachayati raj: Introduction, PRI: Zila Pachayat.
- Elected officials and their roles, CEO Zila Pachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

Unit-V

Election Commission:

- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS/REFERENCES:

- The Constitution of India, 1950 (Bare Act), Government Publication.
- Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
- M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes(COs):

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

E-RESOURCES:

- nptel.ac.in/courses/109104074/8
- nptel.ac.in/courses/109104045/
- nptel.ac.in/courses/101104065/
- www.hss.iitb.ac.in/en/lecture-details

- www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2			2			
CO2						2			2			
CO3						2			2			
CO4						2			2			

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MA 401C PROBABILITY & STATISTICS

Instruction Hours/Week: 3(L)

Credits: 3

Sessional Marks : 40 **End Semester Examinations Marks: 60**

Course Educational Objective (CEOs)

The objective of this course is

- To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
- To impart knowledge in basic concepts and few techniques in probability and statistics in relation to the engineering applications.

UNIT- I

SOLUTION TO ALGEBRAIC EQUATIONS: Solution of polynomial and transcendental equations: bisection method, Newton-Raphson method and Regula-Falsi method. finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT- II

NUMERICAL DIFFERENTIATION AND INTEGRATION: Numerical Differentiation, numerical integration- trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations.

UNIT -III

PROBABILITY : Probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous)**,** probability

distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties.

UNIT- IV

TESTING OF HYPOTHESIS: Formulation of null hypothesis, critical regions, level of significance. Large sample tests: test for single proportion, difference of proportions, test for single mean and difference of means.

UNIT -V

SMALL SAMPLE TESTS: Student t-distribution(single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

Textbooks:

- B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
- P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2/e, Reprint 2012.

References

- Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
- Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

Course Outcomes:

At the end of the course students will be able to

- evaluate approximating the roots of polynomial and transcendental equations by different algorithms
- Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations
- apply discrete and continuous probability distributions
- design the components of a classical hypothesis test

infer the statistical inferential methods based on small and large sampling tests

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										
CO2	2	3										
CO3	3	3	3									
CO4	2	3										

CE 402C CONCRETE TECHNOLOGY

Instruction Hours/Week : 3(L) **Credits : 3**

Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course objectives:

- Explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
- Develop fundamental knowledge in the fresh and hardened properties of concrete
- Produce the testing methodology to evaluate the properties of concrete during fresh and hardened stage
- Knowledge on the behaviour of concrete with response to stresses developed.
- Knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete

UNIT-I

CEMENTS AND AGGREGATES:

General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, heat liberation from a setting cement, structure of hydrated cement, water requirements for hydration.

TYPES OF CEMENTS: Ordinary Portland cement, Rapid hardening cement, Sulphate resisting cement, Slag cement, Quick setting cement, Super sulphated cement, Portland pozzolana cement, air entraining cement, coloured cement, expansive cement, High alumina cement.

AGGREGATES: Classification, source, size and shape texture and influence of texture on strength, specific gravity of aggregates, moisture in aggregates, bulking of fine aggregate, methods used for determination of moisture content of aggregates, grading of aggregates, sieve analysis, standard grading curve, grading limits of fine aggregates as per IS ; gap grading.

UNIT-II

WATER & ADMIXTURES: Quality of water for mixing concrete, Tolerable concentrations of some impurities in mixing water, permissible limit for solids as per IS456-2000, use of sea water for mixing concrete.

ADMIXTURES AND CONSTRUCTION CHEMICALS: General, plasticizers and super plasticizers – Dosage, mixing procedure, equipment, effect of super plasticizes on the properties of hardened concrete, Retardors, accelerators. Air-entraining admixtures, factors affecting amount of air-entrainment, effect of air-entrainment on the properties of concrete, fly ash, effect of fly ash on fresh and hardened concrete, high volume fly ash concrete, silica fume, available forms, effect of silica fume on compressive strength of concrete, construction chemicals for curing, construction chemicals for water proofing.

UNIT-III

FRESH CONCRETE:

Workability, factors affecting workability, slump test, Kelly ball test, V-B test, compaction factor test, segregation, bleeding, volume batching and weigh batching, hand mixing, machine mixing, mixing time, compaction of concrete, hand compaction, compaction by vibration, internal vibrator, form work vibrator, table vibrator, platform vibrator, surface vibrator.

UNIT-IV

HARDENED CONCRETE: General, water-cement ratio; gel/space ratio; gain of strength with age; maturity concept of concrete, effect of maximum size of aggregate on strength.

TEST ON HARDENED CONCRETE: Compression test; moulds and compacting; curing; failure of compression specimen; effect of height/diameter ration strength; flexural strength of concrete; tensile strength of concrete; non-destructive testing methods

ELASTICITY, CREEP AND SHRINKAGE: Elastic properties of aggregate, Factor's affecting modulus of elasticity, poisson's ratio, creep and factors affecting creep, shrinkage and factors affecting shrinkage.

DURABILITY OF CONCRETE: Factors contributing to cracks in concrete, sulphate attack and methods of controlling sulphate attack, chloride attack, corrosion of steel and its control.

CONSTRUCTION EQUIPMENT: Selection of equipment for earth work, concreting, material handling and erection of structures-Dewatering and pumping equipments

UNIT-V

SPECIAL CONCRETES AND CONCRETING METHODS: Fibre reinforced concrete; Fibres used, factors effecting properties, aspect ratio of fibres, orientation of fibres, workability, mixing, applications, current development in FRC.

NO-FINES CONCRETE: mix proportion, drying shrinkage, Thermal conductivity, applications.

Ferrocement: Casting techniques, hand plastering, semi-mechanized process, Centrifuging, guniting, applications.

LIGHT-WEIGHT CONCRETE: Natural and artificial light-weight aggregates, properties of common light-weight concretes. High performance concrete.

PROPORTIONING OF CONCRETE MIXES: Concept of mix design, variables in proportioning ,different methods of mix design, nominal mix and design mix, Indian standard method of mix design.

TEXT BOOK

1. Concrete Technology by M.S.Shetty, S.Chand & Company Pvt. Ltd., New Delhi

REFERENCE BOOKS

1. Properties of concrete by A.M.Neville, Longman Publishers
2. Concrete technology by M.L.Gambhir, Tata McGraw-Hill Publishing company Ltd., New Delhi.

Course Outcomes:

At the end of the course student is able to

- Understand various ingredients of concrete and their role.
- Examine knowledge on the fresh and hardened properties of concrete.
- Design concrete mixes using various methods.
- Perceive special concretes for accomplishing performance levels.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				1		2			1	1		2
CO2	2	2	2	1					1	1	1	
CO3	2	2	2	1	2				1	1	1	
CO4	2		2	1					1		1	2

E403C FLUID MECHANICS AND HYDRAULIC MACHINES

Instruction Hours/Week : 2(L) +1(T) Credits : 3

Sessional Marks : 40 End Semester Examinations Marks: 60

Course Educational Objective (CEOs)

- To understand the significance of fluid properties.
- To apply the knowledge of fluid flow concepts and fundamental equations.
- To solve the problems related to impacts of jets and flow measurements.
- To apply the knowledge of laminar and turbulent flows.
- To design the characteristics of turbines and pumps.

UNIT – I

FLUID PROPERTIES

Definition of a fluid –Density, Specific weight, Specific volume, Specific gravity – Viscosity – Bulk modulus of elasticity – Vapour pressure – Surface tension and capillarity- Pressure at a point – Absolute and gauge pressures

FLUID STATICS

Pascal's law – Pressure measurement – Manometers- Mechanical gauges – Hydrostatic pressure and force: horizontal, vertical and inclined planes, Curved surfaces.

UNIT – II

FLUID FLOW CONCEPTS

Flow characteristics – Velocity – Acceleration – Types of flow – Streamlines, Path lines, Streak lines – Stream function, Velocity potential, flow-net – Circulation and Vorticity.

FUNDAMENTAL EQUATIONS

Continuity equation – Energy Equation - Euler's equation of motion along a streamline – Bernoulli's equation – Applications of Bernoulli's Equation – Free jets and vortex flows.

UNIT III

IMPACTS OF JETS

Linear momentum equation - Impacts of jets on free and fixed moving vanes – Moment of momentum equation.

FLOW MEASUREMENT

Velocity measurement – Pitot tubes – Flow measurements: Flow through pipes- Venturi meter, Orifice meter and Nozzle meter- Flow through Channels: Weir and notches – Flow through tanks: Orifice and Mouth pieces.

UNIT IV

LAMINAR FLOW

Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity.

TURBULENT FLOW

Reynolds experiment, Transition from laminar to turbulent flow, Definition of turbulence, scale and intensity, Causes of turbulence, Turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes,

UNIT V

HYDRAULIC TURBINES

Classifications of turbines – Pelton Wheel, Francis Turbine and Kaplan Turbine velocity triangles at inlet and outlet – work done and efficiency– Draft Tube theory- Specific Speed – Characteristic Curves .

CENTRIFUGAL PUMPS

Components – Working – Types – Workdone – Heads – Losses and Efficiencies – Specific Speed – Multi Stage Pumps – Performance Characteristic Curves – Net positive Suction Head (NPSH).

Course Outcomes (COs)

After completion of the course the student will be

- Able to solve fluid flow problems using fundamental principles
- Able to apply the knowledge of fluid flow concepts and fundamental equations for solving problems
- Able to measure pressure, velocity and discharge, and apply the knowledge of impacts of jets related to real life problems.
- Able to analyze the flow problems in laminar and turbulent flow conditions.
- Able to analyze the characteristics of turbines and pumps.

TEXT BOOKS

- Hydraulics and Fluid Mechanics including Hydraulic Machines by P.N. Modi and S.M. Seth – Twentieth edition 2015, Standard Book House , New Delhi.
- Fluid Mechanics and Hydraulic Machines by R.K.Rajput - 2002 Publication, S.Chand & Company Ltd., New Delhi.
- Fluid Mechanics and Hydraulic Machines by R.K.Bansal -Revised Ninth edition 2010, Laxmi Publications (P) Ltd., New Delhi.

REFERENCE BOOKS

- Fluid Mechanics by Victor L. Streeter and E.Benjamin Wylie, Keith W. Bedford – Edition 2010, Tata Mc Graw Hill Education Private Limited, New Delhi.
- Fluid Mechanics and Turbo machines by Madan Mohan Das. – First Edition 2009, PHI Learning Pvt.Ltd., New Delhi.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	2					2	1	2
CO2	2	2	2	2	2		1			2	2	2
CO3	2	1	2	2	2					2	1	2
CO4	2	2	2	2	2		1			2	2	2
CO5	2	2	2	2	2		1			2	2	2

CE 404C STRUCTURAL ANALYSES

Instruction Hours/Week :2(L)+1(T) **Credits : 3**

Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Objectives

- to teach the student with basic concepts for determination of principal stresses and strains in various structural elements.
- to demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
- to train the student compute shear stresses in different cross-sections and analyze failure mechanisms.
- to make the student analyze circular shafts subjected to torsion
- to make the student determine critical loads for columns with different end conditions.

UNIT- I

DEFLECTIONS: Relationship between curvature, slope and deflection - Differential equation for the elastic line of a beam - Slope and deflection of cantilevers and simply supported beams by integration method, moment area method and conjugate beam method. Uniform bending – slope, deflection and radius of curvature – Differential equation for elastic line of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load-Mohr's theorems – Moment area method – application to simply supported and overhanging beams- analysis of propped cantilever beams under UDL and point loads.

UNIT-II

TORSION OF CIRCULAR SHAFTS: Theory of pure torsion in solid and hollow circular shafts - Transmission of power - Combined bending, torsion and end thrust.

SPRINGS: Types of springs - Close and open coiled helical springs under axial loads and axial couple - springs in series and parallel - Carriage or leaf springs.

UNIT- III

INFLUENCE LINES AND MOVING LOADS:

Influence lines for reactions, BM and SF; Curves of maximum BM and SF for single, two and multiple loads, udl longer and shorter than span, enveloping parabolic and EUDL – forces in truss members.

UNIT- IV

ENERGY THEOREMS: Virtual work and energy principles - Maxwell's, Betti's theorems, Castigliano's first theorem and unit load method - Deflection of simple beams and pin-jointed trusses. Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear force. Introduction to finite element method for plane stress and plane strain.

UNIT- V

INDETERMINATE STRUCTURES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Analysis of plane trusses with two degrees of internal and external indeterminacy - Castigliano's theorem–II – Lack of fit.

TEXT BOOKS:

- Analysis of Structures Vol.I & II by V.N.Vazirani & M.N.Ratwani.
- Intermediate Structural Analysis by Wang.
- Mechanics of Structures Vol.II by S.B.Junarkar.

- Structural Analysis by L.S.Negi & R.S.Jangid.
- Theory of Structures - Vol.I by S.P.Gupta, G.S.Pandit & R.Gupta.
- Fundamentals of Structural Analysis by Sujit Kumar Roy & Subrata Chakrabarty.

Course Outcomes:

On completion of the course, the student will be able to:

- Understand various engineering properties of materials
- Estimate magnitudes under combined loads in members and structures
- Determine shear stresses for different cross-sections.
- Determine deflection at any point on a beam under simple or combined loads
- Apply failure criteria to implement in design of structural members.
- Analyze members under torsion, combined torsion and bending moment for determination of energy absorption

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1			1	1	1	1	1	
CO2	2	1		1	2				1	1	1	2
CO3	2	1		1	2				1	1	1	2
CO4	2	1		1	2				1	1	1	2
CO5	2	1		1	2				1	1	1	2
CO6	2	1		1	2				1	1	1	2

CE 405C WATER QUALITY AND TREATMENT

Instruction Hours/Week : 3(L) **Credits : 3**

Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Educational Objective (CEOs)

- To know the water quality of different sources and water demand estimation.
- To analyze the distribution network
- To learn about the water quality parameters
- To know the design concepts of water treatment plant
- To study the advanced water treatment methods.

UNIT – I

SOURCES AND DEMAND OF WATER: Different sources of water, quantity and quality of different sources, Types and variation in water demand, factors affecting water demand, design period, population forecasting – Different methods and their suitability.

UNIT-II

WATER COLLECTION, CONVEYANCE AND DISTRIBUTION: Intake works for collection of surface water – Conveyance of water – Gravity and pumping – Their design – Different materials used for conveying conduits and their suitability, systems of distribution – Distribution reservoirs – Distribution networks, design of simple and complex pipe networks, pipe accessories – Valves and their location and suitability.

UNIT – III

WATER USES AND QUALITY REQUIREMENTS: Sources of water pollution, water borne diseases. Need for protected water supply,water quality – Physical, chemical and biological characteristics, water quality standards for different uses.

WATER TREATMENT: Conventional water treatment processes units and their functions. Theory and design of aeration,coagulation, flocculation and clarification, Determination of optimum dose of alum for coagulation of water.

UNIT – IV

FILTRATION AND DISINFECTION: Theory of Filtration – Different types of filters and their design. Disinfection – Disinfectant's mechanism of disinfection – Different methods of Disinfection. Types of Chlorination - Break point chlorination.

UNIT – V

ADVANCED TREATMENT METHODS: Treatment methods for removal of fluorides, arsenic, hardness, iron and manganese, salinity, colour.

TEXT BOOKS :

- Water Treatment Principles and Design by James M. Montgomery.
- Water Supply Engineering, by S.K.Garg.
- Environmental Engineering by H.S.Peavy et al.
- Water Supply and Sewerage, by E.W.Steel.

Course Outcomes (COs)

After completion of the course the student will be:

- Able to estimate the water demand of any area and understand the water sources and its quality
- Able to solve the distribution network problems

- Able to explain the water quality parameters
- Able to plan and design water treatment plant
- Able to understand advanced water treatment technologies

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	1		1	1		1	1	1
CO2	2	2	2	2	1		1	1		1	1	1
CO3	2	2	2	2	1		1	1		1	1	1
CO4	2	2	2	2	1		1	1		1	1	1
CO5	2	2	2	2	1		1	1		1	1	1

CE 406C SOIL MECHANICS

Instruction Hours/Week : 2(L)+1(T) **Credits : 3**

Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Objectives:

The objectives of this course is:

- To enable the student to find out the index properties of the soil and classify it.
- To enable the students to differentiate between compaction and consolidation of soils and to determine the consolidation settlement.
- To enable the student to determine permeability of soils using various methods.
- To impart the concept of seepage of water through soils and determine the seepage discharge.
- To enable the students to determine Shear Strength of soils using various methods.

UNIT- I

SOIL COMPOSITION AND PHASE RELATIONSHIPS:

Types of soils - formation and deposition - Phase composition and Soil as 3−Phase system- Weight-Volume parameters : moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity - Relationship between various soil parameters - Determination of Moisture content, Specific gravity and Unit weights using various methods.

UNIT -II

IDENTIFICATION AND CLASSIFICATION OF SOILS:

Index properties- Determination of particle size-Dry Sieve Analysis &Sedimentation Analysis-Determination of Consistency limits-liquid limit, plastic limit, shrinkage limit - Indices from Index properties-Density Index, Plasticity, Liquidity and Consistency indices, Flow & Toughness indices - Soil classification based on particle size , texture - Unified and Indian standard soil classification systems – Engineering significance of classification and classification parameters- Tests for field identification of soils

UNIT -III

SOIL WATER & EFFECTIVE STRESS PRINCIPLE:

Mode, Occurrence and types of soil water – Geostatic stresses in soils - capillarity – Total Stress- Pore water pressure- Effective Stress Principle - nature of effective stress, effect of ground level, surcharge &water table on effective stress.

PERMEABILITY & SEEPAGE ANALYSIS:

Darcy's law- coefficient of permeability: determination by constant-head and falling-head methods-Permeability of stratified soils - factors affecting Permeability -Movement of water through soils- stream and potential functions - flow nets, graphical method to plot flow nets-seepage pressure - quick sand condition.

UNIT- IV

CONSOLIDATION OF SOILS:

comparison between compaction and consolidation, initial, primary & secondary consolidation - Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation.

UNIT – V

SHEAR STRENGTH OF SOILS:

Shear strength of soils - Mohr'-Coulomb Failure Criteria - Measurement of shear strength - Direct shear, Unconfined compression and Tri-axial compression tests - Shear strength parameters - Shear strength of cohesive and cohesion less soils - Test conditions - Stress Paths under different stress conditions.

TEXT BOOKS:

- C. Venkataramiah, Geotechnical Engineering, New age International Pvt. Ltd, (2002).
- K. R. Arora, Soil Mechanics and Foundation Engg., Standard Publishers and Distributors, Delhi.

REFERENCES:

- Gopal Ranjan & A. S. R. Rao, Basic and Applied Soil Mechanics, New age International Pvt . Ltd, New Delhi.
- Braja M. Das Principles of Geotechnical Engineering, Cengage Learning
- B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Soil Mechanics and Foundation, Laxmi publications Pvt. Ltd., New Delhi

Course Outcomes:

At the end of the course, the student must be able to:

- Identify and classify various soils based on their characteristics.
- Compute effective stress under different conditions
- Evaluate permeability and seepage of soils.
- Understand consolidation in soils and Calculate consolidation time and settlement of soils.
- Understand shear strength theories and Determine Shear Characteristics of soils

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	1	1					1	1
CO2	2	2	2	2	1	2	1		1		1	1
CO3	2	2	2	2	2	2	1		1	1	1	1
CO4	2	2	2	1	1	2	1		1	1	1	1

CO5	2	2	2	2	2	2	1		1	1	1	1

CE407P FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Instruction Hours/Week : 3(P) **Credits : 1.5**

Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Educational Objective (CEOs)

- To determine the coefficient of discharge in flow measuring devices.
- To determine the coefficients of different losses in pipe flow.
- To draw the performance characteristic curves of pumps.

FLOW MEASUREMENT

- Calibration of Small Orifice
- Calibration of Venturimeter
- Calibration of Orifice meter
- Calibration of Bend meter
- Calibration of Triangular Notch

HEAD LOSSES IN PIPES

- Determination of Friction factor of the pipe material
- Determination of Head Loss coefficient due to Sudden Contraction
- Determination of Head loss coefficient due to Gate Valve in a pipe line
- Determination of Head Loss coefficient due to Bend in a pipe line

HYDRAULIC MACHINES

- Characteristic curves of 0.8 kW two stage centrifugal pump
- Characteristic curves of variable speed centrifugal pump

Course Outcomes (COs)

After completion of the course the student will be:

- Able to calibrate the flow measuring devices.
- Able to calculate loss coefficients for use in the pipe flow analysis.
- Able to prepare the characteristic curves of the pumps.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1		2				1	1	2
CO2	2	2	2	1		2				1	1	2
CO3	2	2	2	1		2				1	1	2

CE408P SOIL MECHANICS LABORATORY

Instruction Hours/week : 2 (P) **Credits :1**

Sessional Marks : 40 **Semester-end Examination: 60**

Course Educational Objective (CEOs)

The course should enable the students to:

- Develop laboratory skills in dealing with soil as a medium of water flow , for structural support and a primary building material.
- Know the procedure to measure /determine engineering properties of soils in the laboratory.
- To conduct following experiments on different types of soils to arrive the engineering properties.

List of Experiments

- Grain Size Distribution by Dry Sieve Analysis.
- Grain Size Distribution by Hydrometer Analysis
- Specific Gravity of soils and Free Swell Index
- Consistency limits by Liquid limit and by Plastic limit
- In-situ density using Core Cutter method and Shrinkage Limit of given soil pat
- Shrinkage Limit of given soil
- In-situ density by Sand Replacement method.
- I.S. Light Compaction test/ Standard Proctor Compaction test

Course Outcomes (COs)

After completion of the course the student will be able to:

- Depict the procedures for measuring the engineering properties of soils.

- Describe the procedure for measuring the basic properties and compaction characterstics of soils.

- Assess the soil for engineering applications

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2			1			1		1		
CO2	2	1	1							1		
CO3	2	1	1							1		

CE409S PYTHON PROGRAMMING

Instruction Hours/Week: 1(T) +2(P) **Credits : 2.0**

Sessional Marks : 40 **End Semester**

Examinations Marks : 60

Course Educational Objective (CEOs)

- Computer programming skills are now becoming part of basic education as these skills are increasingly of vital importance for future job and career prospects.
- The Python programming language which is one of the most popular programming languages worldwide.
- The course shows you how to use the free open-source Python to write basic programs and high-level applications using concepts such as Class, BIF of Python, functions, variables, If Else statements, For loops, While loops, iterative and recursive programs and algorithms such as the Insertion Sort algorithm.
- This course will be of great interest to all learners who would like to gain a thorough knowledge and understanding of the basic components of computer programming using the Python language – and might be a gentle introduction to programming for those who think they might have a longer-term interest in the subject area.

UNIT I

Introduction to Python Programming Language: Introduction to Python Language: What is Python? Why Python? Installing Python on Windows, Python IDLE, Python Literals, Python Data Types Basic Input-Output operations, Operators in Python, Decision making in Python, Conditional execution in Python, Logical and bit operations in Python, Naming Conventions,

String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Data type conversion, Built in Functions.

UNIT II

Python Built-in Data Structures: Introduction, List, Tuples, Dictionary, Sets, List Operations append, extend, insert, remove, pop, slice, and reverse, List Comprehension, Dictionary operations, Sorting Dictionaries, Copying Collections, Set operations. Standard python modules math, time, IO and time, Regular expressions, multi-threading.

UNIT III

Classes in Python, Principles of Object Oriented programming, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes.

UNIT IV

Functions, I/O, Exception Handling in Python

Introduction:Defining your own functions, keyword and optional parameters, mapping functions, lambda functions, **Data Streams:** Creating Your Own Data Streams · Access Modes · Writing Data to a File · Reading Data From a File · Additional File Methods · Using Pipes as Data Streams · Handling IO Exceptions · Working with Directories · Metadata · Errors · Run Time Errors · The Exception Model · Exception Hierarchy · Handling Multiple Exceptions

Unit V

Python API development.

Introduction to API, Python API programming, Python web application frameworks, REST API, Python Flask, Flask Environment, Routing, Cookies, Sessions, Running Flask Application, Testing API with POSTMAN client

Course Outcomes (COs)

Upon completion of this course, students should be able to

- Apply the OOP principles and best practices of python programming.
- Write clear and effective pythonic code.
- Create applications using python programming.
- Implementing databases using SQLite and Access databases using python programming.
- Understand and feel comfortable in working with web application frameworks.
- Develop APIs required for the web applications using web frameworks like Flask and Fast API.

Reference Book:

- Dive into Python, Mike
- Learning Python, 4th Edition by Mark Lutz
- Programming Python, 4th Edition by Mark L

Fundamentals of Python Programming, Richard L. Halterman Updated content of the book is maintained under the URL:http://python.cs.southern.edu/pythonbook/pythonbook.pdf
The official Python Tutorial. http://docs.python.org/tut/ How to think like a computer scientist (interactive) http://interactivepython.org/runestone/static/thinkcspy/index.html
How to think like a computer scientist http://openbookproject.net/thinkcs/python/english3e/
Code Academy Python http://www.codecademy.com/tracks/python A useful hands-on book: http://anh.cs.luc.edu/python/hands-on/3.1/Hands-onPythonTutorial.pdf

- Introduction to Computation and Programming using Python, by John Guttag, PHI Publisher, Revised and Expanded version (Referred by MIT)
- Python Programming using problem solving Approach by Reema Thareja, Oxford University, Higher Education Oxford University Press; First edition (10 June 2017), ISBN-10: 0199480173
- Data Structures and Algorithms in Python by Michael T Goodrich and Robertto Thamassia, Micheal S Goldwasser, Wiley Publisher (2016) Fundamentals of Python first

Programmes by Kenneth A Lambert, Copyrighted material Course Technology Inc. 1 st edition (6th February 2009

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2					1		1	1
CO2	2	2	2	2					1		1	1
CO3	2	2	2	2					1		1	1
CO4	2	2	2	2					1		1	1
CO5	2	2	2	2					1		1	1
CO6	2	2	2	2					1		1	1

CE410P COMPUTER AIDED BUILDING DRAWING

Instruction Hours/Week : 3(P) **Credits : 1.5**

Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Educational Objective (CEOs)

- Develop parametric design and the conventions of formal engineering drawing
- Produce and interpret 2D drawings
- Communicate a design idea/concept graphically/ visually
- Examine a design critically and with understanding of AUTOCAD software.

UNIT- I

INTRODUCTION: Introduction to concept of drawings, Interpretation of typical drawings, Planning drawings to show information concisely and comprehensively; optimal layout of drawings and Scales; Introduction to computer aided drawing, coordinate systems, reference planes. Commands: Initial settings, Drawing aids, Drawing basic entities, Modify commands, Layers, Text and Dimensioning, Blocks. Drawing presentation norms and standards.

UNIT- II

SYMBOLS AND SIGN CONVENTIONS: Materials, Architectural, Structural, Electrical and Plumbing symbols. Rebar drawings and structural steel fabrication and connections drawing symbols, welding symbols; dimensioning standards

UNIT- III

MASONRY BONDS: English Bond and Flemish Bond – Corner wall and Cross walls – One brick wall and one and half brick wall

UNIT- IV

BUILDING COMPONENTS: Terms, Doors, Windows, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings. Foundation plan.

UNIT- V

TYPICAL BUILDING DRAWINGS: A Building, An Office building, A Dwelling, A Residential House, Plan of a Secondary School, Bank, Primary Health Centre, Duplex House.

It may be advisable to conduct Drawing sessions along with Lab demonstrations.

Text book:

Building Planning and Drawing – Dr. N. Kumaraswamy and A. Kameshwara Rao – CHARATOR PUBLISHING HOUSE**.**

COURSE OUTCOMES:

At the end of the course the student will be able to

- Develop drawing skills for effective demonstration of building details.
- Draw building plans using Computer Aided Design and Drafting soft wares.
- Develop engineering project drawings incorporating details and design parameters in 2D.
- Examine efficacy of AUTOCAD design and Drawing.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2		2	1	1	2	1	1	1	2
CO2	2		2		2	1	1	2	1	1	1	2
CO3	2		2		2	1	1	2	1	1	1	2
CO4	2		2		2	1	1	2	1	1	1	2

SRI VENKATESWARA UNIVERSITY : TIRUPATI

Scheme of Instruction and Syllabi of 4 Year BTech (Computer Science and Engineering), BTech (Honors in CSE) and BTech (Minor in CSE)

By

Prof. Ch. D. V. Subba Rao
Chairman
Board of Studies in CSE (Combined)



Department of Computer Science and Engineering
SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
TIRUPATI – 517 502, Andhra Pradesh

About the Department

- The Department of Computer Science and Engineering was established in 1986 offering B.Tech Program with initial intake of 20. Now the B.Tech (CSE) intake is increased to 40. The new programme 6 Year B.Tech & M.Tech Dual Degree course was introduced in 2015.
- The post graduate program i.e. M.Tech (CSE) was started in the year 2005 with initial intake of 18 and now it is increased to 25. The MTech students, qualified in GATE receive Rs 8000 fellowship per month from AICTE. The Ph.D admissions in CSE started in the year 2002 and there are nearly 34 scholars are working for their doctoral degree. The thrust areas of research of the department are Natural Language Processing, Distributed Systems, Grid Computing, Artificial Intelligence, Software Architecture, Data Mining, Wireless Networks and Speech Processing.

Vision

- To be one of the premier departments for achieving excellence in teaching and research with social responsibility and for producing innovative technical graduates in Computer Science and Engineering.

Mission

- To impart Computer Science and Engineering education by utilizing state of the art computing facilities.
- To infuse scholarly inquisitiveness, professional behavior and ethical values among students and research scholars, thereby making an imprint in the technological, economic and social development of the nation.
- To impart high quality professional training of international standards to meet the current and future demands of the industry and academia.
- To develop adequate e-infrastructure, environment and culture for the state of the art research work in Computer Science and Engineering.

PROGRAMME OUTCOMES:

- PO1: An ability to apply knowledge of computing, mathematics, science and engineering fundamentals appropriate to the discipline
- PO2: An ability to analyze a problem, and identify and formulate the computing requirements appropriate to its solution.
- PO3: An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations
- PO4: An ability to design and conduct experiments, as well as to analyze and interpret data
- PO5: An ability to use current techniques, skills, and modern tools necessary for computing practice.
- PO6: An ability to analyze the local and global impact of computing on individuals, organizations, and
- society.
- PO7: Knowledge of contemporary issues.
- PO8: An understanding of professional, ethical, legal, security and social issues and responsibilities.
- PO9: An ability to function effectively, individually as well as in teams.
- PO10: An ability to communicate fluently with a variety of audiences.
- PO11: Recognition of the need for and an ability to engage in continuing professional development.
- PO12: An understanding of engineering and management principles and applying these as a member/leader in a team, in managing projects.

Program Educational Objectives

- PEO1: To Provide quality learning through effective teaching-learning process enabled by free and open learning environment in turn Producing highquality graduate.
- PEO2: For Prepare students for proper positioning them in the society (academic, industrial, research and entrepreneurial areas in particular) with reference to trans-disciplinary activities, regular professional activities with high degree of innovation, competence, and commitment.
- PEO3: To create broad based expertise in the areas of CSE in general and a few (minimum of 4 to 5) focused areas for in-depth study and high quality research such as e- technologies, very large databases, data mining / warehousing, networking, security, high performance computing systems, embedded systems, software engineering methodology, s/w quality testing, multimedia, theoretical computer science aspects and so on.
- PEO4: To inculcate the culture of Lifelong learning during the evolution of the student to a full-fledged professional through educating the applicant about the ever increasingneeds of the society, technological trends and ethical values.
- PEO5: To set up a sense of efficient administrative / economical practices, to evolve the applicant with the required leadership qualities and managerial skills.

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SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering B.Tech (CSE) – Choice Based Credit System – 2020 Regulations (With effect from the academic year 2020-21)

Scheme of Instruction and Examinations

I Semester

Course Code	Category	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
			L	T	P	Total	
MA101	Basic Sci.	Mathematics I	3	1		4	4
PY102	Basic Sci.	Modern Physics	3	1		4	4
CS103	Basic Eng.	Programming for Problem Solving	2	1		3	3
MA104	Basic Sci.	Probability & Statistics	3	1		4	4
ME105	Basic Engg. Lab	Workshop / Manufacturing Practices			3	3	1.5
CS106	Basic Engg. Lab	Programming for Problem Solving Lab			3	3	1.5
CE107	Audit Course	Environmental Science	4			4	
Total			15	4	6	25	18

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)
- Audit Course - 100 marks (Internal) - Zero Credits

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

(With effect from the academic year 2020-21)

Scheme of Instruction and Examinations

II Semester

Course Code	Category	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
			L	T	P	Total	
MA201	Basic Sci.	Mathematics II	3	1		4	4
CY202	Basic Sci.	Engineering Chemistry	3	1		4	4
EN203	Humanities	English	2			2	2
CS204	Basic Eng.	Data Structures	3			3	3
ME205	Basic Engg. Lab	Engineering Graphics and Design	2		3	5	3.5
EN206	Humanities Lab	English Communication Lab			3	3	1.5
CS207	Basic Engg. Lab	Data Structures Lab			2	2	1
Total			13	2	8	23	19

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

(With effect from the academic year 2021-22)

Scheme of Instruction and Examinations

III Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
MA301C	Mathematics III	3			3	3
CS302C	Database Management Systems	3	1		4	4
CS303C	Discrete Mathematical Structures	3			3	3
CS304C	Basic Electrical Engineering	3			3	3
CS305C	Elements of Electronics and Communication Engineering	3			3	3
CS306L	Database Management Systems Laboratory			3	3	1.5
CS307L	Electronics and Communication Engineering Laboratory			3	3	1.5
CS309S	Skill Oriented Course - Basic Python Programming	1		2	3	2
PA310A	Audit Course - Constitution of India	2			2	0
Total		18	1	8	27	21

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)
- Audit Course - 100 marks (Internal) - Zero Credits

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

(With effect from the academic year 2021-22)

Scheme of Instruction and Examinations

IV Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS401C	Digital Electronics and Logic Design	3			3	3
CS402C	Simulation and Modeling	3			3	3
HS403C	Managerial Economics and Accountancy	3			3	3
CS404C	Computer Oriented Numerical Methods	3			3	3
CS405C	Computer Organization	3			3	3
CS406C	Design and Analysis of Algorithms	3			3	3
CS407L	Assembly Language Programming and VHDL Laboratory			3	3	1.5
CS408L	Algorithms Laboratory			3	3	1.5
CS409S	Skill Oriented Course - Basic Web Designing	1		2	3	2
Total		19		8	27	23
Internship for 4 to 6 Weeks (Mandatory) during summer vacation.						

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

SRI VENKATESWARA UNIVER SITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

(With effect from the academic year 2022-23)

Scheme of Instruction and Examinations

V Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS501C	Formal Languages and Automata Theory	3			3	3
CS502C	Operating Systems	3			3	3
CS503C	Computer Networks	3			3	3
CS504C	Software Engineering	3	1		4	4
CS505O	Open Elective I (Through MOOCs)	2		2	4	3
CS506L	Operating Systems Laboratory			3	3	1.5
CS507L	Computer Networks Laboratory			3	3	1.5
CS508S	Java Programming (Skill Advanced Course)	2		2	4	3
CS509M	Universal Human Values (Mandatory Course)	2			2	0
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)					0	1.5
Total		18	1	10	29	23.5

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)
- Mandatory Course - 100 marks (Internal) - Zero Credits

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

(With effect from the academic year 2022-23)

Scheme of Instruction and Examinations

VI Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS601C	Compiler Design	3			3	3
CS602C	Artificial Intelligence	3			3	3
CS603C	Cryptography and Network Security	3			3	3
CS604C	Computer Graphics	3			3	3
CS605E	Professional Elective I: Data Mining / Distributed Systems / Object Oriented Analysis and Design	3			3	3
CS606L	Artificial Intelligence and Compiler Design Laboratory			3	3	1.5
CS607L	Cryptography and Network Security Laboratory			3	3	1.5
CS608L	Computer Graphics Laboratory			3	3	1.5
CS609S	Advanced Python Programming (Skill Advanced Course)	2		2	4	3
CS610M	Professional Ethics (Mandatory Course)	2			2	0
Total		19		11	30	22.5

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)
- Mandatory Course - 100 marks (Internal) - Zero Credits

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

(With effect from the academic year 2023-24)

Scheme of Instruction and Examinations

VII Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS701E	Professional Elective – II	3			3	3
CS702E	Professional Elective – III	3			3	3
CS703E	Professional Elective – IV	3			3	3
CS704O	Open Elective II (Through MOOCs)	2		2	4	3
CS705O	Open Elective III (Through MOOCs)	2		2	4	3
HS706E	Optimization Techniques	3			3	3
CS707S	Mobile Application Development (Skill Advanced Course)	2		2	4	3
Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)					-	3
Total		18	-	6	24	24

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

Professional Electives II, III & IV (Any three shall be chosen)

1. Cyber Security
2. Machine Learning
3. Big Data Analytics
4. Cloud Computing
5. Image Processing
6. Soft Computing

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

(With effect from the academic year 2023-24)

Scheme of Instruction and Examinations

VIII Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS/PROJ	Project Work				-	12
Internship (6 Months)						
Total		-	-	-	-	12

CS103

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

I Semester B.Tech (CSE) – CBCS Regulations-2020

(With effect from the academic year 2020-21)

PROGRAMMING FOR PROBLEM SOLVING

No.of Credits: 4 Instruction Hours/ Week: 4

Course Objectives:

- To acquire problem solving skills
- To be able to develop flowcharts and algorithms for the given problem
- To learn how to write modular programs in C
- To enable to use arrays, pointers, strings and structures in solving problems.
- To explain the difference between object oriented programming and procedural programming.
- To understand principles of object oriented pogromming.

UNIT-I

Problem Solving : Problem solving techniques, Computer as a problem solving tool, Programming Languages - Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements : Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements: while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continue statements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions, Passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, Accessing structures, Nested structures, Arrays of structures, Structures containing arrays, Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.

UNIT V

Introduction to Object-Oriented Programming (OOP): Need for OOP, Principles of OOP, Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

Course Outcomes:

At the end of the course, student will be able to

- Develop and test programs in C and correct syntax and logical errors.
- Implement conditional branching, iteration and recursion.
- Decompose a problem into functions and synthesize a complete program.
- Use arrays, pointers, strings and structures to formulate algorithms and programs
- Use files to perform read and write operations.
- Handle programming assignments based on class, abstraction, encapsulation, overloading and inheritance.

Text Books

- Ashok N Kamthane, Amit Ashok Kamthane, Programming in C, 3rd Edition, Pearson Education, 2019.
- Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
- R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
- Hanly J R & Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
- Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw-Hill.

Reference Books

- C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
- Programming with C, Bichkar, Universities Press.
- Programming in C, ReemaThareja, OXFORD.
- C by Example, Noel Kalicharan, Cambridge.
- The C++ Programming Language, Bjarne Stroustrup, 3rd Edition, Pearson Education.
- Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

CS106

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

I Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2020-21)

PROGRAMMING FOR PROBLEM SOLVING LABORATORY

No. of Credits: 1.5 Instruction Hours/Week: 3

Course Objectives:

- To provide exposure to problem-solving through programming
- To train the student on the concepts of the C- Programming language

The following programs shall be developed and executed in Programming Language C.

- Programs on conditional control constructs.
- Programs on iterative statements (while, do-while, for).
- Programs on recursive procedures
- Programs on arrays, matrices (single and multi-dimensional arrays).
- Programs using user defined functions, demonstrating parameter passing methods viz. call by value and call by reference.
- Programs using different library functions viz. ctype.h, math.h, stdio.h, stdlib.h, string.h, conio.h and pre-processor directives.
- Programs using pointers (int pointers, char pointers) and pointer arrays.
- Programs on structures and unions
- Programs on File Processing.
- Programs on Pointers to structures and Self-referential structures

Course Outcomes:

After Completion of this course the student would be able to

- Develop the C code for the given algorithm.
- Understand, debug and trace the execution of programs written in C language.

Reference Books:

- Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill,2002.
- Hanly J R & Koffman E.B, “Problem Solving and Program design in C”, Pearson
- Education, 2019.
- R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
- Behrouz A. Forouzan& Richard F. Gilberg, Computer Science: A Structured
- Programming Approach Using C, Third Edition, Cengage Learning

CS204

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

II Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2020-21)

DATA STRUCTURES

No.of Credits: 4 Instruction Hours/ Week: 4

Course objectives:

- Develop skills to design and analyze linear and nonlinear data structures.
- Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
- Develop recursive algorithms as they apply to trees and graphs.
- Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- Understand the various techniques of sorting and searching

UNIT I

Introduction: Data types/Objects/Structures, Abstract definition of Data Structures, Overview of linear and nonlinear data structures, Analysis of algorithms, Algorithm specification, Asymptotic notation, Time-Space trade-off, Searching: Linear, Binary and Fibonacci search and their complexity analysis.

Arrays: Definition, Multidimensional arrays, Pointer arrays, Representation of arrays – Row major and Column major orders, Application of arrays – Polynomials, Sparse matrices representation.

UNIT II

Stacks and Queues: Introduction, ADT, Array representation, Operations and Applications of Stacks - Evaluation of expressions, Code generation for stack machines, Implementation of recursion, Factorial calculation and Towers of Hanoi; Circular Queue, Priority Queue, Double ended queue, Applications of Queues - Simulation, CPU Scheduling; Multiple stacks and queues

UNIT III

Linked Lists: Singly linked lists and chains, Circular linked list, Doubly linked list, Circular doubly linked list, Complexity analysis of the same, Linked representation of Stacks and Queues, Applications of linked lists - Polynomial representation, Sparse matrix multiplication, Dynamic storage management; Generalized list representation, Recursive algorithms for lists, Recursive lists

UNIT IV

Trees: Basic tree terminologies, Binary trees – Definition, Properties, ADT, Representations, Operations and Applications; Binary Search Trees, Heap Trees, Threaded binary trees, Height balanced trees – AVL Trees, Red black tree, Splay tree Their operations and complexity analysis.

UNIT V

Sorting Techniques: Insertion sort, Selection sort, Bubble sort, Quick sort, Radix sort Merge sort, External sort – Introduction, K-way Merge sort.

Graphs: Basic terminologies, Representations, ADT, Operations on graphs – DFS, BFS, Spanning trees, Biconnected components, Minimum cost spanning trees.

Course Outcomes:

After completion of the course the students will be able to

- Choose appropriate data structure for the specified problem definition.
- Implement linear and non-linear data structures viz. stacks, queues, linked list, trees, graphs.
- Apply the concept of trees and graph data structures for the real world problems.
- Comprehend the implementation of sorting and searching algorithms

Text Books:

- Ellis Horowitz and Sartaj Sahani, "Fundamentals of Data Structures", Computer Science Press.
- Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++ Universities Press, Second Edition.
- Debasis Samanta, Classic Data Structures, Second Edition, Prentice Hall of India

Reference Books:

- Aaron M. Tenenbaum,Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI Learning Private Limited
- Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.
- R. Kruse et al, "Data Structures and Program Design in C", Pearson Education

CS207

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

II Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2020-21)

DATA STRUCTURES LABORATORY

No. of Credits: 1 Instruction Hours/Week: 2

Course Objectives:

- To understand the practical application of linear and nonlinear data structures.
- To develop and execute programs in C++/C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, and graphs.
- To develop and execute programs in C to implement various sorting and searching techniques

- Develop an algorithm to implement stack using arrays. Code it in C++.
- Develop an algorithm to evaluate a given postfix expression using stack. Code it in C.
- Develop an algorithm to convert a given infix expression to postfix form using stacks. Code it in C.
- Develop algorithms to implement i) Linear queue and ii) Circular queue using arrays. Code it in C++.
- Develop an algorithm to implement double ended queue (de queue) using arrays. Code it in C++.
- Develop algorithms using dynamic variables and pointers, to construct a singly linked list consisting of the following information in each node: student id (integer), student name (character string) and semester (integer). The operations to be supported are:
    a. Inserting a node i) at the front of a list ii) at the rear of the list ii) at any position in the list
    b. Deleting a node based on student id. If the specified node is not present in the list, an error Message should be displayed.
    c. Searching a node based on student id. If the specified node is not present in the list an error message should be displayed.
    d. Displaying all the nodes in the list.

  Code the same in C++.
- Develop an algorithm using dynamic variables and pointers to construct a stack of integers using singly linked list and to perform the following operations:
- Push, ii) Pop iii) Display (The program should print appropriate messages for stack overflow and stack empty). Code the same in C++.
- Develop an algorithm using dynamic variables and pointers to construct a queue of integers using singly linked list and to perform the following operations: a. Insert
    - b. Delete c. Display. The program should print appropriate messages for queue full
    - and queue empty. Code the same in C++.
- Develop an algorithm to support the following operations on a doubly linked list where each node consists of integer data object:
    a. Create a doubly linked list
    b. Insert a new node

c. Delete the specific node
d. Display the contents of the list.

Code the same in C++.

- Develop algorithms to
  a. Construct a binary tree of integers.
  b. Traverse the binary tree using inorder, preorder and postorder. (both recursive and non-recursive versions)
  c. Display the elements in the tree.

Code the same in C++.

- Develop algorithms to create a binary search tree (BST) and perform the following operations on it. Find (a) Minimum element (b) Maximum element (c) Search for a given element (d) Find predecessor of a node (e) Find successor of a node (f) Delete a node with specific key value. Code the same in C++.
- Develop an algorithm to construct an AVL tree for the given set of elememnts. Code it in C++.
- Develop algorithms to Sort the given list of elements (i.e. numbers or strings)
  (a) Insertion sort (b) Merge sort (c) Quick sort (d) Heap sort
  Code the same in C.
- Develop algorithms to implement of graph traversals by applying:
  (a) BFS (b) DFS. Code the same in C/C++.
- Develop algorithms to find out a minimum spanning tree of a simple connected
  - undirected graph by applying: (a) Prim's algorithm (b) Kruskal's algorithm
  - Code the same in C/C++.

Course Outcomes:

At the end of this course students will demonstrate the ability to

- Identify the appropriate data structure for given problem.
- Have practical knowledge on the application of data structures.
- Analyze the time and space efficiency of the data structure.

Text Books:

- Object Oriented Programming with ANSI & Turbo C++, Ashok N.Kamthane, Pearson Education
- Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
- Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++ Universities Press, Second Edition.
- Data Structures using C and C++, YedidyahLangsam.MosheJ.Augenstein Aaron M.Tenenbaum, 2nd Edition,PHI
- ADTs, Data Structures and Problem Solving with C++, Larry Nyhoff, Pearson Education.

MA301C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

MATHEMATICS III

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

- This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables.
- To understand power series and expansion of analytic function.
- To understand Laurent Series, poles, singular points, Residue theorem and its applications.
- The aim is to analyze the solutions of partial differential equations.
- To discuss the boundary value problems, one dimensional wave equation, heat equation and Laplace Equation.

UNIT I

Complex analysis - I: Analytical functions - Cauchy- Reimann equations – Construction of Analytic functions- Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT II

Complex analysis - II**:** Taylor's and Laurents' series - Transformations - Conformal mapping - Bilinear transformations - Transformation of 1/z, z^2, sin z and cos z.

UNIT III

Complex analysis - III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals.

UNIT IV

Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Legranges' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT V

Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

Course Outcomes:

Upon successful completion of this course, the student should be able to

- Understand the analyticity of complex functions and conformal mappings.
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper
- integrals along contours.
- Describe basic properties of complex integration and having the ability to compute such integrals.
- Describe conformal mappings between various plane regions.

- Apply the concepts of Complex Analysis in many branches of Engineering, including the branches of hydrodynamics, thermodynamics, and particularly quantum mechanics.
- Compute the residue of a function and use the Residue Theory to evaluate a contour integral or an integral over the real line.
- Formulate/solve/classify the solutions of Partial differential equations.
- Identify linear and nonlinear PDE and solve nonlinear PDE by Charpit's method.
- Apply Variables separable methods to solve boundary value problems.
- Find the solution of one dimensional wave equation, heat equation and Laplace equation.

Text/Reference Books:

- Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
- Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
- Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
- Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
- Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

CS302C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

DATABASE MANAGEMENT SYSTEMS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- To learn data models, conceptualize and depict a database system using ER diagram
- To understand the internal storage structures in a physical DB design
- To demonstrate the fundamental concepts, operation and function of different components of database systems.
- To describe the roles of transaction processing and concurrency control in a modern DBMS.
- To demonstrate key issues in the operation of a DBMS including query processing, security and integrity.
- To design and implement a database application.

UNIT-I

Introduction: Managing Data, File Systems versus a DBMS, Advantages of a DBMS, Storing data in a DBMS, Queries in a DBMS, Transactions, Structure of a DBMS.

Introduction to Data base design: ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views Destroying/ altering Tables and Views.

UNIT-II

Relational Algebra and Calculus: Relational Algebra , Relational calculus, Expressive Power of Algebra and calculus.

SQL: Form of Basic SQL Query, UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, NULL values , Complex Integrity Constraints in SQL, Triggers and Active Databases, Designing Active Databases

UNIT-III

Schema Refinement and Normal Forms: Introduction, Functional Dependencies, Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms, BCNF, Properties of Decompositions, Normalization, Schema Refinement in Data base Design, Multi valued Dependencies , FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

Database Application Development: Accessing Databases from Applications, Introduction to JDBC, JDBC Classes and Interfaces, SQLJ, Stored Procedures.

UNIT-IV

Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-based Concurrency Control, Performance Locking, Transaction Support in SQL, Introduction to Crash Recovery.
Concurrency Control: 2PL, Serializability and Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques, Concurrency Control without Locking

Crash Recovery: Introduction to ARIES, Log, Recovery related Structures, Write-Ahead Log Protocols, Checkpointing, Recovering from a System Crash, Media Recovery, Interaction with Concurrency Control

UNIT-V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index data Structures, Comparison of File Organizations, Indexes and Performance Tuning.

Indexing and Hashing: Intuitions for tree indexes, Indexed Sequential Access Method, B+ Trees: A Dynamic Index Structure, Search, Insert, Delete, Duplicates, B+ Trees in Practice, Static Hashing, Extendable Hashing, Linear Hashing, Extendible vs. Linear Hashing.

Parallel and Distributed Databases: Introduction, Architectures for Parallel Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Introduction to Distributed Databases, Distributed DBMS Architectures, Storing Data in Distributed DBMS, Distributed Catalog Management, Distributed Query Processing

Course Outcomes:

Upon successful completion of this course, the student should be able to

- Use relational algebra and relational calculus, to express database queries.
- Use SQL to interact with database management systems.
- Design appropriate database tables, using functional dependencies and normal forms.
- Implement a disk-oriented database storage manager with heap table and indexes.
- Understand, compare, and implement the major concurrency control algorithms.
- Implement database recovery algorithms and verify their correctness.
- Identify trade-offs among database systems techniques and contrast distributed/parallel alternatives for both on-line transaction processing and on-line analytical workloads.

Text Books:

- Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill, 2014.
- C. J. Date, A. Kannan and S. Swamynathan, An Introduction to Database Systems, 8th edition, Pearson Education, 2006.

Reference Books:

- Silberschatz A, Korth H F, and Sudarshan S, Database System Concepts, 6th edition, McGraw-Hill, 2011.
- Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems,
- Fourth Edition, Pearson/Addision wesley, 2007.
- J D Ullman, H. Garcia-Molina and J. Widom, Database Systems: The Complete
- Book, Prentice-Hall, 2009.
- Jeffrey A. Hoffer, Ramesh Venkataraman, Heikki Topi, Modern Database
- Management, 12th edition, Pearson, 2015.

CS303C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

DISCRETE MATHEMATICAL STRUCTURES

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

This course is designed to

- Use mathematical reasoning in order to read, comprehend, and construct mathematical arguments and theorem proving techniques.
- Familiarize students with the basic concept of functions, basic set theory, countability and counting arguments.
- Present basic concepts of number theory and teach students how to apply the same to cryptography.
- Reinforce the method of recursion and use of structural induction.
- Introduce fundamental concepts of graph theory and present different graph models.
- Familiarize students with minimum spanning trees and shortest-path problems.

UNIT I

Logic, Prepositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Methods of Proof and Strategy.

UNIT II

Sets, Set Operations, Functions, Sequences and Summations, Introduction to Semigroups, Groups, Subgroups, Normal subgroups.
Relations and their properties, n-ary relations and their applications, Representing relations, Closures of relations, Equivalence relations, Partial orderings, Lattices.

UNIT III

Counting: Basics of Counting, Pigeonhole principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations.
Advanced Counting Techniques: Recurrence Relations, Solving Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-and-Exclusion and its Applications.
Number Theory and its Applications.

UNIT IV

Introduction to graphs, Graph terminology, Applications of some special graphs, epresentation of graphs, Graph isomorphism.Connectivity: Connectedness in undirected and directed graphs, Paths and Isomorphism,Construction of reliable communication networks, Euler path, amilton path, Chinese postman problem, Shortest path problems, Traveling salesman problem.

UNIT V

Planar graphs, Kuratowski's theorem, Graph coloring and applications.Introduction to trees, Application of trees, Spanning trees, Applications of backtracking, Minimum spanning trees, Flows, Cuts, Max-flow Min-cut problem.

Course Outcomes

On successful completion of this course the students will be able to:

- Verify the correctness of an argument using propositional and predicate logic
- Construct proofs using direct proof, proof by contraposition, proof by contradiction, proof by cases, and mathematical induction.
- Solve problems involving recurrence relations and generating functions.
- Construct and analyze graph models for problems in different areas.
- Design and develop real time application using graph theory

Text Books:

- Kenneth H Rosen, Discrete Mathematics and its Applications, 6th edition, McGraw-Hill Companies.
- Mott J L, Kandel A, and Baker T P, Discrete Mathematics for Computer Scientists and Mathematicians, 2nd edition, PHI, 2004.

Reference Books:

- Malik D S, Sen M K, Discrete Mathematical Structures: Theory and Applications, Thomson Course Technology, 2004.
- Mott J L, Kandel A, and Baker T P, Discrete Mathematics for Computer Scientists and Mathematicians, 2nd edition, PHI, 2004.
- Kolman B, Busby R C, Ross S C, and Rehman N, Discrete Mathematical Structures, 5th edition, Pearson Education, 2006.
- Lipschutz S, Lipson M, Discrete Mathematics, 2nd edition, TMH, 2006.

CS304C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

BASIC ELECTRICAL ENGINEERING

No.of Credits: 3 Instruction Hours/Week: 3

UNIT I

Basic Circuit Concepts: Electrical circuit elements (R, L and C), Classification of Circuit elements, Voltage and Current sources, Source transformation Techniques – Kirchhoff's laws – Star-delta transformation – Network reduction techniques – Mesh and Nodal Analysis for D.C. Circuits – Concept of mutual inductance – Dot convention.

UNIT II

Network Topology: Graph, tree, incidence matrix, and tie set and cut set matrices – Formulation of equilibrium equations based on graph theory. Duality and dual circuits.
A.C. Fundamentals: Periodic wave forms – Average and effective values of different waveforms – Form factor and crest factor.

UNIT III

A.C. Circuits: Phase and phase difference – Phasor notation – Concept of reactance, impedance, susceptance and admittance – Power factor – Active and reactive power – Impedance Triangle – Power triangle – Steady State analysis of single-phase A.C. circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel) – Phasor diagrams. Mesh and Nodal Analysis for A.C. Circuits.

UNIT IV

D.C. Machines: Construction of a D.C. Machine, D.C. Generator: Operation, lassification and EMF equation. D.C. Motor: Operation, Back E.M.F, Types and Applications.Single Phase Transformers: Principle of Operation, Types, EMF equation.

UNIT V

Three Phase Induction Motor: Production of Rotating Magnetic Field, Construction and operation of 3-Phase Induction Motor. Alternators: Construction and working of Alternators.

Course Outcomes

Having successfully completed this course the students will be able to:

- understand and analyze basic electric and magnetic circuits.
- study the working principles of electrical machines and power converters.
- introduce the components of low-voltage electrical installations.

Text/Reference Books:

- Sudhakar and Shyammohan, Circuits and Networks: Analysis and Synthesis,5thEdition, Tata McGraw-Hill.
- Ravish R. Singh, Network Analysis and Synthesis, Tata McGraw-Hill.
- Nagrath and Kothari, Basic Electrical Engineering, 4th Edition, Tata McGraw-Hill.
- 4. D.C.Kulshreshtha, Basic Electrical Engineering, McGraw-Hill.

CS305C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING

No.of Credits: 3 Instruction Hours/Week: 3

UNIT I

Basic Electronic Devices: Semiconductor fundamentals, Principle of operation and V-I Characteristics of Diodes (PN, Zener, Photo, LED, Laser Diode), Transistors (BJT, JFET, MOSFET).

Microelectronics: Concept of miniaturization of electronic systems, Basic principles of monolithic integrated circuit technology, IC fabrication of simple circuit elements.

UNIT II

Transistor Amplifiers: Concept of an amplifier -Gain, Input and Output impedance, Frequency response, Biasing of a transistor, CB, CE and CC Configurations and their characteristics, Multi stage Amplifiers.

Concept of feedback: Negative and Positive feedback, Advantages and limitations, Oscillator Operation, RC phase shift oscillator and Crystal oscillator.

UNIT III

Analog ICs: Concept of differential amplifier, Operational Amplifier (OPAMP), Characteristics of an OP AMP and its applications - Inverting and non-inverting amplifiers, Summer, Integrator, Differentiator.

555 timer, and its application as multi-vibrator, Phase Locked Loop (PLL), and its application as frequency multiplier.

UNIT IV

Basics of Communication Engineering: Introduction, Signal Spectrum, Bandwidth, Noise; Concept of Communication - Source, Channel, Sink; Types of channels; Concept of information and entropy, Shannon's law, Bit rate; Analog Modulation Schemes - AM, FM; Pulse Modulation Schemes - Sampling, PAM, PWM, PPM, PCM, DM; Multiplexing - FDM,TDM.

UNIT V

A/D and D/A Converters: D to A converters- Basic principle, Weighted resistor and ladder types; A to D Converters - Basic principle, Ramp, Successive approximation types.

Basic Electronics Instruments: Block diagram and principle of operation of - Digital Multi-meter, Function generator, Cathode Ray Oscilloscope (CRO).

Text Books:

- Bogart Jr. T F, Beasley J S, and Rico G, Electronic Devices and Circuits, 6th edition, Pearson Education, 2006.
- Malvino A, and Bates D J, Electronic Principles, 7th edition, Tata McGraw-Hill, 2007.

Reference Books:

- Deshpande N P, Electronic Devices and Circuits - Principles and Applications, Tata McGraw-Hill, 2007.
- Muthusubramanian R, Salivahanan S, and Muraleedharan K A, Basic Electrical, Electronics, and Computer Engineering, 2nd edition, Tata McGraw-Hill, 2001. (Part II - Electronics Engineering only)
- Stanley W D, Hackworth J R, and Jones R L, Fundamentals of Electrical Engineering and Technology, Thomson Delmar Learning, 2007. (Part III - Electronic Devices andLinear Electronics only)
- Gates E D, Introduction to Electronics, 5th edition, Thomson Delmar Learning, 2007. (Sections 3 and 4 only)
- Storey N, Electronics - A Systems Approach, 2nd edition, Pearson Education Asia, 2001.

CS306L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

DATABASE MANAGEMENT SYSTEMS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the course, "Database Management Systems".

CS307L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

ELECTRONICS AND COMMUNICATION ENGINEERING LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the courses, "Elements of Electronics and Communication Engineering".

CS309S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

BASIC PYTHON PROGRAMMING

No.of Credits: 2 Instruction Hours/Week: 1T+2P

Course Objectives:

The course is designed to:

- Python syntax and semantics and be fluent in the use of Python flow control and functions.
- the concepts of Object-Oriented Programming as used in Python.
- various problems solving approaches of computer science in various Domains.
- various data structures like lists and dictionaries using python.
- introduce Python third- Party Tools for various domains.

UNIT I

Introduction to Python Programming: Features and History of Python, The Future of Python, Writing and Executing First Python Program, Literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Indentation, Operators and Expressions, Expressions in Python, Operations on Strings, Other Data Types, Type Conversion.

Decision Control Statements: Introduction to Decision Control Statements, Selection/ Conditional Branching Statements, Basic Loop Structures/Iterative Statements, Nested Loops, The break, continue and pass Statement, The else Statement used with Loops.

UNIT II

Functions and Modules: Introduction, Function Definition, Function Call, Variable Scope and Lifetime, The return statement, More on Defining Functions, Lambda Functions or Anonymous Functions, Documentation Strings, Good Programming Practices, Recursive Functions, Modules, Packages in Python, Standard Library modules, Globals(), Locals(), and Reload(), Function Redefinition.

Python Strings Revisited: Introduction, Concatenating, Appending, and Multiplying Strings, Strings are Immutable, String Formatting Operator, Built-in String Methods and Functions, Slice Operation, ord() and chr() Functions, in and not in operators, Comparing Strings, Iterating String, The String Module, Regular Expressions, Metacharacters in Regular Expression.

UNIT III

File Handling: Introduction, File Path, Types of Files, Opening and Closing Files, Reading and Writing Files, File Positions, Renaming and Deleting Files, Directory Methods.

Data Structures: Sequence, Lists, Functional Programming, Tuple, Sets, Dictionaries.

Classes and Objects: Introduction, Defining Classes, Creating Objects, Data Abstraction, Class Method and self Argument, The _init_() Method, Class Variables and Object Variables, The _del_() Method, Other Special Methods, Public and Private Data Members, Private Methods, Calling a Class Method from Another Class Method, Built-in Functions to Check, Get, Set, and Delete Class Attributes, Built-in Class Attributes, Garbage Collection, Class Methods,StaticMethods.

UNIT IV

Inheritance: Introduction, Inheriting Classes in Python, Types of Inheritance, Composition or Containership or Complex Objects, Abstract Classes and Interfaces, Metaclass.

Operator Overloading: Introduction, Implementing Operator Overloading, Reverse Adding, Overriding _getitem_() and _setitem_() Methods, Overriding the in Operator, Overloading Miscellaneous Functions, Overriding the _call_() Method.

Error and Exception Handling: Introduction to Errors and Exceptions, Handling Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block Without Exception, The else Clause, Raising Exceptions, Instantiating Exceptions, Handling Exceptions in Invoked Functions, Built-in and User-defined Exceptions, The finally Block, Pre-defined Clean–up Action, Re-raising Exception, Assertions in Python, Multi-threading.

UNIT V

Survey of The Most Common 3rd Party Packages: Requests, Numpy/Scipy, Matplotlib/ Pyplot, Pandas, Pillow, Flask/Django/Twisted, Pep8, Scikit-Learn/Nltk, Stanford-Corenlp, Bcrypt, Beautiful Soup, and More.

GUI Design with Tkinter: Button, Canvas, Check Button, Entry, Frame, Label, List Box, Menu, Menu Button, Message, Radio Button, Scale, Scrollbar, Text Graphics with Turtle: Motion Control, Pen, Colour, Fill, Multiple Turtles, Reset and Clear.

Course Outcomes

Having successfully completed this course the students will be able to:

- understand the structure, syntax, and semantics of the Python language.
- interpret the concepts of Object-Oriented Programming as used in Python.
- demonstrate proficiency in handling Strings and File Systems.
- implement desktop/Web-based applications using the Python programming language.

Text Books:

- Reema Thareja, Python Programming using problem solving approach, First Edition, Oxford University Press, 2017.
- Mark Lutz, Learning Python, Fifth Edition, O'Rielly, 2016.

Reference Books:

- Mark Lutz, Programming Python, Fourth Edition, O'Reilly, 2010.
- John V.Guttag, Introduction to Computation and Programming Using Python with Application to Understanding, PHI.
- Allen Downey, Think Python: How to think like a Computer Scientist, Green Tea Press.
- Paul Barry, Head First Python: A Brain-Friendly Guide, Second Edition, O'Reilly.
- The Python Standard Library, Python 3.6.5 documentation (Web Resource) https://docs.python.org/3/library/.

PA310A

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

CONSTITUTION OF INDIA

No.of Credits: Nil Instruction Hours/Week: 2

Course Objectives:

The objective of the course is to impart to the students

- understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- address the growth of Indian opinion regarding modern Indian intellectuals'
- constitutional role and entitlement to civil and economic rights as well as the
- emergence of nationhood in the early years of Indian nationalism.
- address the role of socialism in India after the commencement of the Bolshevik
- Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT I

History and philosophy of the Indian Constitution:
History -Drafting Committee, (Composition & Working) - Preamble - Salient Features

UNIT II

Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT III

Organs of Governance: Parliament – Composition - Qualifications and Disqualifications - Powers and Functions, Executive President – Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions.

UNIT IV

Local Administration:
District's Administration Head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT V

Election Commission: Election Commission: Role and Functioning - Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning.Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes

Having successfully completed this course the students will be able to know:

- the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- the circumstances surrounding the foundation of the Congress Socialist Party [CSP]
- under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of
- direct elections through adult suffrage in the Indian Constitution.
- the passage of the Hindu Code Bill of 1956.

Text/Reference Books:

- The Constitution of India, 1950 (Bare Act), Government Publication.
- Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
- M. P. Jain, Indian Constitution Law, Lexis Nexis, 7th Edition, 2014.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

CS401C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

DIGITAL ELECTRONICS AND LOGIC DESIGN

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives

- To understand the essential knowledge on the fundamental of digital circuits
- To understand the overview on the design principles of digital computing systems

UNIT I

Number Representation, Signed and Unsigned, Code Conversion, Review of Boolean Algebra and DeMorgan's Theorem, Sum-of-Product and Product-of-Sum forms, Canonical forms, Karnaugh maps up to 6 variables.

UNIT II

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half andFull Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU

UNIT III

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, PseudoRandom Binary Sequence generator, Clock generation

UNIT IV

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Conceptof Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

UNIT V

VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data typesand objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Course outcomes:

At the end of this course students will demonstrate the ability to

- Design and analyze combinational logic circuits
- Design and analyze synchronous sequential logic circuits
- Design and implement complicated digital systems using Verilog
- Design a VLSI circuit for an application

Text/Reference Books:

- R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2010.
- Douglas Perry, "VHDL: Programming by Example", Tata McGraw Hill, 4th edition.
- Brown S, and Vranesic Z, Fundamentals of Digital Logic with VHDL Design, 3rd
- edition, McGraw Hill, 2012.
- Kinney L L, and Roth Jr. C H, Fundamentals of Logic Design, 7th edition, Cengage
- Learning, 2015.

CS402C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

SIMULATION AND MODELING

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives

- To introduce various system modeling and simulation techniques, and highlight their applications in different areas.
- To provide an overview of modeling, through the basic concepts of systems analysis.
- To provide the elements needed to understand how the models can be used in simulation, forecasting, planning and management, and how they can be integrated to support decision-making

UNIT -I

Introduction to Simulation, Definitions, Types of Simulation Models, Applications, System and Environment, Components of System, Scope, Advantages and Limitations of Simulation.

UNIT- II

Introduction to Sampling, Statistical Distributions – Discrete and Continuous, Generation of Random Numbers and Random Variates.

UNIT- III

Introduction to Mathematical Modeling and Types, Applications, Simulations of Queuing, Inventory and Manufacturing Systems.

UNIT- IV

Introduction to Input data and output Analysis for single Model, Comparing Alternative System Configurations.

UNIT- V

Simulation of computer system, Introduction, Simulation Tools – Process and Event Orientation, CPU and Memory simulation, Simulation of Complex Systems.

Course Outcomes

After successful completion of the course the students would be able to

- describe the components of continuous and discrete systems and simulate the same.
- model any system from different fields.
- discuss the simulation methods and select the suitable technique on the problems.
- implement the model on the computer and from the results, check for the validity of the model and correctness of the assumptions present in the model.
- understand the limitations of their model and nuances in computer modeling of systems.

Text Books:

- Banks J, Carson II J S, Nelson B L, Nicole D M and Shahabudeen P, Discrete-Event System Simulation, Pearson Education, 2007.

- Geoffrey Gordon, System Simulation, 2nd edition, Pearson Education, 2015.

Reference Book:

1. Seila A F, Ceric V, and Tadimalla P, Applied Simulation Modeling, Thomson Brooks/Cole, 2003.

HS403C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

MANAGERIAL ECONOMICS AND ACCOUNTANCY

No.of Credits: 3 Instruction Hours/Week: 3

UNIT I

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR, NPV, IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage, Income tax leverage.

UNIT II

Depreciation and methods of calculating depreciation (straight line, sum of the years digit method, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

UNIT III

Inflation: Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

UNIT IV

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

UNIT V

Cost Accounting: Introduction, Classification of costs, Methods of costing, Techniques of costing, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

Course Outcomes:

On successful completion of this course the students will be able to

- Understand Macro Economic environment of the business and its impact on enterprise.
- Identify various cost elements of the product and its effect on decision making.
- Understand the concepts of financial management and smart investment.
- Prepare the Accounting records and interpret the data for Managerial Decisions.

Text/Reference Books:

- Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw Hill Education, 1996.
- Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
- A.N. Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
- Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
- Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition, Vikas Publication, 2012.

CS404C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

COMPUTER ORIENTED NUMERICAL METHODS

No.of Credits: 3 Instruction Hours/Week: 3

UNIT I

Errors in Numerical Calculations: Truncation and Round-off errors, Effect of errors in data; Closed form solution versus Iterative methods.
Roots of Nonlinear Equations: Bisection, False position and, Newton-Raphson methods.

UNIT II

Iterative Solution of Liner Equations - Jacobi iteration, Gauss-Seidel and Relaxation methods; Convergence of iteration methods.

UNIT III

Interpolation - Lagrange polynomials, Newton's difference formula, Cubic splines, and Two dimensional interpolation.

UNIT IV

Numerical Differentiation - Differentiating continuous and tabulated functions, Difference tables and Richardson extrapolation. Numerical integration - Trapezoidal, Simpson's 1/3 and Simpson's 3/8 Rules.

UNIT V

Numerical Solution of Ordinary Differential Equations - Taylor's Series, Euler's, Runge-Kutta methods.

Text Books:

- Schilling R J, and Harries S L, Applied Numerical Methods for Engineers Using MATLAB and C, Thomson Brooks/Cole, 2006.

Reference Books:

- Chapra S C, Applied Numerical Methods with MATLAB for Engineers and Scientists, 2nd edition, Tata McGraw-Hill, 2007.
- Gerald C F, and Wheatley P O, Applied Numerical Analysis, 6th edition, Pearson Education Asia, 2002.
- Niyogi P, Numerical Analysis and Algorithms, Tata McGraw Hill, 2003.
- Heath M T, Scientific Computing: An Introductory Survey, McGraw-Hill, 1997.

CS405C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

COMPUTER ORGANIZATION

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives

The course is designed to

- make the students understand the basic structure and operations of various functional units of a digital computer.
- familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- Make the stdents understand how to design processing unit using hardwired control and microprogrammed control approaches.
- familiarize the students with hierarchical memory system.
- expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I

Structure of Computers: Introduction, Performance, Memory addressing and Operations, Instructions and Instruction sequencing, Addressing modes, Basic l/0 operations, Pushdown stacks, Subroutines, Encoding of machine instructions, Brief description and functional classification of IA-32 Pentium instruction set

UNIT II

Basic Processing Unit: Fundamental concepts, Single and Multiple bus organization, Hardwired control, Multiprogrammed control – Microinstructions, Microprogram sequencing, Wide-branch addressing, Microinstructions with next-address field, Prefetching microinstructions.

Arithmetic: Multiplication – Booth algorithm; Integer division, Floating-Point Addition and Subtraction.

UNIT III

The memory System: Basic concepts, RAM and ROM Memories and their internal organization, Cache Memories - Mapping functions, Replacement algorithms; Performance Considerations, Virtual Memories, Secondary Storage.

UNIT IV

Input/ Output Organization: Accessing l/O devices; Interrupts –Enabling and disabling, Handling multiple devices; Direct Memory Access - Bus Arbitration; Buses – Synchronous and Asynchronous; Interface circuits – Parallel port, Serial port

UNIT V

Pipelining: Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and control considerations, Superscalar operation.
Processor Families: The ARM family, The Motorola 680x0 and Coldfire families, The IA-32 family.

Course Outcomes:

On successful completion of this course the students will be able to

- Identify the basic structure and functional units of a digital computer.
- Analyze the effect of addressing modes on the execution time of a program.
- Design processing unit using the concepts of hardwired control or microprogrammed control.
- Select appropriate interfacing standards for I/O devices.
- Identify the roles of various functional units of a computer in instruction execution.
- Understand memory hierarchy and its impact on computer cost/performance.
- Understand the advantage of instruction level parallelism and pipelining for high performance processor design.

Text Books

- Hamacher C, Vranesic Z, and Zaky S, Computer Organization, 5th edition, McGraw-Hill.

Reference Books

- Heuring V P, and Jordan H F, Computer systems Design and Architecture Addison-
- Wesley.
- Carpinelli J D, Computer System Organization and Architecture. Addison-Wesley
- 2001.
- Mano M M, Computer system Architecture, 4th edition, Pearson Education Asian
- 2002.

CS406C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

DESIGN AND ANALYSIS OF ALGORITHMS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

- To understand how to design an algorithm for the given problem.
- To analyze the complexity of an algorithm in terms of time and space.
- To get better insight on different strategies of algorithm design.

UNIT-I

Introduction: What is an Algorithm?, Algorithm Specification, Performance Analysis - Space Complexity, Time Complexity, Amortized Complexity, Asymptotic Notation (O, Ω, Θ), Practical Complexities, Performance Measurement, Randomized Algorithms: An Informal Description, Identifying the Repeated Element, Primality Testing, Advantages and Disadvantages.

Sets and Disjoint Set Union: Introduction, Union and Find Operations.

UNIT-II

Divide-and-Conquer: General Method, Defective Chess Board, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quicksort, Selection, Strassen's Matrix Multiplication, Convex Hull.

UNIT-III

The Greedy Method: The General Method, Container Loading, Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees, Optimal Storage on Tapes, Optimal Merge Patterns, Single-Source Shortest Paths.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected Components and Spanning Trees, Biconnected Components and DFS.

UNIT-IV

Dynamic Programming: The General Method, Multistage Graphs, All Pairs Shortest Paths, Single-Source Shortest Paths: General Weights, Optimal Binary Search Trees, String Editing, 0/1-Knapsack, Reliability Design, The Traveling Salesperson Problem, Flow Shop Scheduling.

Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.

UNIT-V

Branch-and-Bound: The Method, 0/1 Knapsack Problem, Traveling Salesperson, Efficiency Considerations.

$\mathcal{NP}$-Hard and $\mathcal{NP}$-Complete Problems: Basic Concepts, Cook's Theorem, NP-Hard Graph Problems, NP-Hard Scheduling Problems.

PRAM Algorithms: Introduction, Computational Model, Fundamental Techniques and Algorithms, Selection.

Course Outcomes:

Upon successful completion of this course, the student should be able to

- Develop systematically an algorithm for solving a problem
- Analyze the time and space complexity of the given algorithm
- Identify algorithm design methodology to solve problems.
- Distinguish between P and NP classes of problems

Text Books:

- Ellis Horowitz, Sartaj Sahni, and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, 2nd edition, Universities Press, 2008.
- Cormen T H, Leiserson C E, Rivest R L, and Stein C, Introduction to Algorithms, 3rd edition, Prentice-Hall of India, 2009.

Reference Books:

- Levitin A, Introduction to the Design and Analysis of Algorithms, 3rd edition, Pearson Education, 2012.
- Goodrich M T, Tamassia R, Algorithm Design, Wiley, 2008.
- Skiena S S, The Algorithm Design Manual, 2nd edition, Springer, 2012.
- Heineman G T, Pollice G, Selkow S, Algorithms in a Nutshell, 2nd edition, O'Reilly, 2016.
- Dave P H, and Dave H B, Design and Analysis of Algorithms, 2nd edition, Pearson Education, 2008.

CS407L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

ALP AND VHDL LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the course, "Assembly Language Programming and VHDL".

CS408L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22) **ALGORITHMS LABORATORY**

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the courses, "Design and Analysis of Algorithms".

CS409S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2021-22)

BASIC WEB DESIGNING

No.of Credits: 2 Instruction Hours/Week: 1T+2P

Course Objectives:

The objectives of this course is to acquire knowledge on the

- Web related terminology and how does a website work.
- Web standards and W3C elements
- Responsive Web Designing
- Client-side Scripting Languages (Front End)
- Domains and Hosting

UNIT I

Introduction to Web and Web Design Principles:

Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Web pages, Website, Web browsers and Web servers and Web protocols. Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design concept.

UNIT II

Introduction to HTML:

What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags. Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

UNIT III

Introduction to Cascading Style Sheets:

Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.

UNIT IV

Introduction to Java Script:

What is Java Script? Basics of Java Script: Variables, functions, and Operators, select HTML elements with Java Script, Java Script Events and Event Handlers, Regular expressions and pattern matching in Java Script. Form validation using Java Script.

UNIT V

Introduction to Web Publishing or Hosting:

Creating the Web Site, Saving the site, Working on the web site, Creating web site structure,

Creating Titles for web pages, Themes-Publishing web sites. Case study: Web publishing and hosting using Heroku cloud platform (https://www.heroku.com/).

Course Outcomes

Having successfully completed this course the students will be able to:

- describe and explain the relationship among HTML, XHTML, CSS, JavaScript, XML
- and other web technologies.
- create and publish advanced web pages with the help of HTML frames, scripting languages, and CSS.
- design forms for thick clients using JavaScript with interactive responsiveness and validations.
- design, host and publish websites in various domains.

Text Books:

- Kogent Learning Solutions Inc., HTML 5 in simple steps, Dreamtech Press.
- A beginner's guide to HTML, NCSA, 14th May 2003.
- Murray, Tom/Lynchburg, Creating a Web Page and Web Site, College, 2002.

Reference Books:

- Web Designing and Architecture-Educational Technology Centre, University of Buffalo.
- Steven M Schafer, HTML, XHTML, CSS and JavaScript, Wiley India.
- Ian Pouncey, Richard York, Beginning CSS: Cascading Style Sheets for Web Design, Wiley India.
- Kogent Learning, Web Technologies: HTML, JavaScript, Wiley India.

CS501C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

FORMAL LANGUAGES AND AUTOMATA THEORY

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Identify different formal language classes and their relationships
- Design grammars and recognizers for different formal languages
- Understand the logical limits to computational capacity
- Get proper insight on un-decidable problems

UNIT I

Why study Automata Theory, Central Concepts of Automata Theory, Informal Picture of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata and Applications, Finite Automation with Epsilon Transitions.

UNIT II

Regular Expressions and their Applications, Finite Automata and Regular Expressions, Algebraic Laws for Regular Expressions.
Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT III

Context Free Grammars (CFG), Parse Trees, Applications of CFG, Ambiguity in Grammars and Languages.
Definition of Pushdown Automaton, The Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

UNIT IV

Normal forms for CFG, Pumping Lemma for Context Free Languages, Closure and Decision Properties of CFLs
Turing Machine Model, Representation of Turing Machines, Language Acceptability by TM, Design of TMs, Universal Turing Machine, Halting Problem of TM, Church-Turing Thesis.

UNIT V

A Language that is not Recursively Enumerable, An Undecidable Problem that is Recursively Enumerable, Undecidable Problems about Turing Machines,
The Classes of P and NP, NP Complete Problem.

Text Books:

- John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
- Martin J C, Introduction to Languages and the Theory of Computation, 3rd edition, Tata McGraw-Hill, 2003.

Reference Books:

- Krithivasan K, Introduction to Formal Languages, Automata Theory and Computation, Pearson Education, 2009.
- Rich E, Automata, Computability, and Complexity – Theory and Applications, Pearson
- Education, 2012.
- Singh A, Elements of Computation Theory, Springer, 2009.
- Cohen D I A, Introduction to Computer Theory, 2nd edition, John Wiley, 2000.
- Lewis H, Papadimitriou C H, Elements of the Theory of Computation, 2nd edition, Prentice Hall, 1997.

Course Outcomes

At the end of the course, students will be able to

- Write a formal notation for strings, languages and machines.
- Design finite automata to accept a set of strings of a language.
- Determine whether the given language is regular or not.
- Design context free grammars to generate strings of context free language.
- Determine equivalence of languages accepted by pushdown automata and languages generated by context free grammars
- Distinguish between computability & non-computability and decidability &
- undecidability.

CS502C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

OPERATING SYSTEMS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- provide knowledge about the services rendered by operating systems
- present detail discussion on processes, threads and scheduling algorithms.
- discuss various file-system design and implementation issues
- provide good insight on various memory management techniques
- expose the students with different techniques of handling of deadlocks
- familiarize students the basics of Linux system and perform administrative tasks on
- Linux servers
- discuss how the protection domains help to achieve security in a system

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, protection and security, Computing environments, Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

UNIT II

Process Concept: Process scheduling, Operations on processes, Interprocess communication, Communication in client server systems.

Multithreaded Programming: Multitheading models, Thread libraries, Threading issues, Examples.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

UNIT III

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples.

Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.

UNIT IV

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.

File Systems: Files, Directories, File system implementation, management and optimization.
Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

UNIT V

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.
System Security: Introduction, Program threats, System and network threats, Cryptography for security, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer security classification.
Case Studies: Linux, Microsoft Windows 7.

Text Books:

- Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
- Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems.)

Reference Books:

- Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
- Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
- Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
- Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

Course Outcomes

By the end of this course students will be able to:

- Recognize how the applications interact with the operating system as the later working as intermediary program between the machine and the application.
- Understand how operating system manages resources such as processors, memory and I/O.
- Demonstrate knowledge and understanding of how concurrency in OS is handled.
- Understand the techniques used to implement the process manager
- Implement various memory management and demand paging techniques.
- Comprehend virtual memory abstractions in operating systems
- Design and develop file system interface.
- Understand various schemes available for achieving system protection and system security

CS503C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPUTER NETWORKS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Provide insight about fundamental concepts, basic taxonomy and terminology of Computer Networks.
- Gain comprehensive knowledge about the principles, protocols, and significance of Layers in OSI and TCP/IP

UNIT I

Introduction to Computer Networks: Networks, Component and Categories, Topologies, Transmission Media, Reference Models: ISO/OSI Model and TCP/IP Model.
Physical Layer: Analog and Digital Signals, Periodic Analog Signals, Transmission Impairments, Data rate limits, Performance, Digital data transmission techniques, Analog data transmission techniques, Multiplexing: FDM, WDM and TDM; Spread Spectrum, Switching: Circuit and Packet.

UNIT II

Data Link Layer and Medium Access Sub Layer: Design Issues, Error Detection and Error Correction, Elementary Data Link Protocols, Sliding Window Protocols, Channel allocation problems, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA; IEEE 802.3 Ethernet.

UNIT III

The Network Layer: Network layer design issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, Internet Transport Protocols: UDP, TCP; Network Performance Measurement.

UNIT V

The Application Layer: Introduction, Client-Server Programming, Domain Name System (DNS), WWW and HTTP, FTP, E-mail, TELNET, Secure Shell, SNMP, IP Security Architecture, Firewalls.

Text Books:

- Computer Networks, Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.
- Data communications and Networking, Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.

Reference Books:

- Kurose J F, Ross K W, *Computer Networking – A Top-Down Approach*, 5th edition, Pearson Education, 2010.
- Peterson L L, Davie B S, *Computer Networks - A Systems Approach*, 5th edition, Morgan Kaufmann, 2011.
- Forouzan B A, Mosharraf F, *Computer Networks – A Top-Down Approach*, Tata McGraw-Hill, 2012.
- Olifer N, Olifer V, *Computer Networks – Principles, Technologies, and Protocols for* Network Design, Wiley, 2006.

Course Outcomes

By the end of this course students will be able to:

- Choose the transmission media depending on the requirements.
- Explain the functions of different layer of the OSI Protocol
- Analyze MAC layer protocols and LAN technologies
- Implement routing and congestion control algorithms
- Design new protocols for computer network.
- Configure DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls using open source software and tools.

CS504C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

SOFTWARE ENGINEERING

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to understand

- Software life cycle models.
- Software requirements and SRS document.
- Different software design strategies
- Quality control and how to ensure good quality software.
- Planning and estimation of software projects.
- Maintenance of software and gain knowledge of the overall project activities.

UNIT I

Introduction to Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: Agility, Agility and the Cost of Change, Extreme Programming, Agile Process Models

UNIT II

Understanding Requirements: Requirements Engineering, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

Requirements Modeling: Requirements Analysis, Scenario based Modeling, Class based Modeling, Requirements Modeling Strategies, Flow Oriented Modeling, Patterns for Requirement Modeling, Requirements Modeling for WebApps

Design Concepts: Design Process, Design Concepts, Design Model.

Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Alternative Architectural Designs, Architectural Mapping using Data flow.

UNIT III

Component Level Design: Component, Class based Components, Conducting Component level design, Component level Design for WebApps, Designing Traditional Components, Component based Development.

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

Pattern Based Design: Design Patterns, Pattern based Software Design, Architectural Patterns, Component Level Design Patterns, User Interface Design Patterns.

UNIT IV

Software Quality Concepts: Software Quality, Software Quality Dilemma, Achieving Software Quality.

Software Quality Assurance: Elements of Software Quality Assurance, SQA Goals and Metrics, Formal Approaches to SQA, Statistical SQA, Software Reliability.

Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Unit Testing and Integration Testing (both Conventional and OO Software), Test Strategies for WebApps, Validation Testing, System Testing, Art of Debugging.

Testing Conventional Applications: Software Testing Fundamentals, Internal and External View of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model based Testing, Testing for Specialized Environments, Patterns for Software Testing.

Computer Aided Software Engineering: CASE and its Scope, CASE Environment, CASE Support in Software Life Cycle, Characteristics of CASE Tools, Towards Second Generation CASE Tool.

UNIT V

Managing Software Projects: Project Management Concepts, Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Project Planning Process, Software Scope and Feasibility, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for OO Projects, Project Scheduling – Basic Principles, Defining a Task Set and Task Network, Scheduling, Introduction to Risk Management, Software Maintenance, Software Supportability, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.

Text Books:

- Pressman R S, *Software Engineering: A Practitioner's Approach*, 7th edition, McGraw-Hill, 2010.
- Sommerville I, *Software Engineering*, 9th edition, Pearson Education, 2011.

Reference Books:

- Jalote P, *Software Engineering: A Precise Approach*, Wiley, 2010.
- Braude E J, Bernstein M E, *Software Engineering: Modern Approaches*, 2nd edition, Wiley, 2010.
- Saleh K A, *Software Engineering*, J Ross Publishing, 2009.
- Bruegge B, Dutoit A H, *Object-Oriented Software Engineering Using UML, Patterns, and*
- *Java*, 3rd edition, Prentice Hall, 2009.
- Bennett S, McRobb S, Farmer R, *Object-Oriented System Analysis and Design Using UML*, 4nd edition, McGraw-Hill, 2010.
- Lethbridge T C, Laganiere R, *Object-Oriented Software Engineering*, 2nd edition, McGraw-Hill, 2005.

Course Outcomes

By the end of this course students will be able to

- Define and develop a software project from requirement gathering to implementation.
- Obtain knowledge about principles and practices of software engineering.
- Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems
- Comprehend, assess, and calculate the cost of risk involved in a project management
- Implement testing methods at each phase of SDLC

CS505O

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

OPEN ELECTIVE I

No.of Credits: 3 Instruction Hours/Week: 2L+2P

- Open elective courses are to be successfully completed on SWAYAM online portal of Government of India.
- Courses offered by Department as Program Core/ Program Elective/ Audit courses shall not be opted as open elective.

CS506L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

OPERATING SYSTEMS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the course, "Operating Systems".

CS507L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPUTER NETWORKS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the course, "Computer Networks".

CS508S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

JAVA PROGRAMMING (Skill Advance Course)

No.of Credits: 3 Instruction Hours/Week: 2T+2P

Course Objectives:
The course is designed to

- Identify Java language components and how they work together in applications.
- Learn how to design a graphical user interface (GUI) with Java Swing.
- Understand how to use Java APIs for program development.
- Learn how to extend Java classes with inheritance and dynamic binding.
- Learn how to use exception handling in Java applications.
- Understand how to design applications with threads in Java.

The course shall cover the following topics:

- Introduction
- Data Types, Variables, Arrays, Operators
- Control Statements
- Classes and Methods
- Inheritance
- Packages and Interfaces
- Exception handling
- Stream based I/O
- Multithreaded Programming
- The Collections Framework
- Networking
- Applet and AWT
- GUI Programming with Swings
- Introduction to JDBC

Text Books:

- Herbert Schildt, *Java The complete reference*, 9th edition, McGraw Hill Education (India) Pvt. Ltd.

Reference Books:

- Paul Dietel, Harvey Dietel, *Java How to Program*, 10th Edition, Pearson Education.
- T. Budd, *Understanding Object-Oriented Programming with Java*, updated edition, Pearson Education.
- Cay S. Horstmann, *Core Java Volume – 1 Fundamentals*, Pearson Education.
- Sagayaraj, Dennis, Karthik and Gajalakshmi, *Java Programming for core and*
- *advanced learners*, University Press
- Y. Daniel Liang, *Introduction to Java programming*, Pearson Education.
- P. Radha Krishna, *Object Oriented Programming through Java*, University Press.
- S. Malhotra, S. Chaudhary, *Programming in Java*, 2nd edition, Oxford Univ. Press.
- R.A. Johnson, *Java Programming and Object-oriented Application Development*, Cengage Learning.

Course Outcomes

Having successfully completed this course the students will be able to:

- Write programs for solving real world problems using java collection frame work.
- Write multithreaded programs.
- Write GUI programs using swing controls in Java.

ME509M

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

UNIVERSAL HUMAN VALUES

No.of Credits: Nil Instruction Hours/Week: 2

Course Objectives:
The course is designed to

- develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- understand (or developing clarity) the harmony in the human being, family, society and nature/existence.
- strengthen self-reflection and to develop commitment and courage to act.
- understand social responsibility of an engineer.
- appreciate ethical dilemma while discharging duties in professional life.

UNIT I

Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT II

Understanding Harmony in The Human Being - Harmony in Myself! :
Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility (Sukh and Suvidha). Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.

UNIT III

Understanding Harmony in The Family and Society- Harmony in Human-Human Relationship: Understanding harmony in the Family - the basic unit of human interaction. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness (Ubhay-tripti); Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution (Samadhan), Prosperity (Samridhi), fearlessness (Abhay) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order

in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family.

UNIT IV

Understanding Harmony in The Nature and Existence - Whole Existence as Coexistence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V

Implications of The Above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations.

Text Books:

- Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.
- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

Reference Books:

- E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
- A. N. Tripathy, 2003, Human Values, New Age International Publishers.
- Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
- A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
- Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
- E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
- M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.
- The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
- India Wins Freedom - Maulana Abdul Kalam Azad.

Relevant CDs, Movies, Documentaries & Other Literature:

- Value Education website, http://www.uptu.ac.in
- Story of Stuff, http://www.storyofstuff.com
- AI Gore, An Inconvenient Truth, Paramount Classics, USA
- Charle Chaplin, Modern Times, United Artists, USA
- IIT Delhi, Modern Technology - the Untold Story.

Course Outcomes

Having successfully completed this course the students will be able to:

- become more aware of themselves, and their surroundings (family, society, nature)
- distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- understand the role of a human being in ensuring harmony in society and nature.
- become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
- distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

CS601C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

COMPILER DESIGN

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Enrich the knowledge in various phases of compiler and its use
- Identify different methods of lexical analysis
- Design top-down and bottom-up parsers
- Develop syntax directed translation schemes
- Develop algorithms to generate code for a target machine
- Use the tools related to compiler design effectively and efficiently

UNIT I

Introduction to Assembler, Compiler and Interpreter; Elements of ALP, Single Pass and Two Pass Assemblers, Structure of a Compiler

Lexical Analysis: Role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, Lexical Analyzer Generator (Lex)

UNIT II

Syntax Analysis: Introduction, Context Free Grammars, Writing a Grammar, Top-down Parsing, Bottom-up Parsing, Introduction to LR Parsing, More Powerful LR Parsers, Introduction to YAAC.

UNIT III

Syntax Directed Translation (SDT): Syntax Definitions, Evaluation Orders for SDTs, Applications of SDTs, Schemes of SDTs

Run Time Environments: Storage Organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management.

UNIT IV

Intermediate Code Generation: Variants of Syntax Trees, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking, Control Flow Statements, Back Patching.

UNIT V

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization.

Text Books:

- Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers Principles, Techniques and Tools, Second Edition, Pearson Education, 2014.
- D M Dhamdhere, Systems Programming, TMH Education, 2011.

Reference Books:

- Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", BS ublications, 2005
- Dhamdhere, D. M., "Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi, 2008

Course Outcomes

By the end of this course students will be able to:

- Design a compiler for a simple programming language
- Understand phases in the design of compiler
- Design top-down and bottom-up parsers
- Develop syntax directed translation schemes
- Comprehend and adapt to Lex and Yacc tools in compiler design

CS602C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

ARTIFICIAL INTELLIGENCE

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand the basic principles of AI toward problem solving, inference, perception,knowledge representation, and learning.
- Introduce the concepts of machine learning and neural networks.
- Examine the applications of AI techniques in intelligent agents, artificial neural networks and other machine learning models.

UNIT I

The History of AI: What is Intelligence, Search for Mechanical Intelligence, Evolution of Artificial Intelligence (AI), Systems Approach, Overview of topics.

Uninformed Search: General state space search, General Search Paradigms Depth-First Search, Depth-Limited Search, Iterative Deepening Search, Breadth-First Search, Bi-directional Search, Uniform-Cost Search.

Informed Search: Best-First Search, N-Queens problem, A* Search, Eight Puzzle problem, Hill Climbing Search, Simulated Annealing, Tabu Search, Constraint Satisfaction, Constraint Satisfaction algorithms: Generate and Test, Backtracking, Forward Checking and Look Ahead, Min-Conflicts Search.

UNIT II

AI and Games: Two Player Games, The Minimax Algorithm, Tic-Tac-Toe problem, Minimax with Alpha-Beta Pruning, Classical Game AI, Checkers, Chess, Scrabble, Video Game AI, Movement and Path finding, Table Lookup with Offensive and Defensive Strategy, NPC Behavior, Team AI, Real-Time Strategy AI.

Knowledge Representation (KR): Types and Role of Knowledge, Semantic Nets, Frames, Propositional Logic, First Order Logic (Predicate Logic), Semantic Web, Computational Knowledge Discovery, Ontology, Common Sense.

UNIT III

Machine Learning: Machine Learning Algorithms, Supervised Learning, Decision Trees, Unsupervised Learning, Markov Models and implementation, Nearest Neighbor Classification, 1NN and k-NN Examples. Evolutionary Computation: Introduction to Evolutionary Computation, Biological Motivation, Genetic Algorithms, Genetic Programming, Evolutionary Strategies, Differential Evolution.

UNIT IV

Neural Networks I: Concept of Neural Networks, Biological Motivation, Fundamentals of Neural Networks, The Perceptron, Least-Mean-Square (LMS) Learning, Learning with Backpropagation, Probabilistic Neural Networks, Tips for Building Neural Networks. Neural Networks II: Unsupervised Learning, Hebbian Learning, Simple Competitive Learning, k-Means Clustering, Adaptive Resonance Theory, Hopfield Auto-Associative Model.

UNIT V

Robotics and AI: Introduction, Taxonomy of Robotics, Hard vs. Soft Robotics, Braitenburg Vehicles, Natural Sensing and Control, Perception with Sensors, Actuation with Effectors, Robotic Control Systems, Simple Control Architectures, Movement Planning, Distributed Robotics. Intelligent Agents: Anatomy of an Agent, Agent Properties and AI, Hybrid Agent, Agent Architectures, Types of Architectures, Agent Languages, Agent Communication. Biologically Inspired and Hybrid Models: Cellular Automata, Artificial Immune Systems, Artificial Life, Fuzzy Logic, Evolutionary Neural Networks, Ant Colony Optimization, Affective Computing.

Text Books:

1. M Tim Jones, Artificial Intelligence - A Systems Approach, Infinity Science Press, 2008.

Reference Books:

- Russel S, Norvig P, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson Education, 2010.
- Rich E, Knight K, Nair S B, Artificial Intelligence, 3rd edition, Tata McGraw-Hill, 2009.
- Luger G F, Artificial Intelligence, 6th edition, Pearson Education, 2009.
- Carter M, Minds and Computers: An Introduction to the Philosophy of Artificial Intelligence, Edinburgh University Press, 2007.
- Coppin B, Artificial Intelligence Illuminated, Jones & Bartlett, 2004.
- Ertel W, Introduction to Artificial Intelligence, Springer, 2011.

Course Outcomes

By the end of this course students will be able to:

- Demonstrate basic understanding of artificial intelligence and its fundamentals.
- Identify a search algorithm for a problem and estimate its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique for a given problem
- Possess the ability to apply AI techniques to solve problems of game playing, expert systems, machine learning and robotics.

CS603C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

CRYPTOGRAPHY AND NETWORK SECURITY

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

This course aims at training students to master the:

- Understand the basic categories of threats to computers and networks
- Discuss various cryptographic algorithms including secret key cryptography and public-key cryptography.
- Different encryption techniques along with hash functions, MAC, digital signatures
- Design issues and working principles of various authentication protocols and PKI standards.

UNIT I

Introduction to Security: Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, a Model for Network Security Mathematics of Cryptography: Algebraic Structures (Groups, Rings, Fields and Galois Fields), Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms

UNIT II

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography Block Ciphers: Traditional Block Cipher Structure, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles, Advanced Encryption Standard, AES Structure, AES Transformation Functions, AES Key Expansion, Multiple Encryption and Triple DES, Block Cipher Modes of Operation

UNIT III

Public-Key Cryptography: Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Cryptography Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Requirements and Security, Secure Hash Algorithm (SHA) Message Authentication Codes: Requirements for Message Authentication Codes, HMAC, CMAC

UNIT IV

Digital Signatures: Digital Signatures, Elgamal Digital Signature Scheme, Schnorr Digital Signature Scheme, NIST Digital Signature Algorithm, Elliptic Curve Digital Signature Algorithm Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure User Authentication: Remote User-Authentication Principles, Remote User-Authentication Using Symmetric Encryption, Kerberos, Remote User-Authentication Using Asymmetric Encryption.

UNIT V

Transport-Level Security: Web Security Considerations, Transport Layer Security, Secure Shell (SSH) Electronic Mail Security: S/MIME, Pretty Good Privacy IP Security: IP Security Overview, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange

Text Books:

1. William Stallings, *Cryptography and Network Security*, 8th Edition, Pearson Education

Reference Books:

- Bernard L. Menezes, Ravinder Kumar, *Cryptography, Network Security and Cyber* Laws, Cengage Learning.
- Behrouz A Forouzan, Debdeep Mukhopadhyaya, *Cryptography and Network* Security, 3rd Edition, Mc-GrawHill.
- Jason Albanese, Wes Sonnenreich, *Network Security Illustrated*, McGraw Hill.

Course Outcomes

At the end of the course, the students will be able to:

- Apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.
- Understand key management and distribution schemes and design user authentication protocols
- Apply different digital signature algorithms to achieve authentication and create secure applications
- Perform simple vulnerablility assessments and password audits.
- Configure simple firewall architectures

CS604C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

COMPUTER GRAPHICS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand the basics of various inputs and output computer graphics hardware devices.
- Exploration of fundamental concepts in 2D and 3D computer graphics.
- Learn 2D raster graphics techniques, 3D modelling, geometric transformations, 3D
- viewing and rendering.

UNIT I

Introduction- Image processing as picture analysis, Advantages of Interactive Graphics, Representative uses of computer graphics, Classification of applications, Development of hardware and software for computer graphics, Conceptual framework for Interactive Graphics.

Scan Converting Lines – Basic Incremental algorithm, Midpoint Line algorithm and additional issues; Scan Converting Circles, Scan Converting Ellipses, Solid Filling– Rectangles, Polygons and Ellipse arcs; Pattern filling, Thick primitives, Cohen-Sutherland line clipping algorithm, Parametric line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm, Generating characters and Antialiasing.

UNIT II

Display Systems - Raster-scan and Random scan.

Geometrical transformations – 2D transformations, Homogeneous coordinates, Matrix representation of 2D transformations, Composition of 2D transformations, Window to view-port transformation, Matrix representation of 3D transformations, Composition of 3D transformations and Transformation as a change in coordinate system.

Representing Curves and surfaces – Polygon meshes, Parametric cubic curves, Parametric bicubic surfaces andQuadric surfaces.

Fractals – Lines and Surfaces.

UNIT III

Viewing in 3D - Projections, Specifying an arbitrary 3D view, Examples of 3D viewing, Mathematics of planar geometric projections, Implementing planar geometric projections, Coordinate systems.

Solid Modeling – Representing solids, Regularized Boolean set operations, Primitive instancing, Sweep representations, Boundary representations, Spatial-Partitioning Representations, Constructive solid geometry, Comparison of representations, User interfaces forsolidmodelling.

UNIT IV

Achromatic and Colored Light – Achromatic light, Chromatic color, Color models for raster graphics, Reproducing color, Using color in computer graphics.
Visible Surface Determination – Functions of two variables, Techniques for efficient visible surface algorithms, z-Buffer algorithm, Scan-line algorithms, Visible surface ray tracing.

UNIT V

Illumination Models - Ambient light, Diffuse reflection, Atmospheric attenuation.
Shading4 Models – Constant shading, Interpolated shading, Polygon mesh shading, Gouraud shading, Phong shading, Problems with interpolated shading.
Surface Detail – Surface-detail polygons, Texture mapping, Bump mapping.
Animation – Conventional and Computer-Assisted animation, Animation languages, Methods of controlling animation, Basic rules of animation, Problems peculiar to animation.

Text Books:

1. Hughes J F, Van Dam A, Foley J D, et al., Computer Graphics*:* Principles and Practice, 3rd edition, Addison-Wesley, 2013.

Reference Books:

- Foley J D, Van Dam A, Feiner S K, John F H, Computer Graphics: Principles & Practice in C, 2nd edition, Pearson Education, 1995.
- Ragiv Chopra, Computer Graphics, S. Chand& Company, 2012.

Course Outcomes

At the end of the course, students will be able to

- Understand the various computer graphics hardware and display technologies.
- Implement various 2D and 3D objects transformation techniques.
- Apply 2D and 3D viewing technologies into the real world applications.

CS605E1

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

DATA MINING (Professional Elective I)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand the principles of Data Warehousing and Data Mining
- Know the Architecture of a Data Mining system
- Learn pre-processing techniques and data mining functionalities
- Compare and contrast classification and clustering algorithms

UNIT I

Introduction: Why Data Mining? What Is Data Mining? What Kinds of Data Can Be Mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining.

Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.

Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT II

DataWarehouse: Basic Concepts, DataWarehouse Modeling: Data Cube and OLAP, DataWarehouse Design and Usage, DataWarehouse Implementation, Data Generalization by Attribute-Oriented Induction.

Data Cube Computation, Data Cube Computation Methods, Processing Advanced Kinds of Queries by Exploring Cube Technology, Multidimensional Data Analysis in Cube Space.

UNIT III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods, Which Patterns Are Interesting?—Pattern Evaluation Methods.

Advanced Pattern Mining: A Road Map, Pattern Mining in Multilevel, Multidimensional Space, Constraint-Based Frequent Pattern Mining, Mining High-Dimensional Data and Colossal Patterns, Mining Compressed or Approximate Patterns, Pattern Exploration and Application.

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy.

UNIT IV

Classification-Advanced Methods: Bayesian Belief Networks, Classification by Backpropagation, Support Vector Machines, Classification Using Frequent Patterns, Lazy Learners (or Learning from Your Neighbors), Other Classification Methods, Additional Topics Regarding Classification.

Cluster Analysis: Basic Concepts, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering.

UNIT V

Advanced Cluster Analysis: Probabilistic Model-Based Clustering, Clustering High-Dimensional Data, Clustering Graph and Network Data, Clustering with Constraints.

Outlier Detection: Outliers and Outlier Analysis, Outlier Detection Methods, Statistical Approaches, Proximity-Based Approaches, Clustering-Based Approaches, Classification-Based Approaches, Mining Contextual and Collective Outliers, Outlier Detection in High-Dimensional Data.

Overview of Data Mining Trends and Research Frontiers: Mining Complex Data Types, Other Methodologies of Data Mining, Data Mining Applications, Data Mining and Society, Data Mining Trends.

Text Books:

1. Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann Publishers, Elsevier, 2012.

Reference Books:

- Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publishers, Elsevier, 2006.
- Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Introduction to Data Mining, Pearson Education, 2016.
- Hongbo Du, Data mining Techniques and Applications: An Introduction, 1st Edition, Cengage India Publishing, 2013.
- Arun K Pujari, Data Mining Techniques, 3rd Edition, Universities Press, 2013.
- T.V Suresh Kumar, B Eswara Reddy, Jagadish S Kallimani, Data Mining: Principles and Applications, First edition, Elsevier, 2012.
- Vikram Pudi, P Radha Krishna, Data Mining, Oxford University Press, 2009.
- Sam Anahory and Dennis Murray, Data Warehousing in the Real World: A Practical
- Guide for Building Decision Support Systems, First Edition, Pearson Education India, 2002.
- K.P.Soman, Shyam Diwakar,V.Ajay, Insight Into Data Mining: Theory and Practice, Prentice Hall India, 2006.

Course Outcomes

By the end of this course students will be able to

- Comprehend the various architectures and its application with data mining
- Design and develop data mining algorithms to analyze raw real world data
- Apply preprocessing techniques for data cleansing
- Analyze multi-dimensional modeling techniques and Classification & Clustering algorithms.

CS605E2

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

DISTRIBUTED SYSTEMS (Professional Elective I)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Familiarize the students with the basics of distributed computing systems.
- Understand issues related to clock Synchronization and distributed mutual exclusion.
- Introduce the concepts of distributed object based systems and distributed file systems.

UNIT I

Distributed Systems: Introduction, Goals, Types of Distributed Systems.
Architectures: Architectural Styles, System Architectures, Architectures versus Middleware, Self-Management in Distributed Systems.
Processes: Threads, Virtualization, Clients, Servers, Code Migration.

UNIT II

Communication: Fundamentals, Remote Procedure Call, Message-Oriented Communication, Stream-Oriented Communication, Multicast Communication.
Naming: Names, Identifiers and Addresses, Flat Naming, Structured Naming, Attribute-Based Naming.

UNIT III

Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of Nodes, Election Algorithms.
Consistency and Replication: Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Replica Management, Consistency Protocols.

UNIT IV

Fault Tolerance: Introduction, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.
Security: Introduction, Secure Channels, Access Control, Security Management.

UNIT V

Distributed Object-Based Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, Security.
Distributed File Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, Security.

Text Books:

- Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems: Principles and Paradigms, Second Edition, Pearson Education, 2007.

Reference Books:

- Brendan Burns, Designing Distributed Systems: Patterns and Paradigms for Scalable, Reliable Services, O'Reilly, First Edition, 2018.
- Sukumar Ghosh, Distributed Systems: An Algorithmic Approach, CRC Press, Second Edition, 2014.
- Kenneth P Birman, Guide to Reliable Distributed Systems: Building High-Assurance Applications and Cloud-Hosted Services, Springer, 2014.
- George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, Distributed Systems: Concepts and Design, Pearson Education, Fifth Edition, 2012.
- Maarten Van Steen, Andrew S. Tanenbaum, Distributed Systems, CreateSpace Independent Publishing Platform/ Amazon Digital Services, Third Edition, 2017.
- Roberto Vitillo, Understanding Distributed Systems, Roberto Vitillo, 2021.
- Gerard Tel, Introduction to Distributed Algorithms, Cambridge University Press, Second Edition, 2000.
- Andrew S. Tanenbaum, Distributed Operating Systems, Pearson Education, First Edition, 2002.

Course Outcomes

Having successfully completed this course the students will be able to:

- Understand the design principles in distributed systems and the architectures for distributed systems
- Apply various distributed algorithms related to clock synchronization, concurrency control, deadlock detection, load balancing.
- Develop the Mutual Exclusion and Deadlock detection algorithms in distributed systems.
- Analyze fault tolerance and recovery in distributed systems and algorithms for the same.
- Analyze the design and functioning of distributed file systems.

CS605E3

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

OBJECT ORIENTED ANALYSIS AND DESIGN
(Professional Elective I)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the Object-based view of systems
- Develop robust object-based models for systems
- Inculcate necessary skills to handle complexity in software design
- Understand the notations of Unified Modelling Language

UNIT I

OOAD Basic Concepts – Complexity: The Structure of Complex Systems, The Inherent Complexity of Software, The Five Attributes of a Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, On Designing Complex Systems.

The Object Model: The Evolution of the Object Model, Foundations of the Object Model, Elements of the Object Model, Applying the Object Model.

UNIT II

Classes and Objects: The Nature of an Object, Relationships among Objects, The Nature of a Class, Relationships among Classes, The Interplay of Classes and Objects, On Building Quality Classes and Objects.

Classification: The Importance of Proper Classification, Identifying Classes and Objects, Key Abstractions and Mechanisms.

UNIT III

Method – Notation: The Unified Modeling Language, Package Diagrams, Component Diagrams, Deployment Diagrams, Use Case Diagrams, Activity Diagrams, Class Diagrams, Sequence Diagrams, Interaction Overview Diagrams, Composite Structure Diagrams, State Machine Diagrams, Timing Diagrams, Object Diagrams, Communication Diagrams.

UNIT IV

Process: First Principles, The Macro Process: The Software Development Lifecycle, The Micro Process: The Analysis and Design Process.

Pragmatics: Management and Planning, Staffing, Release Management, Reuse, Quality Assurance and Metrics, Documentation, Tools, Special Topics, The Benefits and Risks of Object-Oriented Development.

UNIT V

Applications - System Architecture: Satellite-Based Navigation - Inception, Elaboration, Construction, Post-Transition.

Artificial Intelligence: Cryptanalysis - Inception, Elaboration, Construction, Post-Transition.

Web Application: Vacation Tracking System - Inception, Elaboration, Construction, Transition and Post-Transition.

Course Outcomes

Having successfully completed this course the students will be able to:

- Analyse and model software specifications.
- Abstract object-based views for generic software systems.
- Deliver robust software components.

Text Books:

1. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen, Kelli A. Houston, *Object-Oriented Analysis and Design with Applications*, Addison-Wesley/Pearson, Third Edition, 2015.

Reference Books:

- Michael Blaha and James Rumbaugh, Object-oriented modelling and design with UML, Prentice-Hall of India, 2005.
- Craig Larman, Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development, 3rd edition, Pearson Education, 2005.
- Ali Bahrami, Object Oriented Systems Development, McGraw-Hill, 1999.
- Booch Grady, Object Oriented Analysis and Design, 2nd edition Pearson Education, 2000.
- Fowler, Martin, UML Distilled, 3rd edition, Pearson Education, 2004.
- Lunn, Ken, Software development with UML, Palgrave Macmillan, 2003.
- O'Docherty, Mike, Object-Oriented Analysis & Design, Wiley, 2005

CS606L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

ARTIFICIAL INTELLIGENCE AND COMPILER DESIGN LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the course, "Artificial Intelligence and Compiler Design".

CS607L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

CRYPTOGRAPHY AND NETWORK SECURITY LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the courses, "Cryptography and Network Security".

CS608L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

COMPUTER GRAPHICS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the courses, "Computer Graphics".

CS609S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

ADVANCED PYTHON PROGRAMMING

No.of Credits: 3 Instruction Hours/Week: 2T+2P

Course Objectives:

The course is designed to

- Familiarize the basics of Python Third Party Tools and usages.
- Understand the advantage of using Python libraries for implementing Machine Learning models.
- Understand the Python Data Structures for Full Stack Development.

The course shall cover the following topics:

- Parallel System Tools: Forking Processes, Threads, Program Exits, Interprocess Communication, The multiprocessing Module, Other Ways to Start Programs, A Portable Program-Launch Framework, Other System Tools Coverage.

- GUI Design with Tkinter: Menus, Listboxes and Scrollbars, Text, Canvas, Grids, Time Tools, Threads, and Animation, Other Widgets and Options.

- GUI Coding Techniques: GuiMixin: Common Tool Mixin Classes, GuiMaker: Automating Menus and Toolbars, ShellGui: GUIs for Command-Line Tools, GuiStreams: Redirecting Streams to Widgets, Reloading Callback Handlers Dynamically, Wrapping Up Top-Level Window Interfaces, GUIs, Threads, and Queues, More Ways to Add GUIs to Non-GUI Code, The PyDemos and PyGadgets Launchers.

- Complete GUI Programs: PyEdit: A Text Editor Program/Object, PyPhoto: An Image Viewer and Resizer, PyView: An Image and Notes Slideshow, PyDraw: Painting and Moving Graphics, PyClock: An Analog/Digital Clock Widget, PyToe: A Tic-Tac-Toe Game Widget.

- Network Scripting: Python Internet Development Options, Plumbing the Internet, Socket Programming, Handling Multiple Clients, Making Sockets Look Like Files and Streams, A Simple Python File Server.

- Client-Side Scripting: FTP: Transferring Files over the Net, Transferring Files with ftplib, Transferring Directories with ftplib, Transferring Directory Trees with ftplib, Processing Internet Email, POP: Fetching Email, SMTP: Sending Email, email: Parsing and Composing Mail Content, A Console-Based Email Client, The mailtools Utility Package, NNTP: Accessing Newsgroups, HTTP: Accessing Websites, The urllib Package Revisited, Other Client-Side Scripting Options.

- The PyMailGUI Client: Major PyMailGUI Changes, A PyMailGUI Demo, PyMailGUI Implementation, Ideas for Improvement.

- Server-Side Scripting: What's a Server-Side CGI Script?, Running Server-Side Examples, Climbing the CGI Learning Curve, Saving State Information in CGI Scripts, The Hello World Selector, Refactoring Code for Maintainability, More on HTML and URL Escapes, Transferring Files to Clients and Servers.

- The PyMailCGI Server: The PyMailCGI Website, The Root Page, Sending Mail by SMTP, Reading POP Email, Processing Fetched Mail, Utility Modules, Web Scripting Trade-Offs.

- Databases and Persistence: Persistence Options in Python, DBM Files, Pickled Objects, Shelve Files, The ZODB Object-Oriented Database, SQL Database Interfaces, ORMs: Object Relational Mappers, PyForm: A Persistent Object Viewer (External).

- Data Structures: Implementing Stacks, Implementing Sets, Subclassing Built-in Types, Binary Search Trees, Graph Searching, Permuting Sequences, Reversing and Sorting Sequences, PyTree: A Generic Tree Object Viewer.

- Text and Language: Strategies for Processing Text in Python, String Method Utilities, Regular Expression Pattern Matching, XML and HTML Parsing, Advanced Language Tools, Custom Language Parsers, PyCalc: A Calculator Program/Object.

- Python Data Structures for Data Science: Numpy, Pandas, Scipy, MatplotLib, Seaborn

- Python Data Structures for Full Stack Development, Python for Natural Language
- Processing

- Python for Machine Learning: Working with Beautiful Soup, Scikit-Learn, NLP withPython, Text mining with python.

- Python for Deep Learning: Working with Tensor flow, Keras and PyTorch

- Python for Cryptography and Network Security: Stanford-Corenlp, Bcrypt

Text Books:

- Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
- Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016

Reference Books:

- Mark Lutz, Learning Python, O`Reilly, Fifth Edition, 2013.
- Dattaraj Rao, Keras to Kubernetes: The Journey of a Machine Learning Model to Production, Wiley, 2019.
- Wes McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, O`Reilly, Second Edition, 2017.
- Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O`Reilly, First Edition, 2017.
- Andreas C. Müller and Sarah Guido, Introduction to Machine Learning with Python: A Guide for Data Scientists, O`Reilly, First Edition, 2016.

- Jake VanderPlas, Python Data Science Handbook: Essential Tools for Working with Data, O`Reilly, First Edition, 2016.
- Delip Rao and Brian McMahan, Natural Language Processing with PyTorch: Build Intelligent Language Applications Using Deep Learning, O`Reilly, First Edition,2019.
- Miguel Grinberg, Flask Web Development: Developing Web Applications with Python, O`Reilly, Second Edition, 2018.
- Joel Grus, Data Science from Scratch: First Principles with Python, O`Reilly, First Edition, 2015.
- J. Burton Browning, Marty AlchinPro Python 3: Features and Tools for Professional Development, Apress, Third Edition, 2019.
- Abhishek Nandy, Manisha Biswas, Reinforcement Learning: With Open AI, TensorFlow and Keras Using Python, Apress, 2018.
- Navin Kumar Manaswi, Deep Learning with Applications Using Python: Chatbots and Face, Object, and Speech Recognition With TensorFlow and Keras, Apress, 2018.
- Akshay Kulkarni, Adarsha Shivananda, Natural Language Processing Recipes: Unlocking Text Data with Machine Learning and Deep Learning using Python, Apress, 2019.
- Sayan Mukhopadhyay, Advanced Data Analytics Using Python: With Machine Learning, Deep Learning and NLP Examples, Apress, 2018.
- Jojo Moolayil, Learn Keras for Deep Neural Networks: A Fast-Track Approach to Modern Deep Learning with Python, Apress, 2019.
- Manohar Swamynathan, Mastering Machine Learning with Python in Six Steps: A Practical Implementation Guide to Predictive Data Analytics Using Python, Apress, 2017.
- Daniel Rubio, Beginning Django Web Application Development and Deployment with Python, Apress, 2017.
- Fabio Nelli, Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Apress, 2015.
- Fabio Nelli, Python Data Analytics: With Pandas, NumPy, and Matplotlib, Apress, Second Edition, 2018.

Course Outcomes

Having successfully completed this course the students will be able to:

- Apply Python Third- Party Tools in real time environment.
- Apply Python for Cryptography and Network Security.
- Implement Full stack development apps.
- Apply Python libraries for implementing Machine Learning models.
- Apply basic principles of Python Data Structures for Data Science.

CE610M

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2022-23)

PROFESSIONAL ETHICS

No.of Credits: Nil | Instruction Hours/Week: 2

Course Objectives:

The course is designed to

- create an awareness on Engineering Ethics and Human Values.
- instill Moral and Social Values and Loyalty and to appreciate the rights of others.
- study the moral issues and decisions confronting individuals and organizations
- engaged in engineering profession.
- study the related issues about the moral ideals, character, policies, and
- relationships of people and corporations involved in technological activity.

UNIT I

Human Values: Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II

Engineering Ethics: Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg''s theory – Gilligan's theory – Consensus and Controversy –Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III

Engineering as Social Experimentation: Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV

Safety, Responsibilities and Rights: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR)
Discrimination.

UNIT V

Global Issues: Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct – Corporate Social Responsibility.

Text Books:

- Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
- Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

Reference Books:

- Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
- Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
- John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
- Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
- Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for
- Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd., New Delhi, 2013.

Course Outcomes

Having successfully completed this course the students will be able to:

- Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
- Learn the moral issues and problems in engineering; find the solution to those problems.
- Learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
- Gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights.

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VII Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2023-24)

CYBER SECURITY (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Analyze and evaluate the cyber security needs of an organization.
- Design and develop security architecture for an organization.
- Develop cyber security strategies and policies.
- Determine and analyze software vulnerabilities and develop necessary security solutions.

UNIT I

Building a Secure Organization, Preventing System Intrusions, Guarding Against Network Intrusions, Internet Security, The Botnet Problem, Intranet Security, Local Area Network Security.

UNIT II

Wireless Network Security, Cellular Network Security, RFID Security, Protecting Mission-Critical Systems, Security Management Systems, Information Technology Security Management, Identity Management.

UNIT III

Intrusion Prevention and Detection Systems, Computer Forensics, Network Forensics, Firewalls, Penetration Testing, Vulnerability Assessment.

UNIT IV

NET Privacy, Personal Privacy Policies, Virtual Private Networks, Identity Theft, VoIP Security, SAN Security, SAN Devices Security.

UNIT V

Risk Management, Physical Security Essentials, Biometrics, Information Warfare, Security Through Diversity, Reputation Management, Content Filtering, Data Loss Protection.

Text Books:

- Vacca J R (Editor), Computer and Information Security Handbook, 2nd edition, Elsevier / Morgan Kaufmann, 2013.
- Belapure S, Godbole N, Cyber Security, Wiley, 2011.

Reference Books:

- Gogolin G, Digital Forensics Explained, CRC / Auerbach, 2013.
- Godbole N, Information Systems Security, Wiley, 2015.
- Wu C H, Irwin J D, Introduction to Computer Networks and Cyber Security, CRC Press, 2013.
- Singer P W, Friedman A, Cyber Security and Cyber War: What Everyone Needs to Know, Oxford University Press, 2014.
- Boddington R, Practical Digital Forensics, Packt, 2016.
- Drake J J, Lanier Z, et al., Android Hacker's Handbook, Wiley, 2014.
- Graham J, Howard R, Olson R, Cyber Security Essentials, CRC Press, 2010.
- Hadnagy C, Wilson P, Social Engineering: The Art of Human Hacking, Wiley, 2010

Course Outcomes

By the end of this course students will be able to:

- Effectively use cyber security and computer forensics software/tools
- Measure the performance and troubleshoot cyber security systems.
- Protect the network from both internal and external attacks
- Provide new security solutions and implement the same confidently.

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MACHINE LEARNING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the basic concepts, techniques and algorithms used in machine learning.
- Formulate machine learning problems corresponding to different applications.
- Develop skills of using recent machine learning software for solving practical problems.
- Develop skills of using recent machine learning software for solving practical problems.
- Evaluate performance and to identify the limitations of machine learning algorithms.

UNIT I

Introduction to Machine Learning: Well-Posed Learning Problems, Designing a Learning System, Perspectives and Issues in Machine learning.
Concept Learning: Introduction, A Concept Learning Task, Concept Learning as Search, Find-S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate-Elimination Algorithm, Remarks on Version Spaces and Candidate Elimination, Inductive Bias.
Decision Tree Learning: Introduction, Decision Tree Representation. Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Algorithm, Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT II

Artificial Neural Networks: Introduction, Neural Networks Representations, Appropriate Problems for Neural Network Learning, Perceptrons, Multilayer Networks and the Backpropagation Algorithm, Remarks on the Backpropagation Algorithm, An Illustrative Example: Face Recognition, Advanced Topics in Artificial Neural Networks.
Evaluating Hypothesis: Motivation, Estimating Hypothesis Accuracy, Basics of Sampling Theory, A General Approach for Deriving Confidence Intervals, Difference in Error of Two Hypothesis, Comparing Learning Algorithms.

UNIT III

Bayesian Learning: Introduction, Bayes Theorem, Concept Learning, Maximum Likelihood and Least-Squared Error Hypothesis, Maximum Likelihood Hypothesis for Predicting Probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, An Example Learning to Classify Test, Bayesian Belief Networks, The EM Algorithm.

Computational Learning Theory: Introduction, Probably Learning an Approximately Correct Hypothesis, Sample Complexity for Finite Hypothesis Spaces, Sample Complexity for Infinite Hypothesis Spaces, The Mistake Bound Model of Learning.

UNIT IV

Instance-Based Learning: Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

Genetic Algorithms: Motivation, Genetic Algorithms, An Illustrative Example, Hypothesis Space Search, Genetic Programing, Models of Evaluation and Learning, Parallelizing Genetic Algorithms.

Learning Sets of Rules: Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First-Order Rules, Learning Sets of First-Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

UNIT V

Analytical Learning: Introduction, Learning with Perfect Domain Theories: Prolog-EBG, Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

Combining Inductive and Analytical Learning: Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators, State of the Art.

Reinforcement Learning: Introduction, The Learning Task, Q learning, Non-deterministic Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

Text Books:

1. Tom M. Mitchell, Machine Learning, McGraw Hill Education, 2018.

Reference Books:

- Stephen Marsland, Taylor & Francis, Machine Learning: An Algorithmic Perspective, 2nd Edition, CRC Press, 2015.
- Ethem Alpaydin, Introduction to Machine Learning, 2nd Edition, MIT Press, 2010.
- Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach: 3rd Edition, Pearson Education, 2010.
- M.Tim Jones, Artificial Intelligence: A Systems Approach,3rd Edition, Infinity Science Press, New Delhi, 2008.
- Elaine Ritch, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, 3rd Edition, Tata McGraw Hill Education, 2009.

Course Outcomes

Having successfully completed this course the students will be able to:

- Design and implement various machine learning algorithms in a range of real world applications
- Analyze the underlying mathematical relationships within machine learning techniques.
- Realize the strengths and weaknesses of popular machine learning approaches
- Comprehend the concepts in Bayesian analysis from probability models

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BIG DATA ANALYTICS (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Discuss the challenges traditional data mining algorithms face when analyzing Big Data.
- Introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.
- Comprehend machine learning and deep learning algorithms for data analytics.
- Understand how big data analytics can leverage into a key component

UNIT I

Introduction to Analytics and Big Data - Characteristics of Big Data, Domain Specific Examples of Big Data Viz. Web, Financial, Healthcare, IoT, Environment, Logistics & Transportation, Industry, Retail; Analytics Flow for Big Data, Big Data Stack, Mapping Analytics Flow to Big Data Stack, Case Studies: Genome Data Analysis and Weather Data Analysis, Analytics Patterns.

UNIT II

Overview of Setting up Big Data Stack, Big Data Patterns - Analytics Architecture Components & Design Styles, MapReduce Patterns.
NoSQL - Key-Value Databases, Document Databases, Column Family Databases, Graph Databases.

UNIT III

Data Acquisition - Data Acquisition Considerations, Publish-Subscribe Messaging Frameworks, Big Data Collection Systems, Messaging Queues, Custom Connectors.
Big Data Storage - HDFS: Architecture and Usage Examples.
Batch Analysis - Hadoop and MapReduce, Hadoop-MapReduce Examples, Pig, Case Study: Batch Analysis of News Articles, Apache Oozie, Apache Spark, Apache Solr.

UNIT IV

Real-time Analysis - Stream Processing, Storm Case Studies, In-Memory Processing, Spark Case Studies.
Interactive Querying - Spark SQL, Hive, Amazon Redshift, Google BigQuery.
Serving Databases & Web Frameworks - Relational (SQL) Databases, Non-Relational (NoSQL) Databases, Python Web Application Framework-Django, Case Study: Django application for viewing weather data.

UNIT V

Analytics Algorithms - Frameworks, Clustering, Case Study: Song Recommendation System, Classification & Regression, Case Studies: Classifying Handwritten Digits and Genome Data Analysis (Implementation), Recommendation Systems.
Data Visualization - Frameworks & Libraries, Overview of Visualization Examples.

Text Books:

- Arshdeep Bhaga, Vijay Madisetti, Big Data Science and Analytics: A Hands-On Approach, 1st Edition, VPT Publishers, 2019.
- Michael Minelli, Michele Chambers, Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley, 2013.

Reference Books:

- EMC Education Services, "Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2016.
- Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012.
- Rajkumar Buyya, Rodrigo N. Calheiros and Amir Vahid Dastjerdi (Editors), "Big
- Data Principles and Paradigms", Morgan Kaufmann (An imprint of Elsevier), 2016.
- Colleen McCue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007.
- Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
- Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
- Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data
- Streams with Advanced Analytics", Wiley and SAS Business Series, 2012.
- Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, "Understanding Big Data: Analytics
- for Enterprise Class Hadoop and Streaming Data", McGraw Hill, 2011.

Course Outcomes

By the end of this course students will be able to

- Understand big data challenges in different domains viz. social media, transportation, finance, medicine and apply the concepts of big data analytics for the said domains.
- Apply several newer algorithms for Clustering, Classifying and finding associations in Big Data
- Design and develop Hadoop and Map Reduce Framework
- Handle several Data Intensive tasks using the Map Reduce Paradigm

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CLOUD COMPUTING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand fundamental concepts of cloud computing and its services.
- Demonstrate an understanding of Service models, deployment models andVirtualization
- Understand the programming and implementation issues of Cloud

UNIT I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Biocomputing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing, Network Computing.

Cloud Computing Fundamentals: Motivation for Cloud Computing, Defining Cloud Computing, 5-4-3 Principles of Cloud computing, Cloud Ecosystem, Requirements for Cloud Services, Cloud Application, Benefits and Drawbacks.

Cloud Computing Architecture and Management: Introduction, Cloud Architecture, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Migrating Application to Cloud.

Cloud Deployment Models: Introduction, Private Cloud, Public Cloud, Community Cloud, Hybrid Cloud.

UNIT II

Cloud Service Models: Introduction, Infrastructure as a Service, Platform as a Service, Software as a Service, Other Cloud Service Models.

Technological Drivers for Cloud Computing: Introduction, SOA and Cloud, Virtualization, Multicore Technology, Memory and Storage Technologies, Networking Technologies, Web 2.0, Web 3.0, Software Process Models for Cloud, Programming Models, Pervasive Computing, Operating System, Application Environment.

UNIT III

Virtualization: Introduction, Virtualization Opportunities, Approaches to Virtualization, Hypervisors, From Virtualization to Cloud Computing.

Programming Models for Cloud Computing: Introduction, Extended Programming Models for Cloud, New Programming Models Proposed for Cloud,

Software Development in Cloud: Introduction, Different Perspectives on SaaS Development, New Challenges, Cloud-Aware Software Development Using PaaS Technology.

UNIT IV

Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers, Transport Layer Issues in DCNs, TCP Enhancements for DCNs.

Cloud Service Providers: Introduction, EMC, Google, Amazon Web Services, Microsoft, IBM, SAP Labs, Salesforce, Rackspace, VMware, Manjrasoft.

UNIT V

Open Source Support for Cloud: Introduction, Open Source Tools for IaaS, Open Source Tools for PaaS, Open Source Tools for SaaS, Open Source Tools for Research, Distributed Computing Tools for Management of Distributed Systems.

Security in Cloud Computing: Introduction, Security Aspects, Platform-Related Security Audit and Compliance.

Advanced Concepts in Cloud Computing: Intercloud, Cloud Management, Mobile Cloud, Media Cloud, Interoperability and Standards, Cloud Governance, Computational Intelligence in Cloud, Green Cloud, Cloud Analytics.

Text Books:

1. K. Chandrasekaran, Essentials of Cloud Computing, CRC press, 2014.

Reference Books:

- Buyya R, Vecchiola C, Selvi S T, Mastering Cloud Computing, McGraw Hill Education (India), 2013.
- Dan C. Marinescu, Cloud Computing - Theory and Practice, Morgan Kaufmann (an imprint of Elsevier), 2013.
- Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing - Principles and Paradigms, Wiley India, 2011.
- Kai Hwang, Geoffrey C Fox, Jack J Dongarra, Distributed and Cloud Computing - From Parallel Processing to the Internet of Things, Morgan Kaufmann (an imprint of Elsevier), 2012.
- Tim Mather, SubraKumaraswamy, ShahedLatif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'Reilly.
- Rittinghouse J W, Ransome J F, Cloud Computing - Implementation, Management, and Security, CRC Press, 2010.
- Velte A T, Velte T J, Cloud Computing - A Practical Approach, McGraw Hill, 2011.
- Shroff G, Enterprise Cloud Computing - Technology, Architecture, Applications, Cambridge University Press, 2010.
- Antonopoulos N, Gillam L, Cloud Computing - Principles, Systems and Applications, Springer, 2010.
- Furht B, Escalante A, Handbook of Cloud Computing, Springer, 2010.

Course Outcomes

By the end of this course students will be able to:

- Develop the ability to understand the basics of cloud computing and different cloud deployment models.
- Handle resource management and security issues of cloud computing.
- Evaluate the performance of different cloud service models.
- Identify, analyze and use different cloud services/applications/tools available from key cloud providers.

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IMAGE PROCESSING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand the fundamentals of Digital imaging and Image Processing techniques.
- Discuss the concepts of image compression and segmentation.
- Evaluate the performance of image processing algorithms and systems.

UNIT I

Introduction: Fundamentals of Image Processing, Applications of Image Processing, Human Visual Perception, Introduction to Image Formation, Sampling and Quantization, Binary Image, Three-Dimensional Imaging, Image file formats. Color and Color Imagery: Perception of Colors.

UNIT II

Image Transformation: Fourier Transforms, Discrete Cosine Transform, Walsh-adamard Transform, Karhaunen-Loeve Transform or PCA. Discrete Wavelet Transform: Wavelet Transform, Extension to 2D Signals, Lifting Implementation of the Discrete Wave Transforms.

UNIT III

Image Enhancement and Restoration : Introduction, Distinction between image enhancement and restoration, Histrogram-based Contrast Enhancement, Frequency Domain Methods of Image Enhancement, Noise Modeling, Image Restoration, Image Reconstruction, Image Segmentation.

UNIT IV

Recognition of Image Patterns : Introduction, Decision Theoretic Pattern Classification, Baesian Decision Theory, Nonparametric Classification, Linear Discriminant Analysis, Unsupervised Classification Strategies-clustering, K-means clustering algorithm, Syntactic Pattern Classification, Syntactic Inference, Symbolic Projection method. Texture and Shape Analysis.

UNIT V

Fuzzy Set Theory in Image Processing : Introduction, Use of Fuzzy Image, Preliminaries and Background, Image as a Fuzzy Set, Fuzzy Methods of Contrast Enhancement, Image Segmentation using Fuzzy Methods, Fuzzy Approaches to Pixel Classification, Fuzzy c-Means Algorithm, Fusion of Fuzzy logic with neural network. Image mining and Content-Based Retrieval.

Text Books:

- Maria Petrou and Costas Petrou , “Image Processing the Fundamentals”, John-Wiley and Sons Publishers, 2nd edition, 2010.
- Rafael C. Gonzalez , Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", 2nd edition, Gatesmark Publishing, 2009.
- Tinku Acharya and Ajoy K. Ray, “Image Processing Principles and Applications”, John Wiley & Sons publishers, 2005.

Reference Books:

- Rafael Gonzalez and Richard E. Woods, Digital Image Processing, 4th edition, Pearson, 2017.
- Anil K Jain, Fundamentals of Digital Images Processing, First edition, Pearson, 2015.

Course Outcomes

By the end of this course students will be able to:

- Understand Image representation and modeling.
- Design and apply image enhancement and restoration techniques
- Develop image processing techniques for assisting digital forensics

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SOFT COMPUTING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand basic ANN architectures, algorithms and their limitations
- Understand the concepts of feed forward and feedback ANN.
- Discuss the Fuzzy logic concepts, Fuzzy principles and relations
- Familiarize Genetic Algorithm and its applications to Soft Computing.
- Design and develop ML techniques with assistance of MATLAB

UNIT I

Introduction of soft computing - Soft computing vs. Hard computing- Various types of soft computing techniques- Applications of soft computing-Neuron- Nerve structure and synapse- Artificial Neuron and its model- Activation functions- Neural network architecture- Single layer and Multilayer feed forward networks- McCullochPitts neuron model- Perceptron model- MLP- Back propagation learning methods- Effect of learning rule coefficient.

UNIT II

Counter propagation network - Architecture - Functioning & Characteristics of counter-propagation network - Hopfield/ Recurrent network – Configuration - Stability constraints associative memory- and characteristics- Limitations and applications- Hopfield vs Boltzman machine - Adaptive Resonance Theory – Architecture – Classifications -Implementation and training-Associative Memory.

UNIT III

Different faces of imprecision - Inexactness, Ambiguity, Undecidability, Fuzziness and certainty, Fuzzy sets and Crisp sets. Intersections of Fuzzy sets, Union of Fuzzy sets, the complement of Fuzzy sets - Fuzzy reasoning. Linguistic variables, Fuzzy propositions, Fuzzy compositional rules of inference - Methods of decompositions and Defuzzification.

UNIT IV

Basic concept of Genetic algorithm and detail algorithmic steps - Adjustment of free parameters- Solution of typical control problems using Genetic algorithm - Concept on some other search techniques like tabu search and ant colony search techniques for solving optimization problems.

UNIT V

GA application to optimization problems - Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB - Neural Network toolbox. Stability analysis of Neural Network interconnection systems - Implementation of fuzzy logic controller using MATLAB fuzzy logic toolbox - Stability analysis of fuzzy control systems.

Text Books:

- Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Wiley India, 3rd edition, 2012.
- Zimmermann H. J. "Fuzzy set theory and its Applications" Springer international edition, 2011.
- David E. Goldberg, "Genetic Algorithms in Search, Optimization, and Machine Learning", Pearson Education, 2009.
- Laurene V. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms, And Applications", Pearson Education, 1st edition, 1993.
- W. T. Miller, R. S. Sutton and P. J. Webros, "Neural Networks for Control", MIT Press, 1996.

Reference Books:

1. S. Rajasekaran, and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis, and Applications, Prentice Hall of India, 2007.

Course Outcomes

By the end of this course students will be able to:

- Comprehend the fuzzy logic and the concept of fuzziness involved in various systems.
- Understand the role of soft computing techniques in solving real world applications
- Build optimal classifiers using genetic algorithms
- Implement fuzzy logic controller using MATLAB fuzzy logic toolbox

CS704O

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VII Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2023-24)

OPEN ELECTIVE II (Through MOOCs)

No.of Credits: 3 Instruction Hours/Week: 2L+2P

- Open elective courses are to be successfully completed on SWAYAM online portal of Government of India.
- Courses offered by Department as Program Core/ Program Elective/ Audit courses shall not be opted as open elective.

CS705O

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VII Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2023-24)

OPEN ELECTIVE III (Through MOOCs)

No.of Credits: 3 Instruction Hours/Week: 2L+2P

- Open elective courses are to be successfully completed on SWAYAM online portal of Government of India.
- Courses offered by Department as Program Core/ Program Elective/ Audit courses shall not be opted as open elective.

HSS706E

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VII Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2023-24)

OPTIMIZATION TECHNIQUES

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Cast engineering extrema (minima/maxima) problems into optimization framework.
- Learn efficient computational procedures to solve optimization problems.

UNIT I

Overview of Operations Research, Modeling approach, Decision analysis and Games-Decision environments, Decision making under certainty, Decision making under risk, Decision making under uncertainty, Game theory.

UNIT II

Liner Programming – Formulation, Graphical method, Simplex method, Duality, Formulation of transportation, Assignment and Transshipment models. Goal programming – Formulation, Weighting and Preemptive methods.

UNIT III

Integer Linear Programming – Applications, Branch and bound, and Cutting plane algorithms.

UNIT IV

Nonlinear Programming - Sample applications, Graphical illustration of nonlinear programming problems, Types of nonlinear programming problems, One-variable unconstrained optimization, Multivariable unconstrained optimization.

UNIT V

Karush-Kuhn-Tucker conditions for constrained optimization, Quadratic programming, Separable programming, Convex programming and Non-convex programming.

Text Books:

- Hillier F S, and Lieberman G J, *Introduction to Operations Research*, 7th edition, Tata McGraw-Hill, 2003.

Reference Books:

- Taha H A, Operations Research – An Introduction, 8th edition, Prentice Hall of India, 2006.
- Wagner H M, Principles of Operations Research with Applications to Managerial Decisions, 2nd edition, Prentice Hall of India, 2004.
- Tulsian P C, and Pandey V, Quantitative Techniques – Theory and Problems, Pearson Education Asia, 2002.

Course Outcomes

After successful completion of the course, student will be able to

- Apply basic concepts of mathematics to formulate an optimization problem
- Analyse and appreciate variety of performance measures for various optimization problems
- Select appropriate solution technologies and strategies,
- Interpret the solution of an optimization problem
- Understand the effects of problem variation on the optimal solution.

CS707S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VII Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2023-24)

MOBILE APPLICATION DEVELOPMENT

No.of Credits: 2 Instruction Hours/Week: 2L+2P

Course Objectives

The course is designed to

- Impart both conceptual and practical knowledge on Android OS.
- Understand and develop robust applications for Mobile devices on Android platform.

The course shall cover the following topics:

- **Introduction to Android Programming:** What is Android?, Obtaining the Required
- Tools, Launching Your First Android Application.
- **Using Android Studio for Android Development:** Exploring the IDE, Using Code
- Completion, Debugging Your Application, Publishing Your Application.
- **Activities, Fragments, and Intents:** Understanding Activities, Linking Activities
- Using Intents, Fragments, Displaying Notifications.
- **Introduction to Android User Interface:** Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Creating the User Interface Programmatically, and Listening for UI Notifications.
- **Designing User Interface with Views:** Using Basic Views, Using Picker Views, Using List Views to Display Long Lists, Understanding Specialized Fragments.
- **Displaying Pictures and Menus with Views:** Using Image Views to Display
- Pictures, Using Menus with Views, Using WebView.
- **Data Persistence:** Saving and Loading User Preferences, Persisting Data to Files, Creating and Using Databases.
- **Content Providers:** Sharing Data in Android, Using a Content Provider, Creating
- Your Own Content Providers, Using the Content Provider.
- **Messaging:** SMS Messaging, Sending Email.
- **Location-Based Services:** Displaying Maps, Getting Location Data, Monitoring aLocation.
- **Networking:** Consuming Web Services Using HTTP, Consuming JSON Services.
- **Developing Android Services:** Creating Your Own Services, Establishing Communication Between a Service and an Activity, Binding Activities to Services, Understanding Threading.
- **Publishing Android Applications:** Preparing for Publishing, Deploying APK Files.

Text Books:

- J. F. DiMarzio, Beginning Android Programming with Android Studio, John Wiley & Sons, Inc., Fourth Edition, 2017.
- Wei-Meng Lee, Beginning Android™ 4 Application Development, John Wiley & Sons, Inc., 2012.

Reference Books:

- Ian Darwin, Android Cookbook: Problems and Solutions for Android Developers, O'Reilly, Second Edition, 2017.
- Bill Phillips, Chris Stewart and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch, Third Edition, 2017.
- Wei-Meng Lee, Android™ Application Development Cookbook: 93 Recipes for Building Winning Apps, John Wiley & Sons, Inc., 2013.
- Peter Späth, Pro Android with Kotlin: Developing Modern Mobile Apps, Apress, 2018.
- Neil Smyth, Android Studio 3.0 Development Essentials – Android 8 Edition, Neil Smyth / Payload Media, Inc., 2017.

Course Outcomes

Having successfully completed this course the students will be able to:

- Demonstrate their skills of using Android software development tools
- Demonstrate knowledge on mobile platforms, mobile user interface and user interface design requirements.
- Develop mobile applications and publish in different mobile platforms.

CS/PROJ

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VIII Semester B.Tech (CSE) – CBCS Regulations-2020 (With effect from the academic year 2023-24)

PROJECT WORK, SEMINAR AND INTERNSHIP IN INDUSTRY

No.of Credits: 12

Students, not exceeding four per batch, shall pursue either research-oriented or application-oriented Project Work. The steps to be followed in executing the Project Work are given below:

Research-Oriented Project Work

1. Motivation
2. Literature Survey
3. Problem Definition
4. Model Formulation (System Model)
5. System Design/ Algorithm Development
6. Proof of Correctness
7. Performance Analysis
8. Performance Measurement
9. Results and Conclusions

Application-Oriented Project Work

1. Motivation
2. Problem Definition
3. Feasibility Study
4. Software Requirements Analysis
5. Software Design
6. Test Case Design
7. Coding
8. Testing
9. Conclusions

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

Choice Based Credit System – 2020 Regulations

Scheme of Instruction and Examinations

List of subjects for B.Tech (Honors) in Computer Science and Engineering**

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CSHN01	Distributed Databases	3	1		4	4
CSHN02	Advanced Operating Systems	3	1		4	4
CSHN03	Multicore Computing	3	1		4	4
CSHN04	Natural Language Processing	3	1		4	4
CSHN05	Software Architecture and Design Patterns	3	1		4	4
CSHN06	Multi Agent Systems	3	1		4	4
CSHN07	Deep Learning	3	1		4	4
CSHN08	Advanced Parallel Processing	3	1		4	4

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

** Students shall register for any 4 subjects (4*4 = 16 credits) from the above listed subjects, choosing one subject each in IV, V, VI and VII semester. Further, they shall acquire 4 credits through two MOOCs (each of 2 credits), which shall be discipline-specific.

CSHN 01

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

DISTRIBUTED DATABASES

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- To expose the need for distributed database technology to confront with the
- deficiencies of the centralized database systems.
- To introduce basic principles and implementation techniques of distributed database systems.
- To familiarize students with the principles and knowledge of parallel databases.

UNIT I

Introduction: What Is a Distributed Database System?, History of Distributed DBMS, Data Delivery Alternatives, Promises of Distributed DBMSs, Design Issues, Distributed DBMS Architectures.

Distributed and Parallel Database Design: Data Fragmentation, Allocation, Combined Approaches, Adaptive Approaches, Data Directory.

Distributed Data Control: View Management, Access Control, Semantic Integrity Control.

UNIT II

Distributed Query Processing: Overview, Data Localization, Join Ordering in Distributed Queries, Distributed Cost Model, Distributed Query Optimization, Adaptive Query Processing.

Distributed Transaction Processing: Background and Terminology, Distributed Concurrency Control, Distributed Concurrency Control Using Snapshot Isolation, Distributed DBMS Reliability, Modern Approaches to Scaling Out Transaction Management.

UNIT III

Data Replication: Consistency of Replicated Databases, Update Management Strategies, Replication Protocols, Group Communication, Replication and Failures.

Database Integration - Multidatabase Systems: Database Integration, Multidatabase Query Processing.

Parallel Database Systems: Objectives, Parallel Architectures, Data Placement, Parallel Query Processing, Load Balancing, Fault-Tolerance, Database Clusters.

UNIT IV

Peer-to-Peer Data Management: Infrastructure, Schema Mapping in P2P Systems, Querying Over P2P Systems, Replica Consistency, Blockchain.

Big Data Processing: Distributed Storage Systems, Big Data Processing Frameworks, Stream Data Management, Graph Analytics Platforms, Data Lakes.

UNIT V

NoSQL, NewSQL, and Polystores: Motivations for NoSQL, Key-Value Stores, Document Stores, Wide Column Stores, Graph DBMSs, Hybrid Data Stores, Polystores.

Web Data Management: Web Graph Management, Web Search, Web Querying, Question Answering Systems, Searching and Querying the Hidden Web, Web Data Integration.

Course Outcomes:
After completion of the course the students will be able to

- Design and implement distributed databases.
- Handle query processing in a distributed database system.
- Comprehend transaction management and analyze various approaches to concurrency control in distributed databases.
- Design and implement various algorithms and techniques for deadlock and recovery in distributed databases.

Text Books:

1. M. Tamer Ozsu and Patrick Valduriez, "Principles of Distributed Database Systems", Fourth Edition, Springer, 2020.

Reference Books:

- Stefano Ceri and Giuseppe Pelagatti, Distributed Databases: Principles and Systems, McGraw Hill Education, 2017.
- Saeed K. Rahimi and Frank S. Haug, Distributed Database Management Systems: A Practical Approach, Wiley.
- Chhanda Ray, Distributed Database Systems, First Edition, Pearson Education India.
- Sachin Deshpande, Distributed Databases, Dreamtech Press.
- David Bell and Jane Grimson, Distributed Database Systems, First Edition, Addison-Wesley, 1992.
- Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: Database Systems: The Complete Book, Second Edition, Pearson Education.

CSHN 02

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

ADVANCED OPERATING SYSTEMS

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives:

- Familiarize the students with the basics of hardware and software issues in distributed computing systems.
- Understand issues related to Synchronization, mutual exclusion, naming, synchronization, consistency and replication,
- Introduce the concepts of distributed file systems, distributed shared virtual memory fault tolerance and deadlocks in distributed systems.

UNIT I

Distributed systems – Introduction, Hardware concepts, Software concepts and Design issues. Layered protocols, Asynchronous transfer mode networks, Client server model, Remote procedure call, Group communication.

UNIT II

Clock synchronization, Mutual exclusion, Election algorithms, Atomic transactions, Deadlocks in distributed systems.
Threads, System models, Processor allocation, Scheduling in distributed systems.

UNIT III

Fault tolerance, Real-time distributed systems, Distributed file systems – Design, Implementation and Trends.
Distributed shared memory – Introduction and shared memory concept.

UNIT IV

DSM Consistency models, Page-based distributed shared memory.
Case study Amoeba – Introduction, Objects and capabilities, Process management, Memory management, Communication and Servers.

UNIT V

Multimedia operating systems – Introduction, Multimedia files, Video compression, Audio compression, Multimedia process scheduling, Multimedia file system paradigms, File placement, Caching, Disk scheduling for multimedia.

Text Books:

- Tanenbaum A S, Distributed Operating Systems, Pearson Education, 2005.
- Tanenbaum A S, Modern Operating Systems, 3rd Edition, Pearson Education, 2008.

Reference Books:

1. Andrew S Tanenbaum Maarten Van Steen, Distributed Systems: Principles and Paradigms, Pearson, 2006.

Course Outcomes:

After completion of the course the students will be able to

- Understand the design principles in distributed operating systems and the architectures for distributed systems
- Implement clock synchronization, concurrency control, deadlock detection, load balancing related to distributed operating systems.
- Efficiently handle the issues of Mutual Exclusion and Deadlock detection and recovery in distributed operating systems.
- Design and implement distributed file systems and Distributed shared virtual memory.

CSHN 04

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

NATURAL LANGUAGE PROCESSING

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives:

The course is designed to

- Understand computational properties of natural languages and the commonly used algorithms for processing linguistic information.
- Learn basics of semantic analysis and discourse analysis and drives it to machine translation
- Learn how to process written text from basic of fundamental knowledge of Finite automata, Regular expression and probabilistic model with n-grams.

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UNIT I

Introduction to SLP, Regular Expressions and Automata, Words and Transducers, N-grams, Part-of-Speech Tagging, Hidden Markov and Maximum Entropy Models.

UNIT II

Phonetics, Speech Synthesis, Automatic Speech Recognition, Speech Recognition: Advanced Topics, Computational Phonology.

UNIT III

Formal Grammars of English, Syntactic Parsing, Statistical Parsing, Features and Unification, Language and Complexity.

UNIT IV

Semantics and Pragmatics, The Representation of Meaning, Computational Semantics, Lexical Semantics, Computational Lexical Semantics, Computational Discourse.

UNIT V

Information Extraction, Question Answering and Summarization, Dialogue and Conversational Agents, Machine Translation.

Course Outcomes:

After completion of the course the students will be able to

- Comprehend and analyze the various elements of speech processing
- Design and develop machine learning techniques in the area of NLP
- Demonstrate the state-of-the-art algorithms and techniques for text-based processing
- Perform POS tagging for a given natural language

.

Text Books:

1. Jurafsky D, Martin J H, *Speech and Language Processing: An Introduction to Natural Language Processing*, Computational Linguistics and Speech Recognition, 2nd edition, Pearson Education, 2013.

Reference Books:

- Chopra D, Joshi N, Mastering Natural Language Processing with Python, Packt, 2016.
- Watanabe S, Jen-Tzung Chien J T, Bayesian Speech and Language Processing, Cambridge University Press, 2015.
- Kurdi M Z, Natural Language Processing and Computational Linguistics: Speech, Morphology and Syntax, Wiley, 2016.
- Tiwary U S, Siddiqui T, Natural Language Processing & Information Retrieval, Oxford University Press, 2008.
- Bikel D M, Zitouni I, Multilingual Natural Language Processing Applications: From Theory to Practice, Pearson Education, 2012.
- Bharati A, Chaitanya V, Sangal R, Natural Language Processing: A Paninian Perspective, PHI, 1995.
- Steven B, Natural Language Processing with Python, Shroff, 2009.
- 8. Mariani J, Language and Speech Processing, Wiley, 2013.

CSHN 05

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives:

The course is designed to

- Impart knowledge on the different architectural styles and architectural patterns for the software
- Understand design patterns and their underlying object oriented concepts
- Focus on the architectural design issues as well as the use of design patterns for different applications

UNIT I

Design Patterns: Origin and History, Architectural to Software Design Patterns, What Is a Design Pattern?, More about Design Patterns.

UML: A Quick Reference - Structure Diagrams, Behavior Diagrams, Model Management Diagram, Class Diagrams, Sequence Diagrams.

Basic Patterns: Interface, Abstract Parent Class, Private Methods, Accessor Methods, Constant Data Manager, Immutable Object, Monitor.

UNIT II

Creational Patterns: Factory Method, Singleton, Abstract Factory, Prototype, Builder.

Collectional Patterns: Composite, Iterator, Flyweight, Visitor.

UNIT III

Structural Patterns: Decorator, Adapter, Chain of Responsibility, Façade, Proxy, Bridge, Virtual Proxy, Counting Proxy, Aggregate Enforcer, Explicit Object Release, Object Cache.

UNIT IV

Behavioral Patterns: Command, Mediator, Memento, Observer, Interpreter, State, Strategy, Null Object, Template Method, Object Authenticator, Common Attribute Registry.

UNIT V

Concurrency Patterns: Critical Section, Consistent Lock Order, Guarded Suspension, Read-Write Lock.

Case Study: A Web Hosting Company – Objective, KPS Hosting Solutions: A Brief Overview, Requirements, Business Objects and Their Association, Framework for Application Processing, Conclusion.

Text Books:

1. Partha Kuchana, Software Architecture Design Patterns in Java, Auerbach Publications – A CRC Press Company, 2004.

Reference Books:

- Mark Richards, Neal Ford, Fundamentals of Software Architecture: An Engineering Approach, O'Reilly, First Edition, 2020.
- Kamalmeet Singh, Adrian Ianculescu, Lucian-Paul Torje, Design Patterns and Best Practices in Java: A Comprehensive Guide to Building Smart and Reusable Code in Java, Packt Publishing, First Edition, 2018.
- Erich Gamma, Design Patterns, Pearson Education.
- Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley/Pearson Education, 1995.
- Steven John Metsker, William C. Wake, Design Patterns in Java, Addison-Wesley/ Pearson Education, 2006.
- Alan Shalloway, James R. Trott, Design Patterns Explained: A New Perspective on Object-Oriented Design, Pearson Education, 2004.
- Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, Pattern-Oriented Software Architecture: A System of Patterns, John Wiley & Sons, 1996.
- Len Bass, Paul Clements, Rick Kazman, Software Architecture in Practice, Addison-Wesley Professional, Third Edition, 2012.

Course Outcomes:

After completion of the course the students will be able to

- Apply his knowledge to create an architecture for given application.
- Explain the role of analyzing architectures.
- Able to identify different structural patterns.
- Design creational, structural and behavioral patterns.
- Recognize major software architectural styles, design patterns, and frameworks.

CSHN 07

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

DEEP LEARNING

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives:

The course is designed to

- Learn some advanced topics such as recurrent neural networks, long short term memory cells and convolutional neural networks.
- Learn deep recurrent and memory networks and deep Turing machines
- Understand different types of deep learning network models.

UNIT I

Introduction to Machine Learning: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning.

UNIT II

Review of fundamental learning techniques, Feed forward neural network - Artificial Neural Network, activation function, multi-layer neural network, Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization. Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.

UNIT III

Deep Feedforward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms, Historical Notes.

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

UNIT IV

Optimization for Training Deep Models: How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

Convolutional Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuroscientific Basis for Convolutional Networks, Convolutional Networks and the History of Deep Learning.

UNIT V

Sequence Modeling: Recurrent and Recursive Nets, Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long-Term Dependencies, Explicit Memory.

Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition.

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

Course Outcomes:

After completion of the course the students will be able to

- Explain different types of deep learning network models
- Apply optimization techniques to improve the performance of deep neural networks.
- Implement tools on Deep Learning techniques.

Text Books:

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.

Reference Books:

- Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
- Yegnanarayana, Artificial Neural Networks, B., PHI Learning Pvt. Ltd, 2009.
- Raúl Rojas, Neural Networks: A Systematic Introduction, Springer, 1996.
- Golub, G.,H., and Van Loan,C.,F, Matrix Computations, JHU Press,2013.
- Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.
- M Tim Jones, Artificial Intelligence - A Systems Approach, Infinity Science Press, 2008.
- Russel S, Norvig P, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson Education, 2010.

CSHN 08

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

ADVANCED PARALLEL PROCESSING

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives:

The course is designed to

- Understand engineering trade-offs involved in designing modern parallel computers
- Develop programming skills to effectively implement parallel architecture

UNIT I

Introduction: Heterogeneous Parallel Computing, Architecture of a Modern GPU, Why More Speed or Parallelism?, Speeding Up Real Applications, Parallel Programming Languages and Models, Overarching Goals.

History of GPU Computing: Evolution of Graphics Pipelines, GPGPU: An Intermediate Step, GPU Computing.

Introduction to Data Parallelism and CUDA C: Data Parallelism, CUDA Program Structure, A Vector Addition Kernel, Device Global Memory and Data Transfer, Kernel Functions and Threading.

UNIT II

Data-Parallel Execution Model: Cuda Thread Organization, Mapping Threads to Multidimensional Data, Matrix-Matrix Multiplication - A More Complex Kernel, Synchronization and Transparent Scalability, Assigning Resources to Blocks, Querying Device Properties, Thread Scheduling and Latency Tolerance.

CUDA Memories: Importance of Memory Access Efficiency, CUDA Device Memory Types, A Strategy for Reducing Global Memory Traffic, A Tiled Matrix-Matrix Multiplication Kernel, Memory as a Limiting Factor to Parallelism.

Performance Considerations: Warps and Thread Execution, Global Memory Bandwidth, Dynamic Partitioning of Execution Resources, Instruction Mix and Thread Granularity.

UNIT III

Parallel Patterns: Convolution – Background, 1D Parallel Convolution - A Basic Algorithm, Constant Memory and Caching, Tiled 1D Convolution with Halo Elements, A Simpler Tiled 1D Convolution - General Caching.

Parallel Patterns: Prefix Sum – Background, A Simple Parallel Scan, Work Efficiency Considerations, A Work-Efficient Parallel Scan, Parallel Scan for Arbitrary-Length Inputs.

Parallel Patterns: Sparse Matrix-Vector Multiplication – Background, Parallel SpMV Using CSR, Padding and Transposition, Using Hybrid to Control Padding, Sorting and Partitioning for Regularization.

UNIT IV

Application Case Study: Molecular Visualization and Analysis – Application Background, A Simple Kernel Implementation, Thread Granularity Adjustment, Memory Coalescing.

Parallel Programming and Computational Thinking: Goals of Parallel Computing, Problem Decomposition, Algorithm Selection, Computational Thinking.

An Introduction to OpenCL™: Background, Data Parallelism Model, Device Architecture, Kernel Functions, Device Management and Kernel Launch, Electrostatic Potential Map in OpenCL.
Parallel Programming with OpenACC: OpenACC versus CUDA C, Execution Model, Memory Model, Basic OpenACC Programs, Future Directions of OpenACC.

UNIT V
Thrust: A Productivity-Oriented Library for CUDA – Background, Motivation, Basic Thrust Features, Generic Programming, Benefits of Abstraction, Programmer Productivity, Best Practices.
Programming a Heterogeneous Computing Cluster: Background, A Running Example, MPI Basics, MPI Point-to-Point Communication Types, Overlapping Computation and Communication, MPI Collective Communication.
CUDA Dynamic Parallelism: Background, Dynamic Parallelism Overview, Important Details, Memory Visibility, A Simple Example, Runtime Limitations, A more Complex Example.

Course Outcomes:
After completion of the course the students will be able to

- Design and implement parallel programs in environments such as CUDA, OpenMP
- Generate parallel programs for matrix, graph and sorting problems using CUDA
- library
- Learn about different OpenMP programming, MPI programming,
- Develop parallel programs using OpenCL library
- Analyze the functionality of GPU architecture using parallel computing platform
- CUDA.

Text Books:

1. David B. Kirk and Wen-mei W. Hwu, Programming Massively Parallel Processors: A Hands-on Approach, Morgan Kaufmann/ Elsevier, Second Edition, 2013.

Reference Books:

- Peter Pacheco, Matthew Malensek, An Introduction to Parallel Programming, Morgan Kaufmann/ Elsevier, Second Edition, 2022.
- Roman Trobec, Boštjan Slivnik, Patricio Bulić, Borut Robič, Introduction to Parallel Computing: From Algorithms to Programming on State-of-the-Art Platforms, Springer International Publishing, 2018.
- Bertil Schmidt, Jorge Gonzalez- Dominguez, Christian Hundt, Moritz Schlarb, Parallel Programming: Concepts and Practice, Morgan Kaufmann/ Elsevier, 2017.
- Gerassimos Barlas, Multicore and GPU Programming: An Integrated Approach, Elsevier Science, 2014.
- Nicholas Wilt, The CUDA Handbook: A Comprehensive Guide to GPU Programming, Addison-Wesley/ Pearson Education, 2013.
- Rob Farber, CUDA Application Design and Development, Morgan Kaufmann/ Elsevier, 2011.

- Geoffrey C. Fox, Roy D. Williams, Guiseppe C. Messina, Parallel Computing Works!, Elsevier Science, 2014.
- Janusz Kowalik, Tadeusz Puźniakowsk, Using OpenCL: Programming Massively Parallel Computers, IOS Press, 2012.
- Wen-mei W. Hwu, David B. Kirk and Izzat El Hajj, Programming Massively Parallel
- Processors: A Hands-on Approach, Morgan Kaufmann, Fourth Edition, 2022.
- S K Basu, Parallel and Distributed Computing: Architectures and Algorithms, Prentice Hall, 2016.
- Kai Hwang, Jack J. Dongarra, Geoffrey C. Fox, Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Morgan Kaufmann/ Elsevier,2013.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

Scheme of Instruction and Examinations

List of subjects for B.Tech (Minor) in Computer Science and Engineering**

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CSMN01	Data Structures	3	1		4	4
CSMN02	Computer Organization	3	1		4	4
CSMN03	Database Management Systems	3	1		4	4
CSMN04	Computer Networks	3	1		4	4
CSMN05	Software Engineering	3	1		4	4
CSMN06	Java and Web Technology	3	1		4	4

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

** Students shall register for any 4 subjects (4*4 = 16 credits) from the above listed subjects, choosing one subject each in IV, V, VI and VII semester. Further, they shall acquire 4 credits through two MOOCs (each of 2 credits), which shall be discipline-specific.

CSMN 01

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

DATA STRUCTURES

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- Develop skills to design and analyze linear and nonlinear data structures.
- Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
- Develop recursive algorithms as they apply to trees and graphs.
- Strengthen the ability to identify and apply the suitable data structure for the given real world problem.
- Understand the various techniques of sorting and searching.

UNIT I

Introduction: Data types/Objects/Structures, Abstract definition of Data Structures, Overview of linear and nonlinear data structures, Analysis of algorithms, Algorithm specification, Asymptotic notation, Time-Space trade-off, Searching: Linear, Binary and Fibonacci search and their complexity analysis.

Arrays: Definition, Multidimensional arrays, Pointer arrays, Representation of arrays – Row major and Column major orders, Application of arrays – Polynomials, Sparse matrices representation.

UNIT II

Stacks and Queues: Introduction, ADT, Array Representation, Operations and Applications of Stacks - Evaluation of expressions, Code generation for stack machines, Implementation of recursion, Factorial calculation and Towers of Hanoi; Circular Queue, Priority Queue, Double ended queue, Applications of Queues - Simulation, CPU Scheduling; Multiple stacks and queues.

UNIT III

Linked Lists: Single linked lists and chains, Circular linked list, Doubly linked list, Circular doubly linked list, Complexity analysis of the same, Linked representation of Stacks and Queues, Applications of linked lists - Polynomial representation, Sparse matrix multiplication, Dynamic storage management; Generalized list representation, Recursive algorithms for lists, Recursive lists.

UNIT IV

Trees: Basic tree terminologies, Binary Trees – Definition, Properties, ADT, Representations, Operations and Applications; Binary Search Trees, Heap Trees, Threaded binary trees, Height balanced trees – AVL Trees, Red black tree, Splay tree Their operations and complexity analysis.

UNIT V

Sorting Techniques: Insertion sort, Selection sort, Bubble sort, Quick Sort, Radix sort, Merge sort, External sort – Introduction, K-way Merge sort.

Graphs: Basic terminologies, Representations, ADT, Operations on graphs – DFS, BFS, Spanning Trees, Biconnected components, Minimum cost spanning trees.

Course Outcomes:
After completion of the course the students will be able to

- Choose appropriate data structure for the specified problem definition.
- Implement linear and non-linear data structures viz. stacks, queues, linked list, trees, graphs.
- Apply the concept of trees and graph data structures for the real world problems.
- Comprehend the implementation of sorting and searching algorithms.

Text Books:

- Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", Computer Science Press.
- Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Fundamentals of Data Structures in C++, Universities Press, Second Edition.
- Debasis Samanta, Classic Data Structures, Second Edition, Prentice Hall of India.

REFERENCES:

- Aaron M. Tenenbaum Yedidyah Langsam. Moshe J. Augenstein, "Data Structures using C and C++", PHI Learning Private Limited.
- Jean Paul Tremblay and Paul G Sorenson, "An Introduction to Data Structures with Applications", McGraw Hill.
- R. Kruse et.al, "Data Structures and Program Design in C", Pearson Education.

CSMN 02

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

COMPUTER ORGANIZATION

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives

The course is designed to

- make the students understand the basic structure and operations of various functional units of a digital computer.
- familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- Make the students understand how to design processing unit using hardwired control and microprogrammed control approaches.
- familiarize the students with hierarchical memory system.
- expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I

Structure of Computers: Introduction, Performance, Memory addressing and Operations, Instructions and Instruction sequencing, Addressing modes, Basic l/0 operations, Pushdown stacks, Subroutines, Encoding of machine instructions, Brief description and functional classification of IA-32 Pentium instruction set.

UNIT II

Basic Processing Unit: Fundamental concepts, Single and Multiple bus organization, Hardwired control, Multiprogrammed control – Microinstructions, Microprogram sequencing, Wide-branch addressing, Microinstructions with next-address field, Prefetching microinstructions.

Arithmetic: Multiplication – Booth algorithm; Integer division, Floating-Point Addition and Subtraction.

UNIT III

The memory System: Basic concepts, RAM and ROM Memories and their internal organization, Cache Memories - Mapping functions, Replacement algorithms; Performance Considerations, Virtual Memories, Secondary Storage.

UNIT IV

Input/ Output Organization: Accessing l/O devices; Interrupts –Enabling and disabling, Handling multiple devices; Direct Memory Access - Bus Arbitration; Buses – Synchronous and Asynchronous; Interface circuits – Parallel port, Serial port

UNIT V

Pipelining: Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and control considerations, Superscalar operation.

Processor Families: The ARM family, The Motorola 680x0 and Coldfire families, The IA-32 family.

Course Outcomes:

On successful completion of this course the students will be able to

- Identify the basic structure and functional units of a digital computer.
- Analyze the effect of addressing modes on the execution time of a program.
- Design processing unit using the concepts of hardwired control or microprogrammed control.
- Select appropriate interfacing standards for I/O devices.
- Identify the roles of various functional units of a computer in instruction execution.
- Understand memory hierarchy and its impact on computer cost/performance.
- Understand the advantage of instruction level parallelism and pipelining for high performance processor design.

Text Books

1. Hamacher C, Vranesic Z, and Zaky S, Computer Organization, 5th edition, McGraw-Hill.

Reference Books

- Heuring V P, and Jordan H F, Computer systems Design and Architecture Addison-Wesley.
- Carpinelli J D, Computer System Organization and Architecture. Addison-Wesley 2001.
- Mano M M, Computer system Architecture, 4th edition, Pearson Education Asian 2002.

CSMN 03

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

DATABASE MANAGEMENT SYSTEMS

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives:

- To learn data models, conceptualize and depict a database system using ER diagram
- To understand the internal storage structures in a physical DB design
- To demonstrate the fundamental concepts, operation and function of different components of database systems.
- To describe the roles of transaction processing and concurrency control in a modern
- DBMS.
- To demonstrate key issues in the operation of a DBMS including query processing, security and integrity.
- To design and implement a database application.

UNIT-I

Introduction: Managing Data, File Systems versus a DBMS, Advantages of a DBMS, Storing data in a DBMS, Queries in a DBMS, Transactions, Structure of a DBMS.

Introduction to Data base design: ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views Destroying/ altering Tables and Views.

UNIT-II

Relational Algebra and Calculus: Relational Algebra , Relational calculus, Expressive Power of Algebra and calculus.

SQL: Form of Basic SQL Query, UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, NULL values , Complex Integrity Constraints in SQL, Triggers and Active Databases, Designing Active Databases

UNIT-III

Schema Refinement and Normal Forms: Introduction, Functional Dependencies, Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms, BCNF, Properties of Decompositions, Normalization, Schema Refinement in Data base Design, Multi valued Dependencies , FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

Database Application Development: Accessing Databases from Applications, Introduction to JDBC, JDBC Classes and Interfaces, SQLJ, Stored Procedures.

UNIT -IV

Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-based Concurrency Control, Performance Locking, Transaction Support in SQL, Introduction to Crash Recovery.
Concurrency Control: 2PL, Serializability and Recoverability, Introduction to Lock
Management, Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques, Concurrency Control without Locking

Crash Recovery: Introduction to ARIES, Log, Recovery related Structures, Write-Ahead Log Protocols, Checkpointing, Recovering from a System Crash, Media Recovery, Interaction with Concurrency Control

UNI T-V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index data Structures, Comparison of File Organizations, Indexes and Performance Tuning.

Indexing and Hashing: Intuitions for tree indexes, Indexed Sequential Access Method, B+ Trees: A Dynamic Index Structure, Search, Insert, Delete, Duplicates, B+ Trees in Practice, Static Hashing, Extendable Hashing, Linear Hashing, Extendible vs. Linear Hashing.

Parallel and Distributed Databases: Introduction, Architectures for Parallel Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Introduction to Distributed Databases, Distributed DBMS Architectures, Storing Data in Distributed DBMS, Distributed Catalog Management, Distributed Query Processing

Course Outcomes:

Upon successful completion of this course, the student should be able to

- Use relational algebra and relational calculus, to express database queries.
- Use SQL to interact with database management systems.
- Design appropriate database tables, using functional dependencies and normal forms.
- Implement a disk-oriented database storage manager with heap table and indexes.
- Understand, compare, and implement the major concurrency control algorithms.
- Implement database recovery algorithms and verify their correctness.
- Identify trade-offs among database systems techniques and contrast distributed/parallel alternatives for both on-line transaction processing and on-line analytical workloads.

Text Books:

- Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill, 2014.
- C. J. Date, A. Kannan and S. Swamynathan, An Introduction to Database Systems, 8th edition, Pearson Education, 2006.

Reference
Books:

- Silberschatz A, Korth H F, and Sudarshan S, Database System Concepts, 6th edition,McGraw-Hill, 2011.
- Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems,Fourth Edition, Pearson/Addision wesley, 2007.
- J D Ullman, H. Garcia-Molina and J. Widom, Database Systems: The Complete
- Book, Prentice-Hall, 2009.
- Jeffrey A. Hoffer, Ramesh Venkataraman, Heikki Topi, Modern Database
- Management, 12th edition, Pearson, 2015.

CSMN 04

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

COMPUTER NETWORKS

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives:

The course is designed to

- Provide insight about fundamental concepts, basic taxonomy and terminology of Computer Networks.
- Gain comprehensive knowledge about the principles, protocols, and significance of Layers in OSI and TCP/IP

UNIT I

Introduction to Computer Networks: Networks, Component and Categories, Topologies, Transmission Media, Reference Models: ISO/OSI Model and TCP/IP Model.

Physical Layer: Analog and Digital Signals, Periodic Analog Signals, Transmission Impairments, Data rate limits, Performance, Digital data transmission techniques, Analog data transmission techniques, Multiplexing: FDM, WDM and TDM; Spread Spectrum, Switching: Circuit and Packet.

UNIT II

Data Link Layer and Medium Access Sub Layer: Design Issues, Error Detection and Error Correction, Elementary Data Link Protocols, Sliding Window Protocols, Channel allocation problems, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA; IEEE 802.3 Ethernet.

UNIT III

The Network Layer: Network layer design issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, Internet Transport Protocols: UDP, TCP; Network Performance Measurement.

UNIT V

The Application Layer: Introduction, Client-Server Programming, Domain Name System (DNS), WWW and HTTP, FTP, E-mail, TELNET, Secure Shell, SNMP, IP Security Architecture, Firewalls.

Text Books:

- Computer Networks, Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.
- Data communications and Networking, Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.

Reference Books:

- Kurose J F, Ross K W, *Computer Networking – A Top-Down Approach*, 5th edition, Pearson Education, 2010.
- Peterson L L, Davie B S, *Computer Networks - A Systems Approach*, 5th edition, Morgan Kaufmann, 2011.
- Forouzan B A, Mosharraf F, *Computer Networks – A Top-Down Approach*, Tata McGraw-Hill, 2012.
- Olifer N, Olifer V, *Computer Networks – Principles, Technologies, and Protocols for* Network Design, Wiley, 2006.

Course Outcomes

By the end of this course students will be able to:

- Choose the transmission media depending on the requirements.
- Explain the functions of different layer of the OSI Protocol
- Analyze MAC layer protocols and LAN technologies
- Implement routing and congestion control algorithms
- Design new protocols for computer network.
- Configure DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls using open source software and tools.

CSMN 05

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

SOFTWARE ENGINEERING

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives:

The course is designed to understand

- Software life cycle models.
- Software requirements and SRS document.
- Different software design strategies
- Quality control and how to ensure good quality software.
- Planning and estimation of software projects.
- Maintenance of software and gain knowledge of the overall project activities.

UNIT I

Introduction to Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: Agility, Agility and the Cost of Change, Extreme Programming, Agile Process Models

UNIT II

Understanding Requirements: Requirements Engineering, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

Requirements Modeling: Requirements Analysis, Scenario based Modeling, Class based Modeling, Requirements Modeling Strategies, Flow Oriented Modeling, Patterns for Requirement Modeling, Requirements Modeling for WebApps

Design Concepts: Design Process, Design Concepts, Design Model.

Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Alternative Architectural Designs, Architectural Mapping using Data flow.

UNIT III

Component Level Design: Component, Class based Components, Conducting Component level design, Component level Design for WebApps, Designing Traditional Components, Component based Development.

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

Pattern Based Design: Design Patterns, Pattern based Software Design, Architectural Patterns, Component Level Design Patterns, User Interface Design Patterns.

UNIT IV

Software Quality Concepts: Software Quality, Software Quality Dilemma, Achieving Software Quality.

Software Quality Assurance: Elements of Software Quality Assurance, SQA Goals and Metrics, Formal Approaches to SQA, Statistical SQA, Software Reliability.

Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Unit Testing and Integration Testing (both Conventional and OO Software), Test Strategies for WebApps, Validation Testing, System Testing, Art of Debugging.

Testing Conventional Applications: Software Testing Fundamentals, Internal and External View of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model based Testing, Testing for Specialized Environments, Patterns for Software Testing.

Computer Aided Software Engineering: CASE and its Scope, CASE Environment, CASE Support in Software Life Cycle, Characteristics of CASE Tools, Towards Second Generation CASE Tool.

UNIT V

Managing Software Projects: Project Management Concepts, Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Project Planning Process, Software Scope and Feasibility, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for OO Projects, Project Schedu ling – Basic Principles, Defining a Task Set and Task Network, Scheduling, Introduction to Risk Management, Software Maintenance, Software Supportability, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.

Text Books:

1. Pressman R S, *Software Engineering: A Practitioner's Approach*, 7th edition, McGraw-Hill, 2010.
2. Sommerville I, *Software Engineering*, 9th edition, Pearson Education, 2011.

Reference Books:

- Jalote P, Software Engineering: A Precise Approach, Wiley, 2010.
- Braude E J, Bernstein M E, Software Engineering: Modern Approaches, 2nd edition, Wiley, 2010.
- Saleh K A, Software Engineering, J Ross Publishing, 2009.
- Bruegge B, Dutoit A H, Object-Oriented Software Engineering Using UML, Patterns, and Java, 3rd edition, Prentice Hall, 2009.
- Bennett S, McRobb S, Farmer R, Object-Oriented System Analysis and Design Using UML, 4nd edition, McGraw-Hill, 2010.

- Lethbridge T C, Laganiere R, Object-Oriented Software Engineering, 2nd edition, McGraw-Hill, 2005.

Course Outcomes

By the end of this course students will be able to

- Define and develop a software project from requirement gathering to implementation.
- Obtain knowledge about principles and practices of software engineering.
- Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems
- Comprehend, assess, and calculate the cost of risk involved in a project management
- Implement testing methods at each phase of SDLC

CSMN 06

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

JAVA AND WEB TECHNOLOGY

No.of Credits: 4 Instruction Hours/ Week: 3L+1T

Course Objectives:

The course is designed to

- Learn how to extend Java classes with inheritance and dynamic binding.
- Learn how to use exception handling in Java applications.
- Understand how to design applications with threads in Java.
- Learn how to design a graphical user interface (GUI) with Java Swing.
- Understand how to use Java APIs for program development.
- Understand the Web designing using HTML, XML, DHTML and Javascript

UNIT I

Core Java Programming: Introduction to Java programming; Object-oriented programming with Java Classes and Objects, Constructors; Overloading Methods and Constructors, this keyword, Garbage Collection, Type Conversion and Casting, Control Statements, Parameter Passing, Recursion, String Class and String handling methods.

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class.

UNIT II

Packages: Basics, Finding packages and CLASSPATH, Access Protection, Importing packages.

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception subclasses.

UNIT III

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output.

Working with types: Wrapper classes; Autoboxing, Generics.

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.

Applets; Event Handling; Basics of AWT and Swing; Basic concepts of networking.

UNIT IV

HTML: HTTP and HTML: Berners-Lee's Basics, The Request/Response Procedure, The Benefits of HTML5, Introduction to elements of HTML, Working with Text, List, Tables, Images, Forms, Frames, Hyperlinks, Images and Multimedia.

CSS: Introduction, Importing a Style Sheet, Using IDs, Using Classes, Using Semicolons, CSS Rules, Style Types, CSS Selectors, The CSS Cascade, Measurements, Fonts and

SEMESTER IV
AIPD 02

Major Project : Phase –II Dissertation

Instruction Hours/Week : 32(P) Credits : 16
Marks : 100

The object of Major Project Work Phase II& Dissertation is to enable the student to extend further the investigative study , either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student in R&D work and technical leadership. The assignment to normally include:

- In depth study of the topic assigned in the light of the Report prepared ;
- Review and finalization of the Approach to the Problem relating to the assigned topic;
- Preparing an Action Plan for conducting the investigation, including team work;
- Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed;
- Final development of product/process, testing, results, conclusions and future directions;
- Preparing a paper for Conference presentation/Publication in Journals, if possible;
- Preparing a Dissertation in the standard format for being evaluated by the Department.
- Final Seminar Presentation before a Departmental Committee.

Scheme of Instructions and Detailed Syllabus

for

B. Tech- Electrical and Electronics Engineering

(I -VIII Semesters)



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

(AUTONOMOUS)

SRI VENKATESWARA UNIVERSITY:: TIRUPATI-517502

(A.P), INDIA.

About the Department

Department of Electrical and Electronics Engineering has started functioning from the year 1959 since the inception of the S.V. University College of Engineering and pioneered itself in catering the needs of the students, industry and society.The department is offering one Under Graduation course B.Tech (EEE) and one Post Graduation course (Power systems). Both UG and PG programs have been accredited by NBA, New Delhi.The department offers Ph.D program (Part-time & Full –time) in wide range of research areas like Renewable Energy Sources, Power Quality, Reactive Power and Control Management, Electrical Distribution Systems, Electrical Vehicles etc. So far more than 100 Ph.D degrees have been awarded and 30 are in pipeline.The annual intake is 72 in UG program and 18 in PG program.Based on AICTE/APSCHE guidelines, the department is regularly updating the curriculum to meet the industrial, academic and societal needs.The Department has 4 Professors, 2 Assistant professors, 9 Academic Consultants and 9 supporting staff. To meet the academic & research requirements the department has developed 9 laboratories which are regularly maintained and the equipment updated. With the financial pport from TEQIP the department and lab facilities have been improved.All the faculty embers are ommitted to teaching and research. Students of UG and PG are encouraged to take up high uality projects within the college and in industries as well. Most of the UG students get selected in ampus placements while some of them opt for higher studies. Good numbers of students have got placed in Public Sector Undertaking (PSU) through GATE exam. Co-curricular and tracurricular activities are regularly conducted to impart life skills amongst the students and make them feel responsible towards the society and country. The department has active and strong Alumni who are occupying top positions like CEO, EE, GM etc. in highly reputed organizations in India and abroad. They provide financial support to improve the various facilities in the department and college.

Vision:

- The department aims at catering to the needs and aspirations of the people and their development, reach to the world through state of art technologies of Electrical and Electronics Engineering and to serve the society at large.

Mission:

- To provide the necessary domain expertise and infrastructure to the students.
- To make available the advanced laboratories, application oriented engineering principles for students and researchers.
- To offer research and industry orientation to become successful service oriented technocrats.

Choice Based Credit System (CBCS):

- Choice Based Credit system (CBCS) has been implemented in the campus in the year 2004. CBCS is a flexible system of learning and provides choice for students to select courses of his/her choice from the prescribed electric courses. Under this system students are permitted to opt for additional courses of his/her interest, adopt an inter disciplinary approach in learning and make use of expertise of available facility.

Programme Specific Outcomes (PSO's)

At the end of the Program, students will be able to

- PSO 1: Generate Transmit, Distribute, Control and Utilize electrical power effectively by analyzing and applying appropriate techniques and hardware/software tools.
- PSO 2: Develop different electrical and electronics circuits/models using semiconductor and Power Electronic devices considering the environmental and societal needs

Programme Outcomes

- **PO1**: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- **PO2**: **Problem analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- **PO3**: Design / Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
- **PO4**: Conduct investigations of complex problems: Use research – based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
- **PO5**: Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6**: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7**: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
- **PO8**: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9**: Individual and team work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
- **PO10**: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

- **PO11**: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12**: Life-long learning: Recognize the need for , and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Educational Objectives (PEO's)

- **PEO1:** Graduates will, demonstrate professional behavior to cater the global needs of the industry and society.
- **PEO2:** Graduates will pursue higher education to upgrade their professional and research skills and inculcate the attitude of lifelong learning.
- **PEO3:** Graduates will develop the qualities like creativity, leadership, team work and professional ethics contributing to the societal growth.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 5

Department of Electrical and Electronics Engineering-Scheme of Instruction- Choice Based Credit System **(R-20 Regulations)**

B.Tech (Electrical and Electronics Engineering), w.e.f. 2020-21

I- SEMESTER

S.No	Course Code	Category	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	To
1	**MA101**	**BST**	Mathematics-I	3	1	-	4	4	40	60	1
2	**PY102**	**BST**	Modern Physics	3	1	-	4	4	40	60	1
3	**CS103**	**BET**	Programming for problem solving	2	1	-	3	3	40	60	1
4	**CE104**	**BET**	Engineering Mechanics	3	1	-	4	4	40	60	1
5	**ME105**	**BEL**	Workshop/ Manufacturing Practice	-	-	3	3	1.5	40	60	1
6	**CS106**	**BEL**	Programming for problem solving lab	-	-	3	3	1.5	40	60	1
7	**CE107**	**MCT**	Environmental Science	4	-	-	4	0	100	-	1
Total				**15**	**04**	**06**	**25**	**18**	**340**	**360**	**7**

Category	Credits
Basic Science Courses	8
Engineering Science Courses	10
Environmental Science	0
TOTAL CREDITS	18

	B.Tech (Electrical and Electronics Engineering), w.e.f. 2020-21										
	II- SEMESTER										
S. No	Course Code	Category	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1	MA 201	BST	Mathematics-II	3	1	-	4	4	40	60	100
2	CY202	BST	Engineering Chemistry	3	1	-	4	4	40	60	100
3	EN203	HST	English	2	-	-	2	2	40	60	100
4	EE204	BET	Electrical Circuits	3	1	-	4	4	40	60	100
5	ME 205	BEL	Engineering Graphics and Design	2	-	3	5	3.5	40	60	100
6	EN206	HSL	English Communication Lab	-	-	3	3	1.5	40	60	100
Total				**13**	**03**	**06**	**22**	**19**	**240**	**360**	**600**

Category	Credits
Basic Science Courses	8
Engineering Science Courses	7.5
Humanities and social science	3.5
TOTAL CREDITS	19

	Department of Electrical and Electronics Engineering-Scheme of Instruction- Choice Based Credit System**(R-20 Regulations)**										
	B. Tech (Electrical and Electronics Engineering), w.e.f. 2020-21										
	III- SEMESTER										
S.No	**Course Code**	**Category**	**Course Title**	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1.	**MA301B**	**BST**	Mathematics –III	3	-	-	3	3	40	60	100
2.	**EE302C**	**BET**	Electro Magnetic Fields	3	-	-	3	3	40	60	100
3.	**EE303C**	**PCT**	Network Analysis	3	1	-	4	4	40	60	100
4.	**EE304C**	**PCT**	D.C. Machines and Transformers	3	1	-	4	4	40	60	100
5.	**EE305C**	**PCT**	Analog Electronics	3	-	-	3	3	40	60	100
6.	**EE306L**	**PCL**	Electrical Circuits and Networks Lab	-	-	3	3	1.5	40	60	100
7.	**EE307L**	**PCL**	D.C. Machines and Transformers Lab	-	-	3	3	1.5	40	60	100
8.	**EE30**	**SC1**	Compute	1	-	2	3	2	40	60	10

	9S		r Skills								0
9.	**MC310A**	**MCT1**	Constitution of India	2	-	-	2	0	-	100	100
Total				**18**	**02**	**08**	**28**	**22**	**320**	**580**	**900**

Note: NSS to be performed for 60 Hrs during III &IV Semesters. (2 - Credits, 0 - Marks)

Category	**Credits**
Basic Science Courses	3
Engineering Science Courses	3
Professional Core Course	14
Skill Oriented Course	2
TOTAL CREDITS	22

	Department of Electrical and Electronics Engineering-Scheme of Instruction- Choice Based Credit System**(R-20 Regulations)**										
	B. Tech (Electrical and Electronics Engineering), w.e.f. 2020-21										
	IV- SEMESTER										
S.No	**Course Code**	**Category**	**Course Title**	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1.	**EE401C**	**PCT**	Power systems-I	3	1	-	4	4	40	60	100
2.	**EE402C**	**PCT**	Induction Motors and Synchronous Machines	3	1	-	4	4	40	60	100
3.	**HS403C**	**HST**	Managerial Economics and Accountancy	3	-	-	3	3	40	60	100
4.	**EE404C**	**PCT**	Digital Electronics	3	-	-	3	3	40	60	100
5.	**EE405C**	**PCT**	Signals and Systems	3	-	-	3	3	40	60	100
6.	**EE406L**	**PCL**	Induction Motors and Synchronous Machine	-	-	3	3	1.5	40	60	100

			s Lab								
7.	**EE407L**	**PCL**	Analog and Digital Electronics Lab	-	-	3	3	1.5	40	60	100
8.	**EE409S**	**SC2**	Python Programming	1	-	2	3	2	40	60	100
9.			NCC / NSS / NSO Activities	60 Hrs			2	-	-	-	-
Total				**16**	**02**	**08**	**28**	**22**	**320**	**480**	**800**

Note: Community Service Internship (Mandatory) Throughout the semester (45 Hrs , 1.5 – credits , 100 – Marks to be given by mentors) – (Performance will be Reflected in V Semester).

NCC / NSS / NSO –Students should acquire at least 45 Hrs out of 60 Hrs from I semester to IV Semester.

Category	Credits
Professional Core Course	17
Humanities and social science	3
Skill Oriented Course	2
NCC / NSS / NSO Activities	0
TOTAL CREDITS	22

	Based Credit System **(R-20 Regulations)**										
	B. Tech (Electrical and Electronics Engineering), w.e.f. 2020-21										
	V- SEMESTER										
S. No	**Course Code**	**Category**	**Course Title**	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1.	**EE501C**	**PCT**	Power systems-II	3	-	-	3	3	40	60	100
2.	**EE502C**	**PCT**	Linear Control Systems	3	-	-	3	3	40	60	100
3.	**EE503C**	**PCT**	Power Electronics	3	-	-	3	3	40	60	100
4.	**EE504C**	**PET**	Professional Elective - I	3	-	-	3	3	40	60	100
5.	**EE505C**	**OET**	Open Elective – I (MOOCs)	3	-	-	3	3	100	-	100
6.	**EE506L**	**PCL**	Control Systems Lab	-	-	3	3	1.5	40	60	100
7.	**EE507L**	**PCL**	Power Electronics Lab	-	-	3	3	1.5	40	60	100
8.	**EE508S**	**SC3**	MATLAB Laborat	1	-	2	3	2	40	60	100

			ory								
9.	**MC509A**	**MCT2**	Universal Human Values (Mandatory Course)	2	-	-	2	0	100	-	100
10.	**EE510**	**Internship**	Community Service Internship	45 Hrs				1.5	100	-	100
Total				**18**	**-**	**08**	**26**	**21.5**	**580**	**420**	**1000**

Professional Elective – I

i. **Wind and Solar Energy Systems**
ii. **Electrical Distribution System**
iii. **Electrical Safety**

Category	**Credits**
Professional Core Course	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill Oriented Course	2
Universal Human Values	0
Community Service Internship	1.5
TOTAL CREDITS	21.5

	System(**R-20 Regulations**)										
	B. Tech (Electrical and Electronics Engineering), w.e.f. 2020-21										
	VI- SEMESTER										
S. No	**Course Code**	**Category**	**Course Title**	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1.	**EE601C**	**PCT**	Power system Analysis	3	1	-	4	4	40	60	100
2.	**EE602C**	**PCT**	Electrical and Electronics Measurements	3	-	-	3	3	40	60	100
3.	**EE603C**	**PCT**	Micro Processors and Micro Controllers	3	-	-	3	3	40	60	100
4.	**EE604C**	**PCT**	Utilization of Electrical Energy	3	-	-	3	3	40	60	100
5.	**EE605C**	**PET**	Professional Elective - II	3	-	-	3	3	40	60	100
6.	**EE606C**	**OET**	Open Elective – II (MOOCs)	3	-	-	3	3	100	-	100
7.	**EE607L**	**PCL**	Microprocessors and Micro Controllers Lab	-	-	3	3	1.5	40	60	100
8.	**EE608L**	**PCL**	Electrical and Electronics Measurements Lab	-	-	3	3	1.5	40	60	100
9.	**EE609S**	**SC4**	Java Programming	1	-	2	3	2	40	60	100
10.	**MC610 A**	**MCT2**	Professional Ethics (Mandatory Course)	2	-	-	2	0	100	-	100
Total				**21**	**01**	**08**	**30**	**24**	**520**	**480**	**10**

								00

Professional Elective – II		
i. Advanced Control Systems	**ii. Energy Auditing & Management**	**iii. Special Machines**

Note: Summer Industrial Internship (Mandatory) Two months (Duration - 60 Hrs, 3 – credits , 100 – Marks to be given by internal evaluation committee) – during summer vacation (Performance will be Reflected in VII Semester , Online / Offline mode.

Category	**Credits**
Professional Core Course	16
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Professional Ethics	0
Skill Oriented Course	2
TOTAL CREDITS	24

	502										
	Department of Electrical and Electronics Engineering-Scheme of Instruction- Choice Based Credit System**(R-20 Regulations)**										
	B. Tech (Electrical and Electronics Engineering), w.e.f. 2020-21										
	VII- SEMESTER										
S. No	**Course Code**	**Category**	**Course Title**	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1.	**EE701C**	**PCT**	Power System Protection	3	-	-	3	3	40	60	100
2.	**EE702C**	**PET**	Professional Elective – III	3	-	-	3	3	40	60	100
3.	**EE703C**	**PET**	Professional Elective – IV	3	-	-	3	3	40	60	100
4.	**EE704C**	**PET**	Professional Elective - V	3	-	-	3	3	40	60	100
5.	**EE705C**	**OET**	Open Elective – III (MOOCs)	3	-	-	3	3	100	-	100
6.	**EE706C**	**OET**	Open Elective – IV (MOOCs)	3	-	-	3	3	100	-	100
7.	**EE707 L**	**PCL**	Power System Simulation Lab	-	-	3	3	1.5	40	60	100
8.	**EE708S**	**SC5**	IoT Lab	1	-	2	3	2	40	60	100
9.	**EE709I**	**Internship**	Summer Industrial Internship	2 Months			-	3	100	-	100
Total				**19**	**-**	**05**	**24**	**24.5**	**540**	**360**	**900**

Professional Elective – III	Professional Elective – IV	Professional Elective – V
i. Electrical Vehicles ii. Flexible AC Transmission Systems iii. Restructured Power Systems	i. Power System Operation and Control ii. Power Semiconductor Controlled Drives iii. Power Quality	i. HVDC Transmission ii. High Voltage Engineering iii. Smart Grid

Category	Credits
Professional Core Course	4.5
Professional Elective courses	9
Open Elective Course/Job oriented elective	6
Summer Industrial Internship	3
Skill Oriented Course	2
TOTAL CREDITS	24.5

	VIII- SEMESTER										
S. No	Course Code	Category	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1.	EEPROJ801	Major project	Project Work and Internship	-	-	24	24	12	40	60	100
Total				-	-	24	24	12	320	480	800

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502

Department of Electrical and Electronics Engineering-Scheme of Instruction- Choice Based Credit System**(R-20 Regulations)**

B. Tech (Electrical and Electronics Engineering) (HONOURS DEGREE)

S. No	Course Code	Category	Course Title					No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1.	EEHN01	HON	Electrical Machine Design	3	1	-	4	4	40	60	100

2.	**EEH N02**	**HON**	Advanced Power System Protection	3	1	-	4	4	40	60	100
3.	**EEH N03**	**HON**	Digital Control Systems	3	1	-	4	4	40	60	100
4.	**EEH N04**	**HON**	Advanced Power Electronics	3	1	-	4	4	40	60	100
5.	**EEH N05**	**HON**	Hybrid Electrical Vehicles	3	1	-	4	4	40	60	100
6.	**EEH N06**	**HON**	Industrial Applications of Electrical Engineering	3	1	-	4	4	40	60	100

Note: A student shall register for 4 (Four) Subjects from the above list, as per the R20-Regulations for B.Tech (HONOURS) Degree.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502

Department of Electrical and Electronics Engineering-Scheme of Instruction- Choice Based Credit System**(R-20 Regulations)**

B. Tech (Electrical and Electronics Engineering) (MINOR DEGREE)

S. No	**Course Code**	**Category**	**Course Title**					No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1.	**EEM**	**MIN**	Electrical Circuits and	3	1	-	4	4	40	60	10

	N01		Networks								0
2.	**EEM N02**	**MIN**	Electrical Machines	3	1	-	4	4	40	60	100
3.	**EEM N03**	**MIN**	Power Systems	3	1	-	4	4	40	60	100
4.	**EEM N04**	**MIN**	Control Systems	3	1	-	4	4	40	60	100
5.	**EEM N05**	**MIN**	Power Electronics	3	1	-	4	4	40	60	100
6.	**EEM N06**	**MIN**	Electronics Engineering	3	1	-	4	4	40	60	100

Note: A student shall register for 4 (Four) Subjects from the above list, as per the R20-Regulations for B.Tech (MINOR) Degree.

Category	Credits
I- SEMESTER	18
II- SEMESTER	19
III- SEMESTER	22
IV- SEMESTER	22
V- SEMESTER	21.5
VI- SEMESTER	24
VII- SEMESTER	24.5
VIII- SEMESTER	12
TOTAL CREDITS	**163**

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI
DEPARTMENT OF ELECTICAL AND ELECTRONICS ENGINEERING
R20 REGULATIONS
SYLLABUS

I – SEMESTER

MA101	MATHEMATICS –I	4 Credits
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, students will be able to

- Analyze differential equations and solve them
- Apply differential equations to engineering problems.
- Use transformation to convert one type into another type presumably easier to solve.
- Use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.
- Solve an initial value problem for an nth order ordinary differential equation using the Laplace transform.
- Expand functions as power series using Maclaurin's and Taylor's series
- Optimize the problems related to OR, Computer science, Probability and Statistics
- Draw an approximate shape by the study of some of its important characteristics such as symmetry, tangents, regions enclosing curve tracing method to find length, area, volume.
- Use multiple integral in evaluating area and volume of any region bounded by the given curves.

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particular integrals-homogeneous differential equations with variable coefficients-method of parameters-simulation equations.

UNIT II

Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of derivatives and integrals-derivatives of transforms-integrals of transforms.

UNIT III

Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNIT IV

Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNIT V

Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/Reference Books

- B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
- M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
- B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
- Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

PY 102	MODERN PHYSICS	4 Credits
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, students will be able to

- Develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
- Understand the quantum mechanics and ultimately the quantum behavior of charged particles when they are in motion.
- Identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems
- Apply knowledge of band theory in the area of electronics and understanding the basic electron transportation phenomenon in microdevices.
- Understand the principles in electrostatics and electromagnetics and magnetic properties of materials.
- Understand size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
- Think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
- Learn the basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis.
- Provide multidisciplinary experiences throughout the curriculum.

UNIT I

Quantum Mechanics : Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P. Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT II

Band Theory of Solids : Classical Free Electron Theory of Metals – Success and Failures – Quantum Free Electron Theory – Fermi Factor – Electron in Periodic Potential – Bloch Theorem – Kronig – Penney Model – Distinction between Metals , Insulators and semiconductors- Energy Band Structures.

UNIT III

Semiconductors – Introduction- Intrinsic and Extrinsic Semiconductors – Density of states – Carrier Concentrations at Equilibrium – Hall Effect. PN Junction Diode – Energy Band Diagram – Forward and Reverse Bias- Current – Voltage characteristics – Applications- Zener

Diode – Light Emitting Diode- Photo diode -Solar Cell – Semiconductor Laser.

UNIT IV

Electromagnetism and magnetic properties of Materials:

Laws of Electrostatistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws- Maxwell Equations – Polarization – Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization – Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and hysteresis, Applications of ferromagnetic materials.

UNIT V

NanoPhysics and Nanotechnology : Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C^{60} (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials. 10 hrs.

Text Books / Reference Books:

- R.K.Gaur and S.L.Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi
- S.P.Basava Raju `` A Detailed Text Book of Engineering Physics" Sole Distributors, Subhash Stores Book Corner, Bangalore
- HitendraK.Malik and A.K.Singh ``Engineering Physics" Tata MC Graw Hill Education PVt.Ltd., New Delhi
- M.N.Avadhanulu and P.G.Kshirsagar ``A Textbook of Engineering Physics`` S.Chand and Company Pvt.Ltd., New Delhi
- John Allison, ``Electronic Engineering Materials and Devices" TataMcGraw Hill Publications.
- B.L Theraja, "Modern physics", S.Chand& Company.
- V. Raghavan "Material Science", Tata McGraw Hill Publications.
- M.S.RamachandraRao and Shubra Singh, ``Nanoscience and Nanotechnology`` Wiley India Pvt.Ltd, New Delhi

CS 103	PROGRAMMING FOR PROBLEM SOLVING	4 Credits
Sessional Marks: **40**	**2L:1T:0P**	End Examination Marks: **60**

Course Objectives:

- To acquire problem solving skills
- To be able to develop flowcharts and algorithms for the given problem
- To learn how to write modular programs in C
- To enable to use arrays, pointers, strings and structures in solving problems.
- To explain the difference between object-oriented programming and procedural programming.
- To understand principles of object-oriented programming.

UNIT-I

Problem Solving: Problem solving techniques, Computer as a problem solving tool, Programming Languages – Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements: Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements: while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continue statements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions, Passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard

library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, Accessing structures, Nested structures, Arrays of structures, Structures containing arrays, Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.

UNIT V

Introduction to Object-Oriented Programming (OOP): Need for OOP, Principles of OOP, Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

Course Outcomes: At the end of the course, student will be able to

- Develop and test programs in C and correct syntax and logical errors.
- Implement conditional branching, iteration and recursion.
- Decompose a problem into functions and synthesize a complete program.
- Use arrays, pointers, strings and structures to formulate algorithms and programs
- Use files to perform read and write operations.
- Handle programming assignments based on class, abstraction, encapsulation, overloading and inheritance

Text Books

- Ashok N Kamthane, Amit Ashok Kamthane, Programming in C, 3rd Edition, Pearson Education, 2019.
- Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
- R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
- Hanly J R &Koffman E.B, “Problem Solving and Program design in C”, Pearson Education, 2019.

- Herbert Schildt,The Complete Reference C++, 4th Edition, Tata McGraw-Hill.

Reference Books

- C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
- Programming with C, Bichkar, Universities Press.
- Programming in C, ReemaThareja, OXFORD.
- C by Example, Noel Kalicharan, Cambridge.
- The C++ Programming Language, Bjarne Stroustrup, 3rd Edition, Pearson Education.
- Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

CE 104	ENGINEERING MECHANICS	Credits: 4
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, student will be able to

- apply the basic knowledge of force system.
- know the types of supports occur in civil engineering structures
- know the geometrical properties of different cross sections.
- understand different types of stresses and strains, elastic constants.
- understand the behavior of different internal forces under different types of loading.

UNIT I

STATICS : Basic concepts – System of force, Concurrent and non-concurrent coplanar and non- coplanar forces – Resultant – Moment of force and its application – Couples and resultant of force systems – Equilibrium of systems of forces – Free body diagrams, Equations of equilibrium of coplanar systems and spatial systems.

UNIT II

Analysis of plane trusses: Types of supports – Types of trusses – Analysis of trusses using method of joints and method of sections.

UNIT III

CENTRE OF GRAVITY AND MOMENTS OF INERTIA: Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite areas (rolled and built up sections) – Radius of gyration of areas.

UNIT IV

SIMPLE STRESES AND STRAINS : Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-strain diagram for mild steel – Working stress – Factor of safety.

Lateral strain – Poisson's ratio and volumetric strain – Elastic moduli and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses.

UNIT V

STRAIN ENERGY: Gradual, sudden and impact loading – Endurance limit principles of virtual work and its applications.

TEXTBOOKS:

- Ghose D.N. – Applied Mechanics and Strength of Materials.

- Timoshenko & Young – Engineering Mechanics.
- Junarkar SB – Mechanics of Structures – Vol. I.
- Junarkar SB – Elements of Applied Mechanics.

ME 105	WORKSHOP/MANUFACTURING PRACTICE	Credits: 1.5
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Course Outcomes:

1. Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricatecomponents using different materials.

Workshop Practice: Five practices among

- Machine shop
- Fitting shop
- Carpentry
- Electrical wiring
- Welding shop
- Casting
- Smithy
- Plastic moulding & Glass Cutting Examinations could involve the actual fabrication of simple components, utilizing one or More of the techniques covered above.

Detailed Contents

- Manufacturing Methods-casting, forming, machining, joining, advanced manufacturing methods
- CNC machining, Additive manufacturing
- Fitting operations & power tools.
- Electrical &Electronics
- Carpentry
- Plastic moulding. Glass cutting
- Metal casting.

- Welding(arc welding & gas welding), brazing

The above course content is learnt by online videos/ppt presentations.

Text / Reference Books:

- HajraChoudhury S.K., HajraChoudhury A.K.andNirjharRoy S. K., Elements of Workshop Technology", Vol. I 2008and Vol. II 2010, Media promoters and Publishers private limited, Mumbai.
- Kalpakjian S. and Steven S. Schmid ManufacturingFngineeringand Technology", 4th edition, PearsonEducationIndiaEdition,2002.
- GowriP.Hariharanand A. SureshBabu, Manufacturing Technology–I" Pearson Education, 2008.
- Roy A. Lindberg, processes and Materials of manufacturing", 4th edition, Prentice Hall.
- RaoP.N., "ManufacturingTechnology",Vol. I & II,TataMcGrawHillHouse, 2017

CS 106	PROGRAMMING FOR PROBLEM SOLVING LAB	Credits: 1.5
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Course Objectives:

- To provide exposure to problem-solving through programming
- To train the student on the concepts of the C- Programming language

The following programs shall be developed and executed in Programming Language C.

- Programs on conditional control construct.
- Programs on iterative statements (while, do-while, for).
- Programs on recursive procedures
- Programs on arrays, matrices (single and multi-dimensional arrays).
- Programs using user defined functions, demonstrating parameter passing methods viz. call by value and call by reference.
- Programs using different library functions viz. ctype.h, math.h, stdio.h, stdlib.h, string.h, conio.h and pre-processor directives.
- Programs using pointers (int pointers, char pointers) and pointer arrays.
- Programs on structures and unions
- Programs on File Processing.
- Programs on Pointers to structures and Self-referential structures

Course Outcomes: After Completion of this course the student would be able to

- Develop the C code for the given algorithm.
- Understand, debug and trace the execution of programs written in C language.

Reference Books:

- Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
- Hanly J R &Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
- R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
- Behrouz A. Forouzan& Richard F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning

CE 107	ENVIRONMENTAL SCIENCE *(Audit Course / No University Exam)*	Credits: 0(Zero)
Sessional Marks: **40**	**4L:0T:0P**	End Examination Marks: **60**

Course Outcomes:

At the end of the course, students will be able to

- Acquire knowledge in
  - diverse components of environment and natural resources
  - ecosystem and biodiversity & its conservation methods
  - population growth and human health
  - green technology
- Identify and resolve the issues related to sources of different types of pollutions
- Provide solutions to individuals, industries and government for sustainable development of natural resources
- Apply environmental ethics in protection of diversified ecosystems.

UNIT I

Environmental Studies and Natural Resources

Definition, Scope and importance of Environment, Environmental studies, Need for public awareness

Components of Environment- Atmosphere, Hydrosphere, Lithosphere.

Renewable and **Non-Renewable Resources and associated problems**

Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dam benefits and problems.

Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.

Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.

Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

Role of an individual in conservation of natural resources.

UNIT II

Ecosystem and Biodiversity

Ecosystem - Concept of an ecosystem, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem.
(a) Forest ecosystem. (b) Grassland ecosystem
(c) Desert ecosystem. (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation:
Definition, genetic species and ecosystem diversity, Biogeographically classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT – III

Environmental pollution and Global Effects

Definition, Causes, Effects, and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards
Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.
Pollution case studies.
Disaster management: Floods, earthquakes, cyclone, landslides, Tsunami. Climate change-Global warming, Acid rain, Ozone depletion.

UNIT – IV

Environment Issues and Management

- Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, Water Borne Diseases.
- Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms
- Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life

Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcement of Environmental legislation.

UNIT – V

Social Issues and the Environment

- Population growth, Population Explosion, Population Control, Women and Child welfare.
- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rain water harvesting, watershed management, Wasteland reclamation, Human Rights, Value education, Environmental ethics- Issues and possible solution.
- Role of information Technology in Environment and Human Health.

Text Books / Reference Books :

- Anubha Kaushik & C P Kaushik, Environmental studies, New age International Publishers, 2008
- Benny Joseph, Environmental studies, Tata McGraw-Hill Publishers, 2005
- M Chandra Sekhar, Environmental Science, Hi-Tech Publishers, 2004
- Keerthinarayana and Daniel Yesudian, Principles of Environmental Sciences and Engineering, Hi-Tech Publishers, 2005
- AmalK.Datta, Introduction to Environmental Science and Engineering, Oxford & IBH Publishing Co.Pvt.Ltd, 2000
- SanthoshkumarGarg,RajeshawriGarg and RajniGarg, Ecological and Environmental studies, Khanna publishers, 2006
- Gilbert M, Introduction to Environmental Engineering and Science, Masters Publication by Prentice –Hall of India Private Ltd., 1991
- William P Cunningham and Mary Ann Cunningham, Principles of Environmental Science, Tata McGraw Hill Publishing Co.Ltd, 2002

II – SEMESTER

MA 201	MATHEMATICS II	Credits: 4
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, students will be able to

- Use ranks of matrices to decide whether the system of linear equations is consistent or not
- Use Cayley-Hamilton theorem to find inverses or powers of matrices.
- Use Eigen values and vectors to reduce Quadratic forms to normal form.
- To analyze motion problems from real lines to curves and surfaces in 3-D and use tools such as divergence and curl of vector and gradient, directional derivatives that play significant roles in many applications.
- Use Green's theorem to evaluate line integrals along simple closed contours on the plane
- Use Stokes' theorem to give a physical interpretation of the curl of a vector field
- Use the divergence theorem to give a physical interpretation of the divergence of a vector field.
- Find the Fourier Series to represent a function as a series of constants times sine and cosine functions of different frequencies in order to observe periodic phenomenon.
- Evaluate certain improper integrals to make them simple with introduction of Gamma and Beta functions.
- Study certain special functions that arise in solving certain ordinary differential equations to model many physical phenomena.

Unit I

Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors – Canley- Hamilton theorem-quadratic forms- diagonalization.

Unit II

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals- Green's, Stokes's and Gauss Divergence theorems and its applications.

Unit III

Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

Unit IV

Special Functions I: Gamma and Beta functions-series solutions of differential equations-

ordinary points.

Unit V

Special Functions II: Bessel function-recurrence formulae-generating function for $J_n(X)$-Lengender polynomials-recurrence formulae-generating function for $P_n(X)$ - Rodriguez's formula - orthogonality of Lengender polynomials.

Text/Reference Books

- B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
- M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
- B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
- Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

CY 202	ENGINEERING CHEMISTRY	Credits: 4
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, students will be able to

- Analyze microscopic chemistry in terms of atomic and molecular orbital and intermolecular forces.
- Rationalize bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalize periodic properties such as ionization potential, electro negativity, oxidation states and electro negativity.
- List major chemical reactions that are used in the synthesis of molecules.

UNIT I

Atomic and molecular structure (**12 lectures**)

Postulates of quantum chemistry. Schrodinger equation. Particle in a box solutions, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomics, Pi-molecular orbitals of butadiene and benzene. Band structure of solids and the role of doping on band structures

UNIT II

Spectroscopic techniques and applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclearmagnetic resonance and magnetic resonance imaging, surface characterization techniques.

UNIT III

Chemical equilibria, Intermolecular forces and potential energy surfaces

Use of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cellpotentials, the Nernst equation and applications.

Use of free energy considerations in metallurgy through Ellingham diagram. Equations of state of real gases and critical phenomena.

UNIT IV

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular
geometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNIT V

Stereochemistry, Organic reactions and synthesis of a drug molecule

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings Synthesis of a commonly used drug molecule.

Reference/Textbooks

- University chemistry, by B. H. Mahan
- Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
- Physical Chemistryby P. W. Atkins
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Ed.
- Principles of physical chemistry, Puri, Sharma and Pattania.

203	ENGLISH	Credits: 2
Sessional Marks: **40**	**2L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, students will be able to

- learn the elements of grammar and composition of English Language.
- Learn literary texts such as Short stories and prose passages.
- maintain linguistic competence through training in vocabulary, sentence structures and pronunciation.
- develop communication skills by cultivating the habit of reading comprehension passages.
- develop the language skills like listening, speaking, reading and writing.
- Make use of self-instructed learner friendly modes of language learning through competence.

UNIT I

Vocabulary Building

The concept of Word Formation- Root words from foreign languages and their use in English- Acquaintance with prefixes and suffixes from foreign languages in English form derivatives- Synonyms, antonyms, and standard abbreviations.

UNIT II

Basic Writing Skills

Sentence Structures – Use of phrases and clauses in sentences –Importance of proper punctuation - Creating coherence – Organizing principles of paragraphs in documents - Techniques for writing precisely

UNIT III

Identifying Common Errors in Writing

Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article -Prepositions - Redundancies -Clichés

UNIT IV

Nature and Style of sensible Writing

Describing - Defining - Classifying –Providing examples or evidence –Writing introduction and conclusion

UNIT V

Writing Practices

Comprehension - Précis Writing –Essay Writing

Reference/Textbooks:

- Practical English Usage. Michael Swan. OUP. 1995.
- Remedial English Grammar. F.T. Wood. Macmillan.2007
- On Writing Well. William Zinsser. Harper ResourceBook. 2001
- Study Writing. LizHamp- Lyonsand Ben Heasly. Cambridge University Press. 2006.
- Communication Skills. Sanjay KumarandPushpalata. Oxford University Press. 2011.
- Exercises in Spoken English. Parts.I-III. CIEFL, Hyderabad. Oxford University Press

EE 204	ELECTRICAL CIRCUITS	Credits: 4
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

UNIT I

Basic Circuit Concepts: Electrical circuit elements (R, L and C), Classification of Circuit elements, Voltage and Current sources, Source transformation Techniques– Kirchhoff's laws – Star-delta transformation – Network reduction techniques - Mesh and Nodal Analysis for D.C. Circuits– Concept of mutual inductance – Dot convention.

UNIT II

Network Topology: Graph, tree, incidence matrix, and tie set and cut set matrices – Formulation of equilibrium equations based on graph theory. Duality and dual circuits
A.C. Fundamentals: Periodic waveforms – Average and effective values of different waveforms - Form factor and crest factor.

UNIT III

A.C. Circuits: Phase and phase difference – Phasor notation – Concept of reactance, impedance, susceptance and admittance – Power factor -Active and reactive power – Impedance Triangle-Power triangle – Steady State analysis of single-phase A.C. circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel) – Phasor diagrams. Mesh and Nodal Analysis for A.C. Circuits.

UNIT IV

Resonance: Series and Parallel Resonance – Resonant frequency, Half power frequencies, bandwidth and Quality Factor.

Locus diagrams: Current locus diagrams of RL and RC series circuits and two branch parallel circuits.

UNIT V

Three Phase Circuits: Advantages of three phase systems – Phase sequence – Balanced and Unbalanced systems – Magnitude and phasor relationships between line and phase voltages and currents in balanced star and delta circuits – Analysis of balanced and unbalanced three phase circuits with star and delta connected loads, Measurement of three phase power – Two wattmeter method.

Text Books:

- Sudhakar and Shyammohan, Circuits and Networks: Analysis and Synthesis, 5th Edition, Tata McGraw-Hill

- Ravish R. Singh, Network Analysis and Synthesis, Tata Mc. Graw Hill.
- Abhijit Chakrabarti: Circuit Theory Analysis and Synthesis, 7th Revised Edition, Dhanpat Rai & Co

ME 205	ENGINEERING GRAPHICS AND DESIGN	Credits: 3.5
Sessional Marks: **40**	**2L:0T:3P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, the student will be able to

- Make a distinction between first angle projection and third angle projection of drawing
- Draw hyperbola, parabola, Involutes and Cycloidal curves.
- Draw sections of solids including cylinders, cones, prisms and pyramids.
- Draw projections of lines, planes, solids and sections of solids.
- Draw orthographic projections of lines, planes, and solids.

Question Paper
Modular – 4 questions from
Units I t0 IV, 15 marks each

Unit I

Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epi-cycloid, Hypo- cycloid and Involutes.

Unit II

Scales- Scales– construction of Plain &Diagonal Scales.

Projections of points, lines - Projections of Points and lines inclined to both planes, including traces;

Unit III

Projections of planes

Projections of planes (Regular surfaces only) inclined Planes-Auxiliary Planes

Projections of Regular Solids (Simple solids – cylinder, cone, prism & pyramid) those inclined to

both the Planes-Auxiliary Views

Unit IV

Isometric Projections& Orthographic projections

Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale. Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Unit V

Introduction to CAD

CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.;

Text/Reference Books:

- Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
- Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
- Agrawal B. & Agrawal C.M.(2012),Engineering Graphics, TMH Publication
- Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing, Scitech Publishers
- Corresponding set of) CAD Software Theory and User Manuals

EN 206	ENGLISH COMMUNICATION LAB	Credits: 1.5
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Course Outcomes:

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Listening Comprehension -Pronunciation, Intonation, Stress and Rhythm -Common Everyday Situations: Conversations and Dialogues -Communication at Workplace - Interviews -Formal Presentations

Reference/Text Books:

- Practical English Usage. Michael Swan. OUP. 1995.
- Remedial English Grammar. F.T. Wood. Macmillan.2007
- On Writing Well. William Zinsser. Harper Resource Book. 2001
- Study Writing. LizHamp– Lyons and Ben Heasly. Cambridge Univ. Press. 2006
- Communication Skills. Sanjay Kumar and Pushpalata. Oxford Univ. Press.2011
- Exercises in Spoken English. PartsI-III.CIEFL, Hyderabad. Oxford Univ. Press

III – SEMESTER

MA301B	MATHEMATICS –III	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, students will demonstrate the ability to

- Acquire the knowledge of functions of complex variables.
- understand power series and expansion of analytic function.
- understand Laurent Series, poles, singular points, Residue theorem and its applications.
- analyze the solutions of partial differential equations.
- discuss the boundary value problems, one dimensional wave equation, heat equation and Laplace Equation.

UNIT- I

Complex analysis - I: Analytical functions - Cauchy-Riemann equations – Construction of Analytic functions- Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT-II

Complex analysis - II: Taylor's and Laurent's' series- Transformations- Conformal mapping - Bilinear transformations - Transformation of $1/z$, z^2, sin z and cos z.

UNIT- III

Complex analysis –III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals

UNIT- IV

Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Lagrange's' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT- V

Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

Text Books:

- Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
- Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
- Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
- Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
- Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

EE302C	ELECTRO MAGNETIC FIELDS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, students will demonstrate the ability to

- get acquainted with different coordinate systems and their transformation.
- learn different concepts in Electrostatic fields.
- learn different concepts in magnetic fields
- get acquainted with time varying electric and magnetic fields.

UNIT-I

Electrostatic Fields: Review of Vector Algebra & Vector Calculus, Coulomb's law. Electric field intensity. Electric flux density and Gauss's law. Gauss's law in point form. Electrostatic potential. Potential gradient. Energy stored in electric field.

UNIT-II

Conductors and Dielectrics: Current and current density. Continuity equation. Conductors – Ohm's law, Resistance, Power dissipation, and Joule's law. Dielectrics – Dipole moment, Polarization, and bound charge densities. Boundary conditions. Capacitance.

UNIT-III

Magnetostatic fields: Force of a magnet on a current carrying wire**,** Biot-Savart law. Lorentz force law. Ampere's circuital law. Ampere's circuital law in point form. Scalar and vector Magnetic potential, Magnetic flux density.

UNIT-IV

Magnetic field in materials: Magnetic moment, Magnetization, and Bound current densities. Boundary conditions. Inductance. Energy stored in magnetic field.

UNIT-V

Maxwell's equations: Faraday's law – Motional and Transformer induced emfs, Faraday's law in point form. Displacement current. Maxwell's equations in differential and integral forms. Wave equation and its general solution for free space conditions.

Text Books:

- Mathew N.O. Sadiku, "Elements of Electromagnetics", Oxford University Press.
- Edward C. Jordan and Keith G. Balmain, “Electromagnetic Waves and Radiating Systems”, Prentice-Hall of India Pvt. Ltd.

EE303C	NETWORK ANALYSIS	4 Credits
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Apply Network theorems for the analysis of electrical circuits.
- Analyze the time domain behavior of electrical circuits under transient conditions.
- Evaluate the network functions and two-port network parameters.
- Synthesize the one port networks using Foster and Cauer methods.

UNIT-I

Network Theorems: Superposition Theorem– Reciprocity theorem -Thevenin's and Norton's Theorems – Maximum Power Transfer Theorem- Millman's Theorem –– Tellegen's Theorem – Compensation Theorem - Application of these Theorems for D.C. circuits and sinusoidal steady state A.C. circuits.

UNIT-II

Transient Analysis: Time domain analysis of RL, RC, and RLC circuits for D.C. and sinusoidal excitations – Determination of initial conditions – Concept of time constant – Transient response of RL, RC, and RLC circuits using Laplace Transform techniques.

UNIT-III

Network Functions: One-port and Two-port networks – Driving point and transfer functions of networks – Properties of driving point and transfer functions – Concept of complex frequency, poles and zeros – Time domain response from pole-zero diagram – Restrictions on pole-zero locations.

UNIT-IV

Two-port Network Parameters: Open circuit impedance and short circuit admittance parameters – Hybrid and inverse-hybrid parameters – Transmission and inverse transmission parameters – Inter relationships between parameter sets – Series, Parallel, and Cascade connection of two-port networks – Conditions for reciprocity and symmetry of two-port networks. Terminated two-port networks – Image parameters.

UNIT-V

Elementary Ideas of Network Synthesis: Positive real functions - Hurwitz polynomials - Properties and realization of RL, RC, and LC immittance functions by Foster and Cauer methods.

Text Books:

- Sudhakar and Shyammohan, Circuits and Networks: Analysis and Synthesis, 5th Edition, Tata McGraw-Hill
- Ravish R. Singh, Network Analysis and Synthesis, Tata Mc. Graw Hill.
- Abhijit Chakrabarti: Circuit Theory Analysis and Synthesis, 7th Revised Edition, Dhanpat Rai & Co
- M. E. Van Valkenburg; "Network analysis"; Pearson Education, Third Revised Edition.

EE304C	**D.C. MACHINES AND TRANSFORMERS**	**4 Credits**
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks:**60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the concepts of energy conversion principles, constructional details and principle of operation of DC machines and Transformers.
- Analyze the performance of the DC Machines under various operating conditions using their various characteristics and testing methods.
- Analyze the parallel operation of DC machines and transformers and select appropriate machine as per applications.
- Evaluate the performance of Transformers using phasor diagrams, connections, testing methods and equivalent circuits

UNIT-I

Principles of electromechanical energy conversion: Energy in magnetic system, field energy and mechanical force, single and multiply-excited magnetic field systems, forces/torques in systems with permanent magnets, energy conversion via electric field, dynamical equations of electro mechanical systems.

UNIT-II

DC Generators: Construction, armature windings and its types, Emf equation, armature reaction, compensating windings, commutation, characteristics and types of generators.
Parallel operation of DC Generators: DC shunt and series generators in parallel, equalizing connections

UNIT-III

DC Motors: Force on conductor carrying current, Torque and power equations, speed control, starting and characteristics of dc motors, Losses and efficiency, testing and applications of DC machines.

UNIT-IV

Transformers: Principle, construction and operation, equivalent circuit, phasor diagrams, voltage regulation, losses and efficiency, all day efficiency, Testing of transformers**.**
Autotransformer: Construction, principle, applications and comparison with two winding transformers.

UNIT-V

Three-phase transformer: Construction, Cooling, types of connection and their comparative features, Phase conversions - Scott connection, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers, Parallel operation of transformers.

Text Books:

- I.J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.
- P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.

References Books:

- A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
- M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.
- B. L Theraja, A. K. Theraja, “A text book of Electrical Technology, Vol. II,
- AC and DC Machines” S. Chand Publication, Multicolor edition, Reprint 2004

EE305C	ANALOG ELECTRONICS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- understand the characteristics of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Understand the functioning of OP-AMP and design OP-AMP based circuits.

UNIT-I

DIODE CIRCUITS: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits,

UNIT-II

MOSFET CIRCUITS: MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.

UNIT-III

MULTI-STAGE AND POWER AMPLIFIERS: Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers, Power amplifiers - Class A, Class B, Class C.

UNIT-IV

FEEDBACK AMPLIFIERS: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

OSCILLATORS: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

UNIT-V

OPERATIONAL AMPLIFIERS: Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular wave generators.

Text Books:

- Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition 2010
- Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.

References:

- Electronic Devices Conventional and current version -Thomas L. Floyd 2015, pearson.
- J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.
- P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.
- P. R. Gray, R. G. Meyer and S. Lewis, “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons, 2001.

EE306L	ELECTRICAL CIRCUITS AND NETWORKS LAB	1.5 Credits
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Verify Network theorems for the analysis of electrical circuits.
- Analyze the time domain behavior of electrical circuits under transient conditions.
- Draw the locus diagrams and analyse the resonance conditions.
- Evaluate the two-port network parameters.

Experiments related to the course contents of two courses

(1) Electrical Circuits

(2) Network Analysis.

EE307L	D.C. MACHINES AND TRANSFORMERS LAB	1.5 Credits
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Test the performance of any DC machines and single-phase transformers, by conducting suitable experiments and report the results.
- Analyze the various speed control methods of DC motors and characteristics of DC machines.
- Understand the significance of different connections of three-phase transformers.

Experiments related to the course contents of the course D.C. Machines and Transformers.

EE309S	COMPUTER SKILLS	2 Credits
Sessional Marks: **40**	**1L:0T:2P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Identify basic terms, concepts, and functions of computer system components.
- Select and use the appropriate software application to complete a particular task such as a word Processing skill to create, save, modify business documents.
- Identify basic concepts and procedures for creating, viewing, and managing files, and folders for different operating systems.
- Identify basic concepts of organization and procedures for creating, and viewing will software presentation such as PowerPoint.

Experiments related to the following topics:

- Installations of Computer Software.
- Word Processing using MS Office.
- Documentation using LaTex.
- Mathematical Calculations using Spreadsheet.
- Presentation using Power Point.
- Brief study of internet and types of networks.
- Brief Study of world wide web and web browsers.
- Brief Study of Electronic Mail management system.
- Preparation of various data collection forms.

MC310A	CONSTITUTION OF INDIA	0 Credits
Sessional Marks: **0**	**2L:0T:0P**	End Examination Marks: **100**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT-I

History of Making of the Indian Constitution: History. Drafting Committee, (Composition & Working)

Philosophy of the Indian Constitution: Preamble Salient Features

UNIT-II

- **Contours of Constitutional Rights & Duties:**
- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT-III

- **Organs of Governance:**
- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

UNIT-IV

- **Local Administration:**
- District's Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.
- Pachayati raj: Introduction, PRI: Zila Pachayat.
- Elected officials and their roles, CEO Zila Pachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

UNIT-V

- **Election Commission:**
  - Election Commission: Role and Functioning.
  - Chief Election Commissioner and Election Commissioners.
  - State Election Commission: Role and Functioning.
  - Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books/References:

- The Constitution of India, 1950 (Bare Act), Government Publication.
- Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
- M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

IV - SEMESTER

EE401C	POWER SYSTEMS-I	4 Credits
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will be able to

- Understand the power system structure and principles of energy generation from conventional and renewable energy sources
- Analyze the economic aspects of power generation.
- Acquire the knowledge on parameter calculations and mechanical design in transmission lines.

UNIT-I

Fundamentals of Power systems: Evolution of Power Systems- Present Day Scenario-Structure of a power system-Conventional and Renewable Energy Sources.

Power Stations: Hydro-electric, Thermal Stations, Gas Turbine and Nuclear power Stations-Selection of site, Main parts, lay out and working principle.

UNIT-II

Renewable Energy sources: Necessity- principle of operation and working of Solar electric system, wind electric system, bio-mass and bio-gas plants, Fuel cells, Tidal and Geothermal power plants - applications.

UNIT–III

Economic aspects of power stations: Types of loads-Load curve, load duration and integrated load duration curves-Load factor-Demand factor-Diversity factor-Capacity factor-Utilization and plant use factors-The effect of these factors on generation-Number and size of generating units-Base load and peak load plants-Costs of electrical energy-Types of tariff charges on consumers.

UNIT-IV

Inductance and capacitance calculations of transmission lines: Line Conductors-Resistance-Inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacings-Composite conductors-transposition-Bundled Conductors-Effect of earth on capacitance.

UNIT-V

Mechanical design of Transmission line: Catenary Curve-Sag tension calculations- Supports at equal and different levels, effect of wind and ice loading – stringing chart – sag template – conductor vibrations.

Corona: Introduction- critical disruptive voltages-Corona loss-factors affecting corona loss-Methods of reducing corona loss-Disadvantages of corona-Inductive interference between power and communication lines.

Text Books:

- C..L.Wadhwa, "Generation Distribution and utilization of Electrical energy" , New Age International
- Power plant Engineering by A.K.Raja etc, New age International Publishers.
- G. D. Rai, 'Non-Conventional Energy Sources', Khanna Publishers, New Delhi, 2006.
- C..L.Wadhawa, "Electrical Power systems" New age publications.
- B.R.Gupta, "Power system analysis and design" third edition, Wheeler publishing.
- William D.Stevenson "Elements of power system analysis" fourth edition, Mc Grawhill International editions.
- AR Bergen and Vijay Vittal, "Power system analysis", Pearson education, 2001

EE402C	INDUCTION MOTORS AND SYNCHRONOUS MACHINES	4 Credits
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

Course Outcomes: Upon completion of this course, students will be able to

- Understand the constructional details and principle of operation of Induction and Synchronous Machines.
- Understand parallel operation, speed control and starting of AC machines.
- Analyze the performance of the Induction and Synchronous Machines using the phasor diagrams, equivalent circuits and by testing.
- Select appropriate AC machine for any application and appraise its significance.

UNIT-I

Three phase Induction Motors: Construction and principle of operation, types, torque equations, torque slip characteristics, phasor diagrams, equivalent circuit, circle diagram, testing and starting methods.

UNIT-II

Speed control of Three-phase Induction Motors: Pole changing, Cascade connection, injection of emf in to rotor circuit, V/f control of 3-phase induction motor, Double cage induction motor, induction generator and its applications.

Single-phase Induction Motors: Construction, principle, double revolving field theory, equivalent circuit, applications, starting methods, Universal motor

UNIT-III

Synchronous Generators: Construction, principle, emf equation, Armature reaction, leakage flux, synchronous reactance, equivalent circuit, Phasor diagram, voltage regulation, determination of regulation by synchronous impedance method, mmf method, ZPF method, ASA method.

UNIT-IV

Theory of Synchronous Machines: Phasor diagram, determination of X_d and X_q from Slip test, Expression for power expressions, power angle characteristics.

Parallel Operation of Synchronous Generators: Conditions, Synchronizing, load sharing, operation of alternator with infinite busbars, effect of change of mechanical input and excitation, Excitation systems, transient and sub- transient reactance.

UNIT-V

Synchronous Motors: Principle of operation, methods of starting, Phasor diagram, variation of current and power factor with excitation, Predetermination of V and inverted V curves, Hunting and use of damper bars, Synchronous condenser and power factor correction, Excitation and power circles.

Text Books:

- Dr. P.S. Bhimbra, 'Electrical Machinery', Khanna Publications, 7th Edition, 2007.
- Nagrath, I.J. and Kothari, D.P., 'Electrical Machines', Tata McGraw Hill Education Private Limited Publishing Company Ltd., 4th Edition, 2010.
- M. G. Say, 'Performance and Design of Alternating Current Machines', CBS Publishers & Distributors Pvt. Ltd., New Delhi, 3rd Edition, 2002

Reference Books:

- A.E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
- A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
- P. C. Sen., "Principles of Electric Machines and Power Electronics", 2nd edition, John Wiley and Sons Inc., 1997.

EO403C	MANAGERIAL ECONOMICS AND ACCOUNTANCY	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand Macro Economic environment of the business and its impact on enterprise.
- Identify various cost elements of the product and its effect on decision making.
- Understand the concepts of financial management and smart investment.
- Prepare the Accounting records and interpret the data for Managerial Decisions.

UNIT -I

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR, NPV, IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage, Income tax leverage.

UNIT -II

Depreciation and methods of calculating depreciation (straight line, sum of the years digit method, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

UNIT -III

Inflation: Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

UNIT -IV

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

UNIT -V

Cost Accounting**:** Introduction, Classification of costs, Methods of costing, Techniques of costing, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

Text Books:

- Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw Hill Education, 1996.
- Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
- A.N. Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
- Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
- Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition, Vikas Publication, 2012.

EE404C	DIGITAL ELECTRONICS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand working of logic families and logic gates.
- Design and implement Combinational and Sequential logic circuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.

1. Be able to use PLDs to implement the given logical problem.

UNIT-I

Fundamentals of Digital Systems and logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT-II

Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT-III

Sequential circuits and systems: A 1-bit memory, the circuit properties of Bi stable latch, the clocked SR flip flop, J- K-T and D-types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT-IV

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder

D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, duals lope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs

UNIT-V

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Text Books:

- R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
- M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
- A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

EE405C	SIGNALS AND SYSTEMS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Differentiate between various types of signals and understand the implication of operations of signals
- Understand and classify systems based on the impulse response behaviour of both continuous-time and discrete-time systems
- Perform domain transformation from time to frequency and understand the energy distribution as a function of frequency
- Usefulness of convolution for analysing the LTI systems and understand the concepts of power spectral density through correlation.
- Solve differential and difference equations with initial conditions using Laplace and Z-transforms.

UNIT-I

Introduction to Signals and Systems: Definition and classification of signals and systems**,** Basic operations on signals, Elementary signals, Classification of Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time-Invariant Systems - Discrete-Time LTI Systems, Convolution Sum, Continuous-Time LTI Systems Convolution Integral. Causal LTI Systems Described by Differential and Difference Equations.

Signal Analysis: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT-II

Fourier series and Fourier Transform: Fourier series Representation of Continuous-Time Periodic Signals, Dirichlet's conditions, Properties of Continuous-Time Fourier Series. Trigonometric Fourier Series and Exponential Fourier Series with examples, Complex Fourier spectrum.

Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Continuous-Time Fourier Transform,

Magnitude-Phase responses, Parseval's theorem, Inverse Fourier transform.

Discrete-Time Fourier Transform – Properties, Inverse Discrete-time Fourier Transform.

Introduction to Hilbert Transform.

UNIT-III

Convolution and Correlation: Continuous-time convolution, Convolution sum, Correlation between signals, Cross correlation, Autocorrelation, Properties, Energy spectral density, Power spectral density, Relation between convolution and correlation.

UNIT-IV

Behavior of continuous time LTI systems: Distortion less transmission through a system, signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Sampling: Sampling Theorem, Reconstruction of a Signal from its Samples Using Interpolation, types of sampling-natural sampling, flat- top sampling and impulse sampling, Effect of under sampling -Aliasing.

UNIT-V

System Analysis using Laplace and z -Transforms:

Laplace Transform - Region of Convergence – Relation between Laplace and Fourier Transform, Inverse Laplace Transform, Properties, Analysis and Characterization of LTI Systems Using Laplace Transform, Z-Transform -Region of Convergence - Properties, Inverse z-Transform, Analysis and Characterization of LTI Systems Using z-Transforms.

Text Books:

- Anand Kumar, Signals & Systems, PHI, 2011.
- Alan V. Oppenheim, Alan S. Willsky, & S. Hamid Nawab, “Signals and Systems,” Pearson Higher Education, 2nd Ed., 1997.
- Simon Haykin and B. Van Veen, “Signals & Systems,” John Wiley and Sons, 2nd Edition, 2007.

Reference Books:

- J. G. Proakis and D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", Pearson, 2006.
- B.P. Lathi, "Principles of LINEAR SYSTEMS and SIGNALS," Oxford Univ. Press, Second Edition, International version, 2009.
- H. P. Hsu, "Signals and systems", Schaum's series, McGraw Hill Education, 2010.
- Luis F. Chaparro, "Signals and Systems using MATLAB," Academic Press, 2011.
- C. L. Philips, J. M. Parr and Eve A. Riskin, "Signals, Systems and Transforms," Pearson Education, 4th Edition, 2008.

EE406L	INDUCTION MOTORS AND SYNCHRONOUS MACHINES LAB	1.5 Credits
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**
Course Outcomes: At the end of this course, students will demonstrate the ability to ➢ Test the performance of induction motors and synchronous machines by conducting suitable experiments and report the results. ➢ Analyze the speed control methods of three-phase induction motors by conducting suitable experiments. ➢ Understand the parallel operation and estimate the regulation of alternators.		
Experiments related to the course contents of the course - Induction & Synchronous Machines.		

EE407L	ANALOG AND DIGITAL ELECTRONICS LAB	1.5 Credits
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**
Course Outcomes: At the end of this course, students will demonstrate the ability to ➢ Plot the characteristics of Electronic Devices to understand the behavior ➢ Design, construct and test amplifier circuits and interpret results ➢ Design and analyze combinational logic circuits ➢ Design and analyze flip flops and Sequential logic circuits		
Experiments related to the course contents of two courses (1) Analog Electronics (2) Digital Electronics.		

EE409S	**PYTHON PROGRAMMING**	**2 Credits**
Sessional Marks: **40**	**1L:0T:2P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Implement python programming constructs to build small to large applications.
- Implement the problems in terms of real-world objects.
- Evaluate and handle the errors during runtime involved in a program.
- Extract and import packages for developing different solutions for real time problems

Experiments related to the Python Programming Course:

- Python Programming Fundamentals
- Python Built-in Data Structures
- Classes & Objects
- Functions, I/O, Exception Handling in Python
- Applications

V – SEMESTER

EE501C	POWER SYSTEMS-II	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre-Requisites: Power systems-1, Network Analysis

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Analyze the performance of different transmission lines and different voltage control methods
- Understand the concepts of substations and overhead line insulators
- Study and Evaluate power system transients
- Understand the concepts of Underground Cables
- Analyze and understand the concepts of Distribution systems

UNIT-I

Performance of transmission lines: Representation of lines - short transmission lines - medium transmission lines - Nominal pie and T representation of long lines by distributed parameters - Equivalent T and Pie representation of long transmission lines - Evaluation of ABCD parameters of long lines - Ferranti effect.

Voltage Control using Shunt and series capacitors - synchronous capacitors - Tap changing andBooster Transformers - Surge Impedance Loading (SIL).

UNIT-II

Substations: Number and size - Location and installation - The main equipment in substations - Bus Arrangements - Key diagram of a typical primary substation.

Overhead line insulators: Introduction - Types of insulators - Potential distribution over a string of insulators - Methods of equalizing the potential, string efficiency - Testing of insulators.

UNIT–III

Power system transients: Introduction - Circuit closing transients - Sudden symmetrical short circuit analysis of alternator - Recovery transient due to removal of a short circuit - Travelling waveson transmission line - Surge impedance and wave velocity - Specification

of travelling waves - Reflections and refractions of waves - Different types of terminations - Forked line - Successive reflections - Bewley's Lattice Diagram - Attenuation and Distortion - Arcing grounds.

UNIT-IV

Underground Cables: Introduction - The insulation types - Insulating materials for EHV voltage cables - Classification of cables - Parameters of single core cable - Grading of cables -Capacitance of three core belted cable break down of cables - Heating of cables – dielectric loss and Sheath losses - Current rating of cables

UNIT-V

AC Distribution: Comparison of AC single phase, 3 phase 3 wire and 3 phase 4 wire systems with DC 2 wire - Types of primary distribution systems - Types of secondary Distribution systems - AC distributors fed at one end and at both ends-Kelvin's law - Limitations of Kelvin's law - Load estimation - Selection voltage of primary distribution - Choice of scheme - Size of feeders, power factor correcting methods

Text Books:

- C..L.Wadhwa, "Electrical Power systems" New age publications.
- B.R.Gupta, "Power system analysis and design" third edition, Wheeler publishing.
- William D.Stevenson "Elements of power system analysis" fourth edition, Mc Grawhill International editions.

Reference Books

- C.L.Wadhwa, "Generation Distribution and utilization of Electrical energy" , New Age International
- AR Bergen and Vijay Vittal, "Power system analysis", Pearson education, 2001

EE502C	LINEAR CONTROL SYSTEMS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre-Requisites: Engineering Mathematics, Network Analysis

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the modeling of linear-time-invariant systems using transfer function andstate-space representations.
- Understand the concept of stability and its assessment for linear-time invariant systems.
- Understand the applications of control systems in industries.

UNIT–I

Introduction: System representation – Classification of systems – Control system technologies – Types of control Systems: open loop and closed loop systems - Advantages and disadvantages of control systems – Examples of open loop and closed loop control systems – Transfer function andlimitations

UNIT-II

Mathematical modeling of physical systems : Mathematical modeling and transfer functions of electrical, mechanical and electro-mechanical systems – Electrical analogues – Block diagram and their reduction techniques – Signal flow graphs – Introduction to servo motors – DC Servo motors
– two-phase AC servo motors.

UNIT-III

Time domain analysis: Standard test input signals – step response of first and second order systems – Time domain specifications – steady state error – static error and generalized error coefficients – Problems.

UNIT-IV

Stability of control systems: Introduction – Bounded Input –Bounded Output (BIBO) – Necessary conditions for stability – Characteristic equation and location of roots in s-plane for stability – Routh-Hurwitz criterion – Root locus techniques – Rules for construction of root loci.

UNIT-V

Frequency domain analysis: Introduction to frequency domain specifications – correlation between time domain and frequency domain responses – Frequency response plots – polar plots –Nyquist Plots – Relative stability using Nyquist criterion – Bode plots – Gain margin and Phase margin.

Text Books:

- I.J. Nagrath and M. Gopal, "Control system Engineering", Wiley Eastern Ltd.
- Benjamin C. Kuo, "Automatic Control system", Prentice Hall, 1995.
- Ch. Chengaiah and G.V Marutheswar, "Control Systems A comprehensive Lab Manual", B.S Publications, 2017.

EE503C	POWER ELECTRONICS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre Requisites: Analog Electronics

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the differences between signal level and power level devices.
- Analyze controlled rectifier circuits.
- Analyze the operation of DC-DC choppers.
- Analyze the operation of Inverters and Cyclo-Converters.

UNIT-I

Silicon controlled Rectifier – Static characteristics and ratings – turn-ON and turn-OFF mechanism – Gate characteristics – Series and parallel operation of SCR's static and dynamic equalization circuits – Protection circuits – Design of snubber circuit – Class A,B,C,D,E types ofcommutation circuits.

UNIT-II

Phase controlled Rectifiers - Principles of phase control – Half-wave and full- wave controlled rectifiers with resistive, inductive and RLC load – Freewheeling diode operation – Bridge rectifiers – Single phase and three phase Rectifiers with inductive load – Half and fully controlled rectifiers – freewheeling diode operation – Effect of source inductance – Dual converter – circulation and non-circulating current mode of operation.

UNIT-III

Choppers – D.C.Choppers – Principles of operation – control strategies, constant and variable frequency system, current limit control – Types of chopper circuits – Type-A, Type B and TypeE chopper circuits Morgan chopper Jone's chopper

UNIT-IV

Inverters – Classification – series and parallel inverters improved series inverters – Bridge inverters – Commutation circuits – current and voltage commutation circuits – single phase andthree phase inverters – output waveform control – Mc Murray Inverter – Introduction to PWM techniques

UNIT-V

Cyclo-converters – Principle of operation – single phase step-up and step down cycloconverters – Three-phase half-wave cycloconverters – output voltage equation – circulation and non-circulating current mode of operation – Load commutated cycloconverter.

Speed control – Speed control of DC motors using controlled rectifiers and choppers – Speedcontrol of induction motors using inverters

Text Books:

- An introduction to Thyristors and their application – Dr. M. Ramamoorthy – East West press.
- Power Electronics - Dr. P.S. Bimbhra 2nd edition – Khanna publishers.
- Power Electronics – M.D. SINGH and K.B. KHANCHANDANI – Tata Mc.Graw Hill publishers.
- Industrial and Power Electronics – RASHID (3rd Edition)

EE504C.i	WIND AND SOLAR ENERGY SYSTEMS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre-Requisites: Power systems-I, Induction Motors and Synchronous Machines

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the solar radiation, measurements, characteristics of solar PV cell and wind turbines.
- Develop the models of PV system and wind turbine, and their applications.
- Analyze the electrical characteristics and operation of various wind-driven electrical generators.
- Understand various power electronic converters used for hybrid system

UNIT-I

Basic characteristics of sunlight – solar spectrum – insolation specifics– irradiance and irradiation- pyranometer – solar energy statics- Solar PV cell – I-V characteristics –P-V characteristics– fill factor-Modeling of solar cell– maximum power point tracking.

UNIT-II

PV module – blocking diode and bypass diodes– composite characteristics of PV module – PV array– PV system –PV-powered fan–PV fan with battery backup–PV-powered pumping system –PV powered lighting systems–grid- connected PV systems.

UNIT-III

Wind source–wind statistics-energy in the wind –turbine power characteristics - aerodynamics – rotor types – parts of wind turbines– braking systems–tower- control and monitoring system.

UNIT-IV

General characteristics of induction generators– grid-connected and self-excited systems– steady- state equivalent circuit-performance predetermination–permanent magnet alternators–steady- stateperformance.

UNIT-V

Power electronic converters for interfacing wind electric generators – power quality issues-hybrid systems-wind-diesel systems – wind-solar systems.

Text Books:

- S N Bhadra, S Banerjee and D Kastha, 'Wind Electrical Systems', Oxford University Press, 1stEdition, 2005.
- Chetan Singh Solanki, 'Solar Photovoltaics: Fundamentals, Technologies andApplications' PHILearning Publications, 2nd Edition, 2011.

Reference Books:

- Roger A. Messenger and Jerry Ventre, 'Photovoltaic Systems Engineering', Taylor and FrancisGroup Publications, 2nd Edition, 2003.
- M. Godoy Simoes and Felix A. Farret, 'Alternative Energy Systems: Design and Analysis withInduction Generators', CRC Press, 2nd Edition, 2008
- Ion Boldea, 'The Electric Generators Handbook- Variable Speed Generators', CRC Press, 2010.
- Bin Wu, Yongqiang Lang, Navid Zargari, Samir Kouro, 'Power Conversion and Control ofWind Energy Systems', IEEE Press Series on Power Engineering, John Wiley & Sons,2011.
- S. Sumathi,L. Ashok Kumar,P. Surekha ,'Solar PV and Wind Energy ConversionSystems', Springer 2015

EE504C.ii	ELECTRICAL DISTRIBUTION SYSTEM	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre-Requisites: Power systems-1

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the basics of Distribution systems
- Understand different Distribution Transformers &feeders
- Understand the basics of Substations
- Understand the working of Protective devices and coordination
- Acquire the knowledge of power factor and voltage control

.

UNIT-I

Introduction to distribution systems: An overview of the role of computers in distribution system planning. Load modeling and characteristics. Coincidence factor, contribution factor and loss factor. Classification of loads (Residential, Commercial, Agricultural and Industrial) and theircharacteristics.

UNIT-II

Distribution Transformers &feeders – Distribution transformer types, regulation and efficiency.Design considerations of distribution feeders – Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.

UNIT-III

Substations – Introduction – types of substations - main equipments in substations - Busbar Arrangements- Key diagram of a typical primary substation - Rating of a distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT-IV

Protective devices and coordination – Objectives of distribution system protection, Types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of fuses, circuit reclosures, line Sectionalizers, and circuit breakers. Coordination of protective devices General coordination procedure.

UNIT-V

Power factor improvement and voltage control – Capacitive compensation for power-

factor control – Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and Switched), power factor correction, capacitor allocation.

Voltage control – Equipment for voltage control, effect of series capacitors, effect of AVB/AVR,line drop compensation.

Text Books:

- "Electric power Distribution system Engineering "– by Turan Gonen, Mc Graw-Hill book company.
- V. Kamaraju, Electrical Power Distribution Systems, Tata Mc Graw Hill Publishing Company, 2nd edition, 2010.
- Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing company, 4th edition, 1997.

EE504C.iii	ELECTRICAL SAFETY	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre Requisites: Power Systems-1

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the need of electrical safety in different locations
- Understand the need of electrical safety during installation of equipment's
- Describe the electrical safety in residential, commercial and agricultural installations.
- Explain the necessity of electrical safety in Hazardous zones
- Understand electrical safety in distributed systems and usage of Fire extinguishers

UNIT-I

INTRODUCTION TO ELECTRICAL SAFETY, SHOCKS AND THEIR PREVENTION:

Terms and definitions, objectives of safety and security measures, Hazards associated with electric current, and voltage, who is exposed, principles of electrical safety, Approaches to prevent Accidents, scope of subject electrical safety. Primary and secondary electrical shocks, possibilities of getting electrical shock and its severity, medical analysis of electric shocks and itseffects, shocks due to flash/ Spark over's, prevention of shocks, safety precautions against contact shocks, flash shocks, burns, residential buildings and shops.

UNIT-II

SAFETY DURING INSTALLATION OF PLANT AND EQUIPMENT: Introduction,

preliminary preparations, preconditions for start of installation work, during, risks during installation of electrical plant and equipment, safety aspects during installation, field quality and safety during erection, personal protective equipment for erection personnel, installation of a large oil immersed power transformer, installation of outdoor switchyard equipment, safety during installation of electrical rotating machines, drying out and insulation resistance measurement of rotating machines.

UNIT-III

ELECTRICAL SAFETY IN RESIDENTIAL, COMMERCIAL AND AGRICULTURAL

INSTALLATIONS: Wiring and fitting – Domestic appliances – water tap giving shock – shock from wet wall – fan firing shock – multi-storied building – Temporary installations – Agricultural

pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances

UNIT-IV

ELECTRICAL SAFETY IN HAZARDOUS AREAS: Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements –Specifications of electrical plants, equipments for hazardous locations – Classification ofequipment enclosure for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

UNIT-V

ELECTRICAL SAFETY IN DISTRIBUTION SYSTEM: Total quality control and management – Importance of high load factor – Disadvantages of low power factor – Causes

of low P.F. – power factor improvement – equipment – Importance of P.F. improvement

Fire Extinguishers: Fundamentals of fire-initiation of fires, types; extinguishing techniques, prevention of fire, types of fire extinguishers, fire detection and alarm system; CO2 and Halogen gas schemes; foam schemes.

Text Books:

- Rao, S. and Saluja, H.L., "Electrical Safety, Fire Safety Engineering and Safety Management", Khanna Publishers, 1988.
- Pradeep Chaturvedi, "Energy Management Policy, Planning and Utilization", ConceptPublishing Company, 1997.

Reference Books:

- Cooper.W.F, "Electrical safety Engineering", Newnes-Butterworth Company, 1978.
- John Codick, "Electrical safety hand book", McGraw Hill Inc., New Delhi, 2000.
- Nagrath, I.J. and Kothari, D.P., "Power System Engineering", Tata McGraw Hill, 1998.
- Wadhwa, C.L., "Electric Power Systems", New Age International, 2004.

EE506L	CONTROL SYSTEMS LAB	1.5 Credits
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Pre-requisites: Control Systems

Course Outcomes: At the end of the course, the student will be able to:

- Simulate the physical control system for stability studies
- Demonstrate feedback controllers
- Develop logic gates using PLC

LIST OF EXPERIMENTS

- Modeling of Physical Systems (Mechanical and Electrical systems).
- Block Diagram Reduction of Linear Systems
- Time response analysis of Linear Systems for impulse and step inputs
- Frequency response analysis of Linear Systems
- Stability and relative stability analysis of Linear Systems Using (Root Locus, Bode and Nyquist plot).
- Time Response analysis of Second Order System.
- Study the effect of P, PD, PI, PID controllers on second order systems.
- Magnitude and phase plot of Lag and lead compensators.
- Determination of transfer function and effect of feedback on DC servo motor.
- Study of logic gates using PLC

Additional Experiments

- Design of Lag and Lead Compensators for a given system
- Stepper motor control using Simulation tools.
- Study the effect of P, PD, PI, PID controllers on DC servomotor system using PLC.

EE507L	POWER ELECTRONICS LAB	1.5 Credits
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Pre-requisites: Power electronics Theory

Course Outcomes: At the end of the course, the student will be able to :

- Examine the characteristics of Power electronic devices
- Analyze the performance of different power converters using trainer kits.
- Evaluate the performance of different power converters using simulation tools

LIST OF EXPERIMENTS

- Study the operation of a matrix converter.
- Obtain the static V-I characteristics of SCR and IGBT.
- Connect 1-Φ fully controlled rectifier and to control the speed of a DC motor.
- Observe the output waveform of series inverter.
- Verify the operation of dual converter.
- Observe the output waveforms of 1-Φ parallel inverter at different frequencies.
- Study the speed control of 3-Φ induction motor in open- loop and closed loop using sinusoidal PWM techniques.
- Study the circuit of 3-Φ half controlled rectifier.
- Verify Jone's chopper.

EE508S	MATLAB Laboratory	2 Credits
Sessional Marks: **40**	**1L:0T:2P**	End Examination Marks: **60**

Pre-requisites: Computer Skills

Course Outcomes: At the end of the course, the student will be able to :

- Learn the MATLAB environment and its programming fundamentals
- Write programs using commands and functions
- Handle and solve problems using MATLAB and to draw the plots
- Create Simulink model

LIST OF EXPERIMENTS

- To write a program for matrix operation and various functions.
- To develop a program for finding solutions of linear equations and factorial of a number.
- To develop a program for geometric progression and convolution of two signals.
- To write a program to draw a circle and different type of plots.
- To write a program for different types of waveforms with and without switch case.
- To develop a program for integral and differentiation of a polynomial.
- To develop a program to find largest & smallest and ascending & descending order by using MATLAB software.
- To write a program to find date & calendar, given input year is leap year or not
- To develop a program for displaying multiplication table and factorial of a given number.
- To write a program code for taking students and employee details

MC509A	UNIVERSAL HUMAN VALUES	0 Credits
Sessional Marks: **Nil**	**2L:0T:0P**	End Examination Marks:**100**

Pre-requisites/co-requisites: None.

COURSE OUTCOMES: At the end of this of this course, the students will be able

- To become more aware of themselves, and their surroundings (family, society, nature)
- To distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- To Understand the role of a human being in ensuring harmony in society and nature.
- To become sensitive to their commitment towards what they have understood(human values, human relationship and human society)
- To Distinguish between ethical and unethical practices, and start working out thestrategy to actualize a harmonious environment wherever they work.

UNIT I

Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of everyhuman being with their correct priority. Understanding Happiness and Prosperity correctly - Acritical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT II

Understanding Harmony in The Human Being - Harmony in Myself: Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility (Sukh and Suvidha). Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaningofProsperity in detail. Programs to ensure Sanyam and Health.

UNIT III

Understanding Harmony in The Family and Society- Harmony in Human- Human Relationship: Understanding harmony in the Family - the basic unit of human interaction. Understanding values in human-human relationship; meaning of Justice (nine universal valuesin relationships) and program for its fulfilment to ensure mutual happiness (Ubhay-tripti); Trust **(Vishwas)** and Respect **(Samman)** as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence.

Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution (Samadhan), Prosperity (Samridhi), fearlessness (**Abhay**) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - fromfamily to world family.

UNIT IV

Understanding Harmony in The Nature and Existence - Whole Existence as Coexistence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among thefour orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V

Implications of The Above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basisfor Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competencein professional ethics: a. Ability to utilize the professional competence for augmenting universalhuman order b. Ability to identify the scope and characteristics of people friendly and eco- friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS:

- Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, ExcelBooks,New Delhi, 2010.
- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

REFERENCE BOOKS:

- E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered.Blond & Briggs, Britain.
- A. N. Tripathy, 2003, Human Values, New Age International Publishers.
- Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
- A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
- Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi TantraShodh, Amravati.
- E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers,Oxford University Press.
- M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including HumnaValues), Eastern Economy Edition, Prentice Hall of India Ltd.
- The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
- India Wins Freedom - Maulana Abdul Kalam Azad.

Relevant CDs, Movies, Documentaries & Other Literature:

- value Education website, http://www.uptu.ac.in
- Story of Stuff, http://www.storyofstuff.com
- AI Gore, An Inconvenient Truth, Paramount Classics, USA
- Charle Chaplin, Modern Times, United Artists, USA
- IIT Delhi, Modern Technology - the Untold Story.

VI - SEMESTER

EE601C	POWER SYSTEM ANALYSIS	4 Credits
Sessional Marks: **40**	**3L:1T:0P**	End Examination Marks: **60**

Pre-Requisites: Power systems-2

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Analyze symmetrical and unsymmetrical faults.
- Apply the load flow techniques and carry out load flow study of power systems.
- Study and analyze the transient and steady state stability of power systems

UNIT-I

Fault studies: Per unit system, Introduction to symmetrical fault analysis-short circuit capacity ofa bus-The short circuit currents and the reactance of synchronous machines-Internal voltages of loaded machines under transient conditions-Expressions for fault MVA in terms of per unit and percentage quantities-Need for current limiting reactors and their location-selection of circuit breakers.

UNIT-II

Sequence Networks: Symmetrical Components-phase shift of symmetrical components in Star- Delta transformer banks -Power in terms of symmetrical components - Sequence impedances and sequence networks-Sequence impedances of generators-Sequence impedances of transmission lines-Sequence impedances of transformers.

Unsymmetrical fault Analysis: Fault current calculations for single line to Ground fault, Line toLine fault and Double line to Ground fault, open conductor faults.

UNIT-III

Load flow studies: Need for load flow studies in a power system-Formation of Bus admittance matrix-Classification of types of buses in a power system-Formulation of load flow equations- Gauss-Seidel, iterative method for load flow studies-Treatment of PV bus-Acceleration factors- Newton Raphson method for load flow solution with rectangular and polar coordinates- formulation of load flow equations-Decoupled and fast decoupled load flow.

UNIT-IV

Stability studies: Classification of stability studies-The power flow equations of round rotor andsalient pole synchronous machine connected to infinite bus through a

transmission system under steady state and transient state - Power flow equations of a two-machine system - Power flow equations in terms of ABCD constants-Power angle diagrams-Derivation of swing equation, Inertia constant. steady state stability analysis: Steady state stability and steady state stability limits.

UNIT-V

Transient stability analysis: General considerations and assumptions-Transient stability and stability limits-Reduction of two finite machine system to one machine system-Solution of swing equation of one machine system by point-by-point method-Digital solution by numerical methods- Equal area criterion-Limitations of equal area criterion- Determination of critical clearing angle. methods for improving power system stability.

Text Books:

- J.Grainger and W. D. Stevenson, "Power System Analysis", McGraw HillEducation,1994.
- D. P. Kothari and I. J. Nagrath, "Modern Power System Analysis", McGraw HillEducation, 2003.
- Hadi Saadat, "Power System Analysis", Tata McGraw-Hill Education, 2nd Edition,2002.

Reference books:

- O. I. Elgerd, "Electric Energy Systems Theory", McGraw Hill Education, 1995.
- R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999.
- Power System Analysis and design by B.R.Gupta, S.Chand publications.

EE602C	ELECTRICAL AND ELECTRONICS MEASUREMENTS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre Requisites: Electrical Circuits

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the working principle of different measuring instruments.
- Select appropriate measuring instruments for measuring various parameters in theirlaboratory courses.
- Study and correlate the significance of different measuring instruments, recorders andoscilloscopes.

UNIT–I

Measurements – Errors & classification, Deflecting, control, and damping torques in instruments Measurement of voltage & current - permanent magnet moving coil and moving iron meters, dynamometer type instruments.

UNIT–II

Measurement of potential difference, current, and resistance – DC bridges, A.C & DC potentiometers.

Measurement of inductance, capacitance, and resistance- AC bridges.

UNIT–III

Instrument transformers – Current and Potential Transformers, Ratio and phase angle errors.

Measurement of power – Electrodynamic instruments, Induction instruments.

Measurement of energy – Single phase and three phase energy meters.

UNIT–IV

Power factor meters**,** Synchronoscopes, Ratiometers, Frequency meters, Q-meters, Digital Voltmeters, Multimeters.

UNIT – V

Transducers – Position transducers, Force transducers, Piezo-electric transducers, Hall effecttransducers. Temperature measurement.

Signal sources – Oscillators, Function generator & pulse generators.

Oscilloscopes - CRO, Digital storage and Analog storage Oscilloscope. Analog &

DigitalRecorders, error analysis.

Text Books:

- A. K. Sawhney, 'A Course in Electrical and Electronic Measurements and Instrumentation', Dhanpat Rai & Co., 9 th Edition, 2015.
- W. D. Cooper," Electronic Instrumentation and Measurement Techniques", Prentice Hallof India Publications, 1st Edition, 2009.
- C.T.Baldwin, "Fundamentals of Electrical Measurements".

Reference Books:

- Deobelin, 'Measurements Systems', Tata McGraw Hill Publications, 2nd Edition, 2010.
- John P.Bently, "Principles of Measurement Systems", 3rd edition.

EE603C	MICRO PROCESSORS AND MICROCONTROLLERS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre-Requisites: Digital Electronics

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Do assembly language programming.
- Do interfacing design of peripherals like I/O, A/D, D/A, timer etc.
- Understand the architecture and features of 8051 microcontroller.

UNIT-I

Development of microprocessors, 8086 microprocessor – Architecture, Instruction set, Addressing modes, Interrupt system. Minimum mode 8086 system and timings, Maximum mode 8086 system and timings.

UNIT-II

Assembler directives, Assembly language programs (8086) with Assembler directives for addition, subtraction, multiplication, division etc., sorting and searching, bit manipulation, Programs using look–up tables, Delay subroutines. Stages of software development.

UNIT-III

Data transfer schemes – Synchronous, Asynchronous, Interrupt driven and DMA type schemes, Programmable interrupt controller (8259) and its interfacing, Programmable DMA controller (8257) and its interfacing, Programmable Interval Timer (8253) and its interfacing, Programmable Communication Interface (8251 USART) and its interfacing.

UNIT-IV

Memory interfacing to 8086 – Interfacing various types of RAM and ROM chips, 8255 PPI and its interfacing, ADC and DAC Interfacing, Data acquisition, Waveform generation, Traffic light controller, Stepper motor control, temperature measurement and control.

UNIT-V

8051 Microcontroller – Architecture, register set, Instruction set, Interrupt structure, timer and serial port operations, Memory and I/O interfacing, Simple Assembly language programs.

Text Books:

- A.K. Ray and K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", TMH.
- Douglas V. Hall, "Microprocessors and interfacing: Programming and hardware", TMH,2nd edition.
- Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Pernam International / Thomson Publishers, 2nd Edition, 2005.
- Ajay V. Deshmukh, "Microcontrollers – theory applications", Tata McGraw-Hill Company

EE604C	UTILIZATION OF ELECTRICAL POWER	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre-Requisites: D.C. Machines and Transformers, Induction Motors and Synchronous Machines

Course Outcomes: At the end of this course, students will demonstrate the ability to

- To provide students basic practical knowledge of illumination and to get general ideas aboutstreet lighting, building lighting.
- To provide students' knowledge about the various electric heating methods and their advantages.
- To make students to learn electrical welding methods and their advantages
- To provide students basic practical knowledge of electric drives and to learn the characteristicsof different mechanical loads.
- To provide students' knowledge about the electric traction & their advantages.

UNIT–I

Illumination: Nature of light, definitions, Laws of illumination, different types of lamps, construction and working of incandescent lamp, fluorescent lamp and discharge lamps, Illumination schemes; indoor and outdoor, Illumination levels. General ideas about street lighting,building lighting.

UNIT–II

Electric Heating: Advantages of electrical heating, Heating methods: Resistance heating, Induction heating, Electric arc heating, construction and working of arc furnace, Dielectric heating,Infra-red heating, Microwave heating, design problems of resistance heating element.

UNIT –III

Electric Welding: Advantages of electric welding, Welding methods, Principles of resistance welding, welding equipments used, Principle of electric arc welding, carbon arc, metal arc, hydrogen arc welding methods and their applications. Advantages of using coated electrodes, comparison between AC and DC arc welding, welding control circuits.

UNIT –IV

Electric Drives: Introduction, Advantages of electric drives, Characteristics of different mechanical loads, Types of motors used in electric drive, types of braking, Methods of power transfer, selection of motors for different types of domestic loads.

UNIT –V

Electric Traction: Advantages of electric traction, Different systems of electric traction, DC and AC systems, diesel electric system, types of services – urban, sub-urban, and main lines and their speed-time curves, pentagraph, Factors affecting scheduled speed, types of motors used for electric traction, Starting and braking of traction motors.

Text Books:

- Art and Science of Utilization of Electrical Energy by H Partap, Dhanpat Rai &Sons, Delhi.
- Utilization of Electrical Energy by JB Gupta, Kataria Publications, Ludhiana.
- A.Text Book. of Electrical Power by Dr. SL Uppal, Khanna Publications, Delhi.
- Modern Electric Traction by H Partap, Dhanpat Rai & Sons, Delhi.
- Utilization of Electrical Energy by OS Taylor, Pitman Publications.
- Generation, Distribution and Utilization if Electrical Power by CL Wadhwa, WileyEastern,Ltd., New Delhi

EE605C.i	ADVANCED CONTROL SYSTEMS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre Requisites: Linear Control Systems

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the need of compensators and controllers for design aspects
- Design controllers to satisfy the desired design specifications using simple controller structures (P, PI, PID, compensators).
- Understand the state space analysis and build system matrix for stability purpose.
- Understand system Controllability and Observability.

UNIT- I

Compensators: Introduction to Compensators – Need for compensators – Types of Compensators - Lead, Lag, Lead lag compensators – Transfer function of compensators – Comparison of compensators – Applications of compensators.

UNIT- II

Controllers: Introduction to controllers – Need for controllers – Types of Controllers – Proportional, Integral and Derivative Controllers – Transfer function of controllers - PI, PD, PID Controllers – Design of controllers using frequency domain analysis – Comparison of controllers - Applications of controllers.

UNIT-III

State variable descriptions: Introduction – Comparison of advanced control theory and classical control theory – concepts of state, state variables, state vector, state space representation of physical systems – representation in state variable form, phase variables and canonical variables.

UNIT-IV

Controllability and Observability: Definition of controllability and Observability – Controllability and Observability tests for continuous time systems – Duality Principle of Controllability and Observability – Pole placement by state feedback design – State observers – Full order and reduced order observers

UNIT-V

Time response of linear system: Introduction – Solution of state equations – Homogenous and Non-homogenous – State Transition matrix – Properties of STM – Computation of STM

Non linear systems – Introduction – common physical non linearities – Dead Zone,

JumpResonance, Stiction, Friction, Hysteresis etc

Text Books:

- K. Ogata, "Modern Control Engineering", Prentice Hall, 2010.
- Benjamin C. Kuo, "Automatic Control system", Prentice Hall, 1995.
- A Nagoor Khani, "Advanced Control Theory", CBS Publications, 2020.

EE605C.ii	ENERGY MANAGEMENT AND AUDITING	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre-Requisites: D.C. Machines and Transformers, Induction Motors and Synchronous Machines, Power systems-1

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand energy audit of industries and management of energy systems
- Analyze the methods of improving efficiency of electric motors, power factor and design a good illumination system
- Evaluate and analyze economic aspects of energy saving equipment

UNIT-I

Energy Management: Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions, language, Questionnaire – check list for top management.

UNIT-II

Basic Principles of Energy Audit: Energy audit- definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT-III

Energy Efficient Motors: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics – variable speed, variable duty cycle systems, RMS hp-voltage variation-voltage unbalance- over motoring- motor energy audit.

UNIT-IV

Power Factor Improvement, Lighting and Energy Instruments: Power factor – methods of improvement, location of capacitors, pf with nonlinear loads, effect of harmonics on power factor, power factor motor controllers – Good lighting system design and practice, lighting control, lighting

energy audit – Energy Instruments- wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers, application of PLC's.

UNIT-V

Economic Aspects and Analysis: Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting – Applications of life cycle costing analysis, return on investment.

Text Books

- "Energy management", W.R. Murphy and G. Mckay Butter worth, Heinemann publications.
- "Energy management", Paul o' Callaghan, Mc-graw Hill Book company-1st edition,1998

References:

- "Energy efficient electric motors", John.C. Andreas, Marcel Dekker Inc Ltd-2nd edition,1995-
- "Energy management hand book",W.C.Turner, John wiley and son
- "Energy management and good lighting practice: fuel efficiency- booklet", 12-EEO

EE605C.iii	SPECIAL MACHINES	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Pre Requisites: D.C. Machines and Transformers, Induction Motors and Synchronous Machines

Course Outcomes: At the end of the course, student will be able to

- Understand field aspects of electrical machines
- Understand the operation and control of
  a. Stepper motors
  b. BLDC motors
  c. SR motor

UNIT-I

Field aspects of electrical machines: Review of Maxwell's equations and solution of Laplace's and Poisson's equations. Concept of magnetic vector potential. Eddy current braking. Linear motors: Basic principle of operation and types. End effects & transverse edge effects. Field analysis & Propulsion force; equivalent circuit.

UNIT-II

Stepper motors: Construction and operation of Stepper Motors: variable reluctance, permanent magnet, hybrid stepper motors, characteristics of stepper motors. Drive Circuits for Stepper motors: Block diagram of stepper motor controller, logic sequence generator, power drivers, current suppression circuits, and acceleration and deceleration circuits.

UNIT-III

Microprocessor control of stepper motors: microprocessor-based stepper motor controller, PC based stepper motor controller. Micro-stepping Control of Stepper motors: the micro-stepping principle, advantages of micro stepping, design of basic micro-stepping controller. Applications of stepper motor

UNIT-IV

Brushless DC motor: principle of operation of BLDC motor, square wave permanent magnet brushless motor drives, sine wave permanent magnet Brushless DC motor drives, phasor diagram, torque speed characteristics, controllers for BLDC motors, alternating current drives with PM andsynchronous reluctance hybrid motors.

UNIT-V

Switched Reluctance Motor Drives: Types of SR motors, principle of operation, static torque production, energy conversion loop, dynamic torque production. Converter Circuits, Control of SR motors: current regulation, commutation, torque

speed characteristics, shaft position sensing.

Text Books:

- "V .V.Athani, "Stepper Motors Fundamentals, Applications, and Design", New Age.
- TJE Miller, "Brushless Permanent-Magnet and Reluctance Motor Drives" Clarendon Press,Oxford .

EE607L	MICRO PROCESSORS AND MICRO CONTROLLERS LAB	1.5 Credits
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Pre-Requisites: Micro Processors and Micro Controllers

Course Outcomes: At the end of the course, students will be able to:

- Demonstrate program proficiency using the various instructions of the 8086microprocessor.
- Demonstrate program proficiency using the various instructions of the 8051microcontroller
- Design systems for different applications by interfacing external devices

LIST OF EXPERIMENTS

Part-1: 8086 programs:

- Program to demonstrate data transfer operation
- Program to demonstrate arithmetic operation
- Program to demonstrate logical operation
- Program to demonstrate shift operation
- Program to demonstrate string operation
- Program to demonstrate looping operation
- Program to demonstrate decision making operations

PART-2: 8051 PROGRAMS:

- Program to demonstrate data transfer and arithmetic operations
- Program to demonstrate logical and shift operations
- Program to demonstrate looping operations
- Programming timer / counter.
- Programming Serial communication application.
- Programs to demonstrate bit-manipulation operations.

PART-3: INTERFACING PROGRAMS (using 8086 & 8051 Kits)

- Interfacing ADC
- Interfacing DAC.
- Interfacing stepper motor.

- Interfacing 7-segment display.
- Interfacing Traffic light controller.
- Waveform generation

EE608L	ELECTRICAL AND ELECTRONICS MEASUREMENTS LAB	1.5 Credits
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Pre-Requisites: Electrical and Electronics Measurements

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Design and validate DC and AC bridges.
- Analyze the dynamic response and the calibration of few instruments.
- Learn about various measurement devices, their characteristics, their operation and their limitations.
- Understand statistical data analysis.
- Understand computerized data acquisition.

Lectures/Demonstrations:

- Concepts relating to Measurements: True value, Accuracy, Precision, Resolution, Drift, Hysteresis, Dead-band, Sensitivity.
- Errors in Measurements. Basic statistical analysis applied to measurements: Mean, Standard Deviation, Six-sigma estimation, Cp, Cpk.
- Sensors and Transducers for physical parameters: temperature, pressure, torque, flow. Speed and Position Sensors.
- Current and Voltage Measurements. Shunts, Potential Dividers. Instrument Transformers, Hall Sensors.
- Measurements of R, L and C.
- Digital Multi-meter, True RMS meters, Clamp-on meters, Meggers.
- Digital Storage Oscilloscope.

Experiments

- Measurement of a batch of resistors and estimating statistical parameters.
- Measurement of L using a bridge technique as well as LCR meter. Measurement of C using a bridge technique as well as LCR meter.
- Measurement of Low Resistance using Kelvin's double bridge.
- Measurement of High resistance and Insulation resistance using Megger.
- Usage of DSO for steady state periodic waveforms produced by a function generator.

Selection of trigger source and trigger level, selection of time-scale and voltage scale. Bandwidth of measurement and sampling rate.

- Download of one-cycle data of a periodic waveform from a DSO and use values to compute the RMS values using a C program.
- Usage of DSO to capture transients like a step change in R-L-C circuit.
- Current Measurement using Shunt, CT, and Hall Sensor.

EE609S	JAVA PROGRAMMING	2 Credits
Sessional Marks: **40**	**1L:0T:2P**	End Examination Marks: **60**

Pre Requisites: Basics of JAVA

Course Outcomes: At the end of the course, the student will be able to:

- Understand the software's for writing Java programming and code to accept an integer and print its factorial.
- Develop the Java code for different applications.

List of Modules

- Downloading and installing JDK and JRE. Executing simple java program which prints Hello world.
- Program to accept an integer and prints its factorial.
- Develop a java program to create class, which contains data and methods (private and public), create an object to access those members.
- Develop a java program which demonstrates method over loading.
- Develop a java program which demonstrates constructor and constructor over loading use this keyword.
- Develop a java program which creates and Access Static and Non-static members of a class.
- Develop the java program to study different methods provided in String and String Buffer classes.
- Develop a java program that demonstrates single inheritance, use super keyword.
- . Develop a java program for abstract class to find areas of different shapes.
- Develop a java program to achieve multiple inheritance using interfaces.
- Develop a java program to create an interface named Vehicle which contains two abstract methods. (Specifications (), Display ()). Provide two classes named Two- wheeler, Four-wheeler that is implemented by that interface.
- Develop a java program to create a package and accesses it.
- Develop a java program that demonstrates try, catch and finally.
- Develop a java program that displays a frame with two Labels, two Text Fields and Two Buttons.

MC610A	PROFESSIONAL ETHICS IN ENGINEERING	0 Credits
Sessional Marks: **Nil**	**2L:0T:0P**	End Examination Marks: **100**

Pre-requisites/co-requisites: None.

COURSE OUTCOMES: At the end of the course, the student should be able to:

- Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
- Learn the moral issues and problems in engineering; find the solution to those problems.
- Learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
- Gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights.

UNIT I

Human Values: Morals, values and Ethics – Integrity – Work ethic – Service learning –Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuingtime – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II

Engineering Ethics: Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy –Models of professional roles – Theories about right action – Self-interest – Customsand Religion – Uses of Ethical Theories.

UNIT III

Engineering as Social Experimentation: Engineering as Experimentation –Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT-IV

Safety, Responsibilities and Rights: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining– Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Right– Intellectual Property Rights (IPR)Discrimination.

UNIT V

Global Issues: Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct – Corporate Social Responsibility

TEXT BOOKS:

- Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
- Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

- Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
- Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
- John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
- Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
- Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

VII - SEMESTER

EE701C	POWER SYSTEM PROTECTION	3 Credits
Sessional Marks :**40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the different components of a protection system.
- Evaluate fault current due to different types of faults in a network.
- Understand the protection schemes for different power system components.
- Understand the basic principles of digital protection.
- Understand system protection schemes, and the use of wide-area measurements.

UNIT–I

Protection against over voltages: Causes of over voltages-over voltages due to lightning –Rodgaps-Horn Gaps-Expulsion type and valve type lightning arresters-lightning arrester calculations- ground wires-counter poises-surge absorbers and surge diverters. Basics of Insulation coordination
- Power system earthing.

UNIT-II

Fuses: Definitions, characteristics, types, HRC fuses.
Circuit breakers: Introduction - Formation of Arcs in CBs - arc interruption theories - Definitions - Current chopping - Classification of circuit breakers - Oil circuit breakers- Air blast circuitbreaker - SF6 circuit breaker-Vacuum circuit breaker - Testing of circuit breakers.

UNIT–III

Protective Relaying fundamentals: Introduction – Need for protective systems in a power system – Zones of protection - Primary and backup protection – definition and functional characteristics of a protective relay – operating principles of various electromagnetic relays.

UNIT-IV

Types of Protective Relays: Overcurrent relays – Directional overcurrent relays – applications of over current relays. Distance relays: the universal torque equation – impedance, reactance and mhorelays - differential relays – percentage differential relays – Static relays.

UNIT–V

Generator Protection: Protection against stator faults, against rotor faults and against abnormalconditions.

Transformer Protection: Buchholz relay, differential protection, percentage differentialprotection.

Busbar protection: - Frame leakage protection scheme

Text Books:

- Badri Ram & D.N. Vishwakarma – Power system protection and switch gear., TMHpublishing Company Ltd. 1995.
- C.L. Wadhwa – Electrical power systems, Wiley Eastern Ltd.
- B. Ravindranath & M. Chander, power system protection & switch gear., Wiley EasternLtd.

EE702C.i	ELECTRICAL VEHICLES	3 Credits
Sessional Marks :**40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the basics of electric vehicles, technical characteristics and properties ofbatteries and also to design battery pack.
- Know the ratings and requirements of electrical machines.
- Apply the regenerative braking and sizing of motors.
- Configure and design the components of hybrid electric vehicles.

UNIT I

Electric Vehicles: Introduction, Components, vehicle mechanics – Roadway fundamentals, vehicle kinetics, Dynamics of vehicle motion - Propulsion System Design.

UNIT II

Battery: Basics – Types, Parameters – Capacity, Discharge rate, State of charge, state of Discharge, Depth of Discharge, Technical characteristics, Battery pack Design, Properties of Batteries.

UNIT III

DC & AC Electrical Machines: Motor and Engine rating, Requirements, DC machines, three phase A.C machines, Induction machines, permanent magnet machines, switched reluctance machines.

UNIT IV

Electric Vehicle Drive Train: Transmission configuration, Components – gears, differential,clutch, brakes regenerative braking, motor sizing.

UNIT V

Hybrid Electric Vehicles: Types – series, parallel and series, parallel configuration – Design –Drive train, sizing of components.

Text book:

- Iqbal Hussain, “Electric & Hybrid Vehicles – Design Fundamentals”, Second Edition, CRC Press, 2011.
- James Larminie, “Electric Vehicle Technology Explained”, John Wiley & Sons, 2003.

Reference Books:

- Mehrdad Ehsani, Yimin Gao, Ali Emadi, “Modern Electric, Hybrid Electric, and FuelCell Vehicles: Fundamentals”, CRC Press, 2010.
- Sandeep Dhameja, “Electric VehicleBatterySystems”, Newnes, 2000

http://nptel.ac.in/courses/108103009/

EE702C.ii	FLEXIBLE AC TRANSMISSIONSYSTEMS	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the working principles of FACTS devices and their operating characteristics.
- Understand the working principles of static shunt and series compensation.
- Understand the basic concepts of UPFC and IPFC
- Understand the usage of Static voltage regulators and phase shifters

UNIT-I

Flexible Ac Transmission System: Transmission interconnections, flow of power in ac systems, loading capability, dynamic stability considerations, basic types of FACTS controllers.

UNIT-II

Static Shunt Compensators: Objectives of shunt compensation, static var compensators,STATCOM configuration, characteristics and control, comparison between STATCOM and SVC.

UNIT-III

Static Series Compensation: Objectives of series compensation, Variable Impedance type series compensators, switching converter type series compensators, external control for series reactive compensators.

UNIT-IV

UPFC: Principle of operation and characteristics, independent active and reactive power flow control, comparison of UPFC with the series compensators and phase angle regulators.

IPFC: Principle of operation and characteristics and control aspects.

UNIT-V

Static voltage regulators and phase shifters: Introduction**,** Principles of operation-Steady statemodel and characteristics - power circuit configurations

Text Books :

- Hingorani ,L.Gyugyi,' Concepts and Technology of flexible ac transmission

system',IEEE Press New York, 2000.

- K.R.Padiyar, "FACTS controllers in power transmission and distribution", New ageInternational Publishers, Delhi, 2007.
- R. Mohan Mathur and Rajiv K. Varma, 'Thyristor - based FACTS controllers forElectrical transmission systems', IEEE press, Wiley Inter science, 2002.

EE702C.iii	RESTRUCTURED POWER SYSTEM	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the concepts of Restructuring of Power Industry
- Understand the basics of Transmission Congestion Management
- Understand the concepts of Locational Marginal Prices and Financial Transmission Rights
- Understand the basics of Ancillary Service Management
- Understand different pricing techniques of Transmission Network

UNIT I

INTRODUCTION TO RESTRUCTURING OF POWER INDUSTRY Introduction:

Deregulation of power industry, restructuring process, Issues involved in deregulation, Deregulation of various power systems – Fundamentals of Economics: Consumer behavior, Supplier behavior, Market equilibrium, short and long run costs, Various costs of production – Market models: Market models based on Contractual arrangements, Comparison of various market models

UNIT II

TRANSMISSION CONGESTION MANAGEMENT Definition of Congestion, reasons for transfer capability limitation, Importance of congestion management, Features of congestion management – Classification of congestion management methods – Calculation of ATC - Non – market methods – Market methods – Nodal pricing – Inter zonal and Intra zonal congestion management – Price area congestion management – Capacity alleviation method.

UNIT III

LOCATIONAL MARGINAL PRICES AND FINANCIAL TRANSMISSION RIGHTS

Locational marginal pricing– Lossless DCOPF model for LMP calculation – Loss compensated DCOPF model for LMP calculation – ACOPF model for LMP calculation – Financial Transmission rights – Risk hedging functionality -Simultaneous feasibility test and revenue adequency – FTR issuance process: FTR auction, FTR allocation — Flow gate rights – FTR andmarket power

UNIT IV

ANCILLARY SERVICE MANAGEMENT Introduction of ancillary services – Types of Ancillary services – Classification of Ancillary services – Load generation balancing related services – Voltage control and reactive power support devices – Black start capability service

UNIT V

PRICING OF TRANSMISSION NETWORK Transmission pricing – Principles – Classification – Rolled in transmission pricing methods – Marginal transmission pricing paradigm - Composite pricing paradigm – Merits and demerits of different paradigm.

Text Books / References:

- Sally Hunt," Making competition work in electricity", , John Willey and Sons Inc. 2002
- Steven Stoft," Power system economics: designing markets for electricity", John Wiley & Sons, 2002.
- Mohammad Shahidehpour, Muwaffaq Alomoush, Marcel Dekker, "Restructured electrical power systems: operation, trading and volatility" Pub., 2001
- Kankar Bhattacharya, Jaap E. Daadler, Math H.J. Boolen," Operation of restructured power systems", Kluwer Academic Pub., 2001.

EE703C.i	POWER SYSTEM OPERATION AND CONTROL	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand economic operation and analyze methods for unit commitment of power systems.
- Analyze voltage control and frequency regulation methods.
- Realize stability issues and reactive power compensation.

UNIT-I

Economic operation of power systems: Introduction – operating cost of a thermal plant –Economic dispatch neglecting losses and no generation limits –Economic dispatch including losses - derivation of loss formula - Hydroelectric power plant model – Scheduling of hydropower plant.

UNIT-II

Unit commitment and optimal power flow constraints of unit commitment problem – Solution methods of unit commitment – priority list methods – Dynamic programming approach to solve the unit commitment problem - optimal power flow solution – Elementary treatment of optimal power flow with and without constraints

UNIT-III

Load frequency control: The load frequency control problem – Basic P-f and Q-V control loops of a synchronous generator – Governor model- prime mover model – Generator model – Load model – concept of Single & Multi area power systems – Block diagrams representation of an isolated single area power system – steady state and dynamic responses of uncontrolled and proportional plus integral control of single area power system – load frequency control of two-areapower system – Tie line bias control.

UNIT-IV

Automatic voltage regulator – introduction - modeling of amplifier, exciter, Generator and sensor – A simplified AVR block diagram – Excitation system stabilizer – Rate feedback and PID controller – automatic excitation generation control with system – placement and optimal feed- back design.

UNIT-V

Voltage stability and reactive power control- voltage stability problems in a power system –over flow of reactive power control – control of reactive power flow on a line – load compensation

– specification of load compensator – uncompensated and compensated transmission lines

Text Books:

- "Power system analysis" by Hadi Saadat, Tata Mc Grawhill International.
- "Modern power system analysis" by J. Nagarath & DP Kothari, Tata Mc Grawhill secondedition
- "Power system analysis and design" by B.R. Gupta wheeler publishing
- "Electrical energy system theory" by O.I. Elgerd Tata Mc Grawhill Ltd second edition.

EE703C.ii	POWER SEMICONDUCTOR CONTROLLED DRIVES	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the fundamental concepts of electrical drives.
- Understand the principles of speed-control of dc motors and induction motors.
- Understand the power electronic converters used for dc motor and induction motor speed control.

UNIT-I

Electrical Drives – An introduction – Electrical Drives, Advantages of Electrical Drives, parts of electrical drives – Electrical motor, power modulators, sources, control unit, choice of electricaldrives, status of dc and ac drives.

Dynamics of Electrical Drives – Fundamental Torque equations, speed torque convention and multi quadrant operation, Equivalent values of drive parameters – Loads with rotational motion, loads with translational motion, measurement of moment of inertia. Components of load torques, Nature and classification of load torques, calculation of time and energy loss in transient operation,steady state stability, load equalization.

UNIT-II

Control of electrical drives – Modes of operation, speed control and drive classifications closedloop control of drives.

D.C. Motor drives – Starting, Braking, speed control - Armature voltage control, Ward Leonard drives, controlled rectifier fed DC drives – Single phase and 3-phase fully controlled and half controlled converter fed separately excited D.C. Motor, Chopper Controlled DC drives. (separatelyexcited motor).

UNIT-III

Induction Motor Drives: Review of three phase I.M., analysis and performance. Operation with unbalanced source voltages and single phasing, analysis of I.M. fed from non-sinusoidal voltage supply. Starting, Braking, methods

UNIT-IV

Speed control methods of IM, v/f controlled induction motors, controlled current and controlled slip operation, PWM inverter drives, Multi-quadrant drives and field oriented control, slip power control, single phase I.M. Close loop control of I.M. Drives.

UNIT-V

Synchronous motor drives: cylindrical rotor wound field motor, Salient pole wound field motor, Synchronous reluctance motor, Hysteresis synchronous motor, Operation from fixed frequency supply, starting, braking, synchronous motor, variable speed drives, starting large synchronous machines.

Energy Conservation in electrical drives – Losses in electrical drive system, measures of energy conservation in electrical drives, use of efficient converters, energy efficient operation of drives, improvement of p.f., improvement of quality of supply, maintenance of motors.

Text Books:

- G.K.Dubey – Fundamentals of Electrical drives.
- Vedam Subrahmanyam - Electrical drives – Concepts and applications.

EE703C.iii	POWER QUALITY	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the basic concepts of power quality.
- Understand the basic concepts of voltage variations and transients
- Understand different harmonics in power systems
- Understand the working of Power quality conditioners

UNIT –I

Electric power quality phenomena- IEC and IEEE definitions - power quality disturbances-voltage fluctuations – transients – unbalance - waveform distortion - power frequency variations.

UNIT–II

Voltage variations- Voltage sags and short interruptions – flicker-longer duration variations - sources – range and impact on sensitive circuits-standards – solutions and mitigations – equipment and techniques.

UNIT–III

Transients – origin and classifications – capacitor switching transient – lightning-loadswitching – impact on users – protection – mitigation.

UNIT –IV

Harmonics – sources – definitions & standards – impacts - calculation and simulation –harmonic power flow - mitigation and control techniques – filtering – passive and active.

UNIT–V

Power Quality conditioners – shunt and series compensators- DStatcom- Dynamic voltagerestorer-unified power quality conditioners-case studies.

Text Books:

- Bollen,M.H.J., 'Understanding Power Quality Problems: Voltage sags and interruptions', IEEE Press, New York, 1999.
- Arrillaga, J, Watson, N.R., Chen, S., 'Power System Quality Assessment', Wiley, New York, 1999.

- Heydt, G.T., 'Electric Power Quality', Stars in a Circle Publications, Indiana, 1991.

EE704C.i	HVDC TRANSMISSION	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Differentiate between AC and DC transmission, their advantages and applications
- Analyze HVDC converters and converter bridge characteristics
- Understand the particulars of converters and HVDC system control and reactive powercontrol
- Identify Converter faults and protection carried.
- Understand harmonics, filters and different multi terminal systems

UNIT-I

DC Power Transmission Technology:

Introduction, Comparison of AC DC transmission, Converter station, Description of DC Transmission systems, Components of a HVDC system. Choice of voltage level, Modern trends in DC transmission

UNIT-II

Analysis of HVDC Converters:

Pulse number, Choice of converter configuration, valve rating. Transformer, simplified analysis of graetz circuit with and without overlap (2 and 3 valve conduction mode) rectifier and inverter waveforms, converter bridge characteristics

UNIT-III

Converter and HVDC System Control:

Principle of DC Link control, Converter control characteristics, system and control hierarchy, firing angle control, converter and excitation angle control, starting and stopping of DC Link,Power control, Sources of reactive power, static var systems.

UNIT-IV

Converter Faults:

Protection against over currents, over voltages in converter station, surge arresters, protection against over voltages
Smoothing reactor, DC Line, Transient over-voltages in DC line, protection of DC line, DCbreakers.

UNIT-V

Generation of Harmonics, Design of AC Filters, Dc Filters, Carrier frequency and RI noise. **MTDC Links** Multi-Terminal and Multi-Infeed Systems. Series and Parallel MTDC systems using LCCs. MTDC systems using VSCs. Modern Trends in HVDC Technology. Introduction to Modular Multi-level Converters.

Text Books:

- K R Padiyar, "HVDC Transmission Systems"
- S. Rao, "EHV AC and HVDC Transmission engineering and Practice"
- J.Arrillaga, "High Voltage Direct Current Transmission", Peter Peregrinus Ltd.,1983.
- E.W.Kimbark, "Direct Current Transmission", Vol.1, Wiley-Interscience,1971.

EE704C.ii	HIGH VOLTAGEENGINEERING	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of the course, the student will demonstrate

- Understand the basic physics related to various breakdown processes in solid, liquid andgaseous insulating materials.
- Knowledge of generation and measurement of D. C., A.C., & Impulse voltages. Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.
- Knowledge of how over-voltages arise in a power system, and protection against theseover-voltages.

UNIT-I

Breakdown in solid, liquid and gas insulating materials

Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend's theory, Streamer mechanism, Corona discharge Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

UNIT-II

Generation of High Voltages

Generation of high voltages, generation of high D. C. and A.C. voltages - Van de Graff Generator, Cockcroft Walton Voltage multipliers, Cascade transformer circuits, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

UNIT-III

Measurements of High Voltages and Currents

Peak voltage, impulse voltage and high direct current measurement method, cathode ray oscillo graphs for impulse voltage and current measurement, measurement of dielectric constant and lossfactor, partial discharge measurements.

UNIT-IV

Lightning and Switching Over-voltages

Charge formation in clouds, Stepped leader, Dart leader, Lightning Surges. Switching over- voltages, Protection against over-voltages, Surge diverters, and Surge modifiers.

UNIT-V

High Voltage Testing of Electrical Apparatus and High Voltage Laboratories Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.

Text/Reference Books:

- M.S. Naidu and V. Kamaraju, "High VoltageEngineering", Mc Graw Hill Education, 2013.
- C. Wadhwa, "High Voltage Engineering", New Age International Publishers, 2007.
- D.V. Razevig (Translated by Dr. M. P. Chourasia), "High Voltage Engineering Fundamentals", Khanna Publishers,1993.
- E. Kuffel, W.S. Zaengl and J. Kuffel, "High Voltage Engineering Fundamentals", NewnesPublication, 2000.
- R.Arora and W.Mosch "High Voltage and Electrical Insulation Engineering",John Wiley & Sons,2011.Various IS standards for HV Laboratory Techniques and Testing

EE704C.iii	SMART GRID	3 Credits
Sessional Marks: **40**	**3L:0T:0P**	End Examination Marks: **60**

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand smart grids and analyze the smart grid policies and developments in smart grids.
- Develop concepts of smart grid technologies and their applications.
- Analyze micro grids, distributed generation systems, the effect of power quality in smart gridand understand latest developments in ICT for smart grid.

UNIT – 1

Introduction to Smart Grid: Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient &Self-Healing Grid, Present development & International policies on Smart Grid. Case study of Smart Grid.

UNIT – 2

Smart Grid Technologies-I: Introduction to Smart Meters, Real Time Prizing, Smart Appliances,Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase ShiftingTransformers.

UNIT – 3

Smart Grid Technologies-II: Smart Substations, Substation Automation, Feeder Automation. Geographic Information System (GIS), Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System (WAMS), Phase Measurement Unit (PMU).

UNIT – 4

Micro grids and Distributed Energy Resources: Concept of micro grid, need & applications ofmicrogrid, formation of microgrid, Issues of interconnection, protection & control of microgrid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuel cells, microturbines, Captive power plants, Integration of renewable energy sources.

UNIT – 5

Power Quality Management in Smart Grid: Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN),

Wide Area Network (WAN).

Text Books:

- Ali Keyhani, Mohammad N. Marwali, Min Dai "Integration of Green and RenewableEnergy in Electric Power Systems", Wiley
- Clark W. Gellings, "The Smart Grid: Enabling Energy Efficiency and DemandResponse", CRC Press

Reference Books:

- Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "SmartGrid: Technology and Applications", Wiley
- Jean Claude Sabonnadière, Nouredine Hadjsaïd, "Smart Grids", Wiley Blackwell 19
- Peter S. Fox Penner, "Smart Power: Climate Changes, the Smart Grid, and the Future of ElectricUtilities", Island Press; 1 edition 8 Jun 2010
- S. Chowdhury, S. P. Chowdhury, P. Crossley, "Microgrids and Active Distribution Networks."Institution of Engineering and Technology, 30 Jun 2009
- Stuart Borlase, "Smart Grids (Power Engineering)", CRC Press 6. Andres Carvallo, John Cooper, "The Advanced Smart Grid: Edge Power Driving Sustainability: 1", Artech House Publishers July 2011

EE707 L	POWER SYSTEM SIMULATION LAB	1.5 Credits
Sessional Marks: **40**	**0L:0T:3P**	End Examination Marks: **60**

Pre-requisites: Power systems-II, Power System Analysis, Power System Operation and Control,Power System Protection

Course Outcomes: At the end of the course, the student will be able to:

- Analyze transmission systems under steady state and transient conditions
- Perform fault calculation and network protection
- Understand the performance of renewable energy systems

LIST OF EXPERIMENTS

- Determination of Receiving end quantities and the line performance of a medium/longtransmission line using simulation tool.
- Using Computer code determine:
- Bus admittance matrix by inspection method for a 3-bus power system and obtain
- Power flow solution by Newton-Raphson method.
- Determination of Sequence components (Positive, Negative and Zero) of an alternator using simulation tool.
- Transient analysis of a Single Machine Infinite Bus (SMIB) system using simulation tool.
- Simulation of LG, LL, LLG and LLL faults on a simple power system.
- Determine steady state frequency error and frequency deviation response for an
- Isolated power system and
- Interconnected power system.
- Plot the Swing curve for a simple 3 or 4 bus power system using Simulation Tool.
- Study the Over current protection scheme using numerical relay.
- Determination of ABCD parameters and performance of a transmission line
- Determination of Positive, Negative and Zero sequence reactance for a 3-phase alternator

Additional Experiments

- Plot V-I characteristics of Solar panel at various levels of insolation.
- Study the performance of a Wind turbine system at different wind speeds and plot thecharacteristics.
- Determination of Earth resistance in humid and dry earth conditions.

- Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley &Sons, 1996.

Course outcomes :

At the end of the course, students will be able to

- Demonstrate the energy generation from wastes
- Understand the biomass pyrolysis and gasification
- Design, construct and operate biomass combustors
- Develop bio-energy system.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING:

TIRUPATI-517502

R-20 – Scheme of Instructions
Academic year 2023 – 2024

Programme Scheme



SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING (AUTONOMOUS)

SRI VENKATESWARA UNIVERSITY TIRUPATI-517502

(A.P), INDIA.

About the Department

- Electronics and Communication Engineering (ECE) is an emerging stream that offers firm promises to advance students career an edge. Studying this domain of engineering would mean mastering the skills related to electronics and communication engineering as well as having an insight into the world of software skills.

- The U.G. Programme in Electronics and Communication Engineering (ECE) was started under the Department of Electrical and Electronics Engineering (EEE) in 1971 with an intake of 30. After a long co-existence with Department of EEE, due to administrative reasons and anticipated accelerated growth, it got separated and formed as Department of Electronics and Communication Engineering in September, 2011, to meet the requirements of the emerging trends in Electronics as well as communications for bright needs of the students, industry and society at large.

- At Present, the Department is offering two UG programmes, B.Tech (ECE) both Regular and Self-Supporting with an intake of 60 and two PG programmes 1. M.Tech in Communication Systems started in 2011-12 with an intake of 18 and enhanced to 24 in 2014-15 2. M.Tech in Signal Processing started in 2013-14 with intake of 18 and enhanced to 24 in 2014-15 besides offering Full-time/ Part-time Research programme. Both B.Tech (ECE) Regular and M.Tech in Communication Systems Programmes are accredited with NBA. It has well equipped laboratories. The Department also provides Research guidance based on the specialized area and continuously producing the Doctor of Philosophy Degrees (Ph.D). So far more than 150 Ph. D degrees have been awarded in various disciplines. The ECE Department is closely working with National Atmospheric Research Laboratory (NARL, Gadanki). The department is offering consultancy to Tirumala Tirupati Devasthanams (TTD) and Amararaja Power Systems.

Vision of the Department:

- To be a lead department imparting quality and value embedded higher education and research emphasizing freedom of learning and practice.

Mission of the Department:

- Transforming students into full-fledged professionals and to become leaders in dynamic global environment.
- Augmenting knowledge and technologies in rapidly advancing fields of Electronics and Communication Engineering
- Promoting in depth research and create centre of excellence in thrust areas.

Program specific outcomes (PSOs)

- PSO1- Competence in analysis and design of analog and digital system using hardware and software tools.
- PSO2- Understand, analyse the present and future generations of wireless communication technologies.

PROGRAM OUTCOMES

- PO1- **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems related to Electronics & Communication and Engineering.
- PO2- **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems related to Electronics & Communication Engineering and reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3- **Design/development of solutions:** Design solutions for complex engineering problems related to Electronics & Communication Engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4- **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5- **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6- **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the Electronics & Communication Engineering professional engineering practice.
- PO7- **Environment and sustainability:** Understand the impact of the Electronics & Communication Engineering professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8- **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9- **Individual and team work:** Function effectively as an individual, and

  as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10- **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design

documentation, make effective presentations, and give and receive clear instructions.

- PO11- **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to manage projects and in multidisciplinary environments.
- PO12- **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Educational Objectives (PEOs)

ECE graduates will

- PEO 1- have adequate analytical capabilities and practical knowledge to attend to the current challenging tasks and to absorb futuristic trends.
- PEO 2- have adequate analytical capabilities and practical knowledge to attend to the current challenging tasks and to absorb futuristic trends.
- PEO 3- able to abreast with the latest hardware and software design techniques and cutting-edge technologies.
- PEO 4- able to enhance the knowledge and skills continually throughout their career and to make them capable to adapt in diverse environments.
- PEO 5- imbibe leadership qualities among the students to take up challenging roles in their career by ensuring professional ethics with high sense of social responsibility.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
R-20 – Scheme of Instruction effective from the academic year 2020-2021
B. Tech (Electronics and Communications Engineering)

SEMESTER-I (First Year)

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
MA 101	Mathematics-I	3	1	-	4	4
PY 102	Modern Physics	3	1	-	4	4
CS 103	Programming for Problem Solving	2	1	-	3	3
EC 104	Electronic Devices	3	1	-	4	4
ME 105	Workshop/ Manufacturing Practices	-	-	3	3	1.5
CS 106	Programming for Problem Solving Lab	-	-	3	3	1.5
CE 107	Environmental Sciences	4	-	-	4	0
					Total	**18**

Category	CREDITS
Basic Science Course	11
Professional Core Course -PCC	07
Skill Oriented Course-SC	00
TOTAL CREDITS	**18**

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
R-20 – Scheme of Instruction effective from the academic year 2020-2021
B. Tech (Electronics and Communications Engineering)
SEMESTER-II (First Year)

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
MA 201	Mathematics-II	3	1	-		4
CY 202	Engineering Chemistry	3	1	-		4
EN 203	English	2	-	-		2
EE 205	Basic Electrical Engineering	3	1	-		4
ME 205	Engineering Graphics and Design	2	-	3		3.5
EN 206	English Communication Lab	-	-	3		1.5
					Total	**19**

Category	**CREDITS**
Basic Science Course	11.5
Professional Core Course -PCC	7.5
Skill Oriented Course-SC	00
TOTAL CREDITS	**19**

- All courses - 40 marks (Internal) + 60 marks (Univ. Semester End)
- Audit Course – 100 marks (Internal) - Zero Credits

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
R-20 – Scheme of Instruction effective from the academic year 2020-2021
B. Tech (Electronics and Communications Engineering)

Semester III (Second Year)

S. No.	Course Code	Category	Course Title	Hours/Week			Credits	Scheme of Evaluation Marks		Total Marks
				L	T	P		Internal	End Sem	
1	MA301B	BSC	Mathematics-III	3	0	0	3	40	60	100
2	EC302C	PCC	Network Theory	3	0	0	3	40	60	100
3	EC303C	PCC	Signals and Systems	3	0	0	3	40	60	100
4	EC304C	PCC	Electromagnetic Waves and Transmission Lines	3	0	0	3	40	60	100
5	EC305C	PCC	Digital Logic Design	3	0	0	3	40	60	100
6	EC306C	PCC	Analog Circuits	3	0	0	3	40	60	100
7	EC307L	PCC-Lab	Basic Electrical Engineering lab	0	0	3	1.5	40	60	100
8	EC308L	PCC-Lab	Electronic Devices lab	0	0	3	1.5	40	60	100
9	EC309S	SC	Entrepreneurship and Design Thinking	2	0	0	2	100	--	100
10	MC310A	MC	Constitution of India	2	0	0	0	100	--	100
11	EC311L	PCC-Lab	Simulation Lab	0	0	2	1	100	---	100
Total Credits				**22**	**0**	**8**	**24**	**620**	**480**	**1100**

Category	**CREDITS**
Basic Science Course	03
Professional Core Course -PCC	19
Skill Oriented Course-SC	02
TOTAL CREDITS	**24**

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
R-20 – Scheme of Instruction effective from the academic year 2020-2021
B. Tech (Electronics and Communication Engineering)
Semester IV (Second Year)

S. No.	Course Code	Category	Course Title	Hours/Week			Credits	Scheme of Evaluation Marks		Total Marks
				L	T	P		Internal	End Sem	
1	EC401C	ESC	Linear Control Systems	3	0	0	3	40	60	100
2	EC402C	PCC	Probability theory and Stochastic Process	3	0	0	3	40	60	100
3	HS403C	HSS	Managerial Economics and Accountancy	3	0	0	3	40	60	100
4	EC404C	PCC	IC Applications	3	0	0	3	40	60	100
5	EC405C	PCC	Analog Communications	3	0	0	3	40	60	100
6	EC406L	PCC-Lab	Digital Logic Design lab	0	0	3	1.5	40	60	100
7	EC407L	PCC-Lab	Analog Circuits Lab	0	0	3	1.5	40	60	100
8	EC408L	PCC-Lab	IC Applications Lab	0	0	3	1.5	40	60	100
9	EC409S	SC	Python Programming	1	0	2	2	100	---	100
10		MC	NSS/ NCC/ NSO Activities	0	0	0	-	-	-	-
			Total Credits	**16**	**0**	**11**	**21.5**	**420**	**480**	**900**

Category	CREDITS
Professional Core Course -PCC	13.5
Engineering Science course—ESC	03
Humanities and Social sciences-HSS	03
Skill Oriented Course-SC	02
TOTAL CREDITS	**21.5**

All undergraduate students shall register for NCC/NSS/NSO activities in First semester of B.Tech. A student will be required to participate in an activity for two hours in a week during second and third semesters i.e., 60 hours. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behaviour. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION –CHOICE BASED CREDIT SYSTEM
B. Tech (Electronics and Communication Engineering)
R-20 – Program Effective for the batch admitted from the Academic Year 2020-21

Semester V (Third Year)

S. No.	Course Code	Category	Course Title	Hours/Week			Credits	Scheme of Evaluation Marks		Total Marks
				L	T	P		Internal	End Sem	
1	EC501C	PCC	Computer Organization & Architecture	3	0	0	3	40	60	100
2	EC502C	PCC	Microprocessors and Microcontrollers	3	0	0	3	40	60	100
3	EC503C	PCC	Digital Signal Processing	3	0	0	3	40	60	100
4	EC504C	PCC	Antennas and Wave Propagation	3	0	0	3	40	60	100
5	EC505C	PCC	Digital Communications	3	0	0	3	40	60	100
6	EC506L	PCC-Lab	Microprocessors and Microcontrollers Lab	0	0	3	1.5	40	60	100
7	EC507L	PCC-Lab	Digital Signal Processing Lab	0	0	2	1	40	60	100
8	EC508L	PCC-Lab	Analog and Digital Communications Lab	0	0	3	1.5	40	60	100
9	EC509S	SOC	Web Design and Development	1	0	2	2	100	---	100
10	EC510A	MC	Universal Human Values	2	0	0	0	100	----	100
Community Service Project (CSP) during second year (To be evaluated during V semester) with duration greater than 45 hours.				0	0	0	1.5	100	-----	100
Total Credits							**22.5**	**620**	**480**	**1100**

L – Lecturer hours; Tut. – Tutorials; P/D – Practical or Drawing; T – Total

Category	**CREDITS**
Professional Core Course -PCC	19
Skill Oriented Course-SOC-Internal evaluation for 100 Marks	2
Summer Internship	1.5
TOTAL CREDITS	**22.5**

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B.Tech (Electronics and Communication Engineering)
R-20 – Program Effective for the batch admitted from the Academic Year 2020-21

Semester VI (Third Year)

S.NO L	Course Code	Category	Course Title	Hours/Week			Credits	Scheme of Evaluation Marks		Total Marks
					T	P		Internal	End Sem	
1	EC601C	PCC	Microwave Engineering	3	0	0	3	40	60	100
2	EC602C	PCC	Computer Networks	3	0	0	3	40	60	100
3	EC603C	PEC	Professional Elective-I	3	0	0	3	40	60	100
4	EC604C	PEC	Professional Elective-II	3	0	0	3	40	60	100
5	EC605C	OEC	Open Elective-1(Through MOOCS)	3	0	0	3	100	0	100
6	EC606C	OEC	Open Elective-2(Through MOOCS)	3	0	0	3	100	0	100
7	EC607L	PCC-Lab	Microwave Engineering Lab	0	0	3	1.5	40	60	100
8	EC608L	PCC-Lab	Computer Networks Lab	0	0	3	1.5	40	60	100
9	EC609S	SOC	Internet of Things and Applications	2	0	0	2	100	--	100
10	EC610MC	MC	Professional Ethics in Engineering.	2	0	0	0	100	--	100
Summer Internship with duration of 4 to 6 weeks (To be evaluated during VII semester)				0	0	0				
Total Credits							**23**	**640**	**360**	**1000**

L – Lecturer hours; Tut. – Tutorials; P/D – Practical or Drawing; T - Total

Category	CREDITS
Professional Core Course -PCC	9
Professional Elective- PEC	6
Open Elective Course/Job Oriented elective-OEC	6
Skill Oriented Course-SOC -Internal evaluation for 100 Marks	2
TOTAL CREDITS	**23**

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION –CHOICE BASED CREDIT SYSTEM
B.Tech (Electronics and Communication Engineering)
R-20 – Program Effective for the batch admitted from the Academic Year 2020-21
Semester VII (Fourth Year)

S.NO	Code	Category	Course Title	Hours/Week			Credits	Scheme of Evaluation Marks		Total Marks
				L	T	P		Internal	End Sem	
1	EC701C	PCC	Digital Image and Video Processing	3	0	0	3	40	60	100
2	EC702C	PEC	Professional Elective-III	3	0	0	3	40	60	100
3	EC703C	PEC	Professional Elective-IV	3	0	0	3	40	60	100
4	EC704C	PEC	Professional Elective-V	3	0	0	3	40	60	100
5	EC705C	OEC	Open Elective-III (Through MOOCS)	3	0	0	3	100	0	100
6	EC706C	OEC	Open Elective-IV (Through MOOCS)	3	0	0	3	100	0	100
7	EC707S	SOC	Machine Learning	2	0	0	2	100	0	100
8	EC708I		Summer Internship (4 to 6 Weeks) completed during VI Semester				3	100	0	100
TOTAL CREDITS							**23**	**560**	**240**	**800**

L – Lecturer hours; Tut. – Tutorials; P/D – Practical or Drawing; T - Total

Category	CREDITS
Professional Core Course -PCC	3
Professional Elective- PEC	9
Open Elective Course/Job Oriented elective-OEC	6
Skill Oriented Course-SOC-Internal evaluation for 100 Marks	2
Industrial/Research Internship	3
TOTAL CREDITS	**23**

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION –CHOICE BASED CREDIT SYSTEM
B. Tech (Electronics and Communication Engineering)
R-20 – Program Effective for the batch admitted from the Academic Year 2020-21
Semester VIII (Fourth Year)

S.NO	Course Code	Category	Course Title	Hours/Week			Credits	Scheme of Evaluation Marks		Total Marks
				L	T	P		Internal	End Sem	
1		**Major Project**	Project-Work and Internship	0	0	24	12	40	60	100
Total Credits							**12**			**100**

L – Lecturer hours; Tut. – Tutorials; P/D – Practical or Drawing; T – Total

S. No.	Semester	Credits
1.	I	18
2.	II	19
3.	III	23
4.	IV	22.5
5.	V	22.5
6.	VI	23
7.	VII	23
8.	VIII	12
TOTAL CREDITS		**163**

B.Tech. (R20) Program Electives				
I	**II**	**III**	**IV**	**V**
(VI-Semester)	**(VI-Semester)**	**(VII-Semester)**	**(VII-Semester)**	**(VII-Semester)**
CMOS VLSI Design	Cyber Security	Neural Networks and Fuzzy Logic	Satellite Communication	Embedded System Design
Information Theory and Coding	Nano Electronics	Radar Engineering	Fiber Optic Communication	Real Time Operating Systems
Optimization Techniques	Sensors and Transducers	Testing and Testability	Wireless Communication	FPGA Based System Design
Hardware-Software Co-design	Electronic Instrumentation	Bio-Medical Instrumentation	MEMS	Digital Signal Processors & Architectures

Courses offered for Honors degree

S.No.	Course Code	Course Title	Prerequisite if any	Contact Hours per week		Credits
				L	T	
Any 4(Four)From the Following 6(Six) Courses						
1	ECHN01	Advanced Digital Signal Processing	Digital Signal Processing	3	1	4
2	ECHN02	Antennas and Radiating Systems	Antenna and Wave Propagation	3	1	4
3	ECHN03	Wireless and Mobile Communications	Digital Communications	3	1	4
4	ECHN04	Voice and Data Networks	NIL	3	1	4
5	ECHN05	Advanced Communication Networks	Computer Networks	3	1	4
6	ECHN06	Pattern recognition and Machine Learning	Digital Image & Video Processing	3	1	4
Two courses to be pursued through MOOCS with duration of 8 weeks each.						
7	ECHN07	Remote Sensing				2
8	ECHN08	Optical Networks				2
9	ECHNO9	Cloud Computing				2
	Total Credits					**20**

Courses offered for Minors in Electronics

S. No	Course Code	Course Title	Prerequisite if any	Contact Hours per week			Credits
				L	T	P	
Any 4(Four)From the Following 6(Six) Courses							
1.	ECMN01 (EC 104)	Electronic Devices	NIL	3	1	0	4
2.	ECMN02 (EC305C)	Digital Logic Design	NIL	3	1	0	4
3.	ECMN03 (EC306C)	Analog Circuits	Electronic Devices	3	1	0	4
4	ECMN04(EC404C)	IC Applications	Analog Circuits	3	1	0	4
5	ECMN05 (EC604C-Program Elective-II)	Electronic Instrumentation	Electronic Devices	3	1	0	4
6	ECMN06 (EC603C --Program Elective-I)	CMOS VLSI Design	1.Electronic Devices 2.Analog Circuits	3	1	0	4
Two courses to be pursued through MOOCS with a duration of 8 weeks							
7	ECMN07	Internet of Things and Applications					2
8	ECMN08	Sensors and Transducers					2
9	ECMN09	Micro-electromechanical Systems (MEMS)					2
10	ECMN10	Microprocessors and Micro Controllers					2
	Total Credits						20

Courses offered for Minors in Communications

S.No	Course Code	Course Title Offered in Semester	Prerequisite if any	Contact Hours per week			Credits
				L	T	P	
Any 4(Four)From the Following 7(Seven) Courses							
1.	ECMN11 (EC303C)	Signals & Systems	1.Mathematics-I 2.Mathematics-II	3	1	0	4
2.	ECMN12 (EC402C)	Probability theory & Stochastic Process	1.Mathematics-I 2.Mathematics-II	3	1	0	4
3.	ECMN13 (EC405C)	Analog Communications	NIL	3	1	0	4
4.	ECMN14 (EC505C)	Digital Communications	1. Signals & Systems 2. Probability theory & Stochastic Process	3	1	0	4
5.	ECMN15 (EC504C)	Antenna Wave Propagation	Electromagnetic Waves and Transmission Lines	3	1	0	4
6.	ECMN16 (EC601C)	Microwave Engineering	Antenna Wave Propagation	3	1	0	4
7.	ECMN17 (EC602C)	Computer Networks	NIL	3	1	0	4
8.	ECMN18 (EC604C-Program Elective-II)	Cyber Security	NIL	3	1	0	4

Two courses to be pursued through MOOCS with duration of 8 weeks							
9.	ECMN19	Satellite Communications					2
10.	ECMN20	Fiber optic Communications					2
11.	ECMN21	Mobile Communications					2
			Total Credits				20

FIRST YEAR SYLLABAS

I Semester MA 101MATHEMATICS –I
(I Semester - Common for all branches)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particular integrals-homogeneous differential equations with variable coefficients-method of parameters-simulation equations.

UNIT II

Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of derivatives and integrals-derivatives of transforms-integrals of transforms.

UNIT III

Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNIT IV

Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNIT V

Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/Reference Books:

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

Course Outcomes: At the end of the course, students will be able to

1. Analyze differential equations and solve them and also apply differential equations to engineering problems.
2. Use transformation to convert one type into another type presumably easier to solve, and also use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.

3. Solve an initial value problem for an nth order ordinary differential equation using the Laplace transform, and also expand functions as power series using Maclaurin's and Talor's series
4. Optimize the problems related to or, computer science, probability and statistics and also draw an approximate shape by the study of some of its important characteristics such as symmetry, tangents, regions enclosing curve tracing method to find length, area, volume.
5. Use multiple integral in evaluating area and volume of any region bounded by the given curves.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	1	-	1	2	1	2	2	3	-	-	-
CO2	1	3	3	1	-	1	1	1	2	1	3	-	-	-
CO3	2	3	3	1	-	1	2	1	2	2	3	-	-	-
CO4	1	2	2	1	-	1	2	1	1	1	3	-	-	-
CO5	1	2	1	2	-	2	1	1	1	1	3	-	-	-

I & II Semesters CY 101/ CY 202 ENGINEERING CHEMISTRY
(I Semester - CY 101 for Civil & Mechanical Engineering)
(II Semester -CY 202 for EEE, ECE & CSE) Instruction:
3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Atomic and molecular structure (12 lectures)
Postulates of quantum chemistry. Schrodinger equation. Particle in a box solution, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomics, Pi-molecular orbitals of butadiene and benzene. Band structure of solids and the role of doping on band structures

UNIT II

Spectroscopic techniques and applications
Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclearmagnetic resonance and magnetic resonance imaging, surface characterization techniques.

UNIT III

Chemical equilibria, Intermolecular forces and potential energy surfaces
Use of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cellpotentials, the Nernst equation and applications. Use of free energy considerations in metallurgy through Ellingham diagram. Equations of state of real gases and critical phenomenon.

UNIT IV

Periodic properties
Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular
geometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNIT V

Stereochemistry, **Organic reactions and synthesis of a drug molecule**
Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings Synthesis of a commonly used drug molecule.

Reference/Textbooks:

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistry by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Ed.
7. Principles of physical chemistry, Puri, Sharma and Pattania

Course Outcomes: At the end of the course, students will be able to

1. Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular Forces.
2. Rationalize bulk properties and processes using thermodynamic considerations.
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different Molecular energy levels in various spectroscopic techniques.
4. Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity, and also list major chemical reactions that are used in the synthesis of molecules.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	-	-	-	-	1	-	-	-	-	-
CO2	1	1	3	-	-	-	-	-	1	-	-	-	-	-
CO3	1	2	2	2	-	-	-	2	1	-	-	-	-	-
CO4	1	1	2	2	2	-	1	2	1	1	-	-	-	-

I Semester CH 102 CHEMISTRY FOR CHEMICAL ENGINEERING – I
(I Semester –For Chemical Engineering)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Introduction to quantum theory for chemical systems:
Schrodinger equation, Applications to Hydrogen atom, Atomic orbitals, many electron atoms

UNIT II

Chemical bonding in molecules:
MO theory, Structure, bonding and energy levels of bonding and shapes of many atom molecules, Coordination Chemistry, Electronic spectra and magnetic properties of complexes with relevance to bio-inorganic chemistry, organ metallic chemistry

UNIT III

Introduction to Stereochemistry:
Stereo descriptors – R, S, E, Z. Enantiomers and Diastereomers. Racemates and their resolution. Conformations of cyclic and acyclic systems.

UNIT IV

Reactivity of organic molecules:
Factors influencing acidity, basicity, and nucleophilicity of molecules, kinetic vs. thermodynamic control of reactions

UNIT V

Strategies for synthesis of organic compounds:
Reactive intermediates substitution, elimination, rearrangement, kinetic and thermodynamic aspects, role of solvents.

Text / Reference Books:

1. Physical Chemistry: G.W.Castellan, Narosa
2. Organic Chemistry: Finar; I.L. — Vol — I & II, Pearson Education
3. Organic Chemistry: Morrison & Boyd; PHI/Pearson Education.
4. Physical Chemistry: P. W. Atkins: Oxford.
5. A Text book of Physical Chemistry: K. L. Kapoor: Macmillan
6. A guide Book to Mechanism in Organic Chemistry: Peter Sykes
7. Organic Chemistry: Loudon: Oxford

Course Outcomes: At the end of the course, **s**tudents will be able to

1. Appreciate quantum theory of chemical systems
2. Appreciate aliphatic chemistry and stereochemistry
3. Write simple mechanisms.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	-	-	-	-	1	-	-	-	-	-
CO2	1	1	3	-	-	-	-	-	1	-	-	-	-	-
CO3	1	2	2	2	-	-	-	2	1	-	-	-	-	-

I & II Semester EN 203 ENGLISH
(I Semester - EN 103 for ChE, CE & ME) (II Semester - EN 203 for EEE, ECE & CSE)
Instruction: 2(L) Credits: 2 Assessment: 40 + 60

UNIT I
Vocabulary Building
The concept of Word Formation- Root words from foreign languages and their use in English- Acquaintance with prefixes and suffixes from foreign languages in English form derivatives- Synonyms, antonyms, and standard abbreviations.

UNIT II
Basic Writing Skills
Sentence Structures – Use of phrases and clauses in sentences –Importance of proper punctuation - Creating coherence – Organizing principles of paragraphs in documents -Techniques for writing precisely

UNIT III
Identifying Common Errors in Writing
Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article -Prepositions - Redundancies -Clichés

UNIT IV
Nature and Style of sensible Writing
Describing - Defining - Classifying –Providingexamples or evidence –Writingintroductionand conclusion

UNIT V
Writing Practices
Comprehension - Précis Writing –EssayWriting

Reference/Textbooks:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. LizHamp- Lyonsand Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumarand Pushpalata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

Course Outcomes: At the end of the course, students will be able to

1. Learn the elements of grammar and composition, literary texts such as Short stories and prose passages of English Language.
2. Maintain linguistic competence through training in vocabulary, sentence structures and pronunciation.
3. Develop communication skills by cultivating the habit of reading comprehension passages, language skills like listening, speaking, reading and writing.

4. Make use of self-instructed learner friendly modes of language learning through competence.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	2	-	3	2	2	3	-	-
CO2	-	-	-	-	3	-	-	-	2	-	-	1	-	-
CO3	-	-	-	-	-	-	-	-	3	-	3	2	-	-
CO4	-	-	-	-	-	-	-	-	3	-	2	3	-	-

I Semester EE104 BASIC ELECTRICAL AND ELECTRONICS ENGG
(I Semester – for ChE, CE & ME)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

Unit-I
Electric DC Circuits: Kirchhoff's Voltage & Current laws, Superposition Theorem, Star – Delta Transformations. AC Circuits: Complex representation of Impedance, Phasor diagrams, Power & Power Factor, Solution of Single Phase Series & Parallel Circuits. Solution of Three Phase circuits and Measurement of Power in Three Phase circuits.

Unit-II
Single Phase Transformers: Principle of Operation of a Single phase Transformer, EMF equation, regulation and Efficiency of a single phase transformer. DC Machines: Principle of Operation, Classification, EMF and Torque equations, Characteristics of Generators and Motors

UNIT-III
Three Phase Induction Motor: Principle of Rotating Magnetic Field, Principle of Operation of 3-φ I.M., Torque-Speed Characteristics of 3-φ I.M.

UNIT-IV
P-N junction operation, diode applications, Zener diode as regulator. Transistor and applications: Introduction to transistors, BJT Characteristics, biasing and applications

UNIT-V
Integrated Circuits: Operational amplifiers, Applications: adder, subtractor, Integrator and Differentiator. Digital Circuits: logic gates, Combinational Logic circuits, Flip-Flops, counters and shift registers, Laboratory measuring instruments: digital multi-meters and Cathode Ray Oscilloscopes (CRO's).

Textbooks:
1. Electrical Technology by Edward Hughes
2. Basic Electrical Engineering by Nagrath and Kothari

Course Outcomes: At the end of the course, students will be able to

1. Understand the basic concepts of D.C. single phase and 3- phase supply and circuits and solve basic electrical circuit problems
2. Understand the basic concepts of transformers and motors used as various industrial drives.
3. Understand the concept of power factor improvement for industrial installations and concepts of most economical power factor.
4. Understand the operation and characteristics of diodes, transistors, integrated circuits and digital circuits.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	1	1	1	1	2	2	1	-	-
CO2	3	3	-	-	-	1	1	-	-	1		1	-	-
CO3	3	3	3	3	2	1	1	1	1	1	2	-	-	-
CO4	2	3	2	1	3	1	-	-	2	2	3	2	3	2

I & II Semesters
ME 105 / ME 205ENGINEERING GRAPHICS AND DESIGN
(I Semester - ME105 for ChE, CE & ME)
(II Semester - ME205 for EEE, ECE & CSE) Instruction: 2(L) +3
(Drg) /week Credits: 3.5 Assessment: 40 + 60

Unit I
Introduction to Engineering Drawing
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only);Cycloid,Epi-cycloid, Hypo-cycloid and Involutes.

Unit II
Scales- Scales– construction of Plain &Diagonal Scales.
Projections of points, lines - Projections of Points and lines inclined to both planes, including traces;
Question Paper
Modular – 4 questions from Units I t0 IV, 15 marks each

Unit III
Projections of planes
Projections of planes (Regular surfaces only) inclined Planes-Auxiliary Planes
Projections of Regular Solids (Simple solids – cylinder, cone, prism & pyramid) those inclined to both the Planes-Auxiliary Views

Unit IV
Isometric Projections& Orthographic projections
Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale. Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Unit V
Introduction to CAD
CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House.
2. Shah, M. B & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education.
3. Agrawal B. & Agrawal C.M. (2012) Engineering Graphics, TMH Publication.

4. Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing, Scitech Publishers.
5. Corresponding set of) CAD Software Theory and User Manuals

Course Outcomes: At the end of the course, the student will be able to

1. Make a distinction between first angle projection and third angle projection of drawing.
2. Draw hyperbola, parabola, involutes and cycloidal curves.
3. Draw sections of solids including cylinders, cones, prisms and pyramids.
4. Draw orthographic projections of lines, planes, solids and sections of solids.

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Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	1	-	-	-	-	-	-	-	1	-	-
CO2	3	1	2	1	-	-	-	-	-	-	-	-	-	-
CO3	3	1	2	1	-	-	-	-	-	-	-	-	-	-
CO4	3	1	2	1	-	-	-	-	-	-	-	1	-	-

I & II Semesters EN 106 / EN 206 ENGLISH COMMUNICATION LAB
(I Semester - EN 106 for ChE, CE & ME)
(II Semester - EN206 for EEE, ECE & CSE)

Instruction: 0(L) +3(Lab) /week Credits: 1.5 Assessment: 40 + 60

Listening Comprehension -Pronunciation, Intonation, Stress and Rhythm -Common Everyday Situations: Conversations and Dialogues -Communication at Workplace -Interviews -Formal Presentations

Reference/Text Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. LizHamp– Lyons and Ben Heasly. Cambridge Univ. Press. 2006
5. Communication Skills. Sanjay Kumar and Pushpalata. Oxford Univ. Press.2011
6. Exercises in Spoken English. PartsI-III.CIEFL, Hyderabad. Oxford Univ. Press

Course Outcomes:

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	3	2	3	-	-

I Semester PY 102 MODERN PHYSICS
(For I Semester –EEE, ECE & CSE)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Quantum Mechanics : Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P. Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT II

Band Theory of Solids : Classical Free Electron Theory of Metals – Success and Failures – Quantum Free Electron Theory – Fermi Factor – Electron in Periodic Potential – Bloch Theorem – Kronig – Penney Model – Distinction between Metals , Insulators and semiconductors- Energy Band Structures.

UNIT III

Semiconductors – Introduction- Intrinsic and Extrinsic Semiconductors – Density of states – Carrier Concentrations at Equilibrium – Hall Effect. PN Junction Diode – Energy Band Diagram – Forward and Reverse Bias- Current – Voltage characteristics – Applications- Zener Diode – Light Emitting Diode- Photo diode -Solar Cell – Semiconductor Laser.

UNIT IV

Electromagnetism and magnetic properties of Materials:

Laws of Electro statistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws- Maxwell Equations – Polarization – Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization – Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and hysteresis, Applications of ferromagnetic materials.

UNIT V

Nanophysics and Nanotechnology: Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C60 (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials.

Text Books / Reference Books:

1. R.K. Gaur and S.L. Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi
2. S.P. Basava Raju `` A Detailed Text Book of Engineering Physics" Sole Distributors, Subhash Stores Book Corner, Bangalore
3. Hitendra K. Malik and A.K. Singh ``Engineering Physics" Tata MC Graw Hill Education Pvt. Ltd., New Delhi
4. M.N. Avadhanulu and P.G. Kshirsagar ``A Textbook of Engineering Physics`` S.Chand and Company Pvt. Ltd., New Delhi.

5. John Allison, ``Electronic Engineering Materials and Devices" Tata Mc Graw Hill Publications.
6. B. L Theraja, "Modern physics", S. Chand & Company.
7. V. Raghavan "Material Science", Tata McGraw Hill Publications.
8. M.S. Ramachandra Rao and Shubra Singh, `Nanoscience and Nanotechnology` Wiley India Pvt. Ltd, New Delhi.

Course Outcomes: At the end of the course, students will be able to

1. Develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses and also understand the quantum mechanics and ultimately the quantum behavior of charged particles when they are in motion.
2. Identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems and also apply knowledge of band theory in the area of electronics and understanding the basic electron transportation phenomenon in microdevices.
3. Understand the principles in electrostatics and electromagnetics and magnetic properties of materials, size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
4. Think and participate deeply, creatively, and analytically in emerging areas of engineering technology, analyze the basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis and also provide multidisciplinary experiences throughout the curriculum.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	1	1	1	1	2	2	1	-	-
CO2	3	3	-	-	-	1	1	-	-	1	-	1	-	-
CO3	3	3	3	3	2	1	1	1	1	1	2	-	-	-
CO4	2	1	1	1	-	-	-	-	-	-	-	1	-	-

I & II Semesters CS 103 / CS203 PROGRAMMING FOR PROBLEM SOLVING
(I Semester –CS 103 for EEE, ECE & CSE)
(II Semester –CS 203 for ChE, CE & ME) Instruction: 3(L)
+1(T) /week Credits: 4 Assessment: 40 + 60

Course Objectives:

1. To acquire problem solving skills
2. To be able to develop flowcharts and algorithms for the given problem
3. To learn how to write modular programs in C
4. To enable to use arrays, pointers, strings and structures in solving problems.
5. To explain the difference between object-oriented programming and procedural programming.
6. To understand principles of object-oriented programming.

UNIT-I

Problem Solving: Problem solving techniques, Computer as a problem-solving tool, Programming Languages – Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements: Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements: while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continue statements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions, passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, accessing structures, Nested structures, Arrays of structures, Structures containing arrays, Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, reading from a file, Writing onto a file.

UNIT V

Introduction to Object-Oriented Programming (OOP): Need for OOP, Principles of OOP, Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

Course Outcomes: At the end of the course, student will be able to

1. Develop and test programs in C and correct syntax and logical errors.
2. Implement conditional branching, iteration and recursion, and decompose a problem into functions and synthesize a complete program.
3. Use arrays, pointers, strings and structures to formulate algorithms and programs and also use file to perform read and write operations.
4. Handle programming assignments based on class, abstraction, encapsulation, overloading and inheritance.

Text Books

1. Ashok N Kamthane, Amit Ashok Kamthane, Programming in C, 3rd Edition, Pearson Education, 2019.
2. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Hanly J R & Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
5. Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw-Hill.

Reference Books

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, Reema Thareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.
5. The C++ Programming Language, Bjarne Stroustrup, 3rd Edition, Pearson Education.
6. Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	2	1	-	3	-	2	2	-	-	-	-
CO2	2	1	3	-	2	-	-	-	-	-	-	-	-	-
CO3	2	3	1	3	3	-	2	-	-	-	-	-	-	-
CO4	2	3	2	1	1	-	2	-	-	-	-	-	-	-

I & II Semesters CE 104 / CE 204 ENGINEERING MECHANICS
(I Semester –CE 104 for EEE)
(II Semester –CE 204 for CE & ME)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

STATICS : Basic concepts – System of force, Concurrent and non-concurrent coplanar and non-coplanar forces – Resultant – Moment of force and its application – Couples and resultant of force systems – Equilibrium of systems of forces – Free body diagrams, Equations of equilibrium of coplanar systems and spatial systems.

UNIT II

Analysis of plane trusses: Types of supports – Types of trusses – Analysis of trusses using method of joints and method of sections.

UNIT III

CENTRE OF GRAVITY AND MOMENTS OF INERTIA: Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite areas (rolled and built up sections) – Radius of gyration of areas.

UNIT IV

SIMPLE STRESES AND STRAINS : Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-strain diagram for mild steel – Working stress – Factor of safety.
Lateral strain – Poisson's ratio and volumetric strain – Elastic moduli and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses.

UNIT V

STRAIN ENERGY: Gradual, sudden and impact loading – Endurance limit principles of virtual work and its applications.

TEXTBOOKS:

1. Ghose D.N. – Applied Mechanics and Strength of Materials.
2. Timoshenko & Young – Engineering Mechanics.
3. Junarkar SB – Mechanics of Structures – Vol. I.
4. Junarkar SB – Elements of Applied Mechanics.

Course Outcomes: At the end of the course, student will be able to

1. Apply the basic knowledge of force system.
2. Know the types of supports occur in civil engineering structures
3. Know the geometrical properties of different cross sections.
4. Understand different types of stresses and strains, elastic constants, and also understand the behavior of different internal forces under different types of loading.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3														
CO4														

I Semester EC 104 ELECTRONIC DEVICES
(I Semester - for ECE only)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Semiconductor Materials: Atomic structure, Electrons in periodic Lattices, Classifying Materials: Semiconductors, conductors and insulators, Semiconductor material groups, Covalent bonding, Energy Bandgaps, Energy bands in intrinsic and extrinsic silicon /Germanium, Density of Impurity States, Electrical Conductivity and Mobility, , Electronic Properties of N-type and P-type semiconductors, Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, design of resistors. Generation and recombination of carriers; Poisson and continuity equation, P-N junction characteristics, I-V Characteristics, and small signal switching models, Diode resistances and diode capacitances.

UNIT II

Diode models, Avalanche breakdown, Zener diode, Schottky diode, Tunnel diode, Varactor diode and their applications, Testing a diode.

Rectifiers: Diode equivalent circuits, Analysis of diode circuits, Characteristics and comparison of Half-wave, Full-wave and Bridge rectifiers, Analysis of filters (C, L, LC, and CLC) used with Full-wave rectifiers, line regulation and load regulation.

UNIT III

Bipolar Junction Transistors: Bipolar Junction Transistor action, PNP and NPN transistors, CB, CE, and CC configurations and their I-V characteristics, Analytical expressions for transistor characteristics, Typical junction voltages and maximum ratings. Determination of h-parameters from BJT characteristics, Ebers-Moll Model, Multi Emitter transistor.

UNIT IV

Bipolar Junction Transistor Biasing: Operating point, stabilization, thermal runaway.

Field Effect Transistors: Characteristics and parameters of JFET, Pinch off and saturation regions, MOS capacitor, Depletion and Enhancement type of MOSFET, I-V characteristics, and small signal models of MOS transistor, UJT and its I-V characteristics, Metal Semiconductor FET, FET biasing schemes.

UNIT V

Optoelectronic Devices: Principle of operation and characteristics of LED. LCD, LDR, Photoconductor, Photodiode, Phototransistor, Solar cell, PIN photodiode, Charge-Coupled Devices, APD (avalanche photodiode) and their applications.

Power Semiconductor Devices: Device structure, equivalent circuit and characteristics of PNPN Diode, SCR, DIAC and TRIAC.

Text /Reference Books:

1. Ben G. Steetman and Sanjay Kumar Banerjee, “Solid State Electronic Devices,” 7th edition, Pearson Publishers, 2015.
2. Jacob Millman, Christos Halkias, Chetan D Parikh, “**Integrated Electronics**: Analog and Digital Circuits and Systems”, 2nd Edition, Tata Mcgraw Hill Education Private Limited, 2011.

3. Allen Mottershead, “Electronic Devices and Circuits: An Introduction”, PHI Learning, 2011.
4. D. Neamen , D. Biswas "Semiconductor Physics and Devices", McGraw-Hill Education.
5. S. M. Sze and K. N. Kwok, “Physics of Semiconductor Devices,” 3rd edition, John Wiley & Sons, 2006.
6. C.T. Sah, “Fundamentals of solid-state electronics,” World Scientific Publishing Co. Inc, 1991.
7. Y. Tsividis and M. Colin, “Operation and Modeling of the MOS Transistor,” Oxford University Press, 2011.

Course Outcomes: At the end of the course, student will be able to

1. Understand the principles of semiconductor physics of the intrinsic, *p* and *n* type materials and also the characteristics of the diode and some special function diodes and their application in electronic circuits.
2. Use mathematics to analyze electronic devices typical of those in switching and rectifier circuits.
3. Understand and utilize the mathematical models of semiconductor junctions and transistors for circuits and systems.
4. Understand the characteristics of the transistors and opto-electronic devices and their application in electronic circuits and also apply thyristors in power switching and control circuits

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	2	2	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	1	-	-	1	-	-	1	1	-	-	-

I Semester MA 104 PROBABILITY AND STATISTICS
(I Semester - for CSE only)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I
Probability: Introduction, Axiomatic approach, Conditional probability, Baye's theorem, Stochastic process, Random variables, Discrete and Continuous distributions, Expectation, Variance, moments, Moments generating functions.

UNIT II
Distributions - Binomial, Poisson, Normal, Uniform, Exponential and Gamma. Properties and applications.

UNIT III
Estimator-Estimation of parameters by Method of moments and maximum likelihood-Testing of hypothesis-small sample tests-t-test, F-test and Chi-Square test.

UNIT IV
Correlation: Curve fitting by method of least squares-Linear, Quadratic and Exponential Fitting-Correlation-rank correlation-Regression analysis-Multiple correlation.

UNIT V
Quality Control: Concept of quality of a manufactured product-Causes of variation-Principle of Shewart Control charts-X-Chart, R-Chart, p-Chart, np-chart and C-Chart.

Text Books:

1. S P Gupta, Statistical Methods, 38th Edition, Sultan Chand & Sons Educational Publishers,2009.
2. Y K V Iyengar, et al, Probability and Statistics 2nd Edition S. Chand & Company Ltd,2010.
3. S C Gupta and V K Kapur, Fundamentals of Applied Statistics, 3rd Edition, Sultan Chand& Sons Educational Publishers.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	-	-	3	-	-	-	-	-	-	-	-
CO2	-	2	-	1	-	2	-	-	-	-	-	-	-	-
CO3	-	2	2	1	-	2	-	-	-	-	-	-	-	-
CO4	-	2	2	1	-	2	-	-	-	-	-	-	-	-

I & II Semesters ME 105 / ME 205 WORKSHOP/MANUFACTURING PRACTICE
(ME 105 for EEE, ECE & CSE)
(ME 205 for ChE, CE & ME)
Instruction: 0(L) +3 (lab)/week Credits: 1.5 Assessment: 40 + 60

Workshop Practice: Five practices among

1. Machine shop
2. Fitting shop
3. Carpentry
4. Electrical wiring
5. Welding shop
6. Casting
7. Smithy
8. Plastic moulding & Glass Cutting

Examinations could involve the actual fabrication of simple components, utilizing one or More of the techniques covered above.

Detailed Contents:

1. Manufacturing Methods-casting, forming, machining, joining, advanced manufacturing
2. methods
3. CNC machining, Additive manufacturing
4. Fitting operations & power tools.
5. Electrical &Electronics
6. Carpentry
7. Plastic moulding. Glass cutting
8. Metal casting.
9. Welding (arc welding & gas welding), brazing

The above course content is learnt by online videos/ppt presentations.

Text/Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S. K., Elements of Workshop Technology", Vol. I 2008and Vol. II 2010, Media promoters and Publishers private limited, Mumbai.
2. Kalpakjian S. and Steven S. Schmid Manufacturing Engineering and Technology", 4thedition, PearsonEducationIndiaEdition,2002.
3. GowriP.Hariharanand A. SureshBabu, Manufacturing Technology–I" Pearson Education,2008.
4. Roy A. Lindberg, Processes and Materials of Manufacture",4thedition, Prentice Hall India,1998.
5. RaoP.N., "ManufacturingTechnology",Vol. I & II,TataMcGrawHillHouse, 2017.

Laboratory Outcomes

1. Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. By assembling different components, they will be able to produce small devices of their interest.
4. Course Outcomes: Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricate components using different materials.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	1	2	1	1	2	2	1	-	-	-	-
CO2	2	1	2	1	2	1	1	2	2	1	-	-	-	-
CO3	2	1	2	1	2	1	1	2	2	1	-	-	-	-
CO4	2	1	2	1	2	1	1	2	2	1	-	-	-	-

I & II Sem CS 106/ CS206 PROGRAMMING FOR PROBLEM SOLVING LAB
(CS 106 for EEE, ECE & CSE)
(CS 206 for ChE, CE & ME)
Instruction: 0(L) +3 (Lab)) /week Credits: 1.5 Assessment: 40 + 60

Course Objectives:

1. To provide exposure to problem-solving through programming
2. To train the student on the concepts of the C- Programming language

The following programs shall be developed and executed in Programming Language C.

1. Programs on conditional control constructs.
2. Programs on iterative statements (while, do-while, for).
3. Programs on recursive procedures.
4. Programs on arrays, matrices (single and multi-dimensional arrays).
5. Programs using user defined functions, demonstrating parameter passing methods viz. call by value and call by reference.
6. Programs using different library functions viz, ctype.h, stdio.h, stdlib.h, string.h, conio.h and pre-processor directives.
7. Programs using pointers (int pointer, char pointer) and pointer arrays.
8. Programs on structures and unions.
9. Programs on file processing.
10. Programs on pointers to structures and self-referential structures.

Course Outcomes: After completion of this course the student would be able to

1. Develop the C code for the given algorithm.
2. Understand, debug and trance the execution of program written in C language.

Refence Books:

1. Scheldt H, C: The complete Reference, 4th Edition, Tata McGraw-Hill, 2022.
2. Hanly J R & Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Behrouz A. Forouzan & Richard F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	2	1	-	3	-	2	2	-	-	-	-
CO2	2	1	3	-	2	-	-	-	-	-	-	-	-	-

II Semester MA 201 MATHEMATICS II
(II Semester - for all branches)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

Unit I
Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors –Canley-Hamilton theorem-quadratic forms-diagonalization.

Unit II
Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals- Green's, Stokes's and Gauss Divergence theorems and its applications.

Unit III
Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

Unit IV
Special Functions I: Gamma and Beta functions-series solutions of differential equations-ordinary points.

Unit V
Special Functions II: Bessel function-recurrence formulae-generating function for Jn(X)-Lengender polynomials-recurrence formulae-generating function for Pn(X) - Rodriguez's formula - orthogonality of Lengender polynomials.

Text/Reference Books:

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

Course Outcomes: At the end of the course, students will be able to

1. Use ranks of matrices to decide whether the system of linear equations is consistent or not, and also use Cayley Hamilton theorem to find inverses or powers of matrices.
2. Use eigen values and vectors to reduce quadratic forms to normal form, and also to analyze motion problems from real lines to curves and surfaces in 3-d and use tools such as divergence and curl of vector and gradient, directional derivatives that play significant roles in many applications.
3. Use green's theorem to evaluate line integrals along simple closed contours on the plane and also use stokes' theorem to give a physical interpretation of the curl of a vector field
4. Use the divergence theorem to give a physical interpretation of the divergence of a vector field, and also find the Fourier series to represent a function as a series of constants times sine and cosine functions of different frequencies in order to observe periodic phenomenon.
5. Evaluate certain improper integrals to make them simple with introduction of gamma and beta functions, and also study certain special functions that arise in solving certain ordinary differential equations to model many physical phenomena.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	3	3	1	-	2	1	1	2	1	3	-	-
CO2	3	1	3	2	1	-	2	2	1	2	2	3	-	-
CO3	3	1	3	2	2	-	2	2	1	2	2	3	-	-
CO4	2	1	2	1	1	-	1	1	1	1	1	3	-	-
CO5	3	1	3	2	2	-	1	2	2	1	2	3	-	-

II Semester PY 202ENGINEERING PHYSICS
(II Semester - for ChE, CE& ME)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Wave Optics

Interference: Huygen`s Principle-Principle of Superposition-Interference of Light-Young`s double slit experiment- -Newton's Rings.

Diffraction: Fraunhofer Diffraction at a Single Slit and a Circular Aperture-Plane Diffraction grating –Resolving Power-Rayleigh`s Criterion-Resolving power of Grating and Microscope.

Lasers : Introduction – Spontaneous and Stimulated Emission of Radiation – Population Inversion – Types of Lasers – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNIT II

Mechanics of Rigid Body

Rigid Body-Rotational Motion and Kinematics Relations-Kinetic Energy and Angular Momentum of a Rotating Body-Equation of Motion of a Rigid body (Torque of a Rigid Body)-Combined Translation and Rotational Motion of a Rigid Body- Body Rolling on an inclined Plane.

Mechanics of Continuous Media

Elasticity, Stress and Strain- Hook`s Law and Behaviour of Wire Under Load- Elastic Constants-Relation Between Elastic Modulii-Types of Supports, Beams and Loads-Different types of Bending-Cantilever with an End Load. Ultrasonic Waves - Sound Absorption and Reverberation -Sabine Formula - Acoustics of Buildings.

UNIT III

Electromagnetism and magnetic properties of Materials

Laws of Electro statistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws-Maxwells Equations – Polarization - Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization - Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and Hesteresis, Applications of ferromagnetic materials.

UNIT IV

Quantum Mechanics

Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P. Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT V

Nano Physics and Nanotechnology

Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C60 (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials.

Text Books / Reference Books:

1. R.K. Gaur and S.L. Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi
2. S. L. Gupta and Sanjeev Gupta `Unified Physics` Vol. I Jai Prakash Nath& Co., Meerut.

3. Hitendra K. Malik and A.K. Singh ``Engineering Physics" Tata MC Graw Hill Education Pvt. Ltd., New Delhi
4. M.N. Avadhanulu and P.G. Kshirsagar "A Textbook of Engineering Physics" S. Chand and Company Pvt. Ltd., New Delhi
5. B. L Theraja, "Modern physics", S. Chand& Company.
6. V. Raghavan "Material Science", Tata McGraw Hill Publications.
7. M.S. RamachandraRao and Shubra Singh, "Nanoscience and Nanotechnology" Wiley India Pvt. Ltd, New Delhi

Course Outcomes: At the end of the course, students will be able to

1. Develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering course and also understand the quantum mechanics and ultimately the quantum behavior of charged particles when they are in motion.
2. Identify and apply appropriate analytical and mathematical tools of physics in solving engineering problems, and also apply the basic principles of mechanics of rigid body and continuous media and their applications unrest and the principles in electrostatics and electromagnetics and magnetic properties of materials.
3. Understand size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices, and also think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
4. Learn the basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis, and also provide multidisciplinary experiences throughout the curriculum.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	1	1	1	1	2	2	1	-	-
CO2	3	3	-	-	-	1	1	-	-	1	-	1	-	-
CO3	3	3	3	3	2	1	1	1	1	1	2	-	-	-
CO4	2	1	1	1	-	-	-	-	-	-	-	1	-	-

II Semester CY203CHEMISTRY FOR CHEMICAL ENGINEERING-II
(II Semester - For ChE only)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Colloids: Classification of colloids; Size and shape; preparation of sols; Origin of charge in Colloidal particles: Stability of Colloids: Kinetic. Optical & electrical Properties: Electro kinetic phenomena: Electrical Double Layer; Ultracentrifuge and Molecular weight determination of Macromolecules. Viscosity: Definition of viscosity of a liquid; Determination of Viscosity; Surface Tension: Introduction: Origin of Surface Tension: Surface energy, Capillarity; Contact Angle; Measurement of Surface Tension by Capillary rise method; Variation of Surface Tension of a liquid with Temperature and Concentration.

UNIT II

Kinetic theory of gases: Van der Waals Equation of state, Maxwell distribution law, vapour-liquid equilibrium, Colligative property. Adsorption: Introduction; Gibb's adsorption equation; Surface Excess; Adsorption isotherms: Freundlich, Langmuir, BET adsorption equations: Surface Films: Langmuir Balance: two-dimensional equation of state.

UNIT III

Introduction to quantum mechanics: Spectral shape pf Blackbody radiation, Planck's equation and a concept of quanta, breakdown of the classical equipartition principle, basic postulates of quantum mechanics, Hamiltonian function *&*Hamiltonian operator, important properties of a Hamiltonian operator, Heisenberg's uncertainty principle.

UNIT IV

Common organic reactions and their mechanisms: Friedel-Crafts, Claisen Condensation, Cannizaro, Aldolcondensation. Fischer-Troapsch synthesis, Birch reduction, pekins reaction, Riemer Tiemer reaction Wolf Kishner Reductio and Grignard reaction;

UNIT V

Aminoacids: Classification; General methods of preparation and properties of amino acids, polypeptide synthesis, General properties of proteins, colour tests, enzymes. Lipids, fats and steroids; nucleic acid, DNA & RNA - generation and structure. Carbohydrate: Classification, Glucose and fructose, Disaccharides: Sucrose, maltose.

Text / Reference Books:

1. Physical Chemistry: G.W.Castellan, Narosa
2. Organic Chemistry: Finar; I.L. — Vol — I & II, Pearson Education
3. Organic Chemistry: Morrison & Boyd; PHI/Pearson Education.
4. Physical Chemistry: P. W. Atkins: Oxford.
5. A Text book of Physical Chemistry: K. L. Kapoor: Macmillan
6. A guide Book to Mechanism in Organic Chemistry: Peter Sykes
7. Organic Chemistry: Loudon: Oxford

Course outcomes: At the end of the course, students will be able to

1. Understand the theoretical principles underlying molecular structure, bonding and properties
2. Know the fundamental concepts of structure and function in organic reactions, the use of Kinetics and thermodynamics to elucidate mechanisms of reactions
3. Predict reactivity patterns and propose reasonable mechanisms

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	-	-	-	-	1	-	-	-	-	-
CO2	1	1	3	-	-	-	-	-	1	-	-	-	-	-
CO3	1	2	2	2	-	-	-	2	1	-	-	-	-	-

II Semester EE 204 ELECTRICAL CIRCUITS
(II Semester - For ECE only)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT-I

Basic Circuit Concepts: Electrical circuit elements (R, L and C), Classification of Circuit elements, Voltage and Current sources, Source transformation Techniques– Kirchhoff's laws – Star-delta transformation – Network reduction techniques - Mesh and Nodal Analysis for D.C. Circuits– Concept of mutual inductance – Dot convention.

UNIT-II

Network Topology: Graph, tree, incidence matrix, and tie set and cut set matrices – Formulation of equilibrium equations based on graph theory. Duality and dual circuits

A.C. Fundamentals: Periodic waveforms – Average and effective values of different waveforms - Form factor and crest factor.

UNIT-III

A.C. Circuits: Phase and phase difference – Phasor notation – Concept of reactance, impedance, susceptance and admittance – Power factor -Active and reactive power – Impedance Triangle-Power triangle – Steady State analysis of single-phase A.C. circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel) – Phasor diagrams. Mesh and Nodal Analysis for A.C. Circuits.

UNIT-IV

Resonance: Series and Parallel Resonance – Resonant frequency, Half power frequencies, bandwidth and Quality Factor.

Locus diagrams: Current locus diagrams of RL and RC series circuits and two branch parallel circuits.

UNIT-V

Three Phase Circuits: Advantages of three phase systems – Phase sequence – Balanced and Unbalanced systems – Magnitude and phasor relationships between line and phase voltages and currents in balanced star and delta circuits – Analysis of balanced and unbalanced three phase circuits with star and delta connected loads, Measurement of three phase power – Two wattmeter method

Text Books:

1. Sudhakar and Shyammohan, Circuits and Networks: Analysis and Synthesis, 5th Edition, Tata McGraw-Hill
2. Ravish R. Singh, Network Analysis and Synthesis, Tata Mc. Graw Hill.
3. Abhijit Chakrabarti: Circuit Theory Analysis and Synthesis, 7th Revised Edition, Dhanpat Rai & Co.

Course outcomes: At the end of the course, students will be able to

CO1: Explain the operation & Characteristic of DC machines.
CO2: Explain the operation & performance of transformer.
CO3: Calculate efficiency of various Induction motors.
CO4: Determine regulation by synchronous impedance method (OC test & SC test).

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	2	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	3	-	-	-	-	-	-	3	-	-	-

II Semester EE 205 BASIC ELECTRICAL ENGINEERING
(II Semester - for EEE only)
Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT-I
Basic Circuit Concepts: Electrical circuit elements (R, L and C), Classification of Circuit elements, Voltage and Current sources, Source transformation Techniques– Kirchhoff's laws – Star-delta transformation – Network reduction techniques - Mesh and Nodal Analysis for D.C. Circuits– Concept of mutual inductance – Dot convention.

UNIT-II
Network Topology: Graph, tree, incidence matrix, and tie set and cut set matrices – Formulation of equilibrium equations based on graph theory. Duality and dual circuits
A.C. Fundamentals: Periodic waveforms – Average and effective values of different waveforms - Form factor and crest factor.

UNIT-III
A.C. Circuits: Phase and phase difference – Phasor notation – Concept of reactance, impedance, susceptance and admittance – Power factor -Active and reactive power – Impedance Triangle-Power triangle - Steady State analysis of single-phase A.C. circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel) – Phasor diagrams. Mesh and Nodal Analysis for A.C. Circuits.

UNIT-IV
D.C. Machines: Construction of a D.C. Machine, **D.C. Generator:** Operation, Classification and EMF equation. **D.C. Motor:** Operation, Back E.M.F, Types, and Applications.
Single Phase Transformers: Principle of Operation, Types, EMF equation.

UNIT-V
Three Phase Induction Motor: Production of Rotating Magnetic Field, Construction and operation of 3-Phase Induction Motor.
Alternators: Construction and working of Alternators.

Text Books:

1. Sudhakar and Shyammohan, Circuits and Networks: Analysis and Synthesis, 5th Edition, Tata McGraw-Hill
2. Ravish R. Singh, Network Analysis and Synthesis, Tata Mc. Graw Hill.
3. Nagrath and Kothari,Basic Electrical Engineering, 4th Edition, Tata Mc. Graw Hill.
4. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill.

Course Outcomes: At the end of this course, students will be able to

1. Understand and analyze basic electric and magnetic circuits.
2. Study the working principles of electrical machines and power converters.
3. Introduce the components of low-voltage electrical installations.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	1	1	1	1	2	2	1	-	-
CO2	3	3	-	-	-	1	1	-	-	1		1	-	-
CO3	3	3	3	3	2	1	1	1	1	1	2	-	-	-

II Semester CS 204 DATA STRUCTURES
(II Semester – for CSE only)
Instruction: 3 hr / week Credits: 3 Assessment: 3

Course objectives:

1. Develop skills to design and analyze linear and nonlinear data structures.
2. Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
3. Develop recursive algorithms as they apply to trees and graphs.
4. Strengthen the ability to identify and apply the suitable data structure for the given real world problem
5. Understand the various techniques of sorting and searching

UNIT I

Introduction: Data types/Objects/Structures, Abstract definition of Data Structures, Overview of linear and nonlinear data structures, Analysis of algorithms, Algorithm specification, Asymptotic notation, Time-Space trade-off, Searching: Linear, Binary and Fibonacci search and their complexity analysis.

Arrays: Definition, Multidimensional arrays, Pointer arrays, Representation of arrays – Row major and Column major orders, Application of arrays – Polynomials, Sparse matrices representation.

UNIT II

Stacks and Queues: Introduction, ADT, Array representation, Operations and Applications of Stacks - Evaluation of expressions, Code generation for stack machines, Implementation of recursion, Factorial calculation and Towers of Hanoi; Circular Queue, Priority Queue, Double ended queue, Applications of Queues - Simulation, CPU Scheduling; Multiple stacks and queues

UNIT III

Linked Lists: Singly linked lists and chains, Circular linked list, Doubly linked list, Circular doubly linked list, Complexity analysis of the same, Linked representation of Stacks and Queues, Applications of linked lists - Polynomial representation, Sparse matrix multiplication, Dynamic storage management; Generalized list representation, Recursive algorithms for lists, Recursive lists

UNIT IV

Trees: Basic tree terminologies, Binary trees – Definition, Properties, ADT, Representations, Operations and Applications; Binary Search Trees, Heap Trees, Threaded binary trees, Height balanced trees – AVL Trees, Red black tree, Splay tree Their operations and complexity analysis.

UNIT V

Sorting Techniques: Insertion sort, Selection sort, Bubble sort, Quick sort, Radix sort Merge sort, External sort – Introduction, K-way Merge sort.

Graphs: Basic terminologies, Representations, ADT, Operations on graphs – DFS, BFS, Spanning trees, Biconnected components, Minimum cost spanning trees.

Course Outcomes: After completion of the course the students will be able to

1. Choose appropriate data structure for the specified problem definition.
2. Implement linear and non-linear data structures viz. stacks, queues, linked list, trees, graphs.

3. Apply the concept of trees and graph data structures for the real world problems.
4. Comprehend the implementation of sorting and searching algorithms

Text Books:

1. Ellis Horowitz and Sartaj Sahani, "Fundamentals of Data Structures", Computer Science Press.
2. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++ Universities Press, Second Edition.
3. Debasis Samanta, Classic Data Structures, Second Edition, Prentice Hall of India

Reference Books:

1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI Learning Private Limited
2. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.
3. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	2	2	-	-	-	1	-	-	-	-	-
CO2	3	3	2	3	2	-	2	-	-	-	-	-	-	-
CO3	2	-	2	3	3	1	-	-	-	-	1	-	-	-
CO4	1	2	2	3	-	-	-	-	2	-	-	-	-	-

II Semester CS 207 DATA STRUCTURES LAB

(for CSE only)

Instruction: 2 (Lab) hr / week Credits: 1 Assessment: 3

Course Objectives:

1. To understand the practical application of linear and nonlinear data structures.
2. To develop and execute programs in C++/C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, and graphs.
3. To develop and execute programs in C to implement various sorting and searching techniques

1. Develop an algorithm to implement stack using arrays. Code it in C++.
2. Develop an algorithm to evaluate a given postfix expression using stack. Code it in C.
3. Develop an algorithm to convert a given infix expression to postfix form using stacks. Code it in C.
4. Develop algorithms to implement i) Linear queue and ii) Circular queue using arrays. Code it in C++.
5. Develop an algorithm to implement double ended queue (de queue) using arrays. Code it in C++.
6. Develop algorithms using dynamic variables and pointers, to construct a singly linked list consisting of the following information in each node: student id (integer), student name (character string) and semester (integer). The operations to be supported are:
    a. Inserting a nodei) at the front of a list ii) at the rear of the list ii) at any position in the list
    b. Deleting a node based on student id. If the specified node is not present in the list, an error Message should be displayed.
    c. Searching a node based on student id. If the specified node is not present in the list an error message should be displayed.
    d. Displaying all the nodes in the list.
7. Develop an algorithm using dynamic variables and pointers to construct a stack of integers using singly linked list and to perform the following operations: Code the same in C++.
    i) Push, ii) Pop iii) Display (The program should print appropriate messages for stack overflow and stack empty). Code the same in C++.
8. Develop an algorithm using dynamic variables and pointers to construct a queue of integers using singly linked list and to perform the following operations:
    a. Insert b. Deletec. Display. The program should print appropriate messages for queue full and queue empty. Code the same in C++.
9. Develop an algorithm to support the following operations on a doubly linked list where each node consists of integer data object:
    a. Create a doubly linked list
    b. Insert a new node
    c. Delete the specific node
    d. Display the contents of the list. Code the same in C++.
10. Develop algorithms to
    a. Construct a binary tree of integers.

b. Traverse the binary tree using inorder, preorder and postorder. (both recursive and non-recursive versions)
c. Display the elements in the tree. Code the same in C++.

11. Develop algorithms to create a binary search tree (BST) and perform the following operations on it. Find (a) Minimum element (b) Maximum element (c) Search for a given element (d) Find predecessor of a node (e) Find successor of a node (f) Delete a node with specific key value. Code the same in C++.
12. Develop an algorithm to construct an AVL tree for the given set of elements. Code it in C++.
13. Develop algorithms to Sort the given list of elements (i.e. numbers or strings)
    (a) Insertion sort (b) Merge sort (c) Quick sort (d) Heap sort Code the same in C.
14. Develop algorithms to implement of graph traversals by applying:
    (a) BFS (b) DFS. Code the same in C/C++.
15. Develop algorithms to find out a minimum spanning tree of a simple connected undirected graph by applying: (a) Prim's algorithm (b) Kruskal's algorithm Code the same in C/C++.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Identify the appropriate data structure for given problem.
2. Have practical knowledge on the application of data structures.
3. Analyze the time and space efficiency of the data structure.

Text Books:

1. Object Oriented Programming with ANSI & Turbo C++, Ashok N. Kamthane, Pearson Education
2. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
3. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++ Universities Press, Second Edition.
4. Data Structures using C and C++, Yedidyah Langsam. MosheJ. Augenstein Aaron M. Tenenbaum, 2nd Edition, PHI
5. ADTs, Data Structures and Problem Solving with C++, Larry Nyhoff, Pearson Education.
   (a) Forest ecosystem. (b) Grassland ecosystem

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	2	-	-	1	-	-	-	-	-	-	-
CO2	3	3	2	-	2	-		1	-	-	-	-	-	-
CO3	3	2	3	3	-	1	-	-	-	1	-	-	-	-

CE 107 / CE 207 ENVIRONMENTAL SCIENCE *Audit Course*
(CE 107 for EEE, ECE &CSE) *No Univ.Exam*
(CE 207 for ChE, CE & ME)
Instruction: 4(L) Credits: 0(Zero) Assessment: 40 + 60

UNIT I
Environmental Studies and Natural Resources
Definition, Scope and importance of Environment, Environmental studies, Need for public awareness
Components of Environment- Atmosphere, Hydrosphere, Lithosphere.
Renewable and **Non-Renewable Resources and associated problems**
Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dam benefits and problems.
Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.
Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.
Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
Role of an individual in conservation of natural resources.

UNIT II
Ecosystem and Biodiversity
Ecosystem - Concept of an ecosystem, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and function of the following ecosystem.
(c) Desert ecosystem. (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)
Biodiversity and its conservation:
Definition, genetic species and ecosystem diversity, Biogeographically classification of India.
Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation.
Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT – III
Environmental pollution and Global Effects
Definition, Causes, Effects, and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards
Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution. Pollution case studiesDisaster management: Floods, earthquakes, cyclone, landslides, Tsunami. Climate change-Global warming, Acid rain, Ozone depletion.

UNIT – IV

Environment Issues and Management

- Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, Water Borne Diseases.
- Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms
- Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcement of Environmental legislation.

UNIT – V

Social Issues and the Environment

- Population growth, Population Explosion, Population Control, Women and Child welfare.
- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rain water harvesting, watershed management, Wasteland reclamation, Human Rights, Value education, Environmental ethics- Issues and possible solution.
- Role of information Technology in Environment and Human Health.

Text Books / Reference Books :

1. AnubhaKaushik& C P Kaushik, Environmental studies, New age International Publishers, 2008
2. Benny Joseph, Environmental studies, Tata McGraw-Hill Publishers, 2005
3. M Chandra Sekhar, Environmental Science, Hi-Tech Publishers, 2004
4. Keerthinarayana and Daniel Yesudian, Principles of Environmental Sciences and Engineering , Hi-Tech Publishers, 2005
5. SanthoshkumarGarg,RajeshawriGarg and RajniGarg, Ecological and Environmental studies, Khanna publishers, 2006
6. Gilbert M, Introduction to Environmental Engineering and Science, Masters Publication by Prentice –Hall of India Private Ltd., 1991
7. William P Cunningham and Mary Ann Cunningham, Principles of Environmental Science, Tata McGraw Hill Publishing Co.Ltd, 2002
8. AmalK.Datta, Introduction to Environmental Science and Engineering, Oxford & IBH Publishing Co.Pvt.Ltd, 2000

Course Outcomes:

At the end of the course, students will be able to

1. Acquire knowledge in
    - Diverse components of environment and natural resources
    - Ecosystem and biodiversity & its conservation methods
    - Population growth and human health
    - Green technology

2. Identify and resolve the issues related to sources of different types of pollutions
3. Provide solutions to individuals, industries and government for sustainable development of natural resources
4. Apply environmental ethics in protection of diversified ecosystems.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	2	1	-	-	-	-	-	-	-	-
CO4	-	2	3	1	1	-	-	-	-	-	-	-	-	-

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SECOND YEAR SYLLABUS

MA301B-Mathematics – III

Instruction: Hours/Week: **3L:1T:0P** Credits**: 4**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT – I
Complex analysis - I: Analytical functions - Cauchy- Reimann equations – Construction of Analytic functions-Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT – II
Complex analysis - II**:** Taylor's and Laurents' series- Transformations- Conformal mapping - Bilineartransformations - Transformation of 1/z, z^2, sin z and cos z.

UNIT – III
Complex anaylasis –III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluationof real integrals

UNIT – IV
Partial differential equations - I : Formation of differential equations - Classification - First order linear partialdifferential equations – Legranges' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT- V
Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heatequation – Laplace's equation.

Text/Reference Books:

1. Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
3. Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
4. Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
5. Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

Course Outcomes: At the end of this course students will demonstrate the ability to

CO 1: After end of the course, students will be able to understand the analyticity of complex functions and conformal mappings. Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
CO2: Describe conformal mappings between various plane regions. Apply the concepts of complex analysis in many branches of engineering including the branches of hydrodynamics, thermodynamics, and particularly quantum mechanics.
CO3: compute the residue of a function and use the Residue theory to evaluate a contour integrals or an integral over the real line.

CO4: Formulate Solve/Classify the solutions of partial differential equations Identify linear and nonlinear PDE and solve nonlinear PDE by Charpit;s method.
CO5: Apply variables separable methods to solve boundary value problems. Find the solutions of one-dimensional wave equation, heat equation and Laplace equation.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	1	1	-	1	2	1	1	1	3	-	-
CO2	2	1	2	1	1	-	1	2	1	1	1	3	-	-
CO3	2	1	2	1	1	-	1	2	1	1	1	3	-	-
CO4	3	1	3	1	1	-	1	1	1	1	1	3	-	-
CO5	3	2	3	3	1	-	1	2	2	2	2	3	-	-

EC302C-Network Theory

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT-I

Network Theorems: Superposition Theorem– Reciprocity theorem -Thevenin's and Norton's Theorems – Maximum Power Transfer Theorem- Millman's Theorem —Tellegen's Theorem – Compensation Theorem - Application of these Theorems for D.C. circuits and sinusoidal steady state A.C. circuits, Introduction to ThreePhase Circuits.

UNIT-II

Resonance: Series and Parallel Resonance – Resonant frequency, Half power frequencies, bandwidth and Quality Factor.

Locus diagrams: Current locus diagrams of RL and RC series circuits and two branch parallel circuits.

UNIT-III

Transient Analysis: Time domain analysis of RL, RC, and RLC circuits for D.C. and sinusoidal excitations – Determination of initial conditions – Concept of time constant –Laplace transforms of signals and periodic functions and initial and final value theorems – Transient response of RL, RC, and RLC circuits using LaplaceTransform techniques.

UNIT-IV

Network Functions: One-port and Two-port networks – Driving point and transfer functions of networks – Properties of driving point and transfer functions – Concept of complex frequency, poles and zeros – Time domain response from pole-zero diagram – Restrictions on pole-zero locations.

UNIT-V

Two-port Network Parameters: Open circuit impedance and short circuit admittance parameters – Hybrid and inverse-hybrid parameters – Transmission and inverse transmission parameters – Inter relationships between parameter sets – Series, Parallel, and Cascade connection of two-ports – Conditions for reciprocity and symmetry of two-port networks. Terminated two-port networks – Image parameters.

Text/Reference Books:

1. Sudhakar and Shyammohan: Circuits and Networks: Analysis and Synthesis, 5th Edition, Tata McGraw-Hill
2. Ravish R. Singh: Network Analysis and Synthesis, Tata Mc. Graw Hill.
3. Abhijit Chakrabarti: Circuit Theory Analysis and Synthesis, 7th Revised Edition, Dhanpat Rai & Co
4. M. E. Van Valkenburg; “Network analysis”; Pearson Education, Third Revised Edition.

Course Outcomes:
At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
   Apply Laplace Transform for steady state and transient analysis. Determine different network functions.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	-	-	-	-	-	-	-	2
CO2	2	2	2	2	-	-	-	-	-	-	-	2
CO3	2	2	3	2	-	-	-	-	-	-	-	2
CO4	2	2	2	2	-	-	-	-	-	-	-	2

EC303C-Signals and Systems
(Common to EEE, ECE and CSE)

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT I

Introduction to Signals and Systems:

Definition and classification of signals and systems**,** Basic operations on signals, Elementary signals, Classification of Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time- Invariant Systems - Discrete-Time LTI Systems, Convolution Sum, Continuous-Time LTI Systems Convolution Integral. Causal LTI Systems Described by Differential and Difference Equations.

Signal Analysis:

Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT II

Fourier series and Fourier Transform:

Fourier series Representation of Continuous-Time Periodic Signals, Dirichlet's conditions, Properties of Continuous-Time Fourier Series. Trigonometric Fourier Series and Exponential Fourier Series with examples,Complex Fourier spectrum.

Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform ofPeriodic Signals, Properties of Continuous-Time Fourier Transform,
Magnitude-Phase responses, Parseval's theorem, Inverse Fourier transform.

Discrete-Time Fourier Transform – Properties, Inverse Discrete-time Fourier Transform. Introduction to Hilbert Transform.

UNIT III

Convolution and Correlation:

Continuous-time convolution, Convolution sum, Correlation between signals, Cross correlation, Autocorrelation, Properties, Energy spectral density, Power spectral density, Relation between convolution and correlation.

UNIT IV

Behavior of continuous time LTI systems:

Distortion less transmission through a system, signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Sampling:

Sampling Theorem, Reconstruction of a Signal from its Samples Using Interpolation, types of sampling-natural sampling, flat- top sampling and impulse sampling, Effect of under sampling - Aliasing.

UNIT V

System Analysis using Laplace and z -Transforms:

Laplace Transform - Region of Convergence – Relation between Laplace and Fourier Transform, Inverse Laplace Transform, Properties, Analysis and Characterization of LTI Systems Using Laplace Transform, Z- Transform -Region of Convergence - Properties, Inverse z-Transform, Analysis and Characterization of LTI Systems Using z-Transforms.

Reference Books:

1. Alan V. Oppenheim, Alan S. Willsky, & S. Hamid Nawab, "Signals and Systems," PearsonHigher Education, 2nd Ed., 1997.
2. J. G. Proakis and D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms, andApplications", Pearson, 2006.
3. Simon Haykin and B. Van Veen, "Signals & Systems," John Wiley and Sons, 2nd Edition, 2007.
4. B.P. Lathi, "Principles of LINEAR SYSTEMS and SIGNALS," Oxford Univ. Press, Second Edition,International version, 2009.
5. A. Anand Kumar, Signals & Systems, PHI, 2011.
6. H. P. Hsu, "Signals and systems", Schaum's series, McGraw Hill Education, 2010.
7. Luis F. Chaparro, "Signals and Systems using MATLAB," Academic Press, 2011.
8. C. L. Philips, J. M. Parr and Eve A. Riskin, "Signals, Systems and Transforms," Pearson Education, 4th Edition, 2008.

Course Outcomes: At the end of this course students will have the ability to

1. Differentiate between various types of signals and understand the implication of operations ofsignals
2. Understand and classify systems based on the impulse response behavior of both continuous-timeand discrete-time systems
3. Perform domain transformation from time to frequency and understand the energy distribution as afunction of frequency and also usefulness of convolution for analyzing the LTI systems and understand the concepts of power spectral density through correlation.
4. Solve differential and difference equations with initial conditions using Laplace and Z- transforms.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	3
CO2	-	1	-	-	-	2	-	-	-	-	-	-
CO3	-	2	2	-	-	-	-	-	-	-	2	2
CO4	-	2	-	-	-	-	-	-	-	-	-	2

EC304C-ElectroMagnetic Waves and Transmission Lines

Instruction: (Hours/Week) **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT-I

Electrostatic Fields: Coulomb's law, Electric field intensity, Electric fields due to continuous charge distributions, Electric flux density, Gauss's law, Applications of Gauss's law, Electric scalar potential, Relation between E and V, Energy stored in electrostatic field, Electrostatic Boundary conditions, Capacitances.

UNIT-II

Magnetostatic fields: Biot-Savart's law, Magnetic field intensity, Magnetic fields due to continuous current distributions, Magnetic flux density, Ampere's circuital law, Applications of Ampere's circuital law, Magnetic vector potential, Relation between B and A, Energy stored in Magnetostatic field, Magnetostatic Boundary conditions, Inductances.

UNIT-III

Time-Varying EM Fields: Faraday's Law, Transformer EMF, Displacement current, Maxwell's Equationsin Point Form and in Integral Form, Phasor notation for fields, Maxwell's Equations in time harmonic form.**Introduction to waves:** Uniform plane wave, Wave equations, Derivation for **γ,** solutions for free space- conditions, Derivation for **α** and **β,** Derivation for η,

UNIT-IV

EM waves in a homogeneous medium: Wave propagation in lossy dielectrics, Wave propagation in lossless dielectrics, Wave propagation in free space, Wave propagation in good conductors, Skin Depth, Skin Resistance, Polarization, Power, Poynting theorem and Poynting vector.
EM waves in a heterogeneous medium: Reflection of a plane wave at normal incidence: transmission coefficient, reflection coefficient, Reflection of a plane wave at oblique incidence: transmission coefficient,reflection coefficient and Brewster angle in both parallel and perpendicular polarizations.

UNIT-V

Transmission Lines: Transmission line parameters, Transmission line Equations, Input impedance,Reflection coefficient, VSWR and Power of Transmission line, Smith Chart.
Applications of transmission lines: Load matching measurement, Load impedance measurement.

Text/Reference Books:

1. Mathew N.O. Sadiku and S.V. Kulkarni, "Principles of Electromagnetics", Oxford University Press
2. William H. Hayt, John A. Buck, "Engineering Electromagnetics", 8th Edition, McGraw-Hill, 2010.
3. E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Prentice Hall, India
4. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India Education, 2008
5. David K. Cheng, Field and Wave Electromagnetics, Pearson, second edition.

Course Outcomes: At the end of this course students will have the ability to

1. Solve electric field intensity and electric flux density in Electrostatic fields.
2. Solve magnetic field intensity and magnetic flux density in Magnetostatic fields.
3. Analyze Maxwell's equations in static fields, time varying fields, time harmonic fields and studyUniform plane wave characteristics.
4. Compute reflection coefficient and transmission coefficient of waves at media interface.
5. Understand characteristics of high frequency transmission lines and its applications.

Mapping of course outcomes with program outcomes:

PO/ CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	-	-	2	-	-	-	-	-	3
CO2	3	-	3	-	-	2	-	-	-	-	-	3
CO3	3	-	3	-	-	2	-	-	-	-	-	3
CO4	3	-	3	-	-	2	-	-	-	-	-	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3

EC305C-Digital Logic Design

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT I
Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan'sTheorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, CodeConversion.

UNIT II
MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Halfand Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

UNIT III
Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM,Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudorandom Binary Sequence generator.

UNIT IV
Clock generation Logic Families and Semiconductor Memories: TTL NAND gate, Specifications,Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

UNIT V
VLSI Design flow: Design entry, Schematic, FSM & HDL, different modeling styles in VHDL, Datatypes and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Text / Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd Edition,2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

Course outcomes: At the end of this course students will demonstrate the ability to
1. Design and analyze combinational logic circuits.
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder.
3. Design & analyze synchronous sequential logic circuits.
4. Use HDL & appropriate EDA tools for digital logic design and simulation.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	-	-	-	-	1	2
CO2	3	3	2	2	-	1	-	-	-	-	1	2
CO3	3	3	2	2	-	1	-	-	-	-	1	2
CO4	3	3	2	2	-	1	-	-	-	-	1	1

EC306C-Analog Circuits

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT-I

General Amplifiers Characteristics: Concept of Amplifier, Voltage gain, Current gain, Power gain, Input and Output resistances, Conversion efficiency, Frequency response, Bandwidth, Distortion,

BJT Amplifiers: Small signal low frequency model of the transistor, Analysis of CE, CB and CC amplifiers,Approximate model analysis, Effects of coupling and bypass capacitors on low frequency response, Hybrid-Π model at high frequencies, Calculation of High-Frequency parameters in terms of Low Frequency parameters, CE short circuit gain, CE current gain with resistive load.

UNIT-II

FET Amplifiers: Small signal model, Analysis of CS, CD and CG amplifiers, comparison of performance of the three configurations, High frequency FET circuits, CS amplifier at high frequencies, CD amplifier athigh frequencies.

Multistage Amplifiers: Types of coupling, Choice of amplifier configuration, overall voltage gain and Bandwidth of n-stage amplifier, Darlington and Bootstrap circuits.

UNIT-III

Feedback amplifiers: Feedback concept, Classification, Effects of negative feedback on gain, Stability, Noise, Distortion, Bandwidth, input resistance and output resistance.

Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), Crystal oscillators.

UNIT-IV

Power Amplifiers: Series-Fed Class-A power amplifiers, Transformer coupled class-A power amplifiers, harmonic distortion, Push-pull amplifiers, Class-B amplifiers, Class-AB operation, Complementary symmetry Push-Pull class-B Power amplifiers, Cross-over distortion.

UNIT-V

Differential amplifier: Basic structure and principle of operation, calculation of differential gain, commonmode gain, CMRR, circuits to improve CMRR, transfer characteristics.

Operational Amplifier: Ideal op-amp characteristics, Op-amp internal circuit, examples of IC op-amps, DC and AC characteristics, Inverting and non-inverting modes of operation, voltage follower.

Text/Reference Books:

1. Millman and Halkias, “Integrated Electronics”, McGraw-Hill Co
2. Mottershed, “Electronic devices and circuits”, PHI
3. J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988.
4. Salivahanan, “Electronic Devices and circuits”, TMH.
5. David A. Bell, “Electronic Devices and circuits”, PHI
6. D.Roy Choudary, Shail Bala Jain, “Linear Integrated circuits”, New Age International publishers, 2018

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Design and analyze various amplifier circuits.
2. Design sinusoidal oscillators.
3. Understand the functioning of OP-AMP and design OP-AMP based circuits.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	-	-	-	-	1	2
CO2	3	3	2	2	-	1	-	-	-	-	1	2
CO3	3	3	2	2	-	1	-	-	-	-	1	2

EC309S- Entrepreneurship and Design Thinking

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT-I

Introduction to Entrepreneurship and Design Thinking

What is an idea, how to generate an idea, basic requirements to start an enterprise/start-up.
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

Activity: Form into groups and discuss about the requirements to start a business

UNIT-II

Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brain storming, product development

Activity: Every student presents their idea in three minutes, every student can present design process in the form of flow diagram/flow chart etc. Every student should explain about product development.

UNIT-III

Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT-IV

Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT-V

Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

Textbooks:

1. Change by design, Tim Brown, Harper Bollins (2009)
2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

Reference Books:

1. Design Thinking in the Classroom by David Lee, Ulysses press
2. Design the Future, by Shrrutin N Shetty, Norton Press
3. Universal principles of design- William lidwell, kritinaholden, Jill butter.
4. The era of open innovation – chesbrough.H

Course Outcomes: After completion of the course student will be able to:

1. Able to know the concepts related to Entrepreneurship & design thinking.
2. Explain the fundamentals of Design Thinking and innovation and will equip with design thinking techniques for solving problems in various sectors.
3. Analyse to work in a multidisciplinary environment and Evaluate the value of creativity
4. Formulate specific problem statements of real time issues

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	3	2	3	1	1	3	3	-	1	-
CO2	3	3	3	2	3	1	3	3	3	-	3	-
CO3	2	2	2	3	3	1	1	3	3	-	2	-
CO4	-	2	2	2	3	1	2	3	3	-	1	-

MC310A Constitution of India

Instruction: Hours/Week: **2L:0T:0P** **Credits: 0**
Evaluation Scheme: 100 Marks

UNIT-I

History of Making of the Indian Constitution:

History Drafting Committee, (Composition & Working)

Philosophy of the Indian Constitution:

PreambleSalient Features

UNIT-II

- **Contours of Constitutional Rights & Duties:**
- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT-III

- **Organs of Governance:**
- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges,

QualificationsPowers and Functions

UNIT-IV

- **Local Administration:**
- District's Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative, CEO of MunicipalCorporation.
- Pachayati raj: Introduction, PRI: Zila Pachayat.
- Elected officials and their roles, CEO Zila Pachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

UNIT-V

- **Election Commission:**

- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books/References:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes: At the end of this course students will demonstrate the ability to1 Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization ofsocial reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adultsuffrage in the Indian Constitution.Discuss the passage of the Hindu Code Bill of 1956.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	2	3		2	1	2	-	-
CO2	-	-	-	-	2	1	1	1	2	2	1	-
CO3	-	-	-	-	1	2	1	2	1	1	1	-

EC307L-Basic Electrical Engineering Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits: **1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

List of Experiments:

1. Basic safety precautions, Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope).
3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
4. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).
5. Loading of a transformer: measurement of primary and secondary voltages and currents, andpower.
6. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
7. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging
   - slip ring arrangement) and single-phase induction machine.
8. Torque Speed Characteristic of separately excited dc motor.
9. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super synchronous speed.
10. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
11. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the

use ofdc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

Course Outcomes: After completion of the course student will be able to:

CO1: Get an exposure to common electrical components and their ratings.
CO2: Make electrical connections by wires of appropriate ratings.
CO3: Understand the usage of common electrical measuring instruments.
CO4: Understand the basic characteristics of transformers and electrical machines.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	-	-	-	-	-	-	2
CO2	2	2	1	1	-	-	-	-	-	-	-	2
CO3	2	2	1	1	-	-	-	-	-	-	-	2
CO4	2	2	1	1	-	-	-	-	-	-	-	2

EC308L-Electronic Devices Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits: **1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

Hands-on experiments related to the course contents Electronic Devices LaboratoryList of Experiments:

1. P-N Junction Diode Characteristics
2. Zener Diode Characteristics
3. Half Wave Rectifiers (without and with filter)
4. Full Wave Rectifiers (without and with filter)
5. CB Characteristics
6. CE Characteristics
7. CC Characteristics
8. FET Characteristics
9. BJT Biasing
10. SCR Characteristics
11. UJT Characteristics
12. LDR characteristics
13. LED Characteristics
14. Photodiode characteristics
15. Phototransistor characteristics.

Some of the experiments can be done using any Simulation Software.

Prerequisites: None

Course Outcomes: After completion of the course student will be able to:

CO1: Plot the characteristics of electronic devices to understand their behaviour.

CO2: Design, construct and test amplifier circuits, Rectifiers, Special devices and interpret theresults.

CO3: Operate electronic test equipment using hardware/software tools to characterize the behaviourof devices and circuits.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	-	-	-	1	2	-	-	3	-
CO2	3	2	3	-	-	-	-	2	-	-	3	-
CO3	3	3	3	3	-	-	-	2	-	-	3	-

EC311L-Simulation Laboratory

Instruction: Hours/Week: **0L:0T:2P** Credits: **01**
Sessional Marks: **40** End Semester Examination Marks: **60**

- **All the experiments are to be simulated using MATLAB or equivalent software.**
- **Minimum of 12 - 15 experiments are to be completed.**

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as UnitImpulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting,Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts ofSignal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/DiscreteSystem.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI systemand verifying its physical realizability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phasespectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function and verify its stability.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Valueand its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem. Write a program to generate discrete time sequenceby sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
15. Write a program to find autocorrelation and cross correlation of given

sequences. Removal of noise by Autocorrelation / Cross correlation.

16. Write a program to verify Linearity and Time Invariance properties of a givenContinuous/Discrete System
17. Extraction of Periodic Signal masked by noise using Correlation.
18. Write a program to find magnitude and phase response of first order low pass and highpass filter. Plot the responses in logarithmic scale.
19. Write a program to find response of a low pass filter and high pass filter, when a speechsignal is passed through these filters.
20. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
21. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the samefor a time period of 0.2 sec.

Prerequisites: None

Course Outcomes: After completion of the course student will be able to:

CO1: Learn how to use the MATLAB software and know syntax of MATLAB programming.CO2: Understand how to simulate different types of signals and system response.
CO3: Find the Fourier Transform of a given signal and plot amplitude and phasecharacteristics.
CO4: Analyze the response of different systems when they are excited by different signalsand plot power spectral density of signals

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	-	-	-	1	2	-	-	3	-
CO2	3	2	3	-	-	-	-	2	-	-	3	-
CO3	3	3	3	3	-	-	-	2	-	-	3	-
CO4	3	3	3	3	-	-	-	2	-	-	3	-

EC401C-Linear Control Systems

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Unit-I

Introduction to control problem:

Industrial Control examples, System Representation, Classification of systems, Feedback Control, Benefits of Feedback- Open-Loop and Closed-loop systems, Advantages and Disadvantages of control systems, Industrial Control examples.

Mathematical models of physical systems: Electrical, Mechanical and Electro-Mechanical, Transfer function models of linear time-invariant systems: Potentiometers, Synchros, LVDT, dc and ac servomotors, Tacho- generators, electro hydraulic valves, hydraulic servomotors, electro pneumatic valves, pneumatic actuators. Closed-loop systems, Block diagram algebra, Reduction techniques and Signal flow graph.

Unit-II

Time Response Analysis:

Standard test signals, Time response of first and second order systems for standard test inputs. Application of initial and final value theorem. Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness. Design specifications for second-order systems based on the time-response, Steadystate errors and error constants, Performance specifications in time-domain error, Static and Generalized error constants, Concept of stability, Routh-Hurwitz Criteria, Relative Stability analysis, Root-Locus technique, Construction of Root-loci.

Unit-III

Frequency-response analysis:

Introduction to Frequency domain specifications -Relationship between time and frequency response, Polar plots, Bode plot, stability in frequency domain, Nyquist plots. Nyquist stability criterion. Relative stability usingNyquist criterion – gain and phase margin. Performance specifications in frequency-domain, Frequency domainmethods of design.

Unit-IV

Introduction to Controller Design:

Compensation & their realization in time & frequency domain, Introduction to controllers (PI, PD, PID), Application of Proportional, Integral and Derivative Controllers, Need for Lead and Lag compensators, Applications of compensators, Comparison of controllers and compensators, Problems.

Unit-V

State variable Analysis:

Concepts of state, state variables, State space model for linear continuous time functions, Diagonalization of

State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability andobservability.

Text/Reference Books:

1. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 1997.
2. B. C. Kuo, "Automatic Control System", Prentice Hall, Seventh edition, 1995.
3. K. Ogata, "Modern Control Engineering", Prentice Hall, second edition, 1991.
4. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009K. L. Chung.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Identify the various control system components and their representations.
2. Analyze the various time domain parameters.
3. Analysis the various frequency response plots and its system.
4. Apply the concepts of various system stability criterions and design various transfer functions of digitalcontrol system using state variable models.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	-	-	-	-	-	-	-	2
CO2	2	2	2	2	-	-	-	-	-	-	-	2
CO3	3	2	2	2	-	-	-	-	-	-	-	2
CO4	2	1	2	2	-	-	-	-	-	-	-	2

EC402C-Probability Theory and Stochastic Processes

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT-I

Probability: Sets and set operations, Probability space, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Joint Probability, Conditional probability, Total Probability, and Bayestheorem, Combinatorial probability and sampling models.

Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete random variables, probability mass function, probability distribution function, example random variables and distributions. Continuous random variables, probability density function, probability distribution function, Properties, Mixed Random Variable, example distributions - Binomial, Poisson, Uniform, Gaussian, Exponential, Raleigh etc.

UNIT-II

Multiple Random Variables: Vector Random Variables, Joint distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, functions of one and two random variables, Conditional Distribution and Density, Methods of defining Conditioning Event, Conditional Density, Properties. Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Markov, Chebyshev and Chernoff bounds.

UNIT-III

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, momentsof random variable, Characteristic functions of a random variable, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions and Joint Gaussian Random Variables. Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square), Limit theorems: Strong and weak laws of large numbers, Central Limit Theorem, (Proof not expected), Unequal Distribution, Equal Distributions. Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV

Random Process– Temporal Characteristics: The Random Process Concept, Classification of Processes,Stationary processes, First-Order Stationery Processes, Second- Order and Wide-Sense Stationarity, (N- Order) and Strict-Sense Stationarity, Mean and covariance functions, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function & Its Properties, Cross- Correlation Function & its Properties, Covariance Functions, Gaussian Random Processes, Poisson RandomProcess.

Random Processes – Spectral Characteristics: Power spectral density, Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT-V

Transmission of random process through LTI systems: System Response, Convolution, Mean and Mean- squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, properties of white noise, Band pass, Band-Limited and Narrowband Processes, Properties.

Text / Reference Books:

1. H. Stark and J. Woods, Probability and Random Processes with Applications to Signal Processing, 3rdEdition, Pearson Education.
2. Peyton Z. Peebles, Probability, Random Variables & Random Signal Principles, Tata McGraw Hill, 4thEdition, 2001.
3. Athanasios Papoulis and S. Unnikrishnan Pillai, Probability, Random Variables and StochasticProcesses, PHI, 4th Edition, 2002.
4. Hisashi Kobayashi, Brian L. Mark and William Turin, Probability, Random Processes, and StatisticalAnalysis, Cambridge University Press, 2012.
5. John J. Shynk, Probability, Random Variables, and Random Processes Theory and Signal ProcessingApplications, John Wiley & Sons, Inc., Hoboken, New Jersey, 2013, ISBN: 978-0-470-24209-4.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Understand representation of random signals.
2. Obtain Distribution function, Density functions, and Conditional density functions for different Randomvariables.
3. Make use of theorems related to random signals.
4. Investigate temporal and spectral characteristics of random processes.
5. Able to Model of different Noise Sources and understand propagation of random signals in LTI systems.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	-	-	-	3	-	-	2
CO2	3	3	2	2	1	-	-	-	3	-	-	2
CO3	2	2	2	2	2	-	-	-	3	-	-	2
CO4	3	2	3	3	2	-	-	-	3	-	-	1
CO5	3	3	3	2	3	-	-	-	3	-	-	2

HS403C-Managerial Economics and Accountancy

Instruction: Hours/Week: 3**L:0T:0P** Credits**: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT – I

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR,NPV, IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage,Income tax leverage.

UNIT – II

Depreciation and methods of calculating depreciation (straight line, sum of the years digit method, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

UNIT – III

Inflation: Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

UNIT – IV

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

UNIT – V

Cost Accounting: Introduction, Classification of costs, Methods of costing, Techniques of costing, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

Text/ Reference Books:

1. Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw HillEducation, 1996.
2. Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
3. A.N. Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
4. Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
5. Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition, Vikas Publication, 2012.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Understand Macro Economic environment of the business and its impact onenterprise.
2. Identify various cost elements of the product and its effect on decision making.
3. Understand the concepts of financial management and smart investment.
4. Prepare the Accounting records and interpret the data for Managerial Decisions.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-		2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-
CO3	-	1	-	-	-	-	-	-	-	-	3	-
CO4	2	-	-	-	-	-	-	-	-	-	3	-

EC404C-IC Applications

Instruction: Hours/Week: 3**L:0T:0P** Credits**: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT – I

Op-Amp Applications: Scale changer/inverter, Summing amplifier, Instrumentation amplifier, Instrumentationamplifier IC-AD620, DC and AC amplifiers, V to I and I to V converters, Precision rectifiers, Log and Antilog amplifiers, multiplier and divider, Analog multiplier IC-AD633, Differentiator, Integrator, Analog computation.

UNIT – II

Comparators and waveform generators: Comparator, Regenerative comparator (Schmitt Trigger), Astable and mono-stable multi-vibrators using op-amp, Triangular wave generator, Sine wave generators using op-amp. ICwaveform generator (8038).

UNIT – III

Voltage regulators: Series op-amp regulator, IC voltage regulators, 723 General purpose regulator, Switching regulators. Active filters: Low pass, high pass, band pass, band reject and all pass filters, transformation, State variable filter, Switched capacitor filters, Switched capacitor filter ICs.

UNIT – IV

555 Timer: Description of functional diagram, Monostable operation. Applications in monostable mode, Astable operation, Applications in astable mode, Schmitt trigger. Phase Locked Loops: PLL-introduction, block schematic, principles and description individual blocks, IC PLL (565), Voltage controlled oscillator (566), PLLapplications- Frequency multiplication, Frequency translation, FM & FSK demodulation.

UNIT – V

D-A and A-D Converters: Basic DAC Techniques, Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R ladder, Monolithic DAC IC-1409, A-D converters, direct type ADCs, the parallel comparator(flash) A/D converter, The counter type A/D converter, Servo tracking A/D converter, Successive approximation converter,Integrating type of ADCs, Charge balancing ADC, Dual-slope ADC, DAC/ADC specifications.

Text/ Reference Books:

1. D.Roy Choudary, Shail Bala Jain, “Linear Integrated circuits”, New Age International publishers, 2018.
2. Ramakant A.Gayakward, “Op-amps and linear Integrated circuits”, LPE, 4th edition, PearsonEducation.
3. S.Salivahanan, V.S.Kanchana Bhaaskaran “Linear Integrated circuits”, TMH, 2008.
4. David A. Bell, “Operational amplifiers and Linear ICs”, PHI, EEE, 1997.
5. 5. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Understand the functioning of OP-AMP and design OP-AMP based circuits.
2. Understand the functioning of voltage regulators and design IC based voltage regulators,
3. Understand the functioning of 555 timer and design 555 timer-based circuits.
4. Understand the functioning of PLL and design PLL based circuits.
5. Design ADC and DAC circuits

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	-	-	-	-	1	2
CO2	3	3	2	2	-	1	-	-	-	-	1	2
CO3	3	3	2	2	-	1	-	-	-	-	1	2
CO4	3	3	2	2	-	1	-	-	-	-	1	1
CO5	3	3	2	2	-	1	-	-	-	-	1	1

EC405C-Analog Communications

Instruction: (Hours/Week) **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Unit – I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generationof SSB signals, Vestigial sideband (VSB) modulator & demodulator, Frequency division multiplexing (FDM),Illustrative Problems.

UNIT-II

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation- Frequency Modulation & Phase modulation : Bandwidth of angle modulated waves, Narrow bandfrequency modulation (NBFM) and Wide band FM (WBFM), Verification of Frequency modulation bandwidthrelationship, Features of angle modulation, Generation of FM waves-Indirect method, Direct generation; Demodulation of FM, Band pass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis,& De-emphasis filters, FM Capture Effect, Illustrative Problems.

UNIT-III

Noise in Communication Systems: Thermal noise, Time domain representation of narrowband noise, filteredwhite noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noisefigure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

UNIT-IV

Radio Receivers: Working principle of Super heterodyne AM and FM Receivers along with suitable block diagrams, Sensitivity, Selectivity and fidelity.

Analog Pulse Modulation Schemes: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, PPM spectral analysis, Illustrative Problems.

UNIT-V

Information Theory: Introduction, Information and Entropy, and its properties, source coding Theorem, DataCompaction – Prefix coding, Huffman coding, Discrete Memory less channels, Mutual Information, and its properties, Channel capacity, Channel coding Theorem, Application to

binary symmetric channels, differential entropy and mutual information, Information capacity

theorem, implication of information capacity theorem, Rate Distortion, Illustrative problems

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Text Books:

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. Simon Haykin, "Communication Systems," by John Wiley & Sons,3rdEdition, 2010.
3. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.

REFERENCES:

1. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise inElectrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Herbert Taub&Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rdEdition, 2009.
3. R.E. Ziemer& W.H. Tranter, "Principles of Communication-Systems Modulation & Noise", JaicoPublishing House, 5thedition, 2001.
4. George Kennedy and Bernard Davis, "Electronics & Communication System", TMH,2004.

Course Outcomes: At the end of this course students will have the ability to

CO1: Understand the concepts of various Amplitude, Angle and Pulse Modulation schemes. Understand theconcepts of information theory with random processes. (L1)

CO2: Apply the concepts to solve problems in analog and pulse modulation schemes. (L2)

CO3: Analysis of analog communication system in the presence of noise. (L3)

CO4: Compare and contrast design issues, advantages, disadvantages and limitations of various modulationschemes in analog communication systems. (L4)

CO5: Solve basic communication problems & calculate information rate and channel capacity of a discretecommunication channel. (L5)

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	_	1	1	_	_	_	_	_	1
CO2	2	2	1	_	1	1	_	_	_	_	_	1
CO3	2	2	1	_	1	1	_	_	_	_	_	1
CO4	2	2	1	_	1	1	_	_	_	_	_	-

EC409S- Python Programming

Instruction: (Hours/Week) **1L:0T:2P** Credits: **2**
Evaluation Scheme: **100 Marks**

Unit – I

Introduction to Python Programming Language

Introduction to Python Language: What is Python? Why Python? Installing Python on Windows, Python IDLE,Python Literals, Python Data Types Basic Input-Output operations, Operators in Python, Decision making in Python, Conditional execution in Python, Logical and bit operations in Python, Naming Conventions, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Data type conversion, Built in Functions.

UNIT-II

Python Built-in Data Structures

Introduction, List, Tuples, Dictionary, Sets, List Operations append, extend, insert, remove, pop, slice, andreverse, List Comprehension, Dictionary operations, Sorting Dictionaries, Copying Collections, Set operations. Standard python modules math, time, IO and time, Regular expressions, multi-threading.

UNIT-III

Classes & Objects

Classes in Python, Principles of Object-Oriented programming, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, CustomException Classes.

UNIT-IV

Functions, I/O, Exception Handling in Python

Introduction: Defining your own functions, keyword and optional parameters, mapping functions, lambda functions, ·Data Streams · Creating Your Own Data Streams · Access Modes · Writing Data to a File · Reading Data from a File · Additional File Methods · Using Pipes as Data Streams · Handling IO Exceptions ·Working with Directories · Metadata · Errors · Run Time Errors · The Exception Model · Exception Hierarchy
· Handling Multiple Exceptions.

UNIT-V

Python API development.

Introduction to API, Python API programming, Python web application frameworks, REST API, Python Flask,Flask Environment, Routing, Cookies, Sessions, Running Flask Application, Testing API with POSTMAN client

Text Books:

1. Introduction to Computation and Programming using Python, by John Guttag, PHI Publisher,Revised and Expanded version (Referred by MIT)
2. Python Programming using problem solving Approach by Reema Thareja, Oxford University, HigherEducation Oxford University Press; First edition (10 June 2017), ISBN-10: 0199480173
3. Data Structures and Algorithms in Python by Michael T Goodrich and Robertto Thamassia, MichealS Goldwasser, Wiley Publisher (2016)
4. Fundamentals of Python first Programmes by Kenneth A Lambert, Copyrighted material CourseTechnology Inc. 1 st edition (6th February 2009)

REFERENCES:

1. Dive into Python, Mike 2. Learning Python, 4th Edition by Mark Lutz 3. Programming Python, 4th Edition by Mark L
2. Fundamentals of Python Programming, Richard L. Halterman Updated content of the book ismaintained under the URL:http://python.cs.southern.edu/pythonbook/pythonbook.pdf
3. The official Python Tutorial. http://docs.python.org/tut/ How to think like a computer scientist(interactive) http://interactivepython.org/runestone/static/thinkcspy/index.html
4. How to think like a computer scientist http://openbookproject.net/thinkcs/python/english3e/
5. Code Academy Python http://www.codecademy.com/tracks/python
6. A useful hands-on book: http://anh.cs.luc.edu/python/hands-on/3.1/Hands-onPythonTutorial.pdf

Course Outcomes: At the end of this course students will have the ability to

1. Apply the OOP principles and best practices of python programming.
2. Write clear and effective pythonic code.
3. Create applications using python programming.
4. Implementing databases using SQLite and Access databases using python programming.
5. Understand and feel comfortable in working with web application frameworks.
6. Develop APIs required for the web applications using web frameworks like Flask and Fast API.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

EC406L-Digital Logic Design Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits: **1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

LIST OF EXPERIMENTS

1. Realization of Boolean Expressions using Gates
2. Design and realization of logic gates using universal gates
3. Design and realization of a 4 – bit Gray to Binary and Binary to Gray Converter
4. Verify the functionality of Mux and Decoder ICs
5. Design and realization of 4-bit comparator
6. Verify the functionality of Flip-Flop ICs
7. Mod-N counter using 7490 and 74190.
8. Shift register IC 7495.

Note: Implement using digital ICs.VHDL Programming:

1. Write structural and dataflow VHDL models for
   a) 4-bit ripple carry adder. b) 4-bit carry Adder – cum Subtractor.
   c) 2-digit BCD adder /subtractor d) 4-bit carry look ahead adder e) 8-bit comparator

2. Write a VHDL program in structural model for
   a) 16:1 mux realization b) 3:8 decoder realization through 2:4 decoder
3. Write a VHDL program in behavioral model for
   a) 16:1 mux b) 3:8 decoder c) 8:3 encoder d) 8 bit parity generator and checker

4. Write a VHDL program in structural and behavioral models for
   a) 8 bit asynchronous up-down counter b) 8 bit synchronous up-down counter

5. Write a VHDL program for 4-bit sequence detector through Mealy and Moore state machines.

6. Write a VHDL program in behavioral model for 8-bit shift and add multiplier.

7. Write a VHDL program in structural model for 8-bit Universal Shift Register.

Some of the experiments can be done using any Simulation Software.

Course Outcomes: At the end of this course students will have the ability to

1. Construct Basic combinational Circuits and Verification of its functionality
2. Construct Sequential Circuits and Verification of its functionality
3. Write structural, behavioral and data flow models for digital circuits
4. Simulate VHDL models of digital circuits

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	-	-	-	-	1	2
CO2	3	3	2	2	-	1	-	-	-	-	1	2
CO3	3	3	2	2	-	1	-	-	-	-	1	2
CO4	3	3	2	2	-	1	-	-	-	-	1	1

EC407L-Analog Circuits Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits**: 1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

Hands-on experiments related to the course contents Analog Circuits.
Prerequisites: Electronic Devices Laboratory.

Course Outcomes:

After completion of the course student will be able to:

List of Experiments:

1. Common Emitter Amplifier.

2. Common Collector amplifier

3. Two Stage RC coupled amplifier

4. Voltage series feedback amplifier

5. Voltage shunt feedback amplifier

6. Current series feedback amplifier

7. Current shunt feedback amplifier

8. RC phase shift oscillator

9. Wien bridge oscillator

10. LC/ crystal oscillator.

11.Class A Power Amplifier (Transformer

less) 12.Class B Complementary Symmetry

Amplifier12.Differential amplifier

13.Operational amplifier as (i) Inverting amplifies, (ii) Non-Inverting amplifier (III) Voltagefollower

Some of the experiments can be done using any Simulation Software.

Course Outcomes:
At the end of this course students will have the ability to

1. Know about the usage of equipment/components/software tools used to conduct the experiments in analog circuits.
2. Conduct the experiment based on the knowledge acquired in the theory about various analogcircuits using BJT/MOSFETs to find the important parameters of the circuit (viz. Voltage gain, Current gain, bandwidth, input and output impedances etc) experimentally.
3. Analyze the given analog circuit to find required important metrics of it theoretically and Compare the experimental results with that of theoretical ones and infer the conclusions.
4. Draw the relevant graphs between important metrics of the system from the observed measurements.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	-	-	-	-	1	2
CO2	3	3	2	2	-	1	-	-	-	-	1	2
CO3	3	3	2	2	-	1	-	-	-	-	1	2
CO4	3	3	2	2	-	1	-	-	-	-	1	2

EC408L-IC Applications Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits**: 1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

Hands-on experiments related to the course contents

EC408L.List of Experiments:

1. Study and Operation of IC testers, pulse generator and digital trainer.
2. Frequency response of inverting and non-inverting amplifier.
3. Measurement of Op.amp parameters: (i) Offset voltage (ii) Offset current (iii) CMRR and (iv)Slew rate
4. Op-amp monostable and astable multivibrators.
5. Design 2's complement adder/subtractor using IC74283 and verify experimentally.
6. Low voltage regulator IC 723.
7. 555 timer: Monostable and astable multivibrators.
8. IC PLL (565) applications- Frequency multiplication, Frequency translation, FM & FSKdemodulation.
9. Voltage controlled oscillator (566)

Course Outcomes: After the completion of the course the student will be able to

1. Measure the parameters of IC 741 Op-amp.
2. Design applications of IC 741 Op-amp
3. Realize analog filters using Op-amp.
4. Design multivibrators using 555 IC.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	-	-	-	-	1	2
CO2	3	3	2	2	-	1	-	-	-	-	1	2
CO3	3	3	2	2	-	1	-	-	-	-	1	2
CO4	3	3	2	2	-	1	-	-	-	-	1	1

THIRD YEAR SYLLABUS

EC501C- Computer Organization & Architecture

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview: It is important to understand Computer Architecture in order to structure a program so that it runs efficiently on a real machine. When selecting a system to use, it is important to understand the tradeoff among various components, so you can accurately compare competing systems, and understand technical literature on new computer systems. This course will cover the basic concepts of Computer organization and its Architecture that are important for you to understand, including the CPU control and data-path, memory systems including caching and virtual memory, and input/output subsystems.

Prerequisite Courses: Digital Logic Design

Course Objectives: The purpose of the course is

1. To understand the structure of a computer and its operations.
2. To understand the RTL and Micro-level operations and control in a computer.
3. Understanding the concepts of computer arithmetic, instruction set design, micro-programmed control unit, pipelining and vector processing, I/O Systems and memory organization, and operating systems.

UNIT - I:

Basic Structure of Computers: Computer Types, Functional Unit, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, Fixed Point Representation, Floating – Point Representation.

Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit, Instruction Codes, Computer Registers Computer Instructions – Instruction Cycle, Memory – Reference Instructions, Input – Output and Interrupt, STACK Organization, Instruction Formats, Addressing Modes, DATA Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT - II:

Micro Programmed Control: Control Memory, Address Sequencing, Microprogram Examples, Design of Control Unit, Hard Wired Control, Microprogrammed Control.

The Memory System: Basic Concepts of Semiconductor RAM Memories, Read-Only Memories, Cache Memories Performance Considerations, Virtual Memories Secondary Storage, Introduction to RAID.

UNIT - III:

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input –Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE 1394.

UNIT - IV:

Operating Systems Overview: Overview of Computer Operating Systems Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures-Operating System Services and Systems Calls, System Programs, Operating Systems Generation.

Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of The Page Table, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Allocation of Frames, Thrashing Case Studies - UNIX, Linux, Windows.

Principles of Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

UNIT - V:

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection.

File System Implementation: File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management.

Text Books:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.
2. Computer Systems Architecture – M. Moris Mano, IIIrd Edition, Pearson
3. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 8th Edition, John Wiley.

References:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI
3. Fundamentals of Computer Organization and Design - Sivaraama Dandamudi Springer Int. Edition.
4. Operating Systems – Internals and Design Principles, Stallings, sixth Edition–2009, Pearson Education.
5. Modern Operating Systems, Andrew S Tanenbaum 2nd Edition, PHI.

Course Outcomes: After the completion of the course the student will be able to:

1. Visualize the organization of different blocks in a computer.
2. Use micro-level operations to control different units in a computer.
3. Have knowledge about the organization of Arithmetic and Logical unit and I/O unit.
4. Understand the design of Memory unit, and the overview of computer system hardware and learn about major activities of an Operating systems in a computer with regard to file management, and operating system functions.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2	1	1	1	-	-	-	1	-	-	2	-	-
CO2	3	3	2	2	1	-	-	-	1	-	-	2	-	-
CO3	2	2	2	2	1	-	-	-	1	-	-	2	1	-
CO4	3	2	3	3	1	-	-	-	1	-	-	1	-	-

EC502C Microprocessors and Microcontrollers

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview: The purpose of this course is to teach students the fundamentals of Microprocessor and Microcontroller systems. The student will be able to incorporate these concepts into their electronic designs for other courses where control can be achieved via a Microprocessor / Microcontroller implementation.

This course will start with a discussion on a simple microprocessor, 8085. Understanding this architecture is the basis to follow any other complex CPU architecture. It will be followed by a complete overview of a range of microcontrollers covering 8051, PIC, AVR and ARM. The hardware intricacies of these processors and their programming will be covered.

Pre-requisite Courses: Digital Logic Design, Analog Circuits.

Course Objectives: The purpose of the course is

1. To familiarize the Architecture, Instructions and Timings of microprocessors and micro controllers.
2. To introduce 8051 architecture and programming of microcontrollers.
3. To provide the knowledge about interfacing techniques of I/O and memory.
4. To understand the concepts of ARM architecture and Advanced ARM processors.

Unit -I

Overview of microcomputer systems and their building blocks, Introduction to 8-bit microprocessor (8085) Architecture, addressing modes, Instruction set, Machine cycles, instruction cycle and timing states, instruction timing diagrams, simple programs in 8085.

Unit -II

Semiconductor memories: RAM, ROM, SRAM, and DRAM. Memory interfacing, concepts of interrupts and Direct Memory Access.

8086 microprocessor – Architecture, Instruction set, Addressing modes, Interrupt system. Minimum mode 8086 system, Maximum mode 8086 system and timing diagrams. Concepts of virtual memory, Cache memory, Architectures of 286, and 386 processors.

Unit -III

8051 Microcontroller: Architecture, register set, addressing modes, Instruction set, Interrupt structure, I/O ports functions, timer and serial port operations, External memory interfacing with 8051.
Assembly language programming of 8051, Parallel I/O Ports, Interrupts, Timer and Counter, Serial Communication Programming.

Unit -IV

I/O interfacing: LED, LCD, Keyboard, Stepper motor, DC Motor, ADC, DAC Interface to 8051. Assemblers and compilers, C language programs, Programming and debugging tools.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, Onboard communication interfaces - I2C, SPI, and CAN; External communication interfaces - 9-pin RS-232, USB, Bluetooth, Wi-Fi, and ZigBee. Architectures of PIC, Architecture of AVR.

Unit -V

ARM 32-bit Microcontroller: Thumb-2 technology and applications of ARM, Architecture of ARM Cortex M3, Various Units in the architecture, debugging support, General Purpose Registers, Special Registers, exceptions, interrupts, stack operation, reset sequence. (Text 5: Ch 1, 2, 3)

Text/Reference Books:

1. R. S. Gaonkar, Microprocessor Architecture: Programming and Applications with the 8085/8080A, Penram International Publishing, 1996. (UNIT I).
2. D A Patterson and J H Hennessy, "Computer Organization and Design The hardware and software interface", Morgan Kaufman Publishers. (UNIT II).
3. Barry B. Brey, The Intel Microprocessors 8086/8088, 80, 86, 80286, 80386 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming and interfacing, Prentice Hall of India Private Limited, New Delhi, 2003, Pearson Education, 2004. (UNIT II).
4. Kenneth J. Ayala, "The 8051 Microcontroller Architecture, Programming and Applications", Penram International Publishing/ Thomson Publishers, 2nd Edition, 2005.
5. Joseph Yiu, The Definitive Guide to the ARM Cortex-M3‖, 2nd Edition, Newnes, (Elsevier), 2010. (UNIT V).

Course Outcomes: Upon completing this course, the student will have the ability to:

1. Do assembly language programming.
2. Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc and develop systems using different microcontrollers.
3. Understand the usage of Communication interfaces with Microcontrollers.
4. Understand design ARM / PIC Microcontroller-based systems.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	**3**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**3**	**-**	**-**	**2**	**-**	**-**
CO2	**3**	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**3**	**-**	**-**	**2**	**1**	**-**
CO3	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**3**	**-**	**-**	**2**	**-**	**-**
CO4	**3**	**2**	**3**	**3**	**2**	**-**	**-**	**-**	**3**	**-**	**-**	**1**	**-**	**1**

EC503C-Digital Signal Processing

Instruction : Hours/Week : **3L:0T:0P** **Credits: 3**

Sessional Marks : **40** End Semester Examination Marks: **60**

Course Description:

The course covers theory and methods for digital signal processing including basic principles governing the analysis and design of discrete-time systems as signal processing devices. Analyze the digital signals using various digital transforms DFT,FFT etc. Review of discrete-time linear, time-invariant systems, Fourier transforms and z-transforms. Introduction to Multirate signal processing, TMS DSP processors.

Course Learning Objectives:

1. To describe signals mathematically and understand how to perform mathematical operations on signals.
2. It will provide knowledge of Digital filter.
3. Design and develop the basic digital system.
4. To discuss multi rate signal processing and applications.
5. Knowledge on TMS DSP processors and their applications.

Unit -1

Discrete Fourier Transform:

Review of Discrete-time Fourier Transform, Z-Transform, Discrete Fourier transform – Properties, linear convolution, circular convolution of sequences using DFT. Computation of DFT.

Fast Fourier Transforms: Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N.

Unit-2

IIR Digital Filters: Analog filter approximations-Butterworth and Chebyshev, design of IIR digital filters from analog filters, design examples: analog-digital transformations. Realization structures for IIR filters – direct, canonic, cascade, parallel forms.

Unit-3

FIR Digital Filters: Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques, frequency sampling technique. Realization structures of FIR Filter - Transversal, Poly-phase and Linear phase structures. comparison of IIR and FIR filters.

Unit -4

Multirate Digital Signal Processing Fundamentals: Basic sample rate alteration devices, Multirate Structures for sampling rate Converters, Multistage design of decimator and Interpolator, Polyphase Decomposition.

Unit -5

DSP PROCESSORS:

Architecture of TMS320C5X: Introduction, Bus structure, Central Arithmetic Logic Unit, Auxiliary Register ALU, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped Registers, Program controller, some flags in the status registers, On-chip memory, On-chip peripherals.

Text Books

1. John G. Proakis, Dimitris G.Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications", Pearson Education/PHI, 4th ed., 2007.
2. Sanjit K Mitra, "Digital Signal Processing: A computer-based approach", Tata Mcgraw Hill, 3rd edition, 2009.
3. A.V. Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing", Prentice Hall of India.
4. B. Venkataramani, M.Bhaskar, Digital Signal Processors: Architecture, Programming and Applications, Tata McGraw Hill, 2002.
5. Handouts on DSP Processors.
6. Texas Instruments DSP Processor user manuals and application notes

Course Outcomes:

Students must be able to:

CO1: Apply DFT for the analysis of digital signals and systems
CO2: Design IIR and FIR filters
CO3: Design the Multirate Filters
CO4: Analyze and apply suitable DSP algorithm for specific application

Mapping of course outcomes with the program objectives:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	-	3	2	-	-	-	-	-	-	2	**3**	**-**	1
CO2	-	3	3	-	-	-	-	-	-	-	3	**2**	**-**	1
CO3	2	-	2	2	-	-	-	-	-	-	2	**-**	**-**	**-**
CO4	2	-	2	2	-	3	2	2	-	-	3	**-**	**-**	**-**

EC504C- Antennas & Wave Propagation

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Pre-requisite: Electromagnetic Theory and Transmission Lines .

Course Description: Antennas and propagation effects play a crucial role in RF systems. In practice, the design of a working system such as mobile phone networks, WIFI, RFID, Satellite communication and GPS requires a good understanding of these components. This course teaches the fundamentals of antenna and propagation and shows the application in practical examples. The course covers the theory of radiation, fundamental antenna parameters and concepts, wire antennas such as dipoles and loop antennas, antenna arrays, aperture antennas, microstrip antennas, numerical analysis, communication & radar systems and propagation effects.

Course Objectives: The course objectives are:

1. To understand the concept of radiation, antenna definitions and significance of antenna parameters, to derive and analyze the radiation characteristics of thin wire dipole antennas and solve numerical problems.
2. To analyse the characteristics and design relations of UHF, VHF and Microwave Antennas.
3. To identify the antenna array requirements, to determine the characteristics of ULAs and estimate the patterns of BSA, EFA, and Binomial Arrays.
4. To understand the concepts and set-up requirements for microwave measurements, and familiarize with the procedure to enable antenna measurements.
5. To define and distinguish between different phenomenon of wave propagation (ground wave, space wave and sky wave), their frequency dependence, and estimate their characteristics, identifying their profiles and parameters involved.

UNIT-I

Antenna Basics: Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height. Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Antenna Theorems, Radiation ,Retarded Potentials– HelmholtzTheorem

Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height, Natural Current Distributions, Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths. Loop Antennas.

UNIT-II

Antenna Arrays: Point Sources – Definition, Patterns, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End fire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays.

UNIT-III

VHF, UHF and Microwave Antennas - I: Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns.

UNIT-IV

VHF, UHF and Microwave Antennas - II: Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Reflector Antennas – Introduction, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features.

UNIT-V

Ground Wave Propagation –Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections. Space Wave Propagation –Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering phenomena, Troposphere Propagation. Sky Wave Propagation –Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance, Multi-hop Propagation.

Text/Reference Books:

1. Antennas and Wave Propagation – J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, TMH, New Delhi, 4th ed., (Special Indian Edition), 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd edition,2000.
3. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd Ed., 2005.
4.. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.

Course outcomes: At the end of this course students will have the ability to

CO1: Understand the basic parameters of antenna (L1) and apply the concepts to various antennas based on frequency, configuration and establish the radiation patterns of antenna arrays (L2)
CO2: Analysis of VHF, UHF and Microwave Antennas (L3)
CO3: Design and analysis of microstrip antennas (L4)
CO4: To understand the wave propagation in different frequency ranges (L5)

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2	1	-	1	-	2	1	2	1	3	3	-	-
CO2	3	3	2	2	1	2	3	2	2	1	3	3	-	1
CO3	3	2	2	2	1	2	3	1	1	1	2	3	-	1
CO4	3	3	2	3	2	2	3	-	1	1	2	3	-	1

EC504C -DIGITAL COMMUNICATIONS

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

Digital Communications is a fundamental course in the stream of Electronics and Communication Engineering. This course introduces the basic concepts and principles involving in the analysis of a digital communication system including various Modulation techniques, concepts involved at the Matched filter, ISI, Signal space analysis, various digital modulation techniques and error detection and correction methods. All modern communication systems uses these concepts as fundamentals to design, operate the same. This course helps students comprehend respective Engineering competitive examinations such as GATE, IES etc.,

Course Objectives:

1. To understand the key modules of digital communication systems with emphasis on its modulation techniques
2. To analyze Matched filter, Inter-symbol interference, correlative level coding concepts
3. To understand signal space analysis to understand geometric representation of signals
4. To Understand generation and detection of various digital modulation schemes
5. To get introduced to the concept and basics of information theory and Error detection and correction codes.

UNIT I

Digital Coding of Analog Waveforms: Sampling, Quantization, Quantization noise, Encoding, Pulse Code Modulation, Regeneration, Decoding & Filtering, Noise considerations in PCM systems, Time-Division Multiplexing, Synchronization, Differential encoding, Delta Modulation, Differential Pulse Code Modulation, Processing gain, Adaptive Delta Modulation,

UNIT II

Baseband Pulse Transmission: Matched filter and it's Properties, Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference, Nyquist's criterion for distortion-less baseband binary transmission, Duo binary, Modified duo binary in Correlative-level coding, Baseband M-array PAM transmission, Eye patterns. .

UNIT III

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidt Orthogonalization procedure, Response of bank of correlators in noise, Coherent detection of signals in noise, Correlation receiver, Probability of error.

UNIT IV

Digital Modulation Techniques: Introduction, Pass band transmission model, ASK, Coherent Phase Shift Keying – Binary phase shift keying, Quadrature shift keying, Binary Frequency shift keying, M-array Quadrature Amplitude Modulation, Non-coherent orthogonal modulation schemes-Differential PSK, Non-Coherent Binary FSK.

(Error probability, Generation and Detection, Power spectra, Bandwidth above schemes)

UNIT-V

Error Control Coding: Introduction, Examples of Error Control Coding, Methods of controlling Errors, Types of Errors, Types of Codes. Linear Block Codes: Matrix Representation of Linear Block Codes, Error Detection and Error Correctio Capabilities of Linear Block Codes. Convolution Codes: Encoders for Convolution Codes, Decoders for Convolution Codes. Illustrative Problems.

TEXT BOOKS

1. Simon Haykin, "Communication Systems," by John Wiley & Sons,3rd Edition, 2010.
2. Sam Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.

REFERENCES:

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. J.S. Chithode, "Digital Communications", Technical Publications, Ist Edition, 2020
3. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.

Course Outcomes:

1. Understand the Digital communication System and able to analyse the different Digital modulation techniques.
2. Understand the concepts of baseband digital modulation schemes and Inter Symbol Interference.
3. Analyze Signal space concepts, probability of error performance of various digital binary modulation systems and are able to design digital communication systems.
4. Design a system with Error correcting codes by learning Block Codes, Cyclic Codes and Convolutional Codes.

Mapping of course outcomes with program outcomes:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	1	-	-	-	-	-	-	-	-	1	1
CO2	2	1	1	2	-	-	-	-	-	-	-	-	-	1
CO3	1	1	1	1	-	-	-	-	-	-	-	-	-	1
CO4	1	1	1	2	1	-	-	-	-	-	-	1	-	1

EC506L -Analog and Digital Communication Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits: **1.5**

Sessional Marks: **40** Semester Examination Marks: **60**

Course Description:

This course gives students deep knowledge in Analog and Digital communication systems at the practical level so that students can understand the logical, analytical, and mathematical background of the communication system. This lab focuses on understanding the fundamental concepts of signal flow in Analog and Digital communication system. The Detailed analysis of AM, FM, Pulse modulations, digital modulation techniques, sampling and reconstruction, Data Conditioning and Reconditioning are done. The course covers the basic types of Analog and Digital modulation in both Simulink and equipment based.

Course Objectives

1. The course gives students deep knowledge in analog and digital communication systems at the practical level.
2. The course aims to make the student familiar with Analog and Digital Modulation and Demodulation techniques, transmission, reception etc.
3. The Course aims to write and simulate the MATLAB code to study the modulation techniques.
4. The Couse enhance the understanding theory of Analog and Digital Communication concepts.

Hands-on experiments related to the course contents ECPCT404.

List of Experiments:

1. Fourier Synthesis
2. AM Transmitter & Receiver
3. FM Transmitter & Receiver
4. AM/FM Radio Receiver
5. Analog signal sampling & Reconstruction
6. Generation & Detection of PAM/PWM/PPM
7. Generation & Detection of PCM
8. Generation & Detection of DM/SIGMA DELTA/ ADM
9. Baseband digital data transmission
10. Data conditioning & Reconditioning
11. Generation & Detection of BPSK/DPSK/DEPSK

12. Simulation of digital modulation schemes

(i) Phase Shift Keying (PSK), differential phase shift keying (DPSK), DEPSK

(ii) QPSK, M-ary PSK, Quadrature Amplitude Modulation (QAM)

Course Outcomes:

After the completion of the course the student will be able to:

1. Generate AM and FM signals and evaluate their performance.
2. Perform signal sampling by determining the sampling rates for baseband signals and reconstruct the signals.
3. Generate digital modulation signals for ASK, PSK and FSK and perform their detection.
4. Simulate MSK, DPSK, QPSK and DEPSK schemes and estimate their BER.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3	-	-	-	3	-	-	-	3	3
CO2	3		2	2	3	-	-	-	1	-	-	-	3	3
CO3	2	2	3	3	3	-	-	-	2	-	-	-	2	3
CO4	2	2	3	3	3	-	-	-	2	-	-	-	2	3

EC507L Microprocessors and Microcontrollers Laboratory

Instruction : Hours/Week : **0L:0T:3P** Credits: **1.5**

Sessional Marks : **40** Semester Examination Marks: **60**

Course Overview: This course introduces the assembly language programming of 8085 and 8051 Microcontroller. It gives a practical training of interfacing the peripheral devices with the 8085 microprocessor/ 8051microcontroller. It is useful for developing students to be proficient in the assembly language programming skills and real time applications of Microprocessor as well as microcontroller.

Course Objectives: The purpose of the course is

1. To expose students to the operation of typical microprocessor (8085) and microcontroller (8051) trainer kits.
2. To prepare the students to be able to solve different problems by developing different programs.
3. To develop the building of Microcontroller based systems.

Hands-on experiments related to the course contents EC502C.
Pre-requisites: None

Every student is free to do his / her choice of experiments in the Laboratory. Student can do at least 10 to 12 experiments only.

List of Experiments:

(8085/8086 Microprocessor Assembly Language Programming)

1. Write a simple program for arithmetic operations – addition, subtraction, multiplication and division of 16 – bit number.
2. Write a simple program for string operations like string concatenation, swapping.
3. Write a program for interfacing LCD with 8085 and display a message.
4. Write a program for interfacing Stepper Motor with 8085.
5. Write a program for flashing LEDs using 8253 /8254 (PIT) and interrupts.

(8051 Microcontroller Assembly Language Programming)

6. Write a program for performing simple arithmetic operations.
7. Write a program for performing simple Logical operations.
8. Write a simple program for flashing LEDs using software delays, timers and interrupts.
9. Write a program for interfacing Seven Segment Display / LCD with 8051 and display messages.
10. Write a program for interfacing Keypad with 8051 and display keypad input on LCD.

11. Write a program for square waveform generation, with different frequencies and duty cycles.
12. Write a program for serial communication through UART using polling and interrupt methods.
13. Write a program for interfacing ADC with 8051.
14. Write a program for Pulse Width Modulation using on-chip PWM and analog I/O modules.

Write a program for interfacing Seven Segment Display and/or LCD to ARM or 8086 processor.

Course Outcomes: After the completion of the course the student will be able to:

1. Write assembly language programmes for arithmetic and Logical operations using 8085 µp.
2. Develop assembly language programs / C and C++ programs using microcontrollers.
3. Write 8051 assembly language programs to control inbuilt timer and communication modules.
4. Interface ADC and DAC modules with microprocessor-based systems and Write assembly language programmes using ARM / 8086 processor.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2	1	1	1	-	-	-	3	-	-	2	-	-
CO2	3	2	2	2	1	2	2	2	3	-	-	2	1	-
CO3	2	2	2	2	2	-	-	-	3	-	-	2	-	1
CO4	3	2	3	3	2	-	-	-	3	-	-	1	-	1

EC508L-Digital Signal Processing Lab

Instruction : Hours/Week : **0L:0T:2P** Credits: **1**

Sessional Marks : **40** Semester Examination Marks: **60**

Course Description:

The course is to make familiar with practical implementation of the digital signal processing. digital signal processing involving filtering, deconvolution, spectral estimation, and a variety of other techniques. Laboratory work involves developing signal processing systems on a personal computer and using them with both real and simulated data. Questions related to hardware realizations are also considered. Students can able to develop DSP algorithms for convolution, correlation, DFT, filtering of signals etc. Introduction to TMS Processors software and Hardware tools.

Course Learning Objectives:

1. Understanding the mathematical operations on discrete signals
2. Can able to design Inverse DFT and FFT of a discrete time signals.
3. Model IIR and FIR filters using different techniques.
4. Implementing different DSP algorithms on TMS processors.

Part A – Using MATLAB

1. Generation of standard signals, periodic and Aperiodic signal
2. DFT and IDFT
3. FFT algorithms - Decimation in Time / Decimation in Frequency.
4. Linear and Circular Convolution in time domain and in frequency domain (using DFT)
5. Spectrum Analysis using DFT
6. IIR filter design
7. FIR filter design
8. Decimation and Interpolation

Part B – Using Code Composer Studio

9. Linear convolution of two sequences.
10. Circular convolution of two sequences.
11. Generation of Elementary signals.
12. MAC operation using various addressing modes
13. FIR Implementation.

Learning Resources

Text Books

1. J. G. Proakis and D. G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 4/e, Pearson Education, 2007.
2. A.V. Oppenheim, R. W. Schafer, Discrete-Time Signal Processing, 3/e, Prentice Hall of India, 2009.

Reference Books

1. Fundamentals of Digital Signal Processing - Lonnie C Ludeman, John Wiley & Sons, 2003
2. Digital Signal Processing "A – Computer Based Approach" - Sanjit K Mitra, Tata Mc Graw Hill 2nd Edition, 2003
3. Theory and Application of Digital Signal Processing - Lawrence R Rabiner & Bernard Gold, Prentice Hall.

e- Resources & other digital material

1. http://www.nptel.iitm.ac.in/
2. http://www.ee.umanitoba.ca/~moussavi/dsp815/LectureNotes/index.html
3. http://www.ece.cmu.edu/~ee791
4. http://cobweb.ecn.purdue.edu/~ipollak/ee438/FALL04/notes/notes.html

Course Outcomes

Upon successful completion of the course, the student will be able to

1. Interpret discrete-time signals using DFT
2. Apply FFT algorithms for various signal processing operations
3. Design the Multirate Filters
4. Design IIR and FIR digital filters for real time DSP applications

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	-	-	-	-	-	-	-	1	-	-	3	-	1
CO2	3	-	-	1	-	-	-	-	-	-	-	2	1	-
CO3	3	3	-	-	-	-	-	-	-	3	-	2	-	1
CO4	3	3	3	-	2	1	-	2	-	-	-	2	-	1

EC509S-WEB Design and Development

Instruction: Hours/Week: **2L:0T:0P** **Credits: 2**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course offers a preliminary treatment of Web Design and Development concepts that yield visible and audible results through web pages. The course includes an introduction to the World Wide Web, industry standard browsers, effective site and page design, HTML, XHTML, CSS, XML, web graphics and client-side scripting. The course includes detailed discussion of design practices, such as the appropriate use of text and graphics, font and color selection, meta-tags, navigation techniques, media formats, and methods of enhancing the user experience.

COURSE OBJECTIVES:

1. To introduce the fundamentals of Internet, and the principles of web design.
2. To construct basic websites using HTML and Cascading Style Sheets.
3. To build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
4. To develop modern interactive web applications using PHP, XML and MySQL.

Unit–I

Introduction: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of latest version of Web.

Web Design: Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation.

Unit–II

HTML: Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of latest version of HTML.

Style sheets: Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of latest version of CSS.

Unit–III

JavaScript: Client-side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations.

DHTML: Combining HTML, CSS and JavaScript, Events and buttons.

Unit–IV

XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT.

PHP: Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions.

Unit–V

PHP and MySQL: Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.

TEXT BOOKS:

1. Ralph Moseley and M. T. Savaliya, Developing Web Applications, Wiley-India Private Limited, 2011.
2. Robert W.Sebesta, Programming the World Wide Web, 7th edition, Pearson Education, 2013.

REFERENCES:

1. Kogent Learning Solutions Inc., Web Technologies Black Book, Dreamtech Press, 2009.
2. Joel Sklar, Principles of Web Design, Cengage Learning, 6th Edition, 2015.
3. B. M. Harwani, Developing Web Applications in PHP and AJAX, Tata McGraw-Hill, 2010.
4. Internet and World Wide Web How to program, Paul J. Deitel, Harvey M. Deitel, and Abbey Deitel, 5th Edition, Pearson Education, 2011.

COURSE OUTCOMES: At the end of this course, the students will be able to

1. Describe the concepts of World Wide Web, and the requirements of effective web design.
2. Develop web pages using the HTML and CSS features with different layouts as per need of applications.
3. Use the JavaScript to develop the dynamic web pages.
4. Construct simple web pages in PHP and to represent data in XML format and use server-side scripting with PHP to generate the web pages dynamically using the database connectivity.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	1	1	2	-	-	-	-	-	1	2	1	-	1
CO2	3	3	2	1	3	1	-	-	-	-	1	-	-	-
CO3	2	2	1	-	-	3	-	-	-	-	-	1	-	1
CO4	1	2	3	1	2	3	-	-	-	-	-	-	-	-

EC510A- Universal Human Values

Instruction: Hours/Week: **2L:0T:0P** **Credits: 0**

Sessional Marks: **100** End Semester Examination Marks: **0**

COURSE DESCRIPTION:
The methodology of this course is universally adaptable, involving a systematic and rational study of the human being vis-à-vis the rest of existence. It is free from any dogma or value prescriptions. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with and within the student himself/herself finally.
Pre-requisites/co-requisites: None.

COURSE OBJECTIVES:

1. To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. To understand (or developing clarity) the harmony in the human being, family, society and nature/existence.
3. To strengthen self-reflection and to develop commitment and courage to act.
4. To understand social responsibility of an engineer.
5. To appreciate ethical dilemma while discharging duties in professional life.

UNIT I

Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT II

Understanding Harmony in The Human Being - Harmony in Myself!:
Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility(Sukh and Suvidha).Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.

UNIT III

Understanding Harmony in The Family and Society- Harmony in Human-Human Relationship: Understanding harmony in the Family - the basic unit of human interaction. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness(Ubhay-tripti); Trust**(Vishwas)** and Respect **(Samman)**as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution (Samadhan), Prosperity(Samridhi), fearlessness (**Abhay**) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society(AkhandSamaj), Universal Order(SarvabhaumVyawastha) - from family to world family.

UNIT IV

Understanding Harmony in The Nature and Existence - Whole Existence as Coexistence:
Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V

Implications of The Above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.
2. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

REFERENCE BOOKS:

1. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
2. N. Tripathy, 2003, Human Values, New Age International Publishers.
3. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
4. A Nagraj, 1998 Jeevan Vidya ekParichay, Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. E G Seebauer& Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
8. M Govindrajan, S Natrajan& V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.
9. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
10. India Wins Freedom - Maulana Abdul Kalam Azad.

Relevant CDs, Movies, Documentaries & Other Literature:

1. value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story.

COURSE OUTCOMES: On completion of this course, the students will be able to

1. To become more aware of themselves, and their surroundings (family, society, nature) and distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
2. Understand the role of a human being in ensuring harmony in society and nature.
3. To become sensitive to their commitment towards what they have understood (human values, human relationship and human society) .
4. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

ASSESSMENT:

(i). Assessment by faculty mentor: 20 marks
(ii). Socially relevant project/Group Activities/Assignments: 20 marks
(iii). Semester End Examination: 60 marks

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	1	3	-	-	-	1	1	1	-	1	1	-	-
CO2	3	-	-	1	-	3	2	-	-	-	-	-	-	-
CO3	1	-	-	-	-	3	-	-	-	-	-	-	-	-
CO4	-	2	-	-	-	1	2	3	3	1	1	2	-	-

EC601C -Microwave Engineering

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Prerequisite: Antennas and Propagation

Course Description: The course will be broadly focusing on analysis, design and development of microwave circuits and systems. The course will cover introduction to Microwaves, Microwave transmission modes, Transmission lines, Impedance Matching, Microwave Network Analysis, Directional Coupler, Power Divider, Microwave Filters, Microwave Attenuator, RF switches and phase shifters, Microwave Amplifiers, Low Noise Amplifier, Microwave Mixers and Oscillators, Microwave Antennas, Microwave Measurements, Microwave Systems.

Course Objectives:

1. To get familiarized with microwave frequency bands, their applications and to understand the limitations and losses of conventional tubes at these frequencies.
2. To distinguish between different types of microwave tubes, their structures and principles of microwave power generation.
3. To impart the knowledge of Scattering Matrix, its formulation and utility, and establish the S-Matrix for various types of microwave junctions.
4. Understand the utility of Optical Fibres in Communications.

UNIT – I

Microwave Tubes: Limitations and Losses of conventional Tubes at Microwave frequencies, Cavity Klystrons – Structure, Re-entrant Cavities, Velocity Modulation Process, Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for O/P Power and Efficiency. Reflex Klystrons – Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and O/P Characteristics. Helix TWTs: Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.

UNIT - II

M-Type Tubes: Introduction, Cross-field Effects, Magnetrons – Different Types, Cylindrical Traveling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics,

Microwave Solid State Devices: Introduction, Classification, Applications. Gunn Diodes – Principle, RWH Theory, Characteristics, Modes of Operation - Gunn Oscillation Modes, Principle of operation of IMPATT and TRAPATT Devices.

UNIT - III

Waveguide Components: Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide Windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Different Types, Resistive Card and Rotary Vane Attenuators; Waveguide Phase Shifters – Types, Dielectric and Rotary Vane Phase Shifters, Waveguide Multiport Junctions - E plane and H plane Tees. Ferrites– Composition and Characteristics, Faraday Rotation, Ferrite Components – Gyrator, Isolator.

UNIT – IV

Scattering matrix: Importance of S-matrix, Scattering Matrix Properties, Directional Couplers –

2 Hole, Bethe Hole S Parameters, [s] matrix of Magic Tee and Circulator, Measurement of S-parameters.
MICs : Advantages of MIC's, Hybrid MIC's, Strip lines and microstrip lines, Monolithic MICs

UNIT V

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions, Measurement of Attenuation, Frequency. Standing Wave Measurements, Measurement of Low and High VSWR., Cavity Q-factor and Impedance Measurements. Antenna gain measurements.

TEXT BOOKS:

1. Microwave Devices and Circuits – Samuel Y. Liao, Pearson, 3rd Edition, 2003.
2. Electronic Communications Systems- Wayne Tomasi, Pearson, 5th Edition
3. Microwave Engineering - David M. Pozar, John Wiley & Sons (Asia) Pvt Ltd., 1989, 3r ed., 2011 4t. 4. Microwave Engineering - G.S. Raghuvanshi, Cengage Learning India Pvt. Ltd., 2012
5.Microwave and Radar Engineering, Kulkarni, Umesh publications, 1998.
6. Microwave Engineering, Annapurna Das and Sisir K.Das, Tata Mc Graw-Hill, 2000.

Course Outcomes: At the end of this course students will have the ability to

1. Known power generation at microwave frequencies and derive the performance characteristics. (L2)
2. Understand the principles of solid-state devices. (L1)
3. Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications (L4)
4. Understand the utility of S-parameters in microwave component design (L3) and to know the measurement procedure of various microwave parameters. (L5)

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	2	2	1	1	1	1	2	1	2	2	3	3	-	-
CO2	3	2	2	2	1	2	2	2	2	2	3	2	1	-
CO3	3	2	2	3	1	2	2	2	1	2	3	2	-	-
CO4	3	2	3	3	2	2	2	1	2	1	3	3	-	1

EC602C-Computer Networks

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

Computer Networks plays a vital role in the era of communication systems in resources sharing applications. The aim of this course is to introduce the concepts of Computer networking and its applications.

Course Objectives:

1. To understand the basic concepts of computer networks and internet
2. To gain knowledge about the design issues of link layer and internet layer
3. To gain knowledge about the concept of connection oriented and connection less Protocols.
4. To gain knowledge in developing different applications.

Unit -1

Introduction to Computer Networks and the Internet: Principles of network applications and Internet Challenges &Layering concepts.

OSI Reference Model & TCP/IP Reference Model.

Unit -2

DATA Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks, Ethernet, Wireless LAN, Flow Control, Error Detection and Error Correction.

Unit-3

Internet Layer:

IP Addressing, IP Protocol, Routing Algorithms, queuing disciplines. Congestion Control Algorithms, Resource Reservation, Admission Control and Differentiated services.

Unit-4

Transport Layer: User Datagram Protocol, Connection oriented transport protocol– Transmission Control Protocol, Remote Procedure Call. Port Addressing and Socket Programming.

Unit-5.

Application layer: The Web and Hyper Text Transfer Protocol, File transfer, Electronic mail, Domain name system, Peer-to-Peer file sharing, JPEG, MPEG. Network Security: DES & RSA.

Text / Reference books:

1. J.F. Kurose and K. W. Ross, “Computer Networking – A top-down approach Pearson Education, 5th Edition
2. Andrew S Tanenbaum, “Computer Networks”, Prentice Hall India Fourth Edition.
3. Behrouz A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition
4. D. Comer, “Computer Networks and Internet/TCP-IP”, Prentice Hall
5. William Stallings, “Data and Computer Communication, 8th Edition, Pearson Prentice.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Design of computer networks in Internet.
2. Understand the concepts of error handling, flow control IP Addressing and Routing.
3. Understand the concept of TCP and UDP protocols.
4. Develop several protocols foe web Applications.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	3	3	2	2	3	2	2	2	_	3	3	--	1
CO2	1	1	1	1	1	1	3	3	2	3	1	_	-	1
CO3	1	1	1	1	1	1	3	3	2	3	1	_	-	1
CO4	3	3	3	3	2	3	2	2	3	_	3	_	-	1

EC607L- Microwave Engineering Lab

Instruction : Hours/Week : **0L:0T:2P** Credits: **1.5**

Sessional Marks : **40** Semester Examination Marks: **60**

Course Description:
Electromagnetic waves and Microwave Lab will provide practical understanding on Microwave Bench setup such as Reflex Klystron and operation of various components of the same, Gunn diode and their characteristics. This course also ensures to have practical exposure on Antenna parameters measurements and simulation of the same & optical devices and it's characteristics.

Course Objectives:

1. To understand Microwave Bench setups
2. To analyze various parameters of microwave measurements
3. To understand Antenna measurements
4. To understand the characteristics of optical fiber devices.

List of Experiments:

1. Reflex klystron characteristics – I
2. Reflex klystron characteristics – II
3. Gunn diode Oscillator
4. Waveguide parameters
5. VSWR measurements
6. Directional Couplers
7. Attenuation Measurement
8. Impedance Measurement
9. Dipole Antenna Simulation using IE3D software
10. Antenna measurements

Course Outcomes: At the end of the course the students will be able to

1. Able to measure the performance of simple microwave circuits and devices.
2. Perform microwave measurements with sophistical instruments such as vector network analyser and spectrum analyzer.
3. Able to assess the performance of optical devices such as Light sources, fibers and detectors.
4. Able to plot the loss characteristics of optical fibers.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	-	1	1	-	-	-	-	-	-	-	-
CO2	1	2	2	1	1		-	-	-	-	-	-	-	-
CO3	1	1	1	-	1	1	-	-	-	-	-	1	-	-
CO4	1	1	1	-	1		-	-	-	-	-	1	-	-

EC608L- COMPUTER NETWORKS LAB

Instruction: Hours/Week: **0L:0T:3P** **Credits: 1.5**

Sessional Marks: **40** End Semester Examination Marks: **60**

Prerequisites: Nil

Course Over view: This course is designed to impart knowledge about detailed knowledge of Computer Networks, various protocols used in Communication, Managing and configuring Cisco Switches and Routers, and various WAN technologies. Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP.

Course Objectives: A lab provides a practical approach to Ethernet/Internet networking: Networks are assembled, and experiments are made to understand the layered architecture and how to do some important protocols work.

1. Explain network technologies and how devices access local and remote networks.
2. Explain how switching operates in a small to a medium-sized business network.
3. Design an IPv4 and IPv6 addressing scheme to provide network connectivity for a small to a medium-sized business network.
4. Implement basic network connectivity between devices.

Major Equipment Required: Required software (Open Source) like NS-2, NSG-2.1 and Wire SHARK

Note:

(a). Minimum of 12 Experiments have to be conducted

(b). All the Experiments may be Conducted using Network Simulation software like NS-2, NSG-2.1 and Wire SHARK/equivalent software.

For Experiments 2 to 10 Performance may be evaluated through simulation by using the parameters Throughput, Packet Delivery Ratio, Delay etc.

List of Experiments:

1. LAN Configuration.
2. IP Addressing.
3. Error Correction and Error Detection.
4. Routing Algorithms
5. FCFS and SJF algorithms
6. Round Robin Algorithm.
7. Peer to peer file sharing and Socket Programming

8. RSA algorithm.
9. DNS look up tables
10. HTML Design.
11. HTTP.

Course Outcomes: At the end of the course the students will be able to

1. Understand network technologies and to access local and remote networks.
2. Operate switching in a small to a medium-sized business network.
3. Design an IPv4 and IPv6 addressing scheme to provide network connectivity for a small to a medium-sized business network.
4. Implement basic network connectivity between devices.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2	1	1	1	-	-	-	3	-	-	2	-	1
CO2	3	2	2	2	1	2	2	2	3	-	-	2	-	1
CO3	2	2	2	2	2	-	-	-	3	-	-	2	-	1
CO4	3	2	3	3	2	-	-	-	3	-	-	1	-	-

EC609S- Internet of Things and Its Applications

Instruction: Hours/Week: 0**L:1T:2P** **Credits: 2**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

Internet of Things (IoT) cuts across different application domain verticals ranging from civilian to defense sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support a lot. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different lot solutions. IoT-based applications such as innovative shopping systems, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT-based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course Learning Objectives:

The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student:

1. To understand the fundamentals of Internet of things and protocols.
2. It introduces some of the application areas where Internet of Things can be applied.
3. To build a small low-cost embedded system using Arduino / Raspberry Pi or equivalent boards.
4. To apply the concept of Internet of Things in the real-world scenario.

UNIT I:

Fundamentals of IoT: Introduction to IoT – Characteristics, Sensing, Actuation, Physical Design - Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.

UNIT II:

IOT and M2M: M2M, IoT vs M2M, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Introduction to SDN, SDN and NFV for IoT, IOT system Management with NETCONF-YANG.

UNIT III:

IoT Design Methodology: IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development. Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

UNIT IV:

Data Analytics for IoT: Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis.

UNIT V:

Tools for IoT: Chef, Puppet, IOT code generator Case studies: Chef. Puppet – Multi-tier Deployment, NETCONF-YANG.

IOT Applications: IoT applications for industry- Future Factory Concepts, Smart Applications, Smart Cities and Smart Homes. Case Study: Agriculture, Healthcare, Activity Monitoring. Study of existing IoT platforms /middleware, IoT- A, Hydra etc.

Text Book & References:

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.
2. Chef, Puppet, IOT code generator Case studies: Chef. Puppet – Multi-tier Deployment, NETCONF-YANG, Raspberry Pi.
3. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.
4. *Simon Monk, "Programming the Raspberry Pi*: *Getting Started with Python",* McGrawHill, *2013*
5. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.

Course Outcomes: Upon completion of this course, students will be able to:

1. Design a portable IoT using Arduino/ equivalent boards and relevant protocols.
2. Develop web services to access/control IoT devices.
3. Deploy an IoT application and connect to the cloud.
4. Analyze applications of IoT in real-time scenario.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	2	3	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**-**
CO2	**-**	**-**	3	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**-**
CO3	**-**	**2**	**-**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**--**	**1**
CO4	**-**	**-**	**-**	**-**	**1**	**3**	**3**	**3**	**-**	**-**	**-**	**1**		

EC610A- Professional Ethics in Engineering

Instruction: Hours/Week:**2L:0T:0P** **Credits: 0**
Sessional Marks: **100** End Semester Examination Marks: **0**

COURSE DESCRIPTION:
This course is designed to introduce engineering students to the concepts of engineering ethics. It will allow students to explore the relationship between ethics and engineering and apply classical moral theory and decision making to engineering issues encountered in academic and professional careers. It mainly focuses on improving the capacities of leadership /management through training in professional ethics. Codes of ethics have been invoked as a basis for professional engineering licensure. Violations of such ethical codes have led to many well-known tragic engineering failures that endangered human life and jeopardized public welfare. This discipline will doubtless take its place alongside such well-established fields as medical ethics, business ethics, and legal ethics.
Pre-requisites/co-requisites: None.

COURSE OBJECTIVES

To enable the students
1. To create an awareness on Engineering Ethics and Human Values.
2. To instill Moral and Social Values and Loyalty and to appreciate the rights of others.
3. To study the moral issues and decisions confronting individuals and organizations engaged in engineering profession.
4. To study the related issues about the moral ideals, character, policies, and relationships of people and corporations involved in technological activity.

UNIT I
Human Values: Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation –Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II
Engineering Ethics: Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy –Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III
Engineering as Social Experimentation: Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT-IV
Safety, Responsibilities and Rights: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) Discrimination.

UNIT V

Global Issues: Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct– Corporate Social Responsibility.

TEXTBOOKS:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey,2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi,2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd., New Delhi, 2013.

COURSE OUTCOMES: Upon completion of the course, the student should be able to:

1. Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
2. Learn the moral issues and problems in engineering; find the solution to those problems.
3. Learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
4. Gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights.

Grading/Assessment:

(i). Attendance: 20 marks

(ii). Group Activities/Assignments: 20 marks

(iii). Semester End Examination: 60 marks

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2	**1**	**-**	**1**	**2**	**-**	**1**	**1**	**-**	**-**	**2**	**-**	**-**
CO2	**3**	**3**	2	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**-**	**-**
CO3	**2**	**2**	**3**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**1**	**-**
CO4	**3**	**2**	**3**	**-**	**1**	**3**	**3**	**-**	**1**	**-**	**-**	**1**	**-**	**-**

FOURTH YEAR SYLLABUS

EC701C -Digital Image and Video Processing

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

In this course you will learn the basic principles and tools used to process images and videos, and how to apply them in solving practical problems. Digital images and videos are everywhere these days – in thousands of scientific, consumer, industrial, and creative applications. Which are obtained from a wide range of the electromagnetic spectrum - from visible light and infrared to gamma rays and beyond. The ability to process image and video signals is therefore an incredibly important skill to master for engineering/science students, software developers, and practicing scientists. Digital image and video processing continues to enable the multimedia technology revolution we are experiencing today.

This course will strengthen fundamental knowledge about digital image and video processing techniques along with mathematical framework to describe and analyze images and videos. Digital image and video processing is used in almost all engineering fields and wide range of applications in industrial automation, medical, agriculture, security, entertainment, education and many more.

Course Objectives:

The student should be made to:

1. To know the concept of image fundamentals and mathematical transforms necessary for image Processing
2. To study the image enhancement and segmentation techniques
3. To learn about different color models and image compression procedures
4. To understand fundamentals of Video Coding

UNIT-1:

Digital Image Fundamentals: Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

Image Transforms: Need for image transforms, Fourier transform, 2-D Discrete Fourier transform and its properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform.

UNIT –II

Image Enhancements and Filtering: Gray level transformations, histogram equalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain.

Sharpening filters: first and second derivative, frequency domain filters – low-pass and high-pass filters.

Image Segmentation: Detection of discontinuities, edge linking and boundary detection, thresholding –global and adaptive, region-based segmentation.

UNIT –III

Image Compression: Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy & Lossless, Shannon Fano coding, Huffman coding, Bit plane coding, Transform coding, Predictive coding, Lossy Predictive coding, JPEG Standards.

UNIT –IV

Color Image Processing: Color models– RGB, YUV, HSI; Color transformations– formulation, color complements.

Video Processing: Video Formation, Perception and Representation, Video capture and display, Analog video raster, Analog color television systems, Digital video.

UNIT –V

Fundamentals of Video Coding: Inter-frame redundancy, motion estimation techniques – full search, fast search strategies, forward and backward motion prediction, frame classification – I, P and B; Video sequence hierarchy – Group of pictures, frames, slices, macro-blocks and blocks; Elements of a video encoder and decoder; Video coding standards – MPEG and H.26X.

Video Segmentation: Temporal segmentation–shot boundary detection, hard-cuts and soft-cuts.

Text/ Reference Books:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008.
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition 2004.
3. Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015.
4. S.Jayaraman, S.Esakkirajan and T.VeeraKumar, "Digital Image processing, Tata Mc Graw Hill publishers, 2009 .
5. Yao Wang,Jorn Ostermann and Ya Qin Zhang "Video processing and Communications" Prentice Hall Publishers, 2002, ISBN 0-13-017547-1.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Mathematically represent the various types of images and analyze them.
2. Process these images for the enhancement of certain properties or for optimized use of the resources.
3. Develop algorithms for image compression and coding.
4. Apply basic operations on video and estimate the motion of two-dimensional video.

Mapping of course outcomes with program outcomes:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	1	2	1	-	-	-	-	3	2	-	-
CO2	3	2	3	2	2	1	-	-	-	-	3	1	-	-
CO3	2	2	2	1	1	2	-	-	-	-	3	3	2	-
CO4	2	2	2	1	1	2	-	-	-	-	3	3	2	-

EC707S-Machine learning and its Applications.

Instruction: Hours/Week: **2L:0T:0P** **Credits: 2**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description:

This course provides an introduction to the fundamental methods at the core of modern machine learning. It covers theoretical foundations as well as essential algorithms for supervised and unsupervised learning. Classes on theoretical and algorithmic aspects are complemented by practical lab sessions.

COURSE OBJECTIVES:

1. To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IOT nodes.
2. To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
3. Explore supervised and unsupervised learning paradigms of machine learning.
4. To explore Deep learning technique and various feature extraction strategies.

Unit 1:

Supervised Learning (Regression/Classification) Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes. Linear models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods. Beyond Binary Classification: Multi-class/Structured Outputs, Ranking.

Unit 2

Unsupervised Learning -Clustering: K-means/Kernel K-means , Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion Generative Models (mixture models and latent factor models).

Unit 3

Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests.)

Unit 4

Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning.

Unit 5

Scalable Machine Learning (Online and Distributed Learning) A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference Recent trends in various learning techniques of machine learning and classification methods for IOT applications, Various models for IOT applications.

Text / References Books:

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

Course Outcomes: After completion of course, students would be able to:

1. Understand the mathematical and statistical prospective of machine learning algorithms through python programming.
2. Design and evaluate the unsupervised models through python in built functions.
3. Evaluate the machine learning models pre-processed through various feature engineering algorithms by python programming.
4. Design and apply various reinforcement algorithms to solve real time complex problems.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	1	-	-	-	-	2	1	-	2	-	1
CO2	2	1	2	-	-	-	-	-	2	1	-	2	2	-
CO3	-	2	2	-	-	-	-	-	1	1	-	2	2	-
CO4	-	-	-	2	-	-	-	-	2	1	-	2	-	-

B.Tech. (R20) EC603C --Program Elective-I	
S. No.	**Name of the Program Elective**
1.	CMOS VLSI Design
2.	Information Theory and Coding
3.	Optimization Techniques
4.	Hardware-Software Co-design

EC603C- CMOS VLSI Design

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

This is an introductory course that covers basic theories and techniques of digital VLSI design in CMOS technology. In this course, we will study the fundamental concepts and structures of designing digital VLSI systems including CMOS devices and circuits, standard CMOS fabrication processes, CMOS design rules, static and dynamic logic structures, interconnect analysis, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies, VLSI architecture.

Prerequisite Courses: Electronic Devices, Analog Circuits and Digital Logic Design

Course Learning Objectives:

1. To learn basic CMOS Circuits.
2. To learn CMOS process technology.
3. To learn techniques of chip design using programmable devices.
4. To learn the concepts of designing VLSI Subsystems.

Unit -1

Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography and twin-tub CMOS process.

Brief Introduction to MOS, PMOS, NMOS, CMOS & BiCMOS technologies. Review of MOS transistor models, Non-ideal behaviour of the MOS Transistor, $\mathbf{I_{ds} - V_{ds}}$ relationships, MOS transistor threshold Voltage, Transistor as a switch, Inverter characteristics.

Unit -2

Integrated Circuit Layout: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for CMOS Inverters and Gates, Scaling of MOS circuits.

Basic Circuit Concepts: Sheet Resistance R_s and its concepts to MOS, Area Capacitance calculations, Inverter Delays, driving large Capacitive Loads, Wiring Capacitances. Delay: RC Delay model, linear delay model, logical path efforts. Power, interconnect and Robustness in CMOS circuit layout.

Unit -3

Combinational Circuit Design: CMOS logic families including static, dynamic and dual rail logic, Switch logic, Alternate gate circuits. Shifters, Adders, Parity generators, Comparators, Zero/One Detectors, Binary Counters, ALUs, Multipliers, Counters, High Density Memory Elements.

Unit -4

Sequential Circuit Design: Static Circuits, Design of latches and Flip-flops.

Test and Testability: Fault-modeling and simulation, test generation, design for testability, Built-in-self-test.

Unit -5

Physical Design: Floor-Planning, Placement, routing, Power delay estimation, Clock and Power routing.

Design styles: Full-custom, Standard Cells, Gate-arrays, FPGAs, CPLDs and Design Approach for Full-custom and Semi-custom devices.

Text/Reference Books:

1. Neil H.E. Weste and David Money Harris, CMOS VLSI design: A Circuits and Systems Perspective, 4th Edition, Pearson Education India, 2015.
2. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, Essentials of VLSI circuits and systems, PHI, 2005 Edition.
3. John M. Rabaey, A. Chandrakasan, B. Nikolic, Digital Integrated Circuits: A Design Perspective", 2nd Edition, Pearson, 2016.

Course Outcomes: At the end of the course the students will be able to

1. Learn CMOS process technology.
2. Analyze and implement various CMOS static logic circuits using Lambda based design rules.
3. Design different CMOS circuits using various logic families along with their circuit layouts for subsystem design.
4. To learn techniques of chip design using programmable devices and use HDL tools for designing VLSI Subsystems.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	1	3	-	-	-	-	-	-	-	-	-	-	1
CO3	2	-	-	3	-	-	-	-	-	-	-	-	-	-
CO4	2	1	-	-	-	-	-	-	-	-	-	-	-	-

EC603C-INFORMATION THEORY AND CODING

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

Information is the source of a communication system, whether it is analog or digital. Information theory is a mathematical approach to the study of coding of information along with the quantification, storage, and communication of information. With the increasing importance in the field of digital communications, the information theory emphasizes basic aspects such as discrete modulation techniques and coding theory. The purpose of this course is to introduce various concepts in information theory, error detection and correction codes. various fundamental concepts of encoding algorithms.

Course Objectives:

The student should be made to:

1.Be familiar with the concept of amount of information, entropy, channel capacity

2.To know the different communication channels, channel capacity and relation among them.

3. To understand and analyze the various error-detection and error-correction codes

4. To know the design concepts of cyclic codes, convolution codes.

UNIT I

Information Theory: Introduction, Measure of information, Information content of message, Average Information content of symbols in Long Independent sequences, Average Information content of symbols in Long dependent sequences, Markov Statistical Model of Information Sources, Entropy and Information rate of Markoff Sources

UNIT II:

Source Coding: Source coding theorem, Prefix Codes, Kraft McMillan Inequality property – KMI

Encoding of the Source Output, Shannon's Encoding Algorithm. Shannon Fano Encoding Algorithm, Huffman codes, Extended Huffman coding, Arithmetic Coding, Lempel – Ziv Algorithm.

UNIT III

Information Channels: Communication Channels, Channel Models, Channel Matrix, Joint probability Matrix, Binary Symmetric Channel, System Entropies, Mutual Information, Channel Capacity, Channel Capacity of: Binary Symmetric Channel, Binary Erasure Channel, Muroga,s Theorem, Continuous Channels

UNIT IV

Error Control Coding: Introduction, Examples of Error control coding, methods of Controlling Errors, Types of Errors, types of Codes, Linear Block Codes: matrix description

of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes, Single Error Correcting Hamming Codes, LDPC CODES

Binary Cyclic Codes: Algebraic Structure of Cyclic Codes, Encoding using an (n-k) Bit Shift register, Syndrome Calculation, Error Detection and Correction

UNIT V

Cyclic Codes: Golay Codes, BCH Codes.

Convolution Codes: Convolution Encoder, Time domain approach, Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm, TURBO CODES .

Text Books:

1. Digital and analog communication systems, K. Sam Shanmugam, John Wiley
1. India Pvt. Ltd, 1996.
2. Digital communication, Simon Haykin, John Wiley India Pvt. Ltd, 2008.
3. Information Theory and Coding, Muralidhar Kulkarni, K.S. Shivaprakasha, WileyIndia Pvt. Ltd, 2015, ISBN:978-81-265-5305-1.

Reference Books:

1. ITC and Cryptography, Ranjan Bose, TMH, II edition, 2007
2. Principles of digital communication, J. Das, S. K. Mullick, P. K. Chatterjee, Wiley, 1986 - Technology & Engineering
3. Digital Communications – Fundamentals and Applications, Bernard Sklar, Second Edition, Pearson Education, 2016, ISBN: 9780134724058.
4. Information Theory and Coding, K.N.Haribhat, D.Ganesh Rao, CengageLearning, 2017.

Course Outcomes:

Upon completion of the course, the student should be able to:

1. Describe basic parameters of Information, the concepts of source coding techniques, and Error Control coding techniques)
2. Apply knowledge of Information theory and error control coding techniques to solve problems
3. Analyze various source coding and channel coding techniques for error detection and error correction in the information bearing signals
4. Analyze and compare audio and video coding techniques

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	-	-	-	-	1	-	-	-
CO2	3	-	3		1	1	-	-	-	-	2	-	-	-
CO3	3	2	2	3	2	2	-	-	-	-	3	3	3	3
CO4	3	2	2	2	2	2	-	-	-	-	3	3	3	3

EC603C-Optimization Techniques

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description:

The students will try to learn the operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization of objective function). The problem formulation by using linear, dynamic programming, game theory and queuing models.

Course Objectives:

1. Operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization of objective function).
2. The problem formulation by using linear, dynamic programming, game theory and queuing models.
3. The stochastic models for discrete and continuous variables to control inventory and simulation of manufacturing models for the production decision making.
4. Formulation of mathematical models for quantitative analysis of managerial problems in industry.

Unit 1

Introduction to Classical Methods & Linear Programming Problems Terminology, Design Variables, Constraints, Objective Function, Problem Formulation. Calculus method, Kuhn Tucker conditions, Method of Multipliers.

Unit 2

Linear Programming Problem, Simplex method, Two-phase method, Big-M method, duality, Integer linear Programming, Dynamic Programming, Sensitivity analysis.

Unit 3

Single Variable Optimization Problems: Optimality Criterion, Bracketing Methods, Region Elimination Methods, Interval Halving Method, Fibonacci Search Method, Golden Section Method. Gradient Based Methods: Newton-Raphson Method, Bisection Method, Secant Method, Cubic search method.

Unit 4

Multi Variable and Constrained Optimization Technique, Optimality criteria , Direct search Method, Simplex search methods, Hooke-Jeeve‘s pattern search method, Powell‘s conjugate direction method, Gradient based method, Cauchy‘s Steepest descent method, Newton‘s method , Conjugate gradient method. Kuhn - Tucker conditions, Penalty Function, Concept of Lagrangian multiplier, Complex search method, Random search method

Unit 5

Intelligent Optimization Techniques: Introduction to Intelligent Optimization, Soft Computing, Genetic Algorithm: Types of reproduction operators, crossover & mutation,

Simulated Annealing Algorithm, Particle Swarm Optimization (PSO) - Graph Grammer Approach - Example Problems

Genetic Programming (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

Textbooks and References:

1. S. S. Rao, "Engineering Optimisation: Theory and Practice", Wiley, 2008.
2. K. Deb, "Optimization for Engineering design algorithms and Examples", Prentice Hall, 2005.
3. C.J. Ray, "Optimum Design of Mechanical Elements", Wiley, 2007.
4. R. Saravanan, "Manufacturing Optimization through Intelligent Techniques, Taylor & Francis Publications, 2006.
5. D. E. Goldberg, "Genetic algorithms in Search, Optimization, and Machine learning", Addison-Wesley Longman Publishing, 1989.

Course Outcomes:

At the end of this course, students will be able to

1. Understand importance of optimization.
2. Ability to go in research by applying optimization techniques in problems of Engineering and Technology.
3. Apply basic concepts of mathematics to formulate an optimization problem .
4. Analyze and appreciate variety of performance measures for various optimization problems .

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	1	-	-	-	1	-	-	-	-
CO2	3	3	2	3	2	-	-	-	-	-	-	-	2	-
CO3	1	3	3	2	1	-	-	-	-	-	1	2	1	-
CO4	-	1	2	-	-	-	-	-	-	-	-	1	1	1

EC603C-Hardware-Software Co-design

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description:

This course will cover the fundamental topics of HW/SW code design and partitioning concepts in designing embedded systems. The emphasis will be on goals and methodology for partitioning hardware/software in embedded systems**.**

Course Objectives:

1. To provide an understanding of system-level design of embedded systems comprised of both hardware and software.
2. To investigate topics such as Hardware Software partitioning, mapping and scheduling, Co-simulation, synthesis and verification relevant to co-design.
3. To explore, analysis and optimization processes in support of algorithmic and architectural design decisions.
4. Gain design experience with case studies using contemporary high-level methods and tools.

UNIT I
NATURE OF HARDWARE AND SOFTWARE

Hardware, Software, Definition of Hardware/Software Co-Design – Driving factors Platform design space – Application mapping – Dualism of Hardware design and software design – Concurrency andparallelism, Data flow modeling and Transformation – Data Flow Graph – Tokens, actors and queues,Firing rates, firing rules and Schedules – Synchronous data flow graph – control flow modeling – Adding time and resources – Transformations.

UNIT II
DATA FLOW IMPLEMENTATION IN SOFTWARE AND HARDWARE

Software Implementation of Data Flow – Converting queues and actors into software, Dynamic Scheduler – Hardware Implementation of Data Flow – single rate SDF graphs into hardware, Pipelining – Analysis of control flow and data flow – construction of control and data flow graph – Translating C into hardware – Designing data path and controller.

UNIT III
DESIGN SPACE OF CUSTOM ARCHITECTURES

Finite state machines with data path – FSMD design example, Limitations – Micro programmed Architecture – Micro programmed control, microinstruction encoding, Micro programmed data path, micro programmed machine – General purpose Embedded Core – RISC pipeline, Program organization SoC interfaces for custom hardware – Design Principles in SoC Architecture.

UNIT IV
HARDWARE/ SOFTWARE INTERFACES
Principles of Hardware/software communication – synchronization schemes, communication constrained versus Computation constrained, Tight and Loose coupling - On-chip buses – Memory mapped interfaces – coprocessor interfaces – custom instruction interfaces – Coprocessor hardware interface – Data and control design, programmer's model.

UNIT V
CASE STUDIES Trivium Cripto coprocessor – Trivium stream cipher algorithm, Trivium for 8-bit platforms – AES coprocessor, CORDIC coprocessor – algorithm and implementation.

Text Books and References:

1. Ralf Niemann, "Hardware/Software Co-Design for Data Flow Dominated Embedded Systems",
   Kluwer Academic Pub, 1998.
2. Jorgen Staunstrup, Wayne Wolf, "Hardware/Software Co-Design: Principles and Practice" , KluwerAcademic Pub, 1997.
3. Giovanni De Micheli, Rolf Ernst Morgon, "Reading in Hardware/Software Co-Design" Kaufmann Publishers, 2001.
4. Patrick Schaumont, A Practical Introduction to Hardware/Software Codesign, 2nd Edition, Springer.

Course Outcomes: After completion of this course the students will be able to

1. Analyze and apply design methodologies.
2. Appreciate the fundamental building blocks of the using hardware and software co-design and
3. Relate implementation and testing environments and techniques and their interrelationships.
4. Get familiar with modern hardware/software tools for building prototypes and to be able to
   demonstrate practical competence in these areas

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	3	-	-	-	-	-	-	-	1	1	1	2
CO2	2	1	-	-	-	-	-	-	1	-	-	-	3	1
CO3	-	1	3	-	1	-	1	-	3	1	1	1	-	-
CO4	3	2	3	3	3	1	2	-	1	1	-	-	-	3

B.Tech. (R20) EC604C-Program Elective-II	
S. No.	**Name of the Program Elective**
1.	Cyber Security
2.	Nano Electronics
3.	Sensors and Transducers
4.	Electronic Instrumentation

EC604C-Cyber Security

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

The course deals with the underlying principles of cryptography and network security. It develops the mathematical tools required to understand the topic of cryptography. Starting from the classical ciphers to modern day ciphers, the course provides an extensive coverage of the techniques and methods needed for the proper functioning of the ciphers. The course deals with the construction and cryptanalysis of block ciphers, stream ciphers and hash functions. The course defines offers the construction and cryptanalysis of public key ciphers, namely RSA. The key exchange problem and solutions using the Diffie-Hellman algorithm are discussed. Message Authentication Codes (MAC) and signature schemes are also detailed. The course deals with modern trends in asymmetric key cryptography, namely using Elliptic Curves. The course ends with the awareness about different network attacks and precautions to be taken for the security.

Course Objectives:

The student should be made to:

1. To know the basics of Cryptography and Network Security.
2. To be able to secure a message over insecure channel by various means.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4. To have the knowledge of security requirements for a network against various threats

UNIT-I

Introduction: OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality

UNIT-II

Public Key Cryptography Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

UNIT-III

Authentication And Hash Function: Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest algorithm - Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard.

UNIT-IV

Network Security Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

UNIT-V

System Level Security Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TextBook:

1. William Stallings, "Cryptography And Network Security – Principles and Practices", Prentice Hall of India, Third Edition, 2003.

References:

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education.

Course Outcomes

1.Understand different encryption techniques

2. Implement basic security algorithms required by any computing system

3. Analyze the vulnerabilities in any computing system to design a security solution

4. Analyze the possible security attacks and their effective countermeasures in real time systems

Mapping of course outcomes with program outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	1	1	-	-	-	-	2	-	-	-
CO2	3	3	3	2	1	2	-	-	-	-	2	-	-	-
CO3	3	3	2	3	2	2	-	-	-	-	3	3	1	1
CO4	3	3	3	2	2	2	-	-	-	-	3	3	1	1

EC604C-Nano Electronics

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

This course covers specialized topics in modern Nano electronics. It offers an introduction to electron transport in Nano scale semiconductor devices as well as an introduction to magnetism and spintronics. Models for Nano scale transistors and quantum effects in these will be treated.

Course Objectives:

This course is aimed to:

1. Make them understand various advanced concepts in Nano electronics.
2. Explode the fundamentals on QED, SED, molecular electronics, and spintronics.
3. Train the students on state of the art computational tools for modelling and simulation of nano electronics devices.

UNIT I

Introduction: Evolution of science and nanotechnology, Introduction to nanotechnology, Difference between Nano science and nanotechnology, Feynman predictions on Nano technology, Role of up and top down approaches in nanotechnology, challenges in nanotechnology.

UNIT II

Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope –scanning tunnelling microscope – Nano manipulator – Nano tweezers – atom manipulation – Nano dots – self-assembly – dip pen nanolithography.

UNIT III

Nano powders-Synthesis and processing of Nano powders-process for producing ultrafine powders-mechanical milling, wet chemical synthesis, gas condensation process, chemical vapour condensation, laser ablation, Design and synthesis of self-assembled nanostructured materials.

UNIT–IV

Nano Materials: History of Materials, Definition, classification of Nanostructured Materials, cause of interest in Nanomaterial's, Nanomaterial's preparation-present and future applications of Nanomaterials,special nanomaterial's, characterization and tools: carbon nanotubes, Nano composites, carbon fullerenes: An overview of preparation, properties, Electron microscopy techniques: scanning Electron Microscopy, Transmission Electron Microscopy, scanning probe Microscopy-X ray Methods

UNIT-V

Nano Electronics-Introduction to micro, Nano fabrication: optical lithography, Electron beam lithography, Atomic lithography, Molecular beam Epitaxy, MEMS-Introduction, principles, Types of MEMS:-Mechanical, Thermal, Magnetic MEMS, Fabrication of MEMS.

Text /Reference Books:

1. Nano Materials by A S Edelstein& R C Cammarata, Institute of physics publishing, Bristic and Philadelphia
2. Nanotechnology by Mark Ratner & Danier Ratner, Prentice Hall.
3. Micro Manufacturing and Nano technology by N.P.Mahalik.
4. G.W. Hanson, Fundamentals of Nano electronics, Pearson, 2009.
5. W. Ranier, Nano electronics and Information Technology (Advanced Electronic Material and Novel Devices), Wiley-VCH, 2003.
6. K.E. Drexler, Nano systems, Wiley, 1992.

E-resources and other digital material

nptel.iitm.ac.in/courses.php?branch=Ece , www.cdeep.iitb.ac.in

Course outcomes

Upon successful completion of the course, the student will be able to:

1. Understand various aspects of Nano-technology and the processes involved in making Nano- components and material.
2. Leverage advantages of the Nano-materials and appropriate use in solving practical problems.
3. Understand various aspects of Nano-technology and the processes involved in making Nano-
components and material
4. Leverage advantages of the Nano-materials and appropriate use in solving practical problems.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	-	1	1
CO2	1	3	3	3	2	-	-	-	-	-	2	1	1	1
CO3	1	1	3	1	3	1	1	-	1	2	-	-	1	-
CO4	1	1	1	1	1	-	-	-	-	-	-	-	1	1

EC604C-Sensors and Transducers

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview: It is important to understand the concepts of Sensors and Transducers. When selecting a system to use, it is important to understand the tradeoff among various components, so you can accurately use appropriate instruments. This course will cover the basic concepts of instrumentation that are important for you to understand, including the requirements for specific applications.

Course Objectives:

The purpose of the course is

1. To know the performance characteristics of instrument and the quality of measurement based on the type of transducer based on the transduction principles.
2. Understanding the concepts of Measurements and Developments in Sensor Technology.

UNIT- I

Instrument Characteristics: Block diagram of generalized instrument system, Static characteristics - Desirable & Undesirable characteristics; Dynamic characteristics - Transfer function, Dynamic response of zero order, First order and second order instruments to step input. **Measurement Errors and Statistical Analysis:** Definition of parameters, Combination of limiting error, Statistical treatment, Curve fitting methods.

UNIT- II

Transducers: Classification of transducers, Characteristics of transducers.
Passive Transducer Principles: Variable resistance - Change in length and area; Variable inductance - Change in self-inductance, Change in mutual inductance, Production of eddy currents, Variable capacitance - Change in area, Distance and dielectric**.**

UNIT- III

Active Transducer Principles: Thermoelectric, Piezoelectric and Photoelectric effects
Displacement Measurement: Introduction, Pneumatic transducers - Flapper Nozzle transducer; Electrical transducers - Resistive, inductive and capacitive; Digital displacement transducer

UNIT- IV

Velocity, Acceleration and Vibration Measurement: Electromagnetic tachometer, Digital Methods - Photo electric and toothed rotor variable reluctance tachometers, Principles of accelerometers, Types of accelerometers - LVDT, Strain gauge and piezo electric accelerometers.

UNIT- V

Developments in Sensor Technology: Introduction, Smart sensors, Micro sensors, IR radiation sensors, Ultrasonic sensors, Fiber optic sensors, Chemical sensors and Bio sensors.

Text Books:

1. A.K.Ghosh, "Introduction to Measurements & Instrumentation", 3rd Ed., PHI, 2009. (UNIT I)
2. A.K.Sawhney & Puneet Sawhney, "A Course in Mechanical Measurements & Instrumentation", 12th Ed., Dhanapat Rai & Co., 2012. (UNIT II & III)
3. D.V.S.Murty, "Transducers & Instrumentation", 2nd, Ed., PHI. (UNIT IV)

Reference Books:

1. Raman Pallas-Arney & John G.Webster, "Sensors & Signal Conditioning", 2nd Ed., J. Wiley, 2012.
2. D.Patranabis, "Sensors and Transducers" 2nd Ed., PHI, 2013

E-resources and other digital material

1. http://nptel.ac.in/courses/112103174/4
2. http://nptel.ac.in/courses/112103174/3

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Analyze the various performance characteristics of instrument and the quality of Measurement.
2. Identify the type of transducer based on the transduction principles.
3. Select the relevant transducer for measurement of displacement, velocity and acceleration to meet the requirements of industrial applications.
4. Identify the additional attributes in advanced sensors.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	1	-	-
CO3	1	1	1	1	1	1	1	-	-	-	-	-	-	-
CO4	1	1	1	1	1	-	-	-	-	-	-	-	-	2

EC604C- Electronic Instrumentation

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course deals with the basics of electronic instruments used in laboratory and industry. In the process they learn different type of instruments like voltmeter, ammeter, Q meter, Bridges, transducers and display devices CRO, CRT. After learning this subject student will be master in working principle and application of all types of instruments.

Course Objectives:

- To explain basic concepts and definitions in measurement.
- To describe the bridge configurations and their applications.
- To understand, design aspects and performance criterion of measuring instruments.
- To understand the working principle of various transducers.

UNIT-I

Measurement and Error: Definitions, accuracy and precision, types of errors.
DC Ammeters, DC Voltmeters, Series type ohmmeter, Shunt type ohmmeter. AC Voltmeter using rectifiers, True RMS responding voltmeter. Analog Instruments – Transistor voltmeter, micro voltmeter (chopper type) - DC differential voltmeter - AC voltmeters.

UNIT-II

Cathode Ray Oscilloscopes : Motion of electron in electric field and in magnetic field – Block diagram of CRO, CRT, Electrostatic deflection sensitivity – Vertical and Horizontal deflection systems – Principle of operation of Dual beam, Digital, Dual trace, Sampling and Storage CROs – Measurements with CRO (voltage, current, time, frequency, phase angle, Lissajous figures).

UNIT-III

Q meter and measurement methods.Bridges: Wheatstone, Kelvin's, Maxwell, Hay and Schering bridges. Wave analyzers (AF & RF) - Harmonic distortion analyzers – Spectrum analyzer.

UNIT-IV

Digital instruments – Digital voltmeters (Ramp, Dual slope, stair case, successive approximation types) Digital Multimeter, universal counter, Digital tachometer, Digital phase meter IEEE 488 Bus.

UNIT-V

Transducers – Classification and selection of transducers – strain gauges – Temperature measurement (resistance thermometer, thermo couples and thermistors) LVDT – Peizo electric transducer.

Text Books :

1. H.S.Kalsi, "Electronic Instrumentation" TMH, 1995.
2. Helfric and Cooper, "Modern Electronic Instrumentation and measurement techniques", PHI, 1995.
3. A.K.Sawhney , " Electrical and electronic measurements and instrumentation", Danapat Rai & Co.,18th edition., 2007.

E-resources and other digital material
1.https://nptel.ac.in/courses/108106070
2.https://nptel.ac.in/courses/108106070

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Emphasize the basic electronics measurement concepts & Design the different analog and digital

   electronics voltmeters
2. Identify and use different analyzers and oscilloscopes.
3. Design the Measurement of different bridges& generators to make measurements and analyze measurement.
4. Analyze the concepts of Transducers based on applications.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2	1	1	1	-	-	-	1	-	-	2	1	-
CO2	3	3	2	2	1	-	-	-	1	-	-	2	-	-
CO3	2	2	2	2	1	-	-	-	1	-	-	2	1	-
CO4	3	2	3	3	1	-	-	-	1	-	-	1	-	-

B.Tech. (R20) EC702C-Program Elective-III	
S. No	**Name of the Program Elective**
1.	Neural Networks and Fuzzy Logic
2.	Radar Systems
3.	Testing and Testability
4.	Bio-Medical Electronics

EC702C-NEURAL NETWORKS AND FUZZY LOGIC

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

To master the various fundamental concepts of fuzzy logic and artificial neural networks.

This will help you to get sufficient knowledge to analyze and design the various intelligent control systems

Course Objectives:

1. This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.
2. It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components.
3. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented. This subject is very important and useful for doing Project Work.
4. The main objective of this course is to provide the student with the basic understanding of neural networks and fuzzy logic fundamentals.

Unit – 1

Artificial Neural Networks: Introduction to neural networks, biological neurons, artificial neurons, McCulloch-Pitt's neuron model, neuron modeling for artificial neural systems, feed forward network, perceptron network, Supervised and un-supervised learning.

Learning Rules: Hebbian learning Rule, Perceptron learning Rule, Delta learning Rule, Winner-take-all learning rule, Out-star learning rule.

Unit – 2

Supervised Learning: Perceptrons, exclusive OR problem, single layer perceptron network, multi-layer feed forward networks: linearly non separable patter classification, delta learning rule for multi perceptron layer, error back propagation algorithm, training errors , ADALINE, introduction to Radial Basis Function Networks(RBFN).

Unit – 3

Un-Supervised Learning: Hamming net, Max net. Winner–take–all learning, counter propagation network, feature mapping, self-organizing feature maps

Applications of neural Algorithms: elementary aspects of applications of character recognition.

Neural Network control applications: Process identification, Basic dynamic learning control architecture.

Unit – 4

Fundamentals of fuzzy logic and fuzzy sets: Definition of fuzzy set , a-level fuzzy set , cardinality, operations on fuzzy sets: union, intersection, complement, Cartesian product, algebraic sum, definition of fuzzy relation, properties of fuzzy relations, fuzzy composition.

Unit – 5

Design of Fuzzy Systems: Components of fuzzy systems, functions of fuzzification, Rule base patterns, Inference mechanisms.

Methods of de-fuzzification: COG, COA, MOM, Weighted average, height methods, Design of Fuzzy Systems for temperature setting of water heater, fuzzy system for control of air conditioner.

Text / References Books:

1. S.Rajasekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy logic, and Genetic Algorithms", PHI, EEE, 2003.
2. FakhreddineO.Karrry&Clarance De Silva, " Soft Computing and Intelligent Systems, Design Theory, Tools and Applications", Pearson, 2009.
3. Jacek M Zurada, " Introduction to artificial Neural Systems", Jaico Publications.
4. Zimmerman, " Fuzzy Set Theory and its Applications" , Kluwer Academic Publishers.
5. Timothy J. Ross, " Fuzzy Logic with Engineering Applications" ,(McGrawHill).

Course Outcomes:

After successful completion of the course, the student will be In a position to

1. Understand the Biological neural systems and construction of artificial neural systems.
2. Understand and explain different learning rules
3. Understand the concept of pattern classification.
4. Identify the different types of supervised and unsupervised training algorithms.

Mapping of course outcomes with program outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	-	-	-	1	-	-	2	-	-
CO2	3	3	2	2	1	-	-	-	1	-	-	2	-	-
CO3	2	2	2	2	1	-	-	-	1	-	-	2	-	-
CO4	3	2	3	3	1	-	-	-	1	-	-	1	-	-

EC702C-RADAR ENGINEERING

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

It is important to understand the concepts of principles of Radar Engineering, Mri radar and practical applications of Radar.

Course Objectives: The purpose of the course is

1. To understand the basic principle of radar systems and Doppler and MTI Radar.
2. To know how the detection of Noise and principle of Radar receiver.

UNIT I

INTRODUCTION TO RADAR: Basic Radar, The simple form of the Radar Equation, Radar Block Diagram and operation, Applications of Radar, The Radar Equation, Detection of Signals in Noise, Receiver Noise and the Signal to-Noise Ratio, Probability Density Functions- Probabilities of Detection and False Alarm-Integration of Radar Pulses, Radar Cross Section of Targets Radar cross Section Fluctuations- Transmitter Power, Pulse Repetition Frequency-System losses.

UNIT-II

MTI Radar: Introduction to Doppler and MTI Radar- Delay Line Cancellers, Staggered Pulse Repetition Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance.

UNIT- III

Pulse Doppler Radar: Tracking with Radar, Mono-pulse Tracking, Conical Scan and Sequential Lobing, Limitations to Tracking Accuracy, Low-Angle Tracking: Tracking in Range, Other Tracking Radar Topics, Comparison of Trackers, Automatic Tracking with Surveillance Radars (ADT), Radar Antennas.

UNIT- IV

Detection of Signals in Noise: Introduction, Matched Filter Receiver, Detection Criteria, Detectors, Automatic Detector, Integrators, Constant-False Alarm Rate Receivers, The Radar operator, Signal Management

UNIT- V

The Radar Receiver: Receiver noise Figure, Super heterodyne Receiver, Radar Displays. Applications: Electronic Support Measure (ESM), Electronic Counter Measure (ECM), Electronic Counter-Counter Measure (ECCM), Stealth Technology.

Text Books:

1. Merrill I Skolnik, Introduction to Radar Systems, 3rd edition, TMH, 2003.
2. Principles of Modern radar system, M. H. Carpentier, Artech House,1998.
3. Radar Technology, Brookner, Eli, Artech House

4. Peyton Z Peebles Jr. (2004), “Radar Principles”, John Wiley Inc.,
5. Bahman Zohuri, ‘Radar Energy Warfare and the Challenges of Stealth Technology”, Springer.

E-resources and other digital material

1. https://ocw.mit.edu/resources/res-ll-003-build-a-small-radar-systemcapable-of-sensing-range- doppler-and-synthetic-aperture-radar-imagingjanuary-iap-2011/lecture-notes/
2. http://www.radartutorial.eu/07.waves/wa04.en.html

Course outcomes

Upon successful completion of the course, the student will be able to:

1. Understand the principles and applications of RADAR
2. Demonstrate the Doppler Effect and the concepts of continuous wave radars.
3. Analyze the tracking radar systems and mono pulse radar.
4. Understand radar signal detection in presence of noise and its performance

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**	**1**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**
CO2	1	1	1	2	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**
CO3	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**
CO4	**3**	**2**	**3**	**3**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**

EC702C-Testing and Testability

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Pre-requisite, if any: **Digital Logic Design**

Course Overview: The purpose of the course is know the to understand the VLSI testing, types of faults and Fault Diagnosis.

Course Objectives: The purpose of the course is

1. To learn the role of VLSI testing.
2. Understand the types of Faults, Design for Testability and Fault Diagnosis.

Unit-1

Role of testing in VLSI Design flow, Testing at different levels of abstraction, Fault error, defect, diagnosis, yield, Types of testing, Rule of Ten, Defects in VLSI chip. Modelling basic concepts, Functional modelling at logic level and register level, structure models, logic simulation, delay models.

Unit-2

Various types of faults, Fault equivalence and Fault dominance in combinational sequential circuits. Fault simulation applications, General fault simulation algorithms- Serial, and parallel, Deductive fault simulation algorithms. Combinational circuit test generation, Structural Vs Functional test, ATPG, Path sensitization methods.

Unit-3

Difference between combinational and sequential circuit testing, five and eight valued algebra, and Scan chain-based testing method. D-algorithm procedure, Problems, PODEM Algorithm, Problems on PODEM Algorithm. FAN Algorithm, Problems on FAN algorithm, Comparison of D, FAN and PODEM Algorithms. Design for Testability, Ad-hoc design, Generic scan-based design.

Unit-4

Classical scan-based design, System level DFT approaches, Test pattern generation for BIST, and Circular BIST, BIST Architectures, and Testable memory design-Test Algorithms -Test generation for Embedded RAMs.

Unit-5

Fault Diagnosis Logic Level Diagnosis - Diagnosis by UUT reduction - Fault Diagnosis for Combinational Circuits - Self-checking design - System Level Diagnosis.

Text Book(s):

1. M. Abramovici, M. Breuer, and A. Friedman, "Digital Systems Testing and Testable Design, IEEE Press, 1990.
2. Stroud, "A Designer's Guide to Built-in Self-Test", Kluwer Academic Publishers, 2002.

References & Web Resources:

3. M. Bushnell and V. Agrawal, "Essentials of Electronic Testing for Digital, Memory & Mixed-Signal VLSI Circuits", Kluwer Academic Publishers, 2000
4. V. Agrawal and S.C. Seth, Test Generation for VLSI Chips, Computer Society Press.1989.
5. M. Abramovici, M.A. Breuer and A.D. Friedman, "Digital Systems and Testable Design", Jaico Publishing House.
6. M.L. Bushnell and V.D. Agrawal, "Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits", Kluwer Academic Publishers.
7. P.K. Lala, "Digital Circuit Testing and Testability", Academic Press, 2002.
8. A.L. Crouch, "Design Test for Digital IC's and Embedded Core Systems", Prentice Hall International.

Course Outcomes: At the end of the course, the students will be able to:

1. Identify the significance of testable design
2. Understand the concept of yield and identify the parameters influencing the same
3. Specify fabrication defects, errors and faults.
4. Implement combinational and sequential circuit test generation algorithms and techniques to improve fault coverage

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	-	-	-	1	-	-	2	1	1
CO2	3	3	2	2	1	-	-	-	1	-	-	2	-	-
CO3	2	2	2	2	1	-	-	-	1	-	-	2	-	-
CO4	3	2	3	3	1	-	-	-	1	-	-	1	1	1

EC702C-Bio-Medical Instrumentation

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview: The purpose of the course is know the human physiology and various sources of

bioelectric signals and the types of electrodes to be used and Safety aspects to be followed.

Course Objectives: The purpose of the course is

1. To gain knowledge on human physiology for measurement of electrical and non-electrical parameter in the human body.
2. Understand medical assisting and therapy equipment and safety measures when using Bio-Medical Instrumentation.

Unit-1

Brief introduction to human physiology- Problems encountered while making measurements on a human body-Structure of cell – Function of each components of the cell – Membrane potential – Action potential – Generation and Conduction- Anatomy and Physiological aspects of respiration.

Unit-2

Bio-electrodes and bio-potential amplifiers ---Origin of bio potential and its propagation. Electrode-electrolyte interface, electrode–skin interface, half cell potential, impedance, polarization effects of electrode – non-polarizable electrodes. Types of electrodes - surface, needle and micro electrodes and their equivalent circuits. Recording problems .

Unit-3

. Need for bio-amplifier - single ended bio-amplifier, differential bio-amplifier, isolation amplifiers, Chopper amplifier. ECG, EEG, EMG Lead systems and recording methods, Typical waveforms.

Unit-4

Measurement of blood temperature, pressure and flow. Impedance plethysmography. Ultrasonic, X-ray and nuclear imaging.

Prostheses and aids: Introduction to Pacemakers, defibrillators, heart-lung machine, Dialyzers, Diathermy .

Unit-5

Safety aspects: – devices to protect against electrical hazards – Ground fault interrupter, isolation transformer, line isolation monitor, receptacle tester, electrical safety analyzer equipment, preventive maintenance.

Text Book:

1. Leslie Cromwell, Fred. J, Weibell and Erich A. Pleiffer, “Biomedical Instrumentation and Measurements”, 2nd Ed., Prentice Hall of India, 2004
2. R.S.Kandpur. “Handbook of Biomedical Instrumentation”, 2nd Ed., TataMcGraw Hill, 2011
3. Webster, “Medical Instrumentation Application & Design”, John Wiley & Sons

E-resources and other digital material:

1. http://www.eeeuniversity.com/2013/08/ei2311-biomedical-instrumentation.html

Course outcomes: Upon successful completion of the course, the student will be able to:

1. Understand the physical foundations of biological systems and bioelectric potentials in medical field and Examine the various sources of bioelectric signals and the types of electrodesto be used.
2. Describe the acquisition and amplification of the bio-signals
3. Gain knowledge on the measurement of electrical and non-electrical parameter in the human body and Understand medical assisting and therapy equipment.
4. Discuss on electrical safety, hazards, protection against shock and testing of electrical systems

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	2	-	-
CO3	2	2	2	2	-	-	-	-	-	-	-	2	-	-
CO4	3	2	3	3	1	-	-	-	1	-	-	1	-	-

B.Tech. (R20) EC703C-Program Elective-IV	
S.No	**Name of the Program Elective**
1.	Satellite Communication
2.	Fiber Optic Communications
3.	Wireless Communications
4.	MEMS

EC703C-Satellite Communication

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

This course will provide you with an in-depth background of satellite communication techniques, modern satellite multiple access, modulation and coding schemes, as well as providing an update on key emerging technologies and future systems.

Course Objectives:

1. To Enable students to become familiar with satellites and satellite services.
2. Study of satellite orbits and launching.
3. Study of Earth segment and space segment components.
4. Study of satellite access by various users.

Unit -1

Introduction to Satellite Communication: Principles and architecture of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications and frequency bands used for satellite communication.

Orbital Mechanics: Orbital equations, Kepler's laws, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity etc. of a satellite, concepts of Solar day and Sidereal day.

Unit -2

Satellite sub-systems: Study of Architecture and Roles of various sub-systems of a satellite system such as Telemetry, tracking, command and monitoring (TTC & M), Attitude and orbit control system (AOCS), Communication sub-system, power sub-systems etc.

Unit -3

Typical Phenomena in Satellite Communication: Solar Eclipse on satellite, its effects, remedies for Eclipse, Sun Transit Outage phenomena, its effects and remedies, Doppler frequency shift phenomena and expression for Doppler shift. Satellite link budget.

Unit -4

Satellite link budget: Flux density and received signal power equations, Calculation of System noise temperature for satellite receiver, noise power calculation, Drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions.

Unit -5

Modulation and Multiple Access Schemes: Various modulation schemes used in satellite communication, Meaning of Multiple Access, Multiple access schemes based on time, frequency, and code sharing namely TDMA, FDMA and CDMA.

Text /Reference Books:

1. Timothy Pratt Charles W. Bostian, Jeremy E. Allnutt: Satellite Communications: Wiley India. 2nd edition 2002.
2. Tri T. Ha: Digital Satellite Communications: Tata McGraw Hill, 2009.
3. Dennis Roddy: Satellite Communication: 4th Edition, McGraw Hill, 2009.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Visualize the architecture of satellite systems as a means of high speed, high range communication system.
2. State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.
3. Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1	PO1	PS01	PS02
CO1	3	3	2	1	1	-	-	-	-	-	1	1	-	1
CO2	2	3	1	2	1	-	-	-	-	-	-	-	-	1
CO3	1	1	3	3	1	-	-	-	-	-	1	-	-	1

-

EC703C-Fiber Optic Communications

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

Optical fibers have several advantages over conventional copper cables. Optical communication enjoys high bandwidth and thus useful for transmitting huge information securely and with less repeaters to longer distances. The performance of optical system is superior to conventional communication and thus has widespread use in industry.

Course Objectives:

Optical Communication has got greater applicability and students of Communication discipline should master the subject. This course will enable the students:

1. To understand deeply the fundamental aspects of optical communication
2. To analyze the types of fibers and understand the performance by comparison
3. To design optical receivers of optical systems
4. To simulate the performance through parameters like BER and S/N Ratio
5. To apply the principles of optical communication to networks.

Unit -1

Overview of Optical Fiber Communication: The evolution of fiber optic systems, elements of an optical fiber transmission link, block diagram, advantages of optical fiber communication, applications.

Introduction to vector nature of light, propagation of light, Ray theory transmission, total internal reflection, acceptance angle, numerical aperture and skew rays, propagation of light in a cylindrical dielectric rod, Ray model, wave model., Modes, electromagnetic mode theory and propagation, single mode and multimode fibers, linearly polarized modes.

Unit -2

Different types of optical fibers, Fiber material, fiber cables and fiber fabrication, fiber joints, fiber connectors, splicer, Modal analysis of a step index fiber. Signal degradation on optical fiber due to dispersion and attenuation, Fabrication of fibers and measurement techniques like OTDR.

Unit -3

Optical Sources and Detectors: Coherent and non-coherent sources, quantum efficiency, modulation capability of optical sources, LEDs: Working principle and characteristics, Laser diodes: Working principle and characteristics, Working principle and characteristics of Photo-detectors: PIN-diodes, APDs, detector responsivity, noise analysis in detectors, coherent and non-coherent detection

Unit -4

Optical Receiver, Switches & Amplifiers

Receiver structure, bit error rate of optical receivers, and receiver performance, Optical link design - BER calculation, quantum limit, power penalties.
Optical switches - coupled mode analysis of directional couplers, electro-optic switches.
Optical amplifiers - EDFA, Raman amplifier.

Unit -5

Optical Networks: SONET and SDH standards, architecture of optical transport networks (OTNs), network topologies, Operational principle of WDM and DWDM systems, WDM network elements and Architectures, Principles of WDM networks, Solutions.
Nonlinear effects in fiber optic links: Concept of self-phase modulation, group velocity dispersion and solution based communication.

Text/Reference Books:

1. J. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 (Indian Edition).
2. John M. Senior, Optical Fiber Communications: Principles and Practice, Pearson, 3rd Ed. 2008.

G. Agrawal, Nonlinear fibre optics, Academic Press, 2nd Ed. 1994.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the principles fiber-optic communication, the components and the bandwidth advantages.
2. Understand the properties of the optical fibers and optical components.
3. Understand operation of lasers, LEDs, and detectors.
4. Analyze system performance of optical communication systems and design optical networks and understand non-linear effects in optical fibers.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	2	-	-	-	-	-	-	-	-	-	-	1		1
CO2	2	2	-	-	-	-	-	-	-	-	-	1	1	
CO3	2	1	3									2	1	
CO4	-	-	-	-	2	2	-	2	-	1	2	-		

EC703C-WIRELESS COMMUNICATION

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description:

This course provides a comprehensive overview and advanced knowledge of modern mobile and wireless communication systems. Building on the prior knowledge on digital communications, students develop further understanding on the challenges and opportunities brought by the wireless medium in designing current and future wireless communication systems and networks.

Course Objectives:

1. To provide the students with the fundamental treatment about many practical and theoretical concepts that forms Basic of wireless communications.
2. To equip the students with various kinds of wireless networks and it's operations .
3. To provide an to provide analytical perspective on the design and analysis of traditional and emerging wireless networks, And to discuss the need to get off and solution methods, the fundamental problems in wireless networking .
4. To train students do understand the architecture and operation of various wireless wide area networks such as GSM, IS-95, GPRS and SMS.
5. To train students to understand wireless LAN architectures and operations.
6. To prepare students to understand the emerging techniques OFDM and its importance in the wireless communications.

UNIT-I

THE CELLULAR CONCEPT-SYSTEM DESIGN FUNDAMENTALS: Introduction, Frequency reuse, Channel assignment strategies, Handoffs strategies-prioritizing handoffs, Practical handoff considerations, Interference and system capacity – Co-channel interference and system capacity, Channel planning for wireless systems, Adjacent channel interference, Power control for reducing interference, Trunking and grade of service, Improving coverage and capacity in cellular systems - Cell splitting, Sectoring.

UNIT-II

MOBILE RADIO PROPAGATION LARGE-SCALE PATH LOSS: Introduction to radio wave propagation, Free space propagation model, Relating power to electric field, The three basic propagation mechanisms, Reflection-reflection from dielectrics, Brewster angle, Reflection from prefect conductors, Ground reflection (two-ray) model, Diffraction-fresnel zone geometry, Knife-edge diffraction model, Multiple knife-edge diffraction, Scattering, Outdoor propagation models-Longley-Ryce model, Okumura model, Hata model, PCS extension to Hata model, Walfisch and Bertoni losses (Same floor), Partition losses between floors, Log-distance path loss model, Ericsson multiple breakpoint model, Attenuation factor model, Signal penetration into buildings, Ray tracing and site specific modeling.

UNIT-III

MOBILE RADIO PROPAGATION: SMALL-SCALE FADING AND MULTIPATH: Small scale multipath propagation-factors influencing small scale fading, Doppler shift, Impulse response

model of a multipath channel-Relationship between Bandwidth and received power, small-scale multipath measurements Direct RF pulse system, Spread spectrum sliding correlator channel sounding, Frequency domain channels sounding, Parameters of mobile multipath channels-time dispersion parameters, Coherence bandwidth, Doppler spread and coherence time, Types of small-scale fading-fading effects, Due to multipath time delay spread, flat fading, Frequency selective fading, Fading effects due to Doppler spread-fast fading, Slow fading, Statistical models for multipath fading channels-clarke's model for flat fading, Spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and gans fading model, Level crossing and fading st statistics, Two-ray Rayleigh fading model.

UNIT-IV

EQUALIZATION AND DIVERSITY: Introduction, Fundamentals of equalization, Training a generic adaptive equalizer, Equalizers in a communication receiver, Linear equalizers, Non-linear equalization Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-zero forcing algorithm, Least means square algorithm, Recurisve least squares algorithm, Diversity techniques-derivation of selection diversity improvement, Derivation of maximal ratio combining improvement, Practical space diversity consideration-selection diversity, Feedback or scanning diversity, Maximal ratio combining, Equal gain combining, Polarization diversity, Frequency diversity, Time diversity, RAKE receiver.

UNIT-V

WIRELESS NETWORKS: Introduction to wireless networks, Advantages and disadvantages of wireless local area networks, WLAN topologies, WLAN standard IEEE 802.11, IEEE 802.11 medium access control, Comparision of IEEE 802.11 a, b, g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

TEXT BOOKS:

1. Rappaport,T.S., ―Wireless communications‖, Pearson Education, Second Edition, 2010.(UNIT I, II, IV)
2. Andreas.F. Molisch, ―Wireless Communications‖, John Wiley – India, 2006.(UNIT III,V)

REFERENCES:

1. Wireless Communication –Andrea Goldsmith, Cambridge University Press, 2011
2. Van Nee, R. and Ramji Prasad, ―OFDM for wireless multimedia communications, Artech House, 2000
3. David Tse and Pramod Viswanath, ―Fundamentals of Wireless Communication, Cambridge University Press, 2005.
4. Upena Dalal, ―Wireless Communication‖, Oxford University Press, 2009.

Course Outcomes:

Upon completion of the course, the student will be able to:

1. Understand the principles of wireless communications.
2. Understand fundamentals of wireless networking.
3. Understand cellular system design concepts.
4. Analyse various multiple access schemes used in wireless communication.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	2	-	-	-	-	-	-	-	-	-	-	1	-	1
CO2	2	-	-	2	-	-	-	-	-	-	-	1	-	1
CO3	-	1	2	-	-	2	-	-	-	-	2	-	-	
CO4	1	2	1	1	-	-	-	-	-	-	1	2	-	1

EC703C-MEMS

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Overview:

The course will cover fabrication technologies, material properties, structural mechanics, basic sensing and actuation principles, packaging, and MEMS markets and applications. The course will emphasize the fabrication and materials of micro/nano systems.

Course Objectives:

1. Key aim is to learn micro-electro-mechanical systems (MEMS) and micro-integrated system.
2. Properties of useful materials will be discussed in context to MEMS and BioMEMS. Micro-electronics process modules used in the design and fabrication of MEMS and micro-integrated systems will be presented.
3. Applications of these systems in a variety of sensors and transducers for broad ranges of implantable biomedical applications will be described.
4. Recent advances in wearable biomedical applications of MEMS and bio MEMS will also be discussed in detail.

Unit -1

Introduction and Historical Background, Scaling Effects, Micro/Nano Sensors.

Unit -2

Actuators and Systems overview: Case studies.

Unit -3

Review of Basic MEMS fabrication modules: Oxidation, Deposition Techniques, Lithography (LIGA), and Etching.

Unit -4

Micromachining: Surface Micromachining, sacrificial layer processes, Stiction, Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding.

Unit -5

Mechanics of solids in MEMS/NEMS: Stresses, Strain, Hookes's law, Poisson effect, Linear Thermal Expansion, Bending; Energy methods, Overview of Finite Element Method, Modeling of Coupled Electromechanical Systems.

Text/Reference Books:

1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalkrishnan K. N. Bhat, V. K. Aatre, Micro and Smart Systems, Wiley India, 2012.

2. S. E.Lyshevski, Nano-and Micro-Electromechanical systems: Fundamentals of Nano-and
3. Microengineering (Vol. 8). CRC press, (2005).
4. S. D. Senturia, Microsystem Design, Kluwer Academic Publishers, 2001.
5. M. Madou, Fundamentals of Microfabrication, CRC Press, 1997.
6. G. Kovacs, Micromachined Transducers Sourcebook, McGraw-Hill, Boston, 1998.
7. M.H. Bao, Micromechanical Transducers: Pressure sensors, accelerometers, and Gyroscopes, Elsevier, New York, 2000.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Appreciate the underlying working principles of MEMS and NEMS devices.
2. Design and model MEM devices.
3. Gain a knowledge of basic approaches for various sensor design
4. Gain the technical knowledge required for computer-aided design, fabrication, analysis and characterization of Nano-structured materials, micro- and Nano-scale devices.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	2	1	3	2	2	1	-	-	-	-	1	1	-	-
CO2	1	-	3	3	1	1	1	-	-	-	-	-	1	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO4	2	3	2	1	-	-	-	-	-	1	1	-	-	-

B.Tech. (R20) EC704C-Program Elective-V	
S.No	**Name of the Program Elective**
1.	Embedded System Design
2.	Real Time Operating System
3.	FPGA Based System Design
4.	Digital Signal Processors & Architectures

EC704C-Embedded System Design

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description:

This course is **to enable the students to understand embedded-system programming and apply that knowledge to design and develop embedded solutions**. Interaction with peripheral devices. Activities. Identify hardware and software components to build an embedded system.

Prerequisite: Microprocessors and Microcontrollers; Computer Organization and Operating Systems.

Course Objectives:

1. To provide an overview of Design Principles of Embedded System.
2. To provide clear understanding about the role of firmware.
3. To understand the necessity of operating systems in correlation with hardware systems.
4. To learn the methods of interfacing and synchronization for tasking.

UNIT - I:

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT - II:

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT - III:

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT - IV:

RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT - V:

Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Methods to Choose an RTOS.

TEXT BOOKS:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

REFERENCE BOOKS:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education.
5.

Course Objectives:

1. To provide an overview of Design Principles of Embedded System.
2. To provide clear understanding about the role of firmware.
3. To understand the necessity of operating systems in correlation with hardware systems.
4. To learn the methods of interfacing and synchronization for tasking.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	**3**	1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	1	-	1	1	-	**-**	**-**	**-**	**1**	**-**	**-**	1	-	-
CO3	2	2	2	1	-	**-**	**-**	**-**	**1**	**-**	**-**	**2**	-	-
CO4	3	2	1	-	-	**-**	**-**	**-**	**1**	**-**	**-**	**1**	-	-

EC704C-Real Time Operating System

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Abstract / Outline:

In several software applications, especially in embedded application, the operating system is required to support the application to meet the timing constraints. The operating system achieves this by deploying suitable scheduling algorithms. A major problem arises, when the real-time tasks share resources. Priority inversions can take place in this case, unless suitable techniques are deployed. Starting with a brief introduction to real-time operating systems, we first discuss the important real-time task/thread scheduling algorithms and resource sharing protocols. An effort towards standardization of real-time operating systems has come to be known as POSIX-RT. We review POSIX-RT requirements. Besides, we review several commercial and open source real-time operating systems.

Prerequisites: C Programming, Computer Organization and Operating Systems, and Operating Systems.

Course Objectives:

1. To provide an overview of Design Principles of Embedded System.
2. To provide clear understanding about the role of firmware.
3. To understand the necessity of operating systems in correlation with hardware system.
4. To learn the methods of interfacing and synchronization for tasking.

UNIT – I:

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O, (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT – II:

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use.

UNIT – III:

Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem.

UNIT – IV:

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT – V:

Case Studies of RTOS: RT Linux, Micro C/OS-II, Vx Works, Embedded Linux, and Tiny OS.

TEXT BOOK:

1. Qing Li, "Real Time Concepts for Embedded Systems", 2011, Elsevier.

REFERENCE BOOKS:

1. Rajkamal, "Embedded Systems- Architecture, Programming, and Design", 2007, TMH.
2. W. Richard Stevens, Stephan A. Rago, "Advanced UNIX Programming", 2006, 2nd Edition, Pearson.
3. Dr. Craig Hollabaugh, "Embedded Linux: Hardware, Software and Interfacing", 2008, 1st Edition, Pearson.

Course Outcomes:

1. Understand concepts of Real-Time systems and modeling
2. Recognize the characteristics of a real-time system
3. Understand and develop document on an architectural design of a real-time system
4. Develop and document Task scheduling, resource management, real-time operating systems and fault tolerant applications of Real-Time Systems.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	**3**	1	2	1	-	-	-	-	-	-	1	1	-	1
CO2	2	**1**	1	1	-	**-**	**-**	**-**	-	**-**	**-**	-	-	-
CO3	2	3	**3**	2	1	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO4	1	3	**3**	1	1	**-**	**-**	**-**	**1**	**-**	1	**1**	**-**	**-**

EC704C-FPGA Based System Design

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Pre-Requisite(s): Digital Logic Design

Course Description: This course covers the advanced design and analysis of digital circuits with HDL. The primary goal is to provide in depth understanding of system design. The course enables students to apply their knowledge for the design of advanced digital hardware systems with help of FPGA tools.

Course Objectives:

1. Understand Digital system design using HDL.
2. Know FPGA architecture, interconnect and technologies.
3. Know different FPGA's and implementation methodologies.
4. Understand configuring and implementing digital embedded system, micro-controllers, microprocessors, DSP algorithms on FPGA.

UNIT I:

Verilog HDL Coding Style: Lexical Conventions - Ports and Modules – Operators - Gate Level Modeling - System Tasks &Compiler Directives - Test Bench - Data Flow Modeling - Behavioral level Modeling -Tasks & Functions.

UNIT II:

Overview of FPGA Architectures and Technologies: FPGA Architectural options, coarse vs fine grained, vendor specific issues (emphasis on Xilinx FPGA), Antifuse, SRAM and EPROM based FPGAs, FPGA logic cells, interconnection network and I/O Pad.

UNIT III:

Verilog Modelling of Combinational and Sequential Circuits: Behavioral, Data Flow and Structural Realization – Adders – Multipliers- Comparators - Flip Flops - Realization of Shift Register - Realization of a Counter- Synchronous and Asynchronous FIFO –Single port and Dual port RAM – Pseudo Random LFSR – Cyclic Redundancy Check.

UNIT IV

Synchronous Sequential Circuits: State diagram-state table –state assignment-choice of flipflops – Timing diagram –One hot encoding Mealy and Moore state machines – Design of serial adder using

Mealy and Moore state machines - State minimization – Sequence detection- Design examples: Sequence detector, Serial adder, Vending machine using One Hot Controller. Optimization of Speed: Introduction, Strategies for Timing Improvement; Optimization of Area, Optimization of power.

Unit V

FPGA and its Architecture: Types of Programmable Logic Devices- PLA & PAL- FPGA Generic Architecture. Types of FPGAs, CLBs vs LAB vs Slices, MUX vs LUT based logic implementation, ALTERA Cyclone II Architecture – Timing Analysis and Power analysis using Quartus-II- SOPC Builder- NIOS-II Soft-core Processor- System Design Examples using ALTERA FPGAs – Traffic light Controller, Real Time Clock -Interfacing using FPGA: VGA, Keyboard, LCD.

Text Books:

1. M.J.S. Smith, "Application Specific Integrated Circuits", Pearson, 2000.
2. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis" Prentice Hall, Second Edition, 2003, ISBN: 0130449113.
3. Wayne Wolf, "FPGA Based System Design", with CD-ROM, 2004, Prentice Hall, ISBN: 0131424610.
4. S. Ramachandran, "Digital VLSI System Design: A Design Manual for implementation of Projects on FPGAs and ASICs Using Verilog" Springer Publication, 2007.
5. Stephen Brown & ZvonkoVranesic, "Digital Logic Design with Verilog HDL" TATA McGraw Hill Ltd. 2nd Edition 2007.

References:

1. Pong P. Chu, "FPGA Prototyping by Verilog Examples: Xilinx Spartan-3," Wiley-Interscience, 1st Edition, 2008, ISBN-10: 0470185325.
2. Steven Kilts, "Advanced FPGA Design: Architecture, Implementation and Optimization" Wiley-IEEE Press, 1st Edition, 2007, ISBN:0470054379
3. Peter Ashenden, "Digital Design using Verilog", Elsevier, 2007.
4. Michael D. Ciletti, "Advanced Digital Design with the Verilog HDL," First Edition, 2003, Prentice Hall, ISBN: 0130891614.

Course Outcomes: Upon successful completion of this course, students will be able to:

1. Design and optimize complex combinational and sequential digital circuits by using Verilog HDL.
2. Design and model digital circuits with Verilog HDL at behavioural, structural, and RTL Levels.
3. Develop test benches to simulate combinational and sequential circuits and analyse Digital design in terms of area, power and speed..
4. Understand the FPGA Architecture and Implementation of the combinational and sequential digital circuits in FPGA.

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	1	-	-	2	-	-
CO3	-	-	3	-	-	-	-	-	1	-	-	2	-	-
CO4	-	-	3	-	-	-	-	-	1	-	-	1	-	-

EC704C-Digital Signal Processors & Architectures

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description:

This course explains fundamental concepts of Digital Signal Processing and implementation of various applications on Advanced Processor. Helps students to understand architecture of advanced Digital Signal Processor and how to program it for signal processing applications.

Prerequisite: Students should have an understanding of Microcontroller architecture as well as basic C and assembly language programming skills and basic understanding of discrete time signals and systems

Course Objectives:

1. To describe features and architectural improvements of DSP processors.
2. To introduce addressing modes and instruction description of TMS320C6x processors.
3. To demonstrate data representation in DSP Processors and FIR filters.
4. 4. To demonstrate the usefulness of the adaptive filters and learn techniques of code optimization.

Unit 1

Programmable DSP Hardware: Processing Architectures (von Neumann, Harvard), DSP core algorithms (FIR, IIR, Convolution, Correlation, FFT), IEEE standard for Fixed and Floating Point Computations, Special Architectures Modules used in Digital Signal Processors (like MAC unit, Barrel shifters), On-Chip peripherals, DSP benchmarking.

Unit 2

Structural and Architectural Considerations: Parallelism in DSP processing, Texas Instruments TMS320 Digital Signal Processor Families, Fixed Point TI DSP Processors: TMS320C1X and TMS320C2X Family,TMS320C25 –Internal Architecture, Arithmetic and Logic Unit, Auxiliary Registers, Addressing Modes (Immediate, Direct and Indirect, Bit-reverse Addressing), Basics of TMS320C54x and C55x Families in respect of Architecture improvements and new applications fields, TMS320C5416 DSP Architecture, Memory Map, Interrupt System, Peripheral Devices, Illustrative Examples for assembly coding.

Unit 3

VLIW Architecture: Current DSP Architectures, GPUs as an alternative to DSP Processors, TMS320C6X Family, Addressing Modes, Replacement of MAC unit by ILP, Detailed study of ISA, Assembly Language Programming, Code Composer Studio, Mixed Cand Assembly Language programming, On-chip peripherals, Simple applications developments as an embedded environment.

Unit 4

Multi-core DSPs: Introduction to Multi-core computing and applicability for DSP hardware, Concept of threads, introduction to P-thread, mutex and similar concepts, heterogeneous and homogenous multi-core systems, Shared Memory parallel programming –OpenMP approach of parallel programming, PRAGMA directives, OpenMP Constructs for work sharing like for loop, sections, TI TMS320C6678 (Eight Core subsystem).

Unit 5

FPGA based DSP Systems: Limitations of P-DSPs, Requirements of Signal processing for Cognitive Radio (SDR), FPGA based signal processing design-case study of a complete design of DSP processor,High Performance Computing using P-DSP: Preliminaries of HPC, MPI, OpenMP, multicore DSP as HPC infrastructure.

Textbooks and References:

1. M. Sasikumar, D. Shikhare, Ravi Prakash, "Introduction to Parallel Processing", 1st Edition, PHI, 2006.
2. Fayez Gebali, "Algorithms and Parallel Computing",1st Edition, John Wiley & Sons, 2011
3. Rohit Chandra, Ramesh Menon, Leo Dagum, David Kohr, DrorMaydan, Jeff McDonald,"Parallel Programming in OpenMP", 1st Edition, Morgan Kaufman,2000.
4. Ann Melnichuk,Long Talk, "Multicore Embedded systems", 1st Edition, CRC Press,2010.
5. Wayne Wolf, "High Performance Embedded Computing: Architectures, Applications and Methodologies", 1st Edition, Morgan Kaufman, 2006.
6. E.S.Gopi, "Algorithmic Collections for Digital Signal Processing Applications Using MATLAB", 1st Edition, Springer Netherlands,2007.

Course Outcomes:

At the end of this course students will be able to

1. Identify and formalize architectural level characterization of P-DSP hardware
2. Ability to design, programming (assembly and C), and testing code using Code Composer Studio environment
3. Deployment of DSP hardware for Control, Audio and Video Signal processing applications
4. Understanding of major areas and challenges in DSP based embedded systems

Mapping of course outcomes with program outcomes:

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	**3**	2	2	1	-	-	-	-	-	-	-	-	1	-
CO2	1	**3**	3	3	-	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**
CO3	1	3	**3**	3	2	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**1**	**-**
CO4	1	1	**1**	1	-	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**-**	**-**

SYLLABUS

FOR

Honors Degree, Minors in Electronics and Minors in Communications

Courses offered for Honors degree

ECHN01- Advanced Digital Signal Processing

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: Digital signal processing is a method of processing real world signals (represented by a sequence of numbers) using mathematical techniques to perform transformations or extract information.

Course Objectives:

1. To analyze multirate DSP systems.
2. To determine coefficients for perfect reproduction filter banks and wavelets.
3. To choose parameters to take a wavelet transform, and interpret and process the result.

UNIT-I

Multi rate DSP, Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, poly phase filters, QMF, digital filter banks, Applications in sub band coding

UNIT-II

Linear prediction & optimum linear filters, stationary random process, forward-backward linear prediction filters, solution of normal equations, AR Lattice and ARMA Lattice-Ladder Filters, Wiener Filters for Filtering and Prediction.

UNIT-III

Adaptive Filters, Applications, Gradient Adaptive Lattice, Minimum mean square criterion, LMS algorithm, Recursive Least Square algorithm

UNIT-IV

Estimation of Spectra from Finite-Duration Observations of Signals. Nonparametric Methods for Power Spectrum Estimation, Parametric Methods for Power Spectrum Estimation, Minimum-Variance Spectral Estimation, Eigenanalysis Algorithms for Spectrum Estimation.

UNIT-V

Application of DSP & Multi rate DSP, Application to Radar, introduction to wavelets, application to image processing, design of phase shifters, DSP in speech processing & other applications.

Text Books :

1.J.G.Proakis and D.G.Manolakis"Digital signal processing: Principles, Algorithm and Applications", 4th Edition, Prentice Hall, 2007.
2.N. J. Fliege, "Multirate Digital Signal Processing: Multirate Systems -Filter Banks – Wavelets", 1st Edition, John Wiley and Sons Ltd, 1999.
3.Bruce W. Suter, "Multirate and Wavelet Signal Processing",1st Edition, Academic Press, 1997.
4.M. H. Hayes, "Statistical Digital Signal Processing and Modeling", John Wiley & Sons Inc., 2002.
5.S.Haykin, "Adaptive Filter Theory", 4th Edition, Prentice Hall, 2001.
6.D.G.Manolakis, V.K. Ingle and S.M.Kogon, "Statistical and Adaptive Signal Processing", McGraw Hill, 2000.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. To understand theory of different filters and algorithms
2. To understand theory of multi rate DSP, solve numerical problems and write algorithms
3. To understand theory of prediction and solution of normal equations
4. To know applications of DSP at block level

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1					1			
CO2	3		3		1	1					2			
CO3	3	2	2	3	2	2					3	3	3	3
CO4	3	2	2	2	2	2					3	3	3	3

ECHN02- Antennas and Radiating Systems

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: Radiation intensity, or the antenna power pattern, in a given direction is defined as the power radiated from an antenna per unit solid angle. The radiation intensity is a far field parameter which can be obtained by simply multiplying the radiation power density by the square distance

Course Objectives:

1. To fundamental antenna parameters and numerical methods to analyze and differentiate the antennas.
2. To concept of radiation mechanism of various antennas.
3. To mechanism and models for radio-wave propagation.

UNIT-I

Types of Antennas: Wire antennas, Aperture antennas, Micro strip antennas, Array antennas Reflector antennas, Lens antennas, Radiation Mechanism, Current distribution on thin wire antenna.

Fundamental Parameters of Antennas: Radiation Pattern, Radiation Power Density, Radiation Intensity, Directivity, Gain, Antenna efficiency, Beam efficiency, Bandwidth, Polarization, Input Impedance, radiation efficiency, Antenna Vector effective length, Friis Transmission equation, Antenna Temperature.

UNIT-II

Linear Wire Antennas: Infinitesimal dipole, Small dipole, Region separation, Finite length dipole, half wave dipole, Ground effects.

Loop Antennas: Small Circular loop, Circular Loop of constant current, Circular loop with non uniform current.

UNIT-III

LinearArrays: Two element array, N Element array: Uniform Amplitude and spacing, Broadside and End fire array, Super directivity, Planar array, Design consideration.

UNIT-IV

Aperture Antennas: Huygen's Field Equivalence principle, radiation equations, Rectangular Aperture, Circular Aperture.

Horn Antennas: E-Plane, H-plane Sectoral horns, Pyramidal and Conical horns.

UNIT-V

Micro strip Antennas: Basic Characteristics, Feeding mechanisms, Method of analysis, Rectangular Patch, Circular Patch, Reflector Antennas: Plane reflector, parabolic reflector, Cassegrain reflectors, Introduction to MIMO.

Text Books :

1. Constantine A. Balanis, "Antenna Theory Analysis and Design", John Wiley & Sons, 4th edition, 2016.
2. John D Kraus, Ronald J Marhefka, Ahmad S Khan, "Antennas for All Applications", Tata McGraw-Hill, 2002.
3. R.C.Johnson and H.Jasik, "Antenna Engineering hand book", Mc-Graw Hill, 1984.
4. I.J.Bhal and P.Bhartia, "Micro-strip antennas", Artech house, 1980.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Compute the far field distance, radiation pattern and gain of an antenna for given current distribution.
2. Estimate the input impedance, efficiency and ease of match for antennas.
3. Compute the array factor for an array of identical antennas.
4. Design antennas and antenna arrays for various desired radiation pattern characteristics.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	1					1			
CO2	2	1	3	-	1	1					2			
CO3	3	2	2	2	2	2					3	2	2	2
CO4	2	2	2	2	2	1					3	2	2	2

CHN03- Wireless and Mobile Communications

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course offers an insight into the concepts of mobile and wireless data communication technologies. The objective of this course is to enable the student to understand the emerging technologies of wireless and mobile communications and simulate them.

Course Objectives:

1. To understand the new trends in mobile/wireless communications networks.
2. To understand multiple radio access techniques.
3. To analyze various routing algorithms used in mobile/wireless networks.
4. To identify the issues in transport and application layers.

UNIT-I

Cellular Communication Fundamentals: Cellular system design, Frequency reuse, cell splitting, handover concepts, Co channel and adjacent channel interference, interference reduction techniques and methods to improve cell coverage, Frequency management and channel assignment.GSM architecture and interfaces, GSM architecture details, GSM subsystems, GSM Logical Channels, Data Encryption in GSM, Mobility Management, Call Flows in GSM.2.5 G Standards: High speed Circuit Switched Data (HSCSD), General Packet Radio Service (GPRS), 2.75 G Standards: EDGE.

. **UNIT-II**

Spectral efficiency analysis based on calculations for Multiple access technologies: TDMA, FDMA and CDMA, Comparison of these technologies based on their signal separation techniques, advantages, disadvantages and application areas. Wireless network planning (Link budget and power spectrum calculations)

UNIT-III

Mobile Radio Propagation: Large Scale Path Loss, Free Space Propagation Model, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering, Practical Link Budget Design using Path Loss Models, Outdoor Propagation Models, Indoor Propagation Models, Signal Penetration into Buildings. Small Scale Fading and Multipath Propagation, Impulse Response Model, Multipath Measurements, Parameters of Multipath channels, Types of Small Scale Fading: Time Delay Spread; Flat, Frequency selective, Doppler Spread; Fast and Slow fading

UNIT-IV

Equalization, Diversity: Equalizers in a communications receiver, Algorithms for adaptive equalization, diversity techniques, space, polarization, frequency diversity, Interleaving

UNIT-V

Code Division Multiple Access: Introduction to CDMA technology, IS 95 system Architecture, Air Interface, Physical and logical channels of IS 95, Forward Link and Reverse link operation, Physical and Logical channels of IS 95 CDMA, IS 95 CDMA Call Processing, soft Handoff, Evolution of IS 95 (CDMA One) to CDMA 2000, CDMA 2000 layering structure and channels.

Higher Generation Cellular Standards:3G Standards: evolved EDGE, enhancements in 4G standard, Architecture and representative protocols, call flow for LTE, VoLTE, UMTS, introduction to 5G.

Text Books :

1. V.K.Garg, J.E.Wilkes, "Principle and Application of GSM", Pearson Education, 5th edition, 2008.
2. V.K.Garg, "IS-95 CDMA & CDMA 2000", Pearson Education, 4th edition, 2009.
3. T.S.Rappaport, "Wireless Communications Principles and Practice", 2nd edition, PHI,2002.
4. William C.Y.Lee, "Mobile Cellular Telecommunications Analog and Digital Systems", 2nd edition, TMH, 1995.
5. Asha Mehrotra, "A GSM system Engineering" Artech House Publishers Bosten, London, 1997.

Course outcomes :
Upon successful completion of the course, the student will be able to:

1. Apply frequency-reuse concept in mobile communications, and to analyze its effects on interference, system capacity, handoff techniques .
2. Distinguish various multiple-access techniques for mobile communications e.g. FDMA, TDMA, CDMA, and their advantages and disadvantages.
3. Analyze path loss and interference for wireless telephony and their influences on a mobile-communication system's performance.
4. Analyze and design CDMA system functioning with knowledge of forward and reverse channel details, advantages and disadvantages of using the technology

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1					1			
CO2	3		3		1	1					2			
CO3	3	2	2	3	1	1					3	3	3	3
CO4	3	2	2	2	1	1					3	3	3	3

ECHN04- Voice and Data Networks

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description:

This course provides an introduction to voice and data networking technologies, including public and priv ate voice services, Ethernet and Internet data technologies, network security, business applications and net work management. The structure, regulation, andhistory of the telecom and data network industry will be discussed as well.

Course Objectives:

1. To protocol, algorithms, trade-offs rationale.
2. To routing, transport, DNS resolutions
3. To network extensions and next generation architecture.

UNIT-I

Network Design Issues, Network Performance Issues, Network Terminology, centralized and distributed approaches for networks design, Issues in design of voice and data networks

. **UNIT-II**

Layered and Layer less Communication, Cross layer design of Networks, Voice Networks (wired and wireless) and Switching, Circuit Switching and Packet Switching, Statistical Multiplexing.

UNIT-III

Data Networks and their Design, Link layer design- Link adaptation, Link Layer Protocols, Retransmission. Mechanisms (ARQ), Hybrid ARQ (HARQ), Go Back N, Selective Repeat protocols and their analysis.

UNIT-IV

Queuing Models of Networks , Traffic Models , Little's Theorem, Markov chains, M/M/1 and other Markov systems, Multiple Access Protocols , Aloha System , Carrier Sensing , Examples of Local area networks.

UNIT-V

Inter-networking, Bridging, Global Internet, IP protocol and addressing, Sub netting, Classless Inter domain Routing (CIDR) , IP address lookup , Routing in Internet. End to End Protocols, TCP and UDP. Congestion Control, Additive Increase/Multiplicative Decrease, Slow Start, Fast Retransmit/ Fast Recovery, Congestion avoidance, RED TCP Throughput Analysis, Quality of Service in Packet Networks, Network Calculus, Packet Scheduling Algorithms.

Text Books :

1. D. Bertsekas and R. Gallager, “Data Networks”, 2nd Edition, Prentice Hall, 1992.
2. L. Peterson and B. S. Davie, “Computer Networks: A Systems Approach”,5th Edition, Morgan Kaufman, 2011.
3. Kumar, D. Manjunath and J. Kuri, “Communication Networking: An analytical approach”, 1st Edition, Morgan Kaufman, 2004.
4. Walrand,“Communications Network: A First Course”, 2nd Edition, McGraw Hill, 2002.
5. Leonard Kleinrock, “Queueing Systems,Volume I: Theory”, 1st Edition, John Wiley and Sons, 1975.
6. Aaron Kershenbaum,Telecommunication Network Design Algorithms,McGraw Hill, 1993.
7. Vijay Ahuja, “Design and Analysis of Computer Communication Networks”, McGraw Hill, 1987

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Understand Protocol, algorithms, trade-offs rationale.
2. Analyze Routing, transport, DNS resolutions
3. Know about Network extensions and next generation architectures
4. Analyze and design voice and data networking technologies

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1						1			
CO2	3		3		1	1					2			
CO3	3	2	2	3	2							3	3	3
CO4	3	2	2	2	2	2						3	3	3

ECHN05- Advanced Communication Networks

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: Basic techniques for modeling and analyzing communication networks. Fairness and utility functions, routing, congestion control, pricing, queuing models, loss networks, multi-class queues and scheduling.

Course Objectives:

1. To fairness and network utility maximization
2. To optimization based routing and congestion control
3. To basic queuing models and their application to switching and scheduling in networks.

UNIT-I

Overview of Internet-Concepts, challenges and history. Overview of -ATM. TCP/IP Congestion and Flow Control in Internet-Throughput analysis of TCP congestion control. TCP for high bandwidth delay networks. Fairness issues in TCP.

. UNIT-II

Real Time Communications over Internet. Adaptive applications. Latency and throughput issues. Integrated Services Model (intServ). Resource reservation in Internet. RSVP.
Characterization of Traffic by Linearly Bounded Arrival Processes (LBAP). Leaky bucket Algorithm and its properties.

UNIT-III

Packet Scheduling Algorithms-requirements and choices. Scheduling guaranteed service connections. GPS, WFQ and Rate proportional algorithms. High speed scheduler design. Theory of Latency Rate servers and delay bounds in packet switched networks for LBAP traffic.;
Active Queue Management - RED, WRED and Virtual clock. Control theoretic analysis of active queue management

UNIT-IV

IP address lookup-challenges. Packet classification algorithms and Flow Identification-Grid of Tries, Cross producting and controlled prefix expansion algorithms.
Admission control in Internet. Concept of Effective bandwidth. Measurement based admission control. Differentiated Services in Internet (DiffServ). DiffServ architecture and framework

UNIT-V

IPV4, IPV6, IP tunnelling, IPswitching and MPLS, Overview of IP over ATM and its evolution to IP switching. MPLS architecture and framework. MPLS Protocols. Traffic engineering issues in MPLS.

Text Books :

1. Jean Wairand and Pravin Varaiya, “High Performance Communications Networks”, 2nd edition, 2000.
2.Jean Le Boudec and Patrick Thiran, “Network Calculus A Theory of Deterministic Queueing Systems for the Internet”, Springer Veriag, 2001.
3.Zhang Wang, “Internet QoS”, Morgan Kaufman, 2001.
4.Anurag Kumar, D. Manjunath and Joy Kuri, “Communication Networking: An Analytical Approach” , Morgan Kaufman Publishers, 2004.
5.George Kesidis, “ATM Network Performance”, Kluwer Academic, Research Papers, 2005.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Understand advanced concepts in Communication Networking.
2. Design and develop protocols for Communication Networks.
3. Understand the mechanisms in Quality of Service in networking.
4. Optimise the Network Design.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1					1			
CO2	3		3		1	1					2			
CO3	3	2	2	3	2	2					3	3	3	3
CO4	3	2	2	2	2	2					3	3	3	3

ECHN06- Pattern Recognition and Machine Learning

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course introduces fundamental concepts, theories, and algorithms for pattern recognition and machine learning, which are used in computer vision, speech recognition, data mining, statistics, information retrieval, and bioinformatics. Topics include: Bayesian decision theory, parametric and non-parametric learning, data clustering, component analysis, boosting techniques, support vector machine, and deep learning with neural networks.

Course Objectives:

1. To understand, describe and critique pattern recognition, machine learning and deep learning techniques.
2. To identify and select suitable modeling, learning and prediction techniques to solve a problem.
3. To design and implement a machine learning solution.
4. To appraise ethical and privacy issues of artificial intelligence techniques.

UNIT-I

Introduction to Pattern Recognition: Problems, applications, design cycle, learning and adaptation, examples, Probability Distributions, Parametric Learning - Maximum likelihood and Bayesian Decision Theory- Bayes rule, discriminant functions, loss functions and Bayesian error analysis

UNIT-II

Linear models: Linear Models for Regression, linear regression, logistic regression Linear Models for Classification.

UNIT-III

Neural Network: perceptron, multi-layer perceptron, back propagation algorithm, error surfaces, practical techniques for improving back propagation, additional networks and training methods, Adaboost, Deep Learning

UNIT-IV

Linear discriminant functions - decision surfaces, two-category, multi-category, minimum-squared error procedures, the Ho-Kashyap procedures, linear programming algorithms, Support vector machine

UNIT-V

Algorithm independent machine learning – lack of inherent superiority of any classifier, bias and variance, re-sampling for classifier design, combining classifiers

Unsupervised learning and clustering – k-means clustering, fuzzy k-means clustering, hierarchical clustering

Text Books :

1. Richard O. Duda, Peter E. Hart, David G. Stork, "Pattern Classification", 2nd Edition John Wiley & Sons, 2001.

2.Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, "The Elements of Statistical Learning", 2nd Edition, Springer, 2009.

3.C. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Study the parametric and linear models for classification
2. Design neural network and SVM for classification
3. Understand Linear discriminant functions
4. Develop machine independent and unsupervised learning techniques.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1					1			
CO2	3		3		1	1					2			
CO3	3	2	2	3	2	2					3	3	3	3
CO4	3	2	2	2	2	2					3	3	3	3

Courses offered for Minors in Electronics

ECMN01(EC 104)**- Electronic Devices**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course develops a basic understanding of the fundamentals and principles of analog and digital circuits and electronic devices. This understanding is a critical step towards being able to design new electronic circuits or use them appropriately as part of a larger engineering system.

Course Objectives:

1. To familiarize the student with the principal of operation, analysis and design of junction diode, BJT and FET transistors and amplifier circuits.
2. To understand diode as a rectifier.
3. To study basic principal of filter of circuits and various types

UNIT-I

Semiconductor Materials: Atomic structure, Electrons in periodic Lattices, Classifying Materials: Semiconductors, conductors and insulators, Semiconductor material groups, Covalent bonding, Energy Band gaps, Energy bands in intrinsic and extrinsic silicon /Germanium, Density of Impurity States, Electrical Conductivity and Mobility, , Electronic Properties of N-type and P-type semiconductors, Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, design of resistors. Generation and recombination of carriers; Poisson and continuity equation, P-N junction characteristics, I-V Characteristics, and small signal switching models, Diode resistances and diode capacitances.

UNIT-II

Diode models, Avalanche breakdown, Zener diode, Schottky diode, Tunnel diode, Varactor diode and their applications, Testing a diode.

Rectifiers: Diode equivalent circuits, Analysis of diode circuits, Characteristics and comparison of Half-wave, Full-wave and Bridge rectifiers, Analysis of filters (C, L, LC, and CLC) used with Full-wave rectifiers, line regulation and load regulation.

UNIT-III

Bipolar Junction Transistors: Bipolar Junction Transistor action, PNP and NPN transistors, CB, CE, and CC configurations and their I-V characteristics, Analytical expressions for transistor characteristics, Typical junction voltages and maximum ratings. Determination of h-parameters from BJT characteristics, Ebers-Moll Model, Multi Emitter transistor.

UNIT-IV

Bipolar Junction Transistor Biasing: Operating point, stabilization, thermal runaway.

Field Effect Transistors: Characteristics and parameters of JFET, Pinch off and saturation regions, MOS capacitor, Depletion and Enhancement type of MOSFET, I-V characteristics, and small signal models of MOS transistor, UJT and its I-V characteristics, Metal Semiconductor FET, FET biasing schemes.

UNIT-V

Optoelectronic Devices: Principle of operation and characteristics of LED. LCD, LDR, Photoconductor, Photodiode, Phototransistor, Solar cell, PIN photodiode, Charge-Coupled Devices, APD (avalanche photodiode) and their applications.

Power Semiconductor Devices: Device structure, equivalent circuit and characteristics of PNPN Diode, SCR, DIAC and TRIAC. .

Text Books :

1. 1.Ben G. Steetman and Sanjay Kumar Banerjee, “Solid State Electronic Devices,” 7th edition,

Pearson Publishers, 2015.
2. Jacob Millman, Christos Halkias, Chetan D Parikh, "**Integrated Electronics**: Analog and Digital Circuits and Systems", 2nd Edition, Tata Mcgraw Hill Ed. Private Limited, 2011.
3. Allen Mottershead, "Electronic Devices and Circuits**:** An Introduction", PHILearning , 2011.
4. D. Neamen , D. Biswas "Semiconductor Physics and Devices", McGraw-Hill Education.
5. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley & Sons, 2006.
6. C.T. Sah, "Fundamentals of solid state electronics," World Scientific Publishing Co. Inc, 1991.
7. Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford University Press, 2011.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Understand the principles of semiconductor physics of the intrinsic, *p* and *n* type materials.
2. Understand the characteristics of the diode and some special function diodes and their application in electronic circuits and rectifier circuits
3. Understand basics of transistors for circuits and systems.
4. Understand the characteristics of the Transistors biasing opto-electronic devices and Power Semiconductor Devices and their application in electronic circuits.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**		
CO2	**3**	**3**	**2**	**2**	**1**	**-**	**1**	**-**	**1**	**-**	**-**	**2**	1	
CO3	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**1**	**-**	**2**		
CO4	**3**	**2**	**3**	**3**	**1**	**-**	**-**	**-**	**1**	**-**	**1**	**1**		1

ECMN02(EC305C)**- Digital Logic Design**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course develops a basic understanding of the fundamentals and principles of Logic circuits and VLSI Design flow. This understanding is a critical step towards being able to design new Logic circuits or use them appropriately as part of a larger engineering system

Course Objectives:

1. To familiarize the student with Basic Logic circuits and designing.

2. To learn the design concepts of MSI devices, Sequential Logic Design and VLSI Design flow.

UNIT I

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion**.**

UNIT II

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU**.**

UNIT III

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudorandom Binary Sequence generator.

UNIT IV

Clock generation Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices**.**

UNIT V

VLSI Design flow: Design entry, Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Text / Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd Edition,2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Design and analyze combinational logic circuits.
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder.
3. Design & analyze synchronous sequential logic circuits.
4. Use HDL & appropriate EDA tools for digital logic design and simulation

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	1	
CO2	**3**	**3**	**2**	**2**	**1**	**-**	**2**	**-**	**1**	**-**	**-**	**2**		
CO3	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**-**	**1**	**2**		1
CO4	**3**	**2**	**3**	**3**	**1**	**-**	**2**	**-**	**1**	**-**	**1**	**1**		

ECMN03(EC306C)- Analog Circuits

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course develops a basic understanding of the fundamentals and principles of analog circuits and electronic devices in electrical and electronic engineering.

Course Objectives:

1. To specify the small signal equivalent model of transistors
2. To analyze transistor amplifier circuits
3. To design multistage transistor amplifier circuits
4. To identify and discuss operating principles of differential amplifiers
5. To design and analyze integrated circuit biasing
6. To analyze frequency response of linear amplifiers

UNIT-I

General Amplifiers Characteristics: Concept of Amplifier, Voltage gain, Current gain, Power gain, Input and Output resistances, Conversion efficiency, Frequency response, Bandwidth, Distortion,

BJT Amplifiers: Small signal low frequency model of the transistor, Analysis of CE, CB and CC amplifiers, Approximate model analysis, Effects of coupling and bypass capacitors on low frequency response, Hybrid-Π model at high frequencies, Calculation of High-Frequency parameters in terms of Low Frequency parameters, CE short circuit gain, CE current gain with resistive load.

UNIT-II

FET Amplifiers: Small signal model, Analysis of CS, CD and CG amplifiers, comparison of performance of the three configurations, High frequency FET circuits, CS amplifier at high frequencies, CD amplifier at high frequencies.

Multistage Amplifiers: Types of coupling, Choice of amplifier configuration, overall voltage gain and Bandwidth of n-stage amplifier, Darlington and Bootstrap circuits.

UNIT-III

Feedback amplifiers: Feedback concept, Classification, Effects of negative feedback on gain, Stability, Noise, Distortion, Bandwidth, input resistance and output resistance.

Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), Crystal oscillators.

UNIT-IV

Power Amplifiers: Series-Fed Class-A power amplifiers, Transformer coupled class-A power amplifiers, Push-pull amplifiers, Class-B amplifiers, Class-AB operation, Complementary symmetry Push-Pull class-B Power amplifiers

Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load

UNIT-V

Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR, circuits to improve CMRR, transfer characteristics.

Operational Amplifier: Ideal op-amp characteristics, Op-amp internal circuit, examples of IC op-amps, DC and AC characteristics, Inverting and non-inverting modes of operation, voltage follower.

Text Books :

1. Millman and Halkias, “Integrated Electronics”, McGraw-Hill Co
2. Mottershed, “Electronic devices and circuits”, PHI
3. J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988.
4. Salivahanan, “Electronic Devices and circuits”, TMH.
5. David A. Bell, “Electronic Devices and circuits”, PHI
6. D.Roy Choudary, Shail Bala Jain, “Linear Integrated circuits”, New Age International publishers,

2018.
7. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.
8. P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.
9. Adel S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Saunder's College Publishing, IV Edition.
10. Paul R. Gray and Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition.

Course outcomes :
Upon successful completion of the course, the student will be able to:

1. Design and analyze various amplifier circuits.
2. Design sinusoidal oscillators.
3. Understand the functioning Power Amplifiers, Differential amplifier..
4. Understand the functioning of OP-AMP and design OP-AMP based circuits.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	1	-
CO2	**2**	**2**	**2**	**2**	**1**	**-**	**1**	**-**	**1**	**1**	**-**	**2**	-	-
CO3	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	-	-
CO4	**3**	**2**	**3**	**2**	**1**	**-**	**-**	**1**	**1**	**-**	**-**	**1**	-	1

ECMN04(EC404C) - IC Applications

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: The main aim of this lab is to teach the linear and non-linear applications of operational amplifiers (741). Students are made familiar with theory and applications of 555 timers. Students are made to Design combinational logic circuits using digital ICs.

Course Objectives:

1. To introduce the basic building blocks of linear integrated circuits.
2. To teach the linear and non - linear applications of operational amplifiers
3. To introduce the theory and applications of analog multipliers and PLL.
4. To understand and implement the working of basic digital circuits

UNIT-I

Op-Amp Applications: Scale changer/inverter, Summing amplifier, Instrumentation amplifier, Instrumentation amplifier IC-AD620, DC and AC amplifiers, V to I and I to V converters, Precision rectifiers, Log and Antilog amplifiers, multiplier and divider, Analog multiplier IC-AD633, Differentiator, Integrator, Analog computation.

. UNIT-II

Comparators and waveform generators: Comparator, Regenerative comparator (Schmitt Trigger), Astable and mono-stable multi-vibrators using op-amp, Triangular wave generator, Sine wave generators using op-amp. IC waveform generator (8038).

UNIT-III

Voltage regulators: Series op-amp regulator, IC voltage regulators, 723 General purpose regulator, Switching regulators.

Active filters: Low pass, high pass, band pass, band reject and all pass filters, transformation, State variable filter, Switched capacitor filters, Switched capacitor filter ICs.

UNIT-IV

555 Timer: Description of functional diagram, Monostable operation. Applications in monostable mode, Astable operation, Applications in astable mode, Schmitt trigger.

Phase Locked Loops: PLL- introduction, block schematic, principles and description individual blocks, IC PLL (565), Voltage controlled oscillator (566), PLL applications- Frequency multiplication, Frequency translation, FM & FSK demodulation.

UNIT-V

D-A and A-D Converters: Basic DAC Techniques, Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R ladder, Monolithic DAC IC-1409, A-D converters, direct type ADCs, the parallel comparator(flash) A/D converter, The counter type A/D converter, Servo tracking A/D converter, Successive approximation converter, Integrating type of ADCs, Charge balancing ADC, Dual-slope ADC, DAC/ADC specifications.

Text Books :

1. D.Roy Choudary, Shail Bala Jain, "Linear Integrated circuits", New Age International publishers, 2018.
2. Ramakant A.Gayakward, "Op-amps and linear Integrated circuits", LPE, 4th edition, Pearson Education.
3. S.Salivahanan, V.S.Kanchana Bhaaskaran "Linear Integrated circuits", TMH, 2008.
4. David A. Bell, "Operational amplifiers and Linear ICs", PHI, EEE, 1997.
5. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992. Sons, 1975.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Understand the functioning of OP-AMP and design OP-AMP based circuits.
2. Understand the functioning of voltage regulators and design IC based voltage regulators,
3. Understand the functioning of 555 timer and design 555 timer based circuits.
4. Understand the functioning of PLL and design PLL based circuits.
5. Design ADC and DAC circuits.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**2**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	1	-
CO2	**2**	**2**	**2**	**2**	**1**	**-**	**1**	**-**	**1**	**1**	**-**	**2**	-	-
CO3	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	-	-
CO4	**3**	**2**	**3**	**2**	**1**	**-**	**-**	**1**	**1**	**-**	**-**	**1**	-	1

ECMN05(EC604C-Program Elective-II)**- Electronic Instrumentation**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course deals with the basics of electronic instruments used in laboratory and industry. In the process they learn different type of instruments like voltmeter, ammeter, Q meter, Bridges, transducers and display devices CRO, CRT. After learning this subject student will be master in working principle and application of all types of instruments.

Course Objectives:

1. To explain basic concepts and definitions in measurement.
2. To describe the bridge configurations and their applications.
3. To understand, design aspects and performance criterion of measuring instruments.
4. To understand the working principle of various transducers.

UNIT-I

Measurement and Error: Definitions, accuracy and precision, types of errors.
DC Ammeters, DC Voltmeters, Series type ohmmeter, Shunt type ohmmeter. AC Voltmeter using rectifiers, True RMS responding voltmeter. Analog Instruments – Transistor voltmeter, micro voltmeter (chopper type) - DC differential voltmeter - AC voltmeters.

UNIT-II

Cathode Ray Oscilloscopes : Motion of electron in electric field and in magnetic field – Block diagram of CRO, CRT, Electrostatic deflection sensitivity – Vertical and Horizontal deflection systems – Principle of operation of Dual beam, Digital, Dual trace, Sampling and Storage CROs – Measurements with CRO (voltage, current, time, frequency, phase angle, Lissajous figures).

UNIT-III

Q meter and measurement methods.
Bridges: Wheatstone, Kelvin's, Maxwell, Hay and Schering bridges.
Wave analyzers (AF & RF) - Harmonic distortion analyzers – Spectrum analyzer.

UNIT-IV

Digital instruments – Digital voltmeters (Ramp, Dual slope, stair case, successive approximation types) Digital Multimeter, universal counter, Digital tachometer, Digital phase meter IEEE 488 Bus.

UNIT-V

Transducers – Classification and selection of transducers – strain gauges – Temperature measurement (resistance thermometer, thermo couples and thermistors) LVDT – Peizo electric transducer..

Text Books :

1. 1. H.S.Kalsi, "Electronic Instrumentation" TMH, 1995.
2. Helfric and Cooper, "Modern Electronic Instrumentation and measurement techniques", PHI, 1995.
3. A.K.Sawhney , " Electrical and electronic measurements and instrumentation", Danapat Rai & Co.,18th edition., 2007.

E-resources and other digital material
1.https://nptel.ac.in/courses/108106070
2.https://nptel.ac.in/courses/108106070

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Emphasize the basic electronics measurement concepts & Design the different analog and digital electronics voltmeters
2. Identify and use different analyzers oscilloscopes.
3. Design the Measurement of different bridges& generators to make measurements and analyze measurement.
4. Analyze the concepts of Transducers based on application

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**		
CO2	**3**	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	1	
CO3	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**		1
CO4	**3**	**2**	**3**	**3**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	1	

ECMN06(EC603C --Program Elective-I)**- CMOS VLSI Design**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This is an introductory course that covers basic theories and techniques of digital VLSI design in CMOS technology. In this course, we will study the fundamental concepts and structures of designing digital VLSI systems including CMOS devices and circuits, standard CMOS fabrication processes, CMOS design rules, static and dynamic logic structures, interconnect analysis, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies, VLSI architecture.

Prerequisite Courses: Electronic Devices, Analog Circuits and Digital Logic Design.

Course Objectives:

1. To learn basic CMOS Circuits.
2. To learn CMOS process technology.
3. To learn techniques of chip design using programmable devices.
4. To learn the concepts of designing VLSI Subsystems

UNIT-I

Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography and twin-tub CMOS process.

Brief Introduction to MOS, PMOS, NMOS, CMOS & BiCMOS technologies. Review of MOS transistor models, Non-ideal behavior of the MOS Transistor, $I_{ds} - V_{ds}$ relationships, MOS transistor threshold Voltage, Transistor as a switch, Inverter characteristics**.**

UNIT-II

Integrated Circuit Layout: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for CMOS Inverters and Gates, Scaling of MOS circuits.

Basic Circuit Concepts: Sheet Resistance R_s and its concepts to MOS, Area Capacitance calculations, Inverter Delays, driving large Capacitive Loads, Wiring Capacitances. Delay: RC Delay model, linear delay model, logical path efforts. Power, interconnect and Robustness in CMOS circuit layout

UNIT-III

Combinational Circuit Design: CMOS logic families including static, dynamic and dual rail logic, Switch logic, Alternate gate circuits. Shifters, Adders, Parity generators, Comparators, Zero/One Detectors, Binary Counters, ALUs, Multipliers, Counters, High Density Memory Elements.

UNIT-IV

Sequential Circuit Design: Static Circuits, Design of latches and Flip-flops.

Test and Testability: Fault-modeling and simulation, test generation, design for testability, Built-in-self-test.

UNIT-V

Physical Design: Floor-Planning, Placement, routing, Power delay estimation, Clock and Power routing.

Design styles: Full-custom, Standard Cells, Gate-arrays, FPGAs, CPLDs and Design Approach for Full-custom and Semi-custom devices. .

Text Books :

1. 1 Neil H.E. Weste and David Money Harris, CMOS VLSI design: A Circuits and Systems Perspective, 4th Edition, Pearson Education India, 2015.
2. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, Essentials of VLSI circuits and systems, PHI, 2005 Edition.
3. John M. Rabaey, A. Chandrakasan, B. Nikolic, Digital Integrated Circuits: A Design Perspective", 2nd Edition, Pearson, 2016.

Course outcomes :
Upon successful completion of the course, the student will be able to:

1. Learn CMOS process technology.
2. Analyze and implement various CMOS static logic circuits using Lambda based design rules.
3. Design different CMOS circuits using various logic families along with their circuit layouts for subsystem design.
4. To learn techniques of chip design using programmable devices and use HDL tools for designing VLSI Subsystems.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**					**-**	**-**	**-**		**-**	**-**			
CO2	**2**	**1**	**3**							**-**	**-**		1	
CO3	**2**			**3**		**-**	**-**	**-**		**-**	**-**			
CO4	**2**	**1**				**-**	**-**	**-**		**-**	**-**			1

Courses offered for Minors in Communications

ECMN11((EC303C**))- Signals and Systems**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course focuses on analyzing signals (sound, voltage, communication transmissions, pressure, images, etc.) and the systems that act on them (circuits, physical echos, mechanical dynamics, modulation, etc.). We concentrate on the Fourier transform and linear-time invariant systems, providing a depth of tools for sampling, manipulating, preserving, and interpreting information signals

Course Objectives:

1. To represent and classify signal and systems.
2. Represent and apply singularity functions.
3. Obtain the response of a continuous, linear, time-invariant, causal system by using convolution.
4. Obtain the Fourier series expansion of a periodic signal and apply it to continuous, linear, time-invariant systems.
5. Obtain and plot the Fourier transform for simple a periodic continuous-time signals.

UNIT-I

Introduction to Signals and Systems:

Definition and classification of signals and systems as seen in everyday life, and in various branches of engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character, Elementary signals such as Impulse, step, ramp, sinusoidal and exponential signals, Operations on signals. Basic System Properties (Continuous-Time and Discrete-Time): linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability, Examples, Causal LTI Systems Described by Differential and Difference Equations.

Signal Analysis:

Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT-II

Fourier series and Fourier Transform:

The Response of LTI Systems to Complex Exponentials. Fourier series Representation of Continuous-Time Periodic Signals, Convergence of the Fourier series, Properties of Continuous-Time Fourier Series. The Continuous-Time Fourier Transform – properties. Discrete-Time Fourier Transform – Properties, Basic Fourier Transform Pairs. Introduction to Hilbert Transform.

UNIT-III

Convolution and Correlation of Signals:

Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms, Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT-IV

Behaviour of continuous and discrete-time LTI systems:

The Magnitude-Phase Representation of the Fourier Transform, The Magnitude-Phase Representation of the Frequency Response of LTI Systems, Distortion less transmission through a system, signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time, State-space Representation of systems, State-Space Analysis, Multi-input, multi-output representation.

Sampling and Reconstruction:

The Sampling Theorem and its implications, Spectra of sampled signals, Reconstruction: ideal interpolator, zero-order hold, first-order hold, Aliasing and its effects. Relation between continuous and discrete time systems, Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.

UNIT-V

The Laplace Transform -The Region of Convergence - Properties, The Inverse Laplace Transform, Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform, Unilateral Laplace Transform. The Z-Transform -Region of Convergence - Properties, The Inverse z-Transform, Common z-Transform Pairs, Analysis and Characterization of LTI Systems Using z-Transforms, Unilateral z-Transform.

Text Books :

1. 1.Alan V. Oppenheim, Alan S. Willsky, & S. Hamid Nawab, "Signals and Systems," Pearson Higher Education, 2nd Ed., 1997.
2. J. G. Proakis and D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", Pearson, 2006.
3. Simon Haykin and B. Van Veen, "Signals & Systems," John Wiley and Sons, 2nd Edition, 2007.
4. B.P. Lathi, "Principles of LINEAR SYSTEMS and SIGNALS," Oxford Univ. Press, Second Edition, International version, 2009.
5. H. P. Hsu, "Signals and systems", Schaum's series, McGraw Hill Education, 2010.
6. Luis F. Chaparro, "Signals and Systems using MATLAB," Academic Press, 2011.
7. C. L. Philips, J. M. Parr and Eve A. Riskin, "Signals, Systems and Transforms," Pearson Education, 4th Edition, 2008.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Analyze different types of signals
2. Understand the concepts of continuous time and discrete time systems.
3. Analyze systems in complex frequency domain.
4. Investigate whether the system is stable or not.
5. Understand sampling theorem and its implications

Mapping of course outcomes with program outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	--	--	--	--	--	--	--	--	--	--	3	1	--
CO2	--	1	--	--	--	2	--	--	--	2	--	2	--	1
CO3	2	2	2	--	--	--	--	--	--	--	2	2	1	--
CO4	2	2	--	--	--	--	--	--	--	--	--	2	--	1

ECMN12(EC402C)**- Probability theory & Stochastic Process**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course explanations and expositions of probability and stochastic processes concepts which they need for their experiments and research. It also covers theoretical concepts of probability and stochastic processes pertaining to handling various stochastic modeling.

Course Objectives:

1. To provide mathematical background and sufficient experience so that student can read, write and understand sentences in the language of probability theory.
2. To introduce students to the basic methodology of "probabilistic thinking" and apply it to problems.
3. To understand basic concepts of Probability theory and Random Variables, how to deal with multiple Random Variables.
4. To understand the difference between time averages statistical averages

UNIT-I

Sets and set operations, Probability space, Conditional probability Total Probability, and Bayes theorem, Combinatorial probability and sampling models.

Discrete random variables, probability mass function, probability distribution function, example random variables and distributions. Continuous random variables, probability density function, probability distribution function, example distributions

UNIT-II

Joint distributions, functions of one and two random variables, moments of random variables; Conditional distribution, densities and moments, Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds.

UNIT-III

Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, Central Limit Theorem, (Proof not expected), Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV

Random Process: Classification of Processes, Stationary processes, Mean and covariance functions, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function & Its Properties, Cross-Correlation Function & its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

Power spectral density, Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT-V

Transmission of random process through LTI systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, properties of white noise, Band pass, Band-Limited and Narrowband Processes, Properties

Text Books :

1. H. Stark and J. Woods, "Probability and Random Processes with Applications to Signal Processing", 3rd Edition, Pearson Education.
2. Athanasios Papoulis and S. Unnikrishnan Pillai, "Probability, Random Variables and Stochastic Processes", PHI, 4th Edition, 2002.
3. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", Tata McGraw Hill, 4th Edition, 2001.
4. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International.
5. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers.
6. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, UBS Publishers.
7. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Understand representation of random signals.
2. Investigate characteristics of random processes.
3. Make use of theorems related to random signals.
4. Able to Model of different Noise Sources and to understand propagation of random signals in LTI systems

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	--	--	--	--	--	--	--	--	--	--	3	1	--
CO2	--	1	--	--	--	2	--	--	--	2	--	2	--	1
CO3	2	2	2	--	--	--	--	--	--	--	2	2	1	--
CO4	2	2	--	--	--	--	--	--	--	--	--	2	--	1

ECMN13 (EC405C)**- Analog Communications**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: This course gives concepts of Different Analog communications which they need for their experiments and research.

Course Objectives: To understand

1. The concepts of various Amplitude, Angle and Pulse Modulation schemes and information theory with random processes.
2. The working principle of Radio Receivers

. **Unit – I**

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Vestigial sideband (VSB) modulator & demodulator, Frequency division multiplexing (FDM), Illustrative Problems.

UNIT-II

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation- Frequency Modulation & Phase modulation : Bandwidth of angle modulated waves, Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Verification of Frequency modulation bandwidth relationship, Features of angle modulation, Generation of FM waves-Indirect method, Direct generation; Demodulation of FM, Band pass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis, & De-emphasis filters, FM Capture Effect, Illustrative Problems.

UNIT-III

Noise in Communication Systems: Thermal noise, Time domain representation of narrowband noise, filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSBSC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

UNIT-IV

Radio Receivers: Working principle of Super heterodyne AM and FM Receivers along with suitable block diagrams, Sensitivity, Selectivity and fidelity.

Analog Pulse Modulation Schemes: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, PPM spectral analysis, Illustrative Problems.

UNIT-V

Information Theory: Introduction, Information and Entropy, and its properties, source coding Theorem, Data Compaction – Prefix coding, Huffman coding, Discrete Memory less channels, Mutual Information, and its properties, Channel capacity, Channel coding Theorem, Application to binary symmetric channels, differential entropy and mutual information, Information capacity theorem, implication of information capacity theorem, Rate Distortion, Illustrative problems

Text Books:

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. Simon Haykin, "Communication Systems," by John Wiley & Sons,3rdEdition, 2010.
3. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.

REFERENCES:

1. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Herbert Taub&Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.
3. . R.E. Ziemer& W.H. Tranter, "Principles of Communication-Systems Modulation & Noise", Jaico Publishing House, 5thedition, 2001.
4. George Kennedy and Bernard Davis, "Electronics & Communication System", TMH,2004.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Understand the concepts of various Amplitude, Angle and Pulse Modulation schemes and information theory with random processes and to solve problems in analog and pulse modulation schemes
2. Analysis of analog communication system in the presence of noise.
3. Compare and contrast design issues, advantages, disadvantages and limitations of various modulation schemes in analog communication systems.
4. Solve basic communication problems & calculate information rate and channel capacity of a discrete communication channel.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	--	--	--	1	--	--	--	--	--	--	3	1	--
CO2	3	1	2	--	2	2	--	1	--	2	--	2	--	1
CO3	2	2	2	--	--	--	--	1	--	--	2	2	1	--
CO4	2	2	2	--	1	--	--	--	--	--	--	2	--	1

ECMN14(EC505C) **- Digital Communications**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description:

This course provides an introduction to voice and data networking technologies, including public and pri vate voice services, Ethernet and Internet data technologies, network security, business applications and network management. The structure, regulation, andhistory of the telecom and data network industry wil l be discussed as well.

Course Objectives:

1. To protocol, algorithms, trade-offs rationale.
2. To routing, transport, DNS resolutions
3. To network extensions and next generation architecture.

UNIT I

Source Coding Systems: Sampling, Quantization, Quantization noise, Encoding, Pulse Code Modulation (PCM), Line codes, Regeneration, Decoding and Filtering, Noise considerations in PCM systems, Time-Division Multiplexing (TDM), Synchronization, Differential encoding, Delta modulation (DM), Differential Pulse Code Modulation (DPCM), Processing gain, Adaptive Delta Modulation (ADM).

UNIT II

Introduction to Baseband Pulse Transmission, Matched filter and it's Properties,Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI), Nyquist's criterion for distortion less baseband binary transmission, Duo binary, Modified duo binary in Correlative-level coding, Baseband M-array PAM transmission, Eye diagrams.

UNIT III

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidt Orthogonalization procedure, Conversion of the Continuous AWGN channel into a vectorchannel, Coherent detection of signals in noise, Correlation receiver, Probability of error**.**

UNIT IV

Passband Data Transmission: Introduction, Passband transmission model, ASK, Coherent Phase Shift Keying – Binary phase shift keying (BPSK), Quadrature shift keying (QPSK), Binary Frequency shift keying (BFSK), M-array Quadrature Amplitude Modulation (M-array QAM), Non-coherent orthogonal modulation schemes-Differential PSK, Non-Coherent Binary FSK.
(Error probability, Generation and Detection, Power spectra, signal constellation diagram of above schemes)

UNIT-V

Error Control Coding: Repetition & Parity Check Codes, Interleaving, Code Vectors and Hamming Distance, Forward Error Correction (FEC)Systems, Linear Block Codes, Cyclic Codes, Convolutional Encoding methods- Code Tree, Trellis and State Diagram, Decoding Methods- Sequential, Viterbi.

Text Books :

1. Simon Haykin, "Communication Systems," by John Wiley & Sons,3rd Edition, 2010.
2. Sam Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.

REFERENCES:

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. J.S. Chithode, "Digital Communications", Technical Publications, Ist Edition, 2020

3. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Understand the Digital communication System and able to analyse the different Digital modulation techniques.
2. Understand the concepts of baseband digital modulation schemes and Inter Symbol Interference.
3. Analyze Signal space concepts, probability of error performance of various digital binary modulation systems and are able to design digital communication systems.
4. Design a system with Error correcting codes by learning Block Codes, Cyclic Codes and Convolution Codes.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	1	-	-	-	-	-	-	-	-	3	2
CO2	2	1	1	2	-	-	-	-	-	-	-	-	2	3
CO3	1	1	1	1	-	-	-	-	-	-	-	-	3	2
CO4	1	1	1	2	1	-	-	-	-	-	-	1	2	2

ECMN15(EC504C) **Antenna Wave Propagation**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: Antennas and propagation effects play a crucial role in RF systems. In practice, the design of a working system such as mobile phone networks, WiFi, RFID, Satellite communication and GPS requires a good understanding of these components. This course teaches the fundamentals of antenna and propagation and shows the application in practical examples. The course covers the theory of radiation, fundamental antenna parameters and concepts, wire antennas such as dipoles and loop antennas, antenna arrays, aperture antennas, microstrip antennas, numerical analysis, communication & radar systems and propagation effects.

Course Objectives:

1. To understand the concept of radiation, antenna definitions and significance of antenna parameters, to derive and analyze the radiation characteristics of thin wire dipole antennas and solve numerical problems.
2. To analyse the characteristics and design relations of UHF, VHF and Microwave Antennas.
3. To identify the antenna array requirements, to determine the characteristics of ULAs and estimate the patterns of BSA, EFA, and Binomial Arrays.
4. To understand the concepts and set-up requirements for microwave measurements, and familiarize with the procedure to enable antenna measurements.
5. To define and distinguish between different phenomenon of wave propagation (ground wave, space wave and sky wave), their frequency dependence, and estimate their characteristics, identifying their profiles and parameters involved.

UNIT-I

Antenna Basics: Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height. Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Antenna Theorems, Radiation,
Retarded Potentials–Helmholtz Theorem
Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height, Natural Current Distributions, Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths. Loop Antennas.

UNIT-II

Antenna Arrays: Point Sources – Definition, Patterns, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End fire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays.

UNIT-III

VHF, UHF and Microwave Antennas - I: Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Practical Design

Considerations for Monofilar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types,Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns.

UNIT-IV

VHF, UHF and Microwave Antennas - II: Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Reflector Antennas – Introduction, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features.

UNIT-V

Ground Wave Propagation –Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections. Space Wave Propagation –Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering phenomena, Troposphere Propagation. Sky Wave Propagation –Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance, Multi-hop Propagation.

Text Books :

1. Antennas and Wave Propagation – J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, TMH, New Delhi, 4th ed., (Special Indian Edition), 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd edition,2000.
3. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd Ed., 2005.
4.. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications,New Delhi, 2001..

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Understand the basic parameters of antenna (L1) and apply the concepts to various antennas based on frequency, configuration and establish the radiation patterns of antenna arrays (L2)
2. Analysis of VHF, UHF and Microwave Antennas (L3)
3. Design and analysis of microstrip antennas (L4)
4. To understand the wave propagation in different frequency ranges (L5)

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	-	2	1	2	1	3	3		
CO2	3	3	2	2	1	2	3	2	2	1	3	3		
CO3	3	2	2	2	1	2	3	1	1	1	2	3		
CO4	3	3	2	3	2	2	3	-	1	1	2	3		

ECMN16((EC601C)**- Microwave Engineering**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: The course will be broadly focusing on analysis, design and development of microwave circuits and systems. The course will cover introduction to Microwaves, Microwave transmission modes, Transmission lines, Impedance Matching, Microwave Network Analysis, Directional Coupler, Power Divider, Microwave Filters, Microwave Attenuator, RF switches and phase shifters, Microwave Amplifiers, Low Noise Amplifier, Microwave Mixers and Oscillators, Microwave Antennas, Microwave Measurements, Microwave Systems.

Course Objectives:

1. To get familiarized with microwave frequency bands, their applications and to understand the limitations and losses of conventional tubes at these frequencies.
2. To distinguish between different types of microwave tubes, their structures and principles of microwave power generation.
3. To impart the knowledge of Scattering Matrix, its formulation and utility, and establish the S-Matrix for various types of microwave junctions.
4. Understand the utility of Optical Fibres in Communications

UNIT – I

Microwave Tubes: Limitations and Losses of conventional Tubes at Microwave frequencies,
Cavity Klystrons – Structure, Re-entrant Cavities, Velocity Modulation Process, Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for O/P Power and Efficiency. Reflex Klystrons – Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and O/P Characteristics. Helix TWTs: Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process(qualitative treatment), Suppression of Oscillations, Gain Considerations**.**

UNIT - II

M-Type Tubes: Introduction, Cross-field Effects, Magnetrons – Different Types, Cylindrical Traveling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics,
Microwave Solid State Devices: Introduction, Classification, Applications. Gunn Diodes – Principle, RWH Theory, Characteristics, Modes of Operation - Gunn Oscillation Modes, Principle of operation of IMPATT and TRAPATT Devices.

UNIT - III

Waveguide Components: Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide Windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Different Types, Resistive Card and Rotary Vane Attenuators; Waveguide Phase Shifters – Types, Dielectric and Rotary Vane Phase Shifters, Waveguide Multiport Junctions - E plane and H plane Tees. Ferrites– Composition and Characteristics, Faraday Rotation, Ferrite Components – Gyrator, Isolator**.**

UNIT – IV

Scattering matrix: Importance of S-matrix, Scattering Matrix Properties, Directional Couplers – 2 Hole, Bethe Hole S Parameters, [s] matrix of Magic Tee and Circulator, Measurement of S-parameters.
MICs : Advantages of MIC's, Hybrid MIC's, Strip lines and microstrip lines, Monolithic MICs

UNIT V

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions, Measurement of Attenuation, Frequency. Standing Wave Measurements, Measurement of Low and High VSWR., Cavity Q-factor and Impedance Measurements. Antenna gain measurements.

Text Books :

1. Microwave Devices and Circuits – Samuel Y. Liao, Pearson, 3rd Edition, 2003.
2. Electronic Communications Systems- Wayne Tomasi, Pearson, 5th Edition
3. Microwave Engineering - David M. Pozar, John Wiley & Sons (Asia) Pvt Ltd., 1989, 3r ed., 2011 4t.
4. Microwave Engineering - G.S. Raghuvanshi, Cengage Learning India Pvt. Ltd., 2012
5. Kulkarni, "Microwave and Radar Engineering", Umesh publications, 1998.
6. Annapurna Das and Sisir K.Das, "Microwave Engineering" Tata Mc Graw-Hill, 2000.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Known power generation at microwave frequencies and derive the performance characteristics. (L2)
2. Understand the principles of solid state devices. (L1)
3. Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications (L4)
4. Understand the utility of S-parameters in microwave component design (L3) and to know the measurement procedure of various microwave parameters. (L5)

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	1	1	2	1	2	2	3	3	1	
CO2	3	2	2	2	1	2	2	2	2	2	3	2		
CO3	3	2	2	3	1	2	2	2	1	2	3	2		1
CO4	3	2	3	3	2	2	2	1	2	1	3	3		

ECMN17(EC602C-)- Computer Networks

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**

Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: **:** Computer Networks plays an vital role in the era of communication systems in resources sharing applications. The aim of this course is to introduce the concepts of Computer networking and its applications.

Course Objectives:

To gain knowledge in developing different applications

1. To understand the basic concepts of computer networks and internet
2. To gain knowledge about the design issues of link layer and internet layer
3. To gain knowledge about the concept of connection oriented and connection less Protocols.

Unit -I

Introduction to Computer Networks and the Internet: Principles of network applications and Internet Challenges &Layering concepts.

OSI Reference Model & TCP/IP Reference Model.

Unit -II

Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks, Ethernet, Wireless LAN,Flow Control, Error Detection and Error Correction.

Unit -III

Internet Layer:

IP Addressing, IP Protocol, Routing Algorithms, queuing disciplines.

Congestion Control Algorithms, Resource Reservation ,Admission Control and Differentiated services

Unit -IV

Transport Layer: User Datagram Protocol, Connection oriented transport protocol– Transmission Control Protocol, Remote Procedure Call. Port Addressing and Socket Programming.

Unit –V

Application layer: The Web and Hyper Text Transfer Protocol, File transfer, Electronic mail, Domain name system, Peer-to-Peer file sharing,JPEG,MPEG .

Network Security: DES & RSA

Text Books :

1. J.F. Kurose and K. W. Ross, 1."Computer Networking – A top down approach Pearson Education, 5th Edition
2. Andrew S Tanenbaum, "Computer Networks", Prentice Hall India Fourth Edition.
3. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition
4. D. Comer, "Computer Networks and Internet/TCP-IP", Prentice Hall
5. William Stallings, "Data and Computer Communication, 8th Edition, Pearson Prentice

Course outcomes :

Upon successful completion of the course, the student will be able to:

1. Design of computer networks in Internet.

2. Understand the concepts of error handling ,flow control ,IP Addressing and Routing.
3. Understand the concept of TCP and UDP protocols.
4. Develop several protocols foe web Applications

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	3	2	2	2	_	3	3		
CO2	1	1	1	1	1	1	3	3	2	3	1	_	1	
CO3	1	1	1	1	1	1	3	3	2	3	1	_		1
CO4	3	3	3	3	2	3	2	2	3	_	3	_		

ECMN18(EC604C-Program Elective-II)**- Cyber Security**

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Description: The course deals with the underlying principles of cryptography and network security. It develops the mathematical tools required to understand the topic of cryptography. Starting from the classical ciphers to modern day ciphers, the course provides an extensive coverage of the techniques and methods needed for the proper functioning of the ciphers. The course deals with the construction and cryptanalysis of block ciphers, stream ciphers and hash functions. The course defines offers the construction and cryptanalysis of public key ciphers, namely RSA. The key exchange problem and solutions using the Diffie-Hellman algorithm are discussed. Message Authentication Codes (MAC) and signature schemes are also detailed. The course deals with modern trends in asymmetric key cryptography, namely using Elliptic Curves. The course ends with the awareness about different network attacks and precautions to be taken for the security.

Course Objectives:

1. To know the basics of Cryptography and Network Security.
2. To be able to secure a message over insecure channel by various means.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4. To have the knowledge of security requirements for a network against various threats.

Unit -I

Introduction: OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality

Unit –II

Public Key Cryptography Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

Unit -III

Authentication And Hash Function: Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest algorithm - Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard.

Unit -IV

Network Security Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

Unit –V

System Level Security Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TextBook:

1. William Stallings, "Cryptography And Network Security – Principles and Practices", Prentice Hall of India, Third Edition, 2003.

References:

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education.

Course outcomes :

Upon successful completion of the course, the student will be able to:

1.Understand different encryption techniques
2. Implement basic security algorithms required by any computing system
3. Analyze the vulnerabilities in any computing system to design a security solution
4. Analyze the possible security attacks and their effective countermeasures in real time systems

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	1	1	-	-	-	-	2	-	-	-
CO2	3	3	3	2	1	2	-	-	-	-	2	-	-	-
CO3	3	3	2	3	2	2	-	-	-	-	3	3	3	3
CO4	3	3	3	2	2	2	-	-	-	-	3	3	3	3

CO-PO Mapping

POs / COs	POa	POb	POc	POd	POe
CO1	3	3	2	2	1
CO2	2	2	2	3	2
CO3	2	1	1	2	1

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

Department of Mechanical Engineering

S.V. University College of Engineering:: Tirupati

R – 20 Scheme of Instruction and Syllabi of III & IV – Semesters (2nd Year) B. Tech Programme

in

Mechanical Engineering

Academic Year 2023 – 24

About the Department

- Welcome to the Department of Mechanical Engineering at SVUCE Tirupati. It began its journey in the year 1959. Over the last six decades, we have grown our expertise and competence in the core Mechanical Engineering curriculum and research. The programs are designed to prepare our graduates for a rapidly changing world and to go well beyond being significant contributors. We have state of the art research facilities to support our academic programs and research. Our faculties are renowned leaders in their fields, and our students-from undergraduates, postgraduates to doctoral scholars-have the opportunity to work with them one-on-one on problems defining the state-of-the art.

- Our approach is highly interdisciplinary and collaborative, and we stress the exploration of innovative and even unconventional ideas. Our goal for undergraduate students is to give them a high-quality engineering education that includes hands-on experience. Each of our faculty members is ready and willing to work in their research specialty with capable students on individual projects. We strive to ensure that all our undergraduate students have a strong education with teaming and leadership skills, involvement in student activities, and the practical background of internship experience. We believe that emphasizing these areas will make our students well qualified to take leadership roles in the future. Finally, it is my pleasure to work with such highly distinguished staff and to serve our inquisitive and passionate student body in achieving our department mission and vision.

VISION:

To be a globally renowned center for quality education and innovative research in Mechanical Engineering

MISSION:

M1	Prepare effective and responsible graduate engineers for global requirements.
M2	Continuously strive to improve pedagogical methods employed in delivering the academic programs.
M3	Respond dynamically to the changing requirements of the industry.
M4	Conduct basic and applied research to contribute to intellectual human capital.
M5	Inculcate the spirit of entrepreneurship and social responsibility.

Choice Based Credit System (CBCS):

Choice Based Credit system (CBCS) has been implemented in the campus in the year 2004.CBCS is a flexible system of learning and provides choice for students to select courses of his/her choice from the prescribed electric courses. Under this system students are permitted to opt for additional courses of his/her interest, adopt an inter disciplinary approach in learning and make use of expertise of available facility.

Program Specific Outcomes (PSO's)

- PSO1: Graduates will able to analyze, solve and develop complex solutions in Mechanical Engineering field with ethical and environmental consciousness
- PSO2: Graduates will be able to build the nation by recognizing the needs of the society through technical concepts modern tools, managerial and entrepreneurial skills.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

- **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **Environment and sustainability**: Understand the impact of the professional engineering solutions insocietal and environmental contexts, and demonstrate the knowledge of, and need for sustainable

development.

- **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs) of the UG in Mechanical Engineering were established through a Curriculum Design and Development program conducted, involving all stakeholders of the Department.

- PEO1 - To prepare technocrats by imparting basic and contemporary science and engineering skills to identify and solve the problems in the academia, industry and practical research domains.
- PEO2 - To develop an ability to understand and analyze the problem requirements and design novel engineering solutions.
- PEO3 - To provide exposure on emerging technologies and work with interdisciplinary projects.
- PEO4 - To inculcate the spirit of sustainable learning and continued leadership for better decision making.
- PEO5 - To imbibe the spirit of professionalism, ethics, public policies that allow them to become responsible professional Engineers.

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R-20 – Scheme of Instruction effective from the academic year 2020-2021
B.Tech. (Mechanical Engineering)

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
CY 101	Basic Sci	Engg Chemistry	3	1	-	4	**4**
EN103	Humanities	English	2	-	-	2	**2**
EE104	Basic Engg	Basic Electrical and Electronics Engineering	3	1	-	4	**4**
ME105	Basic Engg	Engineering Graphics and Design	2	-	3	5	**3.5**
EN 106	Humanities	English Communication Lab	-	-	3	3	**1.5**
		TOTAL	13	3	6	22	**19**

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
PY 202	Basic Sci	Engineering Physics	3	1	-	4	**4**
CS 203	Basic Engg	Programming for Problem Solving	2	1	-	3	**3**
CE 204	Basic Engg	Engineering Mechanics	3	1	-	4	**4**
ME 205	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS 206	Humanities Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 207	Audit	Environmental Science	4	-	-	4	**0**
		TOTAL	13	3	6	22	**18**

- All courses - 40 marks (Internal) + 60 marks (Univ. Semester End)
- Audit Course – 100 marks (Internal) -Zero Credits

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Semester – III (Second year)

Sl. No	Course Code	Name of the Course	Category	Scheme of Instructions Hours per week				Credits
				Lecture	Tutorial	Practical	Drawing	
01	MA301B	Mathematics – III	BSC	03	01			03
02	ME302C	Strength of Materials	ESC	03	01			03
03	HS303C	Managerial Economics and Accountancy	HSMC	03				03
04	ME304C	Manufacturing Processes	PCC	03	01			03
05	ME305C	Basic Thermodynamics	PCC	03				03
06	ME306L	Strength of Materials Lab	ESC			03		1.5
07	ME307L	Manufacturing Process Lab	PCC			03		1.5
08	ME308L	Fuels Lab	PCC			03		1.5
09	ME309S	CAD Laboratory	SDC	01		02		02
10	MC310A	Constitution of India	MC	02				00
	Total			**18**	**03**	**11**		**21.5**

BSC – Basic Science Course: 03Credits;
SDC – Skill oriented course: 02 Credits
ESC – Engineering Science Course : 4.5 Credits
PCC – Professional Core Course: 09 Credits
HSMC – Humanities and Social Sciences :03 Credits
MC – Mandatory Course as prescribed by AICTE, New Delhi and it is a **non – credit** course

Note 1: Evaluation of SDC/SAC is similar to the evaluation process of regular laboratory work.



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Semester – IV (Second year)

Sl. No	Course Code	Name of the Course	Category	Scheme of Instructions Hours per week				Credits
				Lecture	Tutorial	Practical	Drawing	
01	ME401C	Fluid Mechanics and Hydraulic Machinery	ESC	03	01			03
02	ME402C	Kinematics of Machinery	PCC	03	01			03
03	ME403C	Applied Thermodynamics	PCC	03	01			04
04	ME404C	Advanced Engineering Graphics	PCC	01			04	03
05	ME405C	Machine Tools and Metal Cutting	PCC	03				03
06	ME406L	Fluid Mechanics and Hydraulic Machinery Lab	ESC			03		1.5
07	ME407L	IC Engines Lab	PCC			03		1.5
08	ME408L	Electronics and Electrical Engineering Lab	ESC			03		1.5
09	ME409S	MATLAB	SDC	01		02		02
	Total			**14**	**03**	**11**	**04**	**22.5**

PCC – Professional Core Courses: 14.5 Credits;
ESC– Engineering Science Core: 06 Credits;
SDC – Skill Oriented Course: 02

Note 1: Evaluation of SDC/SAC is similar to the evaluation process of regular laboratory work.

Note 2: Summer Internship for two months after second year (to be evaluated during V semester)



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Semester – V (Third year)

Sl. No	Course Code	Name of the Course	Category	Scheme of Instructions Hours per week				Credit
				Lectur	Tutoria	Practica	Drawing	
01	ME501C	Design of Machine Elements	PCC	e 3	l 01	I		03
02	ME502C	Heat Transfer	PCC	3	01			04
03	ME503C	Machine Drawing	PCC	3	01		04	03
04	ME504E	Professional Elective	PEC	3				03
05	ME505O	Open Elective ***(MOOCS)***	OEC	3				03
06	ME506L	Machine Tools Lab	PCC			3		1.5
07	ME507L	Heat Transfer Lab	PCC			3		1.5
08	ME508S	Finite Element Analysis	SAC	1		2		02
09	MC509A	Universal Human Values	MC	2				00
10		Summer Internship (2 Months)						1.5
		Mandatory* **Total**		**18**	**03**	**8**	**04**	**22.5**

SAC – Skill advanced course : 02 Credits -
PCC – Professional Core Course: 13 Credits
PEC – Professional Elective Course – 03
credits OEC – Open Elective Course – 03
credits Summer internship – 1.5 credits
MC – Mandatory Course as prescribed by AICTE, New Delhi and it is **a non – credit** course

Note 1: Evaluation of SDC/SAC is similar to the evaluation process of regular laboratory work.

Note: Summer Internship for two months after second year (to be evaluated during V semester)

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Semester – VI (Third year)

Sl. No	Course Code	Name of the	Category	Scheme of Instructions				Credit
				Lecture	Tutorial	Practical		
01	ME601C	Machine Design	PCC					3
02	ME602C	Dynamics of Machinery	PCC	3				3
03	ME603C	Metrology and Instrumentation	PCC	3				3
04	ME604E	Professional	PEC	3				3
05	ME605O	Open Elective ***(MOOCS)***	OEC	3				3
06	ME606L	Simulation	PCC			3		1.5
07	ME607L	Lab Dynamics	PCC			3		1.5
08	ME608L	Lab Metrology	PCC					1.5
09	ME609S	Lab	SAC			3		2
10	MC 610A	Professional	MC	2				0
	Total			**1**	**0**	**0**		**21.**

SAC – Skill advanced course : 02 Credits
PCC – Professional Core Course: 13.5
Credits
PEC – Professional Elective Course – 03 credits
OEC – Open Elective Course – 03 credits
MC – Mandatory Course as prescribed by AICTE, New Delhi

Note: Research /Industrial Internship *after third year* to be evaluated during *VII semester*

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Semester – VII (Fourth year)

Sl. No	Course Code	Name of the	Category	Scheme of Instructions				Credit
				Lecture	Tutoria	Practical		
01	ME701C	Industrial Engineering and	PCC					3
02	ME702C	Management	PCC	03				3
03	ME703C	Automobile Engineering	PCC	03				3
04	ME704E	Professional Elective	PEC	03				3
05	ME705E	Professional Elective	PEC	03				3
06	ME706O	Open Elective ***(MOOCS)***	OEC	03				3
07	ME707S	Robot Programming	SAC			3		2
08		Industrial Internship (2 Months)*						3
	Total			**1**		**3**		**2**

SAC – Skill advanced course : 02 Credits
PCC – Professional Core Course: 09 Credits
PEC – Professional Elective Course – 06 credits
OEC – Open Elective Course – 03 credits
Research/Industrial internship – 03 credits

***Research /Industrial Internship after third year to be evaluated during VII semester**

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Semester – VIII (Fourth year)

Sl. No	Course Code	Name of the	Category	Scheme of Instructions				Credit
				Lectur	Tutorial	Practica	Drawin	
01		Major	PROJ		l			12
	Total							**1**

Total number of credits for B. Tech (Mechanical Engineering) Programme – Finalized

Year	Semeste		Credit
First	r	**19**	s
	1st	**18**	
Secon	**Semester**	**21.**	
	2nd	**5**	**4**
d	**Semester**	**22.**	**4**
	1st	**5**	
Fourt	**Semester**	**22.**	
h	**2nd**	**5**	**35**
	Eight		**16**

Division (breaking – up) of Core Subjects/Courses According to Stream (excluding electives and basic science courses):

Thermal	Manufacturing	Management	Design
04 (BTD,ATD,HT and AE)	03 (MP, MT& MC, Metrology)	02 (IE and M, OR)	04 (KoM, DoM, Machine Design, DoME)

Semester – wise Grouping of Professional Electives Courses (PECs)

Semester	Professional Elective Courses
V	1) Advanced Manufacturing Processes 2) Non – conventional Energy Sources
VI	3) Tool Design 1) Engineering Materials and Metallurgy 2) Robotic Engineering
VII	3) NC and CNC Systems 1) Additive Manufacturing 2) Quality control and Reliability
	3) Refrigeration and Air – conditioning 1) Finite Element Method 2) Nanotechnology

Semester – wise Grouping of Open Electives Courses (OECs)**

Semester	Open Elective Courses
	First OEC through SWAYAM platform (MOOCS)
VI	Second OEC through SWAYAM platform (MOOCS)
VII	Third OEC through SWAYAM platform (MOOCS)

**Open elective courses (OECs) are to be completed/done through MOOCS on SWAYAM platform (mostly NPTEL courses offered by premier institutes such as IITs and NITs).

Hence, the list of courses will vary depending upon the availability of slots pertaining to the courses offered by those premier institutes during a particular academic year.

1. PEC (Professional Elective Courses) and OEC (Open Elective Courses)

In REC – 20 (Revised Engineering Curriculum) draft provided by APSCHE the following points are highlighted with regard to MOOCs: **(page 10, point 09)**

There shall be **05** Professional Elective courses (PEC) and **04** Open Elective courses (OEC). All the Professional & Open Elective courses shall be offered for **03 credits**, wherever lab component is involved it shall be (2-0-2) and without lab component it shall be (3-0-0). If a course comes with a lab component, that component has to be cleared separately. The concerned BoS shall explore the possibility of introducing virtual labs for such courses with lab component.

All Open Electives are offered to students of all branches in general. However, a student shall choose an open Elective from the list in such a manner that he/she has not studied the same course in any form during the Programme.

But, we propose to offer 04 PEC and 03 OEC.

2. Courses under MOOCS

In REC – 20 (Revised Engineering Curriculum) draft provided by APSCHE the following points are highlighted with regard to MOOCs: **(page 10, point 11)**

A student shall be permitted to pursue up to a maximum of **two elective courses under MOOCs** during the Programme. Each of the courses must be of minimum 12 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to pursue and acquire a certificate for a MOOC course only from the organizations/agencies approved by the BoS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

3. Summer Internship and its Evaluation

Evaluation of the summer internships shall be through the **departmental committee**. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee. The **report and the oral presentation** shall carry **40% and 60%** weightages respectively.

In the final semester, the student should mandatorily undergo internship and parallelly he/she should work on a **project with well-defined objectives**. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an ***external examiner*** .

4. COMMUNITY SERVICE PROJECT

Community Service Project should be an integral part of the curriculum, as an ***alternative to the 2 months of Summer Internships*** / Apprenticeships / On the Job Training, whenever there is an exigency when students **cannot pursue their summer internships**.

The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of the society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
    - Every student should put in a minimum of **180 hours** for the Community Service Project during the summer vacation.
    - Each class/section should be assigned with a mentor.

I Semester **MA 101MATHEMATICS –I**

(I Semester - Common for all branches)

Instruction: 3(L) +1(T) /week **Credits:4** **Assessment: 40 + 60**

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particular integrals-homogeneous differential equations with variable coefficients-method of parameters-simulation equations.

UNIT II

Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of derivatives and integrals-derivatives of transforms-integrals of transforms.

UNIT III

Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNIT IV

Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNIT V

Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

Course Outcomes: At the end of the course, students will be able to

1. analyze differential equations and solve them
2. apply differential equations to engineering problems.
3. Use transformation to convert one type into another type presumably easier to solve.
4. use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.
5. solve an initial value problem for an nth order ordinary differential equation using the Laplace transform.
6. expand functions as power series using Maclaurin's and Talor's series
7. optimize the problems related to OR, Computer science, Probability and Statistics
8. draw an approximate shape by the study of some of its important characteristics such as symmetry, tangents, regions enclosing curve tracing method to find length, area, volume.
9. use multiple integral in evaluating area and volume of any region bounded by the given curves.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**											
CO2		**2**			**2**							
CO3			**3**	**1**								
CO4			**1**									
CO5					**3**	**2**						

I & II Semesters **CY 101/ CY 202 ENGINEERING CHEMISTRY**
(I Semester - CY 101 for Civil & Mechanical Engg) (II Semester -CY 202 for EEE, ECE & CSE)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40**

+ 60 UNIT I

Atomic and molecular structure (**12 lectures**)

Postulates of quantum chemistry. Schrodinger equation. Particle in a box solutions, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomics, Pi-molecular orbitals of butadiene and benzene. Band structure of solids and the role of doping on band structures

UNIT II

Spectroscopic techniques and applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclearmagnetic resonance and magnetic resonance imaging, surface characterization techniques.

UNIT III

Chemical equilibria, Intermolecular forces and potential energy surfaces

Use of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cellpotentials, the Nernst equation and applications.

Use of free energy considerations in metallurgy through Ellingham diagram. Equations of state of real gases and critical phenomena.

UNIT IV

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states,

coordination numbers and geometries, hard soft acids and bases, molecular

geometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNIT V

Stereochemistry, **Organic reactions and synthesis of a drug molecule**

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings Synthesis of a commonly used drug molecule.

Reference/Textbooks

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A.
Plane 3.Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistryby P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Ed.
7. Principles of physical chemistry, Puri, Sharma and Pattania

Course Outcomes: At the end of the course, students will be able to

1. analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. rationalize bulk properties and processes using thermodynamic considerations.
3. distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
4. rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. list major chemical reactions that are used in the synthesis of molecules.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1				2	2					1
CO2		1		2		1	1					
CO3		2			1		2					2
CO4				1	1		2					
CO5	1			1	2		1					

& II Semesters **EN 103/ EN 203 ENGLISH**

(I Semester - EN 103 forChE,CE & ME)

(II Semester - EN 203 for EEE, ECE & CSE)

Instruction: 2(L) **Credits: 2** **Assessment: 40 + 60**

UNIT I Vocabulary Building

The concept of Word Formation- Root words from foreign languages and their use in English- Acquaintance with prefixes and suffixes from foreign languages in English form derivatives- Synonyms, antonyms, and standard abbreviations.

UNIT II Basic Writing Skills

Sentence Structures – Use of phrases and clauses in sentences –Importance of proper punctuation - Creating coherence – Organizing principles of paragraphs in documents - Techniques for writing precisely

UNIT III Identifying Common Errors in Writing

Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article - Prepositions - Redundancies -Clichés

UNIT IV Nature and Style of sensible Writing

Describing - Defining - Classifying –Providingexamples or evidence –Writingintroductionand conclusion

UNIT V Writing Practices

Comprehension - Précis Writing –EssayWriting

Reference/Textbooks:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper ResourceBook. 2001
4. Study Writing. LizHamp- Lyonsand Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay KumarandPushpalata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts.I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcomes: At the end of the course, students will be able to

1. learn the elements of grammar and composition of English Language.
2. Learn literary texts such as Short stories and prose passages.
3. maintain linguistic competence through training in vocabulary, sentence structures and pronunciation.
4. develop communication skills by cultivating the habit of reading comprehension passages.
5. develop the language skills like listening, speaking, reading and writing.

Make use of self-instructed learner friendly modes of language learning through competence

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									
CO2	2		2	2								
CO3		1		2	2							
CO4			2	2	3							
CO5		1	1	2								

I Semester **EE104BASIC ELECTRICAL AND ELECTRONICS ENGG.**

(I Semester – for ChE, CE & ME)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Unit-I

Electric DC Circuits: Kirchhoff's Voltage & Current laws, Superposition Theorem, Star – Delta Transformations.
AC Circuits: Complex representation of Impedance, Phasor diagrams, Power & Power Factor, Solution of Single Phase Series & Parallel Circuits. Solution of Three Phase circuits and Measurement of Power in Three Phase circuits.

Unit-II

Single Phase Transformers: Principle of Operation of a Single phase Transformer, EMF equation, regulation and Efficiency of a single phase transformer.
DC Machines: Principle of Operation, Classification, EMF and Torque equations, Characteristics of Generators and Motors

UNIT-III

Three Phase Induction Motor: Principle of Rotating Magnetic Field, Principle of Operation of 3- φ I.M., Torque-Speed Characteristics of 3-φ I.M.

UNIT-IV

p-n junction operation, diode applications, Zener diode as regulator.
Transistor and applications: Introduction to transistors, BJT Characteristics, biasing and applications

UNIT-V

Integrated Circuits: Operational amplifiers, Applications: adder, subtractor, Integrator and Differentiator.
Digital Circuits: logic gates, Combinational Logic circuits, Flip-Flops, counters and shift registers, Laboratory measuring instruments: digital multi-meters and Cathode Ray Oscilloscopes (CRO's).

Textbooks:

1. Electrical Technology by Edward Hughes
2. Basic Electrical Engineering by Nagrath and Kothari

Course Outcomes: At the end of the course, students will be able to

1. understand the basic concepts of D.C. single phase and 3- phase supply and circuits and solve basic electrical circuit problems
2. understand the basic concepts of transformers and motors used as various industrial drives understand the concept of power factor improvement for industrial installations andconcepts of most economical power factor
3. understand the operation and characteristics of diodes, transistors, integrated circuits and digital circuits.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1		2							
CO2	2		2									
CO3		1		2	2							
CO4			2	1	2							
CO5			2	2	1							

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105 / ME 205ENGINEERING GRAPHICS AND DESIGN

(I Semester - ME105 for ChE, CE & ME)

(II Semester - ME205 for EEE,ECE & CSE)

I & II Semesters

Instruction: 2(L) +3 (Drg) /week Credits: 3.5 **Assessment: 40 + 60**

Unit I Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments,lettering, Conic sections including the Rectangular Hyperbola (General method only);Cycloid,Epi-cycloid, Hypo- cycloid and Involutes.

Unit II

Scales- Scales– construction of Plain &Diagonal Scales.

Projections of points, lines - Projections of Points and lines inclined to both planes, including traces;

Question Paper
Modular – 4 questions from
Units I t0 IV, 15 marks each

Unit III

Projections of planes

Projections of planes (Regular surfaces only) inclined Planes-Auxiliary Planes

Projections of Regular Solids (Simple solids – cylinder, cone, prism & pyramid) those inclined

to both the Planes-Auxiliary Views

Unit IV

Isometric Projections& Orthographic projections

Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale. Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Unit V Introduction to CAD

CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.;

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
3. Agrawal B. & Agrawal C.M.(2012),Engineering Graphics, TMH Publication
4. Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing, Scitech Publishers
5. Corresponding set of) CAD Software Theory and User Manuals

Course Outcomes: At the end of the course, the student will be able to

1. make a distinction between first angle projection and third angle projection of drawing.
2. draw hyperbola, parabola, Involutes and Cycloidal curves.
3. draw sections of solids including cylinders, cones, prisms and pyramids.
4. draw projections of lines, planes, solids and sections of solids.

draw orthographic projections of lines, planes, and solids.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1			1	1					
CO2	2	1				1	1					
CO3		2		2		2						1
CO4			1	2			1					
CO5		1		2		3						

I & II Semesters EN 106 / EN 206 ENGLISH COMMUNICATION LAB
(I Semester - EN 106 for ChE, CE & ME) (II Semester - EN206 for EEE, ECE & CSE)

Instruction: 0(L) +3(Lab) /week Credits: 1.5 Assessment: 40 + 60

Listening Comprehension -Pronunciation, Intonation, Stress and Rhythm -Common Everyday Situations: Conversations and Dialogues -Communication at Workplace - Interviews -Formal Presentations

Reference/Text Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. LizHamp– Lyons and Ben Heasly. Cambridge Univ. Press. 2006
5. Communication Skills. Sanjay Kumar and Pushpalata. Oxford Univ. Press.2011
6. Exercises in Spoken English. PartsI-III.CIEFL, Hyderabad. Oxford Univ. Press

Course Outcomes:
The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									
CO2	2		2	2								
CO3		1		2	2							
CO4			2	2	3							
CO5		1	1	2								

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

II Semester MA 201MATHEMATICS II

(II Semester - for all branches)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

Unit I

Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors –Canley-Hamilton theorem-quadratic forms-diagonalization.

Unit II

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals- Green's, Stokes's and Gauss Divergence theorems and its applications.

Unit III

Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

Unit IV

Special Functions I: Gamma and Beta functions-series solutions of differential equations-ordinary points.

Unit V

Special Functions II: Bessel function-recurrence formulae-generating function for $J_n(X)$-Lengender polynomials-recurrence formulae-generating function for $P_n(X)$ - Rodriguez's formula - orthogonality of Lengender polynomials.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

Course Outcomes: At the end of the course, students will be able to

1. use ranks of matrices to decide whether the system of linear equations is consistent or not
2. use Cayley-Hamilton theorem to find inverses or powers of matrices.
3. use Eigen values and vectors to reduce Quadratic forms to normal form.
4. to analyze motion problems from real lines to curves and surfaces in 3-D and use tools such as divergence and curl of vector and gradient, directional derivatives that play significant roles in many applications.
5. use Green's theorem to evaluate line integrals along simple closed contours on the plane
6. use Stokes' theorem to give a physical interpretation of the curl of a vector field
7. use the divergence theorem to give a physical interpretation of the divergence of a vector field.

8. find the Fourier series of functions consisting of constants times sine and cosine functions of different frequencies in order to observe periodic phenomenon.
9. Evaluate certain improper integrals to make them simple with introduction of Gamma and Beta functions.
10. study certain special functions that arise in solving certain ordinary differential equations to model many physical phenomena.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2		2	1						
CO2	1	1		2	2							
CO3		1		2	2							
CO4		2		2	2							
CO5		1	2	2								

II Semester **PY 202ENGINEERING PHYSICS**
(II Semester - for ChE, CE& ME)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

UNIT I Wave Optics

Interference: Huygen`s Principle-Principle of Superposition-Interference of Light-Young`s double slit experiment- -Newton's Rings.

Diffraction: Fraunhofer Diffraction at a Single Slit and a Circular Aperture-Plane Diffraction grating –Resolving Power-Rayleigh`s Criterion-Resolving power of Grating and Microscope.

Lasers : Introduction – Spontaneous and Stimulated Emission of Radiation – Population Inversion – Types of Lasers – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNIT II Mechanics of Rigid Body

Rigid Body-Rotational Motion and Kinematics Relations-Kinetic Energy and Angular Momentum of a Rotating Body-Equation of Motion of a Rigid body (Torque of a Rigid Body)-Combined Translation and Rotational Motion of a Rigid Body- Body Rolling on an inclined Plane.

Mechanics of Continuous Media

Elasticity, Stress and Strain- Hook`s Law and Behaviour of Wire Under Load- Elastic Constants-Relation Between Elastic Modulii-Types of Supports, Beams and Loads-Different types of Bending- Cantilever with an End Load. Ultrasonic Waves - Sound Absorption and Reverberation -Sabine Formula - Acoustics of Buildings.

UNIT III Electromagnetism and magnetic properties of Materials

Laws of Electrostatistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws-Maxwells Equations – Polarization - Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization - Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and Hesteresis, Applications of ferromagnetic materials.

UNIT IV Quantum Mechanics

Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P.Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave

Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT V NanoPhysics and Nanotechnology

Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C^{60} (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials.

Text Books / Reference Books:

1. R.K.Gaur and S.L.Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi
2. S.L.Gupta and SanjeevGupta`UnifiedPhysics`Vol.I Jai PrakashNath& Co., Meerut.
3. HitendraK.Malik and A.K.Singh ``Engineering Physics" TataMCGraw Hill Education Pvt.Ltd., New Delhi
4. M.N.Avadhanulu and P.G.Kshirsagar ``A Textbook of Engineering Physics``S.Chand and Company Pvt.Ltd., New Delhi
5. B.L Theraja, "Modern physics", S.Chand& Company.
6. V. Raghavan "Material Science", Tata McGraw Hill Publications.
7. M.S.RamachandraRao and Shubra Singh, ``Nanoscience and Nanotechnology`` Wiley India Pvt.Ltd, New Delhi

Course Outcomes: At the end of the course, students will be able to

1. Develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
2. understand the quantum mechanics and ultimately the quantum behavior of charged particles when they are in motion.
3. identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems
4. apply the basic principles of Mechanics of rigid body and continuous media and their applicationsunderstand the principles in electrostatics and electromagnetics and magnetic properties of materials.
5. understand size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
6. think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
7. Learnthe basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis.
8. provide multidisciplinary experiences throughout the curriculum.

OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3									2		
CO2	2									3		
CO3	1			3								
CO4		3								3		
CO5					2							3

I & II Semesters CS 103 / CS203 PROGRAMMING FOR PROBLEM SOLVING
(I Semester –CS 103 for EEE, ECE & CSE)
(II Semester –CS 203 for ChE, CE & ME)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Course Objectives:

1. To acquire problem solving skills
2. To be able to develop flowcharts and algorithms for the given problem
3. To learn how to write modular programs in C
4. To enable to use arrays, pointers, strings and structures in solving problems.
5. To explain the difference between object-oriented programming and procedural programming.
6. To understand principles of object-oriented programming.

UNIT-I

Problem Solving : Problem solving techniques, Computer as a problem solving tool, Programming Languages – Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements: Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements: while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continue statements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions, Passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard

library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, Accessing structures, Nested structures, Arrays of structures, Structures containing arrays, Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.

UNIT V

Introduction to Object-Oriented Programming (OOP): Need for OOP, Principles of OOP, Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

Course Outcomes: At the end of the course, student will be able to

1. Develop and test programs in C and correct syntax and logical errors.
2. Implement conditional branching, iteration and recursion.
3. Decompose a problem into functions and synthesize a complete program.
4. Use arrays, pointers, strings and structures to formulate algorithms and programs
5. Use files to perform read and write operations.
6. Handle programming assignments based on class,abstraction, encapsulation, overloading and inheritance.

Text Books

1. Ashok N Kamthane, Amit Ashok Kamthane, Programming in C, 3rd Edition, Pearson Education, 2019.
2. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Hanly J R &Koffman E.B, “Problem Solving and Program design in C”, Pearson Education, 2019.
5. Herbert Schildt,The Complete Reference C++, 4th Edition, Tata McGraw-Hill.

Reference Books

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.
5. The C++ Programming Language, Bjarne Stroustrup, 3rd Edition, Pearson Education.
6. Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1		3			2			2		2
CO2	2	3	2		3					2		
CO3		2	1								3	
CO4		3										
CO5			3									

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

I & II Semesters CE 104 / CE 204 ENGINEERING MECHANICS

(I Semester –CE 104 for EEE)

(II Semester –CE 204 for CE & ME)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

STATICS : Basic concepts – System of force, Concurrent and non-concurrent coplanar and non-coplanar forces – Resultant – Moment of force and its application – Couples and resultant of force systems – Equilibrium of systems of forces – Free body diagrams, Equations of equilibrium of coplanar systems and spatial systems.

UNIT II

Analysis of plane trusses: Types of supports – Types of trusses – Analysis of trusses using method of joints and method of sections.

UNIT III

CENTRE OF GRAVITY AND MOMENTS OF INERTIA: Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite areas (rolled and built up sections) – Radius of gyration of areas.

UNIT IV

SIMPLE STRESES AND STRAINS : Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-strain diagram for mild steel – Working stress – Factor of safety.

Lateral strain – Poisson's ratio and volumetric strain – Elastic moduli and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses.

UNIT V

STRAIN ENERGY: Gradual, sudden and impact loading – Endurance limit principles of virtual work and its applications.

TEXTBOOKS:

1. Ghose D.N. – Applied Mechanics and Strength of Materials.
2. Timoshenko & Young – Engineering Mechanics.
3. Junarkar SB – Mechanics of Structures – Vol. I.
4. Junarkar SB – Elements of Applied Mechanics.

Course Outcomes: At the end of the course, student will be able to

1. apply the basic knowledge of force system.
2. know the types of supports occur in civil engineering structures
3. know the geometrical properties of different cross sections.
4. understand different types of stresses and strains, elastic constants.
5. understand the behavior of different internal forces under different types of loading.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1		3										
CO2		3										
CO3		3							2			1
CO4									3			1
CO5			3						1			

I & II Semesters ME 105 / ME 205 WORKSHOP/MANUFACTURING PRACTICE

(ME 105 for EEE, ECE & CSE)

(ME 205 for ChE,CE & ME)

Instruction: 0(L) +3 (lab)/week Credits: 1.5 Assessment: 40 + 60

Workshop Practice: Five practices among

1. Machine shop 2.Fittingshop 3.Carpentry 4.Electrical wiring
5. Welding shop 6.Casting 7.Smithy 8.Plasticmoulding&GlassCutting

Examinations could involve the actual fabrication of simple components, utilizing one or More of the techniques covered above.

Detailed Contents

1. ManufacturingMethods-casting,forming,machining,joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools.
4. Electrical &Electronics
5. Carpentry
6. Plastic moulding. Glass cutting
7. Metal casting.
8. Welding(arc welding & gas welding), brazing

The above course content is learnt by online videos/ppt presentations.

Text/ReferenceBooks:

1. HajraChoudhury S.K., HajraChoudhury A.K.andNirjharRoy S. K., Elements of Workshop Technology", Vol. I 2008and Vol. II 2010, Media promoters and Publishers private limited, Mumbai.
2. Kalpakjian S. and Steven S. Schmid ManufacturingFngineeringand Technology", 4th edition, PearsonEducationIndiaEdition,2002.
3. GowriP.Hariharanand A. SureshBabu, Manufacturing Technology–I" Pearson Education,2008.
4. Roy A. Lindberg, Processes and Materials of Manufacture",4 th edition, Prentice Hall India,1998.
5. RaoP.N., "ManufacturingTechnology",Vol. I & II,TataMcGrawHillHouse, 2017

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.

- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Course Outcomes : Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricatecomponents using different materials.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		3									2
CO2	2		3									
CO3	2		3									
CO4	2		3									
CO5	2		3									



Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

I & II Sem CS 106/ CS206 PROGRAMMING FOR PROBLEM SOLVING LAB
(CS 106 for EEE, ECE & CSE)
(CS 206 for ChE, CE & ME)

Instruction: 0(L) +3 (Lab)) /week Credits: 1.5 Assessment: 40 + 60

Course Objectives:

1. To provide exposure to problem-solving through programming
2. To train the student on the concepts of the C- Programming language

The following programs shall be developed and executed in Programming Language C.

1. Programs on conditional control constructs.
2. Programs on iterative statements (while, do-while, for).
3. Programs on recursive procedures
4. Programs on arrays, matrices (single and multi-dimensional arrays).
5. Programs using user defined functions, demonstrating parameter passing methods viz. call by value and call by reference.
6. Programs using different library functions viz. ctype.h, math.h, stdio.h, stdlib.h, string.h, conio.h and pre-processor directives.
7. Programs using pointers (int pointers, char pointers) and pointer arrays.
8. Programs on structures and unions
9. Programs on File Processing.
10. Programs on Pointers to structures and Self-referential structures

Course Outcomes: After Completion of this course the student would be able to

1. Develop the C code for the given algorithm.
2. Understand, debug and trace the execution of programs written in C language.

Reference Books:

1. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
2. Hanly J R &Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Behrouz A. Forouzan& Richard F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										
CO2	2		3									
CO3	2	3	2									
CO4	2		3									
CO5	2	3										



Department of Mechanical Engineering
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CE 107 / CE 207 **ENVIRONMENTAL SCIENCE** ***Audit Course***
(CE 107 for EEE, ECE &CSE) ***No Univ.Exam***
(CE 207 for ChE, CE & ME)

Instruction: 4(L) **Credits: 0(Zero)** **Assessment: 40 + 60**

UNIT I

Environmental Studies and Natural Resources

Definition, Scope and importance of Environment, Environmental studies, Need for public awareness

Components of Environment- Atmosphere, Hydrosphere, Lithosphere.

Renewable and **Non-Renewable Resources and associated problems**

Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dam benefits and problems.

Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.

Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.

Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

Role of an individual in conservation of natural resources.

UNIT II

Ecosystem and Biodiversity

Ecosystem - Concept of an ecosystem, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem.

(a) Forest ecosystem. (b) Grassland ecosystem
(c) Desert ecosystem. (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation:

Definition, genetic species and ecosystem diversity, Biogeographically classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation.

Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT – III

Environmental pollution and Global Effects

Definition, Causes, Effects, and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial

wastes. Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management: Floods, earthquakes, cyclone, landslides,

Tsunami. Climate change-Global warming, Acid rain, Ozone depletion.

UNIT – IV

Environment Issues and Management

- Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, Water Borne Diseases.
- Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms
- Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcement of Environmental legislation.

UNIT – V

Social Issues and the Environment

- Population growth, Population Explosion, Population Control, Women and Child welfare.
- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rain water harvesting, watershed management, Wasteland reclamation, Human Rights, Value education, Environmental ethics- Issues and possible solution.
- Role of information Technology in Environment and Human Health.

Text Books / Reference Books :

1. AnubhaKaushik& C P Kaushik, Environmental studies, New age International Publishers, 2008
2. Benny Joseph, Environmental studies, Tata McGraw-Hill Publishers, 2005
3. M Chandra Sekhar, Environmental Science, Hi-Tech Publishers, 2004
4. Keerthinarayana and Daniel Yesudian, Principles of Environmental Sciences and Engineering , Hi-Tech Publishers, 2005
5. AmalK.Datta, Introduction to Environmental Science and Engineering, Oxford & IBH Publishing Co.Pvt.Ltd, 2000
6. SanthoshkumarGarg,RajeshawriGarg and RajniGarg, Ecological and Environmental studies, Khanna publishers, 2006
7. Gilbert M, Introduction to Environmental Engineering and Science, Masters Publication by Prentice –Hall of India Private Ltd., 1991
8. William P Cunningham and Mary Ann Cunningham, Principles of Environmental Science, Tata McGraw Hill Publishing Co.Ltd, 2002

Course Outcomes:

At the end of the course, students will be able to

1. acquire knowledge in
   - diverse components of environment and natural resources
   - ecosystem and biodiversity & its conservation methods
   - population growth and human health
   - green technology
2. identify and resolve the issues related to sources of different types of pollutions
3. provide solutions to individuals, industries and government for sustainable development of natural resources
4. apply environmental ethics in protection of diversified ecosystems.

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2						3					2
CO2	3						2					1
CO3	1						3					
CO4							3					
CO5	2						2					

MA301B MATHEMATICS - III

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

Course Objectives:

1. This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables.
2. To understand power series and expansion of analytic function.
3. To understand Laurent Series, poles, singular points, Residue theorem and its applications.
4. The aim is to analyze the solutions of partial differential equations.
5. To discuss the boundary value problems, one dimensional wave equation, heat equation and Laplace Equation.

UNIT - I

Complex analysis - I: Analytical functions - Cauchy-Reimann equations – Construction of Analytic functions- Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT - II

Complex analysis - II**:** Taylor's and Laurents' series- Transformations- Conformal mapping - Bilinear transformations - Transformation of 1/z, z^2, sin z and cos z.

UNIT - III

Complex Analysis –III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals

UNIT - IV

Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Legranges' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT- V

Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

Text Books:

1. Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
3. Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
4. Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
5. Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

Course Outcomes: At the end of the course, students will be able to

1. After the completion of course, students will be able to Understand the analyticity of complex functions and conformal mappings.
2. Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
3. Describe basic properties of complex integration and having the ability to compute such integrals.
4. Describe conformal mappings between various plane regions.
5. Apply the concepts of Complex Analysis in many branches of Engineering, including the branches of hydrodynamics, thermodynamics, and particularly quantum mechanics.
6. Compute the residue of a function and use the Residue Theory to evaluate a contour integral or an integral over the real line.
7. Formulate/solve/classify the solutions of Partial differential equations.
8. Identify linear and nonlinear PDE and solve nonlinear PDE by Charpit's method.
9. Apply Variables separable methods to solve boundary value problems.
10. Find the solution of one dimensional wave equation, heat equation and Laplace equation.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1		3			2							
CO2		3			2							
CO3		3			2							
CO4		3			2							
CO5		3			2							

*ME302C S*TRENGTH OF MATERIALS

Instruction Hours/Week: 3(L) Credits: 3 Assessment : 40 + 60

CO1	Analyze the statically determinate and indeterminate problems
CO2	Determine the stresses and strains in the members subjected to axial, bending and torsional loads
CO3	Evaluate the slope and deflection of beams subjected to loads
CO4	Determine the principal stresses and strains in structural members
CO5	Determine the torsional stress of structural beam

SYLLABUS

UNIT I

Stress And Strain: Concept of statically determinacy and indeterminacy- Determinate and Indeterminate problems in Tension and Compression - Thermal Stresses.

Elastic Constants and Impact Loading: Stress-strain diagrams for brittle and ductile materials -working stress - Strain energy in tension and compression - Impact loading - pure shear - Modulus of rigidity and Bulk modulus - Relation between E, G and K.

UNIT II

Shear Force And Bending Moment: Types of supports - Types of determinate beams - Simply supported, Cantilever, Overhanging and compound beams with articulations -Shear Force and Bending Moment diagrams.

Theory of Simple Bending: Assumptions - Theory of Simple Bending - Bending stresses in beams.

UNIT III

Principal stresses and strains: Principal planes and principal stresses, methods of determining stresses on oblique section, analytical and graphical method for determining stresses on oblique section, Mohr's circle.

Beams: Deflection of cantilever beam, simply supported beam, fixed beam.

UNIT IV

Thin Cylinders & Thick cylinders: Circumferential stresses, longitudinal stresses, Lame's equations and hoop stress.

Torsion Of Circular Shafts: Theory of Pure Torsion in Solid and Hollow circular shafts - Torsional Shear Stresses and angle of twist - transmission of Power.

UNIT V

Theories of failure: Introduction, maximum principal stress theory, maximum principal strain theory, maximum shear stress theory.

Columns and Struts: Introduction, Classification of columns, Derivation of Euler's columntheory, end conditions for long columns, crippling load expressions for different conditions.

TEXT BOOKS:

1. Timoshenko and Gere, Mechanics of Materials, CBS Publishers, New Delhi, 1996.
2. T.D.GunneswraRao and MudimbyAndal, Strength of Materials - Fundamentals and Applications, Cambridge University Press, 1st Edition, 2018.
3. Beer and Johnston, Mechanics of Materials, McGraw Hill International Edition, 1995.
4. E.P.Popov, Engineering Mechanics of Solids, Prentice Hall of India Pvt. Ltd., 1998.

REFERENCE BOOKS:

1. Beer, F.P, Johnston, E.R., Mechanics of Materials, McGraw-Hill Education -7th edition, ISBN: 9780073398235, 2015.
2. Hibbeler, R.C., Mechanics of Materials, Pearson Prentice Hall, ISBN- 978-0136022305, 2010.
3. Gere, M.J., Timoshenko, S.P., Mechanics of Materials, C.B.S., Publishers, 2004. ISBN: 9788123908946.
4. Popov, E.P., Engineering Mechanics of Solids, Pearson,2006. ISBN: 8177585789.
5. Ramamurtham, S., Strength of Materials, DhanpatRai Publications, ISBN: 978-9384378267, 2014.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	1	2									
CO2	1	**1**		2								
CO3		1		**2**	2							
CO4			**2**	2	2							
CO5		1	2	2	**2**							

HS303C Managerial Economics and Accountancy

Course Code	Name of the Course	Category	L-T-P-C
HS303C	Managerial Economics and Accountancy	HSMC	3-0-0-3

Pre-requisites: Nil

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand Macro Economic environment of the business and its impact on enterprise.
CO2	Identify various cost elements of the product and its effect on decision making.
CO3	Understand the concepts of financial management and smart investment.
CO4	Prepare the Accounting records and interpret the data for Managerial Decisions.

Mapping of course outcomes with program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-		2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-
CO3	-	1	-	-	-	-	-	-	-	-	3	-
CO4	2	-	-	-	-	-	-	-	-	-	3	-

Detailed Syllabus:

Unit -I

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR, NPV, IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage, Income tax leverage.

Unit -II

Depreciation and methods of calculating depreciation (straight line, sum of the years digitmethod, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

Unit -III

Inflation: Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

Unit -IV

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

Unit -V

Cost Accounting: Introduction, Classification of costs, Methods of costing, Techniques ofcosting, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

Reading Text Books:

1. Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw Hill Education, 1996.
2. Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
3. A.N. Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
4. Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
5. Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition, Vikas Publication, 2012.

ME304C MANUFACTURING PROCESSES

Lectures/week: 3 hours

Credits: 03

Sessionals: 20 +20

End Examination: 60

Course Outcomes (COs):

CO 1 Able to understand the basic concepts of manufacturing.
CO 2 Able to select suitable manufacturing process to produce products of desired size and shape.
CO3 Able to understand the basic manufacturing processes such as foundry and metal forming processes etc.
CO4 Ability to distinguish between gas welding and arc welding fabrication processes.

UNIT – I

Introduction – What is manufacturing? Basic history of manufacturing – Selecting materials – Basic properties of materials – Classification of Manufacturing Processes – Primary Shaping Processes – Secondary or Machining Processes – Selecting manufacturing processes – Mechanization and Automation – Computers in manufacturing industries.

UNIT – II

Metal – Casting Processes – Sand Casting – Sands – Types of sand moulds – Patterns – Cores – Core prints – Sand casting operation –Different types of casting processes – Melting furnaces – Foundry Automation – Inspection of Castings.

UNIT – III

Forming and Shaping Processes –Deformation of Metals – Elastic and Plastic Deformations – Force – Extension Curve – Metal working – Cold and Hot working processes.

Rolling – Flat rolling – Roll force and power requirement – Flat rolling practice – Cold rolling – Pack rolling – Thread rolling

Forging – Open die forging – Forging force – Impression die forging – Closed – die forging – Forgeability – Forging machines – Presses and Hammers.

UNIT – IV

Extrusion and Drawing – Introduction – Different Types of Extrusion Processes – Equipment – Defects in Extrusion – Drawing Processes – Drawing practice and Drawing defects – Drawing equipment.

UNIT – V

Sheet metal forming processes – Press tool operations – shearing action – Formability – Bending – Deep drawing – Spinning – Embossing and Coining.

Fabrication Processes – Classification – Joining processes – Fusion welding processes – Solid state welding processes – Soldering and Brazing.

TEXTBOOKS:

1. **SeropeKalpakjian:** Manufacturing Engineering and technology, 5th Edition, Pearson Prentice Hall, 2005.
2. **P.N. Rao:** Manufacturing Technology, 2nd Edition, TataMcGraw – Hill, 2007.
3. **P.C. Sharma**: A Textbook of Production Technology: Manufacturing Processes, 7th Edition, S. Chand and Company Ltd., 2007

REFERENCES:

1. **J.P. Kaushish**: Manufacturing Porcesses, 2nd Edition
2. **R.S. Khurmi and J.K. Gupta**: A Textbook of Workshop Technology: Manufacturing Processes, 7th Edition, S.Chand and Company Limited, 2008.
3. **HajraChoudury S.K**.: Elements of Workshop Technology, Volume – 1, Indian Book Distribuiton Co. Calcutta.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		3		3							
CO2	1		2		3							
CO3		2			3							
CO4			3		3							
CO5			2		3							

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ME305C - BASIC THERMODYNAMICS

B.Tech IIISemester Effective from 2021-2022

Lectures / Week: 3 periods Credits:03

Objectives:

- To learn about work and heat interactions, and balance of energy between system and itssurroundings.
- To learn about application of I law to various energy conversion devices.
- To learn about the II & III laws of thermodynamics with relations.
- To understand the difference between high grade and low grade energies and law limitationson energy conversion
- To learn about the air standard cycles

UNIT - I

Basic Concepts: System, boundary, Surrounding, Universe, control volume, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process – Reversible, Quasi static & Irreversible Processes, cycle, Causes of Irreversibility. Energy in State and in Transition – Types, Work and Heat, Point and Path function.Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Const. Volume gas Thermometer – Scales of Temperature.

UNIT – II

First Law for Cyclic & Non-cyclic processes; Concept of total energy E; Demonstration that E is a property; Various modes of energy, Internal energy and Enthalpy; First Law of Thermodynamics and Flow Processes - Derivation of general energy equation for a control volume; Steady state steady flow processes including throttling; Unsteady processes; examples of steady unsteady Firs law applications for system & control volume

UNIT – III

Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence, Corollaries, PMM of Second kind, Carnot cycle and its specialties, Carnot's theorem, Thermodynamic scale of Temperature. Clausius Inequality, Entropy, Principle of Entropy Increase, Availability and Irreversibility (Basic definitions) – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the Third Law of Thermodynamics.

UNIT-IV

Exergy balance equation and Exergy analysis. Definition of Pure substance, Ideal Gases and ideal gas mixtures, Real gases and real gas mixtures, Compressibility charts- Properties of two- phase systems - Const. temperature and Const. pressure heating of water.

UNIT -V

Thermodynamic and Air standard cycles -; Basic Brayton cycle; Introduction to basic concepts of Gas Turbines; Sterling Engine, Otto, Diesel and Dual cycles; Air Standard Efficiency and comparison with Carnot Cycle Efficiency.

Course Outcomes:

- After completing this course, the students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions
- Students can evaluate changes in thermodynamic properties of substances
- The students will be able to evaluate the performance of energy conversion devices
- The students will be able to differentiate between high grade and low grade energies.
- The students will be able to evaluate the performance of air standard cycles.

References:

- R.K. Rajput, 2007, 3rdEdition, EngineeringThermodynamics**,** Laxmi Publications (P) LTD.
- Nag, P.K, 1995, *Engineering Thermodynamics*, Tata McGraw-Hill Publishing Co. Ltd.
- Domakundwar and Kothandaraman, *A Course in Thermal Engineering* Moran, M. J. and Shapiro, H. N., 1999, *Fundamentals of Engineering Thermodynamics*, John Wiley and Sons.
- Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, *Fundamentals of Thermodynamics*, John Wiley and Sons.
- Jones, J. B. and Duggan, R. E., 1996, *Engineering Thermodynamics*, Prentice-Hall of India

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	1		2								
CO2	1			1								
CO3		2	**1**	**1**								
CO4		2	**2**	1								
CO5			2	2	**1**							

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ME306L **- STRENGTH OF MATERIALS LABORATORY**

B.Tech III Semester Effective from- 2021-22

(P/D) / Week: 3 periods **Credits:1.5**

LIST OF EXPERIMENTS:

1. Tension test on mild steel bar
2. Tension test on HYSD steel bar
3. Compression test on wood
4. Shear test on wood
5. Torsion test on steel
6. Test on close coiled helical spring
7. Bending test on rolled steel joist
8. Bending test carriage spring
9. Charpy impact test
10. Deflection test on a beam under Uniform Bending
11. Deflection test on simple supported beam
12. Deflection test on fixed beam

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ME307L - MANUFACTURING PROCESS LAB

B.Tech IIISemester Effective from- 2021-22

(P/D) / Week: 3 periods **Credits:1.5**

LIST OF EXPERIMENTS:

I. LATHE

1:Step Turning

2:Taper Turning with Knurling

3:V Threading

II. SHAPER

4: Making Square prism on Shaper

5: Slot Cutting with Shaping Machine

III. MILLING MACHINE

6: Rectangular Slot Cutting on Vertical Milling Machine

7: Hexagonal Cutting on Horizontal Milling Machine

8: Spur Gear cutting on Milling

IV. THREADING

9: Square Threading

10: Double Start V Threading

11: Drilling ,Boring and Tapping

V. WELDING

12: Joining of Two Metal Work Pieces with Arc Welding or Gas Welding

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***ME308L* - FUELS LABORATORY**

B.Tech III Semester Effective from- 2021-22

(P/D) / Week: 3 periods **Credits: 1.5**

LIST OF EXPERIMENTS:

1. Measurements of Viscosity using Redwood Viscometer
2. Measurements of Viscosity using Saybolt Viscometer
3. Test on Cleaveland flash point apparatus
4. Test on Cleaveland fire point apparatus
5. Test on Ables Flash Point Apparatus
6. Test on Distillation Apparatus
7. Test on Aniline Point Apparatus
8. Test of calorific value of fuels using Bomb Calorimeter
9. Determine the Pour point of given samples



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ME309S – CAD Laboratory

B.Tech III Semester Effective from- 2021-22

(P/D) / Week: 3 periods **Credits: 1.5**

Course objectives:

- Navigate through the drafting user interface.
- Create and maintain drawing sheets and views.
- Create and edit user-defined view boundaries.
- Create and edit associative section views.
- Create view dependent geometry.
- Create and edit symbols, dimensions and text.
- Generate an assembly parts list.

Introduction of 2-D and 3-D modeling:

Part Navigator, Master model drawings and drafting standards, drawing sheets, Drafting views Custom views, Move, copy, and align views, hiding geometry in drafting views, Updating drawings and drafting views, Centerline symbols, Dimensions, Notes and labels, Balloon, symbols, GD&T symbols, Surface finish, weld, and custom symbols, Section views, Editing section lines, Maintaining associativity, Detail views, View boundaries, Broken views, Break-out section views, View dependent edits, Part Attributes, Parts lists, Sectioning assembly views, Exploded views, ordinate dimensions, Hole Tables.

SYLLABUS:

Student will perform six exercises on the following,

2-D Modeling

1. Geometrical construction.
2. Orthographic projections.
3. Isometric projections.
4. Sectional views.

3-D Modeling

5. Machine components such as bolt & nuts, bearing brackets, vice bodies, etc.
6. Assembly drawing of any three simple components.

MC310A **Constitution of India**	
Instruction : Hours/Week : **2L:0T:0P** Sessional Marks : **100**	**Credits: 0**

Course Objectives: Students will be able to

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Unit-I

History of Making of the Indian Constitution: History
Drafting Committee, (Composition & Working)
Philosophy of the Indian Constitution: Preamble
Salient Features

Unit-II

- **Contours of Constitutional Rights & Duties:**
- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit-III

- **Organs of Governance:**
- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

Unit-IV

- **Local Administration:**
- District's Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.

- Pachayati raj: Introduction, PRI: Zila Pachayat.
- Elected officials and their roles, CEO Zila Pachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

Unit-V

- **Election Commission:**
- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books/References:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

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B.TECH IV SEMESTER, MECHANICAL ENGINEERING

ME401C- FLUID MECHANICS AND HYDRAULIC MACHINERY

EFFECTIVE FROM 2021-22 (R20- Regulations 2020)

Lectures/ Week :3 Hours Tutorials/ Week : 1 Hour Credits: 3

COURSE OBJECTIVES:

- To learn about the application of fluid flow concepts and fundamental equations.
- To apply the knowledge of flow through pipes and laminar flow in circular pipes.
- To understand the importance of dimensional analysis and Boundary layer concepts.
- To apply the knowledge of theory of rotodynamic machines and pumps.
- To design the different types of turbines and analyze their performance.

CONTENTS:

UNIT- I

Definition of fluid, Units and dimensions- properties of fluids, mass density, specific volume, specific gravity, viscosity, Newton's law of viscosity, compressibility, surface tension and capillarity – Fluid flow characteristics- Velocity, Acceleration, Types of flows – Stream lines, Path lines, Streak lines – Continuity Equation – Energy Equation - Momentum equation - Euler's equation of motion along a stream line- Bernoulli's equation and its applications.

UNIT –II

Flow through pipes – Laws of fluid Friction, Darcy-Weisbach equation and other formulae for Head loss due to friction in pipes, Minor losses in pipes, Pipes in Series and Pipes in Parallel, Moody's diagram - Laminar flow through circular pipes, Hagen-Poiseuille Equation.

UNIT-III

Boundary layer theory, thickness, measurement– Drag force on a flat plate due to boundary layer - Need for dimensional analysis – methods of dimension analysis – Similitude – type of similitude Dimensionless parameters – application of dimensionless parameters – Model analysis.

UNIT – IV

Theory of Rotodynamic machines - various efficiencies – velocity components at entry and exit of the rotor, velocity triangles – Centrifugal pumps, working principle, work done by the impeller, performance curves – Cavitations in pumps- Reciprocating pump – working principle.

UNIT- V

Classification of water turbines, heads and efficiencies, velocity triangles – Axial, radial and mixed flow turbines – Pelton wheel, Francis turbine, Kaplan turbine, working principles – Draft tube – Specific speed, Unit quantities, Performance curves.

Text Books:

1. Hydraulics and Fluid Mechanics by P.N. Modi and S.M. Seth.
2. Fluid Mechanics and Hydraulic Machines by R.K.Rajput.
3. Fluid Mechanics and Hydraulic Machines by R.K.Bansal.

References:

1. Fluid Mechanics by V.L. Streeter and E.Benzamine, Wylie.
2. Fluid Mechanics and Turbo machines by Madan Mohan Das.– PHI Learning Pvt.Ltd., New Delhi.

COURSE OUTCOMES: Upon completion of this course, students will be able to

	DESCRIPTION OF THE COURSE OUTCOME
CO1	Understand and analyze simple flow situations and solve fluid flow problems.
CO2	Classify flows and evaluate the flow through pipes and laminar flows.
CO3	Apply the knowledge of boundary layer theory and dimensional analysis.
CO4	Design and evaluate the performance of centrifugal and reciprocating pumps.
CO5	Design and analyze the characteristics of turbines.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	3	1								
CO2	3	3	3									
CO3	3	3										
CO4	3	3				2						
CO5	3	3				2	3					

B.TECH IV SEMESTER, MECHANICAL ENGINEERING
***ME402C* – KINEMATICS OF MACHINERY**
EFFECTIVE FROM 2021-22 (R20- Regulations 2020)

Lectures/ Week : 3 Hours Tutorials/ Week : 1 Hour Credits: 3

COURSE OBJECTIVES:

- The course under kinematics of Machinery has been designed to cover the basic concepts of kinematic aspects of machine elements which are useful for design of machines.
- This course provides the knowledge of mechanical engineers in Dynamic synthesis and analysis by providing significant skills and also experience in creating and modeling mechanisms and also provides the knowledge for doing position analysis of mechanisms of various machines.
- This course provides the understanding of the concepts of displacement on kinematics analysis.
- This course provides the kinematic analysis of gears and gear trains which are used in different machines.
- Ability to analyze the kinematics of cams, design of cams and followers. And also understanding of the concepts of displacement, velocity and acceleration of followers and how to determine them.

CONTENTS:

UNIT–I
BASICS OF MECHANISMS :

Elements or Links – Classification – Rigid Link, flexible and fluid link –Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higherpairs– closedandopenpairs–constrainedmotion–completely,partially orsuccessfullyconstrainedand incompletelyconstrained – Degree of freedom, Mobility – Kutzbach criterion, Gruebler's criterion – Grashof's Law – Kinematic inversions of four-bar chain and slider crank chains – Limit positions – Mechanical advantage – Transmission Angle – Quick return mechanisms.

UNIT–II
STRAIGHT LINE MOTION MECHANISMS:
Exact and approximate, copied and generated types –Peaucellier - Hart - Scott Russel – Grasshopper – Watt- Tchebicheff - Robert Mechanisms and Pantograph.

STEERING MECHANISMS:
Conditions for correct steering – Davis Steering gear, Ackerman's steering gear.

UNIT–III

VELOCITY AND ACCELERATION ANALYSIS:

Instantaneous centers of rotation – Kennedy's theorem and its applications to planar mechanism for velocity analysis – Velocity analysis of various mechanisms using Relative velocity method, Velocity Images, Rubbing Velocity – Acceleration of simple mechanisms. Coriolis component of acceleration.

UNIT–IV

GEARS: Toothed gears – types – law of gearing, Forms of tooth- cycloidal and involute profiles. Velocity of sliding – phenomena of interference– Methods to avoid interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact.

GEAR TRAINS: Introduction –Types of gears trains – Simple, Compound, Reverted and Epicyclic gear trains. Train value and Velocity ratios of gear trains.

UNIT–V

CAMS:

Classification of cams and followers- Terminology and definitions- Displacement diagrams- Uniform velocity, parabolic, simple harmonic and cycloidal motions – Cam profiles for specified motions – disk cam withradial Knife edge follower, flat faced follower , roller follower – Oscillatory follower cams of specified contours.

Text Books:

1. Theory of Machines :S.S.Rathan / TMH
2. Theory of Machines :R.S.Khurmi. / S.Chand
3. Mechanisms and Machine theory :J.S.RaoandR.V.Dukkipati./NewAge
4. Theory of Machines &Mechanisms :PL. Ballaney / Khanna Publishers

References:

1. The theory of Machines : ShigleyJ.E/Oxford University Press
2. Mechanisms and Dynamics of Machinery: Hamilton Mabie H. and F. W. Ocvirk / Oxford University Press.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2			2								1
CO2	1	2			2							1
CO3	2	3	2									
CO4	2	3			2	2						1
CO5	3											

COURSE OUTCOMES: Upon completion of this course, students will be able to

	DESCRIPTION OF THE COURSE OUTCOME
CO1	Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms.
CO2	Acquire knowledge and develop straight line motion mechanisms and steering mechanisms.
CO3	Able to draw velocity and acceleration diagrams for different mechanisms.
CO4	Able to design and develop gear and gear train depending on application.
CO5	Design cams and followers for specified motion profiles.

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B.TECH IV SEMESTER, MECHANICAL ENGINEERING
***ME403C* – APPLIED THERMODYNAMICS**
EFFECTIVE FROM 2021-22 (R20- Regulations 2020)

Lectures/ Week : 3 Hours Tutorials/ Week : 1 Hour Credits: 4

COURSE OBJECTIVES:

- Able to learn about the Ist law analysis of combustion reactions.
- Able to learn about steam power cycles, boilers and draughts.
- Able to understand the steam generators and steam properties.
- Able to understand the compressible flows of nozzles.
- Able to analyse the performance of steam turbines.

CONTENTS:

UNIT–I

Introduction to Fuels: Solid, liquid and gaseous fuels– Calorific Value of Fuels: Determination and Calculation of from Chemical Analysis, Combustion equations – Air required complete combustion. Stoichiometry, exhaust gas analysis- First law analysis of combustion reactions-Heat calculations.

UNIT–II

Steam power cycles: Steam Power plant and its components, site selection, Carnot Vapour Power Cycle, Rankine cycle, Rankine Cycle with Reheat, Superheat, and Regeneration, Plant efficiency, Comparison of Carnot and Rankine cycles.

BOILERS: Classification Based on Working Principles & Pressures of Operation - L.P & H.P. Boilers – Mountings and Accessories. DRAUGHT: Classification – Height of Chimney for Given Draught and Discharge, Condition for Maximum Discharge, Efficiency of Chimney – Artificial Draught, Induced and Forced Draught.

UNIT–III

Steam Properties: Properties of Steam, Definitions of saturated states; PV, TS, HS Diagrams, P-V-T surface, Principle of increase of entropy; Steam Processes – Constant Volume, Constant pressure – Isothermal, Adiabatic and Hyperbolic Process, Throttling expansion.Identification of states & determination of properties.

UNIT–IV

Basics of compressible flow: Stagnation properties, Isentropic flow of a perfect gas through a nozzle, choked flow, subsonic and supersonic flows- normal shocks- use of ideal gas tables for isentropic flow and normal shock flow- Flow of steam and refrigerant through nozzle, super saturation- compressible flow in diffusers, efficiency of nozzle and diffuser.

UNIT–V

Analysis of steam turbines: Principles and operation – Classification - velocity and pressure compounding of steam turbines – Work done – Diagram Efficiency, Effect of

Blade friction – stage efficiency, Turbine reheat factor, Height of Turbine blade – Axial Thrust – losses in steam turbine; Governing of turbines.

Text Books:

1. P. K. Nag, "Engineering Thermodynamics", 4thEdition, McGraw Hill, 2014.
2. Thermal Engineering, R.K. Rajput, 9/e, Lakshmi Publications, 2013.
3. Thermal Engineering, R.S Khurmi& JS Gupta, S.Chand, 2012.
4. Engineering Thermodynamics R.K. Rajputh, 3rdEdition, Lakshmi Publications, 2007.
5. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley andSons.

References:

1. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India
2. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
3. Eastop and McKaney, Applied Termodynamics.
4. Domakundwar and Kothandaraman, A Course in Thermal Engineering.

COURSE OUTCOMES: Upon completion of this course, students will be able to

	DISCRIPTION OF THE COURSE OUTCOME
CO1	Understand the Ist law analysis of combustion reactions
CO2	Understanding of various steam power cycles, boilers and droughts.
CO3	Acquire the knowledge about the steam generators and steam properties
CO4	Acquire the knowledge on compressible flows of nozzles
CO5	Acquire the knowledge on the performance of steam turbines.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12
CO1	2			3			2					
CO2	1			2			3					
CO3			2	3								
CO4		3		2								
CO5		3		1								

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

B.TECH IV SEMESTER, MECHANICAL ENGINEERING

***ME404C* – Advanced Engineering Graphics**

EFFECTIVE FROM 2021-22 (R20- Regulations 2020)

Lectures/ Week: 1 Hour Drawing / Week: 4 Hours Credits: 3

COURSE OBJECTIVES:

- To understand the basics of Projections of solids and Auxiliary projections of solids in different inclinations of the principle planes
- To provide the knowledge of section of solids and to provide sufficient knowledge to draw section planes perpendicular to HP and inclined to VP and also of solids inclined to both the planes.
- To provide knowledge of development of surfaces, and to know how to unwound an object / solid when it is being cut by an inclined plane.
- To impart the students, the ability to analyze the interpretation of solids intersections.
- To analyze the isometric projections of simple objects.

CONTENTS:

UNIT–I

Projections of Solids (Simple Solids - Cylinder, Cone, Cube, Prism, & pyramid, Octahedron and Tetrahedron) those inclined to both the planes by Auxiliary projections.

UNIT–II

Sections of solids of tetrahedron, cube, prism, pyramids and cone, section planes perpendicular to HP and inclined to VP, Section planes perpendicular to VP and inclined to HP sections plane Perpendicular to both HP and VP true shape of the sections

UNIT-III

Development of surfaces: Development of lateral surfaces of right regular solids as prisms, pyramids, cylinders and cones which are cut by plane inclined to HP only.

UNIT-IV

Introduction to interpenetration of solids of intersection of two prisms, cylinders, cone and cylinder.

UNIT-V

Isometric Projections: Isometric Projections and views such as prisms, Pyramids, cylinders and cones. Solids placed one over the other simple mechanical components.

Text Books:

1. Bhatt N.D. and V.M. Panchal, &Ingle P. R., (2014), Engineering Drawing, Charatar Publishing House.
2. Shah, M.B. &Rana B.C, (2008), Engineering Drawing and Computer Graphics, Pearson Education.
3. K.L.Narayana and P. Kannaih, A text Book of Engineering Drawing, SCITECH Publications – (2008)

References:

1. Agrawal B. &Agrawal C.M. (2012), Engineering Graphics, TMH Publishers.
2. K. Venugopal: Engineering Drawing & Graphics, New age International Publishers.

COURSE OUTCOMES: Upon completion of this course, students will be

DISCRIPTION OF THE COURSE OUTCOME	
CO1	Able to draw Projections of solids and Auxiliary projections of solids parallel to one plane perpendicular to both the planes
CO2	Able to analyze and draw section of solids inclined to both the planes
CO3	Able to develop surfaces of solids which are perpendicular to both the planes
CO4	Able to draw interpretation of solids in any angle
CO5	Able to draw isometric projections of simple objects

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	1										
CO2	1	**2**				1						
CO3			**1**	**2**	2							
CO4				2	3	1						
CO5		1	1	2		**2**						

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI
(w.e.f. AY: 2020 – 2021)

ME405C MACHINE TOOLS AND METAL CUTTING

Lectures/week: 3 hours

Credits: 03

Sessionals: 20 +20

End Examination: 60

Course Outcomes (COs):

CO 1 Able to understand the basic concepts of metal cutting and basic machine tools of workshop practice.
CO 2 Able to make a distinction between machine tools employing single point cutting tool and multipoint cutting tool.
CO3 Prepared to cut gear teeth on a given job on a milling machine by adopting suitable indexing method.
CO4 Ability to understand the basic features of Capstan and Turret lathes and machining by abrasive grains.

UNIT – I

Cutting tools: Classification – Nomenclature/Signature of Single Point Cutting Tool – Differences between orthogonal cutting and oblique cutting – Mechanism of metal cutting – Types of Chips – Chip Breakers – Forces acting on a single point cutting tool – Merchant's Circle Force Diagram – Velocity relations – Specific energy in cutting – Tool life – Tool life equation.

UNIT – II

Lathe and Shaper: Types – operations done on Lathe. Work holding devices. Boring Machines – types and constructional details – Jig boring machine – Shaper, Slotting and Planer Machines – Constructional details – Quick return mechanisms – Estimation of machining time in lathe, shaper, and planer.

UNIT – III

Drilling and Milling Machines: Types of Drilling machines – Constructional details – Operations performed on them. Twist drill elements. Classification of milling machines – Constructional details of various types – Operations performed on them. Milling methods – Up – cut and Down – cut milling. Estimation of machining time in drilling and milling.

UNIT – IV

Gear cutting by Milling and Finishing Operations: Indexing head and types of indexing methods – Simple, Compound, Differential and Angle indexing. Spur and Helical gear cutting – Gear generating methods – Gear shaping and Gear hobbing. Finishing of gear by gear shaving, gear grinding, and gear lapping.

UNIT – V

Broaching and Grinding Machines : Types of broaches – broaching operations – types of broaching machines – Vertical, Horizontal, Continuous, and Rotary broaching machines. Grinding – Grinding wheels – Manufacturing, Specification – Wheel selection. Wheel dressing and truing. Different types of grinding machines. Use of magnetic chucks – Precision grinding processes – Lapping, Honing and Super finishing. Brief introduction to Capstan and Turret lathes.

TEXTBOOKS:

1. **Serope Kalpakjian**: Manufacturing Engineering and Technology, 5th Edition, Pearson Prentice Hall.
2. **Hazra Choudary and Bose S.K.:** Workshop Technology Volume II, 10th Edition, Media Promoters and Publishers , Pvt. Ltd. 2000
3. **B.S. Raghuvamshi** : Workshop Technology Volume II (Machine Tools), Dhanpat Rai and Co, Pvt. Ltd, 2009.
4. **Sharma P.C.**: Production Engineering, 10th Edition, S. Chand and Co, 2008
5. **Haslehurst M**.: Manufacturing Technology, 3rd Edition, Viva Books Pvt. Ltd. 1998
6. **Gupta S.C and Jain R.K.:** Production Technology, 9th Edition, Khanna Publishers, 2002.

References:

1. **HMT**: Production Technology, McGraw – Hill Education (India) Pvt. Ltd, 28th reprint, 2008.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	2		3									
CO2	1	2	3									
CO3	1		3									
CO4		2	3									
CO5	1		3									

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

B.TECH IV SEMESTER, MECHANICAL ENGINEERING

ME406L- FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

EFFECTIVE FROM 2021-22 (R20- Regulations 2020)

Practical/ Week : 3 Hours
Credits: 1.5

COURSE OBJECTIVES:

- To determine the coefficient of discharge in flow measuring devices.
- To determine the coefficient of different losses in pipe flow.
- To determine Specific Speed and draw the performances Characteristic curves of pumps.

CONTENTS:

FLOW MEASURMENT

1. Calibration of Small Orifice
2. Calibration of Venturi Meter
3. Calibration of Orifice Meter
4. Calibration of Triangular Notch

HEAD LOSSES IN PIPES

5. Determination of Friction factor of the pipe material
6. Determination of Head Loss coefficient due to sudden contraction
7. Determination of Head Loss coefficient due to Gate valve in a pipe line

HYDRAULIC MACHINES

8. Characteristic curves of 0.8 KW two stage centrifugal pump
9. Characteristic curves of 5.5 KW variable speed centrifugal pump

COURSE OUTCOMES: Upon completion of this course, students will be able to

DISCRIPTION OF THE COURSE OUTCOME	
CO1	Able to calibrate the flow measuring devices
CO2	Able to calculate loss coefficients for use in the pipe flow analysis.
CO3	Able to prepare the characteristic curves for the pumps.

Department of Mechanical Engineering
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B.TECH IV SEMESTER, MECHANICAL ENGINEERING

ME407L- IC ENGINES LAB

EFFECTIVE FROM 2021-22 (R20- Regulations 2020)

Practical/ Week : 3 Hours
Credits: 1.5

LIST OF EXPERIMENTS:

1. HeatbalancesheetonListerEngines.
2. PerformanceTeston2-stage Air Compressor.
3. Economical Speed Test on Kirloskar Engine.
4. Load Test on Kirloskar Engine by using Bio diesel.
5. Air fuel ratio& volumetric efficiency test on Kirloskar Engine.
6. Valve Timing diagrams for Cooper Engine.
7. Load Test on 4- stroke Kirloskar Diesel Engine
8. Smoke and Emission Test on four stroke diesel engine with 5-Gas Analyzer.

COURSE OUTCOMES: Upon completion of this course, students will be able to

	DISCRIPTION OF THE COURSE OUTCOME
CO1	Estimate energy distribution by conducting heat balance test on IC engines.
CO2	Conduct constant speed and variable speed tests on IC engines and interpret their performance.
CO3	Evaluate the performance of air compressor.

Department of Mechanical Engineering
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B.TECH IV SEMESTER, MECHANICAL ENGINEERING

ME408L- ELECTRONICS AND ELECTRICAL ENGINEERING LAB

EFFECTIVE FROM 2021-22 (R20- Regulations 2020)

Practical/ Week :3 Hours Credits: 1.5

COURSE OBJECTIVES:

- To study and analyze basic magnetic and electric circuits.
- To acquire knowledge on operating characteristics of Transformer and DC Machines.
- To study the characteristics of various electronic components.

LIST OF EXPERIMENTS:

1. Verification of KCL & KVL
2. Measurement of Inductance
3. Verification of Super position Theorem
4. Measurement of 3 phase power
5. OC & SC Test on 1 phase Transformer
6. Brake test on DC Shunt Motor
7. OCC on DC Shunt Generator
8. 1 Phase Half wave rectifier
9. 1 Phase full wave rectifier
10. PN Junction Diode Characteristics
11. V-I Characteristics of Zener Diode
12. Logic gates (NAND & NOR)

COURSE OUTCOMES: Upon completion of this course, students will be able to

	DISCRIPTION OF THE COURSE OUTCOME
CO1	Verify Network Theorem and analysis of Electrical Circuits
CO2	Understand the Significance and performance of DC Machines and Single phase Transformers
CO3	Design and analyze various Rectifiers & Logic Gates

Mapping of Course Outcomes with Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2							3	2		
CO2	3					2			2	2		
CO3	2		1						2	2		

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI
(w.e.f. AY: 2020 – 2021)

ME409S MATLAB

Lectures/week: 1 hours — Credits: 02

Laboratory/week: 2 hours* — Continuous Assessment: 40

End Examination: 60

***Evaluation is similar to regular Practical/Laboratory Class Model/Pattern**

Course Outcomes (COs):

CO 1 Able to understand the basic features of MATLAB platform
CO 2 Able to distinguish between Script file and Function file
CO3 Prepared to write simple programmes and to solve systems of linear algebraic equations – that is problem solving techniques.
CO4 Ability to make use of the numerical power of MATLAB in practical applications such as linear regression and interpreting and plotting of complex data with ease.

UNIT – I

Introduction: What is MATLAB? – MATLAB System – Starting MATLAB on Windows Platforms – MATLAB Environment – Basic commands and Syntax – Arrays and Matrices – Arithmetic and Array operations – Matrix operations and manipulations – Practice Exercises.

UNIT – II

Scripts and Functions: Script and Function files (M – files) – Control loops – Sample/simple Programmes – Basic Plotting – 2D and 3D plotting – Multiple plots – Additional plotting features – Practice Exercises.

UNIT – III

Matrix Algebra and Solutions to Systems of Linear Equations: Solving Linear algebraic equations by matrix methods – Polynomials – Symbolic mathematics – Preliminaries – Practice Exercises.

UNIT – IV

Solving Linear algebraic equations by Symbolic mathematics – Differentiation and Integration by Symbolic mathematics – Practice Exercises.

UNIT – V

Numerical Techniques: Numerical differentiation and Numerical integration – Fitting of data – Curve fitting – Interpolation of functions – Practice Exercises.

TEXTBOOKS:

1. **Tobin A. Driscoll**: Learning MATLAB, Siam, Cambridge University Press, India, 2005.
2. **Hanselman and Littlefield**: Mastering MATLAB 7, 1st Edition, PHI, 1997.
3. **Rudra Pratap**: Getting Started with MATLAB 7, Oxford University Press, 2006.
4. **Stevan C. Chapra**: Applied Numerical Methods with MATLAB for Engineers and Scientists, 3rdEdition, McGrawHill Companies, Inc, NY, 2012.



Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME501C DESIGN OF MACHINE ELEMENTS

Effective from- 2020-21

Lectures / Week: 3 Periods + 1 Tutorial **credits:3**

Objectives

This course seeks to provide an introduction to the design of machine elements commonly encountered in mechanical engineering practice through

1. A strong background in mechanics of materials based failure criteria underpinning the safety – critical design of machine components
2. An understanding of the origins, nature and applicability of empirical design principles, based on safety considerations
3. An overview of codes, standards and design guidelines for different elements
4. An appreciation of parameter optimization and design iteration
5. An appreciation of the relationships between component level design and overall machine system design and performance

Course Contents

UNIT-I

Engineering Design
What is designing? ; The process of Design; design by evolution; Identification and analysis of need; True need; Specifications ; Standards of performance ; use of checklists ; Morphological Analysis ; Brainstorming; measure of physical realizibility; Designing for shipping, handling and installation; Design considerations; Design tools and resources; Design Engineer‟s Professional Responsibilities; Standards and Codes;

UNIT-II

Design Considerations – limits, fits and standardization, Modes of failure, factor of safety; Stress – strain relationships; Stress-strain relationships; shear stress and shear strain relationships; Review of failure theories for static and dynamic loading(including fatigue failure), Stress concentration factors; Reduction of stress concentration effects; Fluctuating stresses; fatigue failure; Endurance limit; Notch sensitivity; Soderberg and Goodman Diagrams; Modified Goodman‟s diagrams; fatigue design under combined stresses. Design for finite and infinite life.

UNIT-III

Design of Shafts and Keys; Design of shafts under static and fatigue loadings; Axial, Bending, Torsional stresses; Principal stresses; theories of failure. Couplings.
Keys; types of keys; Design os hank key; Effect of keyway. Design of splines.

UNIT-IV

Design of shaft couplings and pipe joints; Introduction; Types of shaft couplings; Design of sleeve or muff couplings, Clamp or Compression coupling, Flange couplings. Design of bushed type flexible coupling. Pipe Joints: Introduction, Design of pipe joints, hydraulic pipe joints, Design of flanged pipe joints

UNIT-V

Design of fasteners Threaded joints – Thread joints; ISO metric screw threads. Bolted joint in tension; Torque requirements for bolt tightening; bolted joint under fluctuating load; eccentricity loaded bolted joints in shear; bolted joints with combined stresses; Bolt of uniform strength. Analysis and applications of power screws.
Welded joints – types of welded joints; stresses in butt and filler welds; strength of welded joints; Eccentric loaded welded joints; weld joint subject to bending moment and fluctuating forces; welding symbols; welded inspection.

TEXT BOOKS:

1. Shigley J. E and Mischke, C.R.: Mechanical Engineering Design, Fifth Edition, McGraw Hill International, 1989
2. Deutschman D. Michels, W.J. and Wilson, C.E, Machine Design Theory and Practice, MacMillan, 1992,
3. Juvinal, R.C., Fundamentals of Machine component esign, John Wiley, 1994
4. Spottes, M.F., Design of Machine Elements, Prentice – Hall India, 1994
5. R.L. Norton, Mechanical Design – An integrated Appoach, Prentice Hall, 1998

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2	3									
CO2		**2**	3									
CO3	1	2	**3**									
CO4		2	**3**									
CO5	1	2	3									



Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME502C HEAT TRANSFER

Lectures/Week: 4
periods Tutorial/Week
: 1 Hrs.

Credits: 4
Sessional marks: 20
+20 End Examination
Marks: 60

UNIT – I

General Modes of Heat Transfer: Basic modes of Heat Transfer, Basic laws of Heat Transfer, Applications of Heat Transfer, Fourier law of heat conduction, Newton‟s law of Cooling Basic equations, Coefficient of thermal conductivity convective, Heat transfer coefficient, Stephan Boltzmann constant, Overall heat transfer coefficient.

Conduction in steady state

Theory of heat conduction, Heat flow through plane wall and cylinder with Variable Thermal conductivity, Conduction through slabs, cylinders and spheres, Concept of thermal resistance, critical thickness insulation, logarithmic mean area, concept of shape factor, one dimensional steady state conduction with heat addition.

UNIT – II

Conduction : Conduction in unsteady state periodic and a periodic temperature variance, infinite semi and infinite solids general equations for conduction in unsteady state, lumped capacitance method, transfer heat flow in semi- infinite solid, convection boundary conditions – use of Grober / Heisler charts.

UNIT – III

Radiation: Introduction, Applications of Radiation, Nature of radiation, Emissive Power-Absorption, Reflection and Transmission, concept of black body, gray body, Planck‟s Law, Stephan Boltzmann law, Kirchhoff „s law, Radiation shape factor relations, Heat exchange between black bodies, Heat exchange between non-black bodies, introduction to radiation network analysis, Radiation shields.

UNIT – IV

Convection:

Heat transfer due to free convection: Introduction, Applications, Free convection heat transfer on a vertical flat plate, Empirical correlations for vertical plates and cylinders, horizontal plates and cylinders, Natural convection cooling in electronic equipment, heat pipe.

Heat transfer due to forced convection: Introduction, Applications, Principles of convection, The boundary layer concept-The velocity and Thermal boundary layer, Laminar boundary layer on a flat plate thermal boundary layer, empirical relations, laminar and turbulent flows, heat transfer in laminar flow over a flat plate, heat transfer in turbulent flows, relations between fluid friction and heat transfer, heat transfer in laminar tube flow, turbulent flow in pipes, flow across cylinders and spheres.

UNIT – V

Heat Exchangers: Introduction, Classification of heat exchangers**,** overall heat transfer coefficient, Fouling factors, LMTD method of Heat exchanger analysis, effectiveness of heat exchangers, NTU method, Compact heat exchangers, different considerations.

Heat transfer through extended surfaces: Theory of fins, fins of uniform cross-sectional area, Analysis of Long Fin and Short fin with insulated tip, heat transfer calculations, fin efficiency, fin effectiveness.

TEXT BOOKS:

1. Heat Transfer : Holman J P
2. Heat Transfer : Mahesh M. Rathore
3. Fundamentals of Engineering Heat and Mass Transfer : Sachdeva R C
4. Fundamentals of Heat and Mass Transfer : Kothandaraman
5. Heat Transfer : R.K. Rajput
6. Basic Heat and Mass Transfer : Mills. A
7. Heat Transfer : Y.A. Cengel

REFERENCES:

1. Introduction to Heat Transfer : Frank P Tancropera David P Dewitt
2. Heat Transfer : Ozisik
3. Principles of Heat Transfer : Frank Kreith
4. Heat and Mass Transfer : Yadav R.
5. Heat Transfer : Ballaney P L

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2	3									
CO2		**2**	3									
CO3	1	2	**3**									
CO4		2	**3**									
CO5	1	2	3									

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME503C Machine Drawing

Effective from- 2020-21

Lectures / Week: 3 Periods + 1 Tutorial **credits:3**

Unit – I

Orthographic Views: Conversion of Pictorial views into Orthographic views with sectioning.

Unit - II

Machine Elements: Drawing views of the following machine elements: Thread profiles, Bolted joint, machine and cap screws, types of nuts, locking devices for nuts, Foundation Bolts.
Keys: Sunk Keys, Feather Keys, Spline Shaft, Wood – Ruff Key and round Key.

Unit – III

Shaft Couplings: Muff Coupling, Split muff Coupling, Flanged Coupling, protective type flanged coupling.
Riveted Joints: Different types of rivet heads, Different types of lap joints and butt joint.

Unit – IV

Assembly Drawing: Preparation of assembly drawing of Plumber Block, Foot Step Bearing, Swivel Bearing, Screw jack, Stuffing Box, Pipe Vice, Lathe tail Stock, Clapper box, Drill Jig, Cross head, Air cock.

Unit – V

Part Drawing: Preparation of part drawing of IC engine connecting rod, Revolving Centre, Square tool post, Eccentric, V- Belt drive, Drill jig, Cross head.

TEXT BOOKS:

1. Narayana K.L, Kannaiah P. and Venkata Reddy K.: Machine Drawing, Third Edition, New Age International, 2006.
2. K.C. John: Text Book of Machine Drawing, PHI Learning Private Ltd, 2010.
3. Narayana K.L, Kannaiah P. and Venkata Reddy K.: Production Drawing, Second Edition, New Age International, 2010 reprint.

REFERENCES:

1. Bhatt N.D.: Machine Drawing, Charotor Publishers, 2008
2. Dhawan R.K.: Machine Drawing, Second Edition, S. Chand & Company Limited, 1998

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2	3									
CO2		**2**	3									
CO3		2	**3**									
CO4		2	**3**									
CO5		2	3									



Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME504E ADVANCED MANUFACTURING PROCESSES

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20
End Examination Marks: 60

UNIT-I

MATERIAL REMOVAL PROCESSES: Introduction, history of machining, traditional machining processes, non-traditional machining processes, hybrid machining processes. need for non-traditional machining processes.

MECHANICAL PROCESSES: Ultrasonic machining - Introduction, the machining system, material removal process, factors affecting material removal rate, dimensional accuracy and surface quality, applications.
Water jet machining - Introduction, The machining system, Process parameters, Applications, Advantages and disadvantages of Abrasive jet machining - Introduction, Machining system, Material removal rate, Applications, Advantages and limitations of AJM.

UNIT-II

CHEMICAL PROCESSES: Chemical Milling - Introduction, Tooling for CHM, Process parameters, Material removal rate, Accuracy and surface finish, Advantages, Limitations, Applications
Photochemical Milling - Introduction, Process description Applications, Advantages
Electro Polishing - Introduction, Process parameters, Applications, Process limitations.
ELECTROCHEMICAL PROCESSES: Electro Chemical Machining: Introduction, Principles of electrolysis, Theory of ECM, ECM equipment, Basic working principles, Process characteristics, Process control, Applications
Basics of Electrochemical Drilling, Electro-Chemical Deburring, and Electro stream drilling

UNIT-III

HYBRID ELECTROCHEMICAL PROCESSES: Electro Chemical Grinding - Introduction, Material removal rate, Accuracy and surface quality, Applications, Advantages and disadvantages
Electrochemical Honing - Introduction, Process characteristics, Applications
Electrochemical Super Finishing - Introduction, Material removal process, Process accuracy
Electrochemical Buffing - Introduction, Material removal process

UNIT-IV

THERMAL PROCESSES: Introduction, Mechanism of material removal, The machining system, Material removal rates, Heat-affected zone, Applications. Wire EDM principle, Process parameters, surface finish and machining accuracy, applications. Laser beam machining - Introduction, material removal mechanism, applications, advantages and limitations.
electron beam machining - introduction, basic equipment and removal mechanism, applications,

advantages and disadvantages. Plasma beam machining - introduction, machining systems, material removal rate, accuracy and surface quality, applications, advantages and disadvantages. Ion beam machining - introduction, material removal rate, accuracy and surface effects, applications

UNIT-V MATERIAL ADDITION PROCESSES: INTRODUCTION, CLASSIFICATION :
Liquid-Based Techniques – stereo-lithography, holographic interference solidification, beam interference solidification, solid ground curing-liquid thermal polymerization, fused deposition, modeling, multi jet modeling, ballistic particles manufacturing, shape deposition manufacturing. Powder based processes - selective laser sintering,
laser engineered net shaping, three-dimensional printing. Solid-Based techniques -solid foil polymerization, laminated object modeling.

TEXT BOOKS:

El-Hofy, Hassan Abdel-Gawad, "Advanced Machining Processes: Nontraditional And Hybrid Machining Processes", McGraw-Hill, 2005.

REFERENCES:

1. Pandey P.C. and Shah H.S, "Modern Machining Processes", 1st Edition, TMH, 2010.
2. Bhattacharya A, "New Technology, the Institution of Engineers", India 1984.
3. V. K. Jain, "Advanced machining processes", 1st Edition, Allied publishers, 2010

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3						2			
CO2			3						2			
CO3			**3**		2							1
CO4			**3**		2							
CO5			3		**2**							



Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME504E NON – CONVENTIONAL ENERGY SOURCES

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20

End Examination Marks: 60

UNIT – I

Introduction:

The solar energy option – Energy Scenario – Survey of Energy Resources – Classification – Need for Role and potential of new and renewable sources.

Principles of Solar Radiation:

Physics of the sun – The solar constant – Solar radiation on tilted surface – Instruments for measuring solar radiation and sunshine – Solar radiation data.

UNIT – II

Solar Energy Collection:

Flat plate and concentrating collectors – Classification of concentrating collectors – Orientation and Thermal analysis – Advanced collectors.

Solar Energy Storage:

Different methods – Sensible, Latent heat and Stratified storage – Solar Ponds

Solar Applications:

Solar heating/cooling techniques – Solar distillation and drying - Photovoltaic energy conversion.

UNIT – III

Wind Energy:

Sources and potentials – Horizontal and Vertical axis windmills – Performance characteristics.

Biogas and Bio-Mass:

Principles of Bio-conversion – Anaerobic/Aerobic digestion – Types of Bio-gas digesters – Gas yield – Combustion characteristics of bio-gas – Utilization for cooking, I.C. engine operation – Economic aspects.

UNIT – IV

Geothermal Energy:

Resources – Types of wells – Methods of harnessing the energy – Potential in India.

OTEC:

Principles – Utilization – Setting of OTEC plants - Thermodynamic cycles.

Tidal and Wave Energy:

Potential and Conversion techniques – Mini-hydel power plants – Their economics.

UNIT – V

Direct Energy Conversion:

Need for DEC – Carnot cycle – Limitations – Principles of DEC – Thermo-electric generators – Seebeck, Peltier and Joule Thompson effects – Figure of merit – Materials – Applications – MHD generators – Principles –

Dissociation and Ionization – Hall effect – Magnetic flux – MHD accelerator – MHD engine – Power generation systems – Electron gas dynamic conversion – Economic aspects

Fuel Cells:

Principle – Faraday‟s laws – Thermodynamic aspects – Selection of fuels and Operating conditions.

TEXT BOOKS:

1. Rai G.D. : Non-conventional Energy Sources, Standard Publishers Distributors.
2. Ashok V Desai : Non-conventional Energy, New Age International.
3. K. Udayakumar, M. Anandakrishnan: Renewable Energy Technologies, Narosa, 1997.

REFERENCES:

1. Twidell and Weir: Renewable Energy Sources, 2nd Edition, Taylor & Francis, 2006.
2. Sukhatme: Solar Energy, 1st Edition, Tata McGraw-Hill Education, 2008
3. D. Yogi Goswami, Jan F. Kreider.:Solar Power Engineering, 2nd Edition, Taylor & Francis, 2006.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									
CO2	2		2	2								
CO3		1		2	2							
CO4			2	2	3							
CO5		1	1	2								



Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME504E TOOL DESIGN

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20

End Examination Marks: 60

COURSE OBJECTIVES:

- To develop a solution oriented approach by in depth knowledge of Tool Design.
- To address the underlying concepts, methods and application of Tool Design.

CONTENTS:

UNIT –I

Cutting Tools Classification – Nomenclature of single point cutting tool – Differences between orthogonal and oblique cutting – Mechanism of metal cutting – Types of chips – chip breakers – Forces acting on a tool – Merchant circle diagram – Velocity relations – specific energy in cutting.

UNIT-II

Tool Wear – Tool life – Factors affecting tool life – Taylor's Tool life Equation – Tool wear mechanisms – Types of tool wear – Heat distribution in metal cutting – Measurement of temperature in metal cutting – Lathe tool Dynamometer – Cutting fluids – Selection and applications.

UNIT-III

Cutting Tool Materials- Requirements of tool materials, advances in tool materials, HSS, Coated HSS, Carbides ,Coated Carbides, Ceramics, Cold pressed, Hot Pressed , Ceramic composites, CBN, Diamond- properties, Advantages and limitations; Specifications for Inserts and tool holders. Design of single point cutting tool and form tool for NC Lathe work- Design of profile milling cutter and broach tools

UNIT- IV

Press Working and Economics of Machining: Press working operations- Press selection and Tonnage- Centre of Pressure- Cutting forces and clearances for Die Design – Compound and Progressive Die, Strip layout. Costs associated with machining operations- Optimum cutting speed for minimum cost and maximum production, cutting speed for minimum cost in Turning.

UNIT-V

Jigs & Fixtures- Uses- Locating devices, 3-2-1 principle of location – pin location- Radial location- 'V' location- Diamond locators. Types of clamping devices- principles of clamping. Design principles to Jigs & Fixtures – Drill Jigs, types- Drill Bushes, types- Fixtures for Turning, Milling and Welding.

TEXT BOOKS:

1. Fundamental of Tool Design – ASTME, Prentice Hall, New Delhi, 1987
2. Donaldson, Lecain and Goold - "Tool Design", McGraw Hill, New York, 1976

REFERENCES:

1. BLJuneja and GSSekhan, "Fundamental of Metal Cutting and Machine Tools", 2nd Edition, New Age International Publishers, New Delhi,2003
2. Milton C.Shaw, "Metal Cutting Principles", 1stEdition,CBS Publishers & Distributors Pvt.Ltd,2002.
3. Kempster, "In Introduction to Jig and Tool Design", ELBS, 1974.
4. Herman W. Pollack ,"Tool Design", Prentice Hall, New Delhi.
5. Clade S. George Jr : Management For Business Industry,1972

COURSE OUTCOMES:

DISCRIPTION OF THE COURSE OUTCOME Upon completion of this course, students will be able to	
CO1	Design single point and multipoint cutting tools.
CO2	Find out the tool wear using different techniques and also select cutting fluids to reduce the heat.
CO3	Select cutting tool materials for different operations.
CO4	Select and design dies for press working operations.
CO5	Design jigs and fixtures and Understand principles of locating and clamping systems.

Mapping of Course Outcomes with Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	2	1	1	-	-	-	-	-	1
CO2	3	2	3	2	1	1	-	-	-	-	-	1
CO3	3	2	3	2	1	1	-	-	-	-	-	1
CO4	3	2	3	2	1	1	-	-	-	-	-	1
CO5	3	2	3	2	1	1	-	-	-	-	-	1

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME506L MACHINE TOOLS LABORATORY

Credits: 1.5

Laboratory/week: 3 hours

Internal Test: 40 Marks

End Examination: 60 Marks

(Any eight of the following experiments will be given)

List of Experiments:

1. Force Measurement on Lathe
2. Power Measurement on Lathe
3. Production of Single point cutting tool using tool and cutter grinder
4. Differential Indexing
5. Alignment Test on Lathe
6. Alignment Test on Radial Drilling Machine
7. Thrust and Toque Measurement in Drilling Operation
8. Measurement of Tool Wear
9. Study of weld Bead in Arc Welding
10. Measurement of Forces in Milling
11. Study of Impact strength tests on Welded joints

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1				2	2					1
CO2		1		2		1	1					
CO3		2			1		2					2
CO4				1	1		2					
CO5	1			1	2		1					

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME507L HEAT TRANSFER LABORATORY

Credits: 1.5

Laboratory/week: 3 hours

Internal Test: 40 Marks

End Examination: 60 Marks

(*Any nine of the following experiments will be given*)

List of Experiments:

1. Test on Thermal conductivity of metal rod.
2. Test on Thermal conductivity of slab.
3. Test on Emissivity Measurement Apparatus.
4. Test on Lagged Pipe Apparatus.
5. Test on Steffan-Boltzman Apparatus.
6. Test on Finned tube heat exchanger.
7. Test on Natural Convection Apparatus.
8. Test on Forced Convection Apparatus.
9. Test on Vapour compression test rig.
10. Test on parallel flow and counter flow heat exchanger
11. Test on thermal conductivity of liquids.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1			1						
CO2	1	1	2									1
CO3		2				2	2	1				
CO4				1	2		2					1
CO5			1		2	3	3					1

ME601C MACHINE DESIGN

Lectures/Week: 3 periods Tut/week: 1 period

Credits: 3

Sessional marks: 20 +20

End Examination Marks: 60

UNIT – I

Statistical Considerations in Design

Frequency distribution , characteristics of frequency curves, measures of central tendency and dispersion, probability – probability distribution – normal curve – population combinations – design and natural tolerances

UNIT – II

Mechanical Springs

Helical springs – stress equation and deflection equation; spring materials; spring end formation; design against – static and fluctuating loads; Design of helical and Torsional springs; Compound springs; equalized stress in spring leaves; multi leaf springs; nipping and shot peening

UNIT – III

Sliding contact bearings

Classification of bearings Hydrodynamic lubricated bearings; Materials for sliding contact bearings; Lubricants – Properties and their selection Terminology used in hydrodynamic journal bearings. Design procedure for journal bearings – Heat in bearings. Design of collar bearings.

Rolling Contact bearings :

Merits and demerits of rolling contact bearings over sliding contact bearings. Types of rolling contact bearings. Static and dynamic load capacities. Equivalent bearing load . Design for cyclic loads. Selection of radial ball bearings.

UNIT – IV

Gears: Types of gears and their applications, gear materials allowable stresses, Law of gearing Spur gears: Terminology, force analysis, Design of spur gears – Lewis equation. Check for dynamic load and

wear load. Gear wheel proportion.
Helical gears; terminology, design of helical gears, Check for wear load. Force analysis.

UNIT-V

Engine parts:
Pistons, forces acting on pistons – Construction, Design and proportions of Pistons.
Connecting rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – Cranks and crank shafts. Strength and proportions of overhang and center cranks – Crank pins, Crank shafts.

TEXTBOOKS:

1. Lal G.K., Vijay Gupta, Venkata Reddy N: Fundamentals of Design and Manufacturing , Alpha Science International, 2005
2. Bhandari V.B.: Design of Machine Elements, Third Edition, TataMcGrawHill, 2010.
3. Shigley J.E: Mechanical Engineering Design, Third Edition, Tata McGrawHill, 2010.

REFERENCES:

1. AllenStrickl and Hall, Alfred R. Holowenko, Herman G. Laughlin: Machine Design, Schaum Series, Tata McGrawHill, 2010.
2. Faires V.M.: Design of Machine Elements, Fourth Edition, Macmillan, 1965
3. Sharma P.C. and Aggarwal D.K.: Machine Design, S.K.Kataria and Sons, 1997
4. Jain R.K.: Machine Design , Fifth Ediiton, Kanna, 1988.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2	3									
CO2		2	3									
CO3		2	3	1								
CO4		2	3									
CO5		2	3									

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ME602C DYNAMICS OF MACHINERY

Lectures/Week: 3 periods Tut/week: Credits: 3

Sessional marks: 20 +20
End Examination Marks: 60

COURSE OBJECTIVES:

- To impart the knowledge on gyroscopic couple, friction applications to analyze the systems.
- To understand the concepts of flywheels and governors.
- To study the balancing of masses, vibration concepts for applying in different applications.

CONTENTS:

UNIT –I

Gyroscopic Couple and Force Analysis –effect ofprecession–motion on the stability of movingvehicles such as motorcycle – motorcar – aero planes and ships. Static and Dynamic Force Analysis of planar mechanisms.

UNIT–II

Friction:

Friction of screw and nuts - Pivots and collars – uniform pressure,uniform wear – friction circle and friction axis: lubricated surfaces – boundary friction – filmlubrication..

Applications: Simple block brake - Internal expanding brake- band brake of vehicle. Dynamometers – absorption and transmission types. General description and methods of operation. Clutches- Singleplate, multiplate, cone clutches.

UNIT–III

Turning Moment Diagram and Flywheels: Turning moment- Inertia torque-connecting rodangularvelocity andacceleration-crank effort andtorque diagrams-fluctuation of energy – flywheelsandtheir

Governors: Watt, Porter and Proell governors-Spring loaded governors–Hartnell and Hartung - Sensitiveness, iso-chronisms and hunting– effort and power ofthegovernors.

UNIT–IV

Balancing of masses: Static and dynamic balance, balancing of rotating masses - analytical and graphical methods. Balancing of reciprocating masses – Partial balancing – locomotive balancing – variation of tractive effort. Swaying couple and Hammer blow. Single and multi cylinder in line engines – firing order. Balancing of radial and V engines. Practical Methods of balancing of rotors.

UNIT –V

Vibrations: Free and forced vibration of single degree of freedom system, Role of damping, whirling of shafts and critical speeds. Free, forced and damped vibrations. Vibration Isolation and

Transmissibility, Transverse vibrations of beams with concentrated and distributed loads, Dunkerly's method, and Raleigh's method. Torsional vibrations - two and three rotor systems.

TEXTBOOKS:

1. Theory of Machines : R.K.Bansal
2. Theory of Machines : S.S. Rattan
3. Mechanisms and Machine Theory : J.S. Rao and R.V. Dukkipati
4. Theory of Vibrations : Thomson

REFERENCEBOOKS:

1. Theory of Machines and Mechanisms : Joseph Edward Shigely
2. Theory of Machines : Thomas Bevan
3. Mechanical Vibrations : Dehhartog.

COURSE OUTCOMES: Upon completion of this course, students will be able to

	DISCRIPTION OF THE COURSE OUTCOME
CO1	Learn the concepts of gyroscopic effects on the stability of ships, aeroplanes and Automobiles. Learn the concepts of static and dynamic force analysis of planar mechanisms.
CO2	Understand the concepts of friction-clutches, brakes and dynamometers and its importance.
CO3	Understand the importance of turning moment diagrams, fly wheels, governors and its analysis.
CO4	Understand the balancing of rotary and reciprocating masses.
CO5	Understand the different types of vibrations.

Mapping of Course Outcomes with Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	3	2	2	-	-	-	-	-	-	1
CO2	3	2	3	2	2	-	-	-	-	-	-	1
CO3	3	2	3	2	2	-	-	-	-	-	-	-
CO4	3	2	3	2	2	2	-	-	-	-	-	2
CO5	3	3	3	2	2	-	-	-	-	-	-	2

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ME603C Metrology and Instrumentation

Effective from- 2020-21

Lectures / Week: 3 periods **credits:3**

UNIT –I

Concept of measurement: - Introduction to Metrology; Need for high precision measurements; Terminologies in Measurement-Precision, accuracy, sensitivity, calibration. Errors in Measurement, types of errors, Abbe's Principle Basic standards of length- Line standard, End standards,Wavelength standard; Various Shop floor standards. Linear Measurement – Slip gauges, wringing, grades; Surface plate; Dial indicators; Height gauges and Vernier calipers. Comparators-mechanical, electrical, optical and pneumatic. Angular Measurement – Bevel protractor; Sine Bar, principle and use of sine bar, sine centre; Angle gauges. Sprit level; Angle Dekkor; Clinometers.

UNIT –II

Limits and Limit gauges – Making to suit, selective assembly, systems of limits and fits; Types of fits; Hole basis system and Shaft basis system. Standard systems of limits and fits; Shaft and Hole system; Tolerance, allowance and deviation (as per BIS). Simple problems on tolerance and allowance, shaft and hole system. Limit Gauges – GO and NO GO gauges; types of limit gauges. Gauge design - Taylor's principle of gauging; Gauge tolerance, disposition of gauge tolerance, wear allowance. Optical Measuring Instruments: - Benefits of using light waves as standards; Monochromatic light; Principle of Interference. Interference band using optical flat, application in surface measurement. Interferometers – NPL flatness interferometer, Pitter-NPL gauge interferometer.

UNIT –III

Screw thread measurement – Screw thread terminology; Measurement of major diameter; Measurement of minor or root diameter. Measurement of pitch; Measurement of effective diameter with two wire method and three wire method. Measurement of flank angle and form by profile projector and microscope. Measurement of surface texture – Meaning of surface texture, roughness and waviness; Analysis of surface traces, peak to valley height, R.M.S. value, Centre Line Average and R_a value, Rt, Rz etc. Methods of measuring surface roughness – Stylus probe, Tomlinson surface meter, Talysurf; Terms used in surface
roughness measurement – assessment length, roughness width cutoff, sampling length and evaluation length.
Interference method for measuring surface roughness – using optical flat and interferometers.
Autocollimator, principle and use of autocollimator.

UNIT –IV

Machine tool metrology – Alignment testing of machine tools like lathe, milling machine, drilling machine.
Advanced measuring devices – Laser interferometers. Coordinate Measuring Machine (CMM) – Introduction to CMM; Components and construction of CMM. Types of CMM; Advantages and application of CMM, CMM probes, types of probes – contact probes and non contact probes Machine Vision – Introduction to machine vision, functions, applications and advantages of machine vision. Steps in machine vision.

UNIT –V

Introduction to Mechanical Measurement – significance of mechanical measurement; Fundamental methods of measurement; Classification of measuring instrument. Stages in generalized measuring system – Sensor-Transducer stage, Signal-Conditioning stage, Readout-Recording stage; Types of input quantities; Active and Passive transducers. Performance characteristic of measuring devices – Static characteristics – Accuracy, Precision, Repeatability, Sensitivity, Reproducibility, Drift, Resolution, Threshold, Hysteresis, Static calibration. Dynamic characteristics- different order systems and their response-, Measuring lag, Fidelity, Dynamic error; Types of errors in measurement. Transducers – Working, Classification of transducers. Motion and Dimension measurement – LVDT – Principle, applications, advantages and limitations.

TEXT BOOKS:

1. Anand K Bewoor, Vinay A Kulkarni, Metrology & Measurement, McGraw-Hill, 2009
2. Ernest O. Doebelin, Dhanesh N. Manik, Measurement Systems Application and Design, McGraw-Hill, 2004
3. Galyer J.F.W., Schotbolt C.R., Metrology for Engineers, ELBS,1990
4. Thomas G. Beckwith, John H. L., Roy D. M., Mechanical Measurements, 6/E , Pearson Prentice Hall, 2007

REFERENCES:

1. ASME, Hand book of Industrial Metrology,1998
2. Hume K. J., Engineering Metrology, Macdonald &Co. Ltd.,1990
3. J.P.Holman, Experimental Methods for Engineers,Mcgraw-Hill, 2007
4. Sharp K.W.B., Practical Engineering Metrology, Sir Isaac Pitman & Sons Ltd.,1958

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1			1	1					
CO2	2	1				1	1					
CO3		2		2		2						1
CO4			1	2			1					
CO5		1		2		3						



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S. V. University College of Engineering:: TIRUPATI

ME604E ENGINEERING MATERIALS AND METALLURGY

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20
End Examination Marks: 60

UNIT -1

Space lattice and unit cells, Crystal structures of common metallic materials – bcc –fcc- hcp – Atomic packing factor – Miller indices –spacing of lattice planes –Relation between density and lattice constant. Crystal imperfections –point, line and surface defects. Edge and screw dislocations – Burger's vector. Plastic deformation by slip and twinning .Critical resolved shear stress for slip.

UNIT – II

Testing of Engineering materials –tensile, compressive, hardness and impact tests. Creep –creep test-creep curve- Mechanism of creep. Fatigue – fatigue stress cycles – fatigue test – S-N- curve –Mechanism of fatigue. Fracture – Ductile and brittle fracture –Griffith's criterion.

UNIT – III

Construction of cooling curves for a pure metal and a solid solution / alloy – Gibb's phase rule for a metal system
– Construction and interpretation of binary phase diagrams-Types of phase diagrams –Eutectic ,Eutectoid, Peritectic, Peritectoid.-Iron-Carbon system – cooling curve of pure iron. Iron – carbide equilibrium diagram – Effect of alloying elements on Iron-Iron carbide diagram.

UNIT – IV

Plain carbon steels – Uses and limitations of plain carbon steels. Alloy steels. Effect of alloying elements in steels. High speed tool steel, stainless steels, High nickel and High chromium steels. Cast irons-grey, white, malleable and SG irons. Non- Ferrous metals and alloys –Copper, Aluminum, Magnesium, Nickel and Zinc-Properties and applications.

UNIT –V

Transformation points – Construction of TTT diagram – TTT diagram and cooling curves. Heat treatment of steels
– Annealing, Normalizing, Hardening, Tempering, Austempering, Martempering. Surface hardening of steels – Carburizing, Nitriding, Cyaniding, Flame Hardening and induction hardening.
Powder Metallurgy –production of metal powders- Basic steps in powder metallurgy - advantages limitations and applications of powder metallurgy.

TEXT BOOKS:

1. Avner: Introduction to Physical Metallurgy, Second Edition, Tata McGraw-Hill, 2009.
2. William D. Callister, Jr.: Materials Science and Engineering, John Wiley & Sons Limited, 2008.
3. Daniel Yesudian C.D. & Harris Samuel D.G: Materials Science and Metallurgy.
4. Kodgire V.D.: Materials Science and Metallurgy, Second Edition, Tata McGraw-Hill, 2010.

REFERENCE BOOKS:

1. Raghavan V: Physical Metallurgy, Second Edition, PHI Learning Pvt. Ltd., 2006.
2. William F. Hosford: Physical Metallurgy, Second Edition, Taylor and Francis, 2009.
3. Reza Abbaschian, Lara Abbaschian, Robert E. Reed-Hill: Physical Metallurgy, Fourth Edition, Cengage Learning, 2010.

4 Krishan K Chawla Composite materials 2nd Edition, Springer, 2006

ME604E ROBOTIC ENGINEERING

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20
End Examination Marks: 60

UNIT – I

Introduction: Overview - Classification of Robots – Classification by Coordinate System – Cartesian , Cylindrical, Spherical and Jointed Arm Robots – Classification by Control Method – Non – servo controlled , Servo Controlled

, Point – to – point and Continuous path controlled robots –Major Components of a Robot – Robot specifications and Performance parameters – Accuracy – repeatability - Precision and Workvolumes of different robot geometries

UNIT – II

Kinematics of Robotic Manipulators – Kinematic links and joints – General description of robot manipulators – Homogeneous transformation (HT) of objects – Forward and Inverse kinematics of two – degrees – of – freedom (DOF) Planar manipulators – Robot hand – Roll – Pitch – Yaw (RPY) Transformations – Denavit – Hartenberg (DH) Representations – Kinematic solutions by DH matrix

UNIT – III

Mathematical Modelling of a Robotic system – Robot control system – Different types of controllers – On – off , Proportional, Integral, Derivative and PD and PID controllers – Control Systems – Closed – loop and Open – loop control systems – Transfer functions – Applications of transfer functions in the context of robot controllers

UNIT – IV

Robot Drives, Sensors and Grippers – Powering the manipulator – Hydraulic, Pneumatic and Electric Drives – Robot Sensors – Types – Position, velocity, force and tactile range and proximity sensors – Robot vision – Robot grippers – Types of end – effectors/grippers – mechanical, pneumatic and magnetic grippers

UNIT – V

Industrial Applications of Robots and Robot Programming – Applications – Material handling, Machine loading and unloading, Assembly and Inspection – Programming by teach box (or pendent) – On – line and offline programming methods – Robot workcells

TEXT BOOKS:

1. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel and Nicholas G. Odrey, 'Industrial Robotics Technology, Programming and Applications', Mc Graw Hill Book company, 1986
2. Bernard Hodges, 'Industrial Robotics', Second Edition, Jaico Publishing House, 1993
3. Deb S.K, Deb.S,"Robotics Technology and Flexible Automation", Tata McGraw-Hill Education Private Limited, 2009.
4. Gonzalez K.S.F.U.R.C. and Lee C.S.G., Robotics – Control – Sensing, Vision, and Intelligence , Mcgraw-Hill Book Company (July 1987)
5. Paul R.P," Robot Manipulators: Mathematics, Programming and Control "The MIT Press (November 2, 1981)

REFERENCES:

1. John J. Craig, Introduction to Robotics Mechanics and Control, Second Edition, Addison Wesly Longman Inc. International Student edition, 1999
2. Mark W. Sponge & Vidya Sagar M.,"Robot Dynamics and Control",Wiley; 1st edition (1989)
3. Tsuneo Yohikwa, Foundations of Robotics Analysis and Control, Prentice Hall of India Pvt. Ltd., 2001

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ME604E NC and CNC Systems

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20

End Examination Marks: 60

UNIT-I

Introduction: Basic concepts of manufacturing systems, Fundamentals of machining Fundamentals of Numerical Control, Advantages of NC systems, Classification of NC systems, Features of NC machine tools and Design considerations of NC Machine Tools, Increasing productivity with NC Machines, Machine Control Unit Functions.

UNIT-II

NC Part Programming: Introduction, Manual programming- Basic concepts, Tape format, Contour Programming- Examples. Computer Aided Programming, APT Programming- General Description, Geometric Expressions, Motion Statements, Additional APT Statements-Examples, Other Programming Systems.

UNIT-III

System Devices: Drives-Hydraulic systems, Direct- Current Motors, stepping motors, Alternate-Current Motors. Feed Back Devices- Encoders, Resolvers, Inductosyn, Tachometers. Counting Devices-Flip- Flops, Counters, Decoders. Digital to Analog Converters.

Interpolators: Digital Differential Analyzer (DDA) – Principle of Operation, Exponential Deceleration, Linear Interpolator, Circular Interpolator, Complete interpolator, CNC Software Interpolators, Reference- word CNC Interpolators.

UNIT-IV

Control Loops: Introduction, Control of point to point systems- Incremental open-loop control, Incremental Closed loop control, Absolute closed loop circuit. Control loops in contouring systems-Principle of operation, position control, operation of a two-axis system.

CNC: Basic Concepts**,** Advantages of CNC, Digital Computer- principal structure, computer memory, Input and output, Reference-Pulse Technique, Microcomputers in CNC

UNIT-V

CNC Programming: – Steps in Programm planning, Part programming, preparatory commands, miscellaneous functions, input of dimensions, spindle and federate control, Tool functions and Reference points, Commands- register, position compensation, work offsets, tool length offset, rapid poisoning, machine zero, dwell.

CNC Turning, CNC Milling, and CNC Drilling- programme examples.

TEXT BOOKS:

Yoram Koren, "Computer Control of Manufacturing Systems", TATA McGraw-Hill, 2005. Peter Smid, "CNC Programming Handbook", second edition- Industrial Press Inc.

REFERENCES:

1. Steve F Krar, - Computer Numerical Control Simplified, Industrial Press,2001
2. Vishal S, "An introduction to NC/CNC machines", India 2013.
3. Agarwal P.M and Patel V.J., "CNC fundamentals and programming", Charotar Publishing House Pvt. Ltd.; 3nd Edition 2022
4. Radhakrishnan P., "Computer Numerical Control Machines", New central book agency,1992

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ME606L SIMULATION LABORATORY

Credits: 1.5

Laboratory/week: 3 hours

Internal Test: 40 Marks

End Examination: 60 Marks

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*(Note: Students shall carry out Any **8 from PART-A and 2 from PART-B** of the following exercises)*

PART-A

Modelling and simulation of functions of basic mechanical elements/process/systems

1. Numerical simulations and modeling of different manufacturing systems and processes using commercial software's, like ABAQUS, DEFORM, MATLAB etc.
2. Modelling of simple processes, like hardness testing, deflection of beam etc.;
3. Generation and distribution of stress during sheet and bulk forming processes;
4. Modelling of machining process (turning) and chip formation;
5. Modelling of heat transfer and temperature distribution during various thermal processes (heat treatment, metal cutting, non-conventional machining processes);
6. Network problem and CAPP problem solutions using MATLAB
7. Thermal stress simulation of a 2D component
8. Conductive/conductive heat transfer simulation of a 2D component

10 Mode frequency analysis of beams (Cantilever, Simply supported & Fixed ends) 11 Harmonic analysis of a 2D component

12 Simulations of deformations and equivalent strains in various bending operations

13 Simulations of deformations, equivalent strains and drawing forces in deep drawing operations

14 Simulations of deformations, equivalent strains and roller forces in roll forming operations

PART-B Manufacturing process Simulation

(Students shall carry out the modeling and simulation for case studies of the following)

1. Casting processes - Study of Solidification, temperatures, Residual stresses, metallurgical phases etc.
2. Forging processes - Study of cold working and hot working processes for extrusion, drawing, rolling, etc.
3. Forming Processes – Study of blanking, bending, deep drawing, etc.
4. Welding Processes – Study of arc, spot, laser welding, etc.

Department of Mechanical Engineering
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ME607L DYNAMICS LABORATORY

Credits: 1.5

Laboratory/week: 3 hours

Internal Test: 40 Marks

End Examination: 60 Marks

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*(Note: Any **Eight** of the following exercises are to be performed)*

LIST OF EXPERIMENTS

1. Determination of Natural Frequency of Free Transverse Vibration
2. Cam Analysis – Cam Profile and Jump-speed Characteristics
3. Free Vibration of Spring Mass System – Determination of Natural Frequency
4. Compound Pendulum – Determination of Radius of Gyration and Moment of Inertia
5. Bifilar Suspension – Determination of Radius of Gyration and Moment of Inertia
6. Trifilar Suspension – Determination of Radius of Gyration and Moment of Inertia
7. Whirling of Shaft – Determination of Critical Speed
8. Balancing of Rotating Masses
9. Determination of Gyroscopic Couple
10. Experiments on centrifugal governors
11. Studies on Gear trains
12. Kinematic analysis of various mechanisms
13. Moment of inertia of flywheel & connecting rod

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ME608L METROLOGY LABORATORY

Credits: 1.5

Laboratory/week: 3 hours

Internal Test: 40 Marks

End Examination: 60 Marks

List of Experiments:

1. Measurement of Taper plug gauge using rollers, slip gauges and micrometer
2. Measurement of internal taper of a ring gauge using spheres and cylinders
3. Study of measuring instruments
4. Measurement of spur gear
5. Measurement of Taper ring gauge using spheres and depth micrometer
6. Sine Bar (Angle measurement of a Taper plug gauge)
7. Inspection of Drill Jig
8. Straightness testing – wedge Method
9. Measurement of Angle of V – Block
10. Measurement of Plug Screw by 3 – wire method
11. a) Measurement of effective diameter (Two – wire method) of a screw tap
    b) Radius measurement of a Partial cylinder

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1			1	1					
CO2	2	1				1	1					
CO3		2		2		2						1
CO4			1	2			1					
CO5		1		2		3						



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ME609S CNC Programming

Credits: 2

Laboratory/week: 3 hours

Internal Test: 40 Marks

End Examination: 60 Marks

List of Experiments

*(Note: Any **Eight** of the following exercises are to be performed)*

1. Introduction to CNC.
2. G-Codes and M-Codes.
3. Outer diameter plane turning and Step turning operation.
4. Inner diameter Profile Turning and Threading operation.
5. Outer diameter Profile Turning and Grooving operation.
6. Drilling & Inner diameter Profile operation.
7. Face milling operation.
8. Profile milling operation using G40 method.
9. Profile milling operation using G41 method.
10. Profile milling operation using G42 method.
11. Drilling & Tapping operation.

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

MC610A PROFESSIONAL ETHICS IN ENGINEERING

Instruction: Hours/Week: **2L:0T:0P** **Credits: 0**

Marks:100 Pre-requisites/co-requisites: None.

COURSE DESCRIPTION:

This course is designed to introduce engineering students to the concepts of engineering ethics. It will allow students to explore the relationship between ethics and engineering and apply classical moral theory and decision making to engineering issues encountered in academic and professional careers. It mainly focuses on improving the capacities of leadership /management through training in professional ethics. Codes of ethics have been invoked as a basis for professional engineering licensure. Violations of such ethical codes have led to many well-known tragic engineering failures that endangered human life and jeopardized public welfare. This discipline will doubtless take its place alongside such well- established fields as medical ethics, business ethics, and legal ethics.

COURSE OBJECTIVES: To enable the students

1. To create an awareness on Engineering Ethics and Human Values.
2. To instill Moral and Social Values and Loyalty and to appreciate the rights of others.
3. To study the moral issues and decisions confronting individuals and organizations engaged in engineering profession.
4. To study the related issues about the moral ideals, character, policies, and relationships of people and corporations involved in technological activity.

UNIT I Human Values: Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II Engineering Ethics: Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg''s theory – Gilligan's theory – Consensus and Controversy –Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT –III Engineering as Social Experimentation: Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT-IV Safety, Responsibilities and Rights: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) Discrimination.

UNIT V Global Issues: Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct – Corporate Social Responsibility.

COURSE OUTCOMES: Upon completion of the course, the student should be able to:

1. Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
2. Learn the moral issues and problems in engineering; find the solution to those problems.
3. Learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
4. Gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights.

Grading /Assessment:

(i). Attendance: 20 marks

(ii). Group Activities/Assignments: 20 marks (iii). Semester End Examination: 60 marks

TEXTBOOKS:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME701C- INDUSTRIAL ENGINEERING AND MANAGEMENT

EFFECTIVE FROM 2023-24 (R20- Regulations 2020)

Lectures/ Week : 3 Hours Tutorials/ Week : -

Credits: 3

COURSE OBJECTIVES:

- TO understand the concepts related to principles of management, Industrial disputes.
- To apply the concepts related to sales forecasting, PPC & work study.
- To understand the emerging concepts of Industrial Engineering for different applications.

CONTENTS:

UNIT–I

Management concepts:

Administration, Management and Organization. Scientific Management. Functions of Management. Principles of Management. Types of Organization. Principles of Organization. Fayol's and Taylor's contributions to Management.

Industrial disputes – Causes and methods of settling,Labour participation in management concept.A brief outline of Factories Act, Industrial disputes Act and Workmen's Compensation Act.

UNIT–II

Sales forecasting – need, Classification moving average exponential smoothing and linear regression technique.

Production Planning and Control – Objectives, Salient features and functions of PPC.

Personnel Management – A brief review of functions of personnel management. Concepts of job evaluation and merit rating

UNIT–III

Plant Location Layout – Location factors. Choice of city, Suburban and country locations. Plant Layout – Definition, Objectives, Salient features of product, process and fixed position layouts. Material Handling – Definition, Objectives, Classification of material handling equipment and factors influencing their selections

UNIT–IV

Work study – Definition, objectives and uses. Method study – definition.Objectives procedure and uses. Time study – Definition, needs, functions.

Basic concepts of break down, preventive, predictive and total productive maintenance.

UNIT–V

Contemporary Practices:

Basic concepts of Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma, Manufacturing Resource Planning (MRP-II), Enterprise Resource Planning (ERP), Business Process Re-engineering, 5S Model, Deming's PDCA, Kaizen, Poka-Yoke, Benchmarking.

TEXT BOOKS:

1. Khanna O P: Industrial Engineering And Management , 7th Edition, DhanpatRai& Sons, 2002
2. PannerSelvam R , Production and Operation Management
3. Ralph Barnes: Principles Of Motion And Time Study, Tata McGraw Hill, 1956
4. Joseph G Monks: Operation Management, 3rd Edition, McGraw-Hill, 1987

REFERENCES:

1. Adam &Edbert: Production/Operation Management, 5th Edition, Prentice Hall, 1992
2. Chary S.N.: Production and Operation Management,14th Reprint, Tata McGraw Hill, 2007
3. Buffa E S: Modern Production/Operation Management, 8th Edition, Wiley India, 2007
4. Clade S. George Jr : Management For Business Industry,1972

COURSE OUTCOMES: Upon completion of this course, students will be able to

DISCRIPTION OF THE COURSE OUTCOME	
CO1	Understand the principles of management and Industrial disputes.
CO2	Identify and design plant location, plant layout and material handling systems.
CO3	Apply forecasting and PPC techniques to production systems.
CO4	Reduce work duration in industries using work study.
CO5	Understand the contemporary concepts of Industrial Engineering.

Mapping of Course Outcomes with Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	2	-	1	2	2	2	2	1	1	2
CO2	2	1	2	2	2	2	2	2	2	1	1	1
CO3	2	1	2	-	2	2	2	2	2	1	1	2
CO4	2	1	2	3	2	2	2	2	2	1	1	1
CO5	2	1	2	1	2	2	2	2	2	1	1	3

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME702C- OPERATIONS RESEARCH

EFFECTIVE FROM 2023-24 (R20- Regulations 2020)

Lectures/ Week : 3 Hours Tutorials/ Week : -

Credits: 3

COURSE OBJECTIVES:

- To impart knowledge in concepts and tools of Operations Research.
- To understand mathematical models used in Operations Research.
- To apply these techniques constructively to make effective decisions.

CONTENTS:

UNIT–I

Development-definition-characteristics and phases-Types of models-Operations Research models-applications.

Allocation: Linear Programming Problem Formulation-Graphical solution- Simplex method-Artificial variable techniques: Two-phase method, Big-M method. Duality.

UNIT–II

Transportation problem: Formulation-Optimal solution, unbalanced transportation problem.

Assignment problem: Formulation- Optimal solution of Assignment problem- Travelling salesman problem.

UNIT–III

Sequencing: Introduction-Flow-Shop sequencing- n jobs through two machines – n jobs through three machines- Job shop sequencing-two jobs through 'm' machines

Replacement: Introduction- Replacement of items that deteriorate with time- when money value is not counted and counted- Replacement of items that fail completely- Group Replacement.

UNIT–IV

Theory of Games: Introduction- Terminology- Solution of games with saddle points and without saddle points. 2 x 2 games- dominance principle- m x 2 & 2 x n games- Graphical method.

Inventory models: Costs used in inventory models, Basic inventory models – deterministic and static demand.Models with price breaks - Models with restrictions. Single period models with probabilistic demand and without set up cost.

UNIT–V

Waiting lines: Introduction- Basic structure of queuing models, single server and multi server models.

PERT/CPM: Network Analysis, Program Evaluation and Review Technique (PERT), Critical Path Method (CPM).

TEXT BOOKS:

1. Vohra N. D.: Quantitative Techniques in Management, 3rd Edition, Tata McGraw Hill, 2007.
2. Pannerselvam R.: Operations Research, 2nd Edition, PHI, 2006.

REFERENCES:

1. Hamdy A Taha: Introduction to Operations Research, 6th Edition, PHI, 1999.
2. Hiller and Lieberman: Introduction to Operations Research, 7th Edition, McGraw Hill, 2001.
3. Hira and Gupta: Introduction to Operations Research, 3rd Edition, S. Chand & Company Limited, 2008.

COURSE OUTCOMES: Upon completion of this course, students will be able to

	DISCRIPTION OF THE COURSE OUTCOME
CO1	Understand the concepts of operations research modelling approaches and solve LP engineering problems.
CO2	Formulate and solve Transportation and Assignment problems relevant to different applications.
CO3	Able to apply replacement and game theory models for practical problems.
CO4	Able to Solve inventory problems.
CO5	Able to solve waiting line and Network problems.

Mapping of Course Outcomes with Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	2	2	1	1	-	-	-	-	1
CO2	3	2	2	2	2	1	1	-	-	-	-	2
CO3	3	2	2	2	2	1	1	-	-	-	-	2
CO4	3	2	2	2	2	1	1	-	-	-	1	1
CO5	3	2	2	2	2	1	1	-	-	-	1	1



Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME703C AUTOMOBILE ENGINEERING

Credits: 3

Lectures/week: 3 Hrs. Sessional Marks: 20+20

End Examination Marks: 60

Unit-I

Introduction

Layout of automobile, Chassis and body – power transmission –types of engines, engine construction, turbo charging and super charging – **Lubrication System:** engine lubrication, splash and pressure lubrication systems, **Liners**- dry and Wet type, function and constructional details, **Combustion chambers:** combustion chambers for petrol and diesel engines, Arrangement of cylinders, types of valve arrangements, **Mufflers and Types**: Baffle type muffler, Wave cancellation type muffler.

Unit-II

Fuel Supply System:

S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump, carburetor: types, Air cleaners and types.

C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump.

Emission from Automobiles: Pollution standards National and international – Pollution Control, Techniques, Multipoint fuel injection system, Common rail diesel injection system, Gasoline direct injection system

UNIT III

Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System, **Radiators**: Types, Cooling Fan, water pump, thermostat, antifreeze solutions.

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage, battery, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker.

Electrical System: Charging circuit, generator, starting system, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

UNIT IV

Transmission Systems:

Clutch: Function of clutch, single plate and multiple plate, and centrifugal clutches and clutch materials, fluid coupling, torque converter.

Gear box: Need, sliding type, constant and synchromesh type. Automatic transmission. Propeller shaft; need and constructional details.

UNIT V

Suspension System: Objects of suspension systems – torsion bar, shock absorber.

Braking System: Mechanical brake system, Hydraulic brake system, Pneumatic and Vacuum brakes.

Steering System: Steering mechanism, Power Steering System, Ackerman steering mechanism, Davis steering mechanism.

TEXTBOOKS:

1. Automobile Engineering : Narang G.B.S.
2. Automobile Engineering Vol. I & II : Kirpal Singh.
3. Automobile Engineering : R.K. Rajput
4. Automobile Engineering : Dr. G. Devaradjane
5. Internal Combustion Engines : V. Ganesan
6. Internal Combustion Engines : K.K. Ramalingam
7. Automobile Engineering : P.S. Gill

REFERENCES:

1. Automotive Mechanics : Heitner J.
2. I.C.Engines : Mathur M.L. & Singh R.P.
3. Fundamentals of Motor Vehicle Technology : Hillier & Pittuck
4. High Speed Combustion Engines : Heldt P.M.
5. Automotive Mechanics Services : Course W.H.
6. Motor Manuals Vol. I to VII : Judge A.W.
7. Advanced Engine Technology : Heisler

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1			1						
CO2	1	1	2									
CO3		2				2	2	1				
CO4				1	2		2					
CO5			1		2	3	3					

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ME704E Additive Manufacturing

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20

End Examination Marks: 60

UNIT-I

Introduction: Basic Principles of Additive Manufacturing (AM), AM Parts, Generic AM Process, Use of term AM, Benefits of AM, Distinction Between AM and Conventional Manufacturing Processes, Examples of AM Parts, Classification of AM Processes, Heat Sources- Lasers, Electron Beam, Electric Arc/Plasma Arc. Milestones in AM Development, AM around the World and AM Standards

UNIT-II

AM Systems: Photopolymer-Based Systems, Powder-Based Systems, Molten Material Systems, Solid Sheets. Metal Systems - Use of Substrates, Energy Density, Weight, Accuracy, Speed, Build Rate. Maintenance of Equipment, Materials Handling Issues, Design for AM.

UNIT-III

Additive Manufacturing Processes: Photopolymerization, Powder Bed Fusion Material Extrusion, Material Jetting, Sheet Lamination, Directed Energy Deposition Direct

- Write technologies, Hybrid Additive Manufacturing.

UNIT-IV

Materials for Additive Manufacturing: Introduction, Liquid-Based Material, Support Material, Powder-Based Materials-Polymer Powder Material, Metal Powder Material, Ceramic Powder Material, Composite Powder for AM Processes, Solid-Based Materials, Material issues in AM. Guidelines for Process Selection, Challenges of Selection, Pre-Processing, Part Build Time, Post- Processing to Improve Surface Quality, Dimensional Deviations, Improve Mechanical Properties, Rapid Tooling

UNIT-V

AM Software: AM Software for STL Editing, Slicing, STL Manipulation, Process Visualization and Collision, Modeling and Simulation, Manufacturing Execution System Software for AM.
Applications: Application Areas for AM-Enabled Product Development, Medical Modeling, Reverse Engineering Data, Architectural Modeling, Automotive, Aerospace.

TEXT BOOKS:

Gibson Ian, David W. Rosen, Brent Stucker, and Mahyar Khorasani, "Additive Manufacturing Technologies", Springer, 2021.

REFERENCES:

1. A Practical Guide to Design for Additive Manufacturing, Diegel, Olaf, Axel Nordin, and Damien Motte, Springer, 2020.
2. The 3D Printing Handbook: Technologies, Design and Applications, Redwood, Ben, Filemon Schoffer, and Brian Garret, 3D Hubs, 2017
3. Design for Advanced Manufacturing: Technologies and Process, Laroux K, Gillespie, McGrawHill, 2017

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME704E Quality Control and Reliability

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20
End Examination Marks: 60

Unit-I

Introduction to Inspection and Quality Control, Objectives of Statistical Quality Control, Chance and Assignable Causes of variation, Control chart basic principles, Choice of control limits, Sample frequency and rational subgroups.
Control charts for variables: X and R charts and σ charts, Interpretation of control charts.

Unit-II

Process Capability Analysis: Specification limits and Control limits, Natural tolerance limits, Specifications and Process Capability, Process Capability indices, setting tolerances on assemblies and components.
Control Charts for Attributes: P chart, C chart, U chart, Sensitivity analysis of P charts, Quality Rating System.

Unit-III

Acceptance Sampling Plans for Attributes: Types of Sampling Plans, Advantages and disadvantages of Sampling Plans, Evaluation of Sampling Plans – OC, Curve, Characteristics of OC Curve, Producer risk and Consumer risk, AOQ, AQL, ATI, ASN. Multiple and Sequential sampling plans. Brief introduction to Acceptance Sampling plans for continuous production and Acceptance sampling plan for variables.

Unit-IV

Reliability: Concepts of reliability, Scope, Importance of reliability, Reliability data collection-
Failure data analysis: MTTF, MTBF, Failure rate, Hazard rate, reliability, Failure rate curve,
Types of failures – Hazard models (Exponential and Weibull).
System Reliability: Series, Parallel and Mixed configurations.
Reliability Improvement: Active and Standby redundancies, Introduction to Fault Tree Analysis, Maintainability and Availability.

Unit-V

Quality Costs: Prevention, Appraisal, Internal failure and External failure costs, Quality and Productivity, Total Quality Management, Quality function deployment, Tools for continuous quality improvement. Quality Circles: Concepts, Objectives and advantages. Introduction to Six Sigma Concept. Features of ISO 9000 quality system- Classification, Need, advantages and limitations.

TEXT BOOKS:

1. Amitava Mitra, "Fundamentals of Quality Control and Improvement" Wiley publications, 3rd Edition, 2008.
2. Gupta, R.C., "Statistical Quality control", Khanna Publishers, 1997.

REFERENCES:

1. Besterfield D.H., "Quality Control– A Practical Approach", Prentice Hall, 1993.
2. Grant E.L. "Statistical Quality Control" McGraw-Hill Science/Engineering/Math; 7th - edition (1996):Srinath, L.S., "Reliability Engineering", Affiliated East west press

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME704E Refrigeration and Air – conditioning

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20

End Examination Marks: 60

UNIT –I

Refrigeration: Cycles: Thermodynamic analysis of vapour compression, absorption, air cycle, steam jet and thermoelectric refrigeration systems. Comparison of COP and cost – Properties and selection of refrigerants – alternative refrigerants.

UNIT-II

Component parts: Reciprocating compressors – Condensers – Air cooled and Water cooled – Economical water rate – Evaporators – Defrosting – Design of towers and evaporative condensers.

UNIT-III

Refrigeration Control: Automatic and thermostatic expansion valve – Capillary tube – Compressor controls – miscellaneous controls. Testing and charging refrigeration units.

Cryogenics – liquification and purification of gases. Applications of refrigeration – dry ice, walk-in-Cooler, Water Coolers, Transportation, Food processing & Preservation, refrigerators, recent developments in refrigeration.

UNIT-IV

Air Conditioning: Basic Concepts : Fundamental functions of air conditioning – psychrometrics – air and humidity calculations – sensible heat factor – analysis of air conditioning process and cycles with psychrometric chart – Cooling load calculations.

UNIT-V

Comfort Air Conditioning: Physiological reactions to cooling – The effective temperature and its use in the determination of standards of comforts – comfort chart – comparison of domestic, industrial and commercial applications of air conditioning.

Ventilation system: Summer and winter ventilation – Ventilation of hot working spaces – industrial ventilation – air cleaning.

Controls: Automatic control of air conditioning systems – Duct work selection of fans.

TEXT BOOKS:

1. C. P. Arora: Refrigeration and Air Conditioning, 3rd Edition, McGraw-Hill, 2009
2. R. S. Agrarwal: Refrigeration and Air Conditioning, Allied Publishers, 2001.
3. Roy J. Dossat, "Principles of Refrigeration", 4th edition, Pearson Education Asia, 2009.
4. Stoecker, W.F. and Jones J. W., "Refrigeration and Air Conditioning", McGraw Hill, New Delhi, 1986.
5. Jones W.P., "Air conditioning engineering", 5th edition,Elsevier Butterworth-Heinemann, 2001

REFERENCES:

1. Hal Williams: Mechanical Refrigeration, 1st Edition, Whittaker & co., 1903.
2. Jordan & Priester: Refrigeration and Air Conditioning, 2nd Edition, Prentice-Hall, 1956.
3. Dossat: Principles of Refrigeration, 4th Edition, Pearson Education India, 2009.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		3								
CO2		2	3									
CO3			2	3								
CO4		3	2	1								
CO5		3	2									



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ME705E FINITE ELEMENT METHOD

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20

End Examination Marks: 60

UNIT – I

Basic concepts of the Finite Element Method – Introduction, How does the FEM work – Comparison of Finite Element and Finite Difference Methods. A general procedure for Finite Element Analysis – Pre – processing, Solution and Post – processing. Brief History of Finite Element Method, Examples of Finite Element Analysis

UNIT – II

Stiffness Matrices – Spring and Bar Elements – Linear spring as a Finite Element – System Assembly in global coordinates, Elastic Bar, Spar/Link/Truss Element, Strain Energy, Castigliano's Theorem, Minimum Potential Energy

UNIT – III

Method of Weighted Residuals – Approximate Solution by Ritz, Galerkin Methods – Finite Element formulation of one – dimensional problems – Derivation of Element Stiffness and Element Force Matrices – Different Approaches in FEM**:** General Steps in FEM – Direct Approach- Variational Approach – Energy approach – Weighted Residual Approach. – Solving one – dimensional (1D) engineering problems and 1D heat transfer problems – fins

UNIT – IV

Flexural elements – Introduction, Elementary Beam theory, Flexural element, Flexural element stiffness matrix, Element load vector, Work equivalent for distributed loads, Hermite shape functions. 2D elements – liner triangular, bilinear rectangular and quadrilateral elements

UNIT – V

FEA of 2D structural and heat transfer problems, Constant strain triangle (CST), Jacobian, isoparameteric and serendipity elements – Numerical integration – Gauss Quadrature – Computer implementation in FEM

TEXTBOOKS

1. Fundamentals of Finite Element Analysis by David V. Hutton
2. A first course in the Finite Element Method by Daryl L. Logan
3. An Introduction to Finite Element Method by J.N. Reddy

REFERENCES

1. Introduction to Finite Elements in Engineering by Chandrupatla T.R. and Belegundu A.D
2. Finite element procedures by Klaus – Jurgen Bathe

ME705E NANOTECHNOLOGY

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20

End Examination Marks: 60

UNIT –I

General Properties of Nano materials: Origin of nanotechnology, classification of nano materials, Fullerene, Carbon Nanotubes (CNT). Nanoparticles, Physical, Chemical, Electrical, Optical, Magnetic and mechanical properties of nanomaterials.

UNIT-II

Fullerenes and Carbon Nanotubes (CNT's): Introduction, Synthesis and Purification, Preparation of Fullerenes in the condensed phase, Transport, mechanical, physical properties of CNT's. Investigating and manipulating materials in the Nanoscale – Electron microscope, scanning probe microscopes, optical microscopes for Nanoscience and Technology, X – Ray Diffraction.

UNIT-III

Nanobiology – Interaction between Biomolecules and Nanoparticle surgaces. Different types of Inorganic materials used for the synthesis of Hybrid Nano – Bio assemblies. Nanoprobes for analytical applications.

UNIT-IV

Nanosensors: Nanosensors based on optical properties. Nanosensors based on quantum size effects. Nanobiosensors.

Nanomedicines – Developments of nanomedicines, Nanotechnology in diagnostic applications, materials for use in Diagnostic and therapeutic applications.

UNIT-V

Fabrication of nano materials – Top down approach grinding, Planeterory milling and comparison of particles and bottom up approach – Wet chemical synthesis methods, Microemulsion approach, Colloidal Nanopartciles production, Sol Gel methods, Sonochemical approach, Microwave and automization, Chemical vapour deposition methods.

TEXT BOOKS:

1. T. Pradeep, Nano: The essentials, Tata MaGraw – Hill, 2008.
2. Sulabha K Kulkarni, Nanotechnology: Principles and Practices, Capital Publishing Company, 2007.
3. W.R. Fahrner, Nanotechnology and Nanoelectronics, Springer , 2006
4. Rechard Booker and Earl Boyssen, Nanotechnology, Willey, 2006.

Reference Books

1. Gabor L. Hornyak, H.F. Tibbalas, Joydeep Datta, John J Moore Introduction to Nanoscience and Nanotechnology CRC Press.

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***ME 705E* MECHANIACAL VIBRATIONS**

EFFECTIVE FROM 2022-23 (R20- Regulations 2020)

Lectures/ Week : 3 Hours Tutorials/ Week : - Credits: 3

COURSE OBJECTIVES:

- To study the basics of the vibrations of system.
- To deal with study and analysis of vibration phenomenon, control of vibration in machine parts, balancing.
- To deal with Introduction of basic terminology of noise engineering and noise control.

CONTENTS:

UNIT – I

Oscillatory motion – Harmonic motion and periodic motion – conservation of energy and Newton's second law.Theory of the single degree – of – freedom oscillator – Free vibrations – Forced vibrations – Harmonic excitation. The undamaped system – The damped system.

UNIT – II

Free vibration with viscous damping – Forced vibration with viscous damping – Logarithmic decrement – response to simple forcing functions – Steady – state response to sinusoidal forcing – Properties of the dynamic amplification factor (DAF).

UNIT – III

Vibration of two – degree – of – freedom system – free response of an undamped 2 – DOF system – Use of Rayleigh's method and fundamental natural frequency – Natural frequency and mode shape shapes of undamped spring – mass system.

UNIT – IV

Normal mode analysis of undamped multi – degree – of – freedom system – Orthogonality properties of an undamped multi – degree – of – freedom system – Orthonormal modes. Decoupling forced vibration equations – Modal damping forced vibrations.

UNIT – V

Vibration of continuous systems – Vibrating string – Longitudinal vibration of rods – Torsional vibration of rods. Approximation methods in vibration analysis.

TEXT BOOKS

1. W.T. Thomson and M.D. Dahleh, Theory of vibration with applications, Pearson Education, Inc, 2007.
2. Max Irvine, Structural dynamics, Allen and Unwin, 1980

REFERENCE BOOKS

1. Denhartog Mechanical Vibrations, John Wiley and Sons, 2008.
2. Benson H. Tongue, Principles of vibration, 1st Edition, ASME, 1993.

COURSE OUTCOMES: Upon completion of this course, students will be able to

	DISCRIPTION OF THE COURSE OUTCOME
CO1	Understand the different types of vibratory systems and solve for the natural frequency of a freely vibrating 1-DOF systems.
CO2	Analyze the responses of different vibratory systems
CO3	Analyze the vibration of 2-DOF systems.
CO4	Analyze the vibration of Multi-DOF systems.
CO5	Conduct the analysis of vibration of systems.

Mapping of Course Outcomes with Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	2	2	1	2	2	-	-	-	-	-
CO2	2	2	2	2	1	1	-	-	-	-	-	-
CO3	2	2	2	2	1	1	-	-	-	-	-	-
CO4	2	3	2	2	1	1	-	-	-	-	-	-
CO5	2	2	2	2	1	2	2	-	-	-	-	1

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME705E COMPOSITE MATERIALS

Lectures/Week: 3 periods

Credits: 3

Sessional marks: 20 +20

End Examination Marks: 60

UNIT – I

Basics of Composites

Introduction: Definition, Classification of Composite materials based on structure, based on matrix, Advantages of composites, Applications of composites, Functional requirements of reinforced and matrix.

UNIT – II

Manufacturing Methods

Open moulding methods Hand – lay up process, Spray – lay up process, Filament winding process Closed moulding methods: Compressive moulding, Vacuum bag moulding, pultrusion process and resin transfer moulding process.

UNIT – III

Types of reinforcements and their properties: Fibers: Carbon, Boron, Glass, Aramid, Al_2O_3 , SiC, Nature and Manufacture of glass, Carbon and aramid fibers, Comparison of fibers.

UNIT – IV

Fabrication of Polymeric Matrix Composites, Structure and Properties of Polymeric Matrix Composites Interface in Polymeric Matrix Composites, Applications.

Fabrication of Metal Matrix Composites: Solid state fabrication, Liquid state fabrication and In – situ fabrication techniques.

UNIT – V

Micromechanics of Composites: Density, Mechanical Properties: Prediction of Elastic constants, Micromechanical approach. Halpin – Tsai Equations, Transverse stresses

TEXTBOOKS

1. Composite Materials – Science and Engineering, K.K. Chawla, Springer – Verlag, NewYork, 1987
2. An introduction to Composite Materials, Hull, Cambridge, 2nd Edition, 1997
3. A textbook of Manufacturing Technology: Manufacturing Processes by R.K. Rajput, 2nd Edition
4. Fracture Mechanics by C.H. Wang , Airframes and Engines Division Aeronautical and Maritime Research Laboratory



Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME707S ROBOT PROGRAMMING

Lectures/week: 1 hours — Credits: 02

Laboratory/week: 2 hours* — Continuous Assessment: 40

End Examination: 60

***Evaluation is similar to regular Practical/Laboratory Class Model/Pattern**

UNIT – I

Types of robots based on mode of control – PTP (point – to – point) and Control and Continuous path (CP) control robots.

Trajectory planning of a robot and its importance in execution of programming commands in accomplishing the given task in the world environment

UNIT – II

Robot Programming Methods – Broad classification – Online and Offline Programming

Types of programming – Manual setup – lead through programming – Computer like robot programming languages – Off line programming.

UNIT – III

Lead through programming – Powered lead through and Manual lead through – Use of Teach box or Control box in Manual programming of a robot – A robot simulator for lead through teaching

General information required or provided for teaching a robot

UNIT – IV

Robot Programming Languages – VAL, AL , and AML – Features and Applications

UNIT – V

Programming a robot in a work cell or robot cell and in Machine Vision environment

Sample Exercises/Experiments**

1. Program for PNP (Pick and Place) Activity
2. Teaching a robot to pick an object that is moving on a chute
3. Program for palletize the object
4. AL for bolt insertion task
5. Training a robot in accomplishing loading and unloading tasks in a robot or work cell
6. Programming a robot in a work cell aided by vision system
7. Programming to ensure safety of a robot in a work cell
8. Programming a robot to perform assembly and handling tasks in a robot cell

References

1. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel and Nicholas G. Odrey, 'Industrial Robotics Technology, Programming and Applications', Mc Graw Hill Book company, 1986
2. Bernard Hodges, 'Industrial Robotics', Second Edition, Jaico Publishing House, 1993
3. Deb S.K, Deb.S,"Robotics Technology and Flexible Automation", Tata McGraw-Hill Education Private Limited, 2009.

** ***Additions and deletions may be permitted in the above list of experiments depending on the availability of training or technical expert.***

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

ME508S FINITE ELEMENT ANALYSIS

Lectures/week: 1 hours — Credits: 02

Laboratory/week: 2 hours* — Continuous Assessment: 40

End Examination: 60

***Evaluation is similar to regular Practical/Laboratory Class Model/Pattern**

Course Outcomes (COs):

CO 1 Able to understand the basic concepts of FEA
CO 2 Able to understand spring , line, quadratic bar and plane truss elements
CO3 Prepared to model and formulate the given physical problem by suitable Finite Elements
CO4 Ability to make use of the numerical power of MATLAB in solving the FEA problems

UNIT – I

Introduction –Steps of the Finite Element Analysis (FEA) – MATLAB Functions for FEA – Overview of MATLAB – The spring Element Basic Equations – MATLAB Functions Used – Practice Exercises

UNIT – II

The Linear Bar Element – Basic Equations – MATLAB Functions Used – Practice Exercises

UNIT – III

The Quadratic Bar Element – Basic Equations – MATLAB Functions Used – Practice Exercises

UNIT – IV

The Plane Truss Element – Basic Equations – MATLAB Functions Used – Practice Exercises

UNIT – V

The Beam Element – Basic Equations – MATLAB Functions Used – Practice Exercises

TEXTBOOKS

1. Fundamentals of Finite Element Analysis by David V. Hutton
2. Concepts and Applications of Finite Element Analysis by Robert D. Cook, David S. Malkus and Michael

   E. Plesha

3. MATLAB Guide to Finite Elements – An interactive Approach by Peter I. Kattan
4. A first course in the Finite Element Method by Daryl L. Logan
5. An Introduction to Finite Element Method by J.N. Reddy

Department of Mechanical Engineering
S. V. University College of Engineering:: TIRUPATI

MC 509A Universal Human Values

Instruction: Hours/Week: **2L:0T:0P** **Credits: 0**
Marks:100 Pre-requisites/co-requisites: None.

COURSE DESCRIPTION:

The methodology of this course is universally adaptable, involving a systematic and rational study of the human being vis-à-vis the rest of existence. It is free from any dogma or value prescriptions. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with and within the student himself/herself finally.

COURSE OBJECTIVES:

1. To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. To understand (or developing clarity) the harmony in the human being, family, society and nature/existence.
3. To strengthen self-reflection and to develop commitment and courage to act.
4. To understand social responsibility of an engineer.
5. To appreciate ethical dilemma while discharging duties in professional life.

COURSE CONTENT:

UNIT I: Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; „Natural Acceptance" and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT II: Understanding Harmony in The Human Being - Harmony in Myself! :

Understanding human being as a co-existence of the sentient „I" and the material „Body". Understanding the needs of Self („I") and „Body" - happiness and physical facility (Sukh and Suvidha). Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer). Understanding the characteristics and activities of „I" and harmony in „I". Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.

UNIT III: Understanding Harmony in The Family and Society- Harmony in Human-Human Relationship: Understanding harmony in the Family - the basic unit of human interaction. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness (Ubhay-tripti); Trust **(Vishwas)** and Respect **(Samman)** as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution (Samadhan), Prosperity (Samridhi), fearlessness (**Abhay**) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family.

UNIT IV: Understanding Harmony in The Nature and Existence - Whole Existence as Coexistence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V: Implications of The Above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations.

COURSE OUTCOMES: On completion of this course, the students will be able to

1. To become more aware of themselves, and their surroundings (family, society, nature)
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the role of a human being in ensuring harmony in society and nature.
4. To become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

TEXT BOOKS:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

REFERENCE BOOKS:

1. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
2. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
3. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
4. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
8. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.
9. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
10. India Wins Freedom - Maulana Abdul Kalam Azad.

Relevant CDs, Movies, Documentaries & Other Literature:

1. value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story.

DEPARTMENT OF MECHANICAL ENGINEERING

(Choice Based Credit System)

POST GRADUATION PROGRAM

MASTER OF TECHNOLOGY

in

INDUSTRIAL ENGINEERING

Scheme of Instructions and Evaluation

SRI VENKATESWARA UNIVERSITY

COLLEGE OF ENGINEERING: TIRUPATI -517502

(AUTONOMOUS)

About the Department

- Welcome to the Department of Mechanical Engineering at SVUCE Tirupati. It began its journey in the year 1959. Over the last six decades, we have grown our expertise and competence in the core Mechanical Engineering curriculum and research. The programs are designed to prepare our graduates for a rapidly changing world and to go well beyond being significant contributors. We have state of the art research facilities to support our academic programs and research. Our faculties are renowned leaders in their fields, and our students-from undergraduates, postgraduates to doctoral scholars-have the opportunity to work with them one-on-one on problems defining the state-of-the art.

- Our approach is highly interdisciplinary and collaborative, and we stress the exploration of innovative and even unconventional ideas. Our goal for undergraduate students is to give them a high-quality engineering education that includes hands-on experience. Each of our faculty members is ready and willing to work in their research specialty with capable students on individual projects. We strive to ensure that all our undergraduate students have a strong education with teaming and leadership skills, involvement in student activities, and the practical background of internship experience. We believe that emphasizing these areas will make our students well qualified to take leadership roles in the future. Finally, it is my pleasure to work with such highly distinguished staff and to serve our inquisitive and passionate student body in achieving our department mission and vision.

VISION:

To be a globally renowned center for quality education and innovative research in Mechanical Engineering

MISSION

M1	Prepare effective and responsible graduate engineers for global requirements.
M2	Continuously strive to improve pedagogical methods employed in delivering the academic programs.
M3	Respond dynamically to the changing requirements of the industry.
M4	Conduct basic and applied research to contribute to intellectual human capital.
M5	Inculcate the spirit of entrepreneurship and social responsibility.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

- **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

MECHANICAL ENGINEERING

M.Tech (Mechanical Engineering) Specialization: Industrial Engineering

SEMESTER – I

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
IEPC 01	Operations Planning and Control	3	-	-	3	3	40	60	100
IEPC 02	Work System Design	3	-	-	3	3	40	60	100
Professional Elective- I Any One from the Following		3	-	-	3	3	40	60	100
IEPE 11	Applied Probability and Statistics								
IEPE 12	Financial Management & Control								
IEPE 13	Human Resource Management								
Professional Elective- II Any One from the Following		3	-	-	3	3	40	60	100
IEPE 21	Design for Manufacturing								
IEPE 22	Marketing Management								
IEPE 23	Facilities Planning								
IECP 01	Industrial Engineering Lab-I	-	-	2	2	2	40	60	100
IECP 02	Simulation Lab - I	-	-	2	2	2	40	60	100
PGMC 01	Research Methodology and IPR	2	-	-	-	2	40	60	100
PGPA 01	Audit Course-I								
	Total	16	-	8	20	15	280	420	700

SEMESTER – II

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
IEPC 03	Advanced Operation Research	3	-	-	3	3	40	60	100
IEPC 04	Quality Control and Reliability Engineering	3	-	-	3	3	40	60	100
Professional Elective- III Any One from the Following		3	-	-	3	3	40	60	100
IEPE 31	Supply Chain Management								
IEPE 32	Project Management								
IEPE 33	Discrete Event System Simulation								
Professional Elective- IV Any One from the Following		3	-	-	3	3	40	60	100
IEPE 41	Productivity Engineering & Management								
IEPE 42	Logistics Engineering & Management								
IEPE 43	Service Engineering & Management								
IECP 03	Industrial Engineering Lab-II	-	-	2	4	2	40	60	100
IECP 04	Simulation Lab - II	-	-	2	4	2	40	60	100
PGPA 02	Audit Course-II	2	-	--	-	-	-	-	-
IEMP 01	Mini Project	-	--	4	4	2	100		100
	Total	14	-	8	20	18	340	360	700

SEMESTER – III

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
Professional Elective- V Any One from the Following		3	-	-	3	3	40	60	100
IEPE 51	Design and Analysis of Experiments								
IEPE 52	System Dynamics								
Open Elective- I Any One from the Following		3	-	-	3	3	40	60	100
PGOP 11	Business Analytics								
PGOP 12	Industrial Safety								
PGOP 13	Operation Research								
PGOP 14	Cost Management of Engineering Projects								
PGOP 15	Composite Materials								
PGOP 16	Waste to Energy								
IEPD 01	Major Project: Phase-I Dissertation	-	-	20	20	10	100	-	100
	Total	6	-	20	26	16	180	120	300

SEMESTER – IV

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
		Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
IEPD 01	Major Project: Phase-I Dissertation	-	-	32	32	16	40	60	100
Total		-	-	32	32	16	40	60	100

Audit Course 1 & 2

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills.

IEPC 01 OPERATIONS PLANNING AND CONTROL

M.Tech I Semester
Common to Industrial Engineering & Production Engineering

Lectures / Week: 3 periods

Course Objectives:

1. To understanding the production processes involved in the manufacturing of a product
2. To forecast the production demand and estimate and plan the schedule activities.
3. To plan the loading of work stations and scheduling for line balancing and LOB.

Course Content:

UNIT-I

OPC a system approach. Types of production and OPC functions.

Forecasting: Forecasting Methods – Qualitative Methods – Quantitative methods — moving average and exponential smoothing methods for different data patterns. Forecast errors, Tracking signal.

UNIT-II

Mass Production Management Principles of flow lines, Assembly line balancing; approach to line balancing — RPW, COMSOAL, Integer and Dynamic programming formulations. Introduction to transfer lines.

Production Planning Linear programming formulations for static demand case, Product Mix Decisions. Chance constrained programming models.

UNIT-III

Aggregate Production Planning Production planning under dynamic conditions strategies, costs involved; Heuristic methods, linear production and inventory programmes. Aggregate production planning — HMMS model, search decision, parametric production planning, management coefficient models. Disaggregation — hierarchical planning, mathematical programming formulations. Master Production Schedule.

UNIT-IV

Operations Scheduling Flow shop sequencing and job scheduling.

Periodic review models. Continuous review models, lot size models with dynamic demand, inventory models of spare parts.

UNIT-V

Materials Requirement Planning (MRP) Introduction. Inventory in a manufacturing environment. Principles of MRP, MRP processing logic. MRP systems, and MRP — II, Jut-In-Time manufacturing: set-up reduction, stable MPS and Kanban control.

Course Outcomes:

At the end of the course student will be able to learn the-

1. Forecasting principles and techniques for short range and long range planning
2. Production requirements for each product and plan the shop floor activities
3. Work station loading and scheduling of paths to avoid bottle necks for smooth production
4. Solution for product mix decision using OR techniques.
5. Optimal job sequences to achieve the minimum make span with maximum production output

REFERENCES

1. Montgomery, Operations Research in Production Planning, Scheduling and Inventory Control — Prentice Hall, N.J
2. Buffa, E.S., Operations Management – John Wiley & Sons.
3. Elsyod and Boucher Analysis of Production Systems, Prentice Hall, N.J,ISE Series
4. Burbridge, Production Planning – Heinemann Publishers, 1971.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3			2							
CO2		3		1	2							
CO3			3	2								
CO4	1	3	2									
CO5	1		3	2								

IEPC02 WORK SYSTEM DESIGN

M.Tech I Semester
Industrial Engineering

Lectures / Week: 3 periods

Course Objectives:

1. To study the existing work place layout and time for each operation.
2. To study the existing working methods and hand and body motion leading to work measurement
3. To learn and design PMTS, MTS systems and man / machine method for implementation of ergonomics.

Course Content:

Unit-I

Method study: Purpose of work-study-Objectives, applications, Method study definition & basic procedure selection of job, Various recording techniques like outline process charts, flow charts, Man machine charts, Two handed process charts, sting diagram, flow diagram, Multiple activity chart, Simo, Cycle-graphs and chrono-cycle graphs, Critical examination, development and maintenance of improved methods.

Unit-II

Micro motion studies: Use of fundamental hand motions- principles of motion economy and work place layout, Process planning and design of jigs and fixtures. Applications of method study in office and other diverse functional areas for development and implementation of work systems.

Unit-III

Ergonomics-Introduction to ergonomics and human engineering, physical basis of mans Perception of his environment. Anthropometry and work design, studies on human psycho sensorial processes for design of work systems.

UNIT-IV

Work Measurement-Work measurement objectives and techniques, time study and rating systems, allowances, standard and allowed time, production norms, production study, activity sampling development of synthetic and standard data, application of work study in non — traditional areas like hospitals, public utilities, etc.

UNIT-V

Principles of predetermined motion time systems (PMTS). The MTM system, its history and development, basic motions and their control characteristics, simultaneous and combined motions, limiting motions, learning curve concepts, application of PMTS & MTM.

Course Outcomes:

At the end of the course student will be able to learn the-

1. Work study principle and design effective work layout for minimal hand and body motions.
2. Design process for improvement and design the method study.
3. Estimation of time for each operation through micro motion study so as to eliminate unnecessary movements.
4. Design the ergonomics for effective usage of hand and body motions.

REFERENCES:

1. Mundel, Motion and Time Study, PHI,1973
2. Niebel, Motion and Time Study. USA Edition
3. Barnes, Motion and Time Study – Design and Measurement of Work.
4. Mc Cormic, Human Factors in Engineering Design
5. Work Study by ILO
6. Hank Book of industrial Engineers by H.B Maynard
7. Work study and Ergonomics - S.K. Sharma and Savita Sharma
8. Workstudy - Suresh Dalela

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2			3				1			2
CO2		3		2			1					1
CO3		3		2	1							
CO4	1	3	2	2								1

IEPE11 APPLIED PROBABILITY AND STATISTICS

M.Tech I Semester
Common to Industrial Engineering & Production Engineering

Lectures / Week: 3 periods

Course Objectives:

1. To identify suitable random variables for discrete and continuous probability estimation.
2. To understand the suitability of the mathematical distributions for the industrial applications
3. To study the sampling theory and apply in prediction of the event and analyze the statistical distributions by process of matrices.

Course Content:

UNIT-I

Introduction to probability: Probability, sample space – axioms of probability, Random variables – Discrete and Continuous – Expectations – Moment Generating functions. Conditional probability – Bayer's theorem – Independent Events.

UNIT-II

Discrete distributions: Binomial, Hyper geometric, Gama, Students t, Chisquare, Weibell distributions.

Bivariate random variables and their distributions (with specific reference to bivariate normal distributions only). Conditional distributions – Covariance, Correlation coefficient – Regression of the mean.

UNIT-III

Functions of random variables: Probability distribution of functions of random variables their joint probability distribution.

Sampling: Sampling Distribution – Law of Large Numbers – Central Limit theorem.

UNIT-IV

Estimation: Point Estimation, Interval Estimation and Confidence Intervals. (Maximum Likelihood Estimation), Bayesians Estimation.

Testing of Hypothesis: Simple hypothesis and the Neyman – Pearson lemma – Composite hypothesis – goodness of fit tests.

UNIT-V

Analysis of variance: One way classification — Randomized, complete block designs.

Course Outcomes:

At the end of the course student will be able to learn the-

1. Basic concepts of sampling applied in population enumeration.
2. Regression techniques for application and forecast the demand and related variables
3. Testing of hypothesis using statistical distributions.
4. Correlation between the observed values and experimental values for analysis of variance.

REFERENCES

1. Ian F. Blake, An introduction to Applied Probability – John Wiley & Sons (1979)
2. Milton, J.S., Arnold, Jee C., Probability and Statistics in the Engineering and Computing Sciences — Mc Grawhill, 2003.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2				3						
CO2	2	3	1									
CO3		3	1									
CO4	2	3										

IEPE12 FINANCIAL MANAGEMENT AND CONTROL

Industrial Engineering
Elective

Lectures / Week: 3 periods

Course Objectives:

1. Able to understand Goals and functions of Finance, risk concepts
2. Able to know the concept of working capital management and evaluation of alternative ways of financing on the liquidity of firms
3. Able to understand the methods of cost accounting and tools of financial analysis

Course Content:

UNIT-I

Goals and functions of Finance; Concepts in Valuation, Time Value of Money. Principles of Capital budgeting generating of cash flows. Evaluation of investment proposals — Capital rationing and mathematical programming of Capital Budgeting.

UNIT-II

Cost of capital for specific sources of financing and weighted average cost of capital. Evaluation of Risky investments — Generation of information needed to evaluate risky investments when cash flows are independent, sequential decisions and decision trees. Abandonment problems evaluation of projects under firm risk concepts.

UNIT-III

Working capital management — factor, principles short term Vs. long term financing, liquidity of assets and evaluation of alternative ways of financing on the liquidity of firms. Management of Cash and marketable securities management of cash, lock box and concentration banking cash management, models of Bumol, Miller and Off, Management of accounts receivable credit collection policies, Evaluating credit applicant, inventory control and financial manager.

UNIT-IV

Cost accounting – Elements of cost, types of methods of costing. Overhead charges and allocation, standard costing and budgetary control/marginal costing. Cost variances — methods of calculating variances. Material, Labour, Expenses and indirect expenses preparation of cost sheets and their usages.

UNIT-V

Tools of financial analysis — financial ratio analysis, Funds flow analysis and financial forecasting, analysis of operating and financial leverage.

Course Outcomes:

1. Clearly understand the cost management discipline and process
2. Recognise potential pitfalls and understand avoidance strategies
3. Use a cost management estimation and control plan
4. Understand the process and importance of Cost Estimation, Cost Budgeting and Cost Control

REFERENCES

1. Vanhorne, James. C. Financial Management and Policy – Pearson Education.
2. Pandey, I. M., Financial Management
3. Humpton, Financial Decision Making(Concepts, problems and cases) – PHI.
4. Humpton, Hand book offinancial decisions – PHI.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		3								
CO2		2	2	3								
CO3		2	3	1								
CO4	1	2	3									

IEPE13 HUMAN RESOURCE MANAGEMENT

Industrial Engineering

Lectures / Week: 3 periods

Course Objectives:

1. Effectively manage and plan key human resource functions within organizations
2. Contribute to employee performance management and organizational effectiveness
3. Develop effective written and oral communication skills

Course Content:

UNIT-I

Introduction: Definition of personnel management, concept of labour, organisation and function of the personnel department, personnel policies.

Organisational objectives, functions, relationships, organisational structure of formal and organisations, job design.

UNIT-II

Manpower planning: Man power forecasting, mobility and promotion problems, job analysis and job description.

Selection: Developing sources, methods of recruitment, alternative selection policies, application blanks and qualification card, interviews, psychological testing.

UNIT-III

Training: The nature of training, objectives in training, types of training, requirements of effective training conventional training techniques, group training, organisation development, evaluating training effectiveness.

Performance appraisal: Traditional performance appraisal systems, appraisal programs.

UNIT-IV

Wage and Salary Administration: Factors affecting compensation policy - equity and compensation - comparable value, job evaluation, job evaluating systems - simple ranking - job grading - point systems – factor comparison system, effects of job evaluation on human relations, Expectancy theory and compensation, variable compensation, supplementary compensations.

UNIT-V

Human Factor Management: Human factors in management behavioural models, motivation, Maslow's hierarchy of needs theory - hygiene approach to motivation, expectancy theory, reinforcement theory Mcclleland's needs theory, motivational techniques.

Leadership: Definition, trait approaches to leadership, leadership behaviour and styles, situational approach to leadership.

Communication and Counseling: Nature and importance of communications, channels and structure, communication process, Management by objectives, counselling.

Course Outcomes:

1. Critically evaluate and apply theories and models of HRM that explain the nature and significance of key HRM practices and HRM outcomes as they relate to diverse organisational contexts.
2. Critically analyse and apply the emerging strategic role that HRM plays in a changing business environment and workplace to maintain current policies and procedures
3. Analyse and align HR systems and processes to leadership strategies and objectives in contemporary organisations to promote best practice in HR performance.
4. Identify and evaluate key organisational approaches to improving HR outcomes for both the organisation and its employees
5. Critically analyse employee-employer issues using relevant ethical and legal processes and approaches to solve problems.

REFERENCES:

1. Scott, Clothier, Springel, Personnel Management, McGraw Hill
2. Strauss and Sayles Personnel, The Human Problems of Management, Prentice Hall.
3. Edwon, B. Fillipo, Personnel Management
4. Koontz, O. Donnel, Weihreich, Essentials of Managemnt, McGraw Hill.
5. Kapoor, N.D., Introduction to Commercial & Industrial Law, Sultan Chand & Sons.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		3								
CO2		2	1	3								
CO3	1	2	1	3								
CO4		2	1	3	1							
CO5		2		3	2							

EPE 21 DESIGN FOR MANUFACTURING

Common to Industrial Engineering & Production Engineering
Elective

Lectures / Week: 3periods

Course Objectives:

1. Understand the design rules and considerations with reference to various manufacturing processes
2. To discusses capabilities and limitations of each manufacturing process in relation to part design and cost
3. To examine DFM principles including how the design affects manufacturing cost, lean manufacturing, six sigma, etc.

Course Content:

UNIT-I

Introduction: Design philosophy-steps in design process-general design rules for manufacturability-basic principles of designing for economical production-creativity in design.

Machining processes: Overview of various machining processes-general design rules for machining-dimensional tolerance and surface roughness-Design for machining – ease –redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT-II

Metal casting: Appraisal of various casting processes, selection of casting process,- general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

UNIT-III

Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines-pre and post treatment of welds-effects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations.

UNIT-IV

Extrusion & Sheet metal work: Design guide lines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.

UNIT-V

Plastics: Visco elastic and creep behavior in plastics-design guidelines for plastic components-design considerations for injection moulding – design guidelines for machining and joining of plastics.

Course Outcomes:

1. Design components for machining
2. Simulate the casting design and choose the best casting process for a specific product.
3. Evaluate the effect of thermal stresses in weld joints
4. Design components for sheet metal work by understanding in depth the sheet metal processes and their formation mechanisms
5. Design plastic components for machining and joining and selecting a proper processes for different joining cases

REFERENCES:

1. Design for manufacture, John cobert, Adisson Wesley. 1995
2. Design for Manufacture by Boothroyd,
3. Design for manufacture, James Bralla
4. ASM Hand book Vol.20

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3									
CO2	2	2	2	2								
CO3	2		2									
CO4	2		3									
CO5	2		3									

IEPE 22 MARKETING MANAGEMENT

Industrial Engineering
Elective

Lectures / Week: 3 periods

Course Objectives:

1. Able to know the concept of role of scientific marketing analysis, generation of product ideas and product development
2. Able to understand the purchasing decisions, strategic pricing analysis
3. Able to learn the concept of advertising, promotional and distribution decisions

Course Content:

UNIT-I

Introduction: Marketing System, role of scientific marketing analysis. Marketing models, their uses and limitations.

UNIT-II

Product Decisions: How to introduce new product — The generation of product idea, product research, Developing utility measures for product research. Product evaluation (Break — even analysis). Product development(application of PERT/CPM).

Purchasing Decisions: Purchasing under fluctuating prices purchasing with quantity discounts. Pricing

UNIT-III

Decisions: Objectives in setting market price and the policies adopted in setting market price for a certain product. Strategic pricing analysis (Decision trees in pricing analysis).

UNIT-IV

Advertising Decisions: Sales response to advertising, joint optimization of price advertising and quality, Game theory models in advertising. Media advertising allocation model.

UNIT-V

Promotional Decisions: Spatial allocation of selling expenses, salesmen recruitment and selection, application of dynamic programming to promotional effort, Branch — Switching analysis.

Distribution Decisions: Distribution Systems, Warehousing problems.

Course Outcomes:

1. State the role and functions of marketing within a range of organizations.
2. Describe key marketing concepts, theories and techniques for analysing a variety of marketing situations.
3. Use written formats to communicate marketing outcomes.
4. Apply the introduced conceptual frameworks, theory and techniques to various marketing contexts.
5. Synthesise ideas into a marketing plan.

REFERENCES

1. Phillips Kotler, Marketing Management Analysis, Planning & Control.
2. Phillips Kotler, Marketing Management – A Model Building Approach.
3. King, Analytical Methods in Marketing.
4. Station, Fundamentals of Marketing.
5. Montgomery, Management Science applied to Marketing.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1									
CO2	2	1			2							
CO3		2	2									2
CO4		1	2	1		1						2
CO5		2	2	1		1						2

IEPE 23 FACILITIES PLANNING

Industrial Engineering
Elective

Lectures / Week: 3 periods

Course Objectives:

1. Able to understand the methodology of facilities planning for manufacturing and service.
2. Able to learn the requirements analysis, design procedures, evaluation and computer aided plant layout.
3. Able to understand the Quantitative Approaches to facilities Planning and probabilistic models

Course Content:

UNIT-I

Facilities Planning: Definition, Significance, Objectives and process of facilities planning — strategic facilities planning; Relationship between product, process and schedule design and facilities planning. Activity relationships and space requirements planning personnel requirements.

UNIT-II

Material Handling: Definition, principles, system design and selection of equipment, unit load concepts. Basic layout types — Immer, Nadler, Muther Apple James and Ree's approaches to plant layout. Modular design concept. Production Line balancing.

UNIT-III

Computer Aided Layout: CRAFT, COFAD, PLANET, CORELAP, ALDEP. Planning for receiving and shipping, storage and ware housing, manufacturing, office planning, facility services and non — manufacturing functions.

UNIT-IV

Quantitative Approaches to facilities Planning: Deterministic models — single and multi — facility location models. Location — Allocation problems — quadratic assignment problem. Warehouse layout models. Plant location problems. Conveyor models. Storage models.

UNIT-V

Probabilistic models: Conveyor models, waiting line models simulation models and Storage models Evaluation, selection, implementation and maintenance of the Facilities plan.

Course Outcomes:

1. Able to know the concept of facilities planning that aid in design of Product, Process and schedule design.
2. Able to design Material handling equipment for industrial and non industrial purpose.
3. Able to design handling, receiving and shipping of goods using computer aided layout software.
4. Able to solve Problems of ware house, conveyor and allocation models using quantitative approach.
5. Able to simulate the waiting line models, storage models and conveyor models using simulation software.

REFERENCES

1. Tompkins. J.A. and White, J.A., Facilities Planning.John Wiley& Sons,1984.
2. Francies, R.L., and Mc Ginnis White, J.A., Facility Layout and Location — An analytical approach, PHI Publications.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										
CO2		3	2	1								
CO3			2		3							
CO4		3	2	1								
CO5		1	3	2								

IECP01 Industrial Engineering LAB-I

List of Experiments:

1. Draw two handed process charts for Bolt, Washer & Nut assembly.
2. Performance rating using playing cards.
3. Standard time calculation.
4. Study of OC curves.
5. Pin board study.
6. Simulation of inventory control system.
7. Normal Distribution.
8. Rectangular Distribution.

Course Outcomes:

At the end of the course student will be able to learn the-

1. To pursue the method adopted in performing the operation.
2. Understanding of reliable and flexible method to accomplish hectic task in minimum possible time.
3. To record the human activities during working conditions using scientific methods.
4. To study the performance rating of individual worker and to cost accordingly
5. Development of new techniques to minimize the bottlenecks

Contribution to outcomes

1. Class room teaching (through chalk and board and presentations)
2. Through PPT's
3. Expert lecture from industries.
4. Video lectures through NPTEL

Assessment of outcomes

1. Sessional test
2. End term exam
3. Surprise quiz
4. Presentation by students
5. Daily class room interaction

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		3									
CO2	1		3									
CO3		2		3								
CO4		2		3								
CO5		2	2	3								

IECP02 SIMULATION LAB-I

List of Experiments:

1. DDA line Algorithm
2. Bresenham‟s line drawing algorithm
3. Queuing Modelling in C-Language.
4. Inventory Modelling in C-Language.
5. Random variation generates using C.
6. Simplex Method
7. Two Phase Method
8. Big M-Method.

Course Outcomes:

1. Able to understand the basic programming knowledge with respect to domain.
2. Able to develop a program to solve N job 2 machine problem using C software, and to develop a program in C to solve inventory price breaks problem
3. Able to solve inventory control problem for Two Phase Method
4. Able to solve queuing theory problems in Big M-Method.
5. Able to solve linear programming and non-linear programming problems using Simplex Method

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3										
CO2		3										
CO3		3										
CO4		3										
CO5		3										

PGMC 01 Research Methodology and IPR
Teaching Scheme

Lectures: 1hrs/week

OBJECTIVES:

• To give an idea about IPR, registration and its enforcement.

Syllabus Contents:

Unit 1: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.
Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations
Unit 2: Effective literature studies approaches, analysis
Plagiarism, Research ethics,
Unit 3: Effective technical writing, how to write report, Paper
Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee
Unit 4: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants
of patents, Patenting under PCT.
Unit 5: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.
Unit 6: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies,
IPR and IITs.

Course Outcomes:

At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today‟s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work
and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

References:

- Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students""
- Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
- Ranjit Kumar, 2nd Edition , "Research Methodology: A Step by Step Guide for beginners"
- Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
- Mayall , "Industrial Design", McGraw Hill, 1992.
- Niebel , "Product Design", McGraw Hill, 1974.
- Asimov , "Introduction to Design", Prentice Hall, 1962.
- Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
- T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1								1
CO2	1	3	2		3							1
CO3		3	2	2		2	3					
CO4		3		2		2						
CO5		3		2	1			3				2
CO6			1		2	1	2					1

IEPC03 ADVANCED OPERATIONS RESEARCH

M.Tech II Semester
Industrial Engineering

Lectures / Week: 3 periods

Course Objectives:

1. Able to learn non-linear, stochastic and dynamic programming
2. Able to understand the concept of multi criteria optimization
3. Able to know the different alogarithms

Course Content:

UNIT-I

Non — linear Programming: Classical Optimisation techniques and Kuhn Tucker theory — One dimensional minimization — Unconstrained and Constrained minimisation methods –Quadratic programming.

UNIT-II

Stochastic programming – Geometric programming problem and applications.

UNIT-III

Dynamic Programming: Characteristics of dynamic programming problems – single and multi – stage models – Practical applications to inventory and Cargo loading problems.

UNIT-IV

Multi — criteria Optimization: Introduction to multicriteria optimization – Methods of solution. Goal programming and applications.

UNIT-V

Meta Hemistich — genetic Algorithms, Simulated Annealing, Tabu search, Ant Colony Optimization algorithms.

Course Outcomes:

1. Able to solve nonlinear problems using Kuhn Tucker conditions.
2. Able to solve Un-constrained and constrained minimization problems using programming methods.
3. Ability to solve multi objective problems using Goal programming.
4. Able to develop meta heuristic algorithms to solve optimization problems.

REFERENCES:

1. Taha, Hamdy. A., Operations Research an Introduction.PHI Edition, 6th Edition.
2. Rao, S.S., Optimisation theory and practice – PHI..
3. Hiller & Liberaman, Operations Research – Tata McGrawhill,7t Edition,2002.

4. Kalyanmoy Deb, Optimization for Engineering Design Algorithms and Examples (1996).

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2	2	3								
CO2		3	2									
CO3		3	1	2								
CO4		2		1	3							

IEPC 04 QUALITY CONTROL AND RELIABILITY ENGINEERING

M.Tech II Semester
Industrial Engineering

Lectures / Week: 3 periods

Course Objectives:

1. Able to know the concepts and methods of modern statistical quality control.
2. Students learn to apply standard quality control tools, theoretical statistical concepts that justify the use of particular quality control tools in particular situations.
3. They learn theory and methods for analyzing the performance of different quality control tools.

Course Content:

UNIT-I

Product Quality, Quality Control, Factors affecting quality, Systems approach to quality, Quality Costs, Quality Circles, Total Quality Management, ISO 9000.

UNIT-II

Control charts for variables and attributes, Process capability studies, Quality Rating System

UNIT-III

Lot – by – Lot acceptance sampling plans by attributes – Acceptance sampling plans for continuous production – Acceptance Sampling plans for variables.

UNIT-IV

Concepts of Reliability, Quality and Reliability, Failure data analysis, Life testing characteristics Failure Rate, Hazard Rate, Reliability. Hazard models (Exponential and Weibull), System reliability with components in series and in parallel, mixed configurations.

UNIT-V

Reliability improvement, Active and standby redundancy, introduction to reliability optimization, Availability and maintainability, Application of reliability in maintenance strategies.

Course Outcomes:

At the end of the course student will be able to learn the-

1. Able to maintain quality in products using quality circle principles.
2. Able to apply statistical methods to accept the lot of samples.
3. Able to increase the reliability of product through statistical approach.
4. Able to judge whether the lots of samples are to be accept or reject.
5. Learn fundamentals of reliability management and risk assessment.

REFERENCES:

1. Fergenbaum,V. Armand, Total Quality Control – Tata MeGrawhill(40th Edition)
2. Besterfield H. Dale., Quality Control – A practical approach – Pearson Education Asia (2nd Edition).
3. Grant, E. L., Statistical Quality Control – Tata Mc Grawhill (6th Edition)
4. Montgomary – Statistical Quality Control – John Wiley & Sons
5. Srinath, L.S., Concepts in Reliability Engineering – Prentice Hall India.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2			3								
CO2			2	3								
CO3	1		3									
CO4	1				3	2					1	1
CO5			2		3						1	

IEPE 31 SUPPLY CHAIN MANAGEMENT

M.Tech II Semester
Industrial Engineering

Lectures / Week: 3 periods

Course Objectives:

1. To understand the managerial decision strategies relating to suppliers and related logistics
2. To compute the tradeoffs between the supplier and the purchaser for continuous process operation
3. To understand and optimal utilization of financial resources

Course Content:

UNIT-I

Strategic Frame work to analyze supply chains – understanding supply chain – supply performance – planning demand and supply in a supply chain.

UNIT-II

Demand forecasting in a supply chain – Aggregate planning in a supply chain – planning managing Inventories in a supply chain.

UNIT-III

Determining optimal level of product availability. Transportation, Network design and information Technology in a supply chains.

UNIT-IV

Coordinating a Supply chain – E – business and the supply chain.

UNIT-V

Financial factors influencing supply chain decisions.

Course Outcomes:

At the end of the course student will be able to learn the-

1. Managerial decision plans for effective implementation with competitive supplies
2. Demand of the materials and maintain zero inventories with proper supply chain.
3. Manufacturing operations and allocation of resources for optimal production.
4. Proper sales market so as to plan the MRP and lean manufacturing concepts
5. Logistics for purchasing raw materials and maintain continuous chain with suppliers and customers

REFERENCES*:*

1. Supply Chain Management Strategy, Planning and operation — Sunil Chopra and Peter Meindl.
2. Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies by David Simchi-Levi, Philip Kaminsky and Edith Simchi-Levi
3. Supply Chain Management: Strategy, Planning, and Operation by Sunil Chopra and Peter Meindl
4. Supply Chain Logistics Management by Donald Bowersox, David Closs and M. Bixby Cooper
5. The Handbook of Logistics and Distribution Management: Understanding the Supply Chain by Alan Rushton, Phil Croucher and Peter Baker

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		3		2							1
CO2	2		2	3								
CO3	1	3										
CO4	1		3									
CO5		3										

IEPE32 PROJECT MANAGEMENT

Common to Industrial Engineering & Production Engineering
Open Elective

Lectures / Week: 3 periods

Course Objectives:

1. To understand the basic concepts of projects, need of projects, project life cycle and knowledge for management
2. To understand the project planning concepts, feasibility studies so as to design a project to achieve break-even point
3. To understand the roles of individual and team work leadership styles, challenges in project improvementation identify the conflict issues and solution process for better execution and control

Course Content:

UNIT-I

Basics of Project Management: Introduction, Need for Project Management, Project Management Knowledge Areas and Processes, The Project Life Cycle, The Project Manager (PM), Phases of Project Management Life Cycle, Project Management Processes, Impact of Delays in Project Completions, Essentials of Project Management Philosophy, Project Management Principles

UNIT-II

Project Identification and Selection: Introduction, Project Identification Process, Project Initiation, Pre-Feasibility Study, Feasibility Studies, Project Break-even point

Project Planning: Introduction, Project Planning, Need of Project Planning, Project Life Cycle, Roles, Responsibility and Team Work, Project Planning Process, Work Breakdown Structure (WBS)

UNIT-III

Organisational Structure and Organisational Issues: Introduction, Concept of Organisational Structure, Roles and Responsibilities of Project Leader, Relationship between Project Manager and Line Manager, Leadership Styles for Project Managers, Conflict Resolution, Team Management and Diversity Management, Change management

UNIT-IV

Project Performance Measurement and Evaluation: Introduction, Performance Measurement, Productivity, Project Performance Evaluation, Benefits and Challenges of Performance Measurement and Evaluation, Controlling the Projects

UNIT-V

Project Execution and Control: Introduction, Project Execution, Project Control Process, Purpose of Project Execution and Control

Course Outcomes:

At the end of the course student will be able to learn the-

1. Better understanding of the project principles and project life cycle so as to avoid the project delays and the design stage itself to arrive at the Break-even point
2. Better analysis of the project planning, the role and responsibility of the team work in the assignment of jobs
3. Organization structure the responsibilities and role of leaders and team management
4. Process of implementation of performance measurements for better productivity and project process control

REFERENCES:

1. Effective project management by Robert K. Wysoki

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2							2		3	
CO2		2							1		3	
CO3	1	2		2							3	
CO4	1	2	3								2	
CO5		2		3					1		1	

IEPE33 DISCRETE EVENT SYSTEM SIMULATION

Industrial Engineering
Elective

Lectures / Week: 3 periods

Course Objectives:

1. Able to understand the need for system modeling and generation of random numbers
2. Able to know the concept of stochastic variates and Various methods of generating stochastic variates
3. Able to learn the design of simulation experiments, simulation languages and applications

Course Content:

UNIT-I

Introduction: Systems — Need for system modeling — General Systems theory — Systems approach to modeling. Open and closed loop models. Concept of Simulation as decision making tool types of simulations — Continuous and discrete probability distributions.

UNIT-II

Generation of Random Numbers: Pseudo random numbers — methods of generation – characteristics of Random numbers and various statistical tests to assess the randomness.

UNIT-III

Generation of Stochastic Variates: Concept of stochastic variates — Various methods of generating stochastic variates – generation of stochastic variates from various statistical distributions(uniform, exponential, normal and empirical distributions etc.,)

UNIT-IV

Design of Simulation Experiments: Problem Formulation – Data collection and reduction — Time flow mechanisms — Flow charts. Starting conditions — Run size experimental design considerations output analysis and interpretation – validation. Variance reduction techniques.

UNIT-V

Simulation Languages – comparison and selection of simulation languages GPSS, SIMSCRIPT, SIMULA, DYNAMO etc.

Application of Simulation: Study of queuing Systems, Production systems, Inventory systems, Maintenance and Replacement systems, Investment analysis etc.

Course Outcomes:

1. Classify various simulation models and give practical examples for each category
2. Construct a model for a given set of data and motivate its validity
3. Generate and test random number variates and apply them to develop simulation models
4. Analyze output data produced by a model and test validity of the model
5. Explain parallel and distributed simulation methods

REFERENCES

1. Banks, J. and Carson II, Discrete Event System Simulation — Prentice Hall International Series(1984).
2. Naylor et al., Computer Simulation techniques – John Wiley & Sons.
3. Geoffrey Gordon – System Simulation – Prentice Hall, India(2‖ Edition).

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										
CO2		3	2	1								
CO3			2		3							
CO4		3	2	1								
CO5		1	3	2								

IEPE41 PRODUCTIVITY ENGINEERING MANAGEMENT

Common to Industrial Engineering & Production Engineering
Elective

Lectures / Week: 4 periods

Course Objectives:

1. To know the basic definition and concepts of diversity and the difference between productivity and efficiency for economic growth.
2. To understand the various parameters and variables those influence the productivity and model the system performance on computers and measurements the output.
3. To know the long & short term productivity models based on technology and improvement for achievement of management goals

Course Content:

UNIT-I

Basic definitions and Scope — Significance of Productivity in economic development. Productivity measurement at nation level. Benefits of higher productivity at firm level. Diversity of productivity concepts.

UNIT-II

Productivity measurement models – Partial Productivity models, the multi – factor productivity Computers for productivity measurement. Productivity Evaluation Productivity Models, Total Model, Objectives Matrix. Expression for Total Productivity change, the Productivity Evaluation Tree.

UNIT-III

Productivity Planning – Long and Short Term Productivity models – Causes of low productivity in companies – Various strategies for productivity improvement. The Analytical Productivity Model.

UNIT-IV

Productivity Management at Enterprise level — Productivity Improvement Techniques — Technology based, Materials based, Product based, employee based and cost based. Productivity in service industries

UNIT-V

Case Studies, R&D Productivity, Evaluation of R&D, productivity, Technology Transfer.

Course Outcomes:

At the end of the course student will be able to learn the-

1. Identification and formulation productivity measurement at national level with diversity concepts
2. Development of suitable software for productive evaluation based on objective matrix and decision tree
3. Identification of long term and short term productive models in industry for improvement of the productivity
4. University-industry interaction for entrepreneurship development and technology transfer

References

1. Sumanth David, J., Productivity Engineering and Management — Mc Grawhill Book(1984)
2. Scott, Sink, D., Productivity Management Planning, Measurement and evaluation, control and Improvement.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2	3		2		1							
CO3	2		3									
CO4	1											

IEPE42 LOGISTIC ENGINEERING AND MANAGEMENT

Industrial Engineering
Elective

Lectures / Week: 4 periods

Course Objective:

1. Acquire a working knowledge regarding the art of Logistics Systems Modeling
2. Able to conceptualize real world situations related to logistics systems development decisions, originating from source requirements and goals.
3. Able to know the concept of TPM, Data collection, Analysis and system evaluation.

Course Content:

UNIT-I

Introduction to logistics: Scope and elements — Need for logistics Engineering — Related Terms and definitions.

UNIT-II

Logistics in the design and Development phase: The design process related discipline – Design for maintainability – Design for Maintainability — Design for Human factors and safety – Design Integration – Configuration change control.

UNIT-III

Logistics in the Production /Construction Phase: Industrial Engineering and operation analysis — quality control — production operations — Transition from Production to user operation.

UNIT-IV

Logistics in the utilization and Support Phase: Totsal Productive maintenance (TPM) — Data collection, Analysis and system evaluation — evaluation of Logistics support Elements.

UNIT-V

Logistics Management: Logistics Planning – Work breakdown structure – cost estimating & controlling – Major Interfaces with other program activities – Management & Control.

Course Outcomes:

1. An ability to apply the knowledge, techniques, skills, and modern tools of the discipline to Engineering Logistics technology;
2. An ability to apply knowledge of engineering, management and technology to Engineering Logistics related issues;
3. An ability to identify analyse and solve Engineering Logistics related issues;
4. An ability to identify, analyse, and solve narrowly defined Engineering Logistics technology problems;

5. An ability to apply written, oral, and graphical communications in both technical and non-technical environments and an ability to identify and use appropriate technical and management literature;

REFERENCES

1. Logistics Engineering and Management – Benjamin S. Blanchard.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1			2	3							
CO2	1	2	3									
CO3	1	2		3								
CO4	1	2		3	1							
CO5		2	2	3								

IEPE43 SERVICE ENGINEERING MANAGEMENT

Industrial Engineering
Elective

Lectures / Week: 3 periods

Course Objectives:

1. Able to understand the Strategic service vision, service concepts and business process management
2. Able to know the applications of inventory models, queuing theory, simulation modeling
3. Able to understand various management control systems, BPO and Services marketing and applications

Course Content:

UNIT-I

Introduction

Strategic service vision, service concepts and strategy, Understanding services, focus on customers, customer service management; Design and delivery of the services, Managing capacity and demand, Service quality and productivity, Globalization of services, Service Network; IT Enabled services, Design and operation of systems for eBusiness ;

UNIT-II

Business Process Management - process analysis, reengineering, process measurement and effectiveness;

UNIT-III

Management science application in services- Applications of inventory models, location analysis, queuing theory, operations scheduling, economic analysis, decision models, utility theory, simulation modeling, performance evaluation with data envelopment analysis, AHP and productivity models, evaluation of the dynamics of enablers, inhibitors and results

UNIT-IV

Management Control systems -control processes, performance measurement, variations in management control and modern control systems, management control of projects, management control of reliability; BPO and Services marketing

UNIT-V

Applications of Technology management, Benchmarking, Customer relationship management, Data mining and Knowledge management

Course Outcome:

1. Able to acquire knowledge on focusing on customer and service management
2. Able to manage modern control system, BPO and Services marketing
3. Able to maintain good customer relationship, data mining knowledge management
4. Able to apply utility theory, simulation modeling in management science applications.

REFERENCES:

1. James A. Fitzsimmons and Mona J. Fitzsimmons (2000(T)), Service Management: Operation, Strategy and JIT, Third Edition, McGraw-Hill, Inc, NY.
2. Joseph M. Juran (1992), Quality by Design, The Free press.
3. R. Kalakota and A. B. Whiston (1999), Frontier of Electronic Commerce, Addison-Wesley.
4. R. N. Anthony and V. Govindarajan (1998), Management Control Systems, Tata McGraw Hill Publishing Co. Ltd.
5. K. D. Hoffmann and J. E. G. Bateson (2002), Essentials of Services Marketing, Thomson South Western College Publishing.
6. M. J. A. Berry and G. S. Linoff (2001), Mastering Data Mining-The Art and Science of CRM, John Wiley & Sons Inc

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	3								
CO2	1	2	3	1								
CO3	1	2		3								
CO4		3			2	2						
CO5			3	2					1			

IECP03 Industrial Engineering LAB –II

List of Experiments:

1. Computations using sales forecasting Techniques.
2. Control charts for Variables.
3. Control charts for Attributes.
4. Development of Bill of Materials for MRP.
5. Draw SIMO charts for Ball Point Pen assembly
6. Determine cycle time using MTM
7. Draw flow process charts on Activities in Workshop/Laboratory.
8. Determine percentage utilization using work sampling.

Course Objectives:

1. Able to learn forecasting techniques, control charts variables and attributes.
2. Able to learn MRP, SIMO charts, & MTM cycles.
3. Able to learn the processing the charts & utilization of work sampling.

Course Outcomes:

1. Understand the forecasting techniques.
2. Understand the control charts for variables and attributes.
3. Understand the development of bills.
4. Understand the processing the charts.
5. Understand the utilization of work sampling.
6. **Mapping of Course Outcomes with Program Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3			2							1
CO2	1	3		2	1							1
CO3		3	1									1
CO4		3	2	2								1
CO5		3			3		3					1

IECP04 SIMULATION LAB-II

List of Experiments:

1. PERT Model
2. Transportation Model
3. Queuing Model
4. Sequencing Problem
5. Assignment Problem.
6. DOE by Taguchi design.
7. DOE by Response surface methodology.
8. Single response Optimization.
9. Multi response Optimization.

Course Objectives:

1. Able to learn the PERT, Transportation, and Queuing models.
2. Able to solve the sequencing and assignment problems
3. Able to learn the single response and multi response optimisation technique

Course Outcomes:

1. Understand the concept of PERT, Transportation and Queuing models.
2. Understand the solving of sequencing and assignment problem.
3. Understand the Taguchi and response Surface Methadology using DOE.
4. Understand the single & multi response optimization.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3			2							1
CO2	1	3			1							1
CO3		3		2								2
CO4	2	3		2								3
CO5		3		1								2

IEPE 51 DESIGN AND ANALYSIS OF EXPERIMENTS

Common to Industrial Engineering & Production Engineering
Elective

Lectures / Week: 3 periods

Course Objectives:

1. Able to know the basic principles of design of experiments, ANOVA
2. able to understand the concept of 2k design and 2k-p fractional factorial design
3. Able to learn basics of robust, Taguchi designs and responses in surface methodology

Course Content:

UNIT-I

Introduction to design of experiments: Background and overview, A brief history of Design of Experiments (DOE), Overview of basic statistical concepts, Basic principles of DOE and Types and purpose of DOE methods.

UNIT-II

Full factorial Design: The basic ¯full factorials‖, ANOVA, Factorial effects and plots, and Model evaluation.

UNIT-III

Fractional Factorial Design: The one-half fraction and one-quarter of the 2k design, The general 2k-p fractional factorial design and Resolution III, IV and V designs.

UNIT-IV

The Robust Design: The basics of robust designs, Taguchi designs and Robust design example.

UNIT-V

Response Surface Methodology – Central composite designs, Box-Behnken design, Analysis of second order response surfaces and process optimization.

Course Outcomes:

1. Formulate objective(s) and identify key factors in designing experiments for a given problem.
2. Develop appropriate experimental design to conduct experiments for a given problem.
3. Analyze experimental data to derive valid conclusions.
4. Optimize process conditions by developing empirical models using experimental data.
5. Design robust products and processes using parameter design approach.

REFERENCES:

1. Design and Analysis of Experiments, 5th edition, by D.C. Montgomery, John Wiley & Sons, New York, 2001.
2. Design of experiments using Taguchi approach, Ranjith K Roy, John Wiley & Sons.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2									
CO2	2	3	2									
CO3	3		3									
CO4	2		3									
CO5	3		2									

IEPE 52 SYSTEM DYNAMICS

Industrial Engineering
Elective

Lectures / Week: 3 periods

Course Objective:

1. Able to learn models for traditional management and their strengths & weaknesses, principles of modeling.
2. Able to learn software packages like DYNAMO and DYSMAP compilers, and DYMOSIM
3. Able to know the concept of Comparison of system dynamics with popular social science modeling paradigms and some applications of system methodologies.

Course Content:

UNIT-I

Mental models for traditional management — their strengths and weaknesses; Synthesizing concept of traditional management, feedback control, and computer simulation.

UNIT-II

Physical and information flows Causality and its interpretation — Causal ioop diagrams and flow diagrams – Decisions and Policies – Level and rate configurations – Principles of modelling – Behavioural characteristics of low order systems; Smoothing of information — Exponential delays — Response characteristics of smoothing and delay functions.

UNIT-III

Simulation of system dynamics models; DYNAMO and DYSMAP compilers, and DYMOSIM software package.

UNIT-IV

Some applications of system dynamics methodology to policy design problems in industrial economic social, environmental, and technological systems, etc.

UNIT-V

Comparison of system dynamics with popular social science modelling paradigms such as operations research economics and cross – impact theory.

Course Outcomes:

1. Ability to develop students' skills in analyzing, simulating, and identifying dynamic systems based upon their input-output responses.
2. Develop and analyze a simulation model that provides a useful explanation of a given problematic behaviour in a narrowly-defined task
3. Able to compare popular social science modeling paradigms such as research economics and cross impact theory

REFERENCES

1. Coyle, RG., Management System Dynamics.
2. Forrester, J.W., Industrial Dynamics.
3. Forrester, J.W., Principles of System.
4. Goodman, M.R, Study Notes on System Dynamics.
5. Richardson, G.P.and Pugh, A.L., Introduction to System Dynamics Modelling with DYNAMO.
6. Roberts, E.B., Managerial Applications of System Dynamics.
7. Roberts, N. et al., Introduction to Computer Simulation — The System Dynamics Approach.
8. Mohapatra, P.K.J., P.Mandal, and Bora, M.C., Lecture Notes on System Dynamics.
9. System Dynamics An International Journal of Policy Modelling, System Dynamics Society of India.
10. System Dynamics Review, System Dynamics Society, M.I.T.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	3								
CO2		3	2	2								
CO3		3	1	2								
CO4	2	1		1								
CO5	1	3	2	1								

OPEN ELECTIVES
PGOP13 Operations Research

Lectures: 3 hrs/week

Course Outcomes: At the end of the course, the student should be able to
1. Students should able to apply the dynamic programming to solve problems of discreet and Continuous variables.
2. Students should able to apply the concept of non-linear programming
3. Students should able to carry out sensitivity analysis
4. Student should able to model the real world problem and simulate it.

Syllabus Contents:

Unit 1:
Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit 2
Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex
method - sensitivity analysis - parametric programming

Unit 3:
Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit 4
Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit 5
Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:
1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3		1								
CO2	1	3										
CO3	1	3		1								
CO4	1	3		1								
CO5	1	3										

Open Elective

PGOP 14 Cost Management of Engineering Projects

Lecture: - 3 h/week

Introduction and Overview of the Strategic Cost Management Process
Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity
cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational
control; Provision of data for Decision-Making.
Project: meaning, Different types, why to manage, cost overruns centres, various stages of project
execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical
activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts
and Network diagram. Project commissioning: mechanical and process
Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and
Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making
problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target
costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement
Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints.
Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.
Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of
Divisional profitability pricing decisions including transfer pricing.
Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation
problems, Assignment problems, Simulation, Learning Curve Theory.

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

Open Elective
PGOP 15 Composite Materials

Lecture: - 3 h/week

UNIT–I: INTRODUCTION: Definition – Classification and characteristics of Composite materials.
Advantages and application of composites. Functional requirements of reinforcement and matrix.
Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.
UNIT – II: REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass
fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle
reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures.
Isostrain and Isostress conditions.
UNIT – III: Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique,
Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix
Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon
composites: Knitting, Braiding, Weaving. Properties and applications.
UNIT–IV: Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and
prepregs – hand layup method – Autoclave method – Filament winding method – Compression
moulding – Reaction injection moulding. Properties and applications.
UNIT – V: Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum
strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight
strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using
caplet plots; stress concentrations.
TEXT BOOKS:
1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.
References:
1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W.Tasi.

Open Elective
PGOP 16 Waste to Energy

Lecture: - 3 h/week

Course Objectives:

1. Familiarizing with management, especially with management in energy sector engineering.
2. Studying methods of energy accounting and energy auditing in energy sector, industry and final consumption.
3. Able to understand the fundamentals of product strategy management and Finding opportunities to increase the rational use of alternative energies.

Unit-I: Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest
residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors
Unit-II: Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods -
Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.
Unit-III: Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers –
Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for
thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.
Unit-IV: Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs,
Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.
Unit-V: Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology
and status - Bio energy system - Design and constructional features - Biomass resources and their
classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion -
biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion -
Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production -
Urban waste to energy conversion - Biomass energy programme in India.

Course Outcomes:

At the end of the course student will be able to learn the-

1. Need and analysis of non-conventional energy sources and the processes of energy conservation.
2. Harnessing the solar energy, storage devices so as to produce electricity; ways for energy distribution.
3. Understand the issue of fuel availability and analyse the supply and demand of fuel at the national level

4. Comparison of the coal-fired power plant with the non-conventional energy utilization to reduce environmental pollution. Working principle of carnot cycle for maximum efficiency, need for power generation systems with thermodynamic concepts.

References:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		3	2							
CO2	2	2		3	3							
CO3	1	2		3	2							
CO4	1	2		3	3							
CO5	1	2		3	3							

AUDIT 1 and 2: ENGLISH FOR RESEARCH PAPER WRITING

Course objectives:

Students will be able to:

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title
4. Ensure the good quality of paper at very first-time submission

Syllabus

Units CONTENTS Hours

1 Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness
4

2 Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction
4

3 Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.
4

4 key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction,
4

skills needed when writing a Review of the Literature,
5 skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions
4

6 useful phrases, how to ensure paper is as good as it could possibly be the first- time submission
4

Course Outcomes:

1. Improve your writing skills and level of readability
2. Learn about what to write in each section
3. Skills needed when writing a Title
4. Good quality of paper at very first-time submission

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman‟s
book .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2							2		3	
CO2		2							1		3	
CO3	1	2		2							3	
CO4	1	2	3								2	

AUDIT 1 and 2: DISASTER MANAGEMENT

Course Objectives: -Students will be able to:
1. learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries.

Syllabus

Units CONTENTS Hours

1 Introduction
Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.
4

2 **Repercussions Of Disasters And Hazards**: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem.
Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.
4

3 Disaster Prone Areas In India
Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics
4

4 Disaster Preparedness And Management
Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.
4

5 **Risk Assessment** 4
Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People‟s Participation In Risk Assessment. Strategies for Survival.

6 Disaster Mitigation
Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.
4

Course Outcomes:
1. Understanding of key concepts in disaster risk reduction and humanitarian response.
2. Evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Understanding the development of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries.

SUGGESTED READINGS:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies ""New Royal book Company.
2. Sahni, Pardeep Et.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1									
CO2	2	1			2							
CO3		2	2									2
CO4		1	2	1		1						2

AUDIT 1 and 2: SANSKRIT FOR TECHNICAL KNOWLEDGE

Course Objectives

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
4. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Syllabus

Unit *Content Hours*

1 ▪ Alphabets in Sanskrit,

- Past/Present/Future Tense,

▪ Simple Sentences

8

2 ▪ Order

- Introduction of roots

▪ Technical information about Sanskrit Literature

8

3 ▪ Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

8

Suggested reading

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India"s Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

Course Output

Students will be able to

1. Understanding basic Sanskrit language
2. Ancient Sanskrit literature about science & technology can be understood
3. Being a logical language will help to develop logic in students

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		3								
CO2		2	2	3								
CO3		2	3	1								

AUDIT 1 and 2: VALUE EDUCATION

Course Objectives

Students will be able to

1. Understand value of education and self- development
2. Imbibe good values in students
3. Let the should know about the importance of character

Syllabus

Unit *Content Hours*

1 • Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism.

• Moral and non- moral valuation. Standards and principles.

• Value judgements

4

2 • Importance of cultivation of values.

• Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness.

• Honesty, Humanity. Power of faith, National Unity.

• Patriotism.Love for nature ,Discipline

6

3 • Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline.

• Punctuality, Love and Kindness.

• Avoid fault Thinking.

• Free from anger, Dignity of labour.

• Universal brotherhood and religious tolerance.

• True friendship.

• Happiness Vs suffering, love for truth.

• Aware of self-destructive habits.

• Association and Cooperation.

• Doing best for saving nature

6

4 • Character and Competence –Holy books vs Blind faith.

• Self-management and Good health.

• Science of reincarnation.

• Equality, Nonviolence ,Humility, Role of Women.

- All religions and same message.
- Mind your Mind, Self-control.
- Honesty, Studying effectively

6

Suggested reading

1 Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University
Press, New Delhi

Course outcomes

Students will be able to

1.Knowledge of self-development
2.Learn the importance of Human values
3.Developing the overall personality

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		3								
CO2		2	2	3		1						
CO3		1	3	1								

AUDIT 1 and 2: CONSTITUTION OF INDIA

Model Curriculum of Engineering & Technology PG Courses [Volume-I]
[286]

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Syllabus

Units Content Hours

1

- **History of Making of the Indian Constitution:**

History
Drafting Committee, (Composition & Working)
4

2

- **Philosophy of the Indian Constitution:**

Preamble
Salient Features
4

3

- **Contours of Constitutional Rights & Duties:**
- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

4

4

- **Organs of Governance:**
- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive

- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

4

5

- **Local Administration:**
- District"s Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative,

CEO of Municipal Corporation.

- Pachayati raj: Introduction, PRI: Zila Pachayat.
- Elected officials and their roles, CEO Zila Pachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

4

6 - **Election Commission:** 4

- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested reading

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]
4. under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
5. Discuss the passage of the Hindu Code Bill of 1956.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	3								
CO2		3	2	2								
CO3		3	1	2								

CO4	2	1		1								
CO5	1	3	2	1								

AUDIT 1 and 2: PEDAGOGY STUDIES

Course Objectives:

Students will be able to:

1. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
2. Identify critical evidence gaps to guide the development.

Syllabus

Units Content Hours

1

- **Introduction and Methodology:**
- Aims and rationale, Policy background, Conceptual framework and terminology
- Theories of learning, Curriculum, Teacher education.
- Conceptual framework, Research questions**.**
- Overview of methodology and Searching.

4

2

- Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries.
- Curriculum, Teacher education.

2

3

- Evidence on the effectiveness of pedagogical practices
- Methodology for the in depth stage: quality assessment of included studies.
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?
- Theory of change.
- Strength and nature of the body of evidence for effective pedagogical practices.

4

- Pedagogic theory and pedagogical approaches.
- Teachers' attitudes and beliefs and Pedagogic strategies.

4

- Professional development: alignment with classroom practices and followup support
- Peer support
- Support from the head teacher and the community.

- Curriculum and assessment
- Barriers to learning: limited resources and large class sizes

4

5

- **Research gaps and future directions**
- Research design
- Contexts
- Pedagogy
- Teacher education
- Curriculum and assessment
- Dissemination and research impact.

2

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2):
245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education
research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic
maths and reading in Africa: Does teacher preparation count? International Journal Educational
Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education.
Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

Course Outcomes:

Students will be able to understand:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?
4. alignment with classroom practices and follow-up support
5. Understand the research gaps further directions

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2				3						
CO2	2	3	1									

CO3		3	1									
CO4	2	3										
CO5		3		2								

AUDIT 1 and 2: STRESS MANAGEMENT BY YOGA

Course Objectives

1. To achieve overall health of body and mind
2. To overcome stress

Syllabus

Unit *Content Hours*

1 ▪ Definitions of Eight parts of yog. (Ashtanga) 8

2 ▪ Yam and Niyam.

Do`s and Don‟t‟s in life.
i) Ahinsa, satya, astheya, bramhacharya and aparigraha
ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan
8

3 ▪ Asan and Pranayam

i) Various yog poses and their benefits for mind & body
ii)Regularization of breathing techniques and its effects-Types of pranayam
8

Suggested reading

1. „Yogic Asanas for Group Tarining-Part-I” : Janardan Swami Yogabhyasi Mandal, Nagpur
2. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

Course Outcomes:

Students will be able to:
1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency
3. Learn how to do asan and pranayama

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		3								
CO2		2	2	3								
CO3		2	3	1								

AUDIT 1 and 2: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Course Objectives

1. To learn to achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

Syllabus

Unit Content Hours

1 Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)
- Verses- 52,53,59 (dont‟s)
- Verses- 71,73,75,78 (do‟s)

8

2 - Approach to day to day work and duties.

- Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17,

23, 35,

- Chapter 18-Verses 45, 46, 48.

8

3

- Statements of basic knowledge.
- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:

Chapter2-Verses 17, Chapter 3-Verses 36,37,42,

- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

8

Suggested reading

1. “Srimad Bhagavad Gita” by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari‟s Three Satakam (Niti-sringar-vairagya) by P.Gopinath,Rashtriya Sanskrit Sansthanam, New Delhi.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502
Department of Chemical Engineering-Scheme of Instruction- (CBCS) effective from the Academic Year 2023-2024

M.Tech (PG) Specialization: Chemical Engineering -- I Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC-1	CH11C	Advanced Transport Phenomena	3	1	0	4	4	40	60	100
PCC-2	CH12C	Separation Processes	3	1	0	4	4	40	60	100
PCC-3	CH13C	Chemical Reactor Theory	3	1	0	4	4	40	60	100
PEC-I	CH14C	Programme Elective Course - I	3	0	0	3	3	40	60	100
PEC-II	CH15C	Programme Elective Course- II	3	0	0	3	3	40	60	100
PCC-I Lab	CH16L	Computational Techniques Lab	0	0	3	3	1.5	40	60	100
PCC-II Lab	CH17L	Advanced Chemical Engg. Lab	0	0	3	3	1.5	40	60	100
MC		Research Methodology and IPR	3	0	0	3	3	40	60	100
	Total		18	03	06	27	24	320	480	800

Course Code	List of Programme Elective Course I	Course Code	List of Programme Elective Course II
1	Process Design and Synthesis	1	Industrial Pollution Control
2	Fluidization Engineering	2	Transport in porous media
3	Process Plant Simulation	3	Chemo-Informatics
4	Computational Fluid Dynamics	4	Advanced Control Systems

II Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Internal Marks	End Sem Marks	Total
PCC-4	CH21C	Membrane Separations	3	1	0	4	4	40	60	100
PCC-5	CH22C	Optimization Theory and Practice	3	1	0	4	4	40	60	100
PEC-III	CH23C	Programme Elective Course- III	3	0	0	3	3	40	60	100
PEC-IV	CH24C	Programme Elective Course- IV	3	0	0	3	3	40	60	100
PCC-III Lab	CH25L	Steady State Simulation Lab	0	0	3	3	1.5	40	60	100
PCC-IV Lab	CH26L	Advanced Instrumentation Lab	0	0	3	3	1.5	40	60	100
MC		Industrial Safety	3	0	0	3	3	100	-	100
PCC		Mini Project with Seminar	0	0	4	4	2	100	-	100
	Total		**15**	**02**	**10**	**27**	**22**	**440**	**360**	**800**

Course Code	List of Programme Electives-III	Course Code	List of Programme Electives IV
1	Modern Concepts in Catalysis & Surface Phenomenon	1	Phase Transitions in Process Equipment
2	Advanced Downstream Processing	2	Process Intensification
3	Process Synthesis and Analysis	3	Micro flow chemistry& Process Technology
4	Micro and Nano Fluids	4	Process Plant Design & Flow settling Tools

Note: 1. Students are allowed to do Open Elective Course through online (MOOCS)/ NPTEL and can select the subjects that are not covered in the Curriculum and twelve (12) weeks in duration. However, the obtained pass certificate should be submitted at the last instruction day of the IIIrd semester course work ant the results will reflect in IIIrd semester Marks MEMO

III Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
OEC	CH31C	Open Elective Course (MOOCs)	0	0	0	0	3	100	-	100
PCC	CH32C	Industrial/Research Internship(Min of 4 Weeks)	0	0	0	0	3	100	-	100
PCC	CH33D	**Dissertation Work Phase-I**	0	0	24	24	12	40(guide)	60(Internal committee)	100
	Total		**0**	**0**	**24**	**24**	**18**	**240**	**60**	**300**

IV Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	CSP41J	**Dissertation Work Phase-II and Viva-Voce**	0	0	20	20	16	40	60	100
	Total		**0**	**0**	**20**	**20**	**16**	**40**	**160**	**100**

Semester	**I**	**II**	**III**	**IV**	**Total**
Credits	**24**	**22**	**18**	**15**	**80**

R-23

M.Tech. Program Regulations

Scheme of Instruction & Syllabus

(Effective from the Batch Admitted in 2020-2021)



DEPARTMENT OF CHEMICAL ENGINEERING

S V UNIVERSITY COLLEGE OF ENGINEERING

TIRUPATI- 517502

CH11C ADVANCES IN TRANSPORT PHENOMENA

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives:

1. To familiarize the student with basic concepts of transport phenomena and brief review of mathematics.
2. To enable students to understand the equations of change for isothermal flow and for non-isothermal flow.
3. To introduce them details of equations of change for multi component systems.
4. To give them insight into properties of two-dimensional flows and aspects of dimensional analysis

Unit-1: Equations of Change for Isothermal Systems: Equation of Continuity, Equation of Motion, Equation of Mechanical Energy, Equations of Change in terms of the Substantial Derivative, Use of the Equations to solve Flow Problems, Dimensional Analysis of the Equations of Change. Velocity Distributions with more than one Independent Variable: Time Dependent Flow of Newtonian Fluids. Velocity Distributions in Turbulent Flow - Comparisons of Laminar and Turbulent Flows, Time Smoothed Equations of Change for Incompressible Fluids, Time Smoothed Velocity Profile near a wall, Empirical Expressions for the Turbulent Momentum Flux, Turbulent Flow in Ducts, Turbulent Flow in Jets.

Unit-2: Macroscopic Balances for Isothermal Systems: The Macroscopic Mass Balance, The Macroscopic Momentum Balance, The Macroscopic Mechanical Energy Balance, Estimation of the Viscous loss, Use of the Macroscopic Balances for Steady-State Problems, Derivation of the Macroscopic Mechanical Energy Balance.
Equations of Change for Non-Isothermal Systems: The Energy Equation, Special forms of the Energy Equation, The Boussine sq Equation of Motion for Forced and Free Convection, Use of the Equations of change to Solve Steady-State Problems, Dimensional Analysis of the Equations of Change for Non-Isothermal Systems.

Unit-3: Temperature Distributions in Solids and in Laminar Flow: Heat Conduction with an Electrical Heat Source, Heat Conduction with a Viscous Heat Source. Temperature Distributions with more than One Independent Variable - Unsteady Heat Conduction in Solids, Steady Heat Conduction in Laminar, Incompressible Flow. Temperature Distributions in Turbulent Flow - Time-Smoothed Equations of Change for Incompressible Non-Isothermal Flow, Time-Smoothed Temperature Profile near a Wall, Empirical Expressions for the Turbulent Heat Flux Temperature Distribution for Turbulent Flow in Tubes.

Unit-4: Macroscopic Balances For Non-Isothermal Systems: Macroscopic Energy Balance, Macroscopic Mechanical Energy Balance, Use Of The Macroscopic Balances To Solve Steady State Problems With Flat Velocity Profiles, Concentration Distributions in Solids and in Laminar Flow: Shell Mass Balances Boundary Conditions, Diffusion through a Stagnant Gas Film, Diffusion with a Heterogeneous Chemical Reaction. Concentration Distributions with more than One Independent Variable: Time-Dependent Diffusion, Steady-State Transport in Binary Boundary Layers, Concentration Distributions in Turbulent Flow -

Concentration Fluctuations and the Time-Smoothed Concentration, Time-Smoothing of the Equation of Continuity of A, Semi-Empirical Expressions for the Turbulent Mass Flux, Enhancement of Mass Transfer by a First-Order Reaction in Turbulent Flow.

Unit -5: Interphase Transport in Multi-Component Systems: Definition of Transfer Coefficients inOne Phase, Analytical Expressions for Mass Transfer Coefficients, Correlation of Binary Transfer Coefficients in One Phase, Definition of Transfer Coefficients in Two Phases, Mass Transfer and Chemical Reactions. Macroscopic Balances For Multi-Component Systems: Macroscopic Mass Balances, Macroscopic Momentum, Use of the Macroscopic Balances to solve Steady-State Problems.

References

1) Thomson W. J., Transport Phenomena, Pearson education, Asia, 2001.

2) Geankopolis C. J., Transport Processes and Unit Operations, 4th Ed., Prentice Hall (India) Pvt. Ltd., New Delhi. 2004.

3) Bird R. B., Stewart W. E. and Light Foot E. N., Transport Phenomena, Revised 2nd Edition, John Wiley & Sons, 2007.

Outcomes: At the end of the course, the student will be able to:

1. Understand the mechanism of momentum, heat and mass transport for steady and unsteady flow.
2. Perform momentum, energy and mass balances for a given system at macroscopic and microscopic scale.
3. Solve the governing equations to obtain velocity, temperature and concentration profiles.
4. Model the momentum, heat and mass transport under turbulent conditions.
5. Develop analogies among momentum, energy and mass transport.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	2								1
CO2	1	2	3	2	2							1
CO3		2	2	3		1						1
CO4		1	3	2								1
CO5		2	2	2	1							1

CH12C SEPARATION PROCESSES

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives:

1) Understand the classification of separation processes
2) To learn the fundamental concepts of rate governed processes
3) To impart the basic concepts of multistage separation processes
4) Understand the design of distillation column using different methods
5) Understand the energy requirements of different separation processes

UNIT I

Use and Characteristics of Separation Processes – Importance and variety of Separations – Characteristics of separation Processes- Inherent separation factors for equilibrium and rate Governed Processes

Simple equilibrium processes: Equilibrium calculations- Checking phase conditions for a mixture- Analysis of simple equilibrium separation-processes for binary and multi component systems - Computational and Graphical Approaches.

Unit II

Additional Factors Influencing Product Purities – Incomplete Mechanical Separation of Product Phases – Flow Configuration and Mixing Effects – Batch Operations – Methods of Regeneration – Mass and Heat Transfer Limitations – Stage Efficiencies

Multistage Separation Processes: Increasing product purity - Reducing consumption of separating agent - co-current, crosscurrent and countercurrent flow - Other separation processes - Fixed bed processes.

Unit-III:

Binary Multistage Separations - Distillation: Binary Systems - Equilibrium stages and McCabe-Thiele Diagram - design and other problems – Multistage batch distillation - Straight operating lines and curved operating lines.

UNIT IV

Patterns of Change: Binary and Multi component multistage separations

Group Methods - Linear stage-exit relationships and constant flow rates- non linear stage – Exit Relationships and varying flow rates.

Capacity of contacting devices: factors limiting capacity and factors influencing efficiency.

UNIT V

Energy Requirements of separations processes:

Thermodynamic efficiency - single stage and multistage separation processes - reduction of energy consumption**.**

Selection of Separation processes: Factors influencing the choice of separation Process - solvent extraction and Illustrative examples

TEXT BOOKS:

1. Separation Processes - C.Judson King,, McGraw – Hill, 1982

REFERENCE BOOKS

1. Separation Process Principles - J.D.Seader and E.J.Henley, , John Wiley, 1998.
2. Mass Transfer Operation - R.E. Treybal, , 3rd edition - McGraw – Hill 1980
3. Transport Processes and Unit Operations – Geankoplis C.J. 4th ed – PHI Pvt. Ltd

Course Outcomes: Student will be able to

1) Applies the concepts of diffusion mass transfer, mass transfer coefficients, convective mass transfer, inter-phase mass transfer, equipment for gas-liquid operations
2) Suggest and design equipment for various mass transfer operations
3) Study of the stage wise mass transfer operations, principles of various stage wise contact processes like distillation
4) Student will be able to select a separation process for a particular system.
5) Able to understand the energy requirements of separation processes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1	1	1			1	1			
CO2				1	2							
CO3			2	1								
CO4			1		2			1	1			
CO5				1	1				1			

CH13C CHEMICAL REACTOR THEORY

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Course Educational Objectives:

1) The emphasis of this course is on the fundamentals of chemical reaction kinetics and chemical reactor operation.
2) The overall goal of this course is to develop a critical approach toward understanding complex reaction systems and elucidating chemical reactor design.
3) Integrate concepts from science & engineering to constitute a basis for the design of chemical reactor, a key element in the design of chemical process.
4) Provide a foundation on Non-ideal reactors and RTD
5) Impart knowledge about heterogeneous catalytic reactors

UNIT I

Isothermal Reactor design: Design structure for isothermal reactors - Scale-up of liquid phase batch reactor data to the design of a CSTR - Tubular reactors - Pressure drop in Reactors - Reversible reactions - unsteady state operation of reactors -Simultaneous reaction and Separation.

UNIT-II

Analysis of Non ideal Reactors - RTD - Measurement and characteristics of RTD- RTD in ideal reactors - Reactor modeling with the RTD - Zero and One parameter models - Two-Parameter model - Modeling real reactors with combinations of ideal reactors - Testing a model and determining it's parameters - Other models of non ideal reactors using CSTRs and PFRs

UNIT-III

External diffusion Effect on Heterogeneous Reactions - Binary diffusion - External resistance to mass transfer - the shrinking core model.

Diffusion and reaction in Porous Catalyst – Diffusion and reaction in spherical pellets - Internal Effectiveness factor - Falsified Kinetics - Overall effectiveness factor - Estimation of diffusion and reaction limited regimes - Mass transfer and reaction in a packed bed

UNIT-IV

Internal Transport Processes-Reaction and Diffusion in porous catalysts:

Intra pellet mass transfer and intra pellet heat transfer, Mass transfer with reaction, Mass and Heat transfer with reaction, effect of internal transport on selectivity and poisoning.

UNIT-V

Design of heterogeneous Catalytic Reactors: Fixed bed reactors and isothermal and adiabatic fixed-bed reactors, non isothermal, non adiabatic fixed bed reactors, Two phase model, Fluidized-Bed reactors, Operating characteristics of FBRs. Mass Transfer in Fluidized Beds: Gas-Solid Mass Transfer, Mass Transfer between the Fluidized-Bed Phases, Reaction in Fluidized Bed. Trickle bed reactor Models, Slurry reactor models.

Text Books

1. J.M.Smith "Chemical Engineering Kinetics" 3rd ED., Mc Graw Hill, New York 1980
2. Fogler H. S., Elements of Chemical Reaction Eng.", 3rd Ed., Prentice Hall, 1999
3. Levenspiel, O., "Chemical Reaction Eng." John Wiley & Sons 1972.

Course Outcomes : Student will be able to

1) learn the importance of RTD and Non-ideal flow in reacting vessels.
2) Calculate the conversions based on segregated flow model, dispersion model and tanks-in-series models.
3) Understand the diffusion and reaction in a porous catalyst.
4) Learn the factors influencing catalyst decay, the role of pore diffusion on catalyst activity rate.
5) Understand the design of heterogeneous catalytic reactors.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1	1	1			1				2
CO2			1		2			1	2			
CO3				1	1			1	1			1
CO4			1	2					1			2
CO5				1					1			

CH16L COMPUTATIONAL TECHNIQUES LABORATORY

Instruction , hours/week : 4 Credits : 2 Assessment : 40 + 60

Objectives:

1. To learn Numerical methods for interpolation, extrapolation, graphical differentiation and integration, curve fitting….Process Modeling and Simulation of Chemical operations and processes.
2. To implement the above on MAT Lab

List of experiments:

1.Euler Method

2. Runge Kutta 4th Order Method

3. Jacobi Iteration Method

4. Gauss-Siedel Iteration Method

5. Lagrange's Iteration Method

6. Newton Forward Interpolation Method

7. Newton Backward Interpolation Method

8, Bisection Method

9. Newton Raphson Method

10. Regula Falsi Method

Outcomes: At the end of the course, the student will be able to:

1. Use numerical methods for various manipulations and be capable of implementing them on a computing system.

CH17L ADVANCED CHEMICAL ENGINEERING LABORATORY

Instruction , hours/week : 4 Credits : 2 Assessment : 40 + 60

PGPC01 Research methodology and IPR

Instruction Hours/Week : 3 Credits : 3
Sessional Marks : 40 End Semester Examination Marks : 60

DESCRIPTION OF THE COURSE:

This subjects gives how to proceed systematically for research, present research findings. This course consists of basics of research methods, paper writing , patenting methods and requirements..

COURSE EDUCATIONAL OBJECTIVES (CEOs):

1. To understand the importance of research objectives and procedures
2. To know the procedures of data collection and report writing of research.
3. To have the knowledge of filing and obtaining a patent on research findings.

UNIT I

Meaning, Objective and Motivation in Research: Types of Research, Research Approaches, Research Process, Validity and Reliability in Research, Research Design: Features of Good Design, Types of Research Design, Basic Principles of Experimental Design

UNIT II

Sampling Design: Steps in Sampling Design, Characteristics of a Good Sample Design, Random Samples and Random Sampling Design Measurement and Scaling Techniques: Errors in Measurement, , Scaling and Scale Construction techniques, Forecasting Techniques, Time Series Analysis, Interpolation and Extrapolation

UNIT III

Methods of Data Collection: Primary Data, Questionnaire and Interviews, Collection of Secondary Data, Cases and Schedules. Professional Attitude and Goals, Concept of Excellence, Ethics in Science and Engineering, Correlation and Regression Analysis, Method of Least Squares, Regression Vs. Correlation, Correlation Vs. Determination.

UNIT IV

Interpretation of Data and Report Writing, Layout of a Research Paper, Techniques o f Interpretation. Making Scientific Presentation at Conferences and Popular Lectures to Semi Technical Audience, Participating in Pubic Debates on Scientific Issues

UNIT V

Nature of Intellectual property rights, Patents, designs, trademarks and copyrights, History of patenting, process of patenting, patent development, international cooperation on IPR, procedure of granting patent, patent rights, licensing and transferring technology, Geographical Indications ,IPR in biological and systems and software.

Text/Reference Books:

1. Research Methodology: Methods And Techniques - C. R. Kothari,2nd Edition, New Age International Publishers.
2. Statistical Methods - S P. Gupta. S. chand & Sons, New Derhi.
3. Intellectual ProPerty-the law of trademarks, copyrights, Patents, and trade Secrets-Deborah E. Bouchoux, Esq.Georgetown University, Fourth edition

Course Outcomes (COs):

1.Able to know research importance and requirements and procedure
2. Able to apply sampling techniques for analysis and forecasting.
3. Able to use methods for data collection and analyze the data using different mathematical techniques.
4. Able to write report on research done and present the research findings in systematic manner.
5. Able to have the knowledge to file and obtain patent on research finding.

CH14C PROCESS DESIGN AND SYNTHESIS

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives:

1. To understand the systematic approaches for the development of conceptual chemical process designs

2. To learn the advances in problem formulation and software capabilities which offer the promise of a new generation of practical process synthesis techniques based directly on structural optimization.

3. Learning chemical process synthesis, analysis, and optimization principles

4. Product design and development procedure and Process life cycle assessment.

Unit I : Introduction

Introduction to fundamental concepts and principles of process synthesis and design and use of flow sheet simulators to assist process design. Process Flow sheet Models: An Introduction to Design, Chemical process synthesis, analysis and optimization. Introduction to commercial process design software such as HYSYS, Aspen plus etc., Chemical Process (reactor, heat exchanger, distillation etc) analysis using commercial software

Unit II : Product design and developments

Process engineering economics and project evaluation Life Cycle Assessments of process: From design to product development, Engineering Economic Analysis of Chemical Processes, Project costing and performance analysis, Environmental concerns, Green engineering, Engineering ethics, Health and safety.

Unit III : Reactor Networks

Geometry of mixing and basic reactor types, The Attainable Region (AR) approach, AR in higher dimensions & for other processes, Reactive Separation processes, Fundamental behavior and problems, Separation through reactions. Reactive Residue Curve Maps

Unit IV : Synthesis of Separation Trains

Criteria for selection of separation methods, select ion of equipment**:** Absorption, Liquid-liquid extraction Membrane separation, adsorption, leaching, drying, crystallization, Ideal distillation - Column and sequence fundamentals, Sharp splits & sequencing Phase diagrams for 2, 3 and 4 components, Feasibility and vapor ow rates for single columns, Residue curve basics, Non-ideal Distillation - Azeotropic systems; detecting binary azeotropes, Residue curve maps for azeotropic systems, Topological analysis, Feasibility for single azeotropic columns ,Binary VLLE and pressure-swing separation, Non-ideal distillation synthesis. Equipment sequencing: VLE + VLLE, Detailed Residue Curve Maps, Residue curve maps: Interior structure

Unit V : Heat Exchanger Network Synthesis

Minimum heating and cooling requirements, Minimum Energy Heat Exchanger Network, Loops and Paths, Reducing Number of Exchangers, HENS basics & graphics, The pinch point approach, Stream Splitting, Performance targets, trade-off & utilities, Heat & power integration, HENS as mathematical programming

References

1. Douglas, J. "Conceptual Design of Chemical Processes",New York, NY: McGraw-HillScience/Engineering/Math, 1988. ISBN: 0070177627.

2. Seider, W. D., J. D. Seader, and D. R. Lewin. "Product and Process Design Principles: Synthesis, Analysis, and Evaluation",. 2nd ed. New York, NY: Wiley, 2004. ISBN: 0471216631.

3. Richard Turton, Richard C. Bailie, Wallace B. Whiting, Joseph A. Shaeiwitz., "Analysis, Synthesis, and Design of Chemical Processes", 2nd Edition, 2002, Prentice Hall ISBN-10: 0-13-064792-6

4. Biegler L.T., Grossmann I.E. and Westerberg A.W., "Systematic Methods of Chemical Process Design", Prentice Hall, 1997.

Outcomes: At the end of the course, the student will be able to

1. Analyze alternative processes and equipment
2. Synthesize a chemical process flow sheet that would approximate the real process
3. Design best process flow sheet for a given product
4. Perform economic analysis related to process design and evaluate project profitability
5. Heat Exchanger Network Synthesis

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	2								
CO2	1			2								
CO3			2			1						
CO4		1		2								
CO5				2	1							

CH14C FLUIDIZATION ENGINEERING

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives

1. To study the phenomenon of fluidization with industrial processing objective
2. To study the various regimes of fluidization and their mapping.
3. To study the design of equipments based on fluidization technique

Unit I : Introduction to fluidization and applications

Phenomenon of fluidization, behavior of fluidized bed, contacting modes, advantages and disadvantages of fluidization, fluidization quality, selection of contacting mode, Beds for Industrial applications, coal gasification, synthesis reactions, physical operations, cracking of hydrocarbons

Unit II : Mapping of fluidization regimes

Characterization of particles, mechanics of flow around single particles, minimum fluidization velocity, pressure drop versus velocity diagram, The Geldart classification of solids, fluidization with carryover of particles, terminal velocity of particles, distributor types, gas entry region of bed, pressure drop requirements, design of gas distributor, power consumption

Unit III : Bubbling fluidized beds

Davidson model for bubble in a fluidized bed, and its implications, the wake region and movement of solids at bubbles, coalescence and splitting of bubbles, bubble formation above a distributor, slug flow, Turbulent and fast fluidization - mechanics, flow regimes and design equations, Emulsion movement, estimation of bed properties, bubble rise velocity, scale up aspects, flow models, two phase model, K-L model

Unit IV : Solids movement and Gas dispersion

Vertical and horizontal movement of solids, Dispersion model, large solids in beds of smaller particles, staging of fluidized beds

Gas dispersion in beds, gas interchange between bubble and emulsion, estimation of gas interchange coefficient, Heat and mass transfer in fluidized systems, Mixing in fluidized systems - measurements and models.

Unit V : Fluidized bed reactors

Entrainment and elutriation, Freeboard behavior, gas outlet, entrainment from tall vessel, freeboard entrainment model, high velocity fluidization, pressure drop in turbulent and fast fluidization, Slugging, Spouted beds, Circulating Fluidized Beds.

Mathematical model of a homogeneous fluidized bed, Design of catalytic reactors, pilot plant reactors, information for design, bench scale reactors, design decisions, deactivating catalysts, Design of non catalytic reactors, kinetic models for conversion of solids, models for shrinking particles, conversion of solids of unchanging size]

References

1. Levenspiel O. and Kunnii D., “Fluidization Engineering”, John Wiley, 1972
2. Liang-Shih Fan, “Gas-Liquid-Solid Fluidization Engineering”, Butterworths, 1989

Course Outcomes: At the end of the course, the student will be able to:

1. Performing and understanding the behavior fluidization in fluidized bed
2. Evaluate the characterization of particles and power consumption in fluidization regimes
3. Understanding the applicability of the fluidized beds in chemical industries
4. Dispersion model, large solids in beds of smaller particles, staging of fluidized beds,Gas dispersion in beds.
5. Entrainment and elutriation,Mathematical model of a homogeneous fluidized bed.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1		1			1				
CO2			1	1	2							
CO3					1			1				
CO4			1		2							
CO5			1	1				1				

CH14C **PROCESS PLANT SIMULATION**

Instruction : 3 hr/week Credits : 3 Evaluation : 40 + 60

Course Objectives ; Students will have to learn the following

1) Learn the Chemical Systems Modeling and Artificial Neural Networks
2) Understand how to design Steady State Extraction and Heat Conduction through Hollow Cylindrical, Unsteady State Mass Balance for CSTR and Heat Transfer in a Tubular Gas Pre Heater
3) Understand how to design models from Fluid Flow and Reaction Engineering
4) Develop Errors of Measurement, Problems in Data Regression and Solving Equation Solving and Modular Approach
5) Develop Algorithms based on Signal Flow Graph, Tearing Algorithms and Physical and Thermodynamic Properties of Convergence Promotion

UNIT I

Modeling Aspects: Deterministic vs. Stochastic Processes, Physical modeling, Mathematical modeling, Chemical Systems Modeling, Cybernetics, Controlled System, Principles of Similarity

Classification of Mathematical Modeling: Independent and Dependent variables, Classification based on variation of independent variables, Classification based on state of the process, Classification based on type of the process, Boundary Conditions, The black Box Principle, Artificial Neural Networks

UNIT II - Process Modeling - I

Models from mass transfer: steady state single stage solvent extraction, steady state two stage solvent extraction, steady state two stage cross current solvent extraction, , steady state N-stage solvent counter current extraction, unsteady state single stage solvent extraction, unsteady state mass balance in a stirred tank and in a mixing tank.

Models from Heat Transfer : steady state heat conduction through a hollow cylindrical pipe, unsteady state steam heating of a liquid, unsteady state heat loss through a measuring tank, heat transfer through extended surfaces, unsteady state heat transfer in a tubular gas pre heater

UNIT III – Process Modeling -II

Models from fluid flow: flow through a packed bed column, flow of a film on the outside of a circular tube, annular flow with inner cylinder moving axially, flow between coaxial cylinders and concentric spheres

Models from Reaction Engineering : chemical reaction with diffusion in a tubular reactor, chemical reactor with heat transfer in a packed bed reactor, gas absorption accompanied by chemical reaction

UNIT IV

Error Propagation & Data Regression :Propagation of errors through addition, subtraction, multiplication and division, Errors of measurement, Precision errors, errors method

Data Regression : Theoretical properties, data regression methods, Problems in data regression

Process Simulation : Modular Approach, The equation solving approach

UNIT V

Decomposition of Networks : Tearing Algorithms, Algorithms based on signal flow graph and reduced digraph

Convergence Promotion: Newton's method, direct substitution method, Wegstein's method, dominant Eigen value method, quasi Newton method, Criterion for acceleration, Physical and Thermodynamic Properties

TEXTBOOKS:

1. Process Plant Simulation, B.V.Babu, Oxford University press, 2004
2. Process Modeling, Simulation and Control for Chemical Engineers, 2nd ed., W. L. Luyben, McGraw-Hill, New York, 1990

REFERENCE:

1. Introduction to Numerical Methods in Chemical Engineering, P. Ahuja, PHI , New Delhi, 2010
2. Process Modeling and Simulation, Amiya K. Jana, 2012.

Course Objectives : Students will be trained in

1) Modelling Aspects and Classification of Mathematical Modelling
2) How to Prepare Models from Mass Transfer and Models on Heat Transfer
3) How to Prepare Models from Fluid Flow and Models on Reaction Engineering
4) The analysis through Propagation of Errors, Error Methods, Data Regression Methods and Process Simulation
5) Decomposition of Networks and Convergence Promotion

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1		1			1				
CO2			1	1	2							
CO3					1			1				
CO4			1		2							
CO5			1	1				1				

CH14C COMPUTATIONAL FLUID DYNAMICS

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives

1. To make students understand the governing equations of fluid dynamics and their derivation from laws of conservation
2. To develop a good understanding in computational skills, including discretisation, accuracy and stability.
3. To acquaint the students with a process of developing a mathematical and geometrical model of flow, applying appropriate boundary conditions and solving system of equations

Unit I : Introduction to Fluid Dynamics

Concepts of Fluid Flow, Pressure distribution in fluids, Reynolds transport theorem, Integral form of conservation equations, Differential form of conservation equations, Different Types of Flows, Euler and Navier Stokes equations, Properties of supersonic and subsonic flows, Flow characteristics over various bodies. Philosophy of CFD, Governing equations of fluid dynamics and there physical meaning, Mathematical behavior of governing equations and the impact on CFD simulations, Simple CFD techniques and CFL condition. Numerical Methods in CFD: Finite Difference, Finite Volume, and Finite Element, Upwind and downwind schemes, Simple and Simpler schemes, Higher order methods, Implicit and explicit methods, Study and transient solutions

Unit II : Grid Generation

Basic theory of structured grid generation, Surface grid generation, Mono block, multi block, hierarchical multi block, Moving and sliding multiblock, Grid clustering and grid enhancement. Basic theory of unstructured grid generation, advancing front, Delaunay triangulation and various point insertion methods, Unstructured quad and hex generation, grid based methods, various elements in unstructured grids, Surface mesh generation, Surface mesh repair, Volume grid generation, Volume mesh improvement, mesh smoothing algorithms, grid clustering and quality checks for volume mesh. Adaptive, Moving and Hybrid Grids, Need for adaptive and, moving grids, Tet, pyramid, prism, and hex grids, using various elements in combination

Unit III : Turbulence and its Modeling

Transition from laminar to turbulent flow, Effect of turbulence on time-averaged Navier-Stokes equations, Characteristics of simple turbulent flows, Free turbulent flows, Flat plate boundary layer and pipe flow, Turbulence models, Mixing length model,The k-e model, Reynolds stress equation models, Algebraic stress equation models

Unit IV : Chemical Fluid Mixing Simulation

Stirred tank modeling using the actual impeller geometry, Rotating frame model, The MRF Model Sliding mesh model, Snapshot model, Evaluating Mixing from Flow Field Results, Industrial Examples

Unit IV : Post-Processing of CFD results

Contour plots, vector plots, and scatter plots, Shaded and transparent surfaces, Particle trajectories and path line trajectories, Animations and movies, Exploration and analysis of data.

References

1. Anderson John D., "Computational Fluid Dynamics: The Basics with Applications", Mc Graw Hill, 1995
2. Ranade V.V., "Computational Flow Modeling for Chemical Reactor Engineering", Process Engineering Science, Volume 5, 2001
3. Knupp Patrick and Steinberg Stanly, "Fundamentals of Grid Generation", CRC Press, 1994
4. Wilcox D.C., "Turbulence Modelling for CFD", 1993
5. Wesseling Pieter, "An Introduction to Multigrid Methods", John Wiley & Sons, 1992
6. Thompson J.F., Warsi Z.U.A. and Mastin C.W., "Numerical Grid Generation: Foundations and Applications", North Holland, 1985
7. Patankar S.V., "Numerical Heat Transfer and Fluid Flow", McGraw-Hill,1981
8. Gatski Thomas B., Hussaini M. Yousuff and Lumley John L., "Simulation and Modelling of Turbulent Flows", Oxford University Press, 1996
9. Laney, C. B., "Computational Gas Dynamics", Cambridge Uni. Press, 1998.

Outcomes: At the end of the course, the students will be able to:

1. Understand the basic principles of mathematics and numerical concepts of fluid dynamics.
2. Develop governing equations for a given fluid flow system.
3. Adapt finite difference techniques for fluid flow models.
4. Apply finite difference method for heat transfer problems.
5. Solve computational fluid flow problems using finite volume techniques. Get familiarized to modern CFD software used for the analysis of complex fluid-flow systems

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1	1	1			1	1			
CO2			2	1				1	2			1
CO3			1	1	1			2	1			2
CO4			1		2			1	1			1
CO5			1	1	1			1	1			1

CH15C **INDUSTRIAL POLLUTION CONTROL**

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives

1. To understand the importance of industrial pollution and its abatement
2. To study the underlying principles of industrial pollution control
3. To acquaint the students with case studies
4. Student should be able to design complete treatment system

Unit I : Industries & Environment

Industrial scenario in India - Industrial activity and Environment - Uses of Water by industry - Sources and types of industrial wastewater - Industrial wastewater and environmental impacts - Regulatory requirements for treatment of industrial wastewater - Industrial waste survey - Industrial wastewater generation rates, characterization and variables - Population equivalent - Toxicity of industrial effluents and Bioassay tests.

Unit II : Industrial Noise pollution

Sources of noise pollution, characterization of noise pollution prevention& control of noise pollution, Factories Act 1948 for regulatory aspects of noise pollution.

Unit III : Air Pollutant Abatement

Air pollutants scales of concentration, lapse rate and stability, plume behavior, dispersion of air pollutants, atmospheric dispersion equation and its solutions, Gaussian plume models.Air pollution control methods, Source correction methods, Design concepts for pollution abatement systems for particulates and gases. Such as gravity chambers, cyclone separators, filters, electrostatic precipitators, condensation, adsorption and absorption, thermal oxidation and biological processes.

Unit IV : Waste water treatment processes

Design concepts for primary treatment, grid chambers and primary sedimentation basins, selection of treatment process flow diagram, elements of conceptual process design, design of thickner, biological treatment Bacterial population dynamics, kinetics of biological growth and its applications to biological treatment, process design relationships and analysis, determination of kinetic coefficients, activated sludge process. Design, trickling filter design considerations, advanced treatment processes, Study of environment pollution from process industries and their abatement: Fertilizer, paper and pulp, inorganic acids, petroleum and petrochemicals, recovery of materials from process effluents.

Unit V : Solid waste and Hazardous waste management

xSources and classification, properties, public health aspects, Sanitary land fill design, Hazardous waste classification and rules, management strategies, Nuclear waste disposal Treatment methods – component separation, chemical and biological treatment, incineration, solidification and stabilization, and disposal methods, Latest Trends in solid waste management.

References

1. Rao C.S., "Environmental Pollution Control Engineering", 2nd edition
2. Mahajan S.P., "Pollution Control in Process Industries".
3. Nemerow N.L., "Liquid waste of industry- theories, Practices and Treatment", Addison Wesley, New York, 1971
4. Weber W.J., "Physico-Chemical Processes for water quality control", Wiley Interscience New York, 1969
5. Strauss W., "Industrial Gas Cleaning", Pergamon, London, 1975
6. Stern A.C., "Air pollution", Volumes I to VI, academic Press, New York, 1968
7. Peterson and Gross .E Jr., "Hand Book of Noise Measurement", 7th Edn, 2003.
8. Antony Milne, "Noise Pollution: Impact and Counter Measures", David & Charles PLC, 2009.

Course Outcomes: At the end of the course, the student will be able to:

1. Recognize the causes and effects of environmental pollution
2. Analyze the mechanism of proliferation of pollution
3. Develop methods for pollution abatement and waste minimization
4. Design treatment methods for gas, liquid and solid wastes
5. Nuclear waste disposal Treatment methods

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1		1			1				
CO2			1	1								
CO3		2			1			1				
CO4			1		2							
CO5			1	1				1				

CH15C **TRANSPORT IN POROUS MEDIA**

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives:

1. Introduce the physics and governing mechanisms controlling flow and transport processes in porous media.
2. Learning Liquid and solute transport in porous media.

Unit-I: Fundamentals: Mass, momentum and energy transport, Darcy and Non-Darcy equations, equilibrium and non-equilibrium conditions, species transport, radioactive decay.

Unit-II: Effective medium approximation: equivalent thermal conductivity, viscosity, dispersion.

Unit-III: Exact solutions: Flow over a flat plate, flow past a cylinder, boundary-layers, reservoir problems.

Unit-IV: Special topics: Field scale and stochastic modeling, Turbulent flow, compressible flow, multiphase flow, numerical techniques, hierarchical porous media, nano scale porous media, multiscale modeling.

Unit-V: Engineering applications: Groundwater, waste disposal, oil and gas recovery, regenerators ,energy storage systems. Experimental techniques: Flow visualization, quantitative methods, inverse parameter estimation.

References:

1. Principles of Heat Transfer in Porous Media, by M. Kaviany, Springer New York (1995).
2. Transport Phenomena in Porous Media, Volumes I-III, edited by D. R. Ingham and I. Pop, Elsevier, New York (1998-2005).
3. Dynamics of Fluids in Porous Media, J. Bear, Dover (1988).
4. Introduction to Modeling of Transport Phenomena in Porous Media, J. Bear and Y. Bachmat, Kluwer Academic Publishers, London (1990).
5. Enhanced Oil Recovery, L.W. Lake, Gulf Publishing Co. Texas (1989).
6. The Mathematics of Reservoir Simulation, R.E. Ewing, SIAM Philadelphia (1983).
7. Stochastic Methods for Flow in Porous Media: Coping with Uncertainties, Zhang, D., Academic Press, California (2002).
8. The Method of Volume Averaging, S. Whitaker, Springer, New York (1999).

Outcomes: At the end of this course, students are able to:

1. Students will understand the mechanisms involved in transport processes in porous media and will be able to work with the equations that govern the fate and transport of gas, water and solutes in porous media.

CH15C CHEMOINFORMATICS

Instruction, hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives

1. To give students a concept of Chemo-informatics related to chemical structure databases and database search methods
2. To understand the quantum methods and models involved in drug discovery and targeted drug delivery
3. To study the application of Chemical Libraries, Virtual Screening, Prediction of Pharmacological Properties

Unit I : Chemo-informatics

Introduction, scope and application, Basics of Chemo-informatics, Current Chemo-informatics resources for synthetic polymers, pigments. Primary, secondary and tertiary sources of chemical information, Databases: Chemical Structure Databases (PubChem, Binding database, Drugbank), Database search methods:chemical indexing, proximity searching, 2D and 3D structure and substructure searching. Drawing the Chemical Structure: 2D & 3D drawing tools (ACD Chemsketch) Structure optimization.

Unit II : Introduction to quantum methods

Combinatorial chemistry (library design, synthesis and deconvolution), spectroscopic methods and analytical techniques, Representation of Molecules and Chemical Reactions: Different types of Notations, SMILES Coding, Structure of Mol files and Sd files (Molecular converter, SMILES Translator).

Unit III : Analysis and use of chemical reaction information

Chemical property information, spectroscopic information, analytical chemistry information, chemical safety information, Drug Designing: Prediction of Properties of Compounds, QSAR Data Analysis, Structure-Activity Relationships, Electronic properties, Lead Identification, Molecular Descriptor Analysis.

Unit IV : Target Identification

Molecular Modeling and Structure Elucidation: Homology Modelling (Modeller 9v7, PROCHECK), Visualization and validation of the Molecule (Rasmol, Pymol Discovery studio), Applications of Chemoinformatics in Drug Research - Chemical Libraries, Virtual Screening, Prediction of Pharmacological Properties.

Unit V : Drug Discovery

Structure based drug designing, Docking Studies (Target Selection, Active site analysis, Ligand preparation and conformational analysis, Rigid and flexible docking, Structure based design of lead compounds, Library docking), Pharmacophore - Based Drug Design, Pharmacophore Modeling (Identification of pharmacophore features, Building 2D/3D pharmacophore hypothesis), Toxicity Analysis-Pharmacological Properties (Absorption,

Distribution and Toxicity), Global Properties (Oral Bioavailability and Drug-Likeness) (ADME, OSIRIS, and MOLINSPIRATION)

References

1. Bajorath J (2004), "Chemoinformatics: Concepts, Methods and Tools for Drug Discovery" Humana Press

2. Leach A, Gillet V, "An Introduction to Chemoinformatics" Revised edition, Springer

3. Gasteiger J. Engel T. "A textbook of Chemoinformatics" Wiley- VCH GmbH & Co. KGaA

4. Bunin B. Siesel B. Guillermo M. "Chemoinformatics: Theory, Practice & Products", Springer

5. Lavine B. (2005), "Chemometrics and Chemoinformatics", American Chemical Society

6. Casteiger J. and Engel T (2003) "Chemoinformatics" Wiley-VCH

7. Bunin Barry A. Siesel Brian, Morales Guillermo,Bajorath Jürgen. Chemoinformatics: Theory, Practice, & Products Publisher:New York, Springer. 2006.

8. Leach Andrew R., Valerie J. Gillet, "An introduction to Chemoinformatics", Publisher: Kluwer academic, 2003. ISBN: 1402013477

9. Gasteiger Johann, Handbook of Chemoinformatics: From Data to Knowledge (4 Volumes),

   2003. Publisher: Wiley-VCH.

Course Outcomes: At the end of the course, the student will be able to:

1. The course will introduce the students preparing for professional work in chemistry must learn how to retrieve specific information from the enormous and rapidly expanding chemical literature.

2. The course will provide a broad overview of the computer technology to chemistry in all of its manifestations.

3. The course will expose the student to current and relevant applications in QSAR and Drug Design.

CH15C ADVANCED CONTROL SYSTEMS

Instruction : 3 hr/week Credits : 3 Evaluation : 40 + 60

Course Educational Objectives ; Students will have to learn the following

1) Learn the Concepts of Advanced Control Strategies
2) Understand the Multi Input and Multi Output controlling
3) Understand the Purpose of Digital Data Acquisition and Control
4) Develop Discrete Time Models & Their Dynamic Response
5) Design the Digital Controllers

Unit I :

Feed Forward and Ratio Control – Introduction, Feed forward controller design based on steady state and dynamic models, tuning and configuration of feed forward control

Advanced Control Strategies – Cascade control, time delay compensation and inferential control, selective and override systems, adaptive control, statistical process control

Unit II :

Control of Multi Input, Multi-Output Systems – Process interactions and control loop interactions, pairing of controlled and manipulated variables, strategy for reducing interactions, decoupling, multivariable control techniques

Supervisory Control – Basic requirements, applications, formulation and solution of optimization problems, unconstrained and constrained optimization

Unit III :

Digital Computer Control – Digital control systems in process control, distributed instrumentation and control systems, general purpose digital data acquisition, digital control hardware and software, table driven PID controller, Programmable logic controllers and batch process control

Sampling and Filtering of Continuous Measurements – Sampling and signal reconstruction, selection of sampling period, signal processing and data filtering, comparison of analog and digital filters, effect of filter selection on control system performance

Unit IV :

Development of Discrete Time Models – Finite difference models, exact discretization for linear systems, higher order systems, fitting discrete time equations to process data

Dynamic Response of Discrete –Time Systems – The z-Transform, inversion, pulse transfer function, relating pulse transfer functions to difference equations, effect of pole and zero locations, conversion between laplace and z- transforms

Unit V :

Analysis of Sampled – Data Control Systems – Open loop block diagram analysis, development of closed loop transfer functions, stability of sampled data control systems

Design of Digital Controllers – Digital PID controller, selection of controller parameters, direct synthesis methods, digital feed forward control, combined load estimation and time delay compensation

Text Books:

1. Process Dynamics and Control – D.E.Seborg, T.F.Edgar and D.A.Mellichamp, John Wiley &
Sons
2. Chemical Process control – An Introduction to Theory and Practice - George Stephanopoulos,
Prentice hall 1990.

Course Objectives : Students will be able to understand and analyze

1) Feed Forward, Ratio Controls and Advanced Controllers
2) Control Loop Interactions & Optimization
3) Digital Computer Control, selection of sampling period, comparison of analog and digital filters
4) Finite Difference Models, Z-Transforms, Pulse Transfer Functions
5) Samples and Data Control Systems

CH21C MEMBRANE SEPARATIONS

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Course Educational Objectives ; Students will have to learn the following

1) Learn the Properties of Membrane and Types of Membrane
2) Learn the Types of Filtrations used
3) Design Reverse Osmosis Module
4) Learn Gas Separation and Pervaporation
5) Understand different Membrane Processes

UNIT I :

OverView of Membrane Separations

Membrane Types, Materials, Preparation and Characterization - Types of Synthetic Membranes – Membrane Modules – Typical Flow patterns – Membrane materials – Pore Characteristics – Membrane Manufacture – Measurement of Pore size and Solute rejection Properties – surface Properties measurement and interpretation

UNIT II :

Nano Filtration – principles – nano-filtration membranes – Mass Transfer – Process Limitations – Industrial application

Ultrafiltration - Basic Principles – Membranes – Configuration – Types of Devices – Factors affecting performance – Flux – Models for Solvent Flux – Fouling and Flux decline – Methods to reduce Concentration Polarization – Energy Considerations – Micellar enhanced UF – Affinity UF – Applications

Microfiltration – Basic Principles – Membranes – Transport Mechanism – retention characteristics – Flow Characteristics – Membrane Plugging and Throughput – Fouling – energy Considerations – Applications

UNIT III :

Reverse Osmosis - Concepts – Phenomenon of RO – Models for RO transport – Design and Operating parameters – Concentration Polarization – Membrane plugging – Equivalent work requirement – Design of an RO module – RO of non-aqueous systems – Osmotic pinch effect – Forward osmosis – Applications

Dialysis – Principles – Dialysis systems – Membranes – Mass transfer – Applications – Diffusion dialysis

UNIT IV :

Gas Separation - Basic Principles – Membranes – Membrane Modules – Fundamental Mechanisms of Gas Transport - Factors affecting Gas Permeation – Complete Mixing Model – Cross and Countercurrent models – Applications

Pervaporation - Basic Principles – Advantages – Membrane characteristics – Thermodynamic Considerations – Mass transfer – Thermodynamic Considerations – Design of a Module – Concentration Polarization – factors affecting pervaporation – Temperature drop at the interface – Applications

UNIT V :

Ion Exchange Membrane Process - Basic Principles – Ion exchange Membranes – Energy requirement, Efficiency- Concentration Polarization and limiting current density – Other operating parameters – applications

Liquid Membranes - Types of liquid membranes – Mechanism of Mass transfer – Applications

Other Membrane Processes – Membrane contactor and applications – Membrane distillation – Membrane reactors – PEM Hydrogen Fuel Cell

Text Book

1. Membrane Separation Processes – Kaushik nath – Prentice Hall, 2008

References

1. Reverse Osmosis and Synthetic Membranes Theory, Technology and Engineering, Sourirajan,S National Research Council, Canada.
2. Reverse Osmosis/ Ultrafiltration Process Principles, Sourirajan,S. and Matsuura, T., National Research Council, Canada. Separation Processes, Elsevier Scientific Publication.
3. Industrial Membrane Separation Technology, Scott,K., and Hughes, R. (Eds.), Blackie Academic & Professional London.
4. Separation Processes, King, C.J, Tata McGraw Hill, New Delhi.
5. Membrane Processes, Rautenbatch, R., and Albrecht, R John Wiley & Sons, New York.
6. Membrane Separation Processes, Baum,B., Halley, W. and White, R.A, Elsevier Scientific Publication

Course Objectives : Students gain

1) Knowledge on Preparation and Characterization of Materials and Types of Membrane
2) Knowledge on Nano-Filtration, Ultra-Filtration and Micro-Filtration
3) Knowledge on Designing Reverse Osmosis and Dialysis
4) Concepts of Gas Separation and Pervaporation and Design of Pervaporation Module
5) Knowledge on Ion Exchange Membrane Process, Liquid Membranes and Other Membrane Processes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1	1	1				1	1			
CO2			1					2	1			
CO3		1	1					1	1			
CO4			1	1				2	1			
CO5		2		1					1			

CH22C **OPTIMIZATION THEORY & PRACTICE**

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Course Educational Objectives :

1) To learn problem formulation and basic concepts of optimization.
2) To study the numerical methods to solve single variable un-constrained problems
3) To understand and apply numerical methods to solve un-constrained multi-variable problems
4) To learn linear& non-linear programming methods
5) To know the applications of optimization through different examples

Unit-I: Introduction

Basic concepts of optimization, applications of optimization, general procedure for solving optimization problem, formulation of the objective function, fitting models to data, classification of functions.

Unit-II: Single Variable unconstrained optimization methods

Direct search methods-Interval halving method, Fibonacci method, Golden section method;
Direct root methods-Newton method and Quasi Newton method;
Polynomial approximation methods - Quadratic interpolation and cubic interpolation.

Unit-III: Optimization of unconstrained multivariable functions

Direct search methods-random search, grid search, uni-variate search and pattern search methods. ; Indirect search methods - steepest descent, conjugate gradient methods, Newton's method and secant method.

Unit-IV: Linear and non-linear programming

Linear programming: Basic concepts in linear programming, Standard LP from, Graphical solution and Simplex method.

Non-linear programming: Lagrange multiplier method, Quadratic programming, Penalty function and augmented Lagrangian methods.

Unit –V: Applications of optimization

Optimizing recovery of waste heat, optimal design and operation of a conventional staged-distillation column, optimal pipe diameter, optimal residence time for maximum yield in chemostat and optimization of a thermal cracker using linear programming.

Text Book:

1.Edgar, T. F., Himmelblau, D. M. and Ladson, L. S., "Optimization of Chemical Processes", 2nd Ed., McGraw Hill, New York.

Reference Books :

1. Diwaker, U. W. “Introduction to Applied Optimization”, Kluwer.
2. Joshi, M. C. and Moudgalya, K. M., “Optimization, Theory and Practice”, Narosa, New Delhi, 2004.
3. Rao, S. S., Engineering Optimization: Theory and Practice, New Age Publishers.

Course Outcomes: Student will be able to

1) formulate and analyse the optimization of the given physical situation.
2) Apply different methods of optimization and to suggest a technique for specific problem
3) Understand the difference between constrained and unconstrained optimization
4) Understand the importance of linear programming problems
5) Realize the importance of optimization by understanding different examples

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		1	1	1				1	1			
CO2		2	1	1				2	1			
CO3		1	1	1		2	1	1	1			
CO4		2	1	1				2	1			
CO5		2	2	1				1	1			

CH25L **STEADY STATE SIMULATION LAB II Semester**

Instruction , hours/week : 3 Assessment : 40 + 60

To introduce students to use of software packages for simulation and also analyzing flow sheets

1. Introduction of Software packages.
2. Setting up models for simulation.
3. Flow sheeting concepts.
4. Steady state simulation for generation of VLE data.
5. Steady state simulation for conversion calculation for single and multiple reactions
6. Steady state simulation for heat and cooling duty of heat exchangers.
7. Simulation of flash column.

CH26L **ADVANCED INSTRUMENTATION LAB**

Instruction , hours/week : 3 Assessment : 40 + 60

To introduce students to use of new Analytical Instruments for analysis like UV Spectro Photo meter, HPLC, Atomic Adsorption Spectro Photometer etc.

INDUSTRIAL SAFETY

Unit-I: Industrial safety: Accident, causes, types, results and control, mechanical and electricalhazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Unit-II: Fundamentals of maintenance engineering: Definition and aim of maintenance engineering,Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-III: Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reductionmethods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-IV: Fault tracing: Fault tracing-concept and importance, decision tree concept, need andapplications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-V: Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing,cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

CH23C MODERN CONCEPTS IN CATALYSIS AND SURFACE PHENOMENON

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives

1. To give the students insight into advances in catalytic reaction engineering
2. To understand the mechanisms involved in catalytic reactions
3. To study the catalyst characterization techniques
4. To study the advanced industrial applications in catalysis
5. To understand the principles behind catalyst deactivation and study their models

Unit I : Introduction to Catalysis

Definition of Catalytic activity, Magnitude of Turnover Frequencies and Active Site Concentrations, Evolution of Important Concepts and Techniques in Heterogeneous Catalysis, Classification of Catalysts – Homogeneous, Heterogeneous, Biocatalysts, Dual Functional Catalysts, Enzymes, Solid Catalysts, Powder Catalysts, Pellets, Composition, Active Ingredients, Supportive materials, Catalysts Activation, Catalyst Deactivation.

Unit II : Adsorption in Catalysis

Adsorption and its importance in Catalysis, Adsorption and potential energy curves, Surface Reconstruction, Adsorption Isotherms and Isobars, Dynamical Considerations, Types of Adsorption Isotherms and their Derivation from Kinetic Principles, Mobility at Surfaces, Kinetics of surface Reactions, Photochemistry on oxide and metallic surfaces, Characterization of the adsorbed molecules

Unit III : Catalyst Characterization

Catalyst Characterization Methods – Their Working Principle and Applications – XRF, XRD, IR Spectroscopy, XPS, UPS, ESR, NMR; Infrared, Raman, NMR, Mossbauer and X-Ray Absorption spectroscopy, Surface Acidity and Toxicity, Activity, Life time, Bulk density, Thermal stability Crystal Defects, Peroviskites, Spinels, Clays, Pillared Clays, Zeolites

Unit IV : Significance of Pore Structure and Surface Area

Importance of Surface Area and Pore Structure, Experimental Methods for Estimating Surface Area– Volumetric, Gravimetric, Dynamic Methods, Experimental Methods for Estimating Pore Volume and Diameter – Gas Adsorption and Mercury Porosimeter Method, Models of the Pore Structure – Hysteresis Loops, Geometric Models, Wheeler's Model, Dusty Gas Model, Random Pore Model, Diffusion in Porous Catalysts – Effective Diffusivity, Knudsen Diffusion, Effect of Intraparticle Diffusion, Non-isothermal Reactions in Pores, Diffusion Control.

Unit V : Industrial applications– Case Studies

Industrial processes involving heterogeneous solid catalyst: Synthesis of Methanol, Fiscer-Tropsch Catalysis, Synthesis of Ammonia, Automobile Exhaust Catalysts and Catalyst Monolith, Photocatalytic Breakdown of Water and the Harnessing of Solar Energy.

Contribution of homogeneous catalytic process in chemical industry:Oxidations of Alkenes such as production of acetaldehyde, propylene oxide etc., Polymerization such as production of polyethylene, polypropylene or polyester production

References

1. Emmett, P.H. - “Catalysis Vol. I and II, Reinhold Corp.", New York, 1954
2. Smith, J.M. - “Chemical Engineering Kinetics ", McGraw Hill, 1971
3. Thomas and Thomas - “Introduction to Heterogeneous Catalysts ", Academic Press, London 1967
4. Piet W.N.M. van Leeuwen, Homogeneous catalysis: Understanding the Art, Springer, 2004
5. Piet W.N.M. van Leeuwen, and John C. Chadwick, Homogeneous catalysis: Activity-stability –deactivation, Wiley, VCH, 2011.

Course Outcomes: At the end of the course, the student will be able to:

1. To understand the concepts of homogenous and heterogeneous catalysis, with specific examples.
2. To study reaction mechanisms and kinetics of homogenous and heterogeneous catalytic reactions.
3. To familiarize with the characterization of catalysts
4. To understand the application and mechanisms of several types of catalysts in chemical industry.

CH22C ADVANCED DOWNSTREAM PROCESSING

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives

1. To understand the unit processes involved in downstream processing.
2. To study advanced treatment methods.
3. To study the energy conservation in different separation processes
4. To understand the underlying design principles

Unit I : Introduction]

Introduction to Downstream processes theory, applications in chemical separation for Gas-Liquid system, Gas-Solid system. Super critical fluids extraction in food, pharmaceutical, environmental and petroleum applications, water treatment, desalination, Bio separation, dialysis, industrial dialysis.

Unit II : Downstream Processes in Petrochemical Industry

Cryogenic distillation for refinery, petrochemical off gases, natural gases, gas recovery-Olefin, Helium, Nitrogen, Desulfurization - coal, flue gases

Unit III :Advanced Distillation Processes

Azeotropic & extractive distillation - residue curve maps, homogeneous azeotropic distillation, pressure swing distillation, Column sequences, heterogeneous azeotropic distillation.

Unit IV : Energy conservation in separation processes

Energy balance, molecular sieves - zeolights, adsorption, catalytic properties, manufacturing processes, hydrogel process, application, New trends.

Unit IV : Non-Ideal Mixtures and Ion Exchange

Separations process synthesis for nonazeotropic mixtures, non ideal liquid mixtures, separation synthesis algorithm, Ion exchange - manufacture of resins, physical & chemical properties, capacity, selectivity, application, regeneration, equipment, catalysis use.

References

1. Perry's "Chemical Engg. Handbook": McGraw Hill Pub.
2. Douglas J.M., "Conceptual Design of Chemical Processes", McGraw Hill
3. Liu Y.A., "Recent Developments in Chemical Process & Plant Design", John Wiley & Sons Inc.
4. Timmerhaus K.D., "Cryogenic Process Engg.", Plenum Press
5. Othmer Kirk "Encyclopedia of Separation Technology, Vol I & II", Wiley Interscience

Course Outcomes: At the end of the course, the student will be able to:

1. To learn effective strategies of downstream processing in chemical industry.
2. Understand the role of downstream processing.
3. Analyze reactors, upstream and downstream processes in production

CH23C **PROCESS SYNTHESIS & ANALYSIS**

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Course Objectives:

1) To familiarize the students about various economic aspects of chemical processes
2) To Learn basics of Cost estimation and to understand the time value of money
3) To Learn the importance of Cash flow diagrams and Break-even analysis.
4) To Study depreciation methods and methods of estimation of profitability of an industry
5) To Study about heat exchanger networks.

UNIT-I :

Nature of Process Synthesis & Analysis : Creative aspects – A hierarchial approach

Enginering Economics : Cost Information – Estimation of Capital and Operating Costs – Total Capital Investment- Total Product Cost - Time Value of Money – Measures of Process Profitability – Simplifying the Economic Analysis for Conceptual Design

UNIT II :

Economic Decision Making : Solvent Recovery System – Problem Definition & General Considerations – Design of a Gas Absorber – Equipment Design Consideration – Rules of Thumb

Input Information & Batch- Continuous: Input Information – Level 1 Decision – Batch Vs. Continuous

UNIT III :

Input-Output Structure of the Flow Sheet : Decisions for the I/O structure – Design Variables – Over all Material Balances – Stream Costs – Process Alternatives

Recycle Structure of the Flow Sheet : Decisions determining the recycle Structure – Recycle Material balances – reactor Heat Effects – Equilibrium Limitations – Compress Design & Costs – Reactor Design – recycle Economic Evaluation

Unit IV :

Heat Exchanger Networks – Minimum Heating & Cooling Requirements – Minimum Number of Exchangers – Area Estimates – Design of Minimum Energy Heat Exchanger Networks – Loops and Paths – Reducing the Number of Exchanger – Stream Splitting – Heat and Power Integration – Heat Distillation – HAD Process

UNIT V :

Separation System : General Structure – Vapor Recovery System – Liquid Separation System – Azeotropic Systems – Rigorous Material Balances

Cost Diagrams and Quick Screening of Process Alternatives - Cost Diagrams for simple and complex process – Quick Screening of Process Alternatives – HAD Process

Text Book :

1. Conceptual Design of Chemical Processes, Douglas, J.M., McGraw Hill,

Reference Books :

1. Chemical Process Design, Robin Smith, McGraw Hill,
2. Chemical Process Design, Dimian A.C, & Bidea,C.S., Wiley – VCH,2008
3. Chemical Process Synthesis & Engineering Design, Kumar,A, Tata McGraw Hill,1982
4. Systematic Methods of Chemical Process Design, Bieglar, L.T., Grossman, E.I and Westerberg, A.W. Prentice Hall Inc.
5. Product and Process Design Principles, Seider, W.D., Seider,J.D & Lewin, D.R. Wiley,2005

Course Outcomes: Student will be able to

1) understand the concepts of Engineering economics
2) Able to estimate various costs involved in a process industry and evaluate the tax burden of an establishment
3) Able to estimate profitability of a company
4) Understand the heat exchanger networks and their importance in industry
5) Compute break even period for an investment and rate of return

CH23C **MICRO AND NANO FLUIDICS**

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives:

1. To introduce to the students, the various opportunities in the emerging field of micro and nano fluids.
2. To the make students familiar with the important concepts applicable to small micro and nano fluidic devices, their fabrication, characterization and application
3. To get familiarize with the new concepts of real-time nano manipulation &

Unit-1: Introduction: Fundamentals of kinetic theory-molecular models, micro and macroscopic properties, binary collisions, distribution functions, Boltzmann equation and Maxwellian distribution functions-Wall slip effects and accommodation coefficients, flow and heat transfer analysis of micro scale Couette flows, Pressure driven gas micro-flows with wall slip effects, heat transfer in micro-Poiseuille flows, effects of compressibility. Pressure Driven Liquid Micro flow: apparent slip effects, physics of near-wall micro scale liquid flows, capillary flows, electro-kinetically driven liquid micro - flows and electric double layer (EDL) effects, concepts of electro osmosis, electrophoresis and dielectro-phoresis.

Unit- 2: Laminar flow: Hagen-Poiseullie eqn, basic fluid ideas, Special considerations of flow insmall channels, mixing, microvalves & micropumps, Approaches toward combining living cells, microfluidics and 'the body' on a chip, Chemotaxis, cell motility. Case Studies in Microfluidic Devices. Ionic transport: Polymer transport – microtubule transport in nanotuble channels driven by Electric Fields and by Kinesin Biomolecular Motors - Electrophoresis of individual nanotubules in microfluidic channels.

Unit-3: Fabrication techniques for Nanofluidic channels – Bio molecules separation using Nanochannels - Biomolecules Concentration using Nano channels – Confinement of Bio molecules using Nano channels. Hydrodynamics: Particle moving in flow fields – Potential Functions in Low Renoyld's Number Flow – Arrays of Obstacles and how particles Move in them: Puzzles and Paradoxes in Low Re Flow.

Unit-4: Micro fluidics and Lab-on-a-chip: Microfluidic Devices - Microchannels, Micro filters, Microvalves, Micropumps, Microneedles, Microreserviors, Micro-reaction chambers. Concepts and Advantages of Microfluidic Devices - Fluidic Transport - Stacking and Scaling – Materials for The Manufacture (Silicon, Glass, Polymers) - Fluidic Structures - Fabrication Methods - Surface Modifications - Spotting - Detection Mechanisms. Microcontact printing of ProteinsStrategies-printing types- methods and characterization-Cell nanostructure interactions-networks for neuronal cells. Applications in Automatic DNA sequencing, DNA and Protein microarrays.

Unit-5: BioMEMS (Micro-Electro-Mechanical Systems): Introduction and Overview, BiosignalTransduction Mechanisms: Electromagnetic Transducers Mechanical Transducers, Chemical Transducers, Optical Transducers – Sensing and Actuating mechanisms (for all types). Case Studies in Biomagnetic Sensors, Applications of optical and chemical transducers. Ultimate Limits of Fabrication and Measurement, Recent Developments in BioMEMS and BioNEMS - An alternative approach to traditional surgery, Specific targeting of tumors and other organs for drug delivery, Micro-visualization and manipulation,

Implantation of microsensors, microactuators and other components of a larger implanted device or external system (synthetic organs).

Text Books

1. Joshua Edel "Nanofluidics" RCS publishing, 2009.

2. Patric Tabeling "Introduction to Microfluids" Oxford U. Press, New York 2005.
3. K. Sarit "Nano Fluids; Science and Technology", RCS Publishing, 2007.

References

1. M. Madou, Fundamentals of Microfabrication, CRC Press, 1997

2. G. Kovacs, Micromachined Transducers, McGraw-Hill, 1998

3. Steven S Saliterman, Fundamentals of BioMEMS and Medical Microdevices, 2006

Outcomes: At the end of this course, students are able to:

1. Introduce students to the physical principles to analyze fluid flow in micro and nano-size devices. It unifies the thermal sciences with electrostatics, electrokinetics, colloid science; electrochemistry; and molecular biology.

CH24C PHASE TRANSITIONS IN PROCESS EQUIPMENT

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives:

1. Basic laws in thermodynamics.
2. Basic statistical concepts and methods: heat, work, energy, temperature and the kinetic theory of matter; entropy, ensemble, partition function, etc
3. Learning phase transition catalysis
4. Have a good grasp of the basic thermodynamic interactions and process: adiabatic, isothermal, etc

Unit-I: Thermodynamic aspects of phase transitions: Concept of phase, First-order phase transition,conditions for phase coexistence lines, free energy barrier of nucleation, and crystal-melt interfacial free energy, Ehrenfest classification of phase transitions, Van der Waals equation of state, Critical point

Unit-II: Single phase and multiphase catalytic reactions, Acid--base catalysis, Transition metal catalysis, Phase transfer catalysis, Micellar catalysis, Microemulsion catalysis, Electron transfer catalysis, Heteropoly acid catalysis, Homogeneous polymer catalysis, Heterogenisation of homogeneous catalysts.

Unit-III: Applications to Multi-phase Systems Stability conditions for a homogeneous system, equilibrium between phases, phase transformations, general relations for a system with several components, general conditions for chemical equilibrium, chemical equilibrium between ideal gases, and the equilibrium constants in terms of partition functions.

Unit -IV: Phase diagrams and transformations Phase rule- single and binary phase diagrams, lever rule, micro structural changes during cooling, Al_2O_3, Cr_2O_3, Pb-Sn, Ag-Pt and Fe-Fe_3C Systems phase diagrams, phase transformations, corrosion- theories of corrosion, control and prevention of corrosion

UNIT-V: Energy balance - heat capacity and calculation of enthalpy changes, Enthalpy changes for phase transitions, evaporation, clausius - clapeyron equation,

References:

1. Hegedus, L.S., Transition Metals in the Synthesis of Complex Organic Molecules, University Science Book (2010) 3rd ed.
2. Raghavan V., Material Science and Engineering Prentice Hall of India, 1996
3. David.M.Himmelblau, “Basic principles and calculations in chemical engineering”, Prentice Hall of India Ltd., 6th Edition, 1998.
4. A.Hougen, K.M. Watson and K.A.Ragatz, “Chemical Process Principles”, Vol 1, John Wiley, 1960.

Outcomes: At the end of this course, students are able to:

1. The student is expected to obtain considerable insight into various types of phase transitions, and how these can be described theoretically in different ways

2. Predict relationships between physical quantities using the laws and methods of thermodynamics.

3. Find probabilities and thermal quantities (free energy, entropy, etc) given the energy eigen values of a system.
4. The student is expected to obtain considerable insight into various types of phase transitions, and how these can be described theoretically in different ways

5. Predict relationships between physical quantities using the laws and methods of thermodynamics.

6. Find probabilities and thermal quantities (free energy, entropy, etc) given the energy eigen values of a system.

CH24C **PROCESS INTENSIFICATION**

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives:

1. Understand the concept of Process Intensification.
2. Know the limitations of intensification of the chemical processes.
3. Apply the techniques of intensification to a range of chemical processes.
4. Develop various process equipment used for intensifying the processes.
5. Infer alternative solutions keeping in view point, the environmental protection, economic viability and social acceptance.

Unit-I: Introduction: Techniques of Process Intensification (PI) Applications, The philosophy andopportunities of Process Intensification, Main benefits from process intensification, ProcessIntensifying Equipment, Process intensification toolbox, Techniques for PI application.

Unit-II: Process Intensification through micro reaction technology: Effect of miniaturization on unitoperations and reactions, Implementation of Microreaction Technology, From basic Properties To Technical Design Rules, Inherent Process Restrictions in Miniaturized Devices and Their Potential Solutions, Microfabrication of Reaction and unit operation Devices - Wet and Dry Etching Processes.

Unit-III: Scales of mixing, Flow patterns in reactors, Mixing in stirred tanks: Scale up of mixing, Heat transfer. Mixing in intensified equipment, Chemical Processing in High-Gravity Fields Atomizer Ultrasound Atomization, Nebulizers, High intensity inline MIXERS reactors Static mixers, Ejectors, Tee mixers, Impinging jets, Rotor stator mixers, Design Principles of static Mixers Applications of static mixers, Higee reactors.

Unit-IV: Combined chemical reactor heat exchangers and reactor separators: Principles of operation;Applications, Reactive absorption, Reactive distillation, Applications of RD Processes, Fundamentals of Process Modelling, Reactive Extraction Case Studies: Absorption of NOx Coke Gas Purification. Compact heat exchangers: Classification of compact heat exchangers, Plate heat exchangers, Spiral heat exchangers, Flow pattern, Heat transfer and pressure drop, Flat tube-and-fin heat exchangers, Microchannel heat exchangers, Phase-change heat transfer, Selection of heat exchanger technology, Feed/effluent heat exchangers, Integrated heat exchangers in separation processes, Design of compact heat exchanger - example.

Unit-V: Enhanced fields: Energy based intensifications, Sono-chemistry, Basics of cavitation,Cavitation Reactors, Flow over a rotating surface, Hydrodynamic cavitation applications, Cavitation reactor design, Nusselt-flow model and mass transfer, The Rotating Electrolytic Cell, Microwaves, Electrostatic fields, Sonocrystallization, Reactive separations, Superctrical fluids

References:

1. Stankiewicz, A. and Moulijn, (Eds.), Reengineering the Chemical Process Plants, Process Intensification, Marcel Dekker, 2003.
2. Reay D., Ramshaw C., Harvey A., Process Intensification, Butterworth Heinemann, 2008.
3. Kamelia Boodhoo (Editor), Adam Harvey (Editor),Process Intensification Technologies for Green Chemistry: Engineering Solutions for Sustainable Chemical Processing, Wiley, 2013.
4. Segovia-Hernández, Juan Gabriel, Bonilla-Petriciolet, Adrián (Eds.)Process Intensification in Chemical Engineering Design Optimization and Control, Springer, 2016.
5. Reay, Ramshaw, Harvey, Process Intensification, Engineering for Efficiency, Sustainability and Flexibility, Butterworth-Heinemann, 2013.

Outcomes: At the end of this course, students are able to:

1. Assess the values and limitations of process intensification, cleaner technologies and waste minimization options.
2. Measure and monitor the usage of raw materials and wastes generating from production and frame the strategies for reduction, reuse and recycle.
3. Obtain alternative solutions ensuring a more sustainable future based on environmental protection, economic viability and social acceptance.
4. Analyze data, observe trends and relate this to other variables.
5. Plan for research in new energy systems, materials and process intensification.

CH24C MICRO FLOW CHEMISTRY AND PROCESS TECHNOLOGY

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives:

1. Introduce the students to micro flow chemistry and process technology.
2. Learning Micromixers, Mixing Principles.
3. Learning micro reactor based chemicals production

Unit-I: State of the Art of Micro reaction Technology, Structural Hierarchy of Micro reactors, Functional Classification of Micro reactors, Fundamental Advantages of Micro reactors, Advantages of Micro reactors Due to Decrease of Physical Size, Advantages of Micro reactors Due to Increase of Number of Units, Potential Benefits of Micro reactors

Unit-II: Modern Micro fabrication Techniques for Micro reactors, Evaluation of Suitability of a Technique, Anisotropic Wet Etching of Silicon, Dry Etching of Silicon, LIGA Process, Injection Molding, Wet Chemical Etching of Glass, Advanced Mechanical Techniques

Unit-III: Micro mixers, Mixing Principles and Classes of Macroscopic Mixing Equipment, Mixing Principles and Classes of Miniaturized Mixers, Mixing Tee-Type Configuration

Unit-IV: Microsystems for Gas Phase Reactions, Catalyst Supply for Micro reactors , Types of Gas Phase Micro reactors, Micro channel Catalyst Structures, H_2/O_2 Reaction, Selective Partial Hydrogenation of Benzene, Selective Oxidation of 1-Butene to Maleic Anhydride, Selective Oxidation of Ethylene to Ethylene Oxide, Oxidative Dehydrogenation of Alcohols, Synthesis of Methyl Isocyanate and Various Other Hazardous Gases, Synthesis of Ethylene Oxide, Oxidation of Ammonia

Unit-V: Microsystems for Energy Generation, Micro devices for Vaporization of Liquid Fuels, Micro devices for Conversion of Gaseous Fuels to Syngas by Means of Partial Oxidations, Hydrogen Generation by Partial Oxidations, Micro devices for Conversion of Gaseous Fuels to Syngas by Means of Steam Reforming

References:

1. Wolfgang Ehrfeld, Volker Hessel, Holger Löwe MicroreactorsNew Technology for Modern Chemistry © WILEY-VCH Verlag GmbH, D-69469 Weinheim (Federal Republic of Germany), 2000.
2. S.V. Luis and E. Garcia-Verdugo, Chemical Reactions and Processes under Flow Conditions, University Jaume I/CSIC, Castello´n, Spain, The Royal Society of Chemistry 2010
3. Madhvanand N. Kashid, Albert Renken,and Lioubov Kiwi-Minsker, Microstructured Devices for Chemical Processing, Wiley-VCH Verlag GmbH & Co. KGaA, Boschstr ©2015 12, 69469 Weinheim, German.
4. Hessel, V., Renken, A., Schouten, J.C., Yoshida, Micro Process Engineering" A Comprehensive Handbook 2009, ISBN 978-3-527-31550-5.

Outcomes: At the end of this course, students are able to:

1. Students will understand the role of micro flow chemistry and process technology in chemical engineering.
2. The student is expected to obtain considerable insight into various types of micro reactors.

CH24C PROCESS PLANT DESIGN & FLOW SHEETING TOOLS

Instruction , hours/week : 3 Credits : 3 Assessment : 40 + 60

Objectives:

1. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.
2. Application of established engineering methods to complex engineering problem solving.
3. Application of systematic engineering synthesis and design processes.

Unit-I: Introduction: Basic concepts: General design considerations, Process design development, Layout of plant items, Flow sheets and PI diagrams, Economic aspects and Optimum design, Practical considerations in design and engineering ethics, Degrees of freedom analysis in interconnected systems, Network analysis, PERT/CPM, Direct and Indirect costs, Optimum scheduling and crashing of activities.

Unit-II: Hierarchy of chemical process design; Nature of process synthesis and analysis; Developing a conceptual design and flow sheet synthesis. Synthesis of reaction-separation systems; Distillation sequencing; Energy targets. Heat integration of reactors, distillation columns, evaporators and driers; Process change for improved heat integration. Heat and mass exchange networks and network design.

Unit-III: Flow-sheeting: Synthesis of flow sheet: Propositional logic and semantic equations, Deduction theorem, Algorithmic flow sheet generation using P-graph theory, Sequencing of operating units, Feasibility and optimization of flow sheet using various algorithms viz, Solution Structure Generation (SSG), Maximal Structure Generation (MSG), Simplex, Branch-and-bound etc.

Unit-IV: Analysis of Cost estimation: Factors affecting Investment and production costs, Estimation of capital investment and total product costs, Interest, Time value of money, Taxes and Fixed charges, Salvage value, Methods of calculating depreciation, Profitability, Alternative investments and replacements.

Unit- V: Optimum Design and Design Strategy: Break-even analysis, Optimum production rates in plant operation, Optimum batch cycle time applied to evaporator and filter press, Economic pipe diameter, Optimum insulation thickness, Optimum cooling water flow rate and optimum distillation reflux ratio.

References:

1. Peters, M.A. and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers, McGraw Hill (2003).
2. Anil Kumar, Chemical Process Synthesis and Engineering Design, Tata McGraw Hill (1982).

3. Ulrich, G.D., A Guide to Chemical Engineering Process Design and Economics, John Wiley & Sons (1984).

4. Perry, R.H. and Green, D., Chemical Engineer's Handbook, McGraw-Hill (1997).

Outcomes: At the end of this course, students are able to:

1. Analyze, synthesize and design processes for manufacturing products commercially
2. Integrate and apply techniques and knowledge acquired in other courses such as thermodynamics, heat and mass transfer, fluid mechanics, instrumentation and control to design heat exchangers, plate and packed columns and engineering flow diagrams
3. Use commercial flow sheeting software to simulate processes and design process equipment
4. Recognize economic, construction, safety, operability and other design constraints
5. Estimate fixed and working capitals and operating costs for process plants

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502
Department of CivilEngineering-Scheme of Instruction- (CBCS) effective from the Academic Year 2023-2024

M.Tech (PG) Specialization: ENVIRONMENTAL ENGINEERING

I **Semester**

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	EE11C	Advanced Water Treatment	3	1	0	4	4	40	60	100
PCC	EE12C	Air Pollution and Control	3	1	0	4	4	40	60	100
PCC	EE13C	Environmental Microbiology	3	1	0	4	4	40	60	100
PEC	EE14C	Programme Elective Course – I*	3	0	0	3	3	40	60	100
PEC	EE15C	Programme Elective Course – II*	3	0	0	3	3	40	60	100
PCC	EE11L	Environmental Engineering Lab - I	0	0	3	3	1.5	40	60	100
PCC	EE12L	Environmental Engineering Lab - II	0	0	3	3	1.5	40	60	100
MC	PG11C	Research Methodology and IPR	3	0	0	3	3	40	60	100
	Total		**18**	**3**	**6**	**27**	**24**	**320**	**480**	**800**

Course Code	List of Programme Elective Course I (EE14L)	Course Code	List of Programme Elective Course II (EE15L)
1	Environmental Chemistry	1	Climate Change
2	Environmental Quality and Pollution Monitoring Techniques	2	Noise Pollution and Control
3	Rural Water Supply and Onsite Sanitation System	3	Ground Water Contamination
4	Ecological Engineering and Stream Ecology	4	Transport of Water and Wastewater

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

II Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	EE21C	Advanced Wastewater Treatment	3	1	0	4	4	40	60	100
PCC	EE22C	Municipal Solid Waste Management	3	1	0	4	4	40	60	100
PEC	EE23C	Programme Elective Course – III*	3	0	0	3	3	40	60	100
PEC	EE24C	Programme Elective Course – IV*	3	0	0	3	3	40	60	100
PCC	EE21L	Environmental Modeling Lab	0	0	3	3	1.5	40	60	100
PCC	EE22L	Unit Operations and Processes laboratory	0	0	3	3	1.5	40	60	100
MC	PG21C	Value Added course**	2	0	2	4	3	100	-	100
PCC	MP21C	Mini Project with Seminar	1	1	0	2	2	100	-	100
	Total		**15**	**3**	**8**	**26**	**22**	**440**	**360**	**800**

Course Code	List of Programme Elective Courses III (EE23C)	Course Code	List of Programme Elective Courses IV (EE24C)
1	Industrial Wastewater Treatment	1	Environmental Impact Assessment
2	Urban Water Management	2	Sustainable Engineering and Technology
3	Hazardous Waste Management	3	Bioremediation
4	Wastewater Reclamation and Reuse	4	Environmental Legislation and Audit

** Value Added course - Cyber Security

III Semester

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
OEC	PG31C	Open Elective Course ($MOOC_S$)	0	0	0	0	3	100	-	100
PCC	SE32S	Industrial/ Research Internship (Min of 4 Weeks)	0	0	0	0	3	100	-	100
PCC	DW31C	**Dissertation Work Phase-I**	0	0	24	24	12	40	60	100
	Total		**0**	**0**	**20**	**20**	**18**	**240**	**60**	**300**

	Open Electives (MOOCs)
1.	Business Analytics
2.	Industrial Safety
3.	Waste to Energy
4.	Cost Management of Engineering Projects
5.	Composite Materials
6.	Cyber security

IV Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	DW41C	**Dissertation Work Phase-II and Viva-Voce**	0	0	20	20	10 + 06 = 16	40	60	100
	Total		**0**	**0**	**20**	**20**	**16**	**40**	**160**	**100**

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502
Department of Civil Engineering-Scheme of Instruction- (CBCS) effective from the Academic Year 2023-2024

M.Tech (PG) Specialization: GEOTECHNICAL ENGINEERING

I Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	GE11C	Advanced Soil Mechanics	3	1	0	4	4	40	60	100
PCC	GE12C	Advanced Foundation Engineering	3	1	0	4	4	40	60	100
PCC	GE13C	Earth Retaining Structures	3	1	0	4	4	40	60	100
PEC	GE14C	Programme Elective- I	3	0	0	3	3	40	60	100
PEC	GE15C	Programme Elective- II	3	0	0	3	3	40	60	100
PCC	GE11L	Geotechnical Engineering Lab - 1	0	0	3	3	1.5	40	60	100
PCC	GE12L	Geotechnical Engineering Lab - 2	0	0	3	3	1.5	40	60	100
MC	PG11C	Research Methodology and IPR	3	0	0	3	3	40	60	100
	Total		**18**	**3**	**6**	**27**	**24**	**320**	**480**	**800**

Course Code	List of Programme Elective Course I (GE14C)	Course Code	List of Programme Elective Course II (GE15C)
1	Soil Structure Interaction	1	Earth & Rockfill Dams
2	Ground Improvement Techniques	2	Environmental Geotechnology
3	Pavement Analysis and Design	3	Critical State Soil Mechanics
4	Physical and Constitutive Modelling in Geomechanics	4	Deep Foundations

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

II Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	GE21C	Dynamics of Soils and Foundations	3	1	0	4	4	40	60	100
PCC	GE22C	Subsurface Investigations and Instrumentation	3	1	0	4	4	40	60	100
PEC	GE23C	Programme Elective Course – III*	3	0	0	3	3	40	60	100
PEC	GE24C	Programme Elective Course – IV*	3	0	0	3	3	40	60	100
PCC	GE21L	Sub Soil Exploration Lab	0	0	3	3	1.5	40	60	100
PCC	GE22L	Numerical Analysis Lab	0	0	3	3	1.5	40	60	100
MC	PG21C	Value Added course**	2	0	2	4	3	100	-	100
PCC	MP21C	Mini Project with Seminar	1	1	0	2	2	100	-	100
	Total		**15**	**3**	**8**	**26**	**22**	**440**	**360**	**800**

Course Code	List of Programme Elective Courses III (GE23C)	Course Code	List of Programme Elective Courses IV (GE24C)
1	Marine Geotechnics	1	Design of underground excavations
2	Computational Geomechanics	2	Foundation on Expansive Soils
3	Engineering rock mechanics	3	Stability Analysis of Slopes
4	Geotechnical Earthquake Engineering	4	Foundations on Weak Rocks

** Value Added course - Cyber Security

III Semester

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
OEC	PG31C	Open Elective Course ($MOOC_S$)	0	0	0	0	3	100	-	100
PCC	SE32S	Industrial/ Research Internship (Min of 4 Weeks)	0	0	0	0	3	100	-	100
PCC	DW31C	**Dissertation Work Phase-I**	0	0	24	24	12	40	60	100
	Total		**0**	**0**	**20**	**20**	**18**	**240**	**60**	**300**

	Open Electives (MOOCs)
1.	Business Analytics
2.	Industrial Safety
3.	Waste to Energy
4.	Cost Management of Engineering Projects
5.	Composite Materials
6.	Cyber security

IV Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	DW41C	**Dissertation Work Phase-II and Viva-Voce**	0	0	20	20	10 + 06 = 16	40	60	100
	Total		**0**	**0**	**20**	**20**	**16**	**40**	**160**	**100**

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

Department of Civil Engineering-Scheme of Instruction- (CBCS) effective from the Academic Year 2023-2024

M.Tech (PG) Specialization: WATER RESOURSE ENGINEERING

I **Semester**

Category	Course	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	WR11C	Advanced Fluid Mechanics	3	1	0	4	4	40	60	100
PCC	WR12C	Free Surface Flows	3	1	0	4	4	40	60	100
PCC	WR13C	Watershed management and Modelling	3	1	0	4	4	40	60	100
PEC	WR14C	Programme Elective- I*	3	0	0	3	3	40	60	100
PEC	WR15C	Programme Elective- II*	3	0	0	3	3	40	60	100
PCC	WR11L	Advanced Fluid Mechanics Lab	0	0	3	3	1.5	40	60	100
PCC	WR12L	Advanced Hydrology Lab	0	0	3	3	1.5	40	60	100
MC	PG11C	Research Methodology and IPR	3	0	0	3	3	40	60	100
	Total		**18**	**3**	**6**	**27**	**24**	**320**	**480**	**800**

Course Code	List of Programme Elective Course I (WR14C)	Course Code	List of Programme Elective Course II (WR15C)
1	Fluvial Hydraulics	1	Water Resources System Planning
2	Hydraulic Structures	2	Irrigation and Drainage
3	Systems Engineering	3	Water Power Engineering
4	Hydraulic Modeling and Experimental techniques	4	Urban Hydrology

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

II Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	WR21C	Advanced Hydrology	3	1	0	4	4	40	60	100
PCC	WR22C	Groundwater Engineering	3	1	0	4	4	40	60	100
PEC	WR23C	Programme Elective Course – III*	3	0	0	3	3	40	60	100
PEC	WR24C	Programme Elective Course – IV*	3	0	0	3	3	40	60	100
PCC	WR21L	Computational Fluid Dynamics Lab	0	0	3	3	1.5	40	60	100
PCC	WR22L	Open Chanel Flow Lab	0	0	3	3	1.5	40	60	100
MC	PG21C	Value Added course**	2	0	2	4	3	100	-	100
PCC	MP21C	Mini Project with Seminar	1	1	0	2	2	100	-	100
	Total		**15**	**3**	**8**	**26**	**22**	**440**	**360**	**800**

Course Code	List of Programme Elective Courses III (WR23C)	Course Code	List of Programme Elective Courses IV (WR24C)
1	Computational Methods in Fluid Mechanics	1	Environmental Hydraulics
2	Theory and Applications of GIS	2	Advanced Numerical Analysis
3	Hydrogeology and Geophysical exploration of groundwater	3	River Water Management
4	Coastal Engineering	4	Theory of Seepage and groundwater movement

** Value Added course - Cyber Security

III Semester

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
OEC	PG31C	Open Elective Course ($MOOC_S$)	0	0	0	0	3	100	-	100
PCC	SE32S	Industrial/ Research Internship (Min of 4 Weeks)	0	0	0	0	3	100	-	100
PCC	DW31C	**Dissertation Work Phase-I**	0	0	24	24	12	40	60	100
	Total		**0**	**0**	**20**	**20**	**18**	**240**	**60**	**300**

	Open Electives (MOOCs)
1.	Business Analytics
2.	Industrial Safety
3.	Waste to Energy
4.	Cost Management of Engineering Projects
5.	Composite Materials
6.	Cyber security

IV Semester

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	DW41C	**Dissertation Work Phase-II and Viva-Voce**	0	0	20	20	10 + 06 = 16	40	60	100
	Total		**0**	**0**	**20**	**20**	**16**	**40**	**160**	**100**

Department of Civil Engineering-Scheme of Instruction- (CBCS) effective from the Academic Year 2023-2024

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

M.Tech (PG) Specialization: STRUCTURAL ENGINEERING

I Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	SE11C	Advanced Structural Analysis	3	1	0	4	4	40	60	100
PCC	SE12C	Advanced Solid Mechanics	3	1	0	4	4	40	60	100
PCC	SE13C	Design of Pre-stressed Concrete Structures	3	1	0	4	4	40	60	100
PEC	SE14C	Programme Elective- I	3	0	0	3	3	40	60	100
PEC	SE15C	Programme Elective- II	3	0	0	3	3	40	60	100
PCC	SE11L	Structural Design Lab	0	0	3	3	1.5	40	60	100
PCC	SE12L	Advanced Solid Mechanics Lab	0	0	3	3	1.5	40	60	100
MC	PG11C	Research Methodology and IPR	3	0	0	3	3	40	60	100
	Total		**18**	**3**	**6**	**27**	**24**	**320**	**480**	**800**

Course Code	List of Programme Elective Course I (SE14C)	Course Code	List of Programme Elective Course II (SE15C)
1	Analytical and Numerical Methods for Structural Engineering	1	Structural Health Monitoring
2	Theory and Applications of Cement Composites	2	Quality Control and Safety Management
3	Theory of Structural Stability	3	Maintenance and Rehabilitation of Structures
4	Advanced Steel Design	4	Fracture Mechanics of Concrete Structures

II Semester

Category	Course	Course Title	Scheme of Instruction (Hours/Week)	No. of	Scheme of Evaluation

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

	Code		Lecture	Tutorial	Practical	Total	Credits	Sessional Marks	Semester End Examination Marks	Total
PCC	SE21C	FEM in Structural Engineering	3	1	0	4	4	40	60	100
PCC	SE22C	Structural Dynamics	3	1	0	4	4	40	60	100
PEC	SE23C	Programme Elective Course – III	3	0	0	3	3	40	60	100
PEC	SE24C	Programme Elective Course - IV	3	0	0	3	3	40	60	100
PCC	SE21L	Model Testing Lab	0	0	3	3	1.5	40	60	100
PCC	SE22L	Numerical Analysis Lab	0	0	3	3	1.5	40	60	100
MC	PG21C	Value Added course	2	0	2	4	3	100	-	100
PCC	MP21C	Mini Project with Seminar	1	1	0	2	2	100	-	100
	Total		**15**	**3**	**8**	**26**	**22**	**440**	**360**	**800**

Course Code	List of Programme Elective Courses III (SE23L)	Course Code	List of Programme Elective Courses IV (SE24L)
1	Design of Plates and Shells	1	Design of Advanced Concrete Structures
2	Design of Bridges	2	Advanced Construction Techniques
3	Design of High Rise Structures	3	Low cost Housing Techniques
4	Design of Earthquake Resistant Structures	4	Design of Industrial Structure

** Value Added course - Cyber Security

III Semester

Category	Course	Course Title	Scheme of Instruction (Hours/Week)	No. of	Scheme of Evaluation

*Students of a particular specialization of a department can also take Core/Elective courses of other specializations offered in the same department as Elective courses.

	Code		Lecture	Tutorial	Practical	Total	Credits	Sessional Marks	Semester End Examination Marks	Total
OEC	PG31C	Open Elective Course ($MOOC_S$)	0	0	0	0	3	100	-	100
PCC	SE32S	Industrial/ Research Internship (Min of 4 Weeks)	0	0	0	0	3	100	-	100
PCC	DW31C	**Dissertation Work Phase-I**	0	0	24	24	12	40	60	100
	Total		**0**	**0**	**20**	**20**	**18**	**240**	**60**	**300**

IV Semester

	Open Electives (MOOCs)
1.	Business Analytics
2.	Industrial Safety
3.	Waste to Energy
4.	Cost Management of Engineering Projects
5.	Composite Materials
6.	Cyber security

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	DW41C	**Dissertation Work Phase-II and Viva-Voce**	0	0	20	20	10 + 06 = 16	40	60	100
	Total		**0**	**0**	**20**	**20**	**16**	**40**	**160**	**100**

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SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING

M.Tech Degree Program (CBCS)

Curriculum & Syllabi for Environmental Engineering

(w.e.f 2023-24)

MAY, 2023

EE11C ADVANCED WATER TREATMENT

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT –I

WATER QUALITY AND CRITERIA: Water quality criteria and standards for different uses-drinking, irrigation, industrial and construction. Water quality indices, physical, chemical and physicochemical unit operations and processes -Typical treatment flow sheet of surface and underground water.

AERATION: Aeration, solubility of gases-two film theory, aeration methods, design of different aeration systems-sprinkler, cascade and mechanical.

UNIT –II

SEDIMENTATION: Different types of settling, settling column analysis, settling velocity and design principles of sedimentation tank, Tube settlers.

COAGULATION AND FLOCCULATION: Theory and mechanism of chemical coagulation and flocculation, determination of optimum coagulant doses, Chemical feed system. Theory of flocculation – orthokinetic and perikinetic, G and Gt factor, Hydraulic and mechanical mixing arrangements, design of different types of flash mixing and flocculator units.

UNIT –III

FILTRATION : Theory of filtration, Filter media-characteristics, hydraulics of flow through porous media, slow sand filtration, rapid sand filtration, precoat filtration, direct filtration of water, their design, back washing of filters – design of backwash ,Operational and maintainence problems.

DISINFECTION : Mechanism of disinfection, Factors affecting the disinfection process. Common disinfectants.Chemistry of chlorination, Chlorine handling and dosing, Ozonation, U.V. Disinfection-design criteria.

UNIT –IV

OTHER TREATMENT METHODS:

Adsorption- Definition ,factors affecting adsorption, isotherms. Removal of taste and odour, colour, iron and manganese, fluorides,arsenic,nitrates and desalination of water.

INDUSTRIAL WATER TREATMENT: Boiler feed water-Softening , Ion – exchange and reverse osmosis, Water stabilization, process water for food processing industries.

UNIT –V

WATER PLANT WASTE MANAGEMENT: Need for sludge management, Characteristics and quantities of water processing sludges, Design of water – treatment sludge thickners.Application of pressure filtration and centrifugation for dewatering of sludges. Alum recovery practices. Ultimate disposal of dewatered sludges.

LAYOUT AND HYDRAULIC DESIGN OF WATER TREATMENT PLANTS

Reference Books :

1. Montgomery, water treatment principles and design, Johnwiley and sons, Newyork.
2. Warren Viessman, Jrand Mark J. Hammer, Water Supply and Pollution Control by Harper & Row Publishers, New York.

3.Hazard S. Peavy, Donald R. Rowe and George Tchobanoglous, (1985). Environmental Engineering, McGraw-Hill Book Company, New York.

4J.RWeber (1972), Physicochemical Processes for Water Quality Control,John Wiley and Sons,USA.

Course Outcomes

After completion of course students are

1. Able to assess water quality parameters and aeration methods of water treatment
2. Able to design primary sedimentation tank and clariflocculator
3. Able to plan and design suitable filtration units and disinfection methods for drinking water treatment
4. Capable of applying appropriate advanced water treatment techniques.
5. Able to manage water treatment plant sludges and carry hydraulic design of Water treatment plant.

EE12C AIR POLLUTION AND CONTROL

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT – I

GLOBAL EFFECTS: Acid Rains, Green house effect and Ozone layer depletion.

POLLUTION SOURCES: Anthropogenic and Natural sources of Air pollutants. Types of Air pollutants. Properties of Air pollutants-Particulates, Carbon monoxide, Oxides of sulphur, Nitrogen Oxides, Hydrocarbons.

AIR POLLUTION SAMPLING AND MEASUREMENT –Devices for sampling, Different sampling methods, Sampling of Particulate Matter and Sampling of stack gas. Analysis of air pollutants Sulphur Dioxide, Nitrogen Oxides, Carbon Monoxide, Oxidants and Ozone, Hydrocarbons, Particulate Matter.

UNIT – II

EFFECTS OF AIR POLLUTANTS:

Effects of Carbon monoxide, Particulate Matter, Sulphur Dioxide, Oxides of Nitrogen, Hydrocarbon and photochemical oxidants on human beings. Effects on vegetation - Necrosis, Epinasty, Abscission and Chlorosis. Effects of Arsenic, Fluorine and Lead on animals. Effects of Air pollutants on metals, building materials, paints, textiles, electrical Materials, paper, leather, rubber and economy.

UNIT – III

METEOROLOGICAL ASPECTS OF AIR POLLUTANT DISPERSION:

Wind direction and speed, Temperature, Atmospheric stability, mixing height, Precipitation, Humidity, Solar radiation, Visibility, Inversions and plume behavior. The Gaussian Dispersion Model, Diffusion coefficients, Box model and Puff model.

UNIT - IV

AIR POLLUTION CONTROL METHODS:

CONTROLL OF PARTICULATE MATTER-General methods of control - Zoning - Town planning. Control of particulate matter –Gravity settling chambers, Cyclones, Inertial seperators, scrubbers, bag- filter, Electrostatic Precipitators.

REMOVAL OF GASEOUS MATTER–Control of Sulphur Dioxide by Reinluft process and Westvaco process; Control of $NO_X$by combustion modification, post-flame treatment;VOCs control by adsorption, combustion, condensation and process modification.

BIOMONITORING AND PHYTOREMEDIATION.

UNIT - V

AIR QUALITY AND EMISSION STANDARDS – Ambient Air Quality Standards (2015)

AUTOMOBILE POLLUTION:

Sources, emissions from diesel and petrol engines, Bharat V standards, catalytic convertors, Management of automobile pollution.

AIR POLLUTION AND LEGISLATION: Air Pollution Control Act, 1981, and Environment (Protection) Act, 1986.

Reference Books :

1. Crawford, M (1976). Air Pollution Control Theory, McGraw-Hill, New York.
2. H.C.Perkins (1974). Air Pollution, Mc-Graw Hill, Tokyo.
3. Wark, Kenneth and Cecil F. Warner (1976). Air Pollution : Its Origin and Control, Dun-Dunnelley, New York.

Course Outcomes (COs)

After completion of course student can able to

1. Describe the global effects of air pollution, air pollutants characteristics and sampling methods of air pollutants.
2. Capable of recognizing the effects caused by different air pollutants on human beings, animals, plants and materials.

3. Apply the meteorological aspects of air pollutants dispersion in the different dispersion modeling.
4. Capable of applying advanced technologies to reduce air pollution.
5. To manage automobile pollution and evaluate their efficiency

EE13C ENVIRONMENTAL MICROBIOLOGY

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT – I

GENERAL: Importance of Microorganisms. Classification of Microorganisms based on nutrition and metabolic activity

PROCARYOTIC ANDEUCARYOTIC MICRO ORGANISMS:

BACTERIA: Distribution, cytology, forms, size, cell structure,chemical composition, metabolism and classification.

FUNGI : Classification, identification, terminology and cultivation, chemical composition

ALGAE : Classification, identification, culture media, metabolism,pigments.

HIGHER FORMS : Protozoa - identification, classification,metabolism,nutrition. Rotifers; crustaceans; worms and larvae.

UNIT – II

STUDY OF MICROORGANISMS: stains and staining.

STUDY OFMICROSCOPES: ordinary, dark field, reflectance and electron microscopes.

GROWTH PATTERN OF MICROORGANISMS: Growth curve, food-microorganism relationship, aerobic-anaerobic growth, temperature,types of culture media, inhibitory media, Fungi media, Algae media, Protozoa media and isolation of microorganisms.Estimation of bacterial numbers.

NUTRITIONAL REQUIREMENTS FOR GROWTH: Required elements, organic growth factor requirements, Carbon source, Nitrogen source, control of synthetic reaction, energy source and selective effect of nutrients.

CONTROL OF MICROORGANISMS: Pattern of death, heat, disinfection, oxidizing agents, surfactants, heavy metals, Antimetabolites and Antibiotics,and PH.

UNIT – III

QUANTATIVE MEASUREMENT OF GROWTH:

Measurement of usable substrate,Measurement of oxygen uptake, Measurement of biomass,relationships between X and S.

ENZYMES AND GENETICS : Enzymes - Nature of enzymes, mode of action, effect of temperature, pH, salts and heavy metals on enzyme activity; Colloidal nature of enzyme, extracellular and intracellular enzymes, hydrolytic enzymes, oxidation-reduction enzymes, classification of enzymes. Genetics.

MICROBIOLOGY OF WATER: Bacterial content of various types of water sources - water borne diseases, differentiation of fecal and non-fecal coli forms, M.P.N. and other microbiological tests on water.

UNIT – IV

MICROBIOLOGY OF WASTEWATER:Aerobic and anaerobic metabolism.

CENTRAL PATHWAYS OF METABOLISM:Embden Meyerhof pathway, Tricarboxylic Acid Cycle(TCA),Hexose Monophosphate (HMP) pathway,Entner-Douderoff pathway.

AEROBIC METABOLISM-Metabolism of carbohydrates, metabolism of proteins, metabolism of lipids, metabolism of nucleic acids, metabolism of hydrocarbons.

ANAEROBIC METABOLISM-Fermentation of sugars-Formation of pyruvate from Glyceraldehyde 3-phosphate, formation of lactic acid,Decarboxylation of pyruvate, Formation of butanediol, Formation of butyric acid and butanol, Formation of propionic acid,Formation of glycerol. Fermentation of non carbohydratesubstrates.Anaerobic digestion process.

UNIT – V

MICROBIOLOGY OF COMPOSTING:Microorganisms involved in composting process.

MICROBIOLOGY OF AIR: Types of microorganisms, Air-borne diseases, control of air-borne diseases.

SOIL MICROBIOLOGY: Types of microorganisms, distribution,Bioremediation.

References Books:

1. R.E.McKiney, (1977), Microbiology for Sanitary Engineers, McGraw Hill, New York.
2. Anthony F.Gaudy and Elizabeth T.Gaudy (1980), Microbiology for environmental scientists and engineersMcGraw Hill publishers,Tokyo.
3. Michael J.Pelczar,JR.Chan, E.C.S. and Noel R. Krieg (2004) ,Microbiology,McGraw Hill, Inc., New York.
4.Ralph Mitchel and JiDonguGu (2010).Environmental Microbiology.Johnwiley and sons.Canada.

Course Outcomes (COs)

After completion of course student can able to

1. Classify the different types of microorganisms and use microscope and cultures suitably.
2. Analyze microbial growth kinetics
3. Understand salient aspects of enzymatic relationships and microbiology of water, wastewater and soil
4. Apply microbiological principles in air pollution control and composting
5. Able to control air borne disease due to microorganisms in the air and able to carry out composting process

EE14C ENVIRONMENTAL CHEMISTRY

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT – I

REACTION KINETICS : The rate law – Order of reactions ,Zero and First order reactions, second order reactions, Pseudo first order reactions– half life and its relationship to the rate constant – Factors affecting rate of reactions.

RECTORS-BATCH, CONTINUOUS, PLUG FLOW, PROCESS SELECTION

Reactors- mass balance analysis- batch, completely mixed and plug flow reactors – process selection Solution equilibrium – Le Chatlier principle -Activity and activity coefficients –Ion activity coeffs – solubility of salts – oxidation-reduction reactions - complex formation, solubility product,LCD for solubility determination, Oxidation-Reduction equillibria.

UNIT – II

CHEMICAL THERMODYNAMICS AND EQUILIBRIUM: Heat and work-Energy-Enthalpy, Free energy and its relationship to the equilibrium constant, calculation of change free energy at standard and ambient conditions. Entropy, Free energy.

EQUILIBRIUM PROCESSES : Volatilization – Air – water equilibrium – Henry's constant with units for a gas dissolving in a liquid – Dimensionless Henrry's constant for species transferring from a liquid to a gas.

UNIT – III

ACID – BASE EQUILIBRIUM: Hydrogen ion concentration (pH) – acids and bases and their equilibrium constants, PC-PH diagram: Log concentration Diagram – The carbonate system, alkalinity, and buffering capacity – Hydrolysis of salts and gases.

CHEMISTRY OF ORGANICS: Major groups of organic compounds – Difference between organics and inorganics – Organic compounds generally encountered in industrial wastewater –

Biodegradable and non - biodegradable organics. Hydrocarbons, Alcohols, Aldehydes, ketones and Acids, Carbohydrates, detergents, fats of organics.

UNIT –IV

NUCLEAR CHEMISTRY-Atomicstructure-stable and radioactive nuclidesnuclear reactions-Nuclear Fission-Nuclear fusion-Effect of Radiation on man, safety of nuclear reactors.

SURFACE AND COLLOIDAL CHEMISTRY-Properties of colloids, environmental significance, colloidal dispersion in liquids and air, EDL Theory, destabilization of colloids, Adsorption at solid-liquid interfaces.

UNIT-V

TREATMENT OF COOLING WATER: Water stabilization, Langumuir saturation Index, Caldwell-Lawrence diagrams, water softening- Chemical precipitation ,split treatment and Ion exchange process.

BIOCHEMISTRY-Biodegradation of carbohydrates, protein, fats and oils, biochemical pathways, Energetics and bacterial growth, enzymes.

Reference Books :

1. Sawyer, C.N., P.L.Mc Carty, and G.F.Parkin, (1994). Chemistry for Environmental Engineering,McGraw Hill, New York.
2. De, A.K. (1994). Environmental Chemistry, Wiley Eastern Limited, New Delhi.
3. Warner Stumn and James J. Morgen (1996). Aquatic Chemistry, 3rd ed., Wiley-Interscience series of tests and monographs.
4. Larry D. Benefield and Joseph F. Judkins. Jr. and Barron L.Weand (1981). Process Chemistry for water and waste water treatment, Printice Hall Inc.

Course Outcomes (Cos)

After completion students are

1. Able to apply principles of reaction kinetics and solution equillibrium

2. Able to apply the enthalpy and its relation with equilibrium constant

3. Able to find acid base equilibrium constants and capable of classifying organic and inorganic compounds.

4. able to understand surface and nuclear chemistry processes

5. To understand principles of softening and biochemistry.

EE14C ENVIRONMENTAL QUALITY AND POLLUTION MONITORING TECHNIQUES

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

INTRODUCTION- Importance of Quantativemeasurements,Character of Environmental Engineering and science problems,standards methods of analysis, scope of a course in analysis of environmental samples, expression of results. Gravemetric methods for solids analysis in water and wastewater.

UNIT-II

TITRAMETRIC METHODS

Determination of acidity, alkalinity,hardness, chloride and residual chlorine.

UNIT-III

INSTRUMENTAL METHODS

Optical methods of analysis, electrical methods of analysis,chromatographic methods,AAS,UV-VIS. Material characterization techniques- SEM, TEM, XRD, FTIR, thermal analysis- working principles and applications. Determination of nitrogen and phosphate.

UNIT-IV

BIOLOGICAL METHODS AND MICROBIOLOGY

Biochemical oxygen demand MPN test for microbial pollution Plate counts Confirmatory test.

UNIT-V

AIR POLLUTION ANALYSIS

Sampling techniques for air pollution measurements, analysis of particulates like PM_{10}, $PM_{2.5}$, $PM_{1.0}$ and common chemical air pollutants like VOC, Hydrocarbons, oxides of nitrogen and sulphur.

Course Outcomes

After completion of course student can

1. Able to do the gravimetric methods for solids analysis
2. Able to apply the different titrametric methods for pollution monitoring
3. Able to use the different instrumental methods for pollution monitoring.
4. Able to apply the different biological methods for pollution monitoring
5. Able to use the different air analysis methods of pollution monitoring

Reference Books :

1.Chemistry for environmental engineering and science ,fifth edition, by clair N sawyer,PerrylMccarty and Gene F, Parkin.

EE14C RURAL WATER SUPPLY AND ONSITE SANITATION SYSTEMS

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

Rural Water Supply: Issues of rural water supply –Various techniques for rural water supply-merits- National rural drinking water program- rural water quality monitoring and surveillance-operation and maintenance of rural water supplies

UNIT-II

Low Cost Water Treatment: Introduction – Epidemiological aspects of water quality- methods for low cost water treatment - Specific contaminant removal systems for contaminants like nitrites ,fluoride and arsenic

UNIT-III

Rural Sanitation: Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater - Compact and simple wastewater treatment units and systems in rural areas- stabilization ponds – Pit latrines-dry latrine-wet latrine-septic tanks - Imhoff tank- soak pits- low cost excreta disposal systems-Effluent disposal.

UNIT-IV

Industrial Hygiene And Sanitation: Occupational Hazards- Schools- Public Buildings-Hospitals- Eating establishments- Swimming pools – Cleanliness and maintenance and comfort-Industrial plant sanitation.

UNIT-V

Solid Waste Management: Disposal of Solid Wastes- Composting- land filling- incineration-Biogas plants - Rural health - Other specific issues and problems encountered in rural sanitation.

ANIMAL WASTE DISPOSAL

Sanitary way of dung storage. Bio-gas plants – Classification, operation and maintenance problems.

Reference:

1. Eulers, V.M., and Steel, E.W., Municipal and Rural Sanitation, 6th Ed., McGraw Hill Book Company, 1965

2. Park, J.E., and Park, K., Text Book of Preventive and Social Medicine, BanarsidasBhanot, 1972

3. Wright, F.B., Rural Water Supply and Sanitation, E. Robert Krieger Publishing Company, Huntington, New York, 1977

4. Juuti, P., Tapio S. K., and Vuorinen H., Environmental History of Water: Global Views on Community Water Supply and Sanitation, IWA Publishing (Intl Water Assoc), 2007

5.WB Mannual –onsite sanitation systems.

6.WHO Mannual

Course Outcomes

After completion of the course student can

1. Able to apply various techniques for rural water supply
2. Able to plan low cost water treatment methods for rural areas.
3. Able to understand the salient aspects of rural sanitation and design wastewater treatment units
4. Able to frame water sanitation plan for industry, hospitals, swimming pools and eating places.
5. Able to manage rural solid wastes and animal waste.

EE14C ECOLOGICAL ENGINEERING AND STREAM ECOLOGY

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

INTRODUCTION TO ECOSYSTEMS

Development and evolution of ecosystems – Principles and concepts – Energy flow and material cycling – productivity – Classification of ecotechnology – ecological engineering- Classification of systems – Structural and functional interactions of environmental systems – Mechanisms of steady-state maintenance in open and closed systems.

UNIT-II

MODELING AND ECOTECHNOLOGY

Modeling and ecotechnology – Classification of ecological models – Applications- Ecological economics- Self-organizing design and processes.

UNIT-III

FLUVIAL ECOSYSTEM

Introduction To Fluvial Ecosystems: Fluvial Ecosystem Diversity- The Water Cycle – Stream flow- Flow Variation- The Stream Channel- Sediments and their Transport- Fluvial Processes along the River Continuum

UNIT-IV

STREAM WATER CHEMISTRY

Dissolved Gases -Major Dissolved Constituents of River Water-Variability in ionic concentrations -The dissolved load -Chemical classification of river water-The Bicarbonate Buffer System-Influence of Chemical Factors on the Biota-Variation in ionic concentration-Salinization - Effects of acidity on stream ecosystems

UNIT-V

WATER QUALITY

Water quality models – Historical development – Non point source pollution- Mass balance equation – Streeter - Phelps Equation – Modification to Streeter – Phelps Equation – Waste load allocations – Dissolved oxygen in Rivers and estuaries; Lake Water Quality Models; Models for Nitrogen, Bacteria, Phosphate and toxicants - Ground Water Quality Modeling - Contaminant solute transport equation, Numerical methods- legislations for water quality.

Reference:

1. Tebutt T.H.Y., Principles of Water Quality Control, 5th Ed., Pergamon Press, 1998

2. Thomann V. R., and Mueller A. J., Principles of Surface Water Quality Modelling and Control, Prentice Hall, 1997

3. Welch, E.D., Ecological Effects of Wastewater, Cambridge University Press, 1992

4. Frank R. Spellman and Joanne Drinan, Stream Ecology and Self Purification: An Introduction, 2nd Ed., CRC Press, 2001

Course Outcomes

After completion of course student can able to

1. Understand concepts of ecology
2. Explain the different types of ecological models
3. Understand the fluvial ecosystem
4. Use aspects of water chemistry for stream ecology
5. Apply suitable models for water quality assessment.

EE15C CLIMATE CHANGE

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

Earth's Climate System: Introduction-Climate in the spotlight - The Earth's Climate Machine – Climate Classification - Global Wind Systems – Trade Winds and the Hadley Cell – The Westerlies - Cloud Formation and Monsoon Rains – Storms and Hurricanes – The Hydrological Cycle – Global Ocean Circulation – El Nino and its Effect - Solar Radiation –The Earth's Natural Green House Effect – Green House Gases and Global Warming – Carbon Cycle.

UNIT-II

Observed Changes And Its Causes: Observation of Climate Change – Changes in patterns of temperature, precipitation and sea level rise – Observed effects of Climate Changes – Patterns of Large Scale Variability – Drivers of Climate Change – Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC –Evidences of Changes in Climate and Environment – on a Global Scale and in India – climate change modeling.

UNIT-III

Impacts Of Climate Change: Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of Climate Change – Risk of Irreversible Changes.

UNIT-IV

Climate Change Adaptation And Mitigation Measures: Adaptation Strategy/Options in various sectors – Water – Agriculture –- Infrastructure and Settlement including coastal zones – Human Health – Tourism – Transport – Energy – Key Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry - Carbon sequestration – Carbon capture and storage (CCS)- Waste (MSW & Bio waste, Biomedical, Industrial waste – International and Regional cooperation.

UNIT-V

Clean Technology And Energy: Clean Development Mechanism –Carbon Trading- examples of future Clean Technology – Biodiesel – Natural Compost – Eco- Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India and Adaptation funding.

Readings:

1. Anil Markandya , Climate Change and Sustainable Development: Prospects for Developing Countries, Routledge, 2002

2. Heal, G. M., Interpreting Sustainability, in Sustainability: Dynamics and Uncertainty, Kluwer Academic Publ., 1998

3. Jepma, C.J., and Munasinghe, M., Climate Change Policy – Facts, Issues and Analysis, Cambridge University Press, 1998

4. Munasinghe, M., Sustainable Energy Development: Issues and Policy in Energy, Environment and Economy: Asian Perspective, Kleindorfor P. R. et. al (ed.), Edward Elgar, 1996

5. Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 2007

Course outcomes:

After completion of course student can able to

1. Identify factors influencing the global climate systems
2. Assess impacts of climate change on global, regional and local scales
3. Describe impacts of climate change on different sectors
4. Develop strategies for adaptation and mitigation measures
5. Identify clean technologies for sustainable development.

EE15C NOISE POLLUTION AND CONTROL

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT – I

ACOUSTICAL CONCEPTS : Nature of Sound - Sound propagation characteristics - Propagation of sound in air - Absorption of sound in air - Hearing mechanics - Measurement scale - Equal loudness contours.

NOISE CHARACTERISTICS AND SOURCES OF NOISE: Noise characterization - Sources of noise.

UNIT – II

MEASURING INSTRUMENT AND TECHNIQUES: Methodology of noise measurements - Sound level meter - Noise dose meter - Audiometer - Noise survey techniques - Vehicular noise measurement techniques - Aircraft noise measurement techniques - Sound power determination techniques - Techniques for characterization of acoustical materials.

UNIT – III

HEALTH EFFECT OF NOISE: Annoyance - Sleep disturbance - Effect of noise on task performance and cardio-vascular system - Effect of noise on speech communication - Noise induced hearing loss (NIHL) : Effect of continuous sounds - Hearing damage due to impulse sounds.

ENVIRONMENTAL NOISE MEASUREMENTS : Introduction - Traffic noise survey - Vehicular noise level - Domesticappliances noise - Industrial noise - Aircraft noise - Community noise - Shipboard noise - Impulse noise.

UNIT – IV

NOISE STANDARDS AND LIMITS : Introduction - Legal position in India - Environmental standards - Occupational / Industrial noise standards - Road vehicles noise standards - Noise vehicles noise standards - noise standards for construction equipment and domesticappliances - Impulse noise (Fireworks) exposure standards.

NOISE IMPACT ASSESSMENT STUDIES: Definition of the problem - Elements of environmental noise - Assessment - Fractionalization approach to impact assessment - Impact of vibration environments - Case study.

UNIT – V

NOISE CONTROL TECHNIQUES: Mechanism of noise generation - Control methodology - Noise control at source - Noise control along the path - Control on the receiver end.

NOISE STRATEGY: FUTURE GUIDELINES: Current trend - Noise control measures - Environmental noise management - Noise labeling - Diagnostics - Noise strategy - Problems for future investigations.

Reference Books:

1. S.P.Singal, (1999) Noise Pollution and Control, Narosa Publishing House, New Delhi.
2. Cunniff, P.F. (1977), Environmental Noise Pollution, Wiley, New York.
3. Thumann, A., and R.K.Miller (1986). Fundamentals of Noise Control Engineering, Prentice Hall, Englewood Cliffs, N.J.

Course Outcomes

After completion of course student can

1. Able to describe about the sound propagation and noise characteristics
2. Able to assess noise levels
3. Able to classify different types of noise and its effect on environment and human beings
4. Able to apply the noise standards and limits and carry noise impact assessment.
5. Able to plan suitable noise control technologies.

EE15C GROUND WATER CONTAMINATION

L / week : 3Hrs **Sessional Marks : 40**
University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

INTRODUCTION- The Hydrological cycle, Ground water Hydrology, Ground water contamination and Transport, Evolution of Ground water Information, Ground Water Remediation. Confined aquifer and unconfined aquifers.

UNIT-II

SOURCES AND TYPES OF GROUNDWATER CONTAMINATION

Introduction, Underground storage tanks, Landfills, surface Impoundments, waste Disposal Injection Wells, septic systems, Agricultural wastes, Land application and Minning, Radioactive Contaminants, Military sources of contamination, classification of organic compounds, Inorganic compounds in ground water.

UNIT-III

CONTAMINANT TRANSPORT MECHANICS

Introduction, Advection process, Diffusion and Dispersion processes, Mass Transport equations, one–Dimensional Models, Governing Flow and Transport Equations, Analytical Methods, Multi dimensional Methods, Tests for Dispersivity, Natural Gradient Field Tests for Dispersion.

UNIT-IV

CONTAMINATION FATE PROCESSES

Sorption and Desorption, Abiotic Fate process, Volatilization, Biodegradation, Evaluation of Fate processes.

MODELLING BIODEGRADATION AND NATURAL ATTENUATION

Kinetics and Rates of Biodegradation, Modeling Biodegradation, Biodegradation Models, Analytical Natural Attenuation Models, Numerical Natural Attenuation Models, Field Applications.

UNIT-V

GROUND WATER REMEDIATION ALTERNATIVES

Remediation Methods, Remedial Alternatives, Containment Methods for source control, Hydraulic controls and pump and treat systems, Bioremediation, soil vapour Extraction systems, Remediating NAPL sites, Emerging Remediation Technologies.

Reference Books :

1.PhilipB.Bedient, Hanadi.s, J.charles (1994).Ground water contamination transport and remediation, PTR Prentice Hall.

2.Geo Environmental Engineering(2004),HariD.Sharma and Krishna Reddy, John wiley and sons.

Course Outcomes

After completion of course student can

1. Able to describe the fundamentals of ground water hydrology
2. Able to understand the sources and types of ground water contamination
3. Able to use models for contaminant transport
4. Able to understand contamination fate process and carry modeling of biodegradation rates
5. Able to apply different remediation methods for ground water.

EE15C TRANSPORT OF WATER AND WASTE WATER

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

TRANSPORT OF WATER: Water Storage and Transmission- Storage requirements, impounding reservoirs, intakes, pressure conduits, hydraulics, pumps and pumping units, capacity and selection of water pumps, economic design of pumps and economic design of gravity and pumping mains.

UNIT-II

MATERIALS FOR PIPES: Specification for pipes, pipe appurtenances, types of loads and stresses, water hammer, causes and prevention, control devices.

DISTRIBUTION SYSTEMS : Principles of design, analysis of distribution networks, Hardy Cross, equivalent pipe and Newton Raphson methods, computer applications in distributions network analysis, optimal design of networks, maintenance of distribution systems, methods of control and prevention of corrosion, storage, distribution and balancing reservoirs.

UNIT-III

TRANSPORT OF WASTEWATER

Sanitary Sewerage: Sanitation technology selection - sanitary sewage flow estimation - sanitary sewer materials - hydraulics of flow in sanitary sewers - partial flows - sewer design - sewer layouts, Concept of model based design - hydraulic fundamentals of design models - Basic properties and model formulations for the design of wastewater of collection system - transitions in flow of sewage.

UNIT-IV

STORM DRAINAGE-Basic philosophy in storm drainage - drainage layouts - storm runoff estimation - rainfall data analysis - hydraulics of flow in storm water drains - storm water drain materials and sections - design of storm drains - storm water inlets.

UNIT-V

OPERATION & MAINTENANCE: Maintenance requirements of sanitary sewerage and storm drainage systems - manpower requirement - equipment requirement; preventive maintenance - monitoring safety requirements-corrosion in sewers - prevention and control - Specific problems related to waste water pumping.

Text Books :

1. Hazard S. Peavy, Donald R. Rowe and George Tchobanoglous, (1985). Environmental Engineering, McGraw-Hill Book Company, New York.
2. Warren Viessman, Jr. and Mark J. Hammer (1985). Water Supply and Pollution Control, Harper and Row, Publishers, New York.
3. Sincero and Sincero (1996), Environmental Engineering, Prentice hall, Michigan university.

Course Outcomes (COs)

After completion of course student is

1. Capable of understanding the fundamentals of fluid flow
2. Able to analyze distribution system and design balancing reservoirs.
3. Capable of designing waste water collection system
4. Can able to design the storm drainage system
5. Can able to carry out maintenance of storm and sewerage drainage systems.

EE11L ENVIRONMENTAL ENGINEERING LAB - I

P / week : 3 Hrs | Sessional Marks : 40

University Exam : 3 Hrs | End Exam Marks : 60

Water and Air Analysis

1. (a) Determination of Colour
   (b) Determination of Turbidity
   (c) Determination of pH
   (d) Determination of Temperature and Odour

2. (a) Determination of Total Solids, Dissolved Solids, Suspended Solids.
   (b) Determination of Total Volatile and Fixed Solids.
   (c) Determination of Electrical Conductivity
3. (a) Determination of Total Acidity
   (b) Determination of Total Alkalinity
   (c) Determination of Dissolved oxygen
4. (a) Determination of Total Hardness
   (b) Determination of Chlorides
   (c) Determination of Sulphates
5. Determination of Residual chlorine content
6. Determination of MPN Index:

Presumptive Test, Confirmation Test, Completed Test, Grams Staining Technique

7. Demonstration of Ambient air quality measurement using High Volume Sampler.

   Analysis – SPM, NO_x, RSPM, SO_x.

Course Outcomes (COs)

After completion of the course the student will :

- Use standard methods for assessment for water quality
- Use statistical principles to analyze and interpret laboratory results
- Communicate effectively either through written or oral

EE12L ENVIRONMENTAL ENGINEERING Lab – II (Practical)

P / week : 3 Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

Wastewater and Solid waste Analysis

1. Determination of Total solids,Total suspended solids and Total Dissolved solids
2. Determination of settleable solids
3. Determination of BOD - Evaluation of Kinematic constants.
4. Determination of COD – Open Reflux Method, Block digester method, Colorimetric method and Titrimetric analysis.
5. Determination of Nitrates, TotalKjeldal Nitrogen, Ammonia and Nitrites.
6. Determination of Phosphates
5. Determination of Sulphates.
6. Demonstration of Rotating Biological Contactor
7. Analysis of Municipal Solid Waste – Component, Physical and Chemical Analysis.

Course Outcomes (COs)

After completion of the course the student will :

- Able to use standard methods to assess wastewater and municipal solid waste characteristics.
- Use effluent standards to analyze and interpret laboratory results
- Communicate effectively either through written or oral

EE21C ADVANCED WASTEWATER TREATMENT

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT – I

GENERAL:

CONSTITUENTS IN DOMESTIC WASTEWATER -BOD, COD, TOC, N AND P – biodegradability, nonbiodegradable organics and other inorganic. **TREATMENT PROCESS AND EFFLUENT DISPOSAL STANDARDS**. **PRIMARY TREATMENT**- Design of Screens, Grit chamber, Sedimentation tanks. **SUSPENDED GROWTH PROCESS:** Activated Sludge Process-ASP and its modifications,process design considerations, evaluation of Biokinetic parameter, Aeration, diffused aeration system.

UNIT – II

ATTACHED GROWTH PROCESS: Substrate removal in attached growth process-design of Trickling filter, rotating biological contactors.

PHOSPHOROUS REMOVAL: Biological phosphorus removal, chemical processes-chemical coagulation,precipitation and oxidation.Tracing phosphorous through treatment processes.

NITROGEN REMOVAL: Biological nitrification and denitrification, ammonia stripping, break point chlorination, and ion–exchange for ammonium (NH^{+}_{4}); Combined removal of nitrogen and phosphorus.Tracing nitrogen through treatment processes.

UNIT – III

ADVANCED PROCESSES:

Granular media filtration, micro screening, MSP like Reverse Osmosis, Electrodialysis, Ultra Filtration, Disinfection of waste water.

REMOVAL OF TOXIC COMPOUNDS AND REFRACTORY ORGANICS : Toxic and refractory organics – Detergents, PCB, phenol, Hydrogenated hydrocarbons, Pesticides and Aromatics. Removal by adsorption, chemical coagulation, Advanced Oxidation Process(AOP).

UNIT – IV

WASTE WATER RECYCLE, REUSE AND RECLAMATION

Ponds,Ditches,Lagoons,UASB,MBR,Constructed wetlands.Waste water Reuse Applications, Waste water Reclamation Technologies- Constituent Removal Technologies-Conventional waste water Treatment process flow diagrams for water Reclamation-Advanced waste water treatment process flow diagrams.

EMERGING CONTAMINANTS IN WASTE WATER- organic compounds and microorganism, Priority pollutants.

UNIT – V
WASTEWATER TREATMENT PLANT RESIDUE MANAGEMENT

Solids sources, characteristics and quantities-solid processing flow diagram-preliminary operations-Thickening-Digestion-condition-dewatering-Heat drying and composting-Thermal reduction-Reuse.

ENVIROMENTAL AND HYDRAULIC DESIGN OF WASTE WATER TREATMENT PLANTS

Stages of Design- data collection-site layout-Environmental and Hydraulic design.

Reference Books :

1. Metcalf and Eddy, Wastewater Engineering, Tata McGraw Hill Pub. Co.
2. M.J. Hammer, Water and Wastewater Technology, John Wiley and Sons.
3. Sincero Sr., A.P., and G.A.Sincero (1999), Environmental Engineering. A Design Approach Prentice-Hall of India Pvt. Ltd., New Delhi.

Course Outcomes (COs)

After completion of course student can able to

1. Identify and assess the characteristics of wastewater and hence impacts
2. Plan and design components of wastewater treatment plants
3. Understand the advanced process of wastewater treatment
4. Understand principles of wastewater reclamation and reuse
5. To manage sludge and do hydraulic design of wastewater treatment plant.

EE22C MUNICIPAL SOLID WASTE MANAGEMENT

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT – I

GENERATION AND CHARACTERISTICS OF SOLID WASTE:

Goals and objectives of solid waste management; Impacts of solid waste generation in a technological society, quantities of solid wastes, elements of solid waste management system, conservation of resources.

Solid waste generation sources; classification of solid waste; data on Indian City wastes; factors influencing generation of solid wastes; components characterization and analysis of solid wastes.

UNIT – II

ONSITE HANDLING, STORAGE AND PROCESSING OF SOLID WASTE:

Public health and aesthetics, onsite handling, methods used at residential and commercial sources; onsite storage dust bins; community containers, container locations; onsite processing methods.

COLLECTION, TRANSFER AND TRANSPORT OF SOLIDWASTE

Collection services, Point collection; frequency of collection, equipment and labour requirements; collection routes, transport means and methods and location of transfer stations.

Design of transfer stations.

UNIT – III

PROCESSING OF SOLID WASTE

Purpose of processing; processing techniques-Mechanical and chemical volume reduction, size reduction, component separation, drying and dewatering.

PROCESSING AND RECOVERY: Thermalrecovery of products – Incineration,pyrolysis and recovery of by-products,Air requirements for combustion-Incineration types-Refuse derived fuels (RDF), biological process and recovery ofconversion products-Composting – static pile, windrow,Vermi composting.

UNIT – IV

DISPOSAL OF SOLID WASTES: Open dumping – problems associated with open dumping sanitary landfills - site selection –design of landfills - Gas and leachate collection and control, ocean disposal of solid wastes. Application of GIS in landfill.

MUNICIPAL SOLID WASTE MANAGEMENT HANDLING RULES (2010).

UNIT – V

HAZARDOUS WASTE MANAGEMENT: Identification and classification of Hazardous wastes, storage, collection and treatment of Hazardous wastes, hazardous waste management rules, Management of Hospital wastes, introduction to e-waste management.

Reference Books:

1. WHO publication SWM for developing countries by frank flintoff**.**

2. Bhide, A.D, and Sundaresan, B.B. (1983) Solid Waste Management in Developing Countries, INSDOC, New Delhi.

3. Tchobanglous, G., Theisen, H. and Ehasin, R. (1996). Solid Waste Engineering Principles and Management Issues - McGraw Hill, Tokyo.

Course Outcomes (COs)

After completion of course students are

1.Able to assess the physical and chemical characteristics of municipal solid waste

2. capable of understanding the elements of solid waste management system.

3. Able to apply different processing methods in the management of municipal solid waste

4. Able to plan and design sanitary landfills for municipal solid waste disposal.

5. Able to apply hazardous waste management rules in handling hazardous waste.

EE23C INDUSTRIAL WASTEWATER TREATMENT

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT – I

INDUSTRIAL WASTE REGULATIONS

Industrial activity in India, Guidelines for siting of industries and industrial estates.Characteristics of industrial Wastewater.Differences between industrial wastes and domestic sewage.

IMPACT OF INDUSTRIAL WASTES ON ENVIRONMENT : Impact of acids and alkalies, suspended matter, organic matter (BOD), refractory organics, coloured matter, inorganic solids, heavy metals, foaming agents (detergents), nutrients, oil and greases, biological (pathogenic) wastes, thermal waters and nuclear wastes on the environment.

DISPOSAL STANDARDS OF DISTILLERY, TANNERY, PULP AND PAPER INDUSTRIES

UNIT – II

TREATMENT METHODOLOGY

Neutralization, Equalization, Proportioning, Sedimentation, Flotation , Screening, coagulation, Evaporation, Ion Exchange, Reverse Osmosis, Lagooning, High –rate aerobic treatment, Trickling filtration ,Rotating biological contactors,Anaerobic digestion system.

UNIT-III

OUTLINES OF MANUFACTURING PROCESSES, SOURCES, VOLUMES, CHARCTERISTICS, AND TREATMENT PROCESSES OF MAJOR INDUSTRIES:Sugarcane, distillery, tannery, pulp and paper mills, textile millindustry,fruit processing industry, steel plant industry

UNIT – IV

INDUSTRIAL WASTE MINIMIZATION PRACTICES:Volume reduction, strength reduction, process changes, equipment modifications, chemical substitution, segregation of wastes, equalization of wastes, by product recovery, proportioning wastes.

MANAGEMENT OF INDUSTRIAL SLUDGES: Sources of production of industrial sludges,anaerobic and aerobic digestion, vacuum filtration, elutriation, drying beds, Sludge Lagooning, wet combustion process, drying and incineration, centrifuging, sanitary landfill.

UNIT – V

CLEAN MANUFACTURE PROCESS-Basic concepts of clean technologies, Zero pollution industrial complexes, Introduction to ISO 14000,Life cycle Analysis, pollution pays policy, common effluent treatment plants.

Reference Books :

1. Nemerow, N.L. (1977). Liquid waste of Industry, Theories, Practices and Treatment, Addision-Wesly Publishing Company, London.
2. Mahajan, S.P. (1990). Pollution Control Processing Industries. Tata Mc–Graw – Hill Publishing Company Limited, New Delhi.
3. Rao, M.N.andA.K.Datta. (1979). Wastewater Treatment. Rational Methods of Design and Industrial Practices. Oxford and IBH Publishing Co., New Delhi.

Course Outcomes (COs)

1. Able to describe the concepts of industrial waste regulations.
2. Capable of applying the different preliminary, physical, chemical and biological treatment methods to the industrial waste water
3. Able to describe the characteristics of different types of industrial waste water,its manufacturing process and design units of treatment plant.
4. Capable of reducing the industrial waste and manage industrial sludge
5. Able to apply concepts of clean manufacturing process.

EE23C URBAN WATER MANAGEMENT

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

General introduction to urbanization and its effect on water cycle – urban hydrological cycle – trends in urbanisation – Effect of urbanisation on hydrology.

Urban Hydrological cycle – time of concentration – importance of short duration of rainfall and runoff data – methods of estimation of time of concentration for design of urban drainage systems.

UNIT-II

Master drainage plans – issues to be concentrated upon – typical content of an urban drainage master plan – interrelation between water resources investigation and urban planning processes – planning objectives – comprehensive planning – use of models in planning.

Basic approaches to urban drainage – runoff quantity and quality – wastewater and storm water reuse – major and minor systems.

UNIT-III

Elements of drainage systems – open channel – underground drains – appurtenances – pumping – source control. Storm water Analysis Calculation of runoff and peak – Design of storm water network systems.

UNIT-IV

Best Management Practices – Detention and retention facilities – Swales-constructed wetlands.

UNIT-V

Operation and maintenance of urban drainage system – interaction between storm water management and solid waste management, various model available for storm water management. Legal aspects

Readings:

1. Geiger W. F., J Marsalek, W. J. Rawls and F. C. Zuidema, Manual on Drainage in Urbanised area – 2 volumes, UNESCO, 1987

2. Hall M J , Urban Hydrology, Elsevier Applied Science Publisher, 1984

3. Stahre P and Urbonas B , Stormwater Detention for Drainage, Water Quality and CSO Management, Prentice Hall, 1990

4. Wanielista M P and Eaglin ,Hydrology – Quantity and Quality Analysis, Wiley and Sons, 1997

Course outcomes

After completion of course student can able to

1.Identify factors affecting urban hydrological cycle

2.Estimate urban water demand and urban storm water quantity

3. plan and design storm water control and disposal systems

4. develop integrated urban water management system

EE23C HAZARDOUS WASTE MANAGEMENT

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT- I

SOURCES, CLASSIFICATION AND REGULATORY FRAMEWORK

Types and Sources of hazardous wastes - Need for hazardous waste management ,Hazardous Wastes (Management and Handling) Rules, 1989

POLLUTION PREVENTION

Management strategies, TCLP, Life cycle analysis, volume reduction, toxicity reduction and recycling.

UNIT -II

PHYSICO CHEMICAL TREATMENT OF HAZARDOUS WASTE

Physico-chemical processes-air stripping, soil vapor extraction, carbon absorption, steam stripping, chemicaloxidation, supercritical fluids, membrane processes.

UNIT- III

BIOLOGICAL TREATMENT OF HAZARDOUS WASTE

Biological methods-Basic microbiology, engineeringfactors,growth kinetics, treatment systems ,conventional treatment, in situ bioremediation, slurry-phase treatment, solid-phase treatment, emerging technologies.

UNIT- IV

DISPOSAL METHODS

Thermal methods-regulations, combustion,liquid injection incinerators,solid waste incineration,storage and feed systems

Land disposal –landfill operation,siteselection,liner and leachate collection systems, cover systems,containment transport through landfill barriers,landfillstability,other types of land disposal facilities.

UNIT- V

CONTAINMENT

Objectives,passive contaminant control systems,surface water control technologies,ground water control,ground water control technologies,activesystems,other remedial measures.

REFERENCES:

1. George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, "Integrated Solid Waste Management, Mc-Graw Hill International edition, New York, 1993.
2. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.
3. CPHEEO, "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi, 2000.
4. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.
5. Paul T Williams, Waste Treatment and Disposal, Wiley, 2005

OUTCOMES:

On completion of the course, the student is expected to be able to

1. Understand the characteristics of different types of hazardous wastes and the factors affecting variation
2. To plan suitable management strategies to handle hazardous waste
3. Apply different treatment methods in the management of hazardous waste
4. Apply concepts of thermal techniques for hazardous disposal and design landfill
5. Understand different surface and ground water control technologies

EE23C WASTE **WATER RECLAMATION AND REUSE**

L / week : 3Hrs	**Sessional Marks : 40**
University Exam : 3 Hrs	**End Exam Marks : 60**

UNIT - I

INTRODUCTION –The Role of Water Recycling in the Hydrological cycle, Wastewater Reuse Applications, Need for Water Reuse.

PUBLIC HEALTH AND ENVIRONMENTAL ISSUES IN WATER REUSE- Constituents in Reclaimed Water ,Public Health Issues, Environmental Issues, Environmental Issues.

UNIT - II

WASTEWATER RECLAMATION TECHNOLOGIES-Conventional wastewater Treatment process -Flow Diagrams for water Reclamation, Advanced Wastewater Treatment process flow diagrams, Performance expectations for water reclamation processes, Predicting the performance of Treatment process Combinations .

UNIT - III

STORAGE OF RECLAIMED WATER – Need for Storage, Meeting water quality discharge Requirements, Operations of Storage reservoirs, Problems involved with storage of Reclaimed Water.

AGRICULTURAL AND LANDSCAPE IRRIGATION EVALUATION OF IRRIGATION WATER QUALITY.

UNIT - IV

INDUSTRIAL WATER REUSE- Industrial water use, Cooling Tower Makeup water, water and salt balances in cooling Tower, Common water quality problems in cooling towers.

GROUND WATER RECHARGE WITH RECLAIMED WATER-Groundwater Recharge Methods, pretreatment Requirements for Groundwater Recharge ,Fate of Contaminants in Groundwater.

UNIT- V

PLANNED INDIRECT AND DIRECT POTABLE WATER REUSE-Planned Indirect Potable Water Reuse, Planned Direct Potable Water Reuse, Planned Potable Water Reuse Criteria.

CASE STUDIES IN WASTE WATER REUSE.

Reference:-

Metcalf and Eddy(2003), Wastewater Engineering Treatment and Reuse,Fourth Edition, Mc-Graw hill education.

Course Outcomes (COs)

After completion of course students are

1. Able to describe the applications of wastewater reuse and constituents in reclaimed water and its implications
2. Capable of planning and designing the advanced wastewater treatment processes.
3. Able to understand aspects of reclaimed water storage.
4. Capable of reusing industrial waste water to suitable applications
5. Capable of applying direct and Indirect Potable Water Reuse methods in the field

EE24C ENVIRONMENTAL IMPACT ASSESSMENTS

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

INTRODUCTION:

Impact of Development on Environment and Environmental Impact Assessment (EIA) and Environmental Impact Statement (EIS) – Objectives – Historical development – EIA Types – EIA in Project cycle- capability and limitations- Legal provisions on EIA.

UNIT-II

METHODOLOGIES:

Elements of EIA – Process screening, Methods of EIA- Strengths, weaknesses and applicability – appropriate methodology.

UNIT-III

PREDICTION AND ASSESSMENT

Socio Economic Impact – Prediction and Assessment of Impact on land, water, air and noise energy impact; Impact on flora and fauna; Mathematical models for prediction; Public participation – Reports – Exchange of Information – Post Audit – rapid EIA.

UNIT-IV

ENVIRONMENTAL MANAGEMENT PLAN:

Plan for mitigation of adverse impact on environment - options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – Environment management Plan

UNIT-V

LIFE CYCLE ANALYSIS

Elements of Life Cycle Assessment **(**LCA) – Life Cycle Costing – Eco Labelling – Design for the Environment – International Environmental Standards – ISO 14001.

ENVIRONMENTAL AUDIT:

Environmental Audit and Environmental legislation objectives of Environmental Audit,Types of environmental Audit, Audit protocol, stages of Environmental audit, onsite activities,evaluation of Audit data and preparation of Audit report.

TEXT BOOKS

1. Anjaneyulu, Y. Environmental Impact Assessmentmethodologies B.S. Publications, Hyderabad 2002.
2. Canter, R.L. Environmental Impact Assessment, McGraw Hill Inc., NewDelhi,1996.
3. S.K. Shukla and P.R. Srinivastava, Concepts in Environmental Impact Analysis, Common Wealth Publishers, New Delhi, 1992.
4. Environmental science and Engineering by j. Glynn and Gary W. Hein Ke-Prentice Hall Publishers.

REFERENCE BOOKS

1. John G.Rau and David C Hooten (Ed)**.,**Environmental Impact Analysis Hand book, McGraw Hill Book Company, 1990.
2. Environmental Assessment Source book, Vol. II and III. The World Bank, Washington, D.C., 1991.
3. Judith Petts, Handbook of Environmental Impact Assessment Vol.I and II. Blackwell Sciencce, New York, 1999.
4. Environmental science and Engineering, by Suresh K.Dhaneja-S.K., Katania and sons Publication., New Delhi.

5. Environmental pollution and control, by Dr. H. S. Bhatia - Galgotia Publication (P) Ltd, Delhi.

6. P. Modak, C. Visvanathan and M. Parasnis, Cleaner Production Audit, Environmental System Reviews, Asian Institute of Technology, Bangkok, 1995.

Course Outcomes

After completion of course student can able to

1. Understand various aspects of EIA
2. Identify suitable methodologies for EIA study
3. Predict and assess the impact on environment
4. Prepare EMP
5. Understand LCA methodology and Environmental audit.

EE24C SUSTAINABLE ENGINEERING AND TECHNOLOGY

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

Unit I

ENERGY SOURCES

Introduction to energy, Environment and SustainableDevelopment; Energy transformation from source to services; Energy sources, sun as the sourceof energy; biological processes; photosynthesis; food chains, classification of energy sources,quality and concentration of energy sources; fossil fuel reserves - estimates, duration; theory of renewability, renewable resources; overview of global/ India's energy scenario.Non-renewable energy sources.

Unit II

ECOLOGICAL PRINCIPLES

Ecological principles, concept of ecosystems, ecosystem theories, energy resources and their inter-linkages, energy flow, the impacts of human activities on energy flow in major man-made ecosystems- agricultural, industrial and urban ecosystems.

Unit III

ENERGY SYSTEMS AND ENVIRONMENT

Environmental effects of energy extraction, conversion and use; sources of pollution from energy technologies (both renewable and non renewable); primary and secondary pollutants; consequence of pollution and population growth; air, water, soil, thermal, noise pollution -cause and effect; pollution control methods, sources and impacts; environmental laws on pollution control. Montrosal Protocol, Kyoto Protocol; Conference of Parties (COP); Clean Development Mechanism (CDM); Reducing Emissions from Deforestation and Degradation (REDD).

Unit IV

GREEN INNOVATION & SUSTAINABILITY

Criteria for choosing appropriate green energyTechnologies, life cycle cost; the emerging trends – process/product innovation-, technological/Environmental leap-frogging; Eco/green technologies for addressing the problems of Water,Energy, Health, Agriculture and Biodiversity- WEHAB (eco-restoration/ phyto-remediation,Ecological sanitation, renewable energy technologies,

industrial ecology, agro ecology and other Appropriate green technologies); design for sustainability (D4S).

Unit V

GREEN ENERGY AND SUSTAINABLE DEVELOPMENT

The inseparable linkages of life supporting systems, biodiversity and ecosystem services and their implications for sustainable development; global warming; greenhouse gas emissions, impacts, mitigation and adaptation ; future energy Systems- clean/green energy technologies; International agreements/conventions on energy and sustainability - United Nations Framework Convention on Climate Change (UNFCC); sustainable development.

References:

[1] Energy and EnvironmentSet: Mathematics of Decision Making, Loulou, Richard; Waaub, Jean-Philippe;Zaccour, Georges (Eds.), 2005, XVIII, 282 p. ISBN: 978-0-387-25351-0

[2] Energy and the Environment, 2nd Edition, John Wiley, 2006, ISBN:9780471172482; Authors: Ristinen, RobertA. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A., Publisher: Wiley, Location: New York, 2006.

[3] Energy and the Challenge of Sustainability, World Energy assessment, UNDP, N York, 2000.

[4] E H Thorndike, Energy & Environment: A Primer for Scientists and Engineers, Addison-Wesley PublishingCompany

[5] R Wilson & W J Jones, Energy, Ecology and the Environment, Academic Press Inc.

[6] D W Davis, Energy: Its Physical Impact on the Environment, John Wiley & Sons

[7] AKN Reddy, RH Williams, TB Johansson, Energy after Rio, Prospects and challenges, UNDP, United NationsPublications, New York, 1997.

[8] Global Energy Perspectives : Edited by NebojsaNakicenovic, ArnulfGrubler and Alan McDonald, CambridgeUniversity Press, 1998.

[9] Environment – A Policy Analysis for India, Tata McGraw Hill, 2000.Environmental Considerations in EnergyDevelopment, Asian Development Bank, Manila (1991).

[10] G. Masters (1991): Introduction to Environmental Engineering and Science, Prentice –Hall InternationalEditions.

[11] Fowler, J.M., Energy and the Environment, 2nd Ed. ,McGraw Hill, New York, 1984.

[12] Energy: Science, Policy, and the Pursuit of Sustainability by Robert Bent, ISBN13: 9781559639118, ISBN10:1559639113, 2002.

[13] New Approaches on Energy and the Environment: Policy Advice for the President, by Richard D. Morgenstern,ISBN13: 9781933115016, ISBN10: 1933115017, Publisher: Resources for the Future, Publication Date: February2005.

[14] http://unfccc.int/

[15] http://cdm.unfccc.int/

Course outcomes

After completion of course student can

1. Able to explain about the energy sources and sustainability
2. Able to understand the ecological principles
3. Capable of understanding consequences of pollution and its control methods.
4. Able to apply suitable the green energy systems
5. Capable of developing green sustainability

EE24C BIOREMEDIATION

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

Fundamental Aspects Of Environmental Microbiology:

Structure and Functions of Procaryotic Cells -Structure and Functions of Eucaryotic Cells

Taxonomy of Microorganisms: Bacteria- Algae, Fungi and Protozoa -Study of Microbial Structure -Light Microscopy -Dark-field and Phase-contrast Microscopy -Electron Microscopy - Environmental Significance of Bacteria, Fungi, and Algae -Microbial Metabolism, Growth and Biokinetics - Microbial Nutrition and Metabolism - Microbial Growth and Energy - Enzymes and Their structures - Biokinetic Models - Batch and Continuous Chemostat Studies - Determination of Biokinetic Parameters

UNIT-II

Microbiology Reactions:

Suspended Growth Reactors - Biofilm Reactors - Batch Reactors - Completely Stirred Tank Reactors - Plug Flow Reactors - Reactors in Series - Engineering Design of Reactors

UNIT-III

Bioflim Processes:

Trickling Filters and Biological Towers -Rotating Biological Contactors - Granular Media Filters - Fluidized-bed Reactors -Hybrid Biofllm Processes

UNIT-IV

Bioremediation For Soil Environment:

Environment of Soil Microorganisms -Soil Organic Matter and Characteristics -Soil Microorganisms Association with Plants - Pesticides and Microorganisms -Petroleum Hydrocarbons and Microorganisms -Industrial solvents and Microorganisms -Biotechnologies for Ex-Situ Remediation of Soil - Biotechnologies for in-Situ Remediation of Soil - Phytoremediation Technology for Soil Decontamination

UNIT-V

Biotreatment of Metals:

Microbial Transformation of Metals -Biological Treatment Technologies for Metals Remediation -Bioleaching and Biobenificiation -Bioaccumulation -Oxidation/Reduction Processes -Biological Methylation -Case studies

Emerging Environmental Biotechnologies:

Phytoremediation -Sequestering Carbon Dioxide -Biomonitoring -Application of Microbial Enzymes -Biomembrane Reactors

References:

1. Ergas, S.J., Chang, D.P.Y., Schreoder, E.D., and Eweis J.B., Bioremediation Principles , WCB/McGraw-Hill, 1998

2. Rittmann, B.E., and McCarty, P.L., Environmental Biotechnology : Principles and Applications, McGraw Hill, 2001

Course outcomes:

After completion of course student can able to

1.understand the fundamentals of environmental microbiology

2.design process for enhancing biodegradation

3.apply principles of bioremediation of soil environment

4.describe biotreatment of metals

5.identify ethical, environmental,societal and safety issues related to bioremediation.

EE24C ENVIRONMENTAL LEGISLATION AUDIT

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT I

INTRODUCTION

Common environmental laws-Role of judiciary in environmental protection-criminal law,common law-criminal procedure code-Indian penal code-fundamental rights and fundamental duties-international and national efforts at environmental protection –green funding and taxes-national environmental policies

UNIT II

WATER (P&CP) ACT, 1974 Power & functions of regulatory agencies - responsibilities of Occupier Provision relating to prevention and control Scheme of Consent to establish, Consent to operate – Conditions of the consents – Outlet – Legal sampling procedures, State Water Laboratory – Appellate Authority – Penalties for violation of consent conditions etc. Provisions for closure/directions in apprehended pollution situation.

UNIT III

AIR (P&CP) ACT, 1981 Power & functions of regulatory agencies - responsibilities of Occupier Provision relating to prevention and control Scheme of Consent to establish, Consent to operate – Conditions of the consents – Outlet – Legal sampling procedures, State Air Laboratory – Appellate Authority – Penalties for violation of consent conditions etc. Provisions for closure/directions in apprehended pollution situation.

UNIT IV

ENVIRONMENT (PROTECTION) ACT 1986 Genesis of the Act – delegation of powers – Role of Central Government - EIA Notification – Sitting of Industries – Coastal Zone Regulation - Responsibilities of local bodies mitigation scheme etc., for Municipal Solid Waste Management - Responsibilities of Pollution Control Boards under Hazardous Waste rules and that of occupier, authorisation – Biomedical waste rules – responsibilities of generators and role of Pollution Control Boards

UNIT V

OTHER TOPICS

Relevant Provisions of Indian Forest Act, Public Liability Insurance Act, CrPC, IPC -Public Interest Litigation - Writ petitions - Supreme Court Judgments in Landmark cases.

ENVIRONMENTAL AUDIT:

Environmental Audit and Environmental legislation objectives of Environmental Audit,Types of environmental Audit, Audit protocol, stages of Environmental audit, onsite activities,evaluation of Audit data and preparation of Audit report.

REFERENCES

1. CPCB "Pollution Control acts, Rules and Notifications issued there under "Pollution Control Series – PCL/2/1992, Central Pollution Control Board, Delhi, 1997.

2. Shyam Divan and Armin Roseneranz "Environmental law and policy in India "Oxford University Press, New Delhi, 2001.

3. GregerI.Megregor "Environmental law and enforcement", Lewis Publishers, London.

4. A. Singh and O.P. Ward Biodegradation and bioremediation, Springer-Verlag Berlin Heidelberg New York, 2004.

5. K.H. Baker and D.S. Herson, Bioremediation, McGraw-Hill, Inc., New York, 1994.

6. M. Alexander, Biodegradation and Bioremediation, Academic Press, 1999.

Course Outcomes:

After completion of course students are able to

1. Apply the different environmental laws and penal codes for environmental protection.
2. To take steps for the control of water pollution
3. Understand the salient features of air act
4. Describe the salient features of environmental act
5. Understand the salient features of Indian forest act, public liability act , public interest litigations and audit.

EE21L ENVIRONMENTAL MODELLING LABORATORY

P / week : 3 Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

Design of water supply pipe sections and networks using Software packages like EPANET – Design of Wastewater collection systems, integrated design of water and wastewater treatment plants by using appropriate free domain software packages. Modeling of Air pollutant dispersion using softwares.

Course Outcomes (COs)

1.Able to apply the application of computing techniques in the environmental engineering field.

2. capable of designing the water supply pipe sections and treatment plants using software packages

3. Able to do Modeling of air pollutant dispersion using software packages.

EE22L UNIT OPERATIONS AND PROCESSES LABORATORY

P / week : 3 Hrs	**Sessional Marks : 40**
University Exam : 3 Hrs	**End Exam Marks : 60**

LIST OF EXPERIMENTS

1. Jar test
2. Sedimentation column analysis
3. Studies on Filtration
4. Adsorption Studies
5. Adsorption studies/Kinetics
6. Activated sludge process
7. Trickling filter
8. Anaerobic Reactor systems (Demonstration)
9. Disinfection for Drinking water

REFERENCES:

1. Metcalf and Eddy. Inc. „Wastewater Engineering, Treatment, Disposal and Reuse, Third Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
2. Lee, C.C. and Shun dar Lin. Handbook of Environmental Engineering Calculations, McGraw Hill, New York, 1999.
3. Casey T.J., Unit Treatment Processes in Water and Wastewater Engineering, John Wileys Sons, London, 1993.
4. David W.Hendricks, „Water Treatment Unit Processes: Physical and Chemical", CRC Press, Boca Raton, 2006.

Course Outcome:

1. Able to conduct Treatability studies of water and wastewater treatment by various Unit Operations and Processes using laboratory scale models

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING DEPARTMENT OF CIVIL ENGINEERING

M.Tech Degree Program (CBCS)

Curriculum & Syllabi for Geotechnical Engineering

(w.e.f 2023-24)

MAY, 2023

PROGRAMME OBJECTIVES

1. To make students learn the principles of soil and rock mechanics. Understand different problems associated with geotechnical engineering. Explain how to select design soil/rock parameters for Design purpose based on the subsurface exploration. Develop Analysis and Design procedure for various geotechnical structures.
2. Students should gain competency in the design of shallow/deep foundations, earth retaining Structures, embankment and earthen dams, underground structures. Can assess stability of slopes and apply preventive measures for stability.

PROGRAMME OUTCOMES (POs)

1. Students will learn soil and rock behaviour. Students will be able to perform various laboratory and in-situ tests on soil/rock to find out design parameters.
2. Students can design shallow/deep foundations, earth retaining structures, embankment and earthen dams, tunnel support systems for given site conditions.
3. Student can compute factor of safety to assess stability of slopes and apply preventive measures for stability.
4. Student can develop numerical models to estimate response of various geotechnical structures under different loadings.

GE11C ADVANCED SOIL MECHANICS

L / week	**: 3Hrs**	**Sessional Marks**	**: 40**
University Exam	**: 3 Hrs**	**End Exam Marks**	**: 60**

UNIT I

COMPRESSIBILITY OF SOILS: Consolidation theory (one, two, and three dimensional consolidation theories), consolidation in layered soil and consolidation for time dependent loading, determination of coefficient of consolidation (Casagrande method and Taylors method)

UNIT II

STRENGTH BEHAVIOUR OF SOILS: Mohr Circle of Stress; UU, CU, CD tests, drained and undrained behaviour of sand and clay, significance of pore pressure parameters; determination of shear strength of soil; Interpretation of triaxial test results.

UNIT III

STRESS PATH: Drained and undrained stress path; Stress path with respect to different initial state of the soil; Stress path for different practical situations.

UNIT IV

CRITICAL STATE SOIL MECHANICS: Critical state parameters; Critical state for normally consolidated and over consolidated soil; Significance of Roscoe and Hvorslev state boundary surface; drained and undrained plane. Critical void ratio; effect of dilation in sands; different dilation models.

UNIT V

ELASTIC AND PLASTIC DEFORMATIONS: Elastic wall; introduction to yielding and hardening; yield curve and yield surface, associated and non-associated flow rule.

References

1. Atkinson, J.H. and Bransby, P.L, The Mechanics of Soils: An introduction to Critical Soil Mechanics, McGraw Hill, 1978.
2. Atkinson J.H, An introduction to the Mechanics of soils and Foundation, McGraw- Hill Co., 1993.

3. Das, B.M., Advanced Soil Mechanics, Taylor and Francis, 2nd Edition, 1997.
4. Wood, D.M., Soil Behavior and Critical State Soil Mechanics, Cambridge University Press, 1990.
5. Craig, R.F., Soil Mechanics, Van Nostrand Reinhold Co. Ltd., 1987.
6. Terzaghi, K., and Peck, R.B., Soil Mechanics in Engineering Practice, John Wiley & Sons, 1967.
7. Lambe, T.W. and Whitman, R.V., Soil Mechanics, John Wiley & Sons, 1979.

Course Outcomes

The Students will be able to:

1. Aquire complete knowledge on Strength and Compressibility of soil mass
2. Aquire complete knowledge on Strength behaviour of soils
3. Understand importance of stress paths with respect to state of soils.
4. Understand mathematical models for solving different problems in soil mechanics using critical state frame work.
5. Visualize the concept of elastic and plastic deformation in soils.

GE12C ADVANCED FOUNDATION ENGINEERING

L / week	**: 3Hrs**	**Sessional Marks**	**: 40**
University Exam	**: 3 Hrs**	**End Exam Marks**	**: 60**

UNIT I

SHALLOW FOUNDATIONS: Requirements for Satisfactory Performance of Foundations, Methods of Estimating Bearing Capacity, Settlements of Footings and Rafts, Proportioning of individual and combined footings using IS code.

UNIT II

PILE FOUNDATIONS: Methods of Estimating Load Transfer of Piles, Settlements of Pile Foundations, Pile Group Capacity and Settlement, Negative Skin Friction of Piles, Pile Load Tests, Analytical Estimation of Load- Settlement Behaviour of Piles, Proportioning of Pile Foundations, Uplift Capacity of Piles.

UNIT III

WELL FOUNDATION: IS and IRC codal provisions, elastic theory and ultimate resistance methods

UNIT IV

FOUNDATIONS ON PROBLEMATIC SOILS: Foundations for collapsible and expansive soils

UNIT V

COFFER DAMS: Various Types, Analysis and Design of Foundations.

References

1. Bowles. J.E., Foundation Analysis and Design, Tata McGraw-Hill International Edition, 5th Edn, 1997.
2. Das B.M., Shallow Foundations: Bearing capacity and settlement, CRC Press, 1999.
3. Tomlinson M.J., Pile design and construction Practice, Chapman and Hall Publication, 1994.
4. Poulos, H. G. and Davis, F. H., "Pile Foundation Analysis and Design", Wiley and Sons. 1980

Course Outcomes

The Students will be able to:

1. Estimate bearing capacity of soil and proportion shallow foundations.
2. Estimate the load in piles and design the pile foundation.
3. Design well foundation as per codal provisions.
4. Design foundations on problematic soils
5. Analyze and design coffer dams.

GE13C EARTH RETAINING STRUCTURES

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks: 60**

UNIT I

EARTH PRESSURE: Rankine and Coulomb theories, active, passive and pressure at rest; concentrated surcharge above the back fill, earth pressure due to uniform surcharge, earth pressure of stratified backfills, saturated and partially saturated backfill.

UNIT II

RETAINING WALLS: Proportioning of retaining walls, stability of retaining walls, mechanically stabilized retaining walls/reinforced earth retaining walls

UNIT III

SHEET PILE WALL: Free earth system, fixed earth system

BULKHEADS: Bulkheads with free and fixed earth supports, equivalent beam method, Anchorage of bulkheads and resistance of anchor walls, spacing between bulkheads and anchor walls, resistance of anchor plates.

UNIT IV

BRACED EXCAVATIONS: Earth pressure against bracings in cuts, Heave of the bottom of cut in soft clays.

UNIT V

TUNNEL AND CONDUIT: Stress distribution around tunnels, Types of conduits, Load on projecting conduits; Arching and Open Cuts: Arching in soils.

References

1. Das, Braja M., "Principles of Foundation Engineering", PWS Publishing. 1998
2. Bowles. J.E., Foundation Analysis and Design, Tata McGraw-Hill International Edition, 5th Edn, 1997.

Course Outcomes (COs)

The students will be able to:

1. Develop ability to compute different conditions for soil and loading.
2. Design Retaining wall
3. Analyze sheet piles Bulkheads
4. Compute earth pressure and heaving in braced excavations
5. Compute the stresses in Tunnels, Conduits and Arching in open cuts.

GE14C SOIL STRUCTURE INTERACTIONS

L / week	**: 3Hrs**	**Sessional Marks**	**: 40**
University Exam	**: 3 Hrs**	**End Exam Marks**	**: 60**

.

UNIT I: Soil-Foundation Interaction: Introduction to soil-foundation interaction problems, Soil behaviour, Foundation behaviour, Interface behaviour, Scope of soil foundation interaction analysis, soil response models, Winkler, Elastic continuum, Two parameter elastic models, Elastic plastic behaviour, Time dependent behavior.

UNIT II: Beam on Elastic Foundation- Soil Models: Infinite beam, Two parameters, Isotropic elastic half space, Analysis of beams of finite length, Classification of finite beams in relation to their stiffness.

UNIT III: Plate on Elastic Medium: Thin and thick plates, Analysis of finite plates, Numerical analysis of finite plates, simple solutions.

UNIT IV: Elastic Analysis of Pile: Elastic analysis of single pile, Theoretical solutions for settlement and load distributions, Analysis of pile group, Interaction analysis, Load distribution in groups with rigid cap.

UNIT V: Laterally Loaded Pile: Load deflection prediction for laterally loaded piles, Subgrade reaction and elastic analysis.

References

1. Selvadurai, A.P.S, Elastic Analysis of Soil-Foundation Interaction, Elsevier, 1979.
2. Poulos, H.G.,and Davis, E.H.,Pile Foundation Analysis and Design, John Wiley, 1980.
3. Scott, R.F., Foundation Analysis, Prentice Hall, 1981.
4. Structure Soil Interaction-State of Art Report, Institution of Structural Engineers,
5. ACI 336. (1988), Suggested Analysis and Design Procedures for combined footings and Mats, American Concrete Institute.

Course Outcomes

The students will be able to:

1. Comprehend soil foundation interaction concepts

2. Analyze soil models with beam on elastic foundation
3. Analyze soil models with plates on elastic medium
4. Analyze load distribution and settlement in piles using elastic analysis
5. Predict the deflections in laterally loaded piles using elastic analysis.

GE14C GROUND IMPROVEMENT TECHNIQUES

L / week : 3Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

UNIT I

INTRODUCTION: situations where Ground Improvement becomes necessary

MECHANICAL MODIFICATION: Dynamic Compaction, Impact Loading, Compaction by Blasting, Vibro-Compaction; Pre-Compression, Stone Columns; Hydraulic Modification: Dewatering Systems, Preloading and Vertical Drains, Electro-Kinetic Dewatering

UNIT II

CHEMICAL MODIFICATION; Modification by admixtures, Stabilization Using Industrial Wastes, Grouting

UNIT III

THERMAL MODIFICATION: Ground Freezing And Thawing.

UNIT IV

SOIL REINFORCEMENT: Reinforced Earth, Basic Mechanism, Type of Reinforcements, Selection of Stabilization/Improvement of Ground using Geotextiles, Goegrid, Geomembranes, Geocells, Geonets, and Soil Nails.

UNIT V

APPLICATION OF SOIL REINFORCEMENT: Shallow foundations on reinforced earth, design of reinforced earth retaining walls, reinforced earth embankments structures, wall with reinforced backfill, analysis and design of shallow foundations on reinforced earth, road designs with geosynthetics.

References

1. Hausmann, M.R., Engineering Principles of Ground Modification, McGraw-Hill
2. International Editions, 1990.
3. Yonekura, R., Terashi, M. and Shibazaki, M. (Eds.), Grouting and Deep Mixing, A.A. Balkema, 1966.
4. Moseley, M.P., Ground Improvement, Blackie Academic & Professional, 1993.
5. Xanthakos, P.P., Abramson, L.W. and Bruce, D.A., Ground Control and Improvement, John Wiley & Sons, 1994.
6. Koerner, R. M., Designing with Geosynthetics, Prentice Hall Inc. 1998.
7. Shukla, S.K., Yin, Jian-Hua, “Fundamentals of Geosynthetic Engineering”, Taylor & Francis.

Course Outcomes

The students will be able to:

1. Assess the site or ground conditions and judge for adopting ground improvement techniques for a particular structure and site conditions.
2. Select suitable improvement techniques or stabilization methods for improving engineering properties of soils in shallow layers.
3. Select suitable reinforced earth methods for stabilizing soils in different applications.
4. Select suitable reinforced earth methods for stabilizing soils in deep layers.

GE14C PAVEMENT ANALYSIS AND DESIGN

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks: 60**

UNIT I

Philosophy of design of flexible and rigid pavements,

UNIT II

Analysis of pavements using different analytical methods,

UNIT III

Selection of pavement design input parameters – traffic loading and volume,

UNIT IV

Material characterization, drainage, failure criteria, reliability,

UNIT V

Design of flexible and rigid pavements using different methods, Comparison of different pavement design approaches, design of overlays and drainage system.

References:

1. Yang and H. Huang, Pavement Analysis and Design, Pearson Prentice Hall, 2004.
2. Yoder and Witzech, Pavement Design, McGraw-Hill, 1982.
3. Sharma and Sharma, Principles and Practice of Highway Engg., Asia Publishing House, 1980.
4. Teng, Functional Designing of Pavements, McGraw- Hill, 1980.

Course Outcomes (COs)

The students will be able to

1. Assess the factors affecting the performance of pavements.
2. Identify failure criteria and design flexible and rigid pavements.
3. Compare and select suitable pavement design approach, overlays, and design aspects.

GE14C PHYSICAL AND CONSTITUTIVE MODELLING IN GEOMECHANICS

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks: 60**

UNIT I

ROLE OF CONSTITUTIVE MODELING: Importance of laboratory testing with relation to constitutive modeling; Elasticity: linear, quasi linear, anisotropic;

UNIT II

PLASTICITY BASICS: yield criteria, flow rule, plastic potential, hardening/softening; Rate Independent Plasticity: mohr-coulomb, nonlinear failure criteria, Drucker Prager, and cap models;

UNIT III

CRITICAL STATE SOIL MECHANICS: critical state concept, cam clay models, simulation of single element test using cam clay,

UNIT IV

CONSOLIDATION: drained and undrained triaxial test; Stress dilatancy theory;

UNIT V

WORK HARDENING PLASTICITY THEORY: formulation and implementation; Applications of elasto-plastic models; Special Topics: hypoelasticity-plasticity, disturbed state concept.

References

1. Hicher and Shao, “Constitutive Modeling of Soils and Rocks”, John Wiley. 2008
2. C.S. Desai and H. J. Siriwardane, “Constitutive Laws for Engineering Materials with
3. Emphasis on Geologic Materials”, Prentice-Hall, Inc., New Jersey. 1984
4. David M Potts and LidijaZdravkovic, “Finite Element Analysis in Geotechnical Engineering Theory and Application”, Thomas Telford. 1999
5. C.S. Desai, “Mechanics of Materials and Interfaces: The Disturbed State Concept”, CRC Press LLC. 2000

6. A.P.S. Selvadurai, M.J. Boulon, “Mechanics of Geomaterial Interfaces, Elsevier.

Course Outcomes

The students will be able to

1. Understand Stress strain models of elasticity of isotropic and anisotropic models.
2. Understand theory of plasticity and various yield criteria and flow rule.
3. Apply critical state concept to consolidation and triaxial soil behaviour.
4. Understand the application aspects of elasto plastic models.

GE15C EARTH AND ROCKFILL DAMS

L + T / week : 3Hrs | Sessional Marks : 40

University Exam: 3 Hrs | End Exam Marks: 60

UNIT – I
EMBANKMENT DAMS – BASIC CONSIDERATIONS
Selection of dam site – Choice of type of dam – Classification of embankment dams – Types of failures – Criteria for safe design – Foundation investigation – laboratory tests – Construction of earth dams – Quality control and instrumentation.

UNIT – II
SEEPAGE THEORY
Fundamentals of seepage flow – Kozney's solution – Anisotropic seepage – Top flow line – Flownet for earth dams – Seepage force and its effects – Control of seepage through embankment dams – Filter design – Drainage measures.

UNIT – III
FOUNDATION TREATMENT
Rock foundations – Alluvial foundations – Primary foundation – Clayey soils – Seepage containment – Upstream impervious blanket – Dam stream drainage.

UNIT – IV
STABILITY ANALYSIS
Critical stage & port pressures in earth dams – Stability analysis – Effective and total stress approach – Method of slices – Location of critical circle – Earthquake considerations.

UNIT – V
ROCKFILL DAMS
General characteristics – Materials – Foundations – Design of dam section – Drainage – Construction.

References

1. Earth and Earth Rock Dams by J.L. Sherard et al.
2. Earth and Rockfill Dams by Bharat Sigh and H.D. Sharma.
3. Development in Soil Mechanics – I edited by C.R. Scoott.

Course Outcomes:

The students will be able to

1. Understand the choice aspects for embankment construction.

2. Compete the seepage and suggest control measure seepage through embankment dams.
3. Suggest suitable embankment foundation treatment technique
4. Analyze stability of embankment for different considerations
5. Design an earthfill rock dam

GE15C ENVIRONMENTAL GEOTECHNOLOGY

L / week	**: 3Hrs**	**Sessional Marks**	**: 40**
University Exam	**: 3 Hrs**	**End Exam Marks**	**: 60**

UNIT I

SOIL AS A MULTIPHASE SYSTEM: Soil-environment interaction; Properties of water in relation to the porous media; Water cycle with special reference to soil medium.

UNIT II

SOIL MINERALOGY: significance of mineralogy in determining soil behavior; Mineralogical characterization.

UNIT III

MECHANISMS OF SOIL-WATER INTERACTION: Diffuse double layer models; Force of attraction and repulsion; Soil-water-contaminant interaction; Theories of ion exchange; Influence of organic and inorganic chemical interaction.

UNIT IV

CONCEPTS OF WASTE CONTAINMENT: Sources, production and classification of wastes, Environmental laws and regulations, physico-chemical properties of soil, ground water flow and contaminant transport, desirable properties of soil; contaminant transport and retention; contaminated site remediation.

UNIT V

SOIL CHARACTERIZATION TECHNIQUES: volumetric water content; gas permeation in soil; electrical and thermal properties; pore-size distribution; contaminant analysis. contaminated site characterization, estimation of landfill quantities, landfill site location, design of various landfill components such as liners, covers, leachate collection and removal, gas generation and management, ground water monitoring, end uses of landfill sites,

References

1. Mitchell, J.K and Soga, K., Fundamentals of Soil Behavior, John Wiley and Sons Inc., 2005.
2. Fang, H-Y., Introduction to Environmental Geotechnology, CRC Press,1997.
3. Daniel, D.E, Geotechnical Practice for Waste Disposal, Chapman and Hall, 1993.
4. Rowe, R.K., Quigley, R.M. and Booker, J.R., Clay Barrier Systems for Waste Disposal Facilities, E & FN Spon, 1995.
5. Rowe, R.K, Geotechnical and Geoenvironmental Engineering Handbook, Kluwer
6. Academic Publishers, 2001.
7. Reddi, L.N. and Inyang, H.F, Geoenvironmental Engineering - Principles and Applications, Marcel Dekker Inc, 2000.
8. Sharma, H.D. and Lewis, S.P, Waste Containment Systems, Waste Stabilization and Landfills: Design and Evaluation, John Wiley & Sons Inc., 1994.

Course Outcomes

The students will be able to

1. Understand Soil-environment interaction, Soil mineralogy and
2. Understand Mechanisms of soil-water interaction
3. Can assess ground water flow and predict contaminant transport phenomenon.
4. Can apply remediation techniques for contaminated site.

GE15C CRITICAL STATE SOIL MECHANICS

L / week	**: 3Hrs**	**Sessional Marks**	**: 40**
University Exam	**: 3 Hrs**	**End Exam Marks:**	**60**

UNIT I

SOIL BEHAVIOUR: State of stress and strain in soils, Stress and strain paths and invariants, behavior of soils under different laboratory experiments.

UNIT II

THE CRITICAL STATE LINE AND THE ROSCOE SURFACE: Families of undrained tests, Families of drained tests, the critical state line, drained and undrained surfaces, The Roscoe surface.

UNIT III

BEHAVIOUR OF OVER CONSOLIDATED SAMPLES: The Hvorslev surface: Behavior of Over consolidated samples, drained and undrained tests, The Hvorslev surface, complete State Boundary Surface, Volume changes and pore water pressure changes.

UNIT IV

BEHAVIOUR OF SANDS: The critical state line for sands, Normalized plots, the effect of dilation, Consequences of Taylor's model.

UNIT V

BEHAVIOUR OF SOILS BEFORE FAILURE: Elastic and plastic deformations, Plasticity theory, Development of elastic-plastic model based on critical state soil mechanics, The Cam-clay model, The modified Cam-clay model.

References:

1. J. H. Atkinson and P. L. Bransby, “The mechanics of soils: An introduction to
2. critical state soil mechanics”, McGraw Hill, 1978.
3. D. M. Wood, “Soil behaviour and critical state soil mechanics”, Cambridge University Press, 1990
4. B. M. Das, “Fundamental of geotechnical engineering”, Cengage Learning, 2013

Course Outcomes

The students will be able to:

1. Acquire fundamentals concept of Stresses and Strains and their states in soils.
2. Comprehend the critical state line and the Roscoe surface.
3. Gain knowledge on Cam-Clay model for analyzing the plastic behaviour of soils before failure.
4. Familiarize with the Development of constitutive laws for geotechnical materials including linear or nonlinear elastic (hyperbolic), linear elastic perfectly plastic, and non-linear elastic-plastic models based on the Critical State Soil Mechanics theory.

GE15C DEEP FOUNDATIONS

L + T / week : 3 Hrs | Sessional Marks : 40

University Exam: 3 Hrs | End Exam Marks : 60

UNIT - I

INTRODUCTION

Pile foundation – Necessity – Classification of piles – Methods of installation – Axially Loaded Piles - Single pile in cohesive and cohesionless soils – Piles in layered soils – Compressive and uplift loads – Negative skin friction – Settlement analysis.

UNIT – II

Laterally Loaded Piles : The occurence of lateral loading - Rigid and flexible piles - Ultimate lateral resistance and deflection of vertical piles carrying lateral loads by I.S. Code method, Brom's method and Reese and Matlock method.

UNIT – III

PILE GROUPS: Necessity – Spacing – Group efficiency – Pile groups in cohesive and cohesionless soils – Individual pile failure – Block failure – Negative skin friction – Free standing pile groups and piled rafts – Settlement analysis.

UNIT - IV

Well Foundations: Types of wells - Depth of well foundation - Bearing capacity and stability considerations - Terzaghi's analysis - IRC method.

UNIT - V

Computer Aided Design

Pile Foundations – Axially Loaded Piles – Laterally Loaded Piles and Pile Groups.

Reference Books :

1. Bowles : Foundation Analysis and Design.
2. V.N.S.Murthy : Soil Mechanics & Foundation Engineering.
3. Bowles : Analytical and Computer Methods in Foundation Engineering.
4. Zeevaret : Foundations for difficult subsoil conditions.
5. Chellis : Pile foundations.
6. Tschebotarioff : Soil Mechanics, Foundations and earth structure.

7. C.Venkatramaiah (1995), Geotechnical Engineering, Wiley Eastern Ltd. (New Age International Ltd.), New Delhi.

8. AV Narasimha Rao and C.Venkatramaiah, (2000), Numerical Problems, Examples and Objective Questions in Geotechnical Engg., Universities Press (India) Ltd., Hyderabad.

9.M.J.Tomlinson, Pile Design and Construction Practice, A View Point Publication, London.

10. H.G. Poules, Pile Foundation Analysis and Design, Ed. Davis, John Wiley & Sons, New York.
11. IS 2911 Part 1-1979 - Code of Practice for design and construction of pile foundations.

Course Outcomes

The students will be able to:

1. Analyze the loads and suggest methods of installation of piles in different soils.
2. Use different methods for competing the lateral resistance and deflection in laterally loaded piles.
3. Evaluate the capacity of pile groups and their efficiency consisting different failure conditions.
4. Analyze and design well foundations.
5. Develop a program for estimating the capacity of axially loaded, laterally loaded and pile groups.

GE11L GEOTECHNICAL ENGINEERING LAB - 1

Practicals / week	**:**	**4Hrs**	**Sessional Marks : 40**
University Exam	**:**	**3 Hrs**	**End Exam Marks : 60**

LIST OF PRACTICAL'S:

1. Determination of Moisture Content and Specific gravity of soil

2. Grain Size Distribution Analysis and Hydrometer Analysis

3. Atterberg Limits (Liquid Limit, Plastic limit, Shrinkage limit)

4. Visual Classification Tests

5. Vibration test for relative density of sand inclusive of in-situ density test.

6. Standard and modified proctor compaction test

7. Falling head permeability test and Constant head permeability test

8. Consolidation test.

Course Outcomes (COs):

The students will be able to:

1. Determine all Index Properties for cohesive and cohesionless soils
2. Determine Density Index for cohesionless soils.
3. Determine Compaction Characteristics for cohesive soils
4. Determine Permeability of cohesive and cohesionless soils.
5. Determine Consolidation Characteristics for cohesive soils.

GE12L GEOTECHNICAL ENGINEERING LAB - 2

Practicals / week :	**4Hrs**	**Sessional Marks**	**: 40**
University Exam :	**3 Hrs**	**End Exam Marks**	**: 60**

LIST OF PRACTICALS

1. Unconfined compression test
2. Direct shear test
3. Tri-axial compression test – UU, CU, CD tests
4. Laboratory vane shear test
5. Swelling Characteristics (Swell Pressure, Swell Potential and swelling Index) by Free-Swell Oedo-Meter method.
6. Swelling Characteristics by Constant Volume Method.

Course Outcomes (COs):

The students will be able to:

1. Determine Unconfined Compressive Stress for cohesive soils.
2. Determine shear parameters for cohesive and cohesionless soils.
3. Determine Swelling Characteristics of cohesive soils by different methods.

GE21C DYNAMICS OF SOILS AND FOUNDATIONS

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks: 60**

UNIT I

FUNDAMENTALS OF VIBRATIONS: Single, two and multiple degree of freedom systems, vibration absorbers, vibration measuring instruments.

UNIT II

WAVE PROPAGATION: Elastic continuum medium, semi-infinite elastic continuum medium, soil behavior under dynamic loading.

UNIT III

DYNAMIC ELASTIC CONSTANTS OF SOIL: Determination of dynamic elastic constants, various methods including block resonance tests, cyclic plate load tests, wave propagation tests, oscillatory shear box test.

UNIT IV

MACHINE FOUNDATIONS: Design criteria for machine foundations; Elastic homogeneous half space and lumped parameter solutions, analysis and design of foundations for reciprocating and impact type machines, turbines, effect of machine foundation on adjoining structures.

UNIT V

BEARING CAPACITY OF FOUNDATIONS: Introduction to bearing capacity of dynamically loaded foundations, such as those of water towers, chimneys and high rise buildings.

VIBRATION ISOLATION: Active and passive types of isolation – Screening of vibrations – Isolation in existing machine foundations.

References

1. Das, B.M., “Fundamentals of Soil Dynamics”, Elsevier,1983.
2. Steven Kramer, “Geotechnical Earthquake Engineering”, Pearson,2008.
3. Prakash, S., Soil Dynamics, McGraw Hill, 1981.
4. Kameswara Rao, N.S.V., Vibration analysis and foundation dynamics, Wheeler Publication Ltd., 1998.
5. Richart, F.E. Hall J.R and Woods R.D., Vibrations of Soils and Foundations, Prentice Hall Inc., 1970.
6. Prakash, S. and Puri, V.K., Foundation for machines: Analysis and Design, John Wiley & Sons, 1998.

Course Outcomes

The students will be able to:

1. Students understands theory of vibration and resonance phenomenon, dynamic amplification
2. Students understand propagation of body waves and surface waves through soil.
3. Students get exposed to different methods for estimation of dynamic soil properties required for design purpose.
4. Students can apply theory of vibrations to design machine foundation based on dynamic soil properties and bearing capacity.
5. Students can predict dynamic bearing capacity and methods of vibration isolation.

GE22C SUBSURFACE INVESTIGATION AND INSTRUMENTATION

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT - I GENERAL

Purpose of soil exploration – Planning a sub-surface exploration – Stages in sub-surface exploration – Depth of exploration – Lateral extent of exploration.

UNIT - II OPEN EXCAVATION AND BORINGS OF EXPLORATION

Pits and Trenches – Drifts and shafts – Auger Borings – Wash borings – Rotary drilling – Percussion drilling – Core drilling.

UNIT - III SOIL SAMPLES AND SAMPLERS

Types of soil samples – Disturbed samples – Undisturbed samples – Design features affecting the Sample Disturbance – Split Spoon Samplers – Scraper Bucket Samplers – Shellby Tubes and Thin walled Samplers – Piston Samlers – Denison Samplers – Hand-curved Samplers.

UNIT – IV IN-SITU TESTING

Standard Penetration Tests – Cone Penetration Tests – In-situ Vane Shear Test – Plate Load Test – Field Permeability Tests – In-situ Tests Using Pressure meter – Observation of Ground Water Table.

UNIT – V GEOPHYSICAL METHODS

Seismic Methods – Electrical Resistivity Methods – Electrical Profiling Method – Electrical Sounding Method – Common Soil Tests – Sub-soil Investigation Report.

References

1. Subsurface exploration and sampling of soils for Civil Engineering purposes by Hvorslev, M.J., Waterways Experiment Station, Vicksburg, Mississipi, 1949.
2. Foundation Engineering by S.P.Brahma Tata Mc Graw-Hill Publishing Company Limited, New Delhi, 1985.
3. Analysis and Design of Foundations and Retaining Structures by Shamsher Prakash, Gopal Ranjan and Swami Saran, Sarita Prakasham, Meerut, 1979.
4. Soil Mechanics & Foundation Engineering, Vol.2 by V.N.S. Murthy, Sai Kripa Technical Consultants, Bangalore.
5. Geotechnical Engineering by C.Venkatramaiah, Wiley Eastern Ltd., New Delhi. Relevant I.S. Codes.

Course Outcomes

The students will be able to:

1. Plan subsurface investigations based on the requirement of civil engineering project and site condition and finalize depth and number of boreholes required.
2. Select methods of exploration.
3. Suggest types of samples to be collected and samplers.
4. Execute different insitu tests for arriving properties of soil and Ground Water Table.
5. Suggest indirect methods for soil exploration and can propose a soil investigation report.

GE23C MARINE GEOTECHNIQUES

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

MARINE SOIL DEPOSITS: Offshore environment, Offshore structures and foundations, Specific problems related to marine soil deposits, Physical and engineering properties of marine soils

UNIT II

BEHAVIOUR OF SOILS SUBJECTED TO REPEATED LOADING: Effect of wave loading on offshore foundations, Behavior of sands and clays under cyclic loading, Laboratory experiments including repeated loading, Cyclic behavior of soils based on fundamental theory of mechanics, Approximate engineering methods which can be used for practical cases

UNIT III

SITE INVESTIGATION IN THE CASE OF MARINE SOIL DEPOSITS: Challenges of site investigation in marine environment, Different site investigation techniques, sampling techniques, Geophysical methods, Recent advancements in site investigation and sampling used for marine soil deposits

UNIT IV

FOUNDATIONS IN MARINE SOIL DEPOSITS: Different offshore and near shore foundations, Gravity platforms, Jack-up rigs.

UNIT V

DEEP FOUNDATIONS AND ANCHORS: Pile foundation – Axial capacity – Lateral capacity – Deflections – Construction – Anchored foundations.

References

1. H. G. Poulos. “Marine Geotechnics”, Unwin Hyman Ltd, London, UK, 1988
2. D. V. Reddy and M. Arockiasamy, “Offshore Structures”, *Volume: 1*, R.E. Kreiger Pub and Co., 1991
3. D. Thomson and D. J. Beasley, “Handbook of Marine Geotechnical Engineering”, US Navy, 2012

Course Outcomes

The students will be able to:

1. Understand the Physical and Engineering properties of marine soils and problems specific to marine soil deposits.
2. Gain knowledge on Behaviour of sands and clays under cyclic loading
3. Can plan Site investigation in marine environment including Geophysical methods.
4. Can assess the factors governing the choice of the most suitable type of foundation for a given marine Structure.
5. Can Select Suitable type of foundation for a given marine structure.

GE23C COMPUTATIONAL GEOMECHANICS

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

SOLUTION OF LINEAR EQUATIONS Jacobi's method, Gauss Seidal method, Successive over relaxation method.

UNIT II

FINITE DIFFERENCE METHOD Two point Boundary value problems – Disichlet conditions, Neumann conditions; ordinary and partial differential equations.

UNIT III

CORRELATION AND REGRESSION ANALYSIS Correlation - Scatter diagram, Karl Pearson coefficient of correlation, Limits of correlation coefficient; Regression –Lines of regression, Regression curves, Regression coefficient, Differences between correlation and regression analysis.

UNIT IV

ONE-DIMENSIONAL CONSOLIDATION - Theory of consolidation, Analytical procedures, Finite difference solution procedure for multilayered systems.

UNIT V

FLOW THROUGH POROUS MEDIA - Geotechnical aspects, Numerical methods, Applications and Design analysis.

References

1. S. Chandrakant., Desai and John T. Christian, "Numerical Methods in Geotechnical Engineering", Mc. Graw Hill Book Company, 1977.
2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, "Numerical Methods for Scientific and Engineering computations", Third edition, New Age International (P) Ltd. Publishers, New Delhi.
3. D.J. Naylor and G.N. Pande, "Finite Elements in Geotechnical Engineering", Pineridge.

Course Outcomes

The students will be able to:

1. Solve linear equations
2. Apply Finite difference form of ordinary and partial differential equations
3. Understand Difference between correlation and regression analysis.
4. Apply finite difference technique to solve complex consolidation and seepage problems in Geotechnical Engineering.

GE23C ENGINEERING ROCK MECHANICS

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

ROCK Formation of rocks, Physical properties, Classification of rocks and rock masses, Elastic constants of rock; Insitu stresses in rock. Application of Rock mechanics in Civil Engineering

UNIT II

ROCK TESTING: Laboratory and Field tests including field sampling

UNIT III

DISCONTINUITIES IN ROCK MASSES: Discontinuity orientation, Effect of discontinuities on strength of rock

UNIT IV

STRENGTH BEHAVIOUR: Compression, Tension and Shear, Stress-Strain relationships, Rheological behaviour

UNIT V

STRENGTH/ FAILURE CRITERION: Mohr-Coulomb, Griffith theory, Hoek and Brown, strength and other strength criteria. Stresses in rock near underground openings;

References

1. Hudson J.A. and J.P. Harrison. Engineering Rock Mechanics: an Introduction to the Principles, 1997. Elsevier, Oxford
2. Goodman, R.E. Introduction to Rock Mechanics, John Wiley & Sons.
3. Ramamurthy, T., “Engineering in Rocks”, PHI Learning Pvt. Ltd.
4. Jaeger, J.C. and Cook, N.G.W, Fundamentals of Rock Mechanics, Chapman and Hall, 1976.
5. Wyllie, D.C., Foundations on Rock, E & FN Spon. 2nd Edition, 1992.

Course Outcomes

The students will be able to:

1. Assess the Physical and Mechanical properties of rocks.
2. Adopt direct & indirect methods of rock exploration.
3. Conduct different laboratory tests on rocks and analyse the results for rock properties
4. Asses Stress Strain behavior under Compressive, tension and Shear
5. Apply Strength criteria functions to analyze stresses in rocks.

GE23C GEOTECHNICAL EARTHQUAKE ENGINEERING

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

EARTHQUAKE SEISMOLOGY: Causes of earthquake, Plate tectonics, Earthquake fault sources, Seismic waves, Elastic rebound theory, Quantification of earthquake, Intensity and magnitudes, Earthquake source models.

UNIT II

EARTHQUAKE GROUND MOTION: Seismograph, Characteristics of ground motion, Effect of local site conditions on ground motions, Design earthquake, Design spectra, Development of site specification and code-based design.

UNIT III

GROUND RESPONSE ANALYSIS: One-dimensional ground response analysis: Linear approaches, Equivalent linear approximation of non-linear approaches.

UNIT IV

LIQUEFACTION AND LATERAL SPREADING: Liquefaction related phenomena, Liquefaction susceptibility: Historical, Geological, Compositional and State criteria. Evaluation of liquefaction by cyclic stress and cyclic strain approaches, Lateral deformation and spreading, Criteria for mapping liquefaction hazard zones.

UNIT V

Seismic design of foundations, Seismic slope stability analysis: Internal stability and weakening instability and Seismic design of retaining walls.

References

1. Steven Kramer, “Geotechnical Earthquake Engineering”, Pearson,2008.

2. Seco e Pinto, P., Seismic behaviour of ground and Geotechnical structure, A. A.
3. Naeim, F., The Seismic Design Handbook, Kluwer Academic Publication, 2ndEdition, 2001.
4. Ferrito, J.M, Seismic design criteria for soil liquefaction, Tech. Report of Naval Facilities service centre, Port Hueneme, 1997.

Course Outcomes

The students will be able to:

1. Know the causes and quantification of earthquake.
2. Get exposed to the effect of earthquake and ground motion.
3. Understand Ground response Analysis and Liquefaction effects.
4. Understand the seismic design of foundation

GE24C DESIGN OF UNDERGROUND EXCAVATIONS

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

Introduction, planning of and exploration for various underground construction projects, stereographic projection method, principle and its application in underground excavation design.

UNIT II

Elastic stress distribution around tunnels, stress distribution for different shapes and under different in-situ stress conditions, Greenspan method, design principles, multiple openings, openings in laminated rocks, elasto-plastic analysis of tunnels, Daemen's theory

UNIT III

Application of rock mass classification systems, ground conditions in tunneling, analysis of underground openings in squeezing and swelling ground, empirical methods, estimation of elastic modulus and modulus of deformation of rocks; uniaxial jacking / plate jacking tests, radial jacking and Goodman jacking tests, long term behavior of tunnels and caverns, New Austrian Tunneling Method (NATM), Norwegian Tunneling Method (NTM), construction dewatering.

UNIT IV

Rock mass-tunnel support interaction analysis, ground response and support reaction curves, Ladanyi'selasto-plastic analysis of tunnels, design of various support systems including concrete and shotcrete linings, steel sets, rock bolting and rock anchoring, combined support systems, estimation of load carrying capacity of rock bolts

UNIT V

In-situ stress, flat jack, hydraulic fracturing and over coring techniques and USBM type drill hole deformation gauge, single and multi-point bore hole extensometers, load cells, pressure cells, etc.

Instrumentation and monitoring of underground excavations, during and after construction, various case studies.

References

1. Hoek, E and and Brown, E. T.," Underground Excavations in Rocks", Institute of Mining Engineering.
2. Obert, L. and Duvall, W.I., "Rock Mechanics and Design of Structures in Rocks", John Wiley.
3. Singh, B. and Goel, R.K.,"Rock Mass Classification- A Practical Engineering Approach", Elsevier.
4. Singh, B. and Goel, R.K., "Tunnelling in Weak Rocks", Elsevier

Course Outcomes

The students will be able to:

1. Plan exploration for various underground projects.
2. Understand the use of elastic and plastic analysis in the design of underground support system.
3. Classify rock masses and select suitable method for advising tunnels.
4. Design various tunnel support system.
5. Gain awareness on the field tests generally conducted during and after construction of under structures.

GE24C FOUNDATION ON EXPANSIVE SOILS

L + T / week : 3Hrs Sessional Marks : 40

University Exam: 3 Hrs End Exam Marks : 60

UNIT – I
GENERAL PRINCIPLES:

Origin of expansive soils - Physical properties of expansive soils – Mineralogical composition - Identification of expansive soils - Field conditions that favour swelling - Consequences of swelling.

UNIT – II
SWELLING CHARACTERISTICS:
Swelling characteristics – Laboratory tests – Prediction of swelling characteristics – Evaluation of heave.

UNIT – III
TECHNIQUES FOR CONTROLLING SWELLING
Horizontal moisture barriers – Vertical moisture barriers – Surface and subsurface drainage – Prewetting – Soil replacement – Sand cushion techniques – CNS layer technique.

UNIT – IV
FOUNDATIONS ON EXPANSIVE SOILS :

Belled piers - Bearing capacity and skin friction - Advantages and disadvantages - Design of belled piers - Underreamed piles - Design and construction.

UNIT – V
MODIFICATION OF SWELLING CHARACTERISTICS

Lime stabilization – Mechanisms – Limitations – Lime injection – Lime columns – Mixing – Chemical stabilization – Construction.

Reference Books:

1. FU HUA CHEN, Foundations on Expansive Soils, Elsevier Scientific Publishing Company, New York.

2. Gopal Ranjan & A.S.R.Rao, Basic and Applied Soil Mechanics, New Age International Publishers - New Delhi.

3. Hand Book on Underreamed and Bored Compaction Pile Foundation, CBRI, Roorkee.

4. IS : 2720 (Part XLI) - 1977 - Measurement of Swelling Pressure of Soils.

5. R.K.Katti, Search for Solutions in Expansive Soils.

6. Alam Singh, Modern Geotechnical Engineering, Geo-Environ Academia, Jodhapur.

7. Swami Saran, Analysis and Design of Substructures, Oxford & IBH, New Delhi.

Course Outcomes

The students will be able to:

1. Identify expansive soil and the factors forming swelling with their consequences.
2. Evaluate the swelling characteristics from laboratory test results
3. Suggest appropriate technique for controlling swelling in expansive soil
4. Design appropriate foundation on expansive soils.
5. Infer the methods for modification of swelling characteristics

GE24C STABILITY ANALYSIS OF SLOPES

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

SLOPES: Types and causes of slope failures, mechanics of slope failure, failure modes.

UNIT II

STABILITY ANALYSIS: Infinite and finite slopes with or without water pressures; concept of factor of safety, pore pressure coefficients, Mass analysis, Wedge methods, friction circle method ; Method of slices, Bishop's method, Janbu's method, Morgenstern and Price, Spencer's method.

UNIT III

STABILITY ANALYSIS IN THE PRESENCE OF SEEPAGE: Two dimensional flow – Laplace equation and it's solution, graphical method, determination of phreatic line, flow nets in homogeneous and zoned earth dams under steady seepage and draw-down conditions, seepage control in earth dams, influence of seepage on slope stability stability analysis of dam body during steady seepage.

UNIT IV

STRENGTHENING MEASURES: stabilization of slopes by drainage methods, surface and subsurface drainage, use of synthetic filters, retaining walls, stabilization and strengthening of slopes, shotcreting, rock bolting and rock anchoring.

UNIT V

Instrumentation and monitoring of slopes, slope movements, warning devices, maintenance of slopes

References:

1. Chowdhary R and Chowdhary I , "Geotechnical Slope Analysis", CRC Press.
2. Harr M.E.," Ground Water and Seepage", McGraw Hill. 1962

Course Outcomes

The students will be able to:

1. Identify types and causes of slope failures.
2. Check the stability of earthen dams
3. Analyze stability of slopes in pressure of seepage
4. Suggest safety measures to be undertaken to prevent the instability of slopes, earthen dams and embankments.
5. Understand the aspects of maintenance and monitoring of slopes.

GE24C FOUNDATIONS ON WEAK ROCKS

L / week	**: 3Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

Engineering properties of weak rocks, different rock mass classification systems, relative merits and demerits. Failure criteria for weak rocks, bi-linear Mohr-Coulomb failure criterion, Hoek and Brown criterion and modified Hoek and Brown failure criterion etc.

UNIT II

Effect of structural planes on rock foundations, possible modes of failure of foundations on rocks/ rock masses, determination of in-situ shear strength of rocks and rock masses

UNIT III

Requirements for satisfactory performance of foundations, bearing capacity of foundations on rocks and rock masses, allowable bearing pressure of rock foundations using a nonlinear failure criterion, monotonic and cyclic plate load tests. Pressure-settlement characteristics, effect of layering, anisotropy, heterogeneity andinelasticity

UNIT IV

Shallow foundations, shallow foundations on sloping ground, raft foundations, stilt foundations, foundations for suspension bridges, transmission line towers, framed buildings etc, treatment of foundations - open joints, solution cavities, weak seams

UNIT V

Piles in weak rocks, bearing capacity and settlement of piles, piles in stratified rock masses, field load tests on piles in weak rocks, behaviour of bored / driven piles in soft / weathered rocks.

References

1. Wyllie Duncan C.," Foundations on Rock: Engineering Practice", E&FN Spon, Taylor and Francis.
2. Hudson J.A. and J.P. Harrison. Engineering Rock Mechanics: an Introduction to the Principles, 1997. Elsevier, Oxford
3. Singh, B. and Goel, R.K.,"Rock Mass Classification- A Practical Engineering Approach", Elsevier.
4. Ramamurthy, T., "Engineering in Rocks", PHI Learning Pvt. Ltd.
5. Hoek, E., "Practical Rock Engineering", Rock science.

Course Outcome

The students will be able to:

1. Understand Rock mass classification and its Engineering properties.
2. Determine engineering properties of in-situ rocks and modes of failure associated.
3. Assess allowable Bearing pressure.
4. Design different types of foundations planned over rock mass.

GE21L SUB SOIL EXPLORATION LAB

L / week	**: 4Hrs**	**Sessional Marks 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

LIST OF PRACTICALS

1. Field vist
2. Field sampling and transports
3. Determination of Identification tests.
4. Determination of Engineering properties
5. Assessment of Allowable Bearing Pressure of foundations.

Course Outcomes (COs)

The students will be able to:

1. Evaluate vertical and lateral extent of exploration; identify, select, and plan different stages of subsurface exploration for various civil engineering projects.
2. Discriminate, Classify and analyse different techniques of exploration to be adopted in rocks and soils.
3. Discriminate different types of soil samples, samplers and judge the appropriateness of a sample or sampler for practical cases accounting for the safety and economy.
4. Evaluate different in-situ methods of tests to determine engineering properties of soils and locate Ground water table required for safe and economic design of foundations.
5. Asses the safe bearing capacity/Allowable Bearing Pressure of soils.

GE22L NUMERICAL ANALYSIS LAB

P/ week	**: 4Hrs**	**Sessional Marks :40**
University Exam	**: 3 Hrs**	**End Exam Marks: 60**

SYLLABUS CONTENTS

1. Development of spread sheets for Analysis of laboratory tests results.
2. Development of Spread sheets for stress distribution, Bearing Capacity and settlements
3. Curve fitting

Course Outcomes (COs)

The students will be able to:

1. Develop and Analyze laboratory tests results using Spread sheets
2. Develop and analyze Spread sheets for stress distribution for different loading conditions.
3. Determine Bearing Capacity of given soil sample.
4. Determine settlements of foundation in soils.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

Curriculum & Syllabi for Hydraulics & Water Resource Engineering

(w.e.f 2023-24)

MAY, 2023

PROGRAM OBJECTIVES

1. To learn the principles, processes and design of pressurized and free surface system.

2. To achieve competency in the pipe network design, analysis of channel networks, pressure rise in pipes due to sudden closure of valves, etc.

3. To assess the impact of climate change detection, Land use/Land cover changes on water availability

4. Efficient use of water in irrigation under varying climate change.

5. Impact of climate change on glaciers, consumptive use of surface and ground water, and optimum allocation of water.

6. Evaluation of various hydrologic processes including flow forecasting and the related practical applications.

WE11C ADVANCED FLUID MECHANICS

L / week	**: 3Hrs**	**Sessional Marks**	**: 40**
University Exam	**: 3 Hrs**	**End Exam Marks:**	**60**

UNIT I: Kinematics of Flow: Equation of continuity in cartesian, polar and cylindrical coordinates, Standard 2D Flow Patterns: Source, sink, doublet and their combinations, construction of flows by superposition, D'Alembert's paradox

UNIT II: Ideal fluid flow

Simple patterns of 2-dimensional flow - Uniform flow, Source, sink, vortex flow, Superposition of elementary flows – Doublet – Rankine-half body - Rankine oval, flow about a circular cylinder and flow about a rotating cylinder.

UNIT III:. Laminar Flow: Derivation of Navier-Stokes equations – exact solutions for flow between parallel plates, Couette flow, flow near a suddenly accelerated plate and an oscillating plate.

UNIT IV: Boundary Layers: Similarity solutions of boundary layer equations, Falkner-Skan Wedge flows, Karman's momentum integral equations, Karman-Puhlhausen approximate solution, separation in boundary layer under adverse pressure gradient, turbulent boundary layer.

UNIT V: Turbulent Flows: Reynolds equations of motion, semi-empirical theories of turbulence, velocity profiles for inner, outer and overlap layers, equilibrium boundary layers.

References:

1. White, F.M., "Fluid Mechanics", McGraw-Hill. 1979
2. Schlichting, H., "Boundary Layer Theory", McGraw-Hill. 1979 Garde, R.J., "Turbulent Flow", Wiley Eastern Limited. 1994
3. Pope, S. B., "Turbulent Flows", Cambridge University Press. 2000
4. Rouse, H., "Advanced Mechanics of Fluids", John Wiley and Sons. 1959
5. Ojha, C.S.P., Berndtsson, R. and Chandaramouli, P.N., "Fluid Mechanics", Oxford University Press. 2010

Course Outcomes (CO's)

After completion of the course the student will have:

1. Able to analyze the fluids in motion condition
2. Able to apply the principles of ideal fluid flow and real fluid flow
3. Able to apply the principles of viscous flow of fluids
4. Able to find out different layer of boundary layer and identifying the separation and control
5. Able to analyze the fluids in turbulent flow conditions.

WE12C FREE SURFACE FLOWS

L / week : 3Hrs **Sessional Marks : 40**
University Exam : 3 Hrs **End Exam Marks : 60**

UNIT I

INTRODUCTION: Free surface flows, velocity distribution, resistance relationships, specific energy and specific force, normal and critical depths computations, governing equation and computation of gradually varied flows.

UNIT II

HYDRAULIC JUMP: Elements of hydraulic jump, hydraulic jump in variety of situations including contracting and expanding geometries and rise in floor levels, control of hydraulic jump using baffle walls and cross jets.

UNIT III

SUPERCRITICAL FLOWS: Flow past deflecting boundaries, oblique shock waves.

Spatially Varied Flows: Flows past side weirs, De Marchi equations, design of side weirs, flow past bottom racks, trench weirs and waste water gutters.

UNIT IV

AERATED FLOWS: Bulking of flow, mechanism of air entrainments, modelling of aerated flows, development of self-aerated flows, uniform aerated region, aeration over spillway.
Stratified Flows: Thermal stratification in water bodies including reservoirs, modelling of stratified flows.

UNIT V

UNSTEADY FLOWS: St. Venant's equations and their solution using method of characteristics and finite difference schemes; dam break problem, hydraulic flood routing. Channel Transitions: Sub-critical and supercritical.

References:

1. Chow, V.T., "Open Channel Hydraulics", McGraw Hill. 1959

2. Choudhary, M.H., "Open-Channel Flows", Prentice-Hall.
1994
3. Ranga Raju, K.G., “Flow Through Open Channels, Tata McGraw Hill. 2003
4. Chanson, H., “The Hydraulics of Open Channel Flow: An Introduction”, Elsevier.
2004 French, R.H., "Open-Channel Hydraulics", McGraw-Hill. 1994
5. Wood, I.R., “Air entrainment in free-surface flows”, A.A. balkema. 1991

Course Outcomes

1. Able to compute flow profile in channel transition

2. Able to apply various principles in unsteady flow conditions

3. Able to formulate and solve the hydraulic flood routing

4. able to apply concepts on aerated flows.

WE13C WATERSHED MANAGEMENT AND MODELLING

L / week : 3Hrs **Sessional Marks : 40**
University Exam : 3 Hrs **End Exam Marks : 60**

UNIT -I

WATERSHEDMANAGEMENT-I:

Basin characteristics - Classification of effective watershed management methods - Factors affecting integrated watershed management - Watershed inventory.

UNIT -II

WATERSHED MANAGEMENT II :

Problem definition and scope - Consultation process - Developing workable management options - Evaluation of constraints and criteria - Simple assessment methods.

WATERSHED MODELLING I :

Runoff components- correlation coefficient, linear regression- least square's method, coefficient of determination, t-and F-test; Types of model- black box, parametric and physically based;cuvillinear relations, multi-linear regression model.

UNIT -III

WATERSHED MODELLING II :API & wetness performance, calibration, validation, errors, coefficient of efficiency and other tests, graphical methods. Simple parametric models- Curve Number Method, its modification, variable source area models; quasi- physically based models; a simple physically based model.

UNIT -1V

SOIL CONSERVATION:

Soil loss estimation - Universal soil loss equation; soil erosion principles - Gulley erosion - Design of permanent gully control structures - Stream bank erosion - Erosivity and erodability, Engineering measures to control erosion - Terracing, bunding, vegitated waterways. Wind erosion and control practices.

UNIT –V

ARTIFICIAL GROUNDWATER RECHARGE TECHNIQUES AND WATER HARVESTING TECHNIQUES:

Artificial recharge - Considerations - Methods - Induced Infiltration - Water Spreading - Flooding - Artificial recharge basins and distches - Natural channel modifications - Recharge pits and shafts - Recharge wells. Farm ponds- Percolation tanks.

Reference Books :

1. Prof. R.Suresh, "Watershed Hydrology" Standard Publishers.
2. Isobel W. Heathiote."Integrated Watershed Management - Principles & Practices".
3. Schwab, G.O. & Others, "Soil and Water Conservation Engg."
4. Prof.R.Suresh, "Soil and Water Conservation Engg.",

   (Standard Publishers).
5. Wayne A. Pettyjohu, "Introduction to Artificial Ground Water Recahrge" Scientific

   Publishers, Jodhpur.
6. Murthy J.V.S., "Wastershed Management".

Course outcomes:

1. Able to use watershed management methods and optimization techniques

3. Able to apply soil conservation equation and principles

4. Able to use water harvesting techniques and artificial recharge techniques

WE14C FLUVIAL HYDRAULICS

L / week : 3Hrs **Sessional Marks : 40**
University Exam : 3 Hrs **End Exam Marks : 60**

UNIT I

The sediment problems, properties of sediments, incipient motion of uniform and non-uniform sediments. Bed forms- mechanics of bed forms, classifications and channel resistance.

UNIT II

Bed load equation, Bed layer characteristics, sediment sampling, measurement and suspended load – sediment concentration, Advection-diffusion equation, suspended sediment concentration profile, Hyper concentration, Field measurements of suspended sediments.

UNIT III

Stable channel design and sediment control – Introduction- variable in channel design and conditions – secondary factors influencing stable channel design- stable channel carrying clear water- Non cohesive material-stable channel carrying sediments-sediment control .

UNIT IV

Bed level variations- continuity equation for sediment – equilibrium depth of scour in long channel contractions- stream bed changes during floods- degradation – aggradations

UNIT V

General mathematical models –silting of reservoirs –local scour- Design of guide bunds and other river training banks.

References:

1. Garde, R.J., "River Morphology", New International Publishers. 2006

2. Julien, P.Y., "Erosion and Sedimentation", Cambridge University Press. 1998 3. Jansen, P.P.H., "Principals of River Engineering", VSSD Publications. 1994

4. Garde, R.J. and Ranga Raju, K.G., "Mechanics of Sediment Transportation and Alluvial Stream Problems", Wiley Eastern Limited. 2006

Course Outcomes

After completion of the course the student will able to

1. Exposure to resistance laws in mobile bed channels/rivers. Scour around bridge piers
2. Design of river protection works

WE14C HYDRAULIC STRUCTURES

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

HYDRAULIC STRUCTURES – INTRODUCTION- Types of Hydraulic structures – water retaining structures – water conveying structures. Embankment Dams: Types, design considerations, seepage analysis and control, stability analysis, construction techniques.

UNIT II

GRAVITY DAMS: Forces acting on failure of a gravity dam, stress analysis, elementary profile, design of gravity dam, other functional features of a gravity dam.

UNIT III

DAM OUTLET WORKS: Types of outlet structures, ogee spillway, chute spillway, siphon spillway, side channel spillway,.

UNIT IV

TERMINAL STRUCTURES: Hydraulic jump types, stilling basin, roller bucket, ski jump b**asi**n, baffled spillway, drop structure

UNIT V

HYDRAULIC MODELING: Basic principles, dimensional analysis, design of physical models of hydraulic structures.

References:

1. Peterka, A.J, “Hydraulic Design of Stilling Basins and Energy Dissipators”, USBR Engineering Monographs No. 25”. 1984
2. Design of Small Dams", Third Edition, Water Resources Technical Publication – US Bureau of Reclamation. 1987
3. Singh, B., and Varshney, R.S., "Embankment Dam and Engineering", Nem Chand and Brothers. 2004
4. Novak, P. and Nalluri, C., “Hydraulic Structures”, Edition 4, Taylor & Francis. 2007 Creager, Justin and Hinds, “Engineering for Dams”, Vol. I and II, John Wiley.

Course Outcome

1. After completion of the course the student will have the ability toAnalysis and design of various types of hydraulic structures

WE14C SYSTEMS ENGINEERING

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

Definitions and components of a system, system control, systems modelling and model development. System synthesis. Economic analysis, conflicts and role of optimization in their resolution.

UNIT II:

Unconstrained optimization – classification – univariate method – Hook-Jeeves pattern search method –powell's search method – Indirect search method – Cauchy's steepest descent method – newton' method.Constrained optimization – elimination method, penality and barrier function method, sequential quadratic programming, mixed integer programming.

UNIT III

Integer programming: Introduction – Integer Linear programming – Graphical Representation – Gomory's cutting plane method (mixed integer programming- sequential discreat programming. Geometric programming: unconstraind geometric programming using differential calculus-arithmetic-geometric inequality

UNIT IV

Linear programming: Geometry of linear programming- Linear simultaneous equation – simplex method- revised simplex method- Duality in linear programming. Dynamic programming-Multistage decision process- concept of sub-optimization and principle and optimality-computational procedure in dynamic programming.

UNIT V

Stochastic programming- Introduction – concept or probability theory – stochastic non-linear programming- geometric programming.

References:

1. Aguilera, R.J., "Systems Analysis and Design", Prentice Hall. 1973
2. Ossenbruggen, P. J., "Systems Analysis for Civil Engineering", John Wiley. 1984
3. Neufrille, R., "Systems Analysis for Engineer" , McGraw Hill. 1971

4. Rao, S.S., "Engineering Optimization – Theory and Practice", New Age International (P) Ltd. 1999
5. Hamdy, A.T., "Operations Research – An Introduction", Prentice Hall. 1997

Course Outcome

1. At the completion of the course the students will be able to understand the system behaviors and know how to apply the various simulation and optimization techniques to achieve optimum utilisation of water resources

WE14C HYDRAULIC MODELLING AND EXPERIMENTAL TECHNIQUES

L / week : 3Hrs **Sessional Marks : 40**
University Exam : 3 Hrs **End Exam Marks : 60**

UNIT – I

HYDRAULIC MODELLING

Hydraulic models - Scale effects - Distorted models - movable bed models - Analogy methods - Design and analysis of experiments - errors in experiments.

UNIT - II

EXPERIMENTAL TECHNIQUES AND MEASUREMENTS

Velocity and pressure measuring Instruments - Pitot cylinder, Pitot sphere, - Anaemometers- Pressure transducers.

UNIT - III

Discharge measuring techniques - Classification of methods - Constriction methods, rotometer - Area-velocity method - Dilution methods and techniques - Special techniques and measuring structures.

UNIT - IV

Measurement of two phase flows - measurement of sediment content in water flows - air-water mixture. Test rigs - Wind and water tunnels - Drag balances.

UNIT - V

Flow visualization techniques- Smoke or dye- Line tracers – oil films – china clay – shadowgraph – direct-shadow method – schlieren method – Interferometer – Examples.

Reference Books :

1. Huntley, H.E. Dover (1967),"Dimensional Analysis"
2. B.B.Sharp (1982), "Hydraulic Modeling" Published by Butter Worths.
3. Troskolousky (1960), "Hydrometry" Pergamon Press, London.
4. Addison, H. Chapman and Hall (1940), "Hydraulic Measurements".
5. Bradshaw, P.(1964), "Experimental Fluid Mechanics", Pergamon Press,
6. Ed. Richard, J. Goldstein, "Fluid Mechanics Measurements" published by

   Hemisphere Publishing Corporation (Distributed by Springer-Verlag).

Course Outcomes (Cos)

Learners should be able to

1. Able to design the prototype by analyzing the models and applying latest techniques for good
   efficiency
2. Able to measure the flow in all channels by using latest measurement devices.
3. Able to measure the sediment transport rate in regime flows.

WE15C WATER RESOURCES SYSTEMS PLANNING

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

INTRODUCTION: Water resources planning process, multi-objective planning.Evaluation of Water Plans: Basic concepts of engineering economics, welfare economics, economic comparison of alternatives.

UNIT II

WATER PLAN OPTIMIZATION: Plan formulation, objective functions and constraint, analytical optimization, numerical optimization, linear programming, dynamic programming, simulation, planning under uncertainty.

UNIT III

DETERMINISTIC RIVER BASIN MODELING: Stream flow modeling, estimation of reservoir storage requirements – dead storage, active storage for water supply/ irrigation / power generation, flood storage, optimal allocation.

UNIT IV

CONJUNCTIVE USE/GROUNDWATER MANAGEMENT MODELS: LP based conjunctive use modeling, aquifer response models, link - simulation, embedded, matrix response based models, soft modeling.

UNIT V

WATER QUALITY MANAGEMENT MODELS: Basic water quality modeling, objectives of management, control alternatives, optimal plans.

References:

1. Hall, W.A. and Dracup, J.A., "Water Resources Systems Engineering", McGraw Hill Book Company. 1970

2. Loucks, D.P., "Water Resource Systems Planning and Analysis", Prentice Hall. 1981

3. Maass et al., "Design of Water-Resource Systems", Harvard University Press. 1962

4. Vedula S. and Mujumdar, P.P., "Water Resources Systems", Tata McGraw Hill. 2005

Course Outcome

1. Able to use optimum utilisation of surface and subsurface water
2. Able to Rational allocation of reservoir water
3. Able to Exposure to various algorithms to solve linear as well as non-linear problems.

WE15C IRRIGATION AND DRAINAGE

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

Introduction, objectives of irrigation, type of irrigation and suitability; selection of irrigation method. Irrigation requirement, water balance, soil water relationships, water storage zone, infiltration.

Unit II

Flow of moisture through root zone, soil physical and chemical properties, crop evaporative and drainage requirements, irrigation efficiency and uniformity.

UNIT III

Surface irrigation systems, types of surface systems, basin irrigation, border irrigation, furrow irrigation, field measurement techniques, flow measurement, flumes, weirs, irrigation events, advance, wetting, depletion and recession phases.

UNIT IV

Infiltration, infiltrometer, ponding methods, soil water, tensiometers, neutron probe, time domain reflectometer, evapotranspiration, crop coefficient, leaf area index, FAO guide lines on evapotranspiration estimation.

UNIT V

Drainage principles, need for drainage, steady state equations, Hooghoudt, Kirkham, Dagan and Ernst equations. Salt balance, water and salt balance of the root zone, salt equilibrium equation and leaching requirement, leaching efficiency.

References:

1. Walker, W.R., and Skogerboe, G.V., "Surface Irrigation Theory and Practice", Prentice Hall, INC. 1987
2. Drainage Principles and Applications, "International Institute for Land Reclamation and Improvement", Wageningen. 1973
3. Michael, A.M., "Irrigation: Theory and Practice", Vikas Publishing House.
4. Asawa, G.L., "Irrigation Engineering", New Age International Publishers.
5. .Majumdar, D.K., “Irrigation Water Management”, PHI Learning. 2009
   6.Luthin, J.N., "Drainage Engineering", John Wiley. 1966
6. Richard H. Cuenea (1989), “Irrigation System Design (An Engineering Approach)” Published by Prentice Hall Inc

Course Outcomes (CO’s)

After completion of course work the students able to

1. Assessment of various soil properties, soil water relationships

2. Measurement of crop water requirements and infiltration
3. Management of salinity problems and leaching process.

WE15C WATER POWER ENGINEERING

L / week : 3Hrs **Sessional Marks : 40**
University Exam : 3 Hrs **End Exam Marks : 60**

UNIT -1
INTRODUCTION
Sources of energy - Development of water power in India - Advantages and disadvantages of hydropower - Estimation of water power potential- Power house components.

UNIT II

ELECTRICAL LOAD CHARACTERISTICS:

Load curve - Load factor - Capacity factor - Utilization factor - Diversity factor - Load duration curves - Firm power and secondary power load prediction.

UNIT -III

HYDROPOWER PLANTS :

Classification of hydel plants - Runoff river, valley dam, and diversion canal plants - Flow duration curves - Storage and pondage - pumped storage plants - Types - Two unit and three unit arrangements - Efficiency of pumped storage plants - Tidal power plants - Basic principle - Components - Modes of generation - Estimation of energy.

UNIT -IV

WATER CONVEYANCE SYSTEM

Intakes - Types - Hydraulic design of intakes and accessories - power canals - Penstocks - Classification - Design criteria - diameter - Anchor blocks - Design criteria - Water hammer - Surge tanks - Channel surges.

UNIT -V

HYDRAULIC TURBINES:

Selection - Setting of turbines - Cavitation in turbines – Design of Francis turbine- Design of Kaplan turbine – Design of pelton wheel – specific speed of turbine – characteristics curves of turbine.

Reference Books :

1. M.M. Dandekar and K.N.Sharma - Water Power Engineering.
2. Emmil Mosonye - Water Power Development, Vol. I & II.

Course Outcomes (Cos)

1. Able to have knowledge about different sources of energy and electrical load on hydro turbines.
2. Able to understand the concepts of low head, high head and head diversion plants
3. Able to design pumped storage power plants
4. Able to use the concepts of water conveyance
5. Able to plan a power house

WE15C URBAN HYDROLOGY

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

INTRODUCTION

Urban Hydrology - Need - Highway drainage - Rainfall Characteristics - Point rainfall for Standard Duration - Rainfall and its variability in time and space.

UNIT II

DESIGN STORM PROFILES :

Differences between urban and rural storm profiles - Recommended design procedure - Sensitivity - Storm movement.

UNIT III

FLOOD ESTIMATION :

Planning of field investigations - Measurements; Methods of flood estimation - Regional runoff rainfall model - ORSTOM model - TRRL method - Generalized tropical flood model - Effect of land use - Examples.

UNIT IV

URBAN STORM WATER DRAINAGE:

Design Criteria - Rational method - TRRL hydrograph method - HYDRAON - ILLUDAS (Illinois Urban Drainage Area Simulator) - The Walkingford procedure - The Hydrograph volume method (HVM) - Environmental Protection Agency for Storm Water Management model (SWMM).

UNIT V

PLANNING AND CONTROL MEASURES :

Urban water resources planning - Surface and subsurface drainage - Design of subsurface drains - Erosion Control - Control of Gully erosion - Control of sheet erosion.

REFERENCE BOOK :

"Highway and Urban Hydrology in Tropics" by L.H.Watkins and D. Fiddes, Pentech Publishers (London - plymouth).

Course Outcomes (COs)

After completion of the course the student will have :

1. Able to know about urban rainfall and storm water management in urban areas .
2. Able to design storm water management in urban areas
3. Able to determine the design flood for storm water drainage system.
4. Able to develop urban storm water management models and to suggest suitable erosion control measures.

WE11L ADVANCED FLUID MECHANICS LAB

P / week : 4Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

List of Practicals:

1. To study the flow behavior in a pipe bend and to calibrate the pipe bend (i.e., bend or elbow meter) for discharge measurement.
2. To study the boundary layer velocity profile, and to determine the exponent in the power law of velocity distribution, boundary layer thickness and displacement thickness.
3. To study the velocity distribution in a pipe flow and to estimate the energy and momentum correction factors.
4. To study velocity distribution and Reynolds stresses in turbulent flow

Course Outcomes (Cos)

After the completion of course the student must

1. Able to find out surface profiles in forced vortex flow
2. Able to find discharge in elbow meters
3. Able to find energy correction factor , momentum correction factor and hydraulic jump in horizontal and sloping channels.

WE12L ADVANCED HYDROLOGY LAB

P / week : 4Hrs **Sessional Marks : 40**

University Exam : 3 Hrs **End Exam Marks : 60**

List of Practicals:

1. Downloading and processing of remote sensing products
2. The hands on experiments in the image processing, GIS platforms
3. Georeferencing of toposheet and creating vector layers(MapInfo/ArcGIS)
4. Creation of attribute tables and layout preparation (MapInfo/ArcGIS)
5. Creation of Digital Elevation Model using Vertical Mapper.
6. GPS Survey and its data transformation into GIS environment.
7. Converting *.tab file to *.shp& vice versa using Universal Translator.
8. Use of D8 pointer algorithm for deriving flow direction, flow accumulation and watershed delineation.

Course Outcomes (Cos)

After the completion of course the student must

1. Able to download the satellite data and it is imported into GIS environment
2. Able to analyse the raster data ,vector data and development of DEM
3. Able to convert GPS data into point data in GIS

WE21C ADVANCED HYDROLOGY

L / week	**: 3 Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

INTRODUCTION: Hydrologic system and hydrologic budget, fundamental laws of hydrology; atmospheric water vapour. Hydrologic Inputs: Precipitation and its forms, snowfall and rainfall; measurement techniques and space-time characteristics

UNIT II

HYDROLOGIC ABSTRACTIONS: Infiltration, depression storage, evapotranspiration; measurement techniques, space time characteristics and their modelling.

UNIT III

STREAM FLOW: Measurement techniques, space-time characteristics, rating curves System Approach: Unit Hydrograph IUH, Clark and Nash model.

UNIT IV

MATHEMATICAL MODELLING: Linear and Nonlinear models, Physically based models Hydrological routing, Flood forecasting

UNIT V

ADVANCED METHOD OF FREQUENCY ANALYSIS: Outliers, Time series analysis. Impact of climate change and Land use/Land cover on basin response

References:

1. Chow, V.T., Maidment, D.R. and Mays, W.L., "Applied Hydrology", McGraw Hill. 1988
2. Ojha, C.S.P., Berndtsson, R. and Bhunya, P., "Engineering Hydrology", Oxford University Press. 2008
3. Wanielista, M., Kersten, R. and Eaglin, R., "Hydrology", John Wiley. 1997

Course Outcomes (Cos)

After the completion of course the student must

1. To develop basic tools for analysis of hydrologic processes
2. To apply the knowledge of time series models for hydrologic data generation and forecasting.
3. To be familiar with the hydrologic design concepts and methods including estimation of the design flows
4. To assess impact of climate change and Land use/Land cover on water availability

WE22C GROUNDWATER ENGINEERING

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

INTRODUCTION

Definition of groundwater, role of groundwater in hydrological cycle, groundwater bearing formations, classification of aquifers, flow and storage characteristics of aquifers, Darcy's law, anisotropy and heterogeneity. Governing Equations for Groundwater Flow: Dupuit-Forchheimer assumptions, general differential equations governing groundwater flows, analytical solutions.

UNIT II

WELLS AND WELL HYDRAULICS

Different types of wells, construction of wells, steady and unsteady state solutions for confined, unconfined and leaky aquifers, effect of boundaries, method of images, pumping test analysis. Groundwater Conservation: Regional groundwater budget; resource assessment; estimation of recharge, Indian practice for artificial recharge

UNIT III

GROUNDWATER QUALITY

General problem of contamination of groundwater, sources, remedial and preventive measures, seawater intrusion in coastal aquifers.

UNIT IV MANAGEMENT OF GROUNDWATER

Concept of basin management – Equation of Hydrologic Equilibrium – Groundwater basin investigations – Data collection and field work – Alternative basin yields – Evaluation of perennial yield – salt balance – basin management by conjunctive use

UNIT IV

GROUNDWATER FLOW MODELLING

Role of groundwater flow models, reference to hydraulic, Hele-Shaw and analog models, introduction to numerical modeling.

References:

1. Todd, D.K., "Groundwater Hydrology", John Wiley. 1959
2. Bear, J., "Hydraulics of Groundwater", McGraw. 1979
3. Bouwer, H., "Groundwater Hydrology", McGraw Hill. 1978

4. Walton, W.C., "Groundwater Resources Evaluation", McGraw Hill. 1970 Freeze and Cherry, "Groundwater", Prentice Hall. 1979
5. Driscoll, F.G., "Ground Water and Wells", Johnson Division. 1986
6. Raghunath, H. M., "Ground Water", New Age International (P) Limited.

Course Outcomes (Cos)

After the completion of course the student must able to

1. To understand aquifer properties and movement of ground water flow after the completion of the course.
2. Able to exposure towards well design and practical problems of ground water aquifers.
3. Able to find out groundwater quality parameters
4. Able to manage the groundwater resources

WE23C COMPUTATIONAL METHODS IN FLUID MECHANICS

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

Review of numerical techniques like method of characteristics, finite difference method.

Finite element method- Finite element formulation – interpolation function – one dimensional element – two dimensional elements – three dimensional elements.

UNIT II

Causes of transients in pipes, water hammer, rigid water column theory, elastic water column theory, equivalent bulk modulus of elasticity.

UNIT III

Transient open channel flow: Introduction- Examples of transient flow – Governing equation – methods of solution – method of characteristics –Explicit and implicit Finite difference method.

UNIT IV

Numerical solutions for Navier-Stokes, boundary layer and Reynolds equations.

UNIT V

Groundwater modeling, formulation of anisotropic and non homogenous flow of groundwater, finite difference methods for solving groundwater flow problems, regional groundwater flow modelling.

References:

1.Anderson, "Computational Fluid Mechanics and Heat Transfer", McGraw Hill. 1984
2. Chung, T. J., "Finite Element Analysis in Fluid Dynamics", McGraw Hill. 1978
3.Anderson, &Weessner, "Applied Groundwater Modelling", Academic Press. 1992

4.Chaudhary, H. M., "Applied Hydraulic Transient", McGraw Hill. 1976

5. Streeter and Wylie, "Fluid Transients", McGraw Hill. 1976

6. Smith, G.D., "Numerical Solution of Partial Differential Equations-FDM". 1985
7. M. Hanif Chaudhry " Applied Hydraulic transients" third edition, springer publications

Course Outcomes

1. Able to compute the various flow parameters using FDM

2. able to analyse the flow field in a variety of practical situation without going for physical model setup

3. Able to solve the groundwater flow modelling conditions.

WE23C THEORY AND APPLICATIONS OF GIS

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

INTRODUCTION, Geographical concepts and Terminology, Difference between Image Processing system and GIS, Utility of GIS. Various GIS packages and their salient features, Essentials components of GIS, Data acquisition through scanners and digitizers.

UNIT II

RASTER AND VECTOR DATA: Introduction, Descriptions: Raster and Vector data, Raster Versus Vector, Raster to Vector conversion, Remote Sensing Data in GIS, Topology and Spatial Relationships, Data storage verification and editing.

UNIT III

DATA PRE-PROCESSING, Georeferencing, Data compression and reduction techniques, Run length encoding, Interpolation of data, Database Construction, GIS and the GPS, Data Output Database structure, Hierarchical data, Network systems, Relational database, Database management, Data manipulation and analysis

UNIT IV

SPATIAL AND MATHEMATICAL OPERATIONS IN GIS, Overlay, Query based, Measurement and statistical modelling, Buffers, Spatial Analysis, Statistical Reporting and Graphing Programming languauges in GIS, Virtual GIS, Web GIS

UNIT V

APPLICATION OF GIS IN WATER RESOURCES : Land use/Land cover, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring. Watershed management for sustainable development and Watershed characteristics – Reservoir sedimentation, Identification of suitable sites for Ground water & identification of sites for artificial recharge structures, Drainage morphometry, water depth estimation

References:

1. Burrough, P.A. and Mc Donnel, R.A., “Principles of Geographic Information System”, Oxford University Press. 2000.

2. Chrisman, Nicholas R., “Exploring Geographic Information Systems”, John Wiley. 2002

3. Demers, Michael N., “Fundamentals of Geographic Information System”, 2nd Ed. Wiley. 2008

4. Ghosh, S.K. and Chandra, A.M., “Remote Sensing and GIS”, Narosa Publishing House. 2008

5. Lo, C.P. and Young, A.K.W., “Concepts and Techniques of Geographical Information System”, Prentice Hall India. 2002

6. Longley, Paul A, Goodchild, Michael F., Maguire, David J. and Rhind, David W., “Geographic Information Systems and Science”, Wiley. 2001.

Course Outcomes

1. Able to analyse the data both in raster format and vector format

2. Able to evaluate the performance of irrigation systems

3. Able to evaluate groundwater potential using GIS and various applications in water resources engineering.

WE23C HYDROGEOLOGY AND GEOPHYSICAL EXPLORATION OF GROUNDWATER

L / week : 3Hrs **Sessional Marks : 40**
University Exam : 3 Hrs **End Exam Marks : 60**

UNIT-I

INTRODUCTION :

Definitions of Hydrogeology – Interdisciplinary subject - Exploration of ground water – Aquifer properties - Porosity, permeability and hydraulic head- Direction and speed of movement of groundwater.

UNIT-II

GROUNDWATER IN DIFFERENT ROCK FORMATIONS

Rock types – Yield of groundwater from Igneous, metamorphic, sedimentary rocks, coastal deposits and glacial deposits - Groundwater indicators – Reservoir indicators – Surface indicators – Boundary indicators

UNIT – III

METHODS OF EXPLORATION- 1

Theory of electrical resistivity - Sounding and profiling - Four electrode system – Wenner and Sclumberger configuration-Cumulative resistivity method – Tagg's master curves. Electrical logging - Spontaneous potential logging - Interpretation from logs.

UNIT – IV

METHODS OF EXPLORATION - 2

Types of waves- elastic constants – Refraction method of measurement – its interpretation - Reflection method of measurement – its interpretation.Soil temperature survey – Magnetic survey – Gravity survey.

UNIT – V

METHODS OF EXPLORATION- 3

Application of Remote sensing method to delineate groundwater potential zones- thematic maps – Assessment of status of groundwater development.Radioactive logging , Induction logging, sonic logging- interpretation from logs.Drilling time, factors influencing and use of drilling time, applications of drill stem test data, wire line formation test.

Reference Books:

1. Raghunath H M (1998) "Groundwater" New Age International Publishers

2. Davis S.N. and Dewiest R.I.M. (1967) "Hydrogeology" – John Wiley sons.

3. Griffith,D.H and King R.F (1966) "Applied geophysics for Engineers and geologists" Pergamen Press.

4. Todd,D.K. (1980) "Groundwater Hydrology" John Wiley and sons, New York.

5. R.Kirsch (edited by) " Groundwater Geophysics- A tool for hydrogeology" 2nd edition, Springer Publications.

Course Outcomes (COs)

After completion of the course the student will have :

1. Able to identify different types of aquifers
2. Able to find out yield of well in different aquifers
3. Able to conduct geophysical exploration studies on groundwater identification studies
4. Applying different logging techniques in groundwater and remote sensing and gis

WE23C COASTAL ENGINEERING

L / week : 3Hrs **Sessional Marks : 40**
University Exam : 3 Hrs **End Exam Marks : 60**

UNIT -I

COASTAL ZONE PROCESS:

General, Sediment properties; measurement and sampling techniques - fundamental principles of movement - bad load and suspended load transport.

UNIT -II

Role of coastal sedimentation process - Long shore drift - Beach Evaluation Models - General sediment transport models - On-shore and off-shore sediment transport.

UNIT -III

Beach nourishment - Coast and Bed Morphology - Regime of the Coast and Sea Beach - Sand features - Features of Estuaries - Coastal and Beach features.

UNIT –IV

COASTAL PROTECTION

Identification of the problem - Restoration of the Beach - Groynes and Rivetments - Off-shore Breakwaters, Bays and Artificial Headlands - Beach replenishment.

UNIT -V

DESIGN PRINCIPLES OF COASTAL AND HARBOUR STRUCTURES :

Break water - types - Waves, Jelties and Piers; Docks - different types.

Reference Books :

1. "Coastal Hydraulics" (2nd Edn) By A.M. Muir Wood and CA Fleming, John Wiley and Sons (Newyork).
2. "Coastal Engineering" (Vol. 1 & 2) by Richard L. Silvister, Elsvier Scientific Publishing Company.

Course Outcomes (Cos)

1. Able to know Explain the properties, measurement and principles of sediment transport.
2. Able to evaluate the different sediment transport models
3. Able to describe the different features of coast and beach
4. Able to apply the knowledge of design principles of coastal and harbor structures

WE24C ENVIRONMENTAL HYDRAULICS

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

Introduction and scope, review of basic principles of engineering fluid mechanics, continuity, momentum, and energy equations, steady flow through pipes- hydraulic gradient and total energy line, basics of open channel flow; Ground water, well hydraulics, well design and constructions,

UNIT II

Parallel, compound and equivalent pipes, head losses in pipes, design of pressurized conduits,

UNIT III

Various forms of mixing in the environment, modeling of the mixing process:

advection dispersion equation, Various forms of advection dispersion eq. and its solution.

UNIT IV

Special cases of mixing, density stratified flow, tide, etc.

UNIT V

Mass transfer in gas-liquid and liquid -liquid system with special emphasis on aeration, Project presentation

References:

1. Roberson, J.A., Cassidy, J.J., Chaudhry, M.H. “Hydraulic Engineering”, 2nd Edition, Wiley. 1998
2. Chadwick, A., Morfett, J., Borthwick, M. “Hydraulics in Civil and Environmental Engineering”, 5th Edition, CRC Press. 2004
3. Lee, C. C., Lin, S.D. “Handbook of Environmental Engineering Calculations”, McGraw Hill. 2007
4. Schnoor, J.L., Environmental Modeling: Fate of Chemicals in Water, Air and Soil, John Wiley & Sons, New York. 1996.

Course Outcome

1. The students will be able to gain a basic knowledge of advection-dispersion processes in the environment.

2. Able to gain the skills to take up research activities in solving environmental problems involving fluid motions.

WE24C ADVANCED NUMERICAL ANALYSIS

L / week	**: 3Hrs**	**Sessional Marks**	**: 40**
University Exam	**: 3 Hrs**	**End Exam Marks**	**: 60**

UNIT I

Introduction to digital computers & Programming an overview; Errors-Polynomial approximations and interpolations-Numerical differentiation & Integration.

UNIT II

Evaluation of single and multiple integrals, Newton's method, variational and weightened residual methods.

UNIT III

Matrices –Linear equations, Eigenvalues and Eigenvectors-nonlinear equations,

UNIT IV

Harmonic and biharmonic equations - solutions, convergence, completeness & stability.

UNIT V

Initial and boundary value problems of finite difference method, Implicit & Explicit scheme.

References

1.Jain M.K, SRK Iyenge and RK Jain."Numerical Methods for Scientific & Engg. Computation".

2.Mathews J. H “Numerical Methods for Mathematics, Science and Engineering”.

3.Gerld C.F and PO Wheatley “Applied Numerical Analysis”.

4. Gupta S.C and V. K. Kapoor “Fundamentals of Applied Statistic”, Sultan Chand & Sons.

5. Johnson R.A “ Probability and Statistics for Mngineers.

Course outcomes:

1.able to determine different variables using different numerical techniques.

WE24C RIVER WATER MANAGEMENT

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT -1

INTRODUCTION

Planning and analysis of Water Resources Systems –Probability concepts and methods.

UNIT -II

WATER RESOURCES PLANNING UNDER UNCERTAINITY

Distributions of random events - Stochastic process and time series - Planning with uncertainity - analysing systems with dynamic uncertainty.

UNIT -111

DETERMINISTIC RIVER BASIN MODELLING:

Food control alternatives - Hydro power production - Withdrawals and Diversions - Model synthesis -Expansion of water resources systems.

UNIT -IV

SYNTHETIC STREAM FLOW GENERATION:

Statistical streamflow generation models - Multisite models - Multiseasonal models - Model selection and parameter estimation - Stream flow generation from precipitation data.

UNIT -V

STOCHASTIC RIVER BASIN PLANNING MODELS

Reservoir operation - Single reservoir design and operation - Multiple - Site River Basin Planning Models.

Reference Books :

1. "Water Resources System Planning and Analysis" by Daniel P.Loucks, Jerry R. Stedinger and Douglass A. Haith (Published by Prentice - Hall Inc.)

Course outcomes:

1. Able to plane water resources projects with different uncertainties
2. Able to design the river basing modelling
3. Able to design the stochastic river basin planning models

WE24C THEORY OF SEEPAGE AND GROUNDWATER MOVEMENT

L / week	**: 3Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

UNIT I

MOVEMENT OF GROUNDWATER

Darcy's flow - Range of validity of Darcy's law - permeability coefficient – laboratory and field methods of measurement - General hydrodynamic equation.

UNIT II

STEADY STATE FLOWS

Bboundary conditions – flow nets – construction and analysis of flow nets – flow nets for anisotropic soils.

UNIT III

UNCONFINED FLOWS

Dupuit's theory of unconfined flow – basic considerations- Two-dimensional flow on a horizontal impervious boundary - Free surface subjected Infiltration and Evaporation - groundwater flow with an inclined lower impervious boundary – Pavlosky's solutions.

UNIT IV
CONFORMAL TRANSFORMATIONS AND MAPPING TECHNIQUES

Geometrical representation of $w = f(z)$ and $z = f(w)$, application of the mapping function $z = w^2$ - Reciprocal function $w = 1/z$ - Velocity hodograph – impervious boundary – boundary of reservoir – surface of seepage –free surface– flow characteristics at singular points of flow domain – example of velocity hodograph.

UNIT V
RECHARGE OF GROUNDWATER

Concept of recharge – methods- waste water recharge for reuse – Artificial recharge for energy purposes.

References :

1. Groundwater and Seepage : M.E. Harr ,Mc Graw Hill pubs.

2. Ground water Hydrology : D.K. Todd, John Wiley & Sons

Course Outcomes (Cos)

1. Able to know about movement of groundwater
2. Able to apply the boundary conditions and flow net analysis of groundwater
3. Able to apply the principles of unconfined flow and infiltration flow of groundwater
4. Able to apply conformation transformation of mapping of groundwater
5. Able to analyze different subsurface investigations and artificial recharge techniques

WE21L Computational Fluid Dynamics

P / week	**: 4Hrs**	**Sessional Marks : 40**
University Exam	**: 3 Hrs**	**End Exam Marks : 60**

List of Practicals

Exposure to software's such as ANSYS, FLUENT, creation of Geometry, Mesh, description of boundary condition and solution of flow problems in 1D, 2D and 3D. typical examples should include flow around sphere, cylinders, bridge piers etc.

Course Outcomes:

1. Able to find out boundary flow condition solution flow in 1D, 2D and 3D flows using software ANSYS, FLUENT

WE22L OPEN CHANNEL FLOW

P / week	**: 4 Hrs**	**Sessional Marks**	**: 40**
University Exam	**: 3 Hrs**	**End Exam Marks**	**: 60**

List of Practicals:

1. To calibrate a broad-crested weir and study the pressure distribution at the upstream end of the weir.
2. To study the characteristics of a hydraulic jump.
3. To study the velocity distribution downstream of an expansion (with and without splitter plates) in a channel.
4. To obtain pressure distribution over spillway profile
5. To study energy dissipation using baffle blocks
6. To study air entrainment in open channel flow
7. To study the velocity distribution in an open channel and to estimate the energy and momentum correction factors.

Course outcomes:

1. Able to find out pressure distributions of the weir

2. Able to determine velocity distribution and pressure distribution in channels

3. Able to find out kinetic energy correction factor , momentum correction factor on horizontal and sloping channels.



SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING

Curriculum & Syllabi for Structural Engineering

(w.e.f 2023-24)

MAY, 2023

PROGRAMME OBJECTIVES

1. To make students learn and Understand different problems Associated with Structural, geotechnical and hydraulics structures.
2. To develop analysis and design procedure for various types of structures.

PROGRAM OUTCOMES (POS):

After completion of the program graduates will be able to

1. Apply the knowledge of science, mathematics, and engineering principles for developing problem solving attitude.
2. Identify, formulate and solve engineering problems in the domain of structural engineering field.
3. Use different software tools for Analysis and Design structural engineering domain.
   Design and conduct experiments, analyse and interpret data, for development of simulation experiments.
4. Function as a member of a multidisciplinary team with sense of ethics, integrity and social responsibility.

SE11C ADVANCED STRUCTURAL ANALYSIS

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

UNIT-I

Introduction to matrix methods of analysis - statical indeterminacy and kinematical indeterminacy - degree of freedom - coordinate system - structure idealization stiffness and flexibility matrices - suitability element stiffness equations - elements flexibility equations - mixed force - displacement equations - for truss element, beam element and torsional element. Transformation of coordinates - element stiffness matrix - and load vector - local and global coordinates.

UNIT-II

Assembly of stiffness matrix from element stiffness matrix - direct stiffness method - general procedure - banded matrix - semi bandwidth - assembly by direct stiffness matrix method.

UNIT-III

Analysis of plane truss - continuous beams with and without settlement - plane frame including side sway single storey, single – bay and gable frame by flexibility method using system approach.

UNIT-IV

Analysis of plane truss - continuous beams with and without settlement - plane frame including sides sway, grids and gable frames by stiffness methods, single bay – two storey, two bay single – storey

UNIT-V

Special analysis procedures - static condensation and sub structuring - initial and thermal stresses.

References:

1. Matrix Structural Analysis by Madhu B. Kanchi.
2. Matrix Methods of Structural Analysis by J.Meek.
3. Structural Analysis by Ghali and Neyveli.
4. Structural Analysis by Devdas Menon, Narosa Publishing Housing Pvt Ltd

Course outcomes:

At the end of the course, students will be able to

1. Distinguish determinate and indeterminate structures.
2. Identify the method of analysis for indeterminate structures.
3. Apply matrix methods of analysis for continuous beams.
4. Apply matrix methods of analysis for rigid and pin jointed frames

SE12C ADVANCED SOLID MECHANICS

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

UNIT-I

INTRODUCTION TO ELASTICITY: Displacement, Strain and Stress Fields, Constitutive Relations, Cartesian Tensors and Equations of Elasticity.

STRAIN AND STRESS FIELD: Elementary Concept of Strain, Stain at a Point, Principal Strains and Principal Axes, Compatibility Conditions, Stress at a Point, Stress Components on an Arbitrary Plane, Differential Equations of Equilibrium, Hydrostatic and Deviatoric Components.

UNIT-II

EQUATIONS OF ELASTICITY: Equations of Equilibrium, Stress- Strain relations, Strain Displacement and Compatibility Relations, Boundary Value Problems, Co-axiality of the Principal Directions.

UNIT-III

TWO-DIMENSIONAL PROBLEMS OF ELASTICITY: Plane Stress and Plane Strain Problems, Airy's stress Function, Two-Dimensional Problems in Polar Coordinates.

UNIT-IV

TORSION OF PRISMATIC BARS: Saint Venant's Method, Prandtl's Membrane Analogy, Torsion of Rectangular Bar, Torsion of Thin Tubes.

UNIT-V

PLASTIC DEFORMATION: Strain Hardening, Idealized Stress- Strain curve, Yield Criteria, von Mises Yield Criterion, Tresca Yield Criterion, Plastic Stress-Strain Relations, Principle of Normality and Plastic Potential, Isotropic Hardening.

References:

1. Theory of Elasticity, Timoshenko S. andGoodierJ. N., McGraw Hill, 1961.
2. Elasticity,SaddM.H.,Elsevier,2005.
3. Engineering Solid Mechanics, RagabA.R., BayoumiS.E., CRC Press,1999.
4. Computational Elasticity, AmeenM., Narosa,2005.
5. Solid Mechanics, KazimiS. M. A., Tata McGraw Hill,1994.
6. Advanced Mechanics of Solids, SrinathL.S., Tata McGraw Hill,2000.

Course outcomes: At the end of the course, students will be able to

1. Solve simple problems of elasticity and plasticity understanding the basic concepts.
2. Apply numerical methods to solve continuum problems.

3. Study the two-dimensional problems of Elasticity.

4. Solving the tensional problem of prismatic beam.

5. Solve the problems of plasticity understanding the basic concepts.

SE13C DESIGN OF PRESTRESSED CONCRETE STRUCTURES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Contents

UNIT-I

INTRODUCTION TO PRESTRESSED CONCRETE: types of prestressing, systems and devices, materials, losses in prestress. Analysis of PSC flexural members: basic concepts, stresses at transfer and service loads, ultimate strength in flexure, code provision.

UNIT-II

TRANSMISSION OF PRESTRESS: Pretensioned members; Anchorage zone stresses for post tensioned members, Short term and Long term PSC beams

UNIT-III

STATICALLY DETERMINATE PSC BEAMS: Analysis and Design for ultimate and serviceability limit states for flexure, shear and torsion, code provisions.

UNIT-IV

STATICALLY INDETERMINATE STRUCTURES - Analysis and design - continuous beams and frames, choice of cable profile, linear transformation and concordancy.

UNIT-V

COMPOSITE CONSTRUCTION with precast PSC beams and cast in-situ RC slab - Analysis and design, creep and shrinkage effects. Partial prestressing - principles, analysis and design concepts, crack-width calculations. Analysis and design of pre stressed concrete pipes

References:

1. Design of Prestressed Concrete Structures, Lin T.Y., Asia Publishing House, 1955.
2. Prestressed Concrete, Krishnaraju N., Tata McGraw Hill, New Delhi, 1981.
3. Limited State Design of Prestressed Concrete, GuyanY., Applied Science Publishers, 1972.
4. IS: 1343- Code of Practice for Prestressed Concrete
5. IRC: 112

Course outcomes: At the end of the course, students will be able to

1. Find out losses in the prestressed concrete. Understand the basic aspects of prestressed concrete fundamentals, including pre and post-tensioning processes.
2. Analyse prestressed concrete deck slab and beam/ girders.
3. Design prestressed concrete deck slab and beam/ girders.
4. Design of end blocks for prestressed members.

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SE14C ADVANCED STEEL DESIGN

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Contents:

UNIT-I

PROPERTIES OF STEEL: Mechanical Properties, Hysteresis, Ductility.

HOT ROLLED SECTIONS: compactness and non-compactness, slenderness, residual stresses.

UNIT-II

DESIGN OF STEEL STRUCTURES: Inelastic Bending Curvature, Plastic Moments, Design Criteria Stability, Strength, Drift.

STABILITY OF BEAMS: Local Buckling of Compression Flange &Web, Lateral Torsional Buckling.

UNIT-III

STABILITY OF COLUMNS: Slenderness Ratio, Local Buckling of Flanges and Web, Bracing of Column about Weak Axis.

METHOD OF DESIGNS: Allowable Stress Design, Plastic Design, Load and Resistance Factor Design;

UNIT-IV

STRENGTH CRITERIA: Beams - Flexure, Shear, Torsion, Columns - Moment Magnification Factor, Effective Length, PM Interaction, Biaxial Bending, Joint Panel Zones.

DRIFT CRITERIA: P Effect, Deformation Based Design;

UNIT-V

CONNECTIONS: Welded, Bolted, Location Beam Column, Column Foundation, Splices.

Reference Books

1. Design of Steel Structures - Vol. II, Ramchandra. Standard Book House, Delhi.

2. Design of Steel Structures - Arya A. S., Ajmani J. L., Nemchand and Bros., Roorkee.

3. The Steel Skeleton- Vol. II, Plastic Behaviour and Design - Baker J. F., Horne M. R., Heyman J., ELBS.

4. Plastic Methods of Structural Analysis, Neal B. G., Chapman and Hall London. IS 800: 2007 – General Construction in Steel - Code of Practice, BIS, 2007.

5. SP – 6 - Handbook ofStructural Steel Detailing, BIS,198

Course Outcomes: At the end of the course, students will be able to

1. Design steel structures/ components by different design processes.

2. Analyze and design beams and columns for stability and strength, and drift.

3. Design welded and bolted connections

SE14C THEORY AND APPLICATIONS OF CEMENT COMPOSITES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Content:

UNIT-I

INTRODUCTION: Classification and Characteristics of Composite Materials- Basic Terminology, Advantages. Stress-Strain Relations- Orthotropic and Anisotropic Materials, Engineering Constants for Orthotropic Materials, Restrictions on Elastic Constants, Plane Stress Problem, Biaxial Strength, Theories for an Orthotropic Lamina.

UNIT-II

MECHANICAL BEHAVIOUR: Mechanics of Materials Approach to Stiffness- Determination of Relations between Elastic Constants, Elasticity Approach to Stiffness- Bounding Techniques of Elasticity, Exact Solutions - Elasticity Solutions with Continuity, Halpin, Tsai Equations, Comparison of approaches to Stiffness.

UNIT-III

CEMENT COMPOSITES: Types of Cement Composites, Terminology, Constituent Materials and their Properties, Construction Techniques for Fibre Reinforced Concrete - Ferro cement, SIFCON, Polymer Concretes, Preparation of Reinforcement, Casting and Curing.

MECHANICAL PROPERTIES OF CEMENT COMPOSITES: Behaviour of Ferro cement, Fibre Reinforced Concrete in Tension, Compression, Flexure, Shear, Fatigue and Impact, Durability and Corrosion.

UNIT-IV

APPLICATION OF CEMENT COMPOSITES: FRC and Ferro cement- Housing, Water Storage, Boats and Miscellaneous Structures. Composite Materials- Orthotropic and Anisotropic behaviour, Constitutive relationship, Elastic Constants.

UNIT-V

ANALYSIS AND DESIGN OF CEMENT COMPOSITE STRUCTURAL ELEMENTS - Ferro cement, SIFCON and Fibre Reinforced Concrete.

Reference Books:

1. Mechanics of Composite Materials, Jones R. M,, 2nd Ed., Taylor and Francis,BSP Books, 1998. Ferro cement – Theory and Applications, Pama R. P., IFIC, 1980.
2. New Concrete Materials, Swamy R.N., 1stEd., Blackie, Academic and Professional, Chapman & Hall, 1983.

Course Outcomes: At the end of the course, students will be able to

1. Formulate constitutive behaviour of composite materials – Ferrocement, SIFCON and Fibre Reinforced Concrete - by understanding their strain- stress behaviour.
2. Classify the materials as per orthotropic and anisotropic behaviour.
3. Estimate strain constants using theories applicable to composite materials.
4. Analyse and design structural elements made of cement composites.

SE14C THEORY OF STRUCTURAL STABILITY

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Contents:

UNIT-I

CRITERIA FOR DESIGN OF STRUCTURES: Stability, Strength, and Stiffness, Classical Concept of Stability of Discrete and Continuous Systems, Linear and nonlinear behaviour.

UNIT-II

STABILITY OF COLUMNS: Axial and Flexural Buckling, Lateral Bracing of Columns, Combined Axial, Flexural and Torsion Buckling.

UNIT-III

STABILITY OF FRAMES: Member Buckling versus Global Buckling, Slenderness Ratio of Frame Members.

UNIT-IV

STABILITY OF BEAMS: lateral torsion buckling.

UNIT-V

STABILITY OF PLATES: Axial, flexural, buckling, shear, flexural, buckling, buckling under combined loads. Introduction to Inelastic Buckling and Dynamic Stability.

Reference Books:

1. Theory of elastic stability, Timoshenko and Gere, Tata Mc Graw Hill,1981
2. Principles of Structural Stability Theory, Alexander Chajes, Prentice Hall, New Jersey.
3. Structural Stability of columns and plates, Iyengar, N. G. R., Eastern west press Pvt. Ltd. Strength of Metal Structures,Bleich F. Bucking, Tata McGraw Hill, New York.

Course Outcomes: At the end of the course, students will be able to

1. Use stability criteria and concepts for analysing discrete and continuous systems,

2. Determine stability of beams and plates
3. Determine stability of columns and frames
4. Determine stability of plates.

SE14C ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL ENGINEERING

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Contents:

UNIT-I

FUNDAMENTALS OF NUMERICAL METHODS: Error Analysis, Polynomial Approximations and Interpolations, **Curve Fitting;** Interpolation and extrapolation. Solution of nonlinear algebraic and transcendental equations

UNIT-II

ELEMENTS OF MATRIX ALGEBRA: Solution of Systems of Linear Equations, Eigen Value Problems.

UNIT-III

NUMERICAL DIFFERENTIATION & INTEGRATION: Solution of Ordinary and Partial Differential Equations.

UNIT-IV

INITE DIFFERENCE SCHEME: Implicit & Explicit scheme.

UNIT-V

COMPUTER ALGORITHMS: Numerical Solutions for Different Structural Problems, Fuzzy Logic and Neural Network.

Reference Books:

1. An Introduction to Numerical Analysis, AtkinsonK.E., J. Wiley and Sons, 1989.

2. Theory and Problems of Numerical Analysis, Scheid F, McGraw Hill Book Company, (Shaum Series), 1988.

3. Introductory Methods of Numerical Analysis, Sastry S. S, Prentice Hall of India, 1998.

Course Outcomes: At the end of the course, students will be able to

1. Analyse the error analysis, polynomial approximations & curve fittings.
2. Write solutions of systems of linear equations & given value problems.
3. Solve ordinary and partial differential equations in structural mechanics using numerical methods.

4. Write a program to solve a mathematical problem.

SE15C STRUCTURAL HEALTH MONITORING

L / L / week : 3Hrs Sessional Marks : 40

University Exam : 3 Hrs End Exam Marks : 60

Syllabus Contents:

UNIT-I

STRUCTURAL HEALTH: Factors affecting Health of Structures, Causes of Distress, Regular Maintenance.

UNIT-II

STRUCTURAL HEALTH MONITORING: Concepts, Various Measures, Structural Safety in Alteration.

STRUCTURAL AUDIT: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures.

UNIT-III

STATIC FIELD TESTING: Types of Static Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static Response Measurement.

UNIT-IV

DYNAMIC FIELD TESTING: Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring.

UNIT-V

INTRODUCTION TO REPAIRS AND REHABILITATIONS OF STRUCTURES: Case Studies (Site Visits), piezo– electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMI technique.

Reference Books:

1. Structural Health Monitoring, Daniel Balageas, Claus Peter Fritzen, Alfredo Güemes, John Wiley and Sons, 2006.
2. Health Monitoring of Structural Materials and Components Methods with Applications, Douglas E Adams, John Wiley and Sons, 2007.
3. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan, Taylor and Francis Group, London, UK, 2006.
4. Structural Health Monitoring with Wafer Active Sensors, Victor Giurglutiu, Academic Press Inc, 2007.

Course Outcomes: At the end of the course, students will be able to

1. Diagnosis the distress in the structure understanding the causes and factors.
2. Assess the health of structure using static field methods.
3. Assess the health of structure using dynamic field tests.
4. Suggest repairs and rehabilitation measures of the structure.

SE15C QUALITY CONTROL AND SAFETY MANAGEMENT

L / L / week : 3Hrs Sessional Marks : 40

University Exam : 3 Hrs End Exam Marks : 60

Syllabus Contents:

UNIT-I

Types Of Organizations: Inspection. Control And Enforcement -Quality Management Systems And Method - Responsibilities And Authorities In Quality Assurances And Quality ControlArchitects, Engineers, Contractors, And Special Consultants, Quality Circle. Quality Systems : Introduction - Quality System Standard – ISO 9000 Family Of Standards – Requirements – Preparing Quality System Documents – Quality Related Training – Implementing A Quality System – Third Party Certification

UNIT-II

Quality Policy: Objectives And Methods In Construction Industry -Consumers Satisfaction, Economics- Time Of Completion -Statistical Tolerance -Taguchi's Concept Of Quality. Codes And Standards -Documents -Contract And Construction Programming -Inspection Procedures - Processes And Products -Total QA I QC Programme And Cost Implication.

UNIT-III

Regularity Agent, Owner, Design, Contract And Construction Oriented Objectives, Methods - Techniques And Needs Of QA/QC -Different Aspects Of Quality - Appraisals, Factors Influencing Construction Quality.

UNIT-IV

Critical, Major Failure Aspects And Failure Mode Analysis -Stability Methods And Tools, Optimum Design -Reliability Testing- Reliability Coefficient And Reliability Prediction – Selection Of New Materials -Influence Of Drawings Detailing, Specification, Standardization-Bid PreparationReliability Based Design.

UNIT-V

Construction Activity And Environmental Safety: Social And Environmental Factors- Natural Causes And Speed Of Construction -Life Cycle Costing- Reliability And Probabilistic MethodsValue Engineering And Value Analysis

Reference Books:

1. Structural Health Monitoring, Daniel Balageas, Claus Peter Fritzen, Alfredo Güemes, John Wiley and Sons, 2006.
2. Health Monitoring of Structural Materials and Components Methods with Applications, Douglas E Adams, John Wiley and Sons, 2007.
3. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan, Taylor and Francis Group, London, UK, 2006.
4. Structural Health Monitoring with Wafer Active Sensors, Victor Giurglutiu, Academic Press Inc, 2007.

Course Outcomes: At the end of the course, students will be able to

1. Diagnosis the distress in the structure understanding the causes and factors.
2. Assess the health of structure using static field methods.
3. Assess the health of structure using dynamic field tests.
4. Suggest repairs and rehabilitation measures of the structure.

SE15C MAINTENANCE AND REHABILITATION OF STRUCTURES

L / L / week : 3Hrs Sessional Marks : 40

University Exam : 3 Hrs End Exam Marks : 60

Syllabus Contents:

UNIT-I

Influence On Serviceability And Durability: General : Quality Assurance For Concrete Construction, As Built Concrete Properties, Strength, Permeability, Volume Changes, Thermal Properties, Cracking. Effects Due To Climate, Temperature, Chemicals, Wear And Erosion, Design And Construction Errors, Corrosion Mechanism, Effects Of Cover Thickness And Cracking Methods Of Corrosion Protection, Inhibitors, Resistant Steels, Coatings Cathodic Protection.

UNIT-II

Maintenance And Repair Strategies: Inspection, Structural Appraisal, Economic Appraisal, Components Of Equality Assurance, Conceptual Bases For Quality Assurance Schemes..

UNIT-III

Materials For Repair: Special Concretes And Mortar, Concrete Chemicals, Special Elements For Accelerated Strength Gain, Expansive Cement, Polymer Concrete, Sulphur Infiltrated Concrete, Ferro Cement, Fibre Reinforced Concrete.

UNIT-IV

Techniques For Repair : Rust Eliminators And Polymers Coating For Rebars During Repair, Foamed Concrete, Mortar And Dry Pack, Vacuum Concrete, Gunite And Shotcrete Epoxy Injection, Mortar Repair For Cracks, Shoring And Underpinning.

UNIT-V

Case Studies : Repairs To Overcome Low Member Strength, Deflection, Cracking, Chemical Disruption, Weathering, Wear, Fire, Leakage, Marine Exposure.

Reference Books:

1. Structural Health Monitoring, Daniel Balageas, Claus Peter Fritzen, Alfredo Güemes, John Wiley and Sons, 2006.
2. Health Monitoring of Structural Materials and Components Methods with Applications, Douglas E Adams, John Wiley and Sons, 2007.
3. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan, Taylor and Francis Group, London, UK, 2006.
4. Structural Health Monitoring with Wafer Active Sensors, Victor Giurglutiu, Academic Press Inc, 2007.

Course Outcomes: At the end of the course, students will be able to

1. Diagnosis the distress in the structure understanding the causes and factors.
2. Assess the health of structure using static field methods.
3. Assess the health of structure using dynamic field tests.
4. Suggest repairs and rehabilitation measures of the structure.

SE15C FRACTURE MECHANICS OF CONCRETE STRUCTURES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Contents:

UNIT-I

INTRODUCTION: Basic Fracture Mechanics, Crack in a Structure, Mechanisms of Fracture and Crack Growth, Cleavage Fracture, Ductile Fracture, Fatigue Cracking.

UNIT-II

FRACTURE MECHANISM:

UNIT-III

STRESS AT CRACK TIP: Stress at Crack Tip, Linear Elastic Fracture Mechanics, Griffith's Criteria, Stress Intensity Factors, Crack Tip Plastic Zone, Erwin's Plastic Zone Correction, R curves, Compliance, J Integral, Concept of CTOD and CMD.

UNIT-IV

MATERIAL MODELS: General Concepts, Crack Models, Band Models, Models based on Continuum Damage Mechanics, Applications to High Strength Concrete, Fibre Reinforced Concrete.

UNIT-V

Environment assisted Cracking, Service Failure Analysis, Crack Concepts and Numerical Modelling.

Reference Books:

1. Fracture Mechanics, Suri C. T. and Jin Z.H., 1st Edition, Elsevier Academic Press, 2012.
2. Elementary Engineering Fracture Mechanics, BroekDavid, 3rd Rev. Ed. Springer, 1982.
3. Fracture Mechanics of Concrete Structures – Theory and Applications, Elfgreen L., RILEM Report, Chapman and Hall, 1989.
4. Fracture Mechanics – Applications to Concrete, Victor, Li C., Bazant Z. P., ACI SP 118, ACI Detroit, 1989.

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Course outcomes: At the end of the course, students will be able to

1. Identify and classify cracking of concrete structures based on fracture mechanics.
2. Implement stress intensity factor for notched members
3. Apply fracture mechanics models to high strength concrete and FRC structures.
4. Compute J-integral for various sections understanding the concepts of LEFM.

SE21C FINITE ELEMENT METHOD IN STRUCTURAL ENGINEERING

L / week : 3Hrs Sessional Marks : 40
University Exam : 3 Hrs End Exam Marks : 60

Syllabus Contents:

UNIT-I

Introduction: Concepts of FEM –Steps Involved –Merits &Demerits –Energy Principles – Discretization –Rayleigh –Ritz Method of Functional Approximation.

Elastic Formulations: Stress Equations-Strain Displacement Relationships in Matrix Form-Plane Stress, Plane Strain and AxiSymmetric Bodies of Revolution With Axi Symmetric Loading

UNIT-II

One Dimensional -FEM-Stiffness Matrix for Beam and Bar Elements Shape Functions for ID Elements –Static Condensation of Global Stiffness Matrix-Solution –Initial Strain and Temperature Effects.

UNIT-III

Two Dimensional FEM: Different Types of Elements for Plane Stress and Plane Strain Analysis – Displacement Models –Generalized Coordinates-Shape Functions-Convergent and Compatibility Requirements –Geometric Invariance –Natural Coordinate System-Area and Volume CoordinatesGeneration of Element Stiffness and Nodal Load Matrices –Static Condensationalerkin Finite Element Method, Application to Structural Elements, Interpolation Functions, Compatibility and Completeness Requirements, Polynomial Forms, Applications.

UNIT-IV

Isoparametric Formulation-Concept, Different Isoparametric Elements for 2D AnalysisFormulation of 4-Noded and 8-Noded Isoparametric Quadrilateral Elements – Lagrangian ElementsSerendipity Elements. Axi Symmetric Analysis –Bodies of Revolution-Axi Symmetric Modelling – Strain Displacement Relationship-Formulation of Axi Symmetric Elements.

UNIT-V

Three Dimensional FEM-Different 3-D Elements, 3D Strain –Displacement RelationshipFormulation of Hexahedral and Isoparametric Solid Element

Reference Books:

1. Finite Element Analysis, Seshu P., Prentice-Hall of India,2005.
2. Concepts and Applications of Finite Element Analysis, Cook R. D., Wiley J., New York, 1995. Fundamentals of Finite Element Analysis, Hutton David, Mc-Graw Hill, 2004.
3. Finite Element Analysis, Buchanan G.R., McGraw Hill Publications, New York, 1995. Finite Element Method, Zienkiewicz O.C. & Taylor R.L. Vol. I, II & III, Elsevier, 2000.
4. Finite Element Methods in Engineering, Belegundu A.D., Chandrupatla, T.R., Prentice Hall India, 1991.

Course Outcomes: At the end of the course, students will be able to

1. Use Finite Element Method for structural analysis.
2. Execute the Finite Element Program/ Software.
3. Solve continuum problems using finite element analysis.
4. Develop the FEM software.

SE22C STRUCTURAL DYNAMICS

L/week : 3Hrs Sessional Marks : 40

University Exam : 3 Hrs End Exam Marks: 60

UNIT - I

RESPONSE OF SIMPLE – SINGLE DEGREE OF FREEDOM SYSTEM - Definition of DOF – Idealization of structure as SDOF system – Formulation of equations of motion for various SDOF systems – Free vibration of un-damped systems – Determination of natural frequency - Free vibration of viscously damped systems – Determination of Damping in structures.

UNIT - II

RESPONSE OF SINGLE DEGREE OF FREEDOM SYSTEMS- FORCED VIBRATIONS -

Forced vibration of systems – Steady state response to harmonic forces – Duhamel's integral-Numerical Evaluation – Response to support motion – Transmissibility – Construction of response Spectrum.

UNIT - III

ANALYSIS OF MULTI-DEGREE OF FREEDOM SYSTEMS - Formal Derivations — Formulation of equation of motion - Evaluation of natural frequencies and modes — Free vibration of undamped systems — Forced vibration of damped systems.

UNIT — IV

APPROXIMATE METHODS OF COMPUTING NATURAL FREQUENCIES - Rayleigh's method – Dunkerley's method – Methods of iteration – Stodola – Vainello Method –Rayleigh – Ritz method.

UNIT — V

DYNAMIC ANALYSIS OF CONTNUOUS SYSTEM - Vibration of flexural beams — Equation of motion — Free vibrations of Uniform Beams - Natural frequencies and Mode Shapes of Beams with different Support Conditions - Orthogonality Condition between Normal Modes.

References :

1. Dynamics of Structures, Clough R.W, and Penzien J, McGraw Hill.
2. Structural Dynamics and Introduction to Earthquake Engineering, Chopra A K, Prentice Hall.
3. Vibrations of Structures – Application in Civil Engg Design, Smith J. W.Chapman and Hall.
4. Dynamics of Structures, Humar J L, Prentice Hall.
5. Structural Dynamics - Theory and Computation, Paz Mario, CBS Publication.

Course Outcomes: At the end of the course, students will be able to

1. Analyze the dynamic response of single degree freedom system usinging fundamental theory and equation of motion.
2. Analyze dynamic response of Multi-degree of freedom system with lumped parameters.
3. Apply approximate methods to obtain fundamental natural frequency of structures.
4. Analyze dynamics response of Multi degree of freedom system with distributed mass.

SE23C THEORY OF THIN PLATES AND SHELLS

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Contents:

UNIT-I

INTRODUCTION: Space Curves, Surfaces, Shell Co-ordinates, Strain Displacement Relations, Assumptions in Shell Theory, Displacement Field Approximations, Stress Resultants, Equation of Equilibrium using Principle of Virtual Work, Boundary Conditions.

UNIT-II

STATIC ANALYSIS OF PLATES: Governing Equation for a Rectangular Plate, Navier Solution for Simply- Supported Rectangular Plate under Various Loadings, Levy solution for Rectangular Plate with other Boundary Conditions.

UNIT-III

CIRCULAR PLATES: Analysis under Axi- Symmetric Loading, Governing Differential Equation in Polar Co-ordinates. Approximate Methods of Analysis- Rayleigh-Ritz approach for Simple Cases in Rectangular Plates.

UNIT-IV

STATIC ANALYSIS OF SHELLS: MEMBRANE THEORY OF SHELLS - Cylindrical, Conical and Spherical Shells,

UNIT-V

SHELLS OF REVOLUTION: WITH BENDING R**ESISTANCE** - Cylindrical and Conical Shells, Application to Pipes and Pressure Vessels.

References:

1. Theory of Plates and Shells, Timoshenko S. and KriegerW., McGraw Hill.
2. Stresses in Plates and Shells, UguralAnsel C., McGraw Hill.
3. Thin Elastic Shells, KrausH., John Wiley and Sons.
4. Theory of Plates, Chandra shekhar K., Universities Press.
5. Design and Construction of Concrete Shells, Ramaswamy G.S.

Course Outcomes: At the end of the course, students will be able to

1. Use analytical methods for the solution of thin plates and shells.
2. Use analytical methods for the solution of shells.
3. Apply the numerical techniques and tools for the complex problems in thin plates.
4. Apply the numerical techniques and tools for the complex problems in shells.

SE23C DESIGN OF BRIDGES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Contents:

UNIT-I

Introduction – Classification, Investigations and Planning, Choice of Type – Economic Span Length – IRC Specifications for Road Bridges, Standard Live Loads, Other Forces Acting on Bridges, General Design Considerations.

UNIT-II

Design of Box Culverts – General Aspects – Design Loads – Design Moments, Shears and Thrusts – Design of Critical Section.

Design of Slab Bridges – Effective Width of Analysis – Workings Stress Design and Detailing of Slab Bridges for IRC Loading.

UNIT-III

T-Beam Bridges – Introduction – Wheel Load Analysis – B.M. in Slab – Pigaud's Theory –

Analysis of Longitudinal Girders by Courbon's Theory Working Stress Design and Detailing of Reinforced Concrete T-Beam Bridges for IRC Loading.

UNIT-IV

Prestressed Concrete Bridges – General Features – Advantages of Prestressed Concrete Bridges – Pre-tensioned Prestressed Concrete Bridges – Post Tensioned Prestressed Concrete Bridge Decks. Design of Post Tensioned Prestressed Concrete Slab Bridge Deck. Bridge Bearings – General Features – Types of Bearings – Forces on Bearings Basis for Selection of Bearings – Design Principles of Steel Rocker and Roller Bearings and Its Design – Design of Elastometric Pad Bearing Detailing of Elastomeric Pot Bearings.

UNIT-V

Piers and Abutments – General Features – Bed Block – Materials for Piers and Abutments – Types of Piers – Forces Acting on Piers – Design of Pier – Stability Analysis of Piers – General Features of Abutments – Forces Acting on Abutments – Stability Analysis of Abutments

References:

- Concrete Bridge Design, Browe, R.E., C.R.Books Ltd., London, 1962.
- Reinforced Concrete Bridges, Taylor F.W., Thomson, S.E., and Smulski E., John Wiley and Sons, New York, 1955.
- An Introduction To Structural Design of Concrete Bridges, Derrick Beckett, Surrey University; Press, Henlely – Thomes, Oxford Shire, 1973
- Bridge Analysis Simplified, Bakht.B.And Jaegar, L.G. Mc Graw Hill, 1985.
- Design of Bridges – N.Krishna Raju – Oxford & IBH 6. Design of Bridge Structures – FR Jagadeesh, M.A. Jaya Ram – Eastern Economy Edition.

Course Outcomes: At the end of the course, students will be able to

- Finalize with the usage of codal provisions in the design of bridges
- Analyze and design substructure elements of bridges
- Analyze and design various types of bridges like t-beam bridge,slab bridge ,box culvert.
- To analyze and design of T beam bridge

SE23C DESIGN OF HIGH RISE STRUCTURES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Content:

UNIT-I

DESIGN OF TRANSMISSION/ TV TOWER, MAST AND TRESTLES: Configuration, bracing system, analysis and design for vertical transverse and longitudinal loads.

UNIT-II

ANALYSIS AND DESIGN OF RC AND STEEL CHIMNEY, Foundation design for varied soil strata.

UNIT-III

TALL BUILDINGS: Structural Concept, Configurations, various systems, Wind and Seismic loads,

UNIT-IV

Dynamic approach, structural design considerations and IS code provisions. Firefighting design provisions.

UNIT-V

APPLICATION of software in analysis and design.

Reference Books:

1. Structural Design of Multi-storeyed Buildings, Varyani U. H., 2nd Ed., SouthAsian Publishers, New Delhi, 2002.
2. Structural Analysis and Design of Tall Buildings, Taranath B. S., Mc Graw Hill, 1988.
3. Illustrated Design of Reinforced ConcreteBuildings(GF+3storeyed), Shah V. L. &Karve S. R., Structures Publications, Pune, 2013.
4. Design of Multi Storeyed Buildings, Vol. 1 & 2, CPWD Publications, 1976. Tall Building Structures, Smith Byran S. and Coull Alex, Wiley India. 1991. High Rise Building Structures, Wolfgang Schueller, Wiley., 1971.
5. Tall Chimneys, Manohar S. N., Tata Mc Graw Hill Publishing Company, New Delhi

Course Outcomes: At the end of the course, students will be able to

1. Analyse, design and detail Transmission/ TV tower, Mast and Trestles with different loading conditions.
2. Analyse, design and detail the RC and Steel Chimney.
3. Analyse. design and detail the tall buildings subjected to different loading conditions using relevant codes.

4. Analysis and design of dynamic approach OF STRUCTURAL DESIGN USING is Code provisions.

SE23C DESIGN OF EARTHQUAKE RESISTANT STRUCTURES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Content:

UNIT-I

Engineering Seismology : Earthquake – Causes of Earthquake – Earthquakes and Seismic Waves – Scale and Intensity of Earthquakes – Seismic Activity – Measurements of Earth Quakes – Seismometer- Strong Motion Accelerograph / Field Observation of Ground Motion – Analysis of Earthquakes Waves – Earth Quake Motion – Amplification of Characteristics of Surface Layers – Earthquake Motion on The Ground.

UNIT-II

Vibration of Structures Under Ground Motion: Elastic Vibration of Simple Structures – Modelling of Structures and Equations of Motion – Free vibrations of Simple Structures – Steady State Forced Vibrations – Non Steady State Forced Vibrations – Response Spectrum Representations; Relation Between The Nature of The Ground Motion and Structural Damage.

UNIT-III

Lateral Force Procedure Seismic Base Shear – Seismic Design Co-Efficient - Vertical Distribution of Seismic Forces and Horizontal Shear – Twisting Moment - Over Turning Moment – Vertical Characteristics Effect – SoilΔSeismic Load and Orthogonal Effects Lateral Deflection – P- Structure Interaction. Seismic – Graphs Study, Earthquake Records for Design – Factors Affecting Accelerogram Characteristics - Artificial Accelerogram – Zoning Map. Dynamic – Analysis Procedure: Model Analysis – Inelastic – Time History Analysis Evaluation of the Results.

UNIT-IV

Earthquake – Resistant Design of Structural Components and Systems: Introduction – Monolithic Reinforced – Concrete Structures – Precast Concrete Structures – Prestressed Concrete Structures – Steel Structures – Composite – Structures, Masonry Structures – Timber Structures

UNIT-V

Fundamentals of Seismic Planning: Selection of Materials and Types of Construction Form of Superstructure – Framing Systems and Seismic Units – Devices for Reducing. Earthquake Loads.

Reference Books:

1. Design of Earthquake Resistant Structures by Minoru Wakabayashi.
2. Strucutural Dynamics for Earthquake Engineering", A.K.Chopra,Pearson Pubilications.
3. Dynamics of Structures. R.W.Clough, Mc Graw – Hill, 2nd Edition,

Course Outcomes: At the end of the course, students will be able to

- Illustrate the measurement of earthquakes and their effect on engineering structures
- Analyse the free and forced vibration response of single degree and multi degree of freedom and continuous systems
- Apply the basic principles of conceptual design of Earthquake Resistant buildings
- Learn the various seismic control methods

SE24C DESIGN OF ADVANCED CONCRETE STRUCTURES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Content:

UNIT – I ESTIMATION OF CRACK WIDTH AND REDISTRIBUTION OF MOMENTS IN REINFORCED CONCRETE BEAMS :

Factors affecting crack width in beams - Calculation of crack width - Empirical Method - Estimation of crack width in beams by IS 456 - Shrinkage and thermal cracking - Redistribution of moments in a fixed beam and a two-span continuous beam - Advantage and disadvantages of moment redistribution.

UNIT – II DESIGN OF RIBBED (VOIDED) SLABS & GRID FLOORS :

Analysis of the ribbed slabs for moment and shears - Design for shear - Deflections - Arrangement of reinforcements.

Analysis of grid floors by Timoshenko's plate theory, stiffness matrix method - Equating joint deflections - Detailing of steel.

UNIT – III DESIGN OF PLAIN CONCRETE WALLS :

Braced and unbraced walls - Eccentricities of vertical loads - Empirical design method (walls carrying axial load) - Design of wall for In-plane horizontal forces.

DESIGN OF DEEEP BEAMS :

Steps of designing deep beams by IS 456 - Detailing of deep beams.

UNIT – IV EARTH QUAKE FORCES AND STRUCTURAL RESPONSE :

Earthquake magnitude and intensity - Determination of design forces - Torsion in buildings - Ductile detailing of beams - Columns and frame members with axial force and moment.

UNIT – IV DESIGN OF SHEAR WALLS :

Classification of shear walls - Loads in shear walls - Design of rectangular and flanged shear walls - Moment of resistance of rectangular shear walls

Reference Books:

1) P.C.Varghese, "Advanced Reinforced Concrete Design", Prentice-Hall of India, Private Ltd., New Delhi.

2) P.C.Varghese, "Limit State Design of Reinforce Concrete", Prentice-Hall of India Private Ltd., New Delhi.

3) Krishna Raju, "Advanced Reinforced Concrete Design - SI Units" CBS, New Delhi, 1986.

4) Blume, J.A., Newmark, N.M. and Corning, L.M. "Design of Multi-Storey Reinforced Concrete Buildings for Earth Quake Motion", Portland Cement Association, Chicogo, 1961.

5) Pankaj Agarwal, "Earthquake Resistant Structures", Prentice-Hall of India, Private Ltd. New Delhi.

Course Outcomes: At the end of the course, students will be able to

1. Model the loads and findings the material properties.
2. Design deep beams and corbels
3. Design of shear walls using IS, ACI & Errocode.
4. Analyse the special structures by understanding their behaviour in torsional buckling.
5. Design and prepare detail structural drawings for execution citing relevant IS codes.

SE24C ADVANCED CONSTRUCTION TECHNIQUES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Content:

UNIT – I

Construction Techniques: Box Jacking -Pipe Jacking - Under Water Construction Of Diaphragm Walls And Basement. Tunneling Techniques. Piling Techniques - Driving Well And Caisson - Sinking Cofferdam - Cable Anchoring And Grouting. Driving Diaphragm Walls Sheet Piles - Laying Operations For Built Up Offshore System - Shoring For Deep - Well Points - Dewatering And Stand By Plant Equipment For Underground Open Excavation - Trenchless Technology.

UNIT – II

Techniques For Concreting: Techniques Of Construction For Continuous Concreting Operation In Tall Buildings Of Various Shapes And Varying Sections Launching Techniques - Slipform Techniques- Suspended Form Work-. Erection Techniques Of Tall Structures - Launching Techniques For Heavy Decks -In Situ Prestressing In High Rise Structures, Aerial Transporting Handling Erecting Lightweight Components On Tall Structures - Erection Of Lattice Towers And Rigging Of Transmission Line Structures.

UNIT – III

Construction Sequence And Methods: Bow String Bridges, Cable Stayed Bridges. Launching And Pushing Of Box Decks. Construction Sequence And Methods In Domes And Prestressed Domes. Vacuum Dewatering Of Concrete Flooring - Concrete Paving Technology- Erection Of Articulated Structures.

UNIT – IV

Construction Techniques For Foundation: Mud Jacking Grout Through Slab Foundation - Micro Piling For Strengthening Floor And Shallow Profile Pipeline Laying - Protecting Sheet Plies, Screw Anchors - Sub Grade Water Proofing Under Pinning Advanced Techniques And Sequence In Demolition And Dismantling.

UNIT – V

Fundamentals Of Energy: Energy Production Systems -Heating. Ventilating And Air.

Conditioning -Solar Energy And Conservation -Energy Economic Analysis -Energy Conservation And Audits Domestic Energy Consumption -Savings- Challenges -Primary Energy Use In Buildings - Residential. Commercial -Institutional And Public Buildings

Reference Books:

1. Practical Foundation Engineering Hand Book, Robertwade Brown, Mcgraw Hill Publications, 1995
2. Construction Dewatering: New Methods And Applications, Patrick Powers .J, John Wiley & Sons, 1992

Course Outcomes: At the end of the course, students will be able to

- Gain an experience in the implementation of new construction technology on engineering concepts which are applied in field Advanced construction technology.
- Get a diverse knowledge of Advanced technology practices applied to real life problems.
- Understand the theoretical and practical aspects of new technology in civil engineering along with the design and management applications.
- Study of construction equipments, and temporary works required to facilitate the construction process

SE24C LOW COST HOUSING TECHNIQUES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Content:

UNIT – I

Housing Scenario Introduction - Status of Urban Housing - Status of Rural Housing Housing Finance: Introducing - Existing Finance System in India - Government Role As Facilitator - Status At Rural

Housing Finance - Impedimently in Housing Finance and Related Issues

Land Use and Physical Planning for Housing Introduction - Planning of Urban Land - Urban Land Ceiling and Regulation Act - Efficiency of Building Bye Lass - Residential Densities

Housing The Urban Poor Introduction - Living Conditions in Slums - Approaches and Strategies for Housing Urban Poor

UNIT – II

Development and Adoption of Low Cost Housing Technology

Introduction - Adoption of Innovative Cost Effective Construction Techniques - Adoption of Precast Elements in Partial Prefatroices - Adopting of Total Prefactcation of Mass Housing in India- General Remarks on Pre Cast Rooting/Flooring Systems -Economical Wall System - Single Brick Thick Loading Bearing Wall - 19cm Thick Load Bearing Masonery Walls - Half Brick Thick Load Bearing Wall - Flyash Grypsym Thick for Masonry - Stone Block Masonery - Adoption of Precast R.C. Plank and Join System for Roof/Floor in The Building

UNIT – III

Alternative Building Materials for Low Cost Housing Introduction - Substitute for Scarce Materials – Ferrocement - Gypsum Boards - Timber Substitutions - Industrial Wastes - Agricultural Wastes - Fitire Starateru; for ,P,Topm of Alternative Building Maintenance

Low Cost Infrastructure Services: Introduce - Present Status - Technological Options - Low Cost Sanitation - Domestic Wall - Water Supply, Energy

UNIT – IV

Rural Housing: Introduction Traditional Practice of Rural Housing Continuous - Mud Housing Technology Mud Roofs - Characteristics of Mud - Fire Treatment for Thatch Roof - Soil Stabilization - Rural Housing Programs

UNIT – V

Housing in Disaster Prone Areas: Introduction – Earthquake - Damages To Houses -

Traditional Prone Areas - Type of Damages and Railways of Non-Engineered Buildings - Repair and Restore Action of Earthquake Damaged NonEngineered Buildings Recommendations for Future Constructions. Requirement's of Structural Safety of Thin Precast Roofing Units Against Earthquake Forces, Status of R&D in Earthquake Strengthening Measures - Floods, Cyclone, Future Safety

Reference Books:

3. Properties of Concrete – Neville A.M. Pitman Publishing Limited, London.
4. Light Weight Concrete, Academic Kiado, Rudhai.G – Publishing Home of Hungarian Academy of Sciences 1963.
5. Low Cost Housing – G.C. Mathur

Course Outcomes: At the end of the course, students will be able to

- Development of construction technology and innovative techniques as tools to address demand mass construction
- Knowledge of eco friendly material with their application
- Learn the use of locally available material according to their availability and maintenance

SE24C DESIGN OF INDUSTRIAL STRUCTURES

L / week	: 3Hrs	Sessional Marks : 40
University Exam	: 3 Hrs	End Exam Marks : 60

Syllabus Contents:

UNIT-I

Chimneys – Introduction, dimensions of steel stacks, chimney lining, breech openings and access ladder, loading and load combinations, design considerations, stability consideration, design of base plate, design of foundation bolts, design of foundation.

UNIT-II

Water Tanks – Design of rectangular riveted steel water tank – Tee covers – Plates – Stays –

Longitudinal and transverse beams –Design of staging – Base plates – Foundation and anchor bolts.

UNIT-III

Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder –Design of staging and foundation.

Reference Books:

1. Design of Steel Structure, Punmia B. C., Jain Ashok Kr., Jain Arun Kr., 2nd Ed., Lakshmi Publishers, 1998.
2. Design of Steel Structures, Ram Chandra, 12th Ed., Standard Publishers, 2009. Design of Steel Structures, Subramaniyam.

Course Outcomes: At the end of the course, the student will be able to:

- Design Steel Gantry Girders.
- Design Steel Portal, Gable Frames.
- Design Steel Bunkers and Silos.
- Design Chimneys and Water Tanks.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Dr. Ch Chengaiah Ph.: 0877-2249900
Professor & Chairman, BoS (PG).

05-06-2023,
Tirupati.

To
The Registrar.
S.V. University,
Tirupati.

"Through the Dean Faculty of Engineering"

Sir,

Sub: SVUCE- Dept. of EEE - Submission of Scheme of instructions and Syllabus - M.Tech (Power Systems) - R23 Regulation – W.e.f. ACY 2023-24 - Reg.

Ref: 1. SVUCE/ Dean/ JBOS M.Tech/ (PG)/2023.Dated.11/04/2023
2. CII (B)/Joint BoS (PG) Meeting/Engg/2022 Dated.18.05.2023.

*****

With reference to the subject cited, the Joint Board of Studies meeting was held on 02/06/2023 and as per the Dean Faculty of Engineering instructions individual Board of Studies meeting was held in the Department of Electrical and Electronics Engineering on the same day.

However, based on Internal and External members discussions and suggestions the scheme of instructions and syllabus are prepared and approved the same for M.Tech (Power Systems) Program with effect from the Academic Year 2023-24 onwards.

In this connection, herewith I am submitting the Scheme of Instructions and Syllabus of the M.Tech (Power System) program. This is for your kind information.

Thanking You, Sir

Yours faithfully,

Professor & Head of the Department of
Electricals and Electronics Engg.,
S.V.U. COLLEGE OF ENGINEERING
TIRUPATI - 517 502

Dr. Ch Chengaiah
Professor & Chairman, BoS (PG).
Electrical & Electronics Engineering

CHAIRMAN
B.O.S. (P.G.)
Dept. of E.E.E.

Encl: 1. Resolution of M.Tech BoS(PG) meeting
2. Scheme of Instructions of the M.Tech (Power System) program } → in Book form
3. Syllabus of the M.Tech (Power System) program

Copy to The Dean, Faculty of Engineering for information.
Copy to file.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING::TIRUPATI
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Date: 02.06.2023

RESOLUTION

1. It is resolved to approve the Scheme of instructions and Syllabus for M.Tech (Power Systems) Curriculum to be implemented for the Academic year 2023-24, as per NEP / AICTE / UGC Guidelines.

2. It is resolved to authorize BOS Chairman to carryout minor modifications for the Scheme of instructions and Syllabus if necessary.

S.No	NAME OF THE MEMBER	SIGNATURE
1.	**Prof. Ch. Chengaiah** Chairman, BOS	
2.	**The Head,** Dept. of EEE Ex-Officio Member	
3.	**Prof. M. Damodar Reddy** Member, BOS	
4.	**Prof. A. Lakshmi Devi** Member, BOS	
5.	**Dr. V. Usha Reddy** Member, BOS	
6.	**Dr. Siva Nagaraju Sirigiri** External Member, JNTUK - Kakinada	Attended online
7.	**Dr. K. Srinivas** External Member, SE – AP TRANSCO, Nellore.	Attended online

BOS (PG), CHAIRMAN
CHAIRMAN
B.O.S. (P.G.)
Dept. of E.E.E.

HEAD, DEPT. OF EEE
Professor & Head of the Department of
Electricals and Electronics Engg.,
S.V.U. COLLEGE OF ENGINEERING
TIRUPATI - 517 502

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING::TIRUPATI

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

M.TECH WITH SPECIALIZATION – POWER SYSTEMS



SCHEME OF INSTRUCTIONS AND SYLLABUS

R23 – REGULATIONS

(w.e.f. ACY 2023-24)

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

SCHEME OF INSTRUCTIONS

(R23 REGULATIONS)



SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Scheme of Instruction- (CBCS) Effective from the Academic Year 2023-24

Specialization: M. Tech (Power Systems)

M.Tech (Power Systems) - I Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	PSPC 01	Computer Methods in Power Systems.	4	0	0	4	4	40	60	100
PCC	PSPC 02	Interconnected Power System Operation and Control.	4	0	0	4	4	40	60	100
PCC	PSPC03	AI Applications to Power Systems.	4	0	0	4	4	40	60	100
PEC	PSPE 01	Program Elective I.	3	1	0	4	3	40	60	100
PEC	PSPE 02	Program Elective II.	3	1	0	4	3	40	60	100
PCL	PSCP 01	Computer Methods in Power Systems Lab.	0	0	3	3	1.5	40	60	100
PCL	PSCP 02	AI Applications to Power Systems Lab.	0	0	3	3	1.5	40	60	100
MC	PGMC01	Research Methodology and IPR.	3	0	0	3	3	40	60	100
Total			**18**	**03**	**06**	**27**	**24**	**320**	**480**	**800**

Course Code	List of Program Elective Course – I (PSPE 01)	Course Code	List of Program Elective Course – II (PSPE 02)
PSPE 01.1	Reactive Power Control and Management.	PSPE 02.1	Dynamics of System Theory.
PSPE 01.2	Energy Auditing and Management.	PSPE 02.2	Pulse Width Modulation for PE Converters.
PSPE 01.3	Smart Grids Technologies.	PSPE 02.3	High Power Converters.
PSPE 01.4	FACTS and Custom Power Devices.	PSPE 02.4	Advanced Micro- Controller Based Systems .

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Scheme of Instruction- (CBCS) Effective from the Academic Year 2023-24

Specialization: M. Tech (Power Systems)

M.Tech (Power Systems) - II Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	PSPC 04	Advanced Power System Protection.	4	0	0	4	4	40	60	100
PCC	PSPC 05	Electrical Power Distribution Systems.	4	0	0	4	4	40	60	100
PCC	PSPC 06	Wind and Solar Energy Systems.	3	1	0	4	3	40	60	100
PEC	PSPE 03	Program Elective III.	3	1	0	4	3	40	60	100
PEC	PSPE 04	Program Elective IV.	3	1	0	4	3	40	60	100
PCL	PSCP 03	Power System Protection Lab.	0	0	3	3	1.5	40	60	100
PCL	PSCP 04	Wind and Solar Energy Systems Lab.	0	0	3	3	1.5	40	60	100
VAC	PSVAC01	Electrical Safety and Management.	3	1	0	4	3	40	60	100
MINI	PSMPS00	Mini Project with Seminar.	1	0	2	3	2	40	60	100
Total			**21**	**04**	**08**	**33**	**25**	**360**	**540**	**900**

Course Code	List of Program Elective Course – III (PSPE 03)	Course Code	List of Program Elective Course – IV (PSPE 04)
PSPE 03.1	Power Quality Issues and Mitigation	PSPE 04.1	Electric and Hybrid Vehicles.
PSPE 03.2	Restructured Power Systems.	PSPE 04.2	Industrial Power Electronics.
PSPE 03.3	Power Apparatus and Design.	PSPE 04.3	SCADA System and Applications.
PSPE 03.4	Advanced Digital Signal Processing.	PSPE 04.4	Embedded Systems.

Instruction: The students can undergo Open Elective Course work (12 week's duration) from the day of commencement of Second semester class work through online (MOOCS)/ NPTEL and can select the subjects that are not covered in the Curriculum. However, the obtained pass certificate should be submitted on or before the last working day of the III - Semester Course work without fail and result will be reflected in III - Semester Marks MEMO. Otherwise, your results will be reflected in supplementary mode if certificate is submitted after last working day of III - Semester.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Scheme of Instruction- (CBCS) Effective from the Academic Year 2023-24

Specialization: M. Tech (Power Systems)

M.Tech (Power Systems) - III Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation	
			Lecture	Tutorial	Practical	Total		Semester End Examination Marks	Total
OEC	PGOE01	Open Elective Course (MOOCS).	3	0	0	3	3	100	100
PCC	PSPD01	Dissertation Project Work Phase - I	0	0	24	24	12	100	100
Total			**3**	**0**	**24**	**27**	**15**	**200**	**200**

Instruction:

1. The Students can undergo Open Elective Course work (12 week's duration) from the day of commencement of Second semester class work through online (MOOCS)/ NPTEL and can select the subjects that are not covered in the Curriculum. However, the obtained pass certificate should be submitted on or before the last working day of the III - Semester Course work without fail and result will be reflected in III - Semester Marks MEMO. Otherwise, your results will be reflected in supplementary mode if certificate is submitted after last working day of III-Semester.
2. Evaluation of Dissertation Phase – I work: Review after 6 – 8 weeks (20 marks), Continuous Guide Evaluation (40 marks) and End Semester Evaluation (40 marks). – Total Marls: 100 marks.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Scheme of Instruction- (CBCS) Effective from the Academic Year 2023-24

Specialization: M. Tech (Power Systems)

M.Tech (Power Systems) - IV Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	PSPD02	Dissertation Project Work Phase – II and Viva-Voce	0	0	32	32	16	60	40	100
Total			**0**	**0**	**32**	**32**	**16**	**60**	**40**	**100**

Instruction:

1. Evaluation of Dissertation Project work Phase – II : Review after 8-10 weeks (20 marks) and Continuous Guide Evaluation (40 marks) and End Semester Examination (40 marks).
2. Student must submit their project work on or before the last working day/Instruction day of the IV Semester of the Program. Otherwise Rs. 1,000/- penalty for late submission will be levied to extend submission up to three months. In case of failure of the said condition the penalty amount will be doubled up to the completion of the course.



M.TECH – I SEMESTER

SYLLABUS

(R23 REGULATIONS)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
M.TECH: POWER SYSTEMS - FIRST SEMESTER - SYLLABUS

PSPC 01: COMPUTER METHODS IN POWER SYSTEMS

Instruction Hours/week: 4(L) **Credits: 4**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Power System Network Matrices: Graphs, Incidence matrices, Primitive network, formation of Bus admittance matrix by singular transformations, direct inspection method for determination of Y_{BUS}, Formation of Bus impedance matrix - Addition of a branch and Addition of a link. Simple problems.

UNIT-II

Load Flow Studies: Load flow problem, Gauss-Seidel method, Newton Raphson method, Decoupled and Fast decoupled load flow methods, Comparison of load flow methods.

UNIT-III

Fault Analysis: Short circuit (Symmetrical - 3-phase fault, Unsymmetrical - SLG, LL, LLG faults) calculations using Bus impedance matrix, Fault Impedance Matrix, Fault Currents and Fault Voltages.

UNIT-IV

Power System Security Analysis: Factors affecting Power system security, Security state diagram, contingency analysis - Sensitivity factors - Generator Outage Shift factor (GOSF) and Line Outage Shift Factor (LOSF).

UNIT-V

Voltage Stability: Voltage collapse and prevention of voltage collapse, Voltage stability analysis - P-V curve method, V-Q curve method and Modal analysis.

Text Books:

1. Computer methods in Power System Analysis by Stagg and El Abiad, Mc.Graw Hill Book Company.
2. L.P. Singh , “Advanced Power System Analysis and Dynamics”, New Age International, 2006
3. A.J. Wood, “Power generation, operation and control”, John Wiley, 1994.

References:

1. J.J. Grainger &W.D. Stevenson, “Power system analysis ”, McGraw Hill ,2003
2. Arthur. R. Bergen & Vijay Vittal , “Power System Analysis” ,Pearson , 2000
3. P.M. Anderson, “Faulted power system analysis” , IEEE Press , 1995

Course outcomes-

Students will be able to:

1. Find the bus admittance and bus impedance matrices of the given power system network.
2. Perform power flow studies using various load flow methods.
3. Calculate fault currents and voltages during fault conditions.
4. Assess the power system security using GOSF and LOSF methods.
5. Analyze voltage stability using PV, QV and Modal Analysis.

PSPC 02- INTERCONNECTED POWER SYSTEM OPERATION AND CONTROL

Instruction Hours/week: 4(L) **Credits: 4**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Unit Commitment: Introduction, constraints in unit commitment, thermal unit constraints, unit commitment solution methods, priority-list methods, Dynamic-Programming solution, forward DP Approach, Lagrange relaxation solution.

State Estimation: Power System State Estimation, Weighted Least Square Estimation, State Estimation of an AC Network.

UNIT-II

Load Frequency Control: Necessity of keeping frequency constant, definition of control area, single area control, block diagram representation of an isolated power system, steady state analysis, dynamic response, uncontrolled case, load frequency control of 2-area system, uncontrolled case and controlled case, tie-line bias control

UNIT-III

Generation with Limited Energy Supply: Introduction, take-or-pay fuel supply contract, composite generation production cost function, solution by gradient search techniques, hard limits and slack variables, fuel scheduling by linear programming

UNIT-IV

Hydro thermal Coordination: Introduction, long range hydro scheduling, short-range hydro-scheduling, hydroelectric plant models, scheduling problems, types of scheduling problems, scheduling energy, the short term hydro-thermal scheduling problem, short term hydro scheduling, gradient approach, pumped storage hydro plants, dynamic programming solution to the hydrothermal scheduling problem.

UNIT-V

Interchange of Power and Energy: Introduction, economy interchange between interconnected utilities, inter-utility economy energy evaluation, interchange evaluation with unit commitment, multiple-utility interchange transactions, types of interchange, capacity interchange, diversity interchange, emergency power interchange, inadvertent power exchange, power pools, transmission effects and issues, problems

Text Books:

1. Power Generation Operation and Control, Allen J. Wood, Bruce F.Wollenberg, 2nd ed. John Wiley & Sons Inc. 2006.
2. Electrical Energy Systems Theory, O.I.Elgerd, Tata McGraw-Hill Publishing Company Ltd, 2nd edition.
3. Modern Power System Analysis, I.J. Nagrath & D.P. Kothari, TMH,3rd edition, 9th reprint, 2007

Course outcomes-

Students will be able to:

1. Acquire knowledge on unit commitment, load frequency control, optimum operation, scheduling and coordination of hydrothermal plants, economic generation and power and energy interchange.
2. Solve unit commitment, load frequency control, hydrothermal and fuel scheduling and economy interchange problems using various solution methods.
3. Select and apply appropriate methods to operate inter connected power systems most economically and at constant frequency by optimum utilization of fuels at different loads.

PSPC 03: AI APPLICATIONS TO POWER SYSTEMS

Instruction Hours/week: 4(L) **Credits: 4**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Introduction to AI: Definition, Applications, Components of an AI program, production system. Problem Characteristics, Overview of searching techniques. Knowledge representation: knowledge representation issues; and overview, Representing knowledge using rules; procedural versus declarative knowledge, Logic programming, forward versus backward reasoning, matching, Control Knowledge.

UNIT-II

Artificial Neural Networks: Biological Neuron, Neural Net, Use of neural nets, applications, perception, idea of single layer and multilayer neural nets, Back propagation, Hopfield nets, supervised and unsupervised learning.

UNIT-III

Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Operations, Properties, Fuzzy relations, Cardinalities, Membership functions.
Fuzzy logic system components: Fuzzification, Inference engine, Defuzzification to crisp sets – Defuzzification methods.

UNIT-IV

Genetic Algorithms – Genetic Algorithm versus Conventional Optimization Techniques, Genetic representations and Selection Mechanisms; Genetic Operators – Different types of crossover and mutation operators.
Particle Swarm Optimization - Particle Swarm Optimization Bird flocking and fish Schooling, anatomy of a particle, equations based on velocity and positions, PSO topologies, control parameters.

UNIT-V

Applications of AI Techniques: ANN – Load flow, Economic load Dispatch, Load forecasting. Fuzzy Logic – Single area and two area load frequency control, Speed control of DC Motor. GA and PSO – GA and PSO algorithms for solving ELD problems.

Text Books:

1. Artificial Intelligence Techniques in Power Systems (Energy Engineering), by Kelvin Warwick, Arthur Ekwue, Rag Aggarwal, 1997.
2. AI Application Areas n Power Systems, Iraj Dabbaghchi, American Electric Power Richard D. Christie, Gary W. Rosenwald and Chen – Ching Liu, University of Washington.
3. J M Zurada , "An Introduction to ANN", Jaico Publishing House
4. Timothy Ross, "Fuzzy Logic with Engg. Applications", McGraw. Hill
5. Golding, "Genetic Algorithms", Addison-Wesley Publishing Com
6. Rajasekharan and Pai, "Neural Networks, Fuzzy logic – Genetic Algorithms –Synthesis and Applications" PHI Publications.
7. Xin-She Yang, "Recent Advances in Swarm Intelligence and Evolutionary Computation", Springer International Publishing, Switzerland, 2015.

Course outcomes-

Students will be able to:

1. Learn the concepts of artificial neural networks and Fuzzy Logic.
2. Acquire the knowledge of GA and PSO.
3. Use the Soft Computing Techniques for Power System problems.
4. Apply GA and PSO to Power System optimization problems.

PROGRAM ELECTIVE- I

PSPE 01.1: REACTIVE POWER CONTROL AND MANAGEMENT

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

The Steady State Reactive Power Control in Electrical Transmission Systems: Basics of Reactive Power Control, uncompensated transmission lines, compensated transmission lines, passive shunt compensation, series compensation

UNIT-II

Reactive Power Compensation and The Dynamic Performance of Transmission System: Introduction, passive shunt compensation, Static compensators, Synchronous condenser, characteristics, comparison of compensations.

UNIT-III

Principles of Static Compensators: Introduction, Compensator applications, properties and types of static compensators, Thyristor Controlled Reactor (TCR) and types of compensation, Thyristor Switched Capacitor (TSC), SVC Schemes/Configurations, Fixed Capacitance (FC).

UNIT-IV

Demand Side Management: Load patterns – basic methods load shaping – power tariffs- KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels.
Distribution side Reactive power Management: System losses –loss reduction methods – examples – Reactive power planning – objectives –Economics Planning capacitor placement – retrofitting of capacitor banks.

UNIT-V

User Side Reactive Power Management: KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations.

Reactive power management in electric traction systems and arc furnaces: Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements –remedial measures –power factor of an arc furnace.

Text Books:

1. Reactive Power Control in Electrical Power Systems by T. J. E. Miller
2. Reactive power Management by D.M. Tagare, Tata McGraw Hill,2004. (Units IV to V)

Course outcomes-

Students will be able to:

1. Understand the significance of reactive power control in power system and principles of various controllers.
2. To know about the importance of reactive power management and various management techniques employed in power system networks

PSPE 01.2: ENERGY AUDITING AND MANAGEMENT

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

System approach and End use approach to efficient use of Electricity, Electricity tariff types.
Energy auditing: Types and objectives - audit instruments, ECO assessment and Economic methods, Specific energy analysis-Minimum energy paths-consumption models- Case study

UNIT-II

Electric motors-Energy efficient controls and starting efficiency-Motor Efficiency and Load Analysis-Energy efficient /high efficient Motors-Case study, Load Matching and selection of motors Variable speed drives; Pumps and Fans-Efficient Control strategies- Optimal selection and sizing-Optimal operation and Storage-Case study, Transformer Loading/Efficiency analysis, Feeder/cable loss evaluation- case study

UNIT-III

Reactive Power Management-Capacitor Sizing-Degree of Compensation-Capacitor Losses-Location-Placement-Maintenance -Case study, Peak Demand controls- Methodologies-Types of Industrial Loads-Optimal Load scheduling-case study, Lighting- Energy efficient light sources-Energy conservation in Lighting Schemes, Electronic ballast-Power quality issues-Luminaries, case study

UNIT-IV

Cogeneration-Types and Schemes-Optimal operation of cogeneration plants-case study, Electric loads of Air conditioning & Refrigeration, Energy conservation measures- Cool storage Types-Optimal operation case study

UNIT-V

Electric water heating-Geysers-Solar Water Heaters, Power Consumption in Compressors, Energy conservation measures, Electrolytic Process, Computer Controls- software-EMS

Text Books:

1. Anthony J. Pansini, Kenneth D. Smalling, .Guide to Electric Load Management., Pennwell Pub; (1998)
2. Howard E. Jordan, .Energy-Efficient Electric Motors and Their Applications., Plenum Pub Corp; 2ndedition (1994)
3. Giovanni Petrecca, .Industrial Energy Management: Principles and Applications., The Kluwerinternational series -207,1999

Course outcomes-

Students will be able to:

1. Acquire the background required for engineers to meet the role of energy managers and to acquire the skills and techniques required to implement energy management
2. Identify and quantify the energy intensive business activities in an organization
3. Able to perform Basic Energy Audit in an Organization

PSPE 01.3: SMART GRID TECHNOLOGIES

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Introduction to Smart Grid: Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities and barriers of smart grid, difference between conventional and smart grid, Concept of Robust & Self Healing Grid Present development & International policies in Smart Grid, Case study of Smart Grid.

UNIT-II

Smart Grid Technologies: Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Smart Substations, Substation Automation, Feeder Automation, Geographic Information System (GIS), Phase Measurement Unit (PMU).

UNIT-III

Microgrids and Distributed energy Resources: Concepts of Microgrid, need and applications of Microgrid, formation of Microgrid, Issues of interconnection, protection & control of micro-grid, plastic and organic solar cells, Thin film solar cells, Variable speed wind generation, fuel cells, micro-turbines, Captive power plants, Integration of renewable energy sources.

UNIT-IV

Power Quality Management in Smart Grid: Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

UNIT-V

Information and Communication technology for smart grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area, Network (NAN), Wide Area Network (WAN), Bluetooth, ZigBee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network, Basics of CLOUD Computing & Cyber Security for Smart Grid, Broadband over Power line (BPL), IP based protocols

Text Books:

1. Ali Keyhani, “Design of smart power grid renewable energy systems”, Wiley IEEE, 2011
2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”, CRC Press, 2009
3. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, “Smart Grid: Technology and Applications”, Wiley 2012
4. Stuart Borlase, “Smart Grid: Infrastructure, Technology and solutions “CRC Press.
5. A. G. Phadke, “Synchronized Phasor Measurement and their Applications”, Springer.
6. S. Chowdary, S.P. Chowdhury, P. Crossley, “Microgrids and Active Distribution Networks”, Institution of Engineering and Technology.
7. A. Keyhani, M.N. Marwali, M. Dal, “Integration of Green and Renewable Energy in Electric Power Systems”, Wiley.

Course Outcomes-

Students will be able to:

1. Appreciate the difference between smart grid & conventional grid.
2. Apply smart metering concepts to industrial and commercial installations.
3. Formulate solutions in the areas of smart substations, distributed generation and wide area measurements.
4. Come up with smart grid solutions using modern communication technologies.

PSPE 01.4: FACTS AND CUSTOM POWER DEVICES

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Transmission line connections, Power flow in parallel lines, Mesh systems, Stability considerations, Relative importance of controllable parameters, Basic types of FACTS controllers, Shunt controllers, Series controllers, Combined shunt and series controllers, Benefits of FACTS.

UNIT-II

Static versus passive VAR compensator, Static shunt compensators: Static VAR Compensation (SVC) and Static Synchronous Compensation (STATCOM), Operation of Thyristor- Switched Capacitor (TSC), Thyristor Controlled Reactor (TCR) and Static Synchronous Compensation (STATCOM), Comparison between SVC and STATCOM.

UNIT-III

Static series compensation: Thyristor Switched Series Capacitor (TSSC), Static Synchronous Series Compensator (SSSC) – Thyristor Controlled Voltage Reactor (TCVR) and Thyristor Controlled Phase Angle Reactor (TCPAR) principle of Operation, Gate-Controlled Series Capacitor (GCSC), Thyristor Switched Series Capacitor (TSSC) and Static Synchronous series compensators operation (SSSC).

UNIT-IV

Sub Synchronous Resonance (SSR) and its damping, Unified Power Flow Controller Circuit, Arrangement Operation of Unified Power Flow Controller (UPFC), Introduction to interline power flow controller (IPFC).

UNIT-V

Power quality problems in distribution systems, passive filters, active filtering – shunt , series and hybrid, Voltage swells , sags, flicker, unbalance and mitigation of these problems by power line conditioners, IEEE standards on power quality.

Text Books:

1. N.G. Hingorani, L. Gyugyi, “Understanding FACTS: Concepts and Technology of Flexible
2. Padiyar, “FACTS Controllers in Power Transmission and Distribution”, New Age International Publishers, 2007
3. X P Zhang, C Rehtanz, B Pal, “Flexible AC Transmission Systems- Modeling and Control”, Springer Verlag, Berlin, 2006
4. AC Transmission Systems”, IEEE Press Book, Standard Publishers and Distributors, Delhi, 2001.
5. K.S. Suresh kumar, S. Ashok, “FACTS Controllers & Applications”, E-book edition, Nalanda Digital Library, NIT Calicut,2003

Course outcomes-

Students will be able to:

1. Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation Schemes at Transmission and Distribution level in Power Systems.
2. Learn various Static VAR Compensation Schemes like Thyristor/GTO Controlled Reactive Power Systems, PWM_Inverter based Reactive Power Systems and their controls.
3. To develop analytical modeling skills needed for modeling and analysis of such Static VAR Systems.

PROGRAM ELECTIVE- II

PSPE 02.1: DYNAMICS OF SYSTEM THEORY

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Controllers: Introduction to controllers – Need for controllers – Types of Controllers – Proportional, Integral and Derivative Controllers – Transfer function of controllers - PI, PD, PID Controllers – Design of controllers using frequency domain analysis – Controllers applications in Systems.

UNIT-II

State Space Analysis: Mathematical Modeling of Physical systems, solutions of state equations – Homogeneous and Non-homogeneous – state transmission matrix (STM) – Computation of STM, Controllability and observability time invariant linear systems.

UNIT-III

Nonlinear Systems - Different techniques of linearizing non-linear systems – behaviour of nonlinear systems - Common physical non linearities - Describing functions for various types of non-linearities – describing function analysis of nonlinear control systems – singular points of non-linear systems.

UNIT-IV

Pole placement technique: Pole placement technique by state feedback for linear SISO time, invariant system – Theory of high-gain feedback-advantages – Pole placement technique along with high-gain feedback control – state observers – Full order and reduced order observer.

UNIT-V

Stability Analysis: Concept of Stability, Definitions in the sense of Lyapunov, Lyapunov stability theorem - Different methods of constructing Liapunov functions for linear and non-linear continuous systems.

Text Books:

1. Gopal, M., „Modern Control Systems Theory", Wiley Eastern Ltd., 1993.
2. Ogata, K., „Modern Control Engineering", Prentice Hall of India, 4th edition , 2003.
3. Kuo, B.C., „Automatic Control Systems", Prentice Hall of India, 1999. Thomas Kailath, "Linear Systems", Prentice Hall Inc., Englewood Cliffs, N.J. 1980.

Course outcomes-

Students will be able to:

1. To learn linear system modeling, analysis and design so as to obtain the ability to apply the same to engineering problems in a global perspective
2. Design observers and controllers for linear systems
3. Acquire Knowledge of continuous time linear systems modeling, analysis and design.
4. Know the stability analysis using Lyapunov methods

PSPE 02.2: PULSE WIDTH MODULATION FOR PE CONVERTERS

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Fundamental Concepts of PWM: Fundamental Concepts of PWM, Evaluation of PWM Schemes, Double Fourier Integral Analysis of a Two-Level Pulse Width- Modulated Waveform, Naturally Sampled Pulse Width Modulation Sine-Sawtooth Modulation, Sine-Triangle Modulation, PWM Analysis by Duty Cycle Variation, Sine-Sawtooth Modulation, Sine-Triangle Modulation

UNIT-II

Regular Sampled Pulse Width Modulation: Fundamental Concepts of PWM, Evaluation of PWM Schemes, Sawtooth Carrier Regular Sampled PWM, Symmetrical Regular Sampled PWM, Asymmetrical Regular Sampled PWM, direct Modulation

UNIT-III

Modulation of One Inverter Phase Leg: Double Fourier Integral Analysis of a Two-Level Pulse Width- Modulated Waveform, Naturally Sampled Pulse Width Modulation, PWM Analysis by Duty Cycle Variation, Regular Sampled Pulse Width Modulation, Integer versus Non-Integer Frequency Ratios

UNIT-IV

Modulation of Single-Phase Voltage Source Inverters: Topology of a Single-Phase Inverter Three-Level Modulation of a Single-Phase Inverter Analytical Calculation of Harmonic Side band Modulation, Switched Pulse Position, Continuous Modulation, Discontinuous Modulation Losses, Switched Pulse Sequence, Discontinuous PWM

UNIT-V

Zero Space Vector Placement Modulation Strategies: Space Vector Modulation, Principles of Space Vector Modulation, SVM Compared to Regular Sampled PWM, Phase Leg References for Space Vector Modulation Naturally Sampled SVM, Analytical Solution for SVM, Harmonic Losses for SVM, Placement of the Zero Space Vector, Discontinuous Modulation, 1200 Discontinuous Modulation, 600 and 300 Discontinuous Modulation

Text Books:

1. D. Grahame Holmes, Thomas A. Lipo, “Pulse width modulation of Power Converter: Principles and Practice”, John Wiley & Sons, 03-Oct-2003
2. J Ned Mohan, Undeland, Robbins, “Power electronics: converters, applications, and design” (John wiley and Sons 2003)

Course outcomes-

Students will be able to:

1. Learn different types of PWM schemes and their applications
2. Asses the THD for different types of PWM schemes
3. Choose suitable PWM scheme for different topologies of power electronic circuits

PSPE 02.3: HIGH POWER CONVERTERS

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

High-Power Switching Devices: Gate Turn-Off (GTO) Thyristor, Gate-Commutated Thyristor (GCT), Insulated Gate Bipolar Transistor (IGBT), Other Switching Devices, Operation of Series-Connected Devices Main Causes of Voltage Unbalance, Voltage Equalization for GCTs, Voltage Equalization for IGBTs

UNIT-II

Two-Level Voltage Source Inverters: Introduction, Sinusoidal PWM, Modulation Schemes, Harmonic Content Over-modulation, Third Harmonic Injection PWM, Space Vector Modulation Switching States, Space Vectors, Dwell Time Calculation, Modulation Index Switching Sequence, Spectrum Analysis, Even-Order Harmonic Elimination, Discontinuous Space Vector Modulation

UNIT-III

Cascaded H-Bridge Multilevel Inverters: Introduction, H-Bridge Inverter Bipolar Pulse-Width Modulation, Unipolar Pulse-Width Modulation, Multilevel Inverter Topologies, CHB Inverter with Equal dc Voltage, H-Bridges with Unequal dc Voltages, Carrier Based PWM Schemes, PWM Schemes, Staircase Modulation

UNIT-IV

A **Diode-Clamped Multilevel Inverters:** Three-Level Inverter, Converter Configuration, Switching State, Phase-Shifted Multicarrier Modulation, Level-Shifted Multicarrier Modulation, Comparison Between Phase- and Level-Shifted Commutation, Space Vector Modulation, Inverter Output Waveforms and Harmonic Content, Even-Order Harmonic Elimination, Neutral-Point Voltage Control, Causes of Neutral-Point Voltage Deviation, Effect of Motoring and Regenerative Operation.

UNIT-V

Other Space Vector Modulation Algorithms: Discontinuous Space Vector Modulation, SVM Based on Two-Level Algorithm, High-Level Diode-Clamped Inverters, Four- and Five-Level Diode-Clamped Inverters, Carrier-Based PWM, NPC/H-Bridge Inverter: Inverter Topology, Modulation Scheme, Waveforms and Harmonic Content

Text Books:

1. Bin Wu," High Power Converters and AC Drives (IEEE Press 2008)
2. By Dorian O Neacsu, "Power Switching Converters: Medium and High Power"
3. Handbook on Energy Audit and Environment Management, Y P Abbi and Shashank Jain, TERI,2006
4. Handbook of Energy Audits Albert Thumann, William J. Younger, Terry Niehus, 2009

Course outcomes-

Students will be able to:

1. Learn the characteristics of GTOs, IGBTs and use them in practical systems
2. Knowledge of working of multi-level VSIs, DC-DC switched mode converters, cyclo-converters and PWM techniques and the ability to use them properly
3. Acquire knowledge of power conditioners and their applications
4. Ability to design power circuit and protection circuit of PSDs and converters.

PSPE 02.4: MICRO-CONTROLLER AND APPLICATIONS

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Overview of Architecture & Microcontroller Resources: Architecture of a microcontroller – Microcontroller resources – Resources in advanced and next generation microcontrollers – 8051 microcontroller – Internal and External memories – Counters and Timers – Synchronous serial-cum asynchronous serial communication - Interrupts.

UNIT-II

8051- Microcontrollers Instruction Set: Basic assembly language programming – Data transfer instructions – Data and Bit manipulation instructions – Arithmetic instructions – Instructions for Logical operations on the test among the Registers, Internal RAM, and SFRs – Program flow control instructions – Interrupt control flow.

UNIT-III

Real Time Control Interrupts: Interrupt handling structure of an MCU – Interrupt Latency and Interrupt deadline – Multiple sources of the interrupts – non-maskable interrupt sources – Enabling or disabling of the sources – Polling to determine the interrupt source and assignment of the priorities among them – Interrupt structure in Intel 8051. TIMERS: Programmable Timers in the MCU's – Free running counter and real time control – Interrupt interval and density constraints.

UNIT-IV

Systems Design Digital and Analog Interfacing Methods: Switch, Keypad and Keyboard interfacings – LED and Array of LEDs – Keyboard-cum-Display controller (8279) – Alphanumeric Devices – Display Systems and its interfaces – Printer interfaces – Programmable instruments interface using IEEE Bus – Interfacing with the Flash Memory – Interfaces – Interfacing to High Power Devices – Analog input interfacing

UNIT-V

Real Time Operating System for Microcontrollers: Real Time operating system – RTOS of Keil (RTX51) – Use of RTOS in Design – Software development tools for Microcontrollers. 16-BIT MICROCONTROLLERS: Hardware – Memory map in Intel 80196 family MCU system – IO ports – Programmable Timers and High-speed outputs and input captures – Interrupts – instructions. ARM 32 Bit MCUs: Introduction to 16/32 Bit processors – ARM architecture and organization – ARM / Thumb programming model – ARM / Thumb instruction set – Development tools.

Text Books:

1. Raj Kamal, "Microcontrollers Architecture, Programming, Interfacing and System Design" – Pearson Education, 2005.
2. Mazidi and Mazidi, "The 8051 Microcontroller and Embedded Systems" – PHI, 2000.
3. Microprocessors and Microcontrollers, Architecture, Programming and System Design, Krishna Kant, PHI Learning PVT. Ltd.
4. Steve Furber "Arm system-on-chip Architechture",2nd edition, Pearson publication.

References:

1. A.V. Deshmuk, "Microcontrollers (Theory & Applications)" – WTMH, 2005.
2. John B. Peatman, "Design with PIC Microcontrollers" – Pearson Education, 2005.
3. Microcontroller Programming, Julio Sanchez, Maria P. Canton, CRC Press.
4. The 8051 Microcontroller, Ayala, Cengage Learning.
5. Microprocessors, Nilesh B. Bahadure, PHI Learning PVT. Ltd.

Course outcomes-

Students will be able to:

1. Distinguish types of computers & microcontrollers,
2. Use 8-Bit, 16- Bit & 32-Bit advanced Microcontrollers.
3. Develop Real time Applications of Microcontrollers & Demonstrate RTOS for Microcontrollers.
4. Translate Hardware applications using Microcontrollers.

PSCP 01: COMPUTER METHODS IN POWER SYSTEMS LAB

Instruction Hours/week: 3(P) **Credits: 1.5**
Sessional Marks: 40 **Semester-End Examination: 60**

S.No	EXPERIMENTS
1	Formation of Incidence Matrices.
2	Formation of Ybus by using Singular Transformation method.
3	Formation of Ybus by using Direct Inspection method.
4	Formation of Bus Impedance Matrix.
5	Load Flow Analysis by using Gauss-Siedel Method.
6	Load Flow Analysis by using Newton-Raphson Method.
7	Fault analysis for Single line to Ground fault.
8	Fault analysis for Three phase to Ground fault.
9	Generation outage Sensitivity Factor.
10	Line Outage Sensitivity Factor.
11	PV Curve.
12	QV Curve.
13	Load Flow Analysis by using Decoupled Methods.

Note: Any **Ten** Experiments are to be conducted.

PSCP 02: AI APPLICATIONS TO POWER SYSTEMS LAB

Instruction Hours/week: 3(P) **Credits: 1.5**
Sessional Marks: 40 **Semester-End Examination: 60**

S.No	EXPERIMENTS
1	Program to Generate XOR Function using Mc-culloch pits Neuron Model
2	Program to Generate Different Activation Function of Neuron Model
3	Load flow analysis using Neural Network
4	State Estimation Using Neural Network
5	Contingency Analysis Using Neural Network
6	Speed Control of DC Motor Using Fuzzy Logic.
7	Single Area Load Frequency Control using Fuzzy Logic Controller.
8	Two Area Load Frequency Control using Fuzzy Logic Controller.
9	Maximization of SinX function using Genetic Algorithm.
10	Economic Load Dispatch solution without system losses using Genetic Algorithm
11	Economic Load Dispatch solution considering system losses using Genetic Algorithm
12	Economic Load Dispatch Solution using PSO

Note: Any **Ten** Experiments are to be conducted.

PGMC 01: RESEARCH METHODOLOGY AND IPR

Instruction Hours/week: 3(L) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

UNIT-II

Effective literature studies approaches, analysis, Plagiarism, Research ethics.

UNIT-III

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT-IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT. Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT-V

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & Engineering students”
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”
3. Ranjit Kumar, 2nd Edition , “Research Methodology: A Step by Step Guide for beginners”
4. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
5. Mayall , “Industrial Design”, McGraw Hill, 1992.
6. Niebel , “Product Design”, McGraw Hill, 1974.
7. Asimov , “Introduction to Design”, Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, 2016.
9. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

Course outcomes-

At the end of this course, students will be able to

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today’s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understand that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.



M.TECH – II SEMESTER

SYLLABUS

(R23 REGULATIONS)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

M.TECH: POWER SYSTEMS - SECOND SEMESTER - SYLLABUS

PSPC 04: ADVANCED POWER SYSTEM PROTECTION

Instruction Hours/week: 4(L) **Credits: 4**

Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

General philosophy of protection - Classification and Characteristic function of various protective relays, basic relay elements and relay terminology - Development of relaying scheme

Numerical Protection: Introduction - Block diagram of numerical relay - Sampling theorem - Correlation with a reference wave - Least Error Squared (LES) technique

UNIT-II

Static Relays: Fundamentals of static relays, Basic Block diagram and principle, Advantages of Static Relays, Types of static relays, Static Over-current relays, Differential relays, Percentage Differential relays, distance relays, characteristics of static relays.

UNIT-III

Amplitude Comparators: Circulating current type and opposed voltage type, rectifier bridge comparators, Instantaneous comparators.

Phase Comparators: Coincidence circuit type, block spike phase comparator, techniques to measure the period of coincidence, Integrating type, Rectifier Phase comparators.

UNIT-IV

Digital Protection of power system apparatus – protection of generators – Transformer protection – magnetizing inrush current – Application and connection of transformer differential relays – transformer over current protection Bus bar protection - line protection - distance protection–long EHV line protection - Power line carrier protection.

UNIT-V

Microprocessor Based Protective Relays: Over current relays – Impedance relays – Directional relay – Reactance relay (Block diagram and flowchart approach).

Basic elements of Digital Protection: Historical Developments in digital protection, performance and operational characteristics of digital protection, basic structure of digital relays, components of digital relay, signal conditioning subsystem, conversion subsystem, digital relay subsystem

Text Books:

1. A.G. Phadke and J. S. Thorp, “Computer Relaying for Power Systems”, Wiley/Research studies Press, 2009
2. A.T. Johns and S. K. Salman, “Digital Protection of Power Systems”, IEEE Press,1999
3. Gerhard Zeigler, “Numerical Distance Protection”, Siemens Publicis Corporate Publishing, 2006
4. S.R.Bhide “Digital Power System Protection” PHI Learning Pvt.Ltd.2014
5. Electrical Power Systems – C.L. Wadwa
6. Lewis Blackburn, J., ‘Protective Relaying – Principles and Applications’, Marcel Dekkar, INC, New York, 2006.
7. Power System Protection with Static Relays – by TSM Rao, TMH.
8. Power system protection & switchgear by Badri Ram & D N viswakarma, TMH.

Course outcomes-

Students will be able to:

1. Learn the importance of static Relays
2. Apply appropriate comparator
3. Learn about digital Protection

PSPC 05: ELECTRICAL POWER DISTRIBUTION SYSTEMS

Instruction Hours/week: 4(L) **Credits: 4**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Distribution of Power, Management, Power Loads, Power System Loading, Short-term & Long-term Load Forecasting, Technological Forecasting. Urban/Rural Distribution, Energy Management and tariffs – Revenue improvement – issues in multi-year tariff and availability based tariff.

UNIT-II

Power Factor Correction, Calculation of Optimum Number of Switches, Capacitors, Optimum Switching Device Placement in Radial Distribution Systems, Sectionalizing Switches – Types, Benefits, Bellman's Optimality Principle.

UNIT-III

Distribution Management System (D.M.S.)-Need, advantages, functions, Distribution Automation: Definition, Restoration / Reconfiguration of Distribution Network-Different Methods and Constraints. Interconnection of Distribution, Control & Communication Systems, Remote Terminal Units, Energy efficiency in electrical distribution & Monitoring

UNIT-IV

SCADA: Introduction, Block Diagram, SCADA Applied To Distribution Automation. Common Functions of SCADA, RTU and Data Communication, Communication media and protocols for Distribution systems- IEC 61850 and IEEE 802.3 standards, Advantages of Distribution Automation through SCADA

UNIT-V

Remote Metering-Automatic Meter Reading and its implementation, Maintenance of Automated Distribution Systems, Difficulties in Implementing Distribution Automation in Actual Practice. AI techniques applied to Distribution Automation.

Text Books:

1. M.K. Khedkar, G.M. Dhole, "A Text Book of Electrical power Distribution Automation", University Science Press, New Delhi
2. A.S. Pabla, "Electric Power Distribution", Tata McGraw Hill Publishing Co. Ltd., Fourth Edition.
3. Anthony J Panseni, "Electrical Distribution Engineering", CRC Press.
4. James Momoh, "Electric Power Distribution, automation, protection & control", CRC Press

Course outcomes-

Students will be able to:

1. Knowledge of power distribution system
2. Study of Distribution automation and its application in practice
3. To learn SCADA system

PSPC 06: WIND AND SOLAR ENERGY SYSTEMS

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Renewable Energy System: Introduction to Renewable Energy System**,** Sources of Renewable Energy System**,** Solar and Wind Power in Power System**:** History and current status, characteristics of solar and wind power generation, Network Integration issues.

UNIT-II

Generators and power electronics for wind turbines: Power in wind, availability, Types of wind turbines, Construction features of wind turbines, rotor design considerations, power extraction by turbine, Integration of wind energy converters to electrical networks, applications of wind energy.

UNIT-III

Solar Radiation and its measurements: Introduction, Solar radiation and its measurements, Estimation of average solar radiation.
Solar Energy Collectors: Introduction, Types Characteristics and principles of different types of collectors and their efficiencies, Advantages and Disadvantages

UNIT-IV

Solar Energy Storage: Introduction, Methods of Energy Storage Systems, Solar Ponds. Pumped Energy Storage, Compressed Energy Storage, Storage Batteries.
Applications of Solar Energy: Introduction, Solar Photo-Voltaic cells, PV array and PV module, Maximum power point tracking system.

UNIT-V

Renewable energy integrated with Grid: Introduction, Integration of Wind Energy and solar energy with Power Systems Grid, Impact on Power Quality, Power Electronics and solutions System modeling, Technologies.

Text Books:

1. Thomas Ackermann, Editor, "Wind power in Power Systems", John Willy and sons ltd.2005
2. G.D.Rai "Non-Conventional Energy sources", Khanna Publishers, Newdelhi,1999
3. Patel M.R "Wind and solar Power Systems, Design, Analysis and Operation", CRC Press, New York, Second Edition, 2005.
4. Siegfried Heier, "Grid integration of wind energy conversion systems", John Willy and sons ltd., 2006.
5. K. Sukhatme and S.P. Sukhatme, "Solar Energy". Tata MacGraw Hill, Second Edition, 1996.

Course outcomes-

Students will be able to:

1. Acquire the knowledge on the principles of wind energy generation and solar energy generation.
2. Realize wind energy and solar energy impact on power and voltage quality.
3. Solve the problems related to issues associated with wind and solar energy.

PROGRAM ELECTIVE- III

PSPE 03.1: POWER QUALITY ISSUES AND MITIGATION

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT –I

Electric power quality phenomena- Introduction to Power Quality, IEC and IEEE definitions - power quality disturbances-voltage fluctuations – sags - swells – transients – unbalance - waveform distortion - power frequency variations.

UNIT–II

Transients – origin of transients - classifications of transients – capacitor switching transient – lightning transients - load switching transients – impact on users – protection against transients – mitigation of transients.

UNIT–III

Voltage Variations – Voltage Sags – Magnitude & Duration – types – Sources of Sags – Estimation of Voltage sag performance: Transmission and Utility distribution system, Effect of Sag on AC Motor Drives, Single – Phase Domestic and Office loads, mitigation of Voltage Sag. Origin of Long and Short interruption – influence on various equipments –Mitigation of interruption.

UNIT –IV

Harmonics – Introduction to harmonics - sources of harmonics – definitions & standards – impacts - calculation and simulation –harmonic power flow - mitigation and control techniques – filtering – passive and active.

UNIT–V

Power Quality Mitigation Techniques: Harmonics filters: passive, Active and hybrid filters – Customer power device: Load compensation using DSTATCOM, Voltage regulation using DSTATCOM, protecting sensitive loads using DVR, UPQC: Status of application of customer power devices.

Text Books:

1. G.T. Heydt, " Electric Power Quality", Stars in a Circle Publishers.
2. M.H. Bollen, " Understanding Power Quality Problems", Wiley – IEEE Press.
3. J. Arrillaga, B.C. Smith, N.R. Waston & AR Wood, " Power System Harmonic Analysis", John Wiley.
4. Bollen, M.H.J., 'Understanding Power Quality Problems: Voltage sags and interruptions', IEEE Press, New York, 1999.
5. Arrillaga, J, Watson, N.R., Chen, S., 'Power System Quality Assessment', Wiley, New York, 1999.
6. Heydt, G.T., 'Electric Power Quality', Stars in a Circle Publications, Indiana, 1991.
7. RC Dugan, 'Electrical Power Systems Quality', Mc-Graw Hill.

Course Outcomes: At the end of this course, students will demonstrate the ability to

1. Understand the basic concepts of power quality.
2. Understand the basic concepts of voltage variations and transients
3. Understand different harmonics in power systems
4. Understand the working of Power quality conditioners.

PSPE 03.2: RESTRUCTURED POWER SYSTEMS

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Introduction to restructuring of power industry: Deregulation of power industry, unbundling of electric utilities, Issues involved in deregulation, Deregulation of various power systems – Fundamentals of Economics: Consumer behavior, Supplier behavior, Market equilibrium, short and long run costs, Various costs of production – Market models: Market models based on Contractual arrangements, Comparison of various market models, Market Mechanism.

UNIT-II

Power System Operation in Competitive Environment: Role of the independent system operator, Operational planning activities of ISO: ISO in Pool markets, ISO in Bilateral markets, Operational planning activities of a GENCO: GENCOs in Pool and Bilateral markets, market participation issues, competitive bidding.

UNIT-III

Transmission congestion management: Definition of Congestion, reasons for transfer capability limitation, Importance of congestion management, Features of congestion management –Classification of congestion management methods –Calculation of ATC -Non – market methods –Market methods –Nodal pricing –Inter zonal and Intra zonal congestion management –Price area congestion management –Capacity alleviation method.

UNIT-IV

Ancillary service management and pricing of transmission network: Introduction of ancillary services –Types of Ancillary services –Classification of Ancillary services –Load generation balancing related services –Voltage control and reactive power support devices –Black start capability service -ancillary service –Co-optimization of energy and reserve services -International comparison Transmission pricing –Principles –Classification –Role in transmission pricing methods –Marginal transmission pricing paradigm –Composite pricing paradigm –Merits and demerits of different paradigm.

UNIT-V

Power market development in India: Institutional structure in Indian Power sector, generation, transmission and distribution utilities. SO, & LDCs. PFC, REC, ERCs, traders, Power Exchanges and their roles. Availability based tariff, Open access, Industry structure and regulatory framework, market development, RE policies, RPO, Tariff policies. Policy changes, regulatory changes, Critical issues / challenges before the Indian power sector.

Text Books:

1. Steven Stoft, "Power system economics: designing markets for electricity", John Wiley and Sons, 1st edition, 2002.
2. Kankar Bhattacharya, Jaap E. Daadler, Math H.J. Boolen, "Operation of restructured power systems", Springer, 1st edition, 2001.
3. Mohammad Shahidehpour, Muwaffaq Alomoush, "Restructured electrical power systems: operation, trading and volatility", CRC Press; 1st edition, 2017.
4. Loi Lei Lai: Power System Restructuring and Deregulation: Trading, Performance and Information Technology, John Wiley & Sons, Pvt. Ltd., 1st edition, 2001.

Course outcomes-

Students will be able to:

1. Understand the basic reasons and motivations for restructuring worldwide.
2. Understand the roles and responsibilities of different entities in electricity market.
3. Explore issues like congestion management, Transmission pricing, Ancillary Services.
4. Understand the power market scenarios in India.

PSPE 03.3: POWER APPARATUS AND DESIGN

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Principles of Design of Machines -Specific loadings, choice of magnetic and electric loadings, Real and apparent flux densities, temperature rise calculation, Separation of main dimension for DC machines, Induction machines and synchronous machines
Design of Transformers-General considerations, output equation, emf per turn, choice of flux density and current density, main dimensions, leakage reactance and conductor size, design of tank and cooling tubes

UNIT-II

Separation of main dimension for DC machines, Induction machines and synchronous machines, Heating and cooling of machines, types of ventilation, continuous and intermittent rating

UNIT-III

General considerations, output equation for induction machines, Choice of specific electric and magnetic loadings, efficiency, power factor, Number of slots in stator and rotor, Elimination of harmonic torques

UNIT-IV

Design of stator and rotor winding, slot leakage flux, Leakage reactance, equivalent resistance of Magnetizing current, efficiency from design data

UNIT-V

Types of alternators, comparison, specific loadings, output co-efficient, design of main dimensions, Introduction to Computer Aided Electrical Machine Design Energy efficient machines.

Text Books:

1. Clayton A.E, "The Performance and Design of D.C. Machines", Sir I. Pitman & sons, Ltd.
2. M.G. Say, "The Performance and Design of A.C. Machines ", Pitman
3. Sawhney A.K, "A course in Electrical Machine Design", DhanpatRai & Sons, 5th Edition

Course outcomes-

Students will be able to:

1. To give a systematic approach for design and analysis of all rotating machines under both transient and steady state conditions with the dimensions and material used.
2. Ability to design all types of transformers and special machines.

PSPE 03.4: ADVANCED DIGITAL SIGNAL PROCESSING

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Discrete time signals, Linear shift invariant systems-Stability and causality. Sampling of continuous time signals-Discrete time Fourier transform- Discrete Fourier series- Discrete Fourier transform, Z Transform-Properties of different transforms

UNIT-II

Linear convolution using DFT, Computation of DFT Design of IIR digital filters from analog filters, Impulse invariance method, Bilinear transformation method

UNIT-III

FIR filter design using window functions, Comparison of IIR and FIR digital filters, Basic IIR and FIR filter realization structures, Signal flow graph representations Quantization process and errors, Coefficient quantization effects in IIR and FIR filters

UNIT-IV

A/D conversion noise- Arithmetic round-off errors, Dynamic range scaling, Overflow oscillations and zero Input limit cycles in IIR filters, Linear Signal Models

UNIT-V

All pole, All zero and Pole-zero models, Power spectrum estimation- Spectral analysis of deterministic signals, Estimation of power spectrum of stationary random signals

Text Books:

1. Sanjit K Mitra, "Digital Signal Processing: A computer-based approach ", Tata Mc Grow-Hill Edition1998
2. Dimitris G. Manolakis, Vinay K. Ingle and Stephen M. Kogon, "Statistical and Adaptive Signal Processing", Mc Grow Hill international editions. -2000

Course outcomes-

Students will be able to:

1. Knowledge about the time domain and frequency domain representations as well analysis of discrete time signals and systems
2. Study the design techniques for IIR and FIR filters and their realization structures.
3. Acquire knowledge about the finite word length effects in implementation of digital filters.
4. Knowledge about the various linear signal models and estimation of power spectrum of stationary random signals
5. Design of optimum FIR and IIR filters

PSPE 04.1: ELECTRIC AND HYBRID VEHICLES

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

History of hybrid and electric vehicles, Social and environmental importance of hybrid and electric vehicles, Impact of modern drive-trains on energy supplies, Basics of vehicle performance, vehicle power source characterization, Transmission characteristics, Mathematical models to describe vehicle performance

UNIT-II

Vehicle mechanics, roadway fundamentals, laws of motion, vehicle kinetics, dynamics of vehicle motion, propulsion power, velocity and acceleration, propulsion system design Basic concept of hybrid Electric drive Tains, Introduction to various hybrid drive-train topologies, Power flow control in hybrid drive-train topologies.

UNIT-III

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Introduction Motor drives configuration and control of Permanent Magnet Motor Drives Configuration and control of Switch Reluctance, Motor drives, drive system efficiency

UNIT-IV

Matching the electric machine and the internal combustion engine (ICE) Sizing the propulsion motor, sizing the power electronics Selecting the energy storage technology, Communications, supporting subsystems

UNIT-V

Introduction to energy management and their strategies used in hybrid and electric vehicle, Classification of different energy management strategies Comparison of different energy management strategies Implementation issues of energy strategies

Text Books:

1. Iqbal Husain, “Electric and Hybrid Vehicles Design Fundamentals”, CRC Press.
2. Mehrdad Ehsani, Yimin Gao, Sebastien, Ali Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles”, CRC Press

Course outcomes-

Students will be able to:

1. Acquire knowledge about fundamental concepts, principles, analysis and design of hybrid and electric vehicles.
2. To learn electric drive-in vehicles and traction

PSPE 04.2: INDUSTRIAL POWER ELECTRONICS

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT – I

Basic power electronic drive system, components. Different types of loads, shaft-load coupling systems. Stability of power electronic drive,
Introduction to overvoltage conditions and protection, practical overvoltage protection in naturally and forced commutated circuits, overcurrent fault conditions, over current protection, gate protection, heat sinks.

UNIT – II

Modeling of DC machine, Conventional methods of D.C. motor speed control, single phase and three phase converter fed D.C motor drive. Power factor improvement techniques, four quadrant operation. steady-state analysis of the three-phase converter-controlled DC motor drive.

UNIT – III

Chopper fed drives, input filter design. Braking and speed reversal of DC motor drives using choppers, multiphase choppers, steady-state analysis of chopper-controlled DC motor drive, closed-loop operation, dynamic simulation of the speed-controlled DC motor drive.

UNIT – IV

Conventional methods of induction motor speed control. Solid state controllers for Stator voltage control, soft starting of induction motors, Rotor side speed control of wound rotor induction motors. Voltage source and Current source inverter fed induction motor drives – d-q axis modeling and vector control.

UNIT – V

Speed control of synchronous motors, field-oriented control, load commutated inverter drives, switched reluctance motors and permanent magnet motor drives. Introduction to design aspects of machines.

Text Books:

1. P.C Sen, 'Thyristor DC Drives', John Wiley and Sons, New York, 1991.
2. R. Krishnan, 'Electric Motor Drives – Modeling, Analysis and Control', Prentice-Hall of India Pvt. Ltd., New Delhi, 2003.
3. Bimal K. Bose, 'Modern Power Electronics and AC Drives', Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
4. M D Singh, K B Khanchandani, "Power Electronics", Tata Mcgraw-Hill Publishing company limited, New Delhi,2008.

Course Outcomes:

Upon completion of the course, the students will be able to

1. Understand and analyze dc and ac motors supplied from different power converters.
2. Simulate and study motor characteristics with different converter configurations
3. Design and implement a prototype drive system.

PSPE 04.3: SCADA SYSTEM AND APPLICATIONS

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

SCADA: Introduction to SCADA, Line diagram of SCADA system, Data acquisition systems, Evolution of SCADA, Monitoring and supervisory functions, Communication technologies,

UNIT-II

SCADA COMPONENTS: Industries SCADA System Components, Schemes- Remote Terminal Unit (RTU), Intelligent Electronic Devices (IED), Programmable Logic Controller (PLC), Communication Network, SCADA Server, SCADA/HMI Systems

UNIT-III

SCADA ARCHITECTURE: SCADA architectures, Various types of technique and applications, advantages and disadvantages of each system, single unified standard architecture -IEC 61850

UNIT-IV

SCADA COMMUNICATION: Schematic diagram of SCADA Communication system, various industrial communication technologies, wired and wireless methods and fiber optics, Open standard communication protocols

UNIT-V

SCADA APPLICATIONS: Utility applications, Transmission and Distribution sector operations, monitoring, analysis and improvement, Industries - oil, gas and water, Case studies, Implementation, Simulation Exercises

Text Books:

1. Stuart A. Boyer: "SCADA-Supervisory Control and Data Acquisition", Instrument Society of America Publications, USA, 2004.
2. Gordon Clarke, Deon Reynders: "Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems", Newnes Publications, Oxford, UK, 2004.
3. William T. Shaw, "Cybersecurity for SCADA systems", PennWell Books, 2006.
4. David Bailey, Edwin Wright, "Practical SCADA for industry", Newnes, 2003.
5. Michael Wiebe, "A guide to utility automation: AMR, SCADA, and IT systems for electric power", PennWell 1999.

Course outcomes-

Students will be able to:

1. Describe the basic tasks of Supervisory Control Systems (SCADA) as well as their typical applications
2. Acquire knowledge about SCADA architecture, various advantages and disadvantages of each system
3. Knowledge about single unified standard architecture IEC 61850
4. To learn about SCADA system components: remote terminal units, PLCs, intelligent electronic devices, HMI systems, SCADA server

PSPE 04.4: EMBEDDED SYSTEMS

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**
Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

Introduction: Processor embedded into system, Embedded Hardware Units, Embedded Software in a system, Embedded system-on-Chip (SOC), Design process, Classification of embedded systems

UNIT-II

8051 and Advanced Processor architecture, Memory Organization and Real- World Interfacing: 8051 architecture, Real world interfacing, Introduction to advanced architecture, Processor and memory organization, Instruction-level-parallelism, Performance matrices, Processor selection, Memory selection

UNIT-III

Devices and Communication buses for Devices and network: I/O types and examples, serial communication devices, Parallel device ports, Wireless devices, Timer and Counting devices, Watch dog timer, real time clock

UNIT-IV

Device Drivers and Interrupts service Mechanism. Programmed I/O Busy- Approach with interrupt service mechanism, ISR concept, Interrupt sources, Interrupt handling mechanism, multiple interrupts, DMA, Device driver programming

UNIT-V

Real-Time- Operating systems: OS Services, Process management, Timer functions, Event functions, Memory management, Real- time Operating systems, Basic design using an RTOS. Introduction to Real time Operating Systems: Windows CE, OSEK, Linux 2.6.X and RT Linux

Text Books:

1. Raj Kamal, “Embedded Systems” (T M H), 2008.
2. Peter Marwedel, “Embedded System Design” – Springer Verlog, 2006.
3. Jane W. S. Liu, “Real time Systems”, -Pearson Education, 2000

Course outcomes-

Students will be able to:

1. Program embedded system with 8051 as processor.
2. Understand different types of communication through, parallel ports, wireless
3. Understand significance of device drivers and interrupt mechanism
4. Understand features of different types of real time OS.

PSCP 03: POWER SYSTEM PROTECTION LAB

Instruction Hours/week: 3(P) **Credits: 1.5**
Sessional Marks: 40 **Semester-End Examination: 60**

S.No	EXPERIMENTS
1	Fault Analysis by using the Symmetrical and Unsymmetrical fault MATLAB Simulink model.
2	Transmission fault detection by using Wavelet applications MATLAB Simulink model.
3	Working with Transformer Differential relay model JND, 040
4	Pickup test for Differential Relay.
5	Transformer protection using the Differential Relay for Zone trip fault.
6	Transformer Out Zone (or) Non- Trip faults.
7	Operation of Electromechanical type Earth Fault Relay.
8	Operation of Electromechanical type Over Voltage Relay.
9	Percentage Differential Relay.
10	Micro Controller Based Over Current Relay.
11	Micro Controller Based Over / Under Voltage Relay.

Note: Any **Ten** Experiments are to be conducted.

PSCP 04: WIND AND SOLAR ENERGY SYSTEMS LAB.

Instruction Hours/week: 3(P) **Credits: 1.5**
Sessional Marks: 40 **Semester-End Examination: 60**

S. No	EXPERIMENTS
1	IV & PV characteristics of series and parallel combination of PV module.
2	IV & PV characteristics of PV module with varying the radiation and temperature level.
3	Effect of shading on output power of module.
4	Effect of variation in tilt angle on PV module power.
5	Simulation of IV – PV Curves.
6	Modeling & Simulation of wind turbine generator in MATLAB Simulink.
7	Power Equation simulation for wind turbine.
8	Evaluation of Tip Speed ratio at different wind speed.
9	Evaluation of the efficiency of charge controller.
10	Evaluation of co-efficient of performance of wind turbine.

Note: All the **Ten** Experiments are to be conducted.

PSVAC01: ELECTRICAL SAFETY AND MANAGEMENT

Instruction Hours/week: 3(L) & 1(T) **Credits: 3**

Sessional Marks: 40 **Semester-End Examination: 60**

UNIT-I

INTRODUCTION TO ELECTRICAL SAFETY, SHOCKS AND THEIR PREVENTION: Terms and definitions, objectives of safety and security measures, Hazards associated with electric current, and voltage, principles of electrical safety, Primary and secondary electrical shocks, possibilities of getting electrical shock and its severity, shocks due to flash/ Spark over's, prevention of shocks, safety precautions against contact shocks, flash shocks, burns, approaches to prevent Accidents.

UNIT-II

ELECTRICAL SAFETY IN RESIDENTIAL, COMMERCIAL AND AGRICULTURAL INSTALLATIONS: Wiring and fitting – Domestic appliances – water tap giving shock – shock from wet wall – fan firing shock – multi-storied building – Temporary installations – Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances

UNIT-III

ELECTRICAL SAFETY IN HAZARDOUS AREAS: Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements –Specifications of electrical plants, equipments for hazardous locations – Classification of equipment enclosure for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

UNIT- IV

ELECTRICAL SAFETY DEVICES: Fire Extinguishers: Fundamentals of fire-initiation of fires, types; extinguishing techniques, prevention of fire, types of fire extinguishers, fire detection and alarm system; CO2 and Halogen gas schemes; foam schemes.

UNIT-V

SAFETY DURING INSTALLATION OF PLANT: Introduction, preliminary preparations, preconditions for start of installation work, during, risks during installation of electrical plant and equipment, safety aspects during installation, field quality and safety during erection, personal protective equipment for erection personnel.

SAFETY MANAGEMENT OF ELECTRICAL SYSTEMS: Principles of Safety Management, Management Safety Policy, Safety organization, safety auditing, Motivation to managers, supervisors, employees.

Text Books:

1. Rao, S. and Saluja, H.L., "Electrical Safety, Fire Safety Engineering and Safety Management", Khanna Publishers, 1988.
2. Pradeep Chaturvedi, "Energy Management Policy, Planning and Utilization", Concept Publishing Company, 1997.

Reference Books:

1. Cooper.W.F, "Electrical safety Engineering", Newnes-Butterworth Company, 1978.
2. John Codick, "Electrical safety hand book", McGraw Hill Inc., New Delhi, 2000.
3. Nagrath, I.J. and Kothari, D.P., "Power System Engineering", Tata McGraw Hill, 1998.
4. Wadhwa, C.L., "Electric Power Systems", New Age International, 2004.

Course outcomes:

At the end of the course, students will be able to

1. Understand the necessity of electrical safety
2. Know about Hazardous zones
3. Apply different safety measures to various machines and equipment
4. Understand the electrical management principles

PSMPS00: MINI-PROJECT WITH SEMINAR

Instruction Hours/week: 1(L) & 2(P) **Credits: 2**
Sessional Marks: 40 **Semester-End Examination: 60**

Mini-Project with Seminar course is a project-based learning methodology in Power System Analysis

Course outcomes: Students will be able to**:**

1. Know the meaning of research problem, Sources of research problem Approaches of investigation of solutions for research problem.
2. Understand effective literature studies approaches, analysis Effective technical writing.
3. Learn how to write an assessment report and preparation of documentation and presentation.
4. Know the criteria characteristics of good research problem.
5. Acquire the knowledge of comprehensive analysis in Electrical Power Network.



M.TECH – III SEMESTER

COURSE INSTRUCTIONS

(R23 REGULATIONS)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
M.TECH: POWER SYSTEMS - THIRD SEMESTER - SYLLABUS

PGOE01: OPEN ELECTIVE COURSE (MOOCS)

Instruction Hours/week: 3(L)-MOOCS (12 weeks) **Credits: 3**

Sessional Marks: 00 **Semester-End Examination: 100**

Instructions of the course: The Students can undergo Open Elective Course work (12 week's duration) from the day of commencement of Second semester class work through online (MOOCS)/ NPTEL and can select the subjects that are not covered in the Curriculum. However, the obtained pass certificate should be submitted on or before the last working day of the III - Semester Course work without fail and result will be reflected in III - Semester Marks MEMO. Otherwise, the results will be reflected in supplementary mode.

PSPD01: DISSERTATION PROJECT WORK PHASE-I

Instruction Hours/week: 24(P) **Credits: 12**

Sessional Marks: 20+40 **Semester-End Examination: 40**

Instructions of the course: The Students will acquire knowledge about research problem, sources of research problem Approaches of investigation of solutions for research problem and understand effective literature studies approaches and analysis.

Scheme of Evaluation of Dissertation project work Phase – I: Review after 6 – 8 weeks (20 marks), Continuous Guide Evaluation (40 marks) and End Semester Evaluation (40 marks). – Total Marls: 100 marks.



M.TECH – IV SEMESTER

COURSE INSTRUCTIONS

(R23 REGULATIONS)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
M.TECH: POWER SYSTEMS - FOURTH SEMESTER - SYLLABUS

PSPD02: DISSERTATION PROJECT WORK PHASE – II AND VIVA-VOCE

Instruction Hours/week: 32(P) **Credits: 16**

Sessional Marks: 20+40 **Semester-End Examination: 40**

Instructions of the course: The Student will be able to analyze and solve the problem with programmable code/Simulink to obtain appropriate solution, how to write a assessment report and preparation of project work/documentation and presentation of results.
The student must publish the work in a reputed reviewed UGC approved journal.

Scheme of Evaluation of Dissertation project work Phase – II:

1. Review after 8-10 weeks (20 marks) and Continuous Guide Evaluation (40 marks) and End Semester Examination (40 marks).
2. Student must submit their project work on or before the last working day/Instruction Day of the IV Semester of the Program. Otherwise Rs. 1,000/- penalty for late submission will be levied to extend submission up to three months. In case of failure of the said condition the penalty amount will be doubled up to the completion of the course work.



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING:

TIRUPATI-517502

R-23– Scheme of Instructions effective from the academic year 2023 – 2024

Programme Scheme



SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING (AUTONOMOUS)

SRI VENKATESWARA UNIVERSITY

TIRUPATI-517502 (A.P), INDIA.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502

Department of Electronics and Communication Engineering-Scheme of Instruction- (CBCS) effective from the Academic Year 2023-2024

M.Tech (PG) (Electronics and Communication Engineering)
Specialization: Communication Systems (CM)

I Semester

S.No.	Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1	PCC	CM11C	Advanced Digital Signal Processing (Common to Signal Processing SP11C)	3	1	0	4	4	40	60	100
2	PCC	CM12C	Wireless and Mobile Communication	3	1	0	4	4	40	60	100
3	PCC	CM13C	DSP Architecture (Common to Signal Processing SP13C)	3	1	0	4	4	40	60	100
4	PEC	CM14C	Programme Elective- I	3	0	0	3	3	40	60	100
5	PEC	CM15C	Programme Elective- II	3	0	0	3	3	40	60	100
6	PCC	CM16L	Advanced Digital Signal Processing Lab (Common to Signal Processing SP16L)	0	0	3	3	1.5	40	60	100
7	PCC	CM17L	Wireless and Mobile Communication Lab	0	0	3	3	1.5	40	60	100
8	MAC	CM18C	Research Methodology and IPR	3	0	0	3	3	40	60	100
Total				18	3	6	27	24	320	480	800

List of Programme Elective Course I(CM14C)	List of Programme Elective Course II(CM15C)
1. Optical Networks	1. Cognitive Radio
2. Statistical Information Processing	2. Voice and Data Networks (Common to signal Processing SP15C)
3. Wireless Sensor Networks (Common to signal Processing SP14C)	3. Secured Communication
4. High Performance Networks	**4.** Electromagnetic Interference and Compatibility

II Semester

S.No.	**Category**	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1	PCC	CM21C	Antennas and Radiating Systems	3	1	0	4	4	40	60	100
2	PCC	CM22C	Advanced Communication Networks	3	1	0	4	4	40	60	100
3	PEC	CM23C	Programme Elective Course - III	3	0	0	3	3	40	60	100
4	PEC	CM24C	Programme Elective Course - IV	3	0	0	3	3	40	60	100
5	PCC	CM25L	Antennas and Radiating Systems Lab	0	0	3	3	1.5	40	60	100
6	PCC	CM26L	Advanced Communication Networks Lab	0	0	3	3	1.5	40	60	100
7	VAC	CM27C	Cyber Security	2	0	2	4	3	100	-	100
8	PCC	CM28M	Mini Project with Seminar	0	0	4	4	2	100	-	100
Total				**14**	**2**	**12**	**28**	**22**	**440**	**360**	**800**

List of Programme Elective Courses III(CM23C)	**List of Programme Elective Courses IV(CM24C)**
1. Satellite Communication	1. Random processes and Queueing models. (Common to Signal Processing SP24C)
2. IoT and Applications (Common to signal Processing SP23C)	2. Pattern Recognition and Machine Learning (Common to Signal Processing SP21C)
3. RF and Microwave Circuit Design	3. Programmable Networks-SDN, NFV
4. MIMO Systems	4. Remote Sensing (Common to Signal Processing SP24C)

III Semester

S.No.	Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1	OEC	CM31C	Open Elective Course (Through MOOCS)	0	0	0	0	3	100	-	100
2	PCC	CM32I	Industrial/ Research Internship (Min of 4 Weeks)	0	0	0	0	3	100	-	100
3	PCC	CM33D	Dissertation Work Phase-I	0	0	24	24	12	40	60	100
Total				**0**	**0**	**20**	**20**	**18**	**240**	**60**	**300**

IV Semester

S.No.	Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1	PCC	CM41D	Dissertation Work Phase-II and Viva-Voce	0	0	20	20	10 + 06 = 16	40	60	100
Total				**0**	**0**	**20**	**20**	**16**	**40**	**60**	**100**

M. Tech. (Electronics & Communication Engineering)
Curriculum Structure
Specialization: Communication systems (CM)

Vision of The Institute

The Vision of Sri Venkateswara University College of Engineering is to be the leader in the creation and development of globally competitive human capital in Engineering Education for Technological, Economical and Social Enrichment of the Society, through its open and flexible Academic Programs.

Mission of The Institute

- To be recognized as a premier institution offering Engineering Education programs, training human resources oriented to problem solving and system development.
- To carry out research in Engineering and Technology relevant to all segments of society.
- To assume leadership in sustainable technological growth of the Indian society.
- To be a natural destination for excellence and diversity in thought and practice.

Department of Electronics & Communication Engineering

Vision

To be a lead department imparting quality and value embedded higher education and research emphasizing freedom of learning andpractice.

Mission

1. Transforming students into full-fledged professionals and to become leaders in dynamic global environment.
2. Augmenting knowledge and technologies in rapidly advancing fields of Electronics and Communication Engineering.
3. Promoting in depth research and create Centre of excellence in thrust areas.

Program Outcomes (POs) for PG programs

POs are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability attitude and behaviour that students acquire through the program.

The POs essentially indicate what the students can do from subject-wise knowledge acquired by them during the program. As such, POs define the professional profile of a graduate of PG Engineering Program.

NBA has defined the following three POs for a graduate of PG Engineering Program:

1. **PO1**: An ability to independently carry out research/investigation and development work to solve practical problems.
2. **PO2**: An ability to write and present a substantial technical report/document.
3. **PO3**: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

Program Specific Outcomes (PSOs):

M. Tech. in Communication Systems graduates will be able to:

1. **PSO 1**. Integrate knowledge to identify, formulate, solve complex problems and meet the challenges in the domain of communication and networking.
2. **PSO 2.** Use the concepts of communications, networking and signal processing to simulate algorithms in virtual platforms and implement them in real time environment.

Program Educational Objectives (PEOs):

M. Tech. in Communication Systems Program, graduates will be able to:

. **PEO 1.** Apply the concepts of mathematics and engineering principles in the domain of communication and networking and analyze advantages and disadvantages of using the various communication technologies.
. **PEO 2.** Solve numerical problems and write algorithms using communication and networking platforms and different software tools to evolve viable communication systems.
. **PEO 3.** Inculcate professional ethics, integrity and social responsibility, enhance communication skills, and practice effective teamwork to pursue research or attain a career in the domain of Communication Engineering.

CM11C: Advanced Digital Signal Processing
(Common to signal processing)

Instruction Hours/week: (L-T-P-C): 3-1-0-4 **Credits : 4**
Sessional Marks : 40 **Semester-End Examination : 60**

Course Description: This course will provide rigorous foundations in Digital filter structures, Multirate signal processing, Linear prediction, Adaptive filters and Spectral estimation. This course emphasizes the use of digital signal processing techniques for designing digital systems used in Communications, Control, Media Applications etc.

Prerequisites: Signals and Systems, Digital Signal Processing.

Course Objectives: To enable the student to

1. Understand to develop FIR & IIR filter structures depending upon the given applications.
2. Understand theory of Multirate DSP, solve numerical problems and write algorithms.
3. Understand theory of prediction and solution of normal equations.
4. Understand the different types of adaptive filters used in signal processing applications.
5. Discuss different methods of spectrum estimation and analysis.

Course Outcomes: After completion of the course, student will be able to

1. Learn and implement the digital filters to computational complexity problems.
2. Analyze multirate DSP systems and Design a decimator and integrator including multi-stages.
3. Apply theory of prediction and find solution of normal equations
4. Design different types of filters such as Adaptive filters, poly phase filters, Wiener filters, ARMA lattice-ladder filters, etc.
5. Estimate the power spectrum by using different methods.

Contents:

Unit 1

Digital filter structures: Basic FIR/IIR filter structures, FIR/IIR Cascaded lattice structures, Parallel structures, all pass realization of IIR transfer functions, Sine- cosine generator, Computational complexity of filter structures.

Unit 2

Multirate Digital Signal Processing: Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, poly phase filters, Quadrature mirror filter (QMF) banks, Conditions for perfect reconstruction, digital filter banks, Applications in sub-band coding.

Unit 3

Linear Prediction and Optimum Linear Filters: Innovations Representation of a Stationary Random Process, Forward and Backward linear prediction, Solution of the Normal Equations, Properties of linear prediction-Error Filter, AR Lattice and ARMA Lattice-Ladder Filters, Wiener Filters for Filtering and Prediction.

Unit 4

Adaptive Filters, Applications, Gradient Adaptive Lattice, Minimum mean square criterion, The Least-Mean-Square (LMS) algorithm, Normalized LMS (NLMS), The Leaky LMS, Recursive Least Square (RLS) algorithm.

Unit 5

Power Spectral Estimation: Estimation of Spectra from Finite Duration Observations of a Signal, Periodogram, Use DFT in power Spectral Estimation, Bartlett, Welch and Blackman, Tukey methods, Comparison of performance of Non-Parametric Power Spectrum Estimation Methods.

Parametric Methods of Power Spectrum Estimation: Relationship between Auto-Correlation and Model Parameters, Yule-Walker, Burg and Unconstructrained Least Squares Methods, Moving Average (MA) and ARMA Models Minimum Variance Method, Eigen analysis Algorithms for Spectrum Estimation.

Text Books:

1. **John G. Proakis** and **Dimitris G. Manolakis,** Digital Signal Processing: Principles, Algorithms and Applications, 5th Edition, **ISBN-13: 9780137348657, Published** by Pearson, 2021.
2. John G. Proakis, Digital Signal Processing Principles, Algorithms, and Applications, Prentice Hall International Inc, 4th Edition, 2012.
3. Sanjit Kumar Mitra, Digital Signal Processing- A Computer Based Approach, 4th edition, McGraw Hill Education, 2011.
4. D.G. Manolakis, V.K. Ingle and S.M.Kogon, "Statistical and Adaptive Signal Processing", McGraw Hill, 2000.

References:

1. N. J. Flieg Multirate Digital Signal Processing: Multirate Systems - Filter Banks – Wavelets, 1st Edition, John Wiley and Sons Ltd, 1999.

2. Sanjit Kumar Mitra, and Yonghong Kuo. Digital Signal Processing: A Computer-Based Approach, 4 th. Edition McGraw-Hill Higher Education, New York, 2013.
3. M. H. Hayes, "Statistical Digital Signal Processing and Modeling", John Wiley & Sons Inc., 2002.
4. Simon Haykin, "Adaptive Filter Theory", 4th Edition, Prentice Hall, 2001.

CM12C: Wireless and Mobile Communication

Instruction Hours/week : (L-T-P-C): 3-1-0-4 **Credits : 4**

Sessional Marks : 40 **Semester-End Examination : 60**

Course Description: This course provides a comprehensive overview and advanced knowledge of modern mobile and wireless communication systems. Building on the prior knowledge on digital communications, students develop further understanding on the challenges and opportunities brought by the wireless medium in designing current and future wireless communication systems and networks

Course Objectives:

1. To provide the students with an understanding of the cellular concepts, frequency reuse, handoff strategies.
2. To enable the students to analyze and understand wireless and mobile cellular communication systems over stochastic fading channels.
3. To provide the students with an understanding of Co-channel and Non-Co channel Interference.
4. To give students an understanding of cell coverage for signal and traffic diversity techniques and mobile antennas.
5. To give the students an understanding of frequency management, channel assignment and types of handoff.

Contents

UNIT 1

Cellular Communication Fundamentals: Cellular system design, Frequency reuse, cell splitting, handover concepts, Co channel and adjacent channel interference, interference reduction techniques and methods to improve cell coverage, frequency management and channel assignment.GSM architecture and interfaces, GSM architecture details, GSM subsystems, GSM Logical Channels, Data Encryption in GSM, GPRS, IS 95, Forward Link and Reverse links.

UNIT 2

Spectral efficiency analysis based on calculations for Multiple access technologies: TDMA, FDMA and CDMA, Comparison of these technologies based on their signal separation techniques, advantages, disadvantages and application areas. Wireless network planning (Link budget and power spectrum calculations)

UNIT 3

Mobile Radio Propagation: Large Scale Path Loss, Free Space Propagation Model, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering, Practical Link Budget Design using Path Loss Models, Outdoor Propagation Models, Indoor Propagation Models, Signal Penetration into Buildings. Small Scale Fading and Multipath Propagation, Impulse Response Model, Multipath Measurements, Parameters of Multipath channels, Types of Small-Scale Fading: Time Delay Spread; Flat, Frequency selective, Doppler Spread; Fast and Slow fading.

UNIT 4

Equalization, Diversity: Equalizers in a communications receiver, Algorithms for adaptive equalization, diversity techniques, space, polarization, frequency diversity, Interleaving.

UNIT 5

5G Architecture Add Network, 5G Radio, Access Technologies, Security for 5G Communications, 5G challenges and future scope.

Course Outcomes: Upon completion of the course, students will be able to

1. Design appropriate mobile communication systems by applying frequency-reuse concept, and analyze its effects on interference, system capacity, handoff techniques.
2. Distinguish various multiple-access techniques e.g. FDMA, TDMA, CDMA, and their advantages and disadvantages.
3. Analyze path loss and interference for wireless telephony and their influences on a mobile communication system's performance.
4. Analyze and design CDMA system with the knowledge of forward and reverse channel details, advantages and disadvantages of it.
5. Understand technologies like 2G, 3G, 4G, 5G, etc.

TEXT BOOKS:

1. T.S.Rappaport, "Wireless Communications Principles and Practice", 2nd edition, PHI, 2002.
2. William C.Y.Lee, "Mobile Cellular Telecommunications Analog and Digital Systems", 2nd edition, TMH, 1995.
3. Ajit Singh, "5G Simplified", Shroff Publishers, 2019.

REFERENCES:

1. V.K.Garg, J.E.Wilkes, "Principle and Application of GSM", Pearson Education, 5th edition, 2008.
2. V.K.Garg, "IS-95 CDMA & CDMA 2000", Pearson Education, 4th edition, 2009.
3. Asha Mehrotra, "A GSM system Engineering" Artech House Publishers Bosten, London,1997.

CM13C: DSP Architecture
(Common To Signal Processing)

Instruction Hours/week : (L-T-P-C): 3-1-0-4 Credits : 4
Sessional Marks : 40 Semester-End Examination : 60

Course Description: This course explains fundamental concepts of Digital Signal Processing and implementation of various applications on Advanced Processor. Helps students to understand architecture of advanced Digital Signal Processor and how to program it for signal processing applications.

Course Objectives:

1. To describe features and architectural improvements of DSP processors.
2. Introduce addressing modes and instruction description of TMS320C6x processors.
3. To demonstrate data representation in DSP Processors and FIR filters.
4. To demonstrate the usefulness of the adaptive filters and learn techniques of code optimization.

Course Outcomes:

1. At the end of this course, students will be able to
2. Identify and formalize architectural level characterization of P-DSP hardware
3. Ability to design, programming (assembly and C), and testing code using Code Composer Studio environment
4. Deployment of DSP hardware for Control, Audio and Video Signal processing applications
5. Understanding of major areas and challenges in DSP based embedded systems

Syllabus Contents:

Unit 1

Programmable DSP Hardware: Processing Architectures (von Neumann, Harvard), DSP core algorithms (FIR, IIR, Convolution, Correlation, FFT), IEEE standard for Fixed and Floating Point Computations, Special

Architectures Modules used in Digital Signal Processors (like MAC unit, Barrel shifters), On-Chip peripherals, DSP benchmarking.

Unit 2

Structural and Architectural Considerations: Parallelism in DSP processing, Texas Instruments.TMS320 Digital Signal Processor Families, Fixed Point TI DSP Processors: TMS320C1X and TMS320C2X Family,TMS320C25 – Internal Architecture, Arithmetic and Logic Unit, Auxiliary Registers, Addressing Modes (Immediate, Direct and Indirect, Bit-reverse Addressing), Basics of TMS320C54x and C55x Families in respect of Architecture improvements and new applications fields, TMS320C5416 DSP Architecture, Memory Map, Interrupt System, Peripheral Devices, Illustrative Examples for assembly coding.

Unit 3

VLIW Architecture: Current DSP Architectures, GPUs as an alternative to DSP Processors, TMS320C6X Family, Addressing Modes, Replacement of MAC unit by ILP, Detailed study of ISA, Assembly Language Programming, Code Composer Studio, Mixed Cand Assembly Language programming, On-chip peripherals, Simple applications developments as an embedded environment.

Unit 4

Multi-core DSPs: Introduction to Multi-core computing and applicability for DSP hardware, Concept of threads, introduction to P-thread, mutex and similar concepts, heterogeneous and homogenous multi-core systems, Shared Memory parallel programming –OpenMP approach of parallel programming, PRAGMA directives, OpenMP Constructs for work sharing like for loop, sections, TI TMS320C6678 (Eight Core subsystem).

Unit 5

FPGA based DSP Systems: Limitations of P-DSPs, Requirements of Signal processing for Cognitive Radio (SDR), FPGA based signal processing design-case study of a complete design of DSP processor,High Performance Computing using P-DSP: Preliminaries of HPC, MPI, OpenMP, multicore DSP as HPC infrastructure.

References:

1. M. Sasikumar, D. Shikhare, Ravi Prakash, “Introduction to Parallel Processing”, 1st Edition, PHI, 2006.
2. Fayez Gebali, “Algorithms and Parallel Computing”,1st Edition, John Wiley & Sons, 2011
3. Rohit Chandra, Ramesh Menon, Leo Dagum, David Kohr, DrorMaydan,

Jeff McDonald,"Parallel Programming in OpenMP", 1st Edition, Morgan Kaufman,2000.
4. Ann Melnichuk,Long Talk, "Multicore Embedded systems", 1st Edition, CRC Press,2010.
5. Wayne Wolf, "High Performance Embedded Computing: Architectures, Applications and Methodologies", 1st Edition, Morgan Kaufman, 2006.
6. E.S.Gopi, "Algorithmic Collections for Digital Signal Processing Applications Using MATLAB", 1st Edition, Springer Netherlands, 2007.

CM14C: Program Elective-I
1. Optical Networks

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Description: Optical fibers have several advantages over conventional copper cables. Optical communication enjoys high bandwidth and thus useful for transmitting huge information securely and with less repeaters to longer distances. The performance of optical system is superior to conventional communication and thus has widespread use in industry.

Course Objectives: Optical Communication has got greater applicability and students of Communication discipline should master the subject. This course will enable the students:
1. To understand deeply the fundamental aspects of optical communication
2. To analyze the types of fibers and understand the performance by comparison
3. To design optical receivers of optical systems
4. To simulate the performance through parameters like BER and S/N Ratio
5. To apply the principles of optical communication to networks.

Course Outcomes:
At the end of this course, students will be able to
1. Contribute in the areas of optical network and WDM network design.
2. Implement simple optical network and understand further technology developments for future enhanced network.

Syllabus Contents:

Unit 1
SONET/SDH: optical transport network, IP, routing and forwarding, multiprotocol label switching.
WDM network elements: optical line terminals and amplifiers, optical add/dropmultiplexers, OADM architectures, reconfigurable OADM, optical cross connects.

Unit 2

Control and management: network management functions, optical layer services and interfacing, performance and fault management, configuration management, optical safety.

Unit 3

Network Survivability: protection in SONET/SDH & client layer, optical layer protection schemes

Unit 4

WDM network design: LTD and RWA problems, dimensioning wavelength routingnetworks, statistical dimensioning models.

Unit 5

Access networks: Optical time division multiplexing, synchronization, header processing,buffering, burst switching, test beds, Introduction to PON, GPON, AON.

References:

1. Rajiv Ramaswami, Sivarajan, Sasaki, "Optical Networks: A Practical Perspective", MK, Elsevier, 3 rd edition, 2010.
2. C. Siva Ram Murthy and Mohan Gurusamy, "WDM Optical Networks: Concepts Design, and Algorithms", PHI, EEE, 2001.

CM14C: Program Elective-I
2. Statistical Information Processing

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

At the end of this course, students will be able to

1. Characterize and apply probabilistic techniques in modern decision systems, such as information systems, receivers, filtering and statistical operations.
2. Demonstrate mathematical modelling and problem solving using such models.
3. Comparatively evolve key results developed in this course for applications to signal processing, communications systems.
4. Develop frameworks based in probabilistic and stochastic themes for modelling and analysis of various systems involving functionalities in decision making, statistical inference, estimation and detection.

Syllabus Contents:

Unit 1

Review of random variables: Probability Concepts, distribution and density functions, moments, independent, uncorrelated and orthogonal random variables; Vector-space representation of Random variables, Vector quantization, Tchebay chef inequality theorem, Central Limit theorem, Discrete &Continuous Random Variables.

Random process: Expectations, Moments, Ergodicity, Discrete-Time Random Processes Stationary process, autocorrelation and auto covariance functions, Spectral representation of random signals, Properties of power spectral density, Gaussian Process and White noise process.

Unit 2

Random signal modelling: MA(q), AR(p), ARMA(p,q) models, Hidden Markov Model &its applications ,Linear System with random input , Forward and Backward Predictions, Levinson Durbin Algorithm.

Unit 3

Statistical Decision Theory: Bayes' Criterion, Binary Hypothesis Testing, M-aryHypothesis Testing, Minimax Criterion, Neyman-Pearson Criterion, Composite Hypothesis Testing.

Parameter Estimation Theory: Maximum Likelihood Estimation, Generalized Likelihood Ratio Test ,Some Criteria for Good Estimators, Bayes' Estimation Minimum Mean-Square Error Estimate, Minimum, Mean Absolute Value of Error Estimate Maximum A Posteriori Estimate , Multiple Parameter Estimation Best Linear Unbiased Estimator ,Least-Square Estimation Recursive Least-Square Estimator.

Unit 4

Spectral analysis: Estimated autocorrelation function, Periodogram, Averaging the periodogram (Bartlett Method), Welch modification, Parametric method, AR(p) spectral estimation and detection of Harmonic signals.

Information Theory and Source Coding: Introduction, Uncertainty, Information and Entropy, Source coding theorem, Huffman, ShanonFano , Arithmetic , Adaptive coding , RLE , LZW Data compaction, , LZ-77, LZ-78. Discrete Memory less channels, Mutual information, channel capacity, Channel coding theorem, Differential entropy and mutual information for continuous ensembles.

Unit 5

Application of Information Theory: Group, Ring & Field, Vector, GF

addition,multiplication rules. Introduction to BCH codes, Primitive elements ,Minimal polynomials, Generator polynomials in terms of Minimal polynomials, Some examples of BCH codes,& Decoder, Reed- Solomon codes & Decoder, Implementation of Reed Solomon encoders and decoders.

References:

1. Papoulis and S.U. Pillai, "Probability, Random Variables and Stochastic Processes",4th Edition, McGraw-Hill, 2002.
2. D.G. Manolakis, V.K. Ingle and S.M. Kogon, "Statistical and Adaptive Signal Processing", McGraw Hill, 2000.
3. Mourad Barkat , "Signal Detection and Estimation", Artech House, 2nd Edition, 2005.
4. R G. Gallager, "Information theory and reliable communication", Wiley, 1st edition, 1968.
5. F. J. MacWilliams and N. J. A. Sloane, "The Theory of Error-Correcting Codes", NewYork, North-Holland, 1977.
6. Rosen K.H, "Elementary Number Theory", Addison-Wesley, 6th edition, 2010.

CSPE13: Program Elective-I
3. Wireless Sensor Networks

Instruction Hours/week: 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Description: This course offers an insight into the concepts of mobile and wireless data communication technologies. The objective of this course is to enable the student to understand the emerging technologies of wireless and mobile communications and simulate them.

Course Objectives:

1. To understand the new trends in mobile/wireless communications networks.
2. To understand multiple radio access techniques.
3. To analyze various routing algorithms used in mobile/wireless networks.
4. To identify the issues in transport and application layers.

Course Outcomes:

At the end of this course, students will be able to

1. Design wireless sensor network system for different applications under consideration.
2. Understand the hardware details of different types of sensors and select right type of sensor for various applications.
3. Understand radio standards and communication protocols to be used for wireless sensor network based systems and application.

4. Use operating systems and programming languages for wireless sensor nodes, performance of wireless sensor networks systems and platforms.
5. Handle special issues related to sensors like energy conservation and security challenges.

Syllabus Contents:

Unit 1

Introduction and overview of sensor network architecture and its applications, sensornetwork comparison with Ad Hoc Networks, Sensor node architecture with hardware and software details.

Hardware: Examples like mica2, micaZ, telosB, cricket, Imote2, tmote, btnode, and Sun

SPOT, Software (Operating Systems): tinyOS, MANTIS, Contiki, and RetOS.

Unit 2

Programming tools: C, nesC. Performance comparison of wireless sensor networks simulation and experimental platforms like open source (ns-2) and commercial (QualNet, Opnet)

Unit 3

Overview of sensor network protocols (details of atleast 2 important protocol per layer):Physical, MAC and routing/ Network layer protocols, node discovery protocols, multi-hop and cluster based protocols, Fundamentals of 802.15.4, Bluetooth, BLE (Bluetooth low energy), UWB.

Unit 4

Data dissemination and processing; differences compared with other database management systems, data storage; query processing.

Unit 5

Specialized features: Energy preservation and efficiency; security challenges; fault-tolerance, Issues related to Localization, connectivity and topology, Sensor deployment mechanisms; coverage issues; sensor Web; sensor Grid, Open issues for future research, and Enabling technologies in wireless sensor network.

References:

1. 1.H. Karl and A. Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley & Sons, India, 2012.
2. C. S. Raghavendra, K. M. Sivalingam, and T. Znati, Editors, “Wireless Sensor Networks”, Springer Verlag, 1st Indian reprint, 2010.
3. F. Zhao and L. Guibas, “Wireless Sensor Networks: An Information Processing Approach”, Morgan Kaufmann, 1st Indian reprint, 2013.

4. YingshuLi, MyT. Thai, Weili Wu, “Wireless sensor Network and Applications”, Springer
5. Series on signals and communication technology, 2008.

CM14C: Program Elective-I
4. High Performance Networks

Instruction Hours/week: 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Course Description: This course provides an introduction to voice and data networking technologies, including public and private voice services, Ethernet and Internet data technologies, network security, business applications and net work management. The structure, regulation, andhistory of the telecom and data network industry will be discussed as well.

Course Objectives:
1. To protocol, algorithms, trade-offs rationale.
2. To routing, transport, DNS resolutions
3. To network extensions and next generation architecture.

Course Outcomes:

At the end of this course, students will be able to
1. Apply knowledge of mathematics, probability, and statistics to model and analyze some networking protocols.
2. Design, implement, and analyze computer networks.
3. Identify, formulate, and solve network engineering problems.
4. Show knowledge of contemporary issues in high performance computer networks. Use techniques, skills, and modern networking tools necessary for engineering practice.

Syllabus Contents:

Unit 1
Types of Networks, Network design issues, Data in support of network design. Networkdesign tools, protocols and architecture. Streaming stored Audio and Video, Best effort service, protocols for real time interactive applications, Beyond best effort, scheduling and policing mechanism, integrated services, and RSVP-differentiated services.

Unit 2
VoIP system architecture, protocol hierarchy, Structure of a voice endpoint, Protocols forthe transport of voice media over IP networks. Providing IP quality of service for voice, signaling protocols for VoIP, PSTN gateways, VoIP applications.

Unit 3

VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. MPLS-operation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P connections.

Unit 4

Traffic Modeling: Little's theorem, Need for modeling, Poisson modeling, Non-poissonmodels, Network performance evaluation.

Unit 5

Network Security and Management: Principles of cryptography, Authentication, integrity,key distribution and certification, Access control and fire walls, attacks and counter measures, security in many layers.Infrastructure for network management, The internet standard management framework –SMI, MIB, SNMP, Security and administration, ASN.1.

References:

1. 1.Kershenbaum A., "Telecommunications Network Design Algorithms", Tata McGraw Hill, 1993.
2. Larry Peterson & Bruce David, "Computer Networks: A System Approach", Morgan Kaufmann, 2003.
3. Douskalis B., "IP Telephony: The Integration of Robust VoIP Services", Pearson Ed. Asia, 2000.
4. Warland J., Varaiya P., "High-Performance Communication Networks", Morgan Kaufmann, 1996.
5. Stallings W., "High-Speed Networks: TCP/IP and ATM Design Principles", Prentice Hall, 1998.
6. Leon Garcia, Widjaja, "Communication networks", TMH 7threprint 2002.
7. William Stalling, "Network security, essentials", Pearson education Asia publication, 4th Edition, 2011.

CM15C: Program Elective-II
1.Cognitive Radio

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Description: To understand the fundamental concepts of cognitive radios networks and develop the cognitive radio, as well as techniques for spectrum holes detection that cognitive radio takes advantages in order to exploit it. Technologies to allow an efficient use of TVWS for radio communications based on two spectrum sharing business models.

Course Objectives:

1. To understand the fundamental concepts of cognitive radio networks and develop the cognitive radio, as well as techniques for spectrum holes detection that cognitive radio takes advantages in order to exploit it.
2. Understand technologies to allow an efficient use of TVWS for radio communications based on two spectrum sharing business models/policies

Course Outcomes:

At the end of this course, students will be able to

1. Understand the fundamental concepts of cognitive radio networks.
2. Develop the cognitive radio, as well as techniques for spectrum holes detection that cognitive radio takes advantages in order to exploit it.
3. Understand technologies to allow an efficient use of TVWS for radio communications based on two spectrum sharing business models/policies
4. Understand fundamental issues regarding dynamic spectrum access, the radio-resource management and trading, as well as a number of optimisation techniques for better spectrum exploitation.

Syllabus Contents:

Unit 1

Introduction to Cognitive Radios: Digital dividend, cognitive radio (CR) architecture, functions of cognitive radio, dynamic spectrum access (DSA), components of cognitive radio, spectrum sensing, spectrum analysis and decision, potential applications of cognitive radio.

Unit 2

Spectrum Sensing: Spectrum sensing, detection of spectrum holes (TVWS), collaborative sensing, geo-location database and spectrum sharing business models (spectrum of commons, real time secondary spectrum market).

Unit 3

Optimization Techniques of Dynamic Spectrum Allocation: Linear programming, convex programming, non-linear programming, integer programming, dynamic programming, stochastic programming.

Unit 4

Dynamic Spectrum Access and Management: Spectrum broker, cognitive radio architectures, centralized dynamic spectrum access, distributed dynamic spectrum access, learning algorithms and protocols.

Unit 5

Spectrum Trading: Introduction to spectrum trading, classification to spectrum trading, radio resource pricing, brief discussion on economics theories in DSA (utility, auction theory), classification of auctions (single auctions, double auctions, concurrent, sequential).

Research Challenges in Cognitive Radio: Network layer and transport layer issues, cross-layer design for cognitive radio networks.

References:

1. Ekram Hossain, Dusit Niyato, Zhu Han, "Dynamic Spectrum Access and Management in Cognitive Radio Networks", Cambridge University Press, 2009.
2. Kwang-Cheng Chen, Ramjee Prasad, "Cognitive radio networks", John Wiley & Sons Ltd., 2009.
3. Bruce Fette, "Cognitive radio technology", Elsevier, 2nd edition, 2009.
4. Huseyin Arslan, "Cognitive Radio, Software Defined Radio, and Adaptive Wireless ,Systems", Springer, 2007.
5. Francisco Rodrigo Porto Cavalcanti, Soren Andersson, "Optimizing Wireless Communication Systems" Springer, 2009.
6. Linda Doyle, "Essentials of Cognitive Radio", Cambridge University Press, 2009.

CM15C :Program Elective-II
2. Voice and Data Networks
(Common to signal processing)

Instruction Hours/week : 3(L) **Credits : 3**

Sessional Marks : 40 **Semester-end Examination : 60**

Course Description: This course provides an introduction to voice and data networking technologies, including design and performance issues. And also focus is on layered & cross layer communication along with Packet and circuit switching communication. Provides Link layer error and flow control mechanisms, also know about queuing models of networks and its applications. Finally have idea about different internet protocols and packet scheduling algorithm.

Course Objectives:

1. Know different design and performance issues of communications networks.
2. Understand the concepts of layered & cross layer communication, along with circuit & packet switching technologies and their deployments in public networks
3. Understand the role of data link layer and various queuing models for

communication.
4. Understand the functions of internetworking devices and importance of different internet protocols.

Course Outcomes:

1. An ability to apply knowledge of networking. network topologies in designing of a network.
2. An ability to model systems using concept of layered/cross layered and TCP/IP architecture.
3. An ability apply the link layer functionalities and queuing models during communication.
4. An ability to use modern engineering techniques for analysis and design of a network with the knowledge of internet concepts and protocols.

Syllabus Contents:

Unit 1

Network Design Issues, Network Performance Issues, Network Terminology, centralized and distributed approaches for networks design, Issues in design of voice and data networks.

Unit 2

Layered and Layer less Communication, Cross layer design of Networks, Voice Networks (wired and wireless) and Switching, Circuit Switching and Packet Switching, Statistical Multiplexing.

Unit 3

Data Networks and their Design, Link layer design- Link adaptation, Link Layer Protocols, Retransmission. Mechanisms (ARQ), Hybrid ARQ (HARQ), Go Back N, Selective Repeat protocols and their analysis.

Unit 4

Queuing Models of Networks , Traffic Models , Little's Theorem, Markov chains, M/M/1 and other Markov systems, Multiple Access Protocols , Aloha System , Carrier Sensing , Examples of Local area networks,

Unit 5

Inter-networking, Bridging, Global Internet, IP protocol and addressing, Sub netting, Classless Inter domain Routing (CIDR) , IP address lookup , Routing in Internet. End to End Protocols, TCP and UDP. Congestion Control, Additive Increase/Multiplicative Decrease, Slow Start, Fast Retransmit/ Fast Recovery, Congestion avoidance, RED TCP Throughput Analysis, Quality of Service in Packet Networks, Network Calculus, Packet Scheduling Algorithms.

References:

1. D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, Prentice Hall, 1992.
2. L. Peterson and B. S. Davie, "Computer Networks: A Systems Approach",5th Edition, Morgan Kaufman, 2011.
3. Kumar, D. Manjunath and J. Kuri, "Communication Networking: An analytical approach", 1st Edition, Morgan Kaufman, 2004.
4. Walrand,"Communications Network: A First Course", 2nd Edition, McGraw Hill, 2002.
5. Leonard Kleinrock, "Queueing Systems,Volume I: Theory", 1st Edition, John Wiley and Sons, 1975.
6. Aaron Kershenbaum,Telecommunication Network Design Algorithms, McGraw Hill, 1993.
7. Vijay Ahuja, "Design and Analysis of Computer Communication Networks", McGraw Hill, 1987

CM15C: Program Elective-II
3. Secured Communication

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Description: The principles are tempered with their practical significance to cope up with the interest to both researchers and system designers. Learning is facilitated by streamlined derivations and assignments.

Course Objectives:

1. To introduce the basic concept encryption techniques
2. To familiarize with the concept of private key and public key cryptosystems.
3. To introduce the concept of Elliptic curves

Course Outcomes: After completing this course, students will be able to:

1. To Understand Cryptography attacks, Integer arithmetic, linear congruence
2. To Understand encryption techniques
3. To Understand Private key and public cryptosystem
4. To Understand Elliptic Curves
5. Discrete logarithm problem on Elliptic Curves

UNIT 1

Introduction: Security Goals, Cryptographic Attacks, Services and Mechanisms, Integer Arithmetic, Modular Arithmetic, Linear Congruence.

UNIT 2

Basic Encryption Techniques: Concept of cryptanalysis ,Symmetric key ,Block ciphers, Cryptographic algorithms , Features of DES, Stream ciphers, Pseudo random sequence generators, linear complexity, Non-linear combination of LFSRs ,Boolean functions.

UNIT 3

Private Key and Public Key Cryptosystems: Asymmetic Key, One way functions, Primality Testing, Factorization problem, Chinese Remainder Theorem , RSA encryption, Diffie Hellmann key exchange , Message authentication and hash functions, Digital signatures, Secret sharing, features of visual cryptography , other applications of cryptography.

UNIT 4

Elliptic Curves: Basic theory, Weirstrass equation, Group law, Point at Infinity, Elliptic curves over finite fields.

UNIT 5

Discrete logarithm problem on Elliptic curve: Elliptic curve cryptography, Diffie Hellmann key exchange over EC, Elgamal encryption over EC, ECDSA.

Text Books:

1. Douglas R. Stinson, Maura B. Paterson "Cryptography, Theory and Practice", 4th Edition, CRC Press, Taylor & Francis Group, 2019.
2. Lawrence C. Washington, " Elliptic Curves", **2nd Edition** , Chapman & Hall/ CRC Press Publishers, April 2008, ISBN: 9781420071474.
3. David S. Dummit, Richard M. Foote, " Abstract Algebra", Third Edition John Wiley & Sons, Inc., 2004.

CM15C: Program Elective-II
4. Electromagnetic Interference And Compatibility

Instruction Hours/Week:3L **Credits: 3**

Sessional Marks :40 **End Semester Examination Marks: 60**

Course objective:

1. The course Electromagnetic interference and compatibility gives the in-depth expose of unintentional generation, propagation and reception of electromagnetic energy which may cause unwanted effects such as

electromagnetic interference or even physical damage to the operational or impaired function of equipment.

2. The goal of EMC is to inbuilt the withstanding capability of operation of different equipment in a common electromagnetic environment. This course will equip the learner's in-depth understanding of Sources and victim of EMI. The course gives the insight of the suppression techniques like Shielding, bonding Grounding, Earthing.
3. Learners should be able to explore and apply EMI/EMC measurement technique, evaluation methods and various EMI/EMC standards.
4. A Prerequisite knowledge of Antennas and Microwave Engineering is required for the course.

Syllabus Contents:

UNIT I

BASIC THEORY (10): Introduction to EMI and EMC, Intra and inter system EMI, Elements of Interference, Sources and Victims of EMI, Conducted and Radiated EMI emission and susceptibility, Case Histories, Radiation hazards to humans, Various issues of EMC, EMC Testing categories, EMC Engineering Application. Importance of EMI emission in communications.

UNIT II

EMI from Apparatus and circuits (10): Electromagnetic emissions, noise from relays and switches, non-linearities in circuits, passive inter-modulation, cross-talk in transmission lines, transients in power supply lines, electromagnetic interference(EMI), Overview on Open area test sites and measurements

UNIT III

Radiated and Conducted Interference Measurements (10): Anechoic chamber, TEM cell, GH TEM cell, characterization of conduction Currents/voltages, conducted EM noise on power lines, conducted EMI from Equipment, immunity to conducted EMI detectors and Measurements.

UNIT IV

STANDARDS AND REGULATION (10): Need for Standards, Generic/General Standards for Residential and Industrial environment, Basic Standards, Product Standards, National and International EMI Standardizing Organizations; IEC, ANSI, FCC, CISPR, CENELEC, Electro Magnetic Emission and susceptibility standards and specifications, MIL461E Standards.

UNIT V

EMI TEST METHODS AND INSTRUMENTATION (10): Fundamental

considerations, Basic principles of RE, CE, RS and CS measurements, EMI Shielding effectiveness tests, TEM cell for immunity test, Shielded chamber , Shielded anechoic chamber, EMI test receivers, Spectrum analyzer, EMI test wave simulators, EMI coupling networks, Line impedance stabilization networks, Feed through capacitors, Antennas, Current probes, MIL -STD test methods, Civilian STD test methods.

TEXT BOOK

1. Clayton Paul, "Introduction to Electromagnetic Compatibility", Wiley Interscience, 2006.
2. V Prasad Kodali, "Engineering Electromagnetic Compatibility", IEEE Press, Newyork, 2001.

REFERENCES

1. Henry W. Ott, "Electromagnetic Compatibility Engineering", John Wiley & Sons Inc, Newyork, 2009.
2. Daryl Gerke and William Kimmel, "EDN's Designer's Guide to Electromagnetic Compatibility", Elsevier Science & Technology Books, 2002.
3. W Scott Bennett, "Control and Measurement of Unintentional Electromagnetic Radiation", John Wiley & Sons Inc., (Wiley Interscience Series) 1997.
4. Dr Kenneth L Kaiser, "The Electromagnetic Compatibility Handbook", CRC Press 2005.

COURSE OUTCOMES:

1. Identify the various types and mechanisms of Electromagnetic Interference
2. Identify the various types and mechanisms of Electromagnetic Interference Analyze various sources of EMI and various possibilities to provide EMC.
3. Analyze possible EMI prevention techniques such as grounding, shielding, filtering and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.
4. To measure emission immunity level from different systems to couple with the prescribed EMC standards
5. Understand the different types of EMI/EMC measurement techniques and measuring equipment

CM16L: Advanced Digital Signal Processing Lab
(Common to signal Processing)

Instruction Hours/week : 3(P) **Credits : 1.5**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Overview: This practical course enables students to apply skills learned in Advanced Digital Signal Processing algorithms and will help to teach implementation of them. MATLAB is used to apply theoretical concepts and to demonstrate signal processing techniques by means of hands-on application examples. Recognize estimation problems and design, implement and analyze algorithms for solving them. Implement signal processing systems with DSP based development platforms.

Pre-requisites: Signals & Systems, Digital Signal Processing, Digital Signal Processing Lab, MATLAB, and Code Composer Studio.

Course Learning Objectives: The student after studying this courseis able to:

1. Understand how to analyze and manipulate digital signals and have the programming knowledge to do so.
2. Understand the trade-offs in the practical design and implement of various structures of FIR and IIR digital filters, for example which can be reduces noise or realizes various applications.
3. Understand theory of prediction and solution of normal equations.
4. Acquaint knowledge of the concepts, algorithms and applications of adaptive signal processing in digital communication systems.
5. Understand the implementation of adaptive filters used in signal processing applications.
6. Understand different methods for estimation of power spectra and its analysis.

Course Outcomes: After completion of this coursethe student is:

1. Able to design, analyze, and implement digital filters using MATLAB.
2. Able to implement various structures of digital filters.
3. Able to implement up-sampling and down-sampling of a given Sequences.
4. Apply the Lattice filter architecture and implement the Wiener filter, Least Squares, LMS and RLS algorithms, and apply to selected applications.
5. Deduce and apply correlation functions and power spectra for various signal classes, in particular for stochastic signals.

Course Contents:

Note: (i) Minimum of 10 Experiments have to be done invariably.
(ii) All Experiments may be Simulated using MATLAB and to be

verified theoretically.

List of Experiments:

1. Introduction to DSP with MATLAB Programming Environment and Familiarization to Code Composer Studio.
2. Basic Operations on Signals, Generation of Various Signals and finding its FFT.
3. Simple Digital Filters (LPF, HPF, BPF, BSF and Comb Filters).
4. Realization of Structures (Cascade / Parallel/ Lattice Structure's) of a system transfer function.
5. Implement Program to verify Decimation and Interpolation of a given Sequences.
6. Implement Program to Convert CD data into DVD data (sampling rate converters).
7. Estimation of data series using Nth order Forward Predictor and comparing to the Original Signal.
8. Design of linear prediction coding (LPC) filter using Levinson-Durbin Algorithm.
9. Apply the Lattice filter architecture from the Levinson-Durbin algorithm.
10. Computation of Reflection Coefficients using Schur Algorithm.
11. To implement the Wiener filter, and Least Squares algorithms, and apply to selected applications.
12. To implement the LMS and RLS algorithms, and apply to selected applications.
13. Design and verification of a Matched filter.
14. Adaptive Noise Cancellation / Linear Equalizer.
15. Computing Power Spectrum of a Square Signal and chirp signal.
16. Design and Simulation of Notch Filter to remove 50Hz Hum / any unwanted frequency component of given Signal (Speech / ECG).
17. Plot the Periodogram of a Noisy Signal and estimate PSD using Periodogram and Modified Periodogram methods.
18. Estimation of Power Spectrum using Bartlett and Welch methods.
19. Parametric methods (Yule-Walker and Burg) of Power Spectrum Estimation.

For Motivated Learners Extra experiments can be done:

Applications: Adaptive filter and experiments on communication such as generation of a N-tuple PN sequence, generation of a white noise sequence using the PN sequence, restoration of a sinusoidal signal embedded in white noise by Wiener Filtering; speech and multi-media applications.

Texts / References:

1. **John G. Proakis** and **Dimitris G. Manolakis,** Digital Signal Processing:

Principles, Algorithms and Applications, 5th Edition, **ISBN-13: 9780137348657, Published** by Pearson, 2021.
2. Sanjit Kumar Mitra, Digital Signal Processing: A Computer Based Approach, 4th edition, McGraw Hill Education, 2011.
3. LjiljanaMilić, Multirate Filtering for Digital Signal Processing: MATLAB Applications, Published by Information Science Reference, Hershey PA 17033, New York, ISBN 978-1-60566-178-0 (Hardcover) - ISBN 978-1-60566-179-7 (eBook), 2009.
4. R. Chassaing and D. Reay, Digital Signal Processing and Applications withTMS320C6713 *and* TMS320C6416, Wiley, 2008.

CM17L: Wireless and Mobile Communication Lab

Instruction Hours/week : 3(P) **Credits : 1.5**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Objectives:

1. To enable the students to understand and investigate Wireless channels, Fading environment and analyze their behaviour.
2. To study various radio propagation models.
3. To describe different algorithms of adaptive filtering.
4. To facilitate students with hands on 4G LTE network to establish communication between user equipment.

List of Experiments

1. Radio propagation models: Okumura and Hata models.
2. Calculation of frequency reuse factor and cluster size.
3. Improving channel capacity of wireless network using cell sectoring.
4. Selection diversity for wireless communication.
5. Power spectral density of GMSK.
6. RLS and LMS algorithms for adaptive filtering.
7. Configuration of processor and IP address for 4G LTE operation.
8. Configuration of eNodeB Radio parameters and Bandwidth.
9. Configuration of EPC and user database.
10. Configuration of IMS and users, complete LTE run and UE application setup.
11. Virtual lab experiments on understanding of pathloss, beam patterns, calculation of boundary coverage probability and SINR.
12. Virtual lab experiments on handoff, frequency reuse, flat and frequency selective fading.

Course Outcomes:

Upon completion of the course, students will be able to

1. Understand Cellular concepts and radio propagation models.
2. Perform 4G LTE wireless network through experimentation
3. Analyze configuration parameters of Software Defined Radio in real time environment.
4. Demonstrate various concepts of wireless and mobile communication like handoff, cell sectoring, frequency reuse, etc., using virtual labs.

Resources:

1. Software Tools: Matlab
2. Amitec 4G LTE Network Setup
3. Virtual Labs: Fading Channels and Mobile Communications, http://vlabs.iitkgp.ernet.in/fcmc

CM18C: Research Methodology and IPR

Instruction Hours/week : 3L **Credits:3**
Sessional Marks : 40 **Semester-end Examination : 60**

Description of the Course: This subject gives how to proceed systematically for research, present research findings. This course consists of basics of research methods, paper writing, patenting methods and requirements.

Course Educational Objectives (CEOs):

1. To understand the importance of research objectives and procedures.
2. To know the procedures of data collection and report writing of research.
3. To have the knowledge of filing and obtaining a patent on research findings.

UNIT I

Meaning, Objective and Motivation in Research: Types of Research, Research Approaches, Research Process, Validity and Reliability in Research, Research Design: Features of Good Design, Types of Research Design, Basic Principles of Experimental Design

UNIT II

Sampling Design: Steps in Sampling Design, Characteristics of a Good Sample Design, Random Samples and Random Sampling Design Measurement and Scaling Techniques: Errors in Measurement, , Scaling and Scale Construction techniques, Forecasting Techniques, Time Series

Analysis, Interpolation and Extrapolation

UNIT III

Methods of Data Collection: Primary Data, Questionnaire and Interviews, Collection of Secondary Data, Cases and Schedules. Professional Attitude and Goals, Concept of Excellence, Ethics in Science and Engineering, Correlation and Regression Analysis, Method of Least Squares, Regression Vs. Correlation, Correlation Vs. Determination.

UNIT IV

Interpretation of Data and Report Writing, Layout of a Research Paper, Techniques o f Interpretation. Making Scientific Presentation at Conferences and Popular Lectures to Semi Technical Audience, Participating in Pubic Debates on Scientific Issues

UNIT V

Nature of Intellectual property rights, Patents, designs, trademarks and copyrights, History of patenting, process of patenting, patent development, international cooperation on IPR, procedure of granting patent, patent rights, licensing and transferring technology, Geographical Indications ,IPR in biological and systems and software.

Text/Reference Books:

1. Research Methodology: Methods And Techniques - C. R. Kothari,2nd Edition, New Age Intemational Publishers.
2. Statistical Methods - S P. Gupta. S. chand& Sons, New Derhi.
3. Intellectual ProPerty-the law of trademarks, copyrights, Patents, and trade Secrets- Deborah E. Bouchoux, Esq.Georgetown University, Fourth edition

Course Outcomes (COs):

1. 1.Able to know research importance and requirements and procedure
2. Able to apply sampling techniques for analysis and forecasting.
3. Able to use methods for data collection and analyze the data using different mathematical techniques.
4. Able to write report on research done and present the research findings in systematic manner.
5. Able to have the knowledge to file and obtain patent on research finding.

Semester II

CM21C: Antennas and Radiating Systems

Instruction Hours/week : (L-T-P-C): 3-1-0-4 **Credits : 4**

Sessional Marks : 40 **Semester-end Examination :60**

Course Description: To understand the fundamental principles of antenna theory and to apply them to analysis and design. Because there are so many methods of analysis and design and different antenna structures, applications are made to some of the most basic and practical configurations such as linear dipoles, loops, arrays, aperture antennas, horn antennas, microstrip antennas and reflector antennas.

Course Objectives:

1. To fundamental antenna parameters and numerical methods to analyze and differentiate the antennas.
2. To concept of radiation mechanism of various antennas.
3. To mechanism and models for radio-wave propagation.

Course Outcomes:

At the end of this course, students will be able to

1. Compute the far field distance, radiation pattern and gain of an antenna for given current distribution.
2. Estimate the input impedance, efficiency and ease of match for antennas.
3. Compute the array factor for an array of identical antennas.
4. Design antennas and antenna arrays for various desired radiation pattern characteristics.

Syllabus Contents:

Unit 1

Types of Antennas: Wire antennas, Aperture antennas, Micro strip antennas, Arrayantennas Reflector antennas, Lens antennas, Radiation Mechanism, Current distribution on thin wire antenna.

Fundamental Parameters of Antennas: Radiation Pattern, Radiation Power Density, Radiation Intensity, Directivity, Gain, Antenna efficiency, Beam efficiency, Bandwidth, Polarization, Input Impedance, radiation efficiency, Antenna Vector effective length, Friis Transmission equation, Antenna Temperature.

Unit 2

Linear Wire Antennas: Infinitesimal dipole, Small dipole, Region separation, Finite lengthdipole, half wave dipole, Ground effects.

Loop Antennas: Small Circular loop, Circular Loop of constant current, Circular loop with non uniform current.

Unit 3

LinearArrays: Two element array, N Element array: Uniform Amplitude and spacing,Broadside and End fire array, Super directivity, Planar array, Design consideration.

Unit 4

Aperture Antennas: Huygen's Field Equivalence principle, radiation equations,Rectangular Aperture, Circular Aperture.

Horn Antennas: E-Plane, H-plane Sectoral horns, Pyramidal and Conical horns.

Unit 5

Micro strip Antennas: Basic Characteristics, Feeding mechanisms, Method of analysis, Rectangular Patch, Circular Patch, Reflector Antennas: Plane reflector, parabolic reflector, Cassegrain reflectors, Introductionto MIMO.

References:

1. 1.Constantine A. Balanis, "Antenna Theory Analysis and Design", John Wiley & Sons, 4th edition, 2016.
2. 2.John D Kraus, Ronald J Marhefka, Ahmad S Khan, "Antennas for All Applications", Tata McGraw-Hill, 2002.
3. 3.R.C.Johnson and H.Jasik, "Antenna Engineering hand book", Mc-Graw Hill, 1984.
4. 4.I.J.Bhal and P.Bhartia, "Micro-strip antennas", Artech house, 1980.

CM22C: Advanced Communication Networks

Instruction Hours/week : (L-T-P-C): 3-1-0-4 Credits :4
Sessional Marks : 40 Semester-end Examination :60

Description of the Course: Basic techniques for modeling and analyzing communication networks. Fairness and utility functions, routing, congestion control, pricing, queuing models, loss networks, multi-class queues and scheduling.

Course Objectives:

1. To fairness and network utility maximization
2. To optimization based routing and congestion control
3. To basic queuing models and their application to switching and scheduling in networks.

Course Outcomes:

At the end of this course, students will be able to

1. Understand advanced concepts in Communication Networking.
2. Design and develop protocols for Communication Networks.
3. Understand the mechanisms in Quality of Service in networking.
4. Optimise the Network Design

Syllabus Contents:

Unit 1

Overview of Internet-Concepts, challenges and history. Overview of -ATM. TCP/IPCongestion and Flow Control in Internet-Throughput analysis of TCP congestion control. TCP for high bandwidth delay networks. Fairness issues in TCP.

Unit 2

Real Time Communications over Internet. Adaptive applications. Latency and throughputissues. Integrated Services Model (intServ). Resource reservation in Internet. RSVP.

Characterization of Traffic by Linearly Bounded Arrival Processes (LBAP). Leaky bucketalgorithm and its properties.

Unit 3

Packet Scheduling Algorithms-requirements and choices. Scheduling guaranteed serviceconnections. GPS, WFQ and Rate proportional algorithms. High speed scheduler design. Theory of Latency Rate servers and delay bounds in packet switched networks for LBAP traffic.

Active Queue Management - RED, WRED and Virtual clock. Control theoretic analysis of active queue management.

Unit 4

IP address lookup-challenges. Packet classification algorithms and Flow Identification-Grid of Tries, Cross producting and controlled prefix expansion algorithms.Admission control in Internet. Concept of Effective bandwidth. Measurement basedadmission control. Differentiated Services in Internet (DiffServ). DiffServ architecture and framework.

Unit 5

IPV4, IPV6, IP tunnelling, IPswitching and MPLS, Overview of IP over ATM and itsevolution to IP switching. MPLS architecture and framework. MPLS Protocols. Traffic engineering issues in MPLS.

References:

1. Jean Wairand and Pravin Varaiya, “High Performance Communications Networks”, 2nd edition, 2000.
2. Jean Le Boudec and Patrick Thiran, “Network Calculus A Theory of Deterministic Queueing Systems for the Internet”, Springer Veriag,

2001.
3. Zhang Wang, “Internet QoS”, Morgan Kaufman, 2001.
4. Anurag Kumar, D. Manjunath and Joy Kuri, “Communication Networking: An Analytical Approach” , Morgan Kaufman Publishers, 2004.
5. George Kesidis, “ATM Network Performance”, Kluwer Academic, Research Papers, 2005.

CM23C: Program Elective-III
1. Satellite Communication

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Description of the Course: Antennas and propagation effects play a crucial role in RF systems. In practice, the design of a working system such as mobile phone networks, WiFi, RFID, Satellite communication and GPS requires a good understanding of these components. This course teaches the fundamentals of antenna and propagation and shows the application in practical examples. The course covers the theory of radiation, fundamental antenna parameters and concepts, wire antennas such as dipoles and loop antennas, antenna arrays, aperture antennas, microstrip antennas, numerical analysis, communication & radar systems and propagation effects.

Course Objectives:

1. To fairness and network utility maximization
2. To optimization based routing and congestion control
3. To basic queuing models and their application to switching and scheduling in networks.

Course Outcomes:
At the end of this course, students will be able to
1. Visualize the architecture of satellite systems as a means of high speed, high range communication system.
2. State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.
3. Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.

Syllabus Contents:

Unit 1:
Architecture of Satellite Communication System: Principles and architecture

of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications, and frequency bands used for satellite communication and their advantages/drawbacks.

Unit 2:
Orbital Analysis: Orbital equations, Kepler's laws of planetary motion, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity etc of a satellite, concepts of Solar day and Sidereal day.

Unit 3:
Satellite sub-systems: Architecture and Roles of various sub-systems of a satellite system such as Telemetry, tracking, command and monitoring (TTC & M), Attitude and orbit control system (AOCS), Communication sub-system, power sub-systems, antenna sub-system.

Unit 4:
Typical Phenomena in Satellite Communication: Solar Eclipse on satellite, its effects, remedies for Eclipse, Sun Transit Outage phenomena, its effects and remedies, Doppler frequency shift phenomena and expression for Doppler shift.

Unit 5:
Satellite link budget: Flux density and received signal power equations, Calculation of System noise temperature for satellite receiver, noise power calculation, Drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions, Case study of Personal Communication system (satellite telephony) using LEO. Modulation and Multiple Access Schemes used in satellite communication. Typical case studies of VSAT, DBS-TV satellites and few recent communication satellites launched by NASA/ ISRO. GPS.

References:

1. Timothy Pratt and Others, "Satellite Communications", Wiley India, 2nd edition,2010.
2. S. K. Raman, "Fundamentals of Satellite Communication", PearsonEducation India, 2011.Tri T. Ha, "Digital Satellite Communications", Tata McGraw Hill, 2009.
3. Dennis Roddy, "Satellite Communication", McGraw Hill, 4th Edition, 2008.

CM23C: Program Elective-III
2. IOT and Applications
(Common to Signal processing)

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Description of the Course: Internet of Things (IoT) cuts across different application domain verticals ranging from civilian to defense sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support a lot. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different lot solutions. IoT-based applications such as innovative shopping systems, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT-based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course Objectives:

1. To apprise students with basic knowledge of IoT that paves a platform to understand physical and logical design of IOT
2. To teach a student how to analyse requirements of various communication models and protocols for cost-effective design of IoT applications on different IoT platforms.
3. To introduce the technologies behind Internet of Things (IoT).
4. To explain the students how to code for an IoT application using Arduino/Raspberry Pi open platform.

Syllabus Contents:

UNIT I

THE INTERNET OF THINGS TODAY, TIME FOR CONVERGENCE

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT II

COMPONENTS IN INTERNET OF THINGS

Functional Blocks of an IoT Ecosystem – Sensors, Actuators, and Smart Objects – Control Units - Communication modules (Bluetooth, Zigbee,Wi-Fi, GPS, GSM Modules)

UNIT III

PROTOCOLS AND TECHNOLOGIES BEHIND IOT

IOT Protocols - IPv6, 6LoWPAN, MQTT, CoAP - RFID, Wireless Sensor Networks, BigData Analytics, Cloud Computing, Embedded Systems.

UNIT IV

OPEN PLATFORMS AND PROGRAMMING

IOT deployment for Raspberry Pi /Arduino platform-Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud.

UNIT V

IOT APPLICATIONS

Business models for the internet of things, Smart city, Smart mobility and transport, Industrial IoT, Smart health, Environment monitoring and surveillance – Home Automation – Smart Agriculture

COURSE OUTCOMES:

Upon completion of the course, students will be able to

1. Explain the concept of IoT.
2. Understand the communication models and various protocols for IoT.
3. Design portable IoT using Arduino/Raspberry Pi/open platform.
4. Apply data analytics and use cloud offerings related to IoT.
5. Analyze applications of IoT in real time scenario.

TEXT BOOKS:

1. Dr. Ovidiu Vermesan, Dr. Peter Friess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers, Aalborg, 2013.
2. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, CISCO Press, 2017.
3. Samuel Greengard, The Internet of Things, The MIT Press, 2015.

REFERENCES:

1. Perry Lea, “Internet of things for architects”, Packt, 2018
2. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things – Key applications and Protocols”, Wiley, 2012
3. IOT (Internet of Things) Programming: A Simple and Fast Way of

Learning, IOT Kindle Edition.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
5. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.
6. https://www.arduino.cc/https://www.ibm.com/smarterplanet/us/en/?ca=v_smarterplanet.

CM23C: Program Elective-III
3. RF and Microwave Circuit Design

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Course Objectives:

1. To understand the behaviour of RF passive components model active components and Perform transmission line analysis.
2. To know the use of Smith Chart for high frequency circuit design.
3. To Justify the choice/selection of components from the design aspects and contribute in the areas of RF circuit design

Course Outcomes: At the end of this course, students will be able to

1. Understand the behaviour of RF passive components and model active components.
2. Perform transmission line analysis.
3. Demonstrate use of Smith Chart for high frequency circuit design.
4. Justify the choice/selection of components from the design aspects.
5. Contribute in the areas of RF circuit design.

Syllabus Contents:

Unit 1

Transmission Line Theory: Lumped element circuit model for transmission line, field analysis, Smith chart, quarter wave transformer, generator and load mismatch, impedance matching and tuning.

Microwave Network Analysis: Impedance and equivalent voltage and current, Impedance and admittance matrix, The scattering matrix, transmission matrix, Signal flow graph.

Unit 2

Microwave Components: Microwave resonators, Microwave filters, power dividers and directional couplers, Ferromagnetic devices and components.

Unit 3

Nonlinearity And Time Variance Inter-symbol interference, random process & noise, definition of sensitivity and dynamic range, conversion gain and distortion.

Unit 4

Microwave Semiconductor Devices and Modeling: PIN diode, Tunnel diodes, Varactor diode, Schottky diode, IMPATT and TRAPATT devices, transferred electron devices, Microwave BJTs, GaAs FETs, low noise and power GaAs FETs, MESFET, MOSFET, HEMT.

Unit 5

Amplifiers Design: Power gain equations, stability, impedance matching, constant gain and noise figure circles, small signal, low noise, high power and broadband amplifier, oscillators, Mixers design.

References:

1. Matthew M. Radmanesh, "Advanced RF & Microwave Circuit Design: The Ultimate Guide to Superior Design", AuthorHouse, 2009.
2. D.M.Pozar, " Microwave engineering" ,Wiley, 4th edition, 2011.
3. R.Ludwig and P.Bretchko, "R. F. Circuit Design", Pearson Education Inc, 2009.
4. G.D. Vendelin, A.M. Pavoi, U. L. Rohde, "Microwave Circuit Design Using Linear And Non Linear Techniques", John Wiley 1990.
5. S.Y. Liao, "Microwave circuit Analysis and Amplifier Design", Prentice Hall 1987. Radmanesh, "RF and Microwave Electronics Illustrated" , Pearson Education, 2004.W.H.Freeman & Co, 1978

CM23C: Program Elective-III
4. MIMO Systems

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Course Objectives:

1. To understand channel modelling and propagation, MIMO Capacity, space-time coding MIMO receivers, MIMO for multi-carrier
2. systems (e.g. MIMO-OFDM), multi-user communications, multi-user MIMO.
3. To gain knowledge understand cooperative and coordinated multi-cell MIMO, introduction to MIMO in 4G (LTE, LTE-Advanced, WiMAX).
4. To perform Mathematical modelling and analysis of MIMO systems. To build a small low-cost embedded system using Arduino / Raspberry Pi or

equivalent boards.

Course Outcomes:

At the end of this course, students will be able to

1. Understand channel modelling and propagation, MIMO Capacity, space-time coding.
2. MIMO receivers, MIMO for multi-carrier systems (e.g. MIMO-OFDM), multi-user communications, multi-user MIMO.
3. Understand cooperative and coordinated multi-cell MIMO, introduction to MIMO in 4G (LTE, LTE-Advanced, WiMAX).
4. Perform Mathematical modelling and analysis of MIMO systems.

Syllabus Contents:

Unit 1:

Introduction to Multi-antenna Systems, Motivation, Types of multi-antenna systems,MIMO vs. multi-antenna systems.Diversity, Exploiting multipath diversity, Transmit diversity, Space-time codes, TheAlamouti scheme, Delay diversity, Cyclic delay diversity, Space-frequency codes, Receive diversity, The rake receiver, Combining techniques, Spatial Multiplexing, Spectral efficiency and capacity, Transmitting independent streams in parallel, Mathematical notation

Unit 2:

The generic MIMO problem, Singular Value Decomposition, Eigenvalues andeigenvectors, Equalising MIMO systems, Disadvantages of equalising MIMO systems, Pre-distortion in MIMO systems, Disadvantages of pre-distortion in MIMO systems, Pre-coding and combining in MIMO systems, Advantages of pre-coding and combining, Disadvantages of pre-coding and combining, Channel state information.

Unit 3

Codebooks for MIMO, Beamforming, Beamforming principles, Increased spectrumefficiency, Interference cancellation, Switched beamformer, Adaptive beamformer, Narrowband beamformer, Wideband beamformer

Unit 4:

Case study: MIMO in LTE, Codewords to layers mapping, Pre-coding for spatialmultiplexing, Pre-coding for transmit diversity, Beamforming in LTE, Cyclic delay diversity based pre-coding, Pre-coding codebooks, Propagation Channels, Time & frequency channel dispersion, AWGN and multipath propagation channels, Delay spread values and time variations, Fast and slow fading environments, Complex baseband multipath channels, Narrowband and wideband channels, MIMO channel models

Unit 5:
Channel Estimation, Channel estimation techniques, Estimation and tracking, Trainingbased channel estimation, Blind channel estimation, Channel estimation architectures, Iterative channel estimation, MMSE channel estimation, Correlative channel sounding, Channel estimation in single carrier systems, Channel estimation for CDMA, Channel estimation for OFDM.

References:

1. Claude Oestges, Bruno Clerckx, "MIMO Wireless Communications : From Real-world Propagation to Space-time Code Design",Academic Press, 1st edition, 2010.
2. Mohinder Janakiraman, "Space - Time Codes and MIMO Systems", Artech House Publishers, 2004.

CM24C: Program Elective-IV
1. Random Processes and Queuing Models
(Common to Signal Processing)

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Prerequisites: Probability Theory and Stochastic Processes

Preamble: This course is designed to provide necessary basic concepts in random processes which are widely applied in random signals, linear systems in communication engineering and IT fields. The objective of this course is to familiarize the understanding of stochastic processes and queuing models. The syllabus also covers the concepts of Markovian and advanced queueing models which are essential to design and analyze communication networks.

Course Learning Objectives: The objectives of this course is to enable the student to

1. Characterize stochastic processes with an emphasis on stationary random processes.
2. Use the properties of random processes with LTI systems in real world situations.
3. Understand Markov chains and their transient behavior.
4. Differentiate between different models of queuing theory and their performance measures.
5. Understand network of queues with Poisson external arrivals, exponential service requirements and independent routing.

Course Outcomes:

At the end of the course, the students will be able to

1. Analyze the various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.
2. Apply the ideas of Random Processes to the LTI Systems for Spectral analysis.
3. Understand Markov Chains and regenerative processes used in modeling a wide variety of systems.
4. Understand the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.
5. Analyze the performance of the queuing networks.

UNIT I

REVIEW OF RANDOM PROCESSES: Classification of General Random Processes, Binomial Processes, Poisson Processes, Ergodic Process, Gaussian Random Processes, Stationary and Wide Sense Stationary Random Processes, Random walks and gambler's ruin, Processes with independent increments and martingales, Brownian motion, Counting processes and the Poisson process, Stationarity, Joint properties of random processes.

UNIT II

RANDOM PROCESSES IN LINEAR SYSTEMS AND SPECTRAL ANALYSIS: Basic definitions, Spectral Density Function, transfer functions and power spectral densities, Discrete-time processes in linear systems, Low Pass and Band Pass Processes, Baseband random processes, Narrowband random processes.

UNIT III

MARKOV PROCESSES: Markov Chains, Probability Distribution of a Markov Chain, Transition Probability Matrices of a Markov Chain, Classification of States and Chains, Chapman-Kolmogorov Theorem, Stationary Distribution for a Markov Chains, Classification of States of a Markov Chain, Birth and Death Processes, Renewal Process, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poison Process.

UNIT IV

QUEUING THEORY: Basic Characteristics of Queueing Models, Introduction to Markovian queueing models, Steady state distribution, Little's Theorem, Cost equations, steady state probabilities, Queuing Models: **(M/M/1) : (∞/FIFO)** Single server with infinite system capacity, **(M/M/1) : (k/FIFO)**

Single Server with Finite Capacity, **(M/M/s) : (∞/FIFO)** Multiple Server with Infinite Capacity, **(M/M/s) : (k/FIFO)** Multiple Server with Finite Capacity, models balance equations, Erlang's B and C formulae, M/G/1 Queuing system characteristics, Queues with finite waiting rooms – Queues with impatient customers: Balking and reneging.

Unit V

QUEUEING NETWORKS: Network of queues basic concepts, Tandem Queues, Channels in Series or Jackson Networks, Queues in series with multiple channels at each phase, Closed Jackson Networks, Approximating Closed Networks, Open Networks with General Customer Routes, Symmetric Queues.

Text Books:

1. Sheldon M. Ross, Introduction to Probability Models, 10th Edition, Elsevier, 2010.
2. T Veera Rajan , Probability, Statistics and Random Process, 3rd Edition, Tata Mc Graw Hill, 2008.
3. R. D. Yates and D. J. Goodman, "Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers", 3rd Edition International Student Version, Wiley, 2014.

Reference Books:

1. J.F. Shortle, J.M. Thompson, D. Gross and C.M. Harris, Fundamentals of Queueing Theory, 5th Edition, Wiley, 2018.
2. J. Medhi, Stochastic Models in Queueing Theory, 2nd Edition, Academic Press, 2003.
3. U.N. Bhat, An Introduction to Queueing Theory, Springer, 2015.

CM24C: Program Elective-IV
2. Pattern Recognition and Machine Learning
(Common to Signal Processing)

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Course Objectives:

1. To study the parametric and linear models for classification and design neural network and SVM for classification
2. To develop machine independent and unsupervised learning techniques.

Course Outcomes:

At the end of this course, students will be able to

1. Study the parametric and linear models for classification
2. Design neural network and SVM for classification

3. Develop machine independent and unsupervised learning techniques.

Syllabus Contents:

Unit 1

Introduction to Pattern Recognition: Problems, applications, design cycle, learning andadaptation, examples, Probability Distributions, Parametric Learning - Maximum likelihood and Bayesian Decision Theory- Bayes rule, discriminant functions, loss functions and Bayesian error analysis

Unit 2

Linear models: Linear Models for Regression, linear regression, logistic regression LinearModels for Classification

Unit 3

Neural Network: perceptron, multi-layer perceptron, back propagation algorithm, error surfaces,practical techniques for improving back propagation, additional networks and training methods, Adaboost, Deep Learning

Unit 4

Linear discriminant functions - decision surfaces, two-category, multi-category, minimum-squared error procedures, the Ho-Kashyap procedures, linear programming algorithms, Support vector machine

Unit 5

Algorithm independent machine learning – lack of inherent superiority of any classifier, biasand variance, re-sampling for classifier design, combining classifiers

Unsupervised learning and clustering – k-means clustering, fuzzy k-means clustering,hierarchical clustering

References:

1. 1.Richard O. Duda, Peter E. Hart, David G. Stork, “Pattern Classification”, 2nd Edition John
2. Wiley & Sons, 2001.
3. 2.Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, “The Elements of Statistical
4. Learning”, 2nd Edition, Springer, 2009.
5. 3.C. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.

CM24C: Program Elective-IV
3. Programmable Networks - SDN, NFV

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Course Objectives:

1. To understand advanced concepts in Programmable Networks, Software Defined Networking, an emerging Internet architectural framework.
2. To know the main concepts, architectures, algorithms, protocols and applications in SDN and NFV.

Course Outcomes:

At the end of this course, students will be able to

1. Understand advanced concepts in Programmable Networks.
2. Understand Software Defined Networking, an emerging Internet architectural framework.
3. Implement the main concepts, architectures, algorithms, protocols and applications in SDN and NFV.

Syllabus Contents:

Unit 1

Introduction to Programmable Networks, History and Evolution of Software Defined Networking (SDN), Fundamental Characteristics of SDN, Separation of Control Plane and Data Plane, Active Networking.

Unit 2

Control and Data Plane Separation: Concepts, Advantages and Disadvantages, the basics of Open Flow protocol.

Network Virtualization: Concepts, Applications, Existing Network Virtualization Framework, Mininet A simulation environment for SDN.

Unit 3

Control Plane: Overview, Existing SDN Controllers including Floodlight and Open Day light projects. Customization of Control Plane: Switching and Firewall Implementation using SDN Concepts. Data Plane: Software-based and Hadrware-based; Programmable Network Hardware.

Unit 4

Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs. Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications.

Unit 5

Data Center Networks: Packet, Optical and Wireless Architectures, Network Topologies. Use Cases of SDNs: Data Centers, Internet Exchange Points, Backbone Networks, Home Networks, Traffic Engineering.

References:

1. Thomas D. Nadeau, Ken Gray, "SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies", O'Reilly Media, August 2013.
2. Paul Goransson, Chuck Black, Timothy Culver. "Software Defined Networks: A Comprehensive Approach", Morgan Kaufmann Publishers, 2016.
3. Fei Hu, "Network Innovation through OpenFlow and SDN: Principles and Design", CRC Press, 2014.
4. Vivek Tiwari, "SDN and OpenFlow for Beginners", Amazon Digital Services, Inc., ASIN: ,2013.
5. Nick Feamster, Jennifer Rexford and Ellen Zegura, "The Road to SDN: An Intellectual History of Programmable Networks" ACM CCR April 204.
6. Open Networking Foundation (ONF) Documents, https://www.opennetworking.org,2015.http://www.openflow.org,

CM24C: Program Elective-IV
4. Remote Sensing
(Common to Signal Processing)

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Course Objectives:

1. To understand basic concepts, principles and applications of remote sensing, particularly the geometric and radiometric principles
2. To know the applications of principles to a variety of topics in remote sensing, particularly related to data collection, radiation, resolution, and sampling.

Course Outcomes:

At the end of this course, students shall be able to

1. Understand basic concepts, principles and applications of remote sensing, particularly the geometric and radiometric principles
2. Provide examples of applications of principles to a variety of topics in remote sensing, particularly related to data collection, radiation, resolution, and sampling.

Syllabus Contents:

Unit 1

Physics Of Remote Sensing: Electro Magnetic Spectrum, Physics of Remote Sensing-Effects of Atmosphere-Scattering–Different types–Absorption-Atmospheric window-Energy interaction with surface features –Spectral reflectance of vegetation, soil and water atmospheric influence on spectral response patterns-multi concept in Remote sensing.

Data Acquisition: Types of Platforms–different types of aircrafts-Manned and Unmanned space crafts–sun synchronous and geo synchronous satellites – Types and characteristics of different platforms –LANDSAT, SPOT, IRS, INSAT, IKONOS, QUICKBIRDetc.

Unit 2

Photographic products, B/W,color, color IR film and their characteristics – resolving power of lens and film - Optomechanical electro optical sensors – across track and along track scanners-multispectral scanners and thermal scanners–geometric characteristics of scanner imagery - calibration of thermal scanners.

Unit 3

Scattering System: Microwave scatterometry, types of RADAR –SLAR – resolution –range and azimuth –real aperture and synthetic aperture RADAR. Characteristics of Microwave images topographic effect-different types of Remote Sensing platforms –airborne and space borne sensors -ERS, JERS, RADARSAT, RISAT -Scatterometer, Altimeter-LiDAR remote sensing, principles, applications.

Unit 4

Thermal And Hyper Spectral Remote Sensing: Sensors characteristics-principle of spectroscopy-imaging spectroscopy–field conditions, compound spectral curve, Spectral library, radiative models, processing procedures, derivative spectrometry, thermal remote sensing –thermal sensors, principles, thermal data processing, applications.

Unit 5

Data Analysis: Resolution–Spatial, Spectral, Radiometric and temporal resolution-signal to noise ratio-data products and their characteristics-visual and digital interpretation–Basic principles of data processing – Radiometric correction–Image enhancement–Image classification–Principles of LiDAR, Aerial Laser Terrain Mapping.

References:

1. 1.Lillesand.T.M. and Kiefer.R.W,"Remote Sensing and Image interpretation", 6thEdition, John Wiley & Sons, 2000.
2. 2.John R. Jensen, "Introductory Digital Image Processing: A Remote Sensing Perspective", 2nd Edition, Prentice Hall,1995.
3. 3.Richards, John A., Jia, Xiuping, "Remote Sensing Digital Image Analysis", 5th Edition, Springer-Verlag Berlin Heidelberg, 2013.
4. 4.Paul Curran P.J. Principles of Remote Sensing, 1st Edition, Longman Publishing Group, 1984.
5. 5.Charles Elachi, Jakob J. van Zyl, "Introduction to The Physicsand Techniques of Remote Sensing", 2nd Edition, Wiley Serie, 2006.
6. 6.Sabins, F.F.Jr, "Remote Sensing Principles and Image Interpretation", 3rd Edition, W.H.Freeman& Co, 1978

CM25L: Antennas and Radiating Systems Lab

Instruction Hours/week : 3(P) **Credits : 1.5**
Sessional Marks : 40 **Semester-end Examination :60**

Course Objectives:

1. To determine specifications, design, construct and test antenna.
2. To explore and use tools for designing, analyzing and testing antennas. These tools include Antenna design and analysis software, network analyzers, spectrum analyzers, and antenna pattern measurement techniques.

Course Outcomes:

At the end of this course, students will be able to

1. Determine specifications, design, construct and test antenna.
2. Explore and use tools for designing, analyzing and testing antennas. These tools include Antenna design and analysis software, network analyzers, spectrum analyzers, and antenna pattern measurement techniques.

List of Assignments:

1. Simulation of half wave dipole antenna.
2. Simulation of change of the radius and length of dipole wire on frequency of resonance of antenna.
3. Simulation of quarter wave, full wave antenna and comparison of their parameters.
4. Simulation of monopole antenna with and without ground plane.
5. Study the effect of the height of the monopole antenna on the radiation characteristics of the antenna.

6. Simulation of a half wave dipole antenna array.
7. Study the effect of change in distance between elements of array on radiation pattern of dipole array.
8. Study the effect of the variation of phase difference 'beta' between the elements of the array on the radiation pattern of the dipole array.
9. Case study.

CM26L: Advanced Communication Networks Lab

Instruction Hours/week : 3(P) **Credits : 1.5**
Sessional Marks : 40 **Semester-end Examination :60**

Course Objectives:

1. To identify the different types of network devices and their functions within a network.
2. To understand the skills of sub-netting and routing mechanisms, basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Course Outcomes:

At the end of this course, students will be able to

1. Identify the different types of network devices and their functions within a network.
2. Understand and build the skills of sub-netting and routing mechanisms.
3. Understand basic protocols of computer networks, and how they can be used to assist in network design and implementation.

List of Assignments:

1. Study of Networking Commands (Ping, Tracert, TELNET, nslookup, netstat, ARP, RARP) and Network Configuration Files.
2. Linux Network Configuration.
   a. Configuring NIC's IP Address.
   b. Determining IP Address and MAC Address using if-config command.
   c. Changing IP Address using if-config.
   d. Static IP Address and Configuration by Editing.
   e. Determining IP Address using DHCP.
   f. Configuring Hostname in /etc/hosts file.
3. Design TCP iterative Client and Server application to reverse the given input sentence.
4. Design a TCP concurrent Server to convert a given text into upper case using multiplexing system call "select".
5. Design UDP Client Server to transfer a file.
6. Configure a DHCP Server to serve contiguous IP addresses to a pool of

four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address.

   a. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down.

7. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails.
8. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment.
9. Signaling and QoS of labeled paths using RSVP in MPLS.
10. Find shortest paths through provider network for RSVP and BGP.
11. Understand configuration, forwarding tables, and debugging of MPLS.

CM27C:Cyber Security

Course Type:	**Value Added**	**Semester:**	**II Sem**	**Credits :**	**3**
Course Code:	**CM27C**	**Theory :**	**2 Hrs/ Week**	**Practical :**	**2Hrs/ Week**
		Assessment:	**Lab reports and written exams**	**Internal Continuous Assessment:**	**100 M**

Course Overview / Description: Cyber security is perhaps the most important topic in today environment. Demand for cyber security professionals has exploded, in the private and public sectors alike. Student can learn how to defend information systems from cyber attacks, how to recover compromised systems, how to architect secure systems and so much more. This course is focuses on the models, tools, and techniques for enforcement of security with some emphasis on the use of cryptography. Students will learn security from multiple perspectives.

Course Learning Objectives:

1. To prepare students with the technical knowledge and skills needed to protect and defend computer systems and networks from cyber security attacks.
2. To develop graduates that can plan, implement, and monitor cyber security mechanisms to help ensure the protection of information

technology assets.
3. To develop graduates that can identify, analyze, and remediate computer security breaches.

Course Outcomes: After completing this course student will be:

1. Be able to understand the basic terminologies related to cyber security and current cyber security threat landscape. They will also develop understanding about the Cyber warfare and necessity to strengthen the cyber security of end user machine, critical IT and national critical infrastructure.
2. Have complete understanding of the cyber attacks that target computers, mobiles and persons. They will also develop understanding about the type and nature of cyber crimes and as to how report these crimes through the prescribed legal and Government channels.
3. Be able to understand the legal framework that exist in India for cyber crimes and penalties and punishments for such crimes, It will also expose students to limitations of existing IT Act, 2000 legal framework that is followed in other countries and legal and ethical aspects related to new technologies.
4. Understand the aspects related to personal data privacy and security. They will also get insight into the Data Protection Bill, 2019 and data privacy and security issues related to Social media platforms.
5. Understand the main components of cyber security plan. They will also get insights into risk-based assessment, requirement of security controls and need for cyber security audit and compliance.

Unit- I Overview of Cyber security

Cyber security increasing threat landscape, Cyber security terminologies- Cyberspace, attack, attack vector, attack surface, threat, risk, vulnerability, exploit, exploitation, hacker., Non-state actors, Cyber terrorism, Protection of end user machine, Critical IT and National Critical Infrastructure, Cyber warfare, Case Studies.

Unit-II Cyber Crimes

Cyber crimes targeting Computer systems and Mobiles- data diddling attacks, spyware, logic bombs, DoS, DDoS, APTs, virus, Trojans, ransomware, data breach., Online scams and frauds- email scams, Phishing, Vishing, Smishing, Online job fraud, Online sextortion, Debit/ credit card fraud, Online payment fraud, Cyber bullying, website defacement, Cyber squatting, Pharming, Cyber espionage, Cryptojacking, Darknet- illegal trades, drug trafficking, human trafficking., Social Media Scams & Frauds- impersonation, identity theft, job scams, misinformation, fake news cyber crime against persons - cyber grooming, child pornography, cyber stalking., Social Engineering attacks, Cyber Police stations, Crime reporting procedure, Case studies.

Unit-III Cyber Law

Cyber crime and legal landscape around the world, IT Act, 2000 and its amendments, Limitations of IT Act, 2000,Cyber crime and punishments, Cyber Laws and Legal and ethical aspects related to new technologies-

AI/ML, IoT, Blockchain, Darknet and Social media, Cyber Laws of other countries, Case Studies.

Unit-IV Data Privacy and Data Security

Defining data, meta-data, big data, non-personal data. Data protection, Data privacy and data security, Personal Data Protection Bill and its compliance, Data protection principles, Big data security issues and challenges, Data protection regulations of other countries- General Data Protection Regulations(GDPR), 2016 Personal Information Protection and Electronic Documents Act (PIPEDA), Social media- data privacy and security issues.

Unit-V Cyber security Management, Compliance and Governance:

Cyber security Plan- cyber security policy, cyber crises management plan, Business continuity, Risk assessment, Types of security controls and their goals, Cyber security audit and compliance, National cyber security policy and strategy.

Practical Work

The practical list has been suggested for the applicable modules; however, the faculty may expand the list as per the syllabus content duly taking into consideration the emerging nature of cyber threats and incumbent protective measures to guard against such threats.

Practical list of Experiments:

1. Platforms for reporting cyber crimes.
2. Checklist for reporting cyber crimes online.
3. Setting privacy settings on social media platforms.
4. Do's and Don'ts for posting content on Social media platforms.
5. Registering complaints on a Social media platform.
6. Prepare password policy for computer and mobile device.
7. List out security controls for computer and implement technical security controls in the personal computer.
8. List out security controls for mobile phone and implement technical security controls in the personal mobile phone.
9. Log into computer system as an administrator and check the security policies in the system.

Text Books/ References:

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd.
2. Information Warfare and Security by Dorothy F. Denning, Addison Wesley.
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform.
4. Data Privacy Principles and Practice by Natraj Venkataramanan and Ashwin Shriram, CRC Press.

5. Information Security Governance, Guidance for Information Security Managers by W. KragBrothy, 1st Edition, Wiley Publication.
6. Auditing IT Infrastructures for Compliance By Martin Weiss, Michael G. Solomon, 2nd Edition, Jones Bartlett Learning.

CM28M:Mini Project With Seminar

Instruction Hours/week : 4(P) **Credits : 2**
Sessional Marks : 100 **Semester-end Examination :-**

Course Outcomes:

At the end of this course, students will be able to

1. Understand of contemporary / emerging technology for various processes and systems.
2. Share knowledge effectively in oral and written form and formulate documents.

Syllabus Contents:

The students are required to search / gather the material / information on a specific a topic comprehend it and present / discuss in the class.

Semester III & IV
(Dissertation) Dissertation Phase – I, Phase – II and Viva-Voce

Instruction Hours/week : 24+20(P) **Credits : 12+16**
Sessional Marks : 40+40 **Semester-end Examination : 60+60**

Course Outcomes:

At the end of this course, students will be able to

1. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
2. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
3. Ability to present the findings of their technical solution in a written report.
4. Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the

following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Implementation and Verification
- Report and presentation

The dissertation stage II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

- Experimental verification / Proof of concept.
- Design, fabrication, testing of Communication System.
- The viva-voce examination will be based on the above report and work.

Guidelines for Dissertation Phase – I and II at M. Tech. (Electronics):

- As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.
- The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.
- After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.
- Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.
- Phase – I deliverables: A document report comprising of summary of

literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.

- Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.
- During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.
- Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, a record of continuous progress.
- Phase – II evaluation: Guide along with appointed external examiner shall assess the
- progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING:

TIRUPATI-517502

R-23– Scheme of Instructions effective from the academic year 2023 – 2024

Programme Scheme



SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING (AUTONOMOUS)

SRI VENKATESWARA UNIVERSITY

TIRUPATI-517502 (A.P), INDIA.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502
Department of Electronics and Communication Engineering-Scheme of Instruction- (CBCS) effective from the Academic Year 2023-2024

M.Tech (PG) (Electronics and Communication Engineering)
Specialization: Signal Processing (SP)

I Semester

S.No.	Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
				Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
1	PCC	SP11C	Advanced Digital Signal Processing (Common to Communication systems CM11C)	3	1	0	4	4	40	60	100
2	PCC	SP12C	Digital Image and Video Processing	3	1	0	4	4	40	60	100
3	PCC	SP13C	DSP Architecture (Common to Communication systems CM12C)	3	1	0	4	4	40	60	100
4	PEC	SP14C	Programme Elective- I	3	0	0	3	3	40	60	100
5	PEC	SP15C	Programme Elective- II	3	0	0	3	3	40	60	100
6	PCC	SP16L	Advanced Digital Signal Processing Lab (Common to Communication systems CM16L)	0	0	3	3	1.5	40	60	100
7	PCC	SP17L	Digital image and Video Processing Lab	0	0	3	3	1.5	40	60	100
8	MAC	SP18C	Research Methodology and IPR	3	0	0	3	3	40	60	100
Total				18	3	6	27	24	320	480	800

List of Programme Elective Course I (SP14C)	List of Programme Elective Course II (SP15C)
1. Computer Vision	1. Joint time Frequency Analysis and Multi Resolution Analysis
2. Artificial Intelligence	2. Voice and Data Networks (Common to Communication systems CM15C)
3. Wireless Sensor Networks (Common to Communication systems CM14C)	3. Audio Video Coding and Compression
4. Optimization Techniques.	4. Modeling and simulation techniques

II Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	SP21C	Pattern recognition and Machine Learning (Common to Communication systems CM24C)	3	1	0	4	4	40	60	100
PCC	SP22C	Detection and Estimation Theory	3	1	0	4	4	40	60	100
PEC	SP23C	Programme Elective Course - III	3	0	0	3	3	40	60	100
PEC	SP24C	Programme Elective Course - IV	3	0	0	3	3	40	60	100
PCC	SP25L	Pattern recognition and Machine Learning Lab	0	0	3	3	1.5	40	60	100
PCC	SP26L	Detection and Estimation Theory Lab	0	0	3	3	1.5	40	60	100
VAC	SP27C	Cyber Security	2	0	2	4	3	100	-	100
PCC	SP28M	Mini Project with Seminar	0	0	4	4	2	100	-	100
	Total		**14**	**2**	**12**	**28**	**22**	**440**	**360**	**800**

List of Programme Elective Courses III(SP23C)	List of Programme Elective Courses III (SP24C)
1. Advanced Computer Architecture	1. Random processes and Queueing models (Common to Communication systems CM24C)
2. IoT and Applications (Common to Communication systems CM23C)	2. Multispectral signal analysis
3. Digital design and verification	3. Biomedical signal Processing
4. Audio Processing	4. Remote Sensing (Common to Communication systems CM24C)

III Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
OEC	SP31C	Open Elective Course (Through MOOCS)	0	0	0	0	3	100	-	100
PCC	SP32I	Industrial/ Research Internship (Min of 4 Weeks)	0	0	0	0	3	100	-	100
PCC	SP33D	Dissertation Work Phase-I	0	0	24	24	12	40	60	100
	Total		**0**	**0**	**20**	**20**	**18**	**240**	**60**	**300**

IV Semester

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	SP41D	Dissertation Work Phase-II and Viva-Voce	0	0	20	20	10 + 06 = 16	40	60	100
	Total		**0**	**0**	**20**	**20**	**16**	**40**	**60**	**100**

M. Tech.(Electronics and Communication Engineering)
Curriculum Structure
Specialization: Signal processing

Vision of The Institute

The Vision of Sri Venkateswara University College of Engineering is to be the leader in the creation and development of globally competitive human capital in Engineering Education for Technological, Economical and Social Enrichment of the Society, through its open and flexible Academic Programs.

Mission of The Institute

1. To be recognized as a premier institution offering Engineering Education programs, training human resources oriented to problem solving and system development.
2. To carry out research in Engineering and Technology relevant to all segments of society.
3. To assume leadership in sustainable technological growth of the Indian society.
4. To be a natural destination for excellence and diversity in thought and practice.

Department of Electronics &Communication Engineering

Vision

To be a lead department imparting quality and value embedded higher education and research emphasizing freedom of learning andpractice.

Mission

1. Transforming students into full-fledged professionals and to become leaders in dynamic global environment.
2. Augmenting knowledge and technologies in rapidly advancing fields of Electronics and Communication Engineering.
3. Promoting in depth research and create Centre of excellence in thrust areas.

Program Outcomes (POs) for PG programs

POs are statements that describe what students are expected to know and

be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability attitude and behaviour that students acquire through the program.
The POs essentially indicate what the students can do from subject-wise knowledge acquired by them during the program. As such, POs define the professional profile of a graduate of PG Engineering Program.

NBA has defined the following three POs for a graduate of PG Engineering Program:

1. **PO1**: An ability to independently carry out research/investigation and development work to solve practical problems.
2. **PO2**: An ability to write and present a substantial technical report/document.
3. **PO3**: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

Program Specific Outcomes (PSOs):

M. Tech. in Signal Processing graduates will be able to:

1. **PSO 1**. Integrate knowledge to identify, formulate, solve complex problems and apply in Signal Processing, Machine Vision and Communication Networks.
2. **PSO 2.** Use the concepts and software tools of signal processing to design the systems to meet the specific needs within economic, social and environmental constraints.

Program Educational Objectives (PEOs):

M. Tech. in Signal Processing Program, graduates will be able to:

1. **PEO 1.**Providetechnical competency to identify, analyze and solve engineering problems pertaining to design, development, and deployment of signal processing systems.
2. **PEO 2.**Possess suitable knowledge for analyzing, modelling, and evaluating the research problems in signal processing to pursue research and enhance the employability.
3. **PEO 3.**Inculcate professionalism, ethical attitude, communication skills, social values and ability to relate engineering solutions to real life and practical applications.

SP11C Advanced Digital Signal Processing
(Common to Communication Systems)

Instruction Hours/week : (L-T-P-C): 3-1-0-4 **Credits : 4**

Sessional Marks : 40 **Semester-End Examination: 60**

Course Description: This course will provide rigorous foundations in Digital filter structures, Multirate signal processing, Linear prediction, Adaptive filters and Spectral estimation. This course emphasizes the use of digital signal processing techniques for designing digital systems used in Communications, Control, Media Applications etc.

Prerequisites: Signals and Systems, Digital Signal Processing.

Course Objectives: To enable the student to

1. Understand to develop FIR & IIR filter structures depending upon the given applications.
2. Understand theory of Multirate DSP, solve numerical problems and write algorithms.
3. Understand theory of prediction and solution of normal equations.
4. Understand the different types of adaptive filters used in signal processing applications.
5. Discuss different methods of spectrum estimation and analysis.

Course Outcomes: After completion of the course, student will be able to

1. Learn and implement the digital filters to computational complexity problems.
2. Analyze multirate DSP systems and Design a decimator and integrator including multi-stages.
3. Apply theory of prediction and find solution of normal equations
4. Design different types of filters such as Adaptive filters, poly phase filters, Wiener filters, ARMA lattice-ladder filters, etc.
5. Estimate the power spectrum by using different methods.

Contents:

Unit 1

Digital filter structures: Basic FIR/IIR filter structures, FIR/IIR Cascaded lattice structures, Parallel structures, all pass realization of IIR transfer functions, Sine- cosine generator, Computational complexity of filter structures.

Unit 2

Multirate Digital Signal Processing: Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, poly phase

filters, Quadrature mirror filter (QMF) banks, Conditions for perfect reconstruction, digital filter banks, Applications in sub-band coding.

Unit 3

Linear Prediction and Optimum Linear Filters: Innovations Representation of a Stationary Random Process, Forward and Backward linear prediction, Solution of the Normal Equations, Properties of linear prediction-Error Filter, AR Lattice and ARMA Lattice-Ladder Filters, Wiener Filters for Filtering and Prediction.

Unit 4

Adaptive Filters, Applications, Gradient Adaptive Lattice, Minimum mean square criterion, The Least-Mean-Square (LMS) algorithm, Normalized LMS (NLMS), The Leaky LMS, Recursive Least Square (RLS) algorithm.

Unit 5

Power Spectral Estimation: Estimation of Spectra from Finite Duration Observations of a Signal, Periodogram, Use DFT in power Spectral Estimation, Bartlett, Welch and Blackman, Tukey methods, Comparison of performance of Non-Parametric Power Spectrum Estimation Methods.

Parametric Methods of Power Spectrum Estimation: Relationship between Auto-Correlation and Model Parameters, Yule-Walker, Burg and Unconstructrained Least Squares Methods, Moving Average (MA) and ARMA Models Minimum Variance Method, Eigen analysis Algorithms for Spectrum Estimation.

Text Books:

1. **John G. Proakis** and**Dimitris G. Manolakis,** Digital Signal Processing: Principles, Algorithms and Applications, 5th Edition, **ISBN-13: 9780137348657,** Published by Pearson, 2021.
2. John G. Proakis, Digital Signal Processing Principles, Algorithms, and Applications, Prentice Hall International Inc, 4th Edition, 2012.
3. Sanjit Kumar Mitra, Digital Signal Processing- A Computer Based Approach, 4th edition, McGraw Hill Education, 2011.
4. D.G. Manolakis, V.K. Ingle and S.M.Kogon, “Statistical and Adaptive Signal Processing”, McGraw Hill, 2000.

References:

1. N. J. FliegMultirate Digital Signal Processing: Multirate Systems - Filter Banks – Wavelets,1st Edition, John Wiley and Sons Ltd, 1999.
2. Sanjit Kumar Mitra, and Yonghong Kuo. Digital Signal Processing: A Computer-Based Approach, 4 th. Edition McGraw-Hill Higher Education, New York, 2013.
3. M. H. Hayes, “Statistical Digital Signal Processing and Modeling”, John

Wiley & Sons Inc., 2002.
4. Simon Haykin, "Adaptive Filter Theory", 4th Edition, Prentice Hall, 2001.

SP12C Digital Image and Video Processing

Instruction Hours/week : (L-T-P-C): 3-1-0-4 **Credits : 4**

Sessional Marks : 40 **Semester-End Examination: 60**

Course Description:n this course you will learn the basic principles and tools used to process images and videos, and how to apply them in solving practical problems. Digital images and videos are everywhere these days – in thousands of scientific, consumer, industrial, and creative applications. Which are obtained from a wide range of the electromagnetic spectrum - from visible light and infrared to gamma rays and beyond. The ability to process image and video signals is therefore an incredibly important skill to master for engineering/science students, software developers, and practicing scientists. Digital image and video processing continues to enable the multimedia technology revolution we are experiencing today. This course will strengthen fundamental knowledge about digital image and video processing techniques along with mathematical framework to describe and analyze images and videos. Digital image and video processing is used in almost all engineering fields and wide range of applications in industrial automation, medical, agriculture, security, entertainment, education and many more.

Course Objectives: The student should be made to:

1. To know the concept of image fundamentals and mathematical transforms necessary for image Processing
2. To study the image enhancement and segmentation techniques
3. To learn about different color models and image compression procedures
4. To understand fundamentals of Video Coding

Course Outcomes:

At the end of this course, students will be able to

1. Learn different techniques for image enhancement, video and image recovery
2. Understand techniques for image and video segmentation
3. Study techniques for image and video compression and object recognition

Syllabus Contents:

Unit 1

Digital Image and Video Fundamentals: Digital image and video fundamentals and formats, 2-D and 3-D sampling and aliasing, 2-D/3-D filtering, image decimation/interpolation, video sampling and interpolation, Basic image processing operations, Image Transforms,Need for image

transforms, DFT, DCT, Walsh, Hadamard transform, Haar transform, Wavelet transform

Unit 2

Image and Video Enhancement and Restoration: Histogram, Point processing, filtering, image restoration, algorithms for 2-D motion estimation, change detection, motion-compensated filtering, frame rate conversion, deinterlacing, video resolution enhancement, Image and Video restoration (recovery).

Colour image Processing: Colour fundamentals, Colour models, Conversion of colour models, Pseudo colour image processing, Full colour processing

Unit 3

Image and Video Segmentation: Discontinuity based segmentation- Line detection, edge detection, thresholding, Region based segmentation, Scene Change Detection, Spatiotemporal Change Detection, Motion Segmentation, Simultaneous Motion Estimation and Segmentation Semantic Video Object Segmentation, Morphological image processing.

Unit 4

Image and Video Compression: Lossless image compression including entropy coding, lossy image compression, video compression techniques, and international standards for image and video compression (JPEG, JPEG 2000, MPEG-2/4, H.264, SVC), Video Quality Assessment

Unit 5

Object recognition: Image Feature representation and description-boundary representation, boundary descriptors, regional descriptors, feature selection techniques, introduction to classification, supervised and unsupervised learning, Template matching, Bayes classifier

References:

1. Ed. Al Bovik ,"Handbook of Image and Video Processing", 2nd Edition, Academic Press,2000.
2. J. W. Woods, "Multidimensional Signal, Image and Video Processing and Coding", 2nd Edition, Academic Press, 2011.
3. Rafael C. Gonzalez and Richard E. Woods," Digital Image Processing", 3rd Edition,Prentice Hall, 2008.
4. M. Tekalp, "Digital Video Processing", 2nd Edition, Prentice Hall, 2015.
5. S. Shridhar, "Digital Image Processing", 2nd Edition, Oxford University Press, 2016.

SP13C DSP Architecture
(Common to Communication Systems)

Instruction Hours/week :(L-T-P-C): 3-1-0-4 **Credits : 4**

Sessional Marks : 40 **Semester-End Examination: 60**

Course Description: This course explains fundamental concepts of Digital Signal Processing and implementation of various applications on Advanced Processor. Helps students to understand architecture of advanced Digital Signal Processor and how to program it for signal processing applications.

Course Objectives:

1. To describe features and architectural improvements of DSP processors.
2. Introduce addressing modes and instruction description of TMS320C6x processors.
3. To demonstrate data representation in DSP Processors and FIR filters.
4. To demonstrate the usefulness of the adaptive filters and learn techniques of code optimization.

Course Outcomes:

1. At the end of this course, students will be able to
2. Identify and formalize architectural level characterization of P-DSP hardware
3. Ability to design, programming (assembly and C), and testing code using Code Composer Studio environment
4. Deployment of DSP hardware for Control, Audio and Video Signal processing applications
5. Understanding of major areas and challenges in DSP based embedded systems.

Syllabus Contents:

Unit 1

Programmable DSP Hardware: Processing Architectures (von Neumann, Harvard), DSP core algorithms (FIR, IIR, Convolution, Correlation, FFT), IEEE standard for Fixed and Floating Point Computations, Special Architectures Modules used in Digital Signal Processors (like MAC unit, Barrel shifters), On-Chip peripherals, DSP benchmarking.

Unit 2

Structural and Architectural Considerations: Parallelism in DSP processing, Texas Instruments, TMS320 Digital Signal Processor Families, Fixed Point TI DSP Processors: TMS320C1X and TMS320C2X Family,TMS320C25 – Internal Architecture, Arithmetic and Logic Unit, Auxiliary Registers,

Addressing Modes (Immediate, Direct and Indirect, Bit-reverse Addressing), Basics of TMS320C54x and C55x Families in respect of Architecture improvements and new applications fields, TMS320C5416 DSP Architecture, Memory Map, Interrupt System, Peripheral Devices, Illustrative Examples for assembly coding.

Unit 3

VLIW Architecture: Current DSP Architectures, GPUs as an alternative to DSP Processors, TMS320C6X Family, Addressing Modes, Replacement of MAC unit by ILP, Detailed study of ISA, Assembly Language Programming, Code Composer Studio, Mixed Cand Assembly Language programming, On-chip peripherals, Simple applications developments as an embedded environment.

Unit 4

Multi-core DSPs: Introduction to Multi-core computing and applicability for DSP hardware, Concept of threads, introduction to P-thread, mutex and similar concepts, heterogeneous and homogenous multi-core systems, Shared Memory parallel programming –OpenMP approach of parallel programming, PRAGMA directives, OpenMP Constructs for work sharing like for loop, sections, TI TMS320C6678 (Eight Core subsystem).

Unit 5

FPGA based DSP Systems: Limitations of P-DSPs, Requirements of Signal processing for Cognitive Radio (SDR), FPGA based signal processing design-case study of a complete design of DSP processor,High Performance Computing using P-DSP: Preliminaries of HPC, MPI, OpenMP, multicore DSP as HPC infrastructure.

References:

1. M. Sasikumar, D. Shikhare, Ravi Prakash, “Introduction to Parallel Processing”, 1st Edition, PHI, 2006.
2. Fayez Gebali, “Algorithms and Parallel Computing”,1st Edition, John Wiley & Sons, 2011
3. Rohit Chandra, Ramesh Menon, Leo Dagum, David Kohr, DrorMaydan, JeffMcDonald,“Parallel Programming in OpenMP”, 1st Edition, Morgan Kaufman,2000.
4. Ann Melnichuk,Long Talk, “Multicore Embedded systems”, 1st Edition, CRC Press,2010.
5. Wayne Wolf, “High Performance Embedded Computing: Architectures, Applications and Methodologies”, 1st Edition, Morgan Kaufman, 2006.
6. E.S.Gopi, “Algorithmic Collections for Digital Signal Processing Applications Using MATLAB”, 1st Edition, Springer Netherlands,2007.

SP14C :Program Elective-I

1. Computer Vision

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Description: This course introduces fundamental concepts, theories, and algorithms for pattern recognition and machine learning, which are used in computer vision, speech recognition, data mining, statistics, information retrieval, and bioinformatics. Topics include: Bayesian decision theory, parametric and non-parametric learning, data clustering, component analysis, boosting techniques, support vector machine, and deep learning with neural networks.

Course Objectives:

1. To understand, describe and critique pattern recognition, machine learning and deep learning techniques.
2. To identify and select suitable modeling, learning and prediction techniques to solve a problem.
3. To design and implement a machine learning solution.
4. To appraise ethical and privacy issues of artificial intelligence techniques.

Course Outcomes:

At the end of this course, students will be able to

1. Study the image formation models and feature extraction for computer vision
2. Identify the segmentation and motion detection and estimation techniques
3. Develop small applications and detect the objects in various applications

Syllabus Contents:

Unit 1

Image Formation Models: Monocular imaging system • Orthographic & Perspective Projection • Camera model and Camera calibration • Binocular imaging systems, Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration. Apparel, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration. Apparel, Stereo vision

Unit 2

Feature Extraction

Image representations (continuous and discrete) • Edge detection, Edge

linking, corner detection, texture, binary shape analysis, boundary pattern analysis, circle and ellipse detection, Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges.

Unit 3

Shape Representation and Segmentation • Deformable curves and surfaces • Snakes and activecontours • Level set representations • Fourier and wavelet descriptors • Medial representations • Multi-resolution analysis, Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation

Unit 4

Motion Detection and Estimation • Regularization theory • Optical computation • Stereo Vision

Motion estimation, Background Subtraction and Modelling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation • Structure from motion, Motion Tracking in Video

Unit 5

Object recognition • Hough transforms and other simple object recognition methods, Shapecorrespondence and shape matching, Principal component analysis, Shape priors for recognition.

Applications of Computer Vision: Automated Visual Inspection, Inspection of Cereal Grains, Surveillance, In-Vehicle Vision Systems, CBIR, CBVR, Activity Recognition, computational photography, Biometrics, stitching and document processing

References:

1. D. Forsyth and J. Ponce,"Computer Vision - A modern approach", 2nd Edition, Pearson Prentice Hall, 2012
2. Szeliski, Richard, "Computer Vision: Algorithms and Applications", 1st Edition, Springer-Verlag London Limited, 2011.
3. Richard Hartley and Andrew Zisserman, "Multiple View Geometry in Computer Vision", 2nd Edition, Cambridge University Press, 2004.
4. K. Fukunaga,"Introduction to Statistical Pattern Recognition",2ndEdition, Morgan Kaufmann, 1990.
5. Rafael C. Gonzalez and Richard E. Woods," Digital Image Processing", 3rd Edition, Prentice Hall, 2008.
6. B. K. P. Horn, "Robot Vision", 1st Edition, McGraw-Hill, 1986.
7. E. R. Davies"Computer and Machine Vision: Theory, Algorithms, Practicalities", 4th Edition, Elsevier Inc,2012.

SP14C : Program Elective-I

2. Artificial Intelligence

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Description: This course introduces fundamental concepts, theories, and algorithms for pattern recognition and machine learning, which are used in computer vision, speech recognition, data mining, statistics, information retrieval, and bioinformatics. Topics include: Bayesian decision theory, parametric and non-parametric learning, data clustering, component analysis, boosting techniques, support vector machine, and deep learning with neural networks.

Course Objectives:

1. To understand, describe and critique pattern recognition, machine learning and deep learning techniques.
2. To identify and select suitable modeling, learning and prediction techniques to solve a problem.
3. To design and implement a machine learning solution.
4. To appraise ethical and privacy issues of artificial intelligence techniques.

Syllabus Contents:

Unit 1

What is AI (Artificial Intelligence)? : The AI Problems, The Underlying Assumption, What are AI Techniques, The Level Of The Model, Criteria For Success, Some General References, One Final WordProblems, State Space Search & Heuristic Search Techniques: Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics, And Issues In The Design Of Search Programs, Additional Problems. Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

Unit 2

Knowledge Representation Issues: Representations And Mappings, Approaches To Knowledge
Representation. Using Predicate Logic: Representation Simple Facts In Logic, Representing Instance And Isa Relationships, Computable Functions And Predicates, Resolution. Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning.

Unit 3

Symbolic Reasoning Under Uncertainty: Introduction To No monotonic Reasoning, Logics For Non-monotonic Reasoning. Statistical Reasoning: Probability And Bays' Theorem, Certainty.Factors And Rule-Base Systems, Bayesian Networks, Dempster Shafer Theory.

Fuzzy Logic. Weak Slot-and-Filler Structures: Semantic Nets, Frames. Strong Slot-and-Filler

Structures: Conceptual Dependency, Scripts, CYC

Unit 4`

Game Playing: Overview, And Example Domain: Overview, MiniMax, Alpha-Beta Cut-off, Refinements, Iterative deepening, The Blocks World, Components Of A Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques. Understanding: What is understanding? What makes it hard? As constraint satisfaction

Unit 5

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Semantic Analysis, Discourse And Pragmatic Processing, Spell Checking Connectionist Models: Introduction: Hopfield Network, Learning In Neural Network, Application of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI And Symbolic AI.

References:

1. Elaine Rich and Kevin Knight "Artificial Intelligence", 2nd Edition, Tata Mcgraw-Hill, 2005.
2. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rdEdition, Prentice Hall, 2009.

SP14C : Program Elective-I
3. Wireless Sensor Networks
(Common to Communication Systems)

Instruction Hours/week : 3(L) **Credits : 3**

Sessional Marks : 40 **Semester-end Examination : 60**

Course Description: This course offers an insight into the concepts of mobile and wireless data communication technologies. The objective of this course is to enable the student to understand the emerging technologies of wireless and mobile communications and simulate them.

Course Objectives:

1. To understand the new trends in mobile/wireless communications networks.

2. To understand multiple radio access techniques.
3. To analyze various routing algorithms used in mobile/wireless networks.
4. To identify the issues in transport and application layers.

Course Outcomes:

At the end of this course, students will be able to

1. Design wireless sensor network system for different applications under consideration.
2. Understand the hardware details of different types of sensors and select right type of sensor for various applications.
3. Understand radio standards and communication protocols to be used for wireless sensor network based systems and application.
4. Use operating systems and programming languages for wireless sensor nodes, performance of wireless sensor networks systems and platforms.
5. Handle special issues related to sensors like energy conservation and security challenges.

Syllabus Contents:

Unit 1

Introduction and overview of sensor network architecture and its applications, sensornetwork comparison with Ad Hoc Networks, Sensor node architecture with hardware and software details.

Hardware: Examples like mica2, micaZ, telosB, cricket, Imote2, tmote, btnode, and Sun

SPOT, Software (Operating Systems): tinyOS, MANTIS, Contiki, and RetOS.

Unit 2

Programming tools: C, nesC. Performance comparison of wireless sensor networkssimulation and experimental platforms like open source (ns-2) and commercial (QualNet, Opnet)

Unit 3

Overview of sensor network protocols (details of atleast 2 important protocol per layer):Physical, MAC and routing/ Network layer protocols, node discovery protocols, multi-hop and cluster based protocols, Fundamentals of 802.15.4, Bluetooth, BLE (Bluetooth low energy), UWB.

Unit 4

Data dissemination and processing; differences compared with other database managementsystems, data storage; query processing.

Unit 5

Specialized features: Energy preservation and efficiency; security challenges; fault-tolerance, Issues related to Localization, connectivity and

topology, Sensor deployment mechanisms; coverage issues; sensor Web; sensor Grid, Open issues for future research, and Enabling technologies in wireless sensor network.

References:

1. H. Karl and A. Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, India, 2012.
2. C. S. Raghavendra, K. M. Sivalingam, and T. Znati, Editors, "Wireless Sensor Networks", Springer Verlag, 1st Indian reprint, 2010.
3. F. Zhao and L. Guibas, "Wireless Sensor Networks: An Information Processing Approach", Morgan Kaufmann, 1st Indian reprint, 2013.
4. YingshuLi, MyT. Thai, Weili Wu, "Wireless sensor Network and Applications", Springer series on signals and communication technology, 2008.

SP14C : Program Elective-I

4. Optimization Techniques

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Course Description: The students will try to learn the operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization of objective function). The problem formulation by using linear, dynamic programming, game theory and queuing models.

Course Objectives:

1. Operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization of objective function).
2. The problem formulation by using linear, dynamic programming, game theory and queuing models.
3. The stochastic models for discrete and continuous variables to control inventory and simulation of manufacturing models for the production decision making.
4. Formulation of mathematical models for quantitative analysis of managerial problems in industry.

Course Outcomes:

At the end of this course, students will be able to

1. Understand importance of optimization
2. Apply basic concepts of mathematics to formulate an optimization problem
3. Analyze and appreciate variety of performance measures for various optimization problems

Syllabus Contents:

Unit 1

Introduction to ClassicalMethods & Linear Programming ProblemsTerminology, Design Variables, Constraints, Objective Function, Problem Formulation. Calculus method, Kuhn Tucker conditions, Method of Multipliers.

Unit 2

Linear Programming Problem,Simplex method, Two-phase method, Big-M method, duality, Integer linear Programming, Dynamic Programming, Sensitivity analysis.

Unit 3

Single Variable Optimization Problems: Optimality Criterion, Bracketing Methods, Region Elimination Methods, Interval Halving Method, Fibonacci Search Method, Golden Section Method. Gradient Based Methods: Newton-Raphson Method, Bisection Method, Secant Method, Cubic search method.

Unit 4

Multi Variable and Constrained Optimization Technique, Optimality criteria, Direct search Method, Simplex search methods, Hooke-Jeeve‘s pattern search method, Powell‘s conjugate direction method,Gradient based method, Cauchy‘s Steepest descent method, Newton‘s method , Conjugate gradient method. Kuhn - Tucker conditions, Penalty Function, Concept of Lagrangian multiplier, Complex search method, Random search method.

Unit 5

Intelligent Optimization Techniques:Introduction to Intelligent Optimization, Soft Computing, Genetic Algorithm: Types of reproduction operators, crossover & mutation, Simulated Annealing Algorithm, Particle Swarm Optimization (PSO) - Graph Grammer Approach - Example Problems

Genetic Programming (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

References:

1. S. S. Rao, “Engineering Optimisation: Theory and Practice”, Wiley, 2008.
2. K. Deb, “Optimization for Engineering design algorithms and Examples”, Prentice Hall, 2005.
3. C.J. Ray, “Optimum Design of Mechanical Elements”, Wiley, 2007.
4. R. Saravanan, “Manufacturing Optimization through Intelligent Techniques, Taylor & Francis Publications, 2006.

5. D. E. Goldberg, “Genetic algorithms in Search, Optimization, and Machine learning”,
6. Addison-Wesley Longman Publishing, 1989.

SP15C : Program Elective-II

1. Joint Time Frequency Analysis & Multi Resolution Analysis

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

At the end of this course, students will be able to

1. Introduction to Transforms in signal processing
2. To understand Time -Frequency Analysis & Multiresolution
3. Analysis Study of Wavelets and its Applications

Syllabus Contents:

Unit 1

Introduction Review of Fourier Transform, Parseval Theorem and need for joint time-frequency Analysis. Concept of non-stationary signals, Short-time Fourier transforms (STFT), Uncertainty Principle, and Localization/Isolation in time and frequency, Hilbert Spaces, Banach Spaces, and Fundamentals of Hilbert Transform.

Unit 2

Bases for Time-Frequency Analysis: Wavelet Bases and filter Banks, Tilings of Wavelet Packet and Local Cosine Bases, Wavelet Transform, Real Wavelets, Analytic Wavelets, Discrete Wavelets, Instantaneous Frequency, Quadratic time-frequency energy, Wavelet Frames, Dyadic wavelet Transform, Construction of Haar and Roof scaling function using dilation equation and graphical method.

Unit 3

Multiresolution Analysis: Haar Multiresolution Analysis, MRA Axioms, Spanning Linear Subspaces, nested subspaces, Orthogonal Wavelets Bases, Scaling Functions, Conjugate Mirror Filters, Haar 2-band filter Banks, Study of up samplers and down samplers, Conditions for alias cancellation and perfect reconstruction, Discrete wavelet transform and relationship with filter Banks, Frequency analysis of Haar 2-band filter banks, scaling and wavelet dilation equations in time and frequency domains, case study of decomposition and reconstruction of given signal using orthogonal framework of Haar 2band filter bank.

Unit 4

Wavelets: Daubechies Wavelet Bases, Daubechies compactly supported family of wavelets; Daubechies filter coefficient calculations, Case study of Daub-4 filter design, Connection between Haar and Daub-4, Concept of Regularity, Vanishing moments. Other classes of wavelets like Shannon, Meyer, and Battle-Lamarie.

Unit 5

Bi-orthogonal wavelets and Applications: Construction and design. Case studies of biorthogonal 5/3 tap design and its use in JPEG 2000. Wavelet Packet Trees, Time-frequency localization, compactly supported wavelet packets, case study of Walsh wavelet packet bases generated using Haar conjugate mirror filters till depth level 3. Lifting schemes for generating orthogonal bases of second generation wavelets.

JTFA Applications: Riesz Bases, Scalograms, Time-Frequency distributions: fundamental ideas, Applications: Speech,audio, image and video compression; signal denoising, feature extraction, inverse problem.

References:

1. S. Mallat, "A Wavelet Tour of Signal Processing," 2nd Edition, Academic Press, 1999.
2. L. Cohen, “Time-frequency analysis”, 1st Edition, Prentice Hall, 1995.
3. G.Strang and T. Q. Nguyen, “Wavelets and Filter Banks",2nd Edition, Wellesley Cambridge Press, 1998.
4. Daubechies, "Ten Lectures on Wavelets", SIAM, 1992.
5. P. P. Vaidyanathan, "Multirate Systems and Filter Banks", Prentice Hall, 1993.
6. M. Vetterli and J. Kovacevic, "Wavelets and Subband Coding", Prentice Hall, 1995

SP15C : Program Elective-II
2. Voice and Data Networks
(Common to Communication Systems)

Teaching Scheme

Instruction Hours/week : 3(L) **Credits : 3**

Sessional Marks : 40 **Semester-end Examination : 60**

Course Description: This course provides an introduction to voice and data networking technologies, including design and performance issues. And also focus is on layered & cross layer communication along with

Packet and circuit switching communication. Provides Link layer error and flow control mechanisms, also know about queuing models of networks and its applications. Finally have idea about different internet protocols and packet scheduling algorithm.

Course Objectives:

1. Know different design and performance issues of communications networks.
2. Understand the concepts of layered & cross layer communication, along with circuit & packet switching technologies and their deployments in public networks
3. Understand the role of data link layer and various queuing models for communication.
4. Understand the functions of internetworking devices and importance of different internet protocols.

Outcomes:

1. An ability to apply knowledge of networking. network topologies in designing of a network.
2. An ability to model systems using concept of layered/cross layered and TCP/IP architecture.
3. An ability apply the link layer functionalities and queuing models during communication.
4. An ability to use modern engineering techniques for analysis and design of a network with the knowledge of internet concepts and protocols.

Syllabus Contents:

Unit 1

Network Design Issues, Network Performance Issues, Network Terminology, centralized and distributed approaches for networks design, Issues in design of voice and data networks.

Unit 2

Layered and Layer less Communication, Cross layer design of Networks, Voice Networks (wired and wireless) and Switching, Circuit Switching and Packet Switching, Statistical Multiplexing.

Unit 3

Data Networks and their Design, Link layer design- Link adaptation, Link Layer Protocols, Retransmission. Mechanisms (ARQ), Hybrid ARQ (HARQ), Go Back N, Selective Repeat protocols and their analysis.

Unit 4

Queuing Models of Networks , Traffic Models , Little's Theorem, Markov chains, M/M/1 and other Markov systems, Multiple Access Protocols , Aloha System , Carrier Sensing , Examples of Local area networks,

Unit 5

Inter-networking, Bridging, Global Internet, IP protocol and addressing , Sub netting , Classless Inter domain Routing (CIDR) , IP address lookup , Routing in Internet. End to End Protocols, TCP and UDP. Congestion Control, Additive Increase/Multiplicative Decrease, Slow Start, Fast Retransmit/ Fast Recovery,

Congestion avoidance, RED TCP Throughput Analysis, Quality of Service in Packet Networks,Network Calculus, Packet Scheduling Algorithms.

References:

1. D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, Prentice Hall, 1992.
2. L. Peterson and B. S. Davie, "Computer Networks: A Systems Approach",5th Edition, Morgan Kaufman, 2011.
3. Kumar, D. Manjunath and J. Kuri, "Communication Networking: An analytical approach", 1st Edition, Morgan Kaufman, 2004.
4. Walrand,"Communications Network: A First Course", 2nd Edition, McGraw Hill, 2002.
5. Leonard Kleinrock, "Queueing Systems,Volume I: Theory", 1st Edition, John Wiley and Sons, 1975.
6. Aaron Kershenbaum, "Telecommunication Network Design Algorithms", McGraw Hill, 1993.
7. Vijay Ahuja, "Design and Analysis of Computer Communication Networks", McGrawHill, 1987

SP15C : Program Elective-II

3. Audio Video Coding & Compression

Teaching Scheme

Instruction Hours/week : 3(L) **Credits : 3**

Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

At the end of this course, students will be able to

1. Familiarity to lossy and lossless compression systems.
2. Study of Video coding techniques and standards.
3. Understand audio coding and multimedia synchronization techniques.

Syllabus Contents:

Unit 1

Introduction to Multimedia Systems and Processing, Lossless Image Compression Systems Image Compression Systems, Huffman Coding, Arithmetic and Lempel-Ziv Coding, Other Coding Techniques

Unit 2

Lossy Image Compression Systems, Theory of Quantization, Delta Modulation and DPCM, Transform Coding & K-L Transforms, Discrete Cosine Transforms, Multi-Resolution Analysis, Theory of Wavelets, Discrete Wavelet Transforms, Still Image Compression Standards: JBIG and JPEG

Unit 3

Video Coding and Motion Estimation: Basic Building Blocks & Temporal Redundancy, Block based motion estimation algorithms, Other fast search motion estimation algorithms

Video Coding Standards MPEG-1 standards, MPEG-2 Standard, MPEG-4 Standard, H.261, H.263 Standards, H.264 standard

Unit 4

Audio Coding, Basic of Audio Coding, Audio Coding, Transform and Filter banks, Polyphase filter implementation, Audio Coding, Format and encoding, Psychoacoustic Models

Unit 5

Multimedia Synchronization, Basic definitions and requirements, References Model and Specification, Time stamping and pack architecture, Packet architectures and audio-video interleaving, Multimedia Synchronization, Playback continuity, Video Indexing And Retrieval: Basics of content based image retrieval, Video Content Representation, Video Sequence Query Processing

References:

1. Iain E.G. Richardson, “H.264 and MPEG-4 Video Compression”, Wiley, 2003.
2. Khalid Sayood, “Introduction to Data Compression”, 4th Edition, Morgan Kaufmann, 2012
3. Mohammed Ghanbari, “Standard Codecs: Image Compression to Advanced Video Coding”, 3rd Edition, The Institution of Engineering and Technology, 2011.
4. Julius O. Smith III, “Spectral Audio Signal Processing”, W3K Publishing, 2011.
5. Nicolas Moreau, “Tools for Signal Compression: Applications to Speech and Audio Coding”, Wiley, 2011.

SP15C : Program Elective-II

4. Modelling and Simulation Techniques

Teaching Scheme

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination :60**

Course Outcomes:

At the end of this course, students will be able to

1. Identify and model discrete systems (deterministic and random)
2. Identify and model discrete signals (deterministic and random)
3. Understand modelling and simulation techniques to characterize systems/processes.

Syllabus Contents:

Unit 1

Introduction Circuitsas dynamicsystems, Transfer functions, poles and zeroes, State space, Deterministic Systems, Difference and Differential Equations, Solution of Linear Difference and Differential Equations, Numerical Simulation Methods for ODEs, System Identification, Stability and Sensitivity Analysis.

Unit 2

Statistical methods, Description of data, Data-fitting methods, Regression analysis, Least Squares Method, Analysis of Variance, Goodness of fit.

Unit 3

Probability and Random Processes, Discrete and Continuous Distribution, Central Limit theorem, Measure of Randomness, MonteCarlo Methods.
Stochastic Processes and Markov Chains, Time Series Models.

Unit 4

Modeling and simulation concepts, Discrete-event simulation, Event scheduling/Time advance algorithms, Verification and validation of simulation models.

Unit 5

Continuous simulation: Modeling with differential equations, Example models, Bond Graph Modeling, Population Dynamics Modeling, System dynamics.

References:

1. 1.R. L. Woods and K. L. Lawrence, "Modeling and Simulation of Dynamic Systems", Prentice-Hall, 1997.
2. 2.Z. Navalih, "VHDL Analysis and Modelling of Digital Systems", McGraw-Hill, 1993.
3. 3.J. Banks, JS. Carson and B. Nelson, "Discrete-Event System Simulation", 2nd Edition, Prentice-Hall of India, 1996.

SP16L: Advanced Digital Signal Processing Lab (Common to Communication Systems)

Instruction Hours/week :3(P) **Credits : 1.5**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Overview: This practical course enables students to apply skills learned in Advanced Digital Signal Processing algorithms and will help to teach implementation of them. MATLAB is used to apply theoretical concepts and to demonstrate signal processing techniques by means of hands-on application examples. Recognize estimation problems and design, implement and analyze algorithms for solving them. Implement signal processing systems with DSP based development platforms.

Pre-requisites: Signals & Systems, Digital Signal Processing, Digital Signal Processing Lab, MATLAB, and Code Composer Studio.

Course Learning Objectives: The student after studying this courseis able to:

1. Understand how to analyze and manipulate digital signals and have the programming knowledge to do so.
2. Understand the trade-offs in the practical design and implement of various structures of FIR and IIR digital filters, for example which can be reduces noise or realizes various applications.
3. Understand theory of prediction and solution of normal equations.
4. Acquaint knowledge of the concepts, algorithms and applications of adaptive signal processing in digital communication systems.
5. Understand the implementation of adaptive filters used in signal processing applications.
6. Understand different methods for estimation of power spectra and its analysis.

Course Outcomes: After completion of this coursethe student is:

1. Able to design, analyze, and implement digital filters using MATLAB.
2. Able to implement various structures of digital filters.

3. Able to implement up-sampling and down-sampling of a given Sequences.
4. Apply the Lattice filter architecture and implement the Wiener filter, Least Squares, LMS and RLS algorithms, and apply to selected applications.
5. Deduce and apply correlation functions and power spectra for various signal classes, in particular for stochastic signals.

Course Contents:

Note: (i) Minimum of 10 Experiments have to be done invariably.
(ii) All Experiments may be Simulated using MATLAB and to be verified theoretically.

List of Experiments:

1. Introduction to DSP with MATLAB Programming Environment and Familiarization to Code Composer Studio.
2. Basic Operations on Signals, Generation of Various Signals and finding its FFT.
3. Simple Digital Filters (LPF, HPF, BPF, BSF and Comb Filters).
4. Realization of Structures (Cascade / Parallel/ Lattice Structure's) of a system transfer function.
5. Implement Program to verify Decimation and Interpolation of a given Sequences.
6. Implement Program to Convert CD data into DVD data (sampling rate converters).
7. Estimation of data series using Nth order Forward Predictor and comparing to the Original Signal.
8. Design of linear prediction coding (LPC) filter using Levinson-Durbin Algorithm.
9. Apply the Lattice filter architecture from the Levinson-Durbin algorithm.
10. Computation of Reflection Coefficients using Schur Algorithm.
11. To implement the Wiener filter, and Least Squares algorithms, and apply to selected applications.
12. To implement the LMS and RLS algorithms, and apply to selected applications.
13. Design and verification of a Matched filter.
14. Adaptive Noise Cancellation / Linear Equalizer.
15. Computing Power Spectrum of a Square Signal and chirp signal.
16. Design and Simulation of Notch Filter to remove 50Hz Hum / any unwanted frequency component of given Signal (Speech / ECG).
17. Plot the Periodogram of a Noisy Signal and estimate PSD using

Periodogram and Modified Periodogram methods.

18. Estimation of Power Spectrum using Bartlett and Welch methods.
19. Parametric methods (Yule-Walker and Burg) of Power Spectrum Estimation.

For Motivated Learners Extra experiments can be done:

Applications: Adaptive filter and experiments on communication such as generation of a N-tuple PN sequence, generation of a white noise sequence using the PN sequence, restoration of a sinusoidal signal embedded in white noise by Wiener Filtering; speech and multi-media applications.

Texts / References:

1. **John G. Proakis** and **Dimitris G. Manolakis,** Digital Signal Processing: Principles, Algorithms and Applications, 5th Edition, **ISBN-13: 9780137348657, Published** by Pearson, 2021.

2. Sanjit Kumar Mitra, Digital Signal Processing: A Computer Based Approach, 4th edition, McGraw Hill Education, 2011.
3. LjiljanaMilić, Multirate Filtering for Digital Signal Processing: MATLAB Applications, Published by Information Science Reference, Hershey PA 17033, New York, ISBN 978-1-60566-178-0 (Hardcover) - ISBN 978-1-60566-179-7 (eBook), 2009.

4. R. Chassaing and D. Reay, Digital Signal Processing and Applications withTMS320C6713 *and* TMS320C6416, Wiley, 2008.

SP17L: Digital Image and Video Processing Lab

Teaching Scheme

Instruction Hours/week :3(P) **Credits : 1.5**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

At the end of this course, students will be able to

1. Perform image and video enhancement.
2. Perform image and video segmentation
3. Detect an object in an image/video

List of Assignments:

1. Perform basic operations on images like addition, subtraction etc.
2. Plot the histogram of an image and perform histogram equalization
3. Implement segmentation algorithms

4. Perform video enhancement
5. Perform video segmentation
6. Perform image compression using lossy technique
7. Perform image compression using lossless technique
8. Perform image restoration
9. Convert a colour model into another
10. Calculate boundary features of an image
11. Calculate regional features of an image
12. Detect an object in an image/video using template matching/Bayes classifier

SP18C: Research Methodology and IPR

Instruction Hours/week : 3L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Description of the Course:
This subjects gives how to proceed systematically for research, present research findings. This course consists of basics of research methods, paper writing , patenting methods and requirements..

Course Educational Objectives (Ceos):

1. To understand the importance of research objectives and procedures.

2. To know the procedures of data collection and report writing of research.

3. To have the knowledge of filing and obtaining a patent on research findings.

UNIT I
Meaning, Objective and Motivation in Research: Types of Research, Research Approaches, Research Process, Validity and Reliability in Research, Research Design: Features of Good Design, Types of Research Design, Basic Principles of Experimental Design

UNIT II
Sampling Design: Steps in Sampling Design, Characteristics of a Good Sample Design, Random Samples and Random Sampling Design Measurement and Scaling Techniques: Errors in Measurement, , Scaling and Scale Construction techniques, Forecasting Techniques, Time Series Analysis, Interpolation and Extrapolation

UNIT III
Methods of Data Collection: Primary Data, Questionnaire and Interviews, Collection of Secondary Data, Cases and Schedules. Professional

Attitude and Goals, Concept of Excellence, Ethics in Science and Engineering, Correlation and Regression Analysis, Method of Least Squares, Regression Vs. Correlation, Correlation Vs. Determination.

UNIT IV

Interpretation of Data and Report Writing, Layout of a Research Paper, Techniques o f Interpretation. Making Scientific Presentation at Conferences and Popular Lectures to Semi Technical Audience, Participating in Pubic Debates on Scientific Issues

UNIT V

Nature of Intellectual property rights, Patents, designs, trademarks and copyrights, History of patenting, process of patenting, patent development, international cooperation on IPR, procedure of granting patent, patent rights, licensing and transferring technology, Geographical Indications ,IPR in biological and systems and software.

Text/Reference Books:

1. Research Methodology: Methods And Techniques - C. R. Kothari,2nd Edition, New Age Intemational Publishers.
2. Statistical Methods - S P. Gupta. S. chand& Sons, New Derhi.
3. Intellectual ProPerty-the law of trademarks, copyrights, Patents, and trade Secrets- Deborah E. Bouchoux, Esq.Georgetown University, Fourth edition

Course Outcomes (COs):

1.Able to know research importance and requirements and procedure

2. Able to apply sampling techniques for analysis and forecasting.

3. Able to use methods for data collection and analyze the data using different mathematical techniques.

4. Able to write report on research done and present the research findings in systematic manner.

5. Able to have the knowledge to file and obtain patent on research finding

Semester - II

SP21C: Pattern Recognition and Machine Learning (Common to Communication Systems)

Instruction Hours/week : (L-T-P-C): 3-1-0-4 **Credits : 4**

Sessional Marks : 40 **Semester-End Examination: 60**

Course Outcomes:

At the end of this course, students will be able to

1. Study the parametric and linear models for classification
2. Design neural network and SVM for classification
3. Develop machine independent and unsupervised learning techniques.

Syllabus Contents:

Unit 1

Introduction to Pattern Recognition: Problems, applications, design cycle, learning andadaptation, examples, Probability Distributions, Parametric Learning - Maximum likelihood and Bayesian Decision Theory-Bayes rule, discriminant functions, loss functions and Bayesian error analysis

Unit 2

Linear models: Linear Models for Regression, linear regression, logistic regression LinearModels for Classification

Unit 3

Neural Network: perceptron, multi-layer perceptron, back propagation algorithm, error surfaces,practical techniques for improving back propagation, additional networks and training methods, Adaboost, Deep Learning

Unit 4

Linear discriminant functions - decision surfaces, two-category, multi-category, minimum-squared error procedures, the Ho-Kashyap procedures, linear programming algorithms, Support vector machine

Unit 5

Algorithm independent machine learning – lack of inherent superiority of any classifier, biasand variance, re-sampling for classifier design, combining classifiers

Unsupervised learning and clustering – k-means clustering, fuzzy k-means clustering,hierarchical clustering

References:

1. 1.Richard O. Duda, Peter E. Hart, David G. Stork, “Pattern Classification”, 2nd Edition John Wiley & Sons, 2001.
2. Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, “The Elements of Statistical Learning”, 2nd Edition, Springer, 2009.
3. C. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.

SP22C: Detection and Estimation Theory

Instruction Hours/week : (L-T-P-C): 3-1-0-4 **Credits : 4**

Sessional Marks : 40 **Semester-End Examination: 60**

Course Outcomes:

At the end of this course, students will be able to

1. Understand the mathematical background of signal detection and estimation
2. Use classical and Bayesian approaches to formulate and solve problems for signal detection and parameter estimation from noisy signals.
3. Derive and apply filtering methods for parameter estimation.

Syllabus Contents:

Unit I

Review of Vector Spaces: Vectors and matrices: notation andproperties, orthogonality and linear independence, bases, distance properties, matrix operations, Eigen values and eigenvectors.

Properties of Symmetric Matrices: Diagonalization of symmetric matrices, symmetric positive, definite and semi definite matrices, principal component analysis (PCA), singular value decomposition.

Unit II

Review of Gaussian variables and processes; problem formulation and objective of signal detection and signal parameter estimation in discrete-time domain.

Unit III

Statistical Decision Theory:

Bayesian, minimax, and Neyman-Pearson decision rules, likelihood ratio, receiver operating characteristics, composite hypothesis testing, locally optimum tests, detector comparison techniques, asymptotic relative efficiency.

Unit IV

Detection of Random Signals:

Estimator-correlator, linear model, general Gaussian detection, detection of Gaussian random signal with unknown parameters, weak signal detection.

Unit V

Estimation of Signal Parameters:

Minimum variance unbiased estimation, Fisher information matrix,

Cramer-Rao bound, sufficient statistics, minimum statistics, complete statistics; linear models; best linear unbiased estimation; maximum likelihood estimation, invariance principle; estimation efficiency; Bayesian estimation: philosophy, nuisance parameters, risk functions, minimum mean square error estimation, maximum a posteriori estimation.

References:

1. H. L. Van Trees, "Detection, Estimation and Modulation Theory: Part I, II, and III", John Wiley, NY, 1968.
2. H. V. Poor, "An Introduction to Signal Detection and Estimation", Springer, 2/e,1998.
3. Steven M. Kay, “Fundamentals of Statistical Signal Processing, Volume I: Estimation Theory”, Prentice Hall, 1993
4. Steven M. Kay, “Fundamentals of Statistical Signal Processing, Volume II: Detection Theory”, 1st Edition, Prentice Hall, 1998
5. Thomas Kailath, BabakHassibi, Ali H. Sayed, “Linear Estimation”, Prentice Hall, 2000.
6. H. Vincent Poor, “An Introduction to Signal Detection and Estimation”,2nd Edition, Springer, 1998.

SP23C:Program Elective-III

1. Advanced Computer Architecture

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

At the end of this course, students will be able to

1. Understand parallelism and pipelining concepts, the design aspects and challenges.
2. Evaluate the issues in vector and array processors.
3. Study and analyze the high performance scalable multithreaded and multiprocessor systems.

Syllabus Contents:

Unit 1

Parallel Processing and Pipelining Processing- Architectural Classification, Applications ofparallel processing, Instruction level Parallelism and Thread Level Parallelism, Explicitly Parallel Instruction Computing (EPIC) Architecture

Unit 2

Pipeline Architecture-Principles and implementation of Pipelining, Classification of pipeliningprocessors, Design aspect of Arithmetic and

Instruction pipelining, Pipelining hazards and resolving techniques, Data buffering techniques, Advanced pipelining techniques, Software pipelining, VLIW (Very Long Instruction Word) processor.

Unit 3

Vector and Array Processor- Issues in Vector Processing, Vector performance modeling, SIMD Computer Organization, Static Vs Dynamic network, Parallel Algorithms for Array Processors: Matrix Multiplication.

Unit 4

Multiprocessor Architecture - Loosely and Tightly coupled multiprocessors, Inter Processorcommunication network, Time shared bus, Multiport Memory Model, Memory contention and arbitration techniques, Cache coherency and bus snooping, Massively Parallel Processors (MPP).

Unit 5

Multithreaded Architecture- Multithreaded processors, Latency hiding techniques, Principles ofmultithreading, Issues and solutions, Parallel Programming Techniques: Message passing program development.

Parallel algorithms for multiprocessors- Classification and performance of parallel algorithms,operating systems for multiprocessors systems, Message passing libraries for parallel programming interface, PVM (in distributed memory system), Message Passing Interfaces (MPI).

References:

1. Kai Hwang, Faye A. Briggs, "Computer Architecture and Parallel Processing" McGraw Hill Education, 2012.
2. Kai Hwang, "Advanced Computer Architecture", McGraw Hill Education, 1993.
3. William Stallings, "Computer Organization and Architecture, Designing for Performance" Prentice Hall, 6th edition, 2006.
4. Kai Hwang, "ScalableParallelComputing", McGraw Hill Education, 1998.
5. Harold S. Stone "High-Performance Computer Architecture", Addison-Wesley, 1993.

SP23C:Program Elective-III

2. IOT and Applications

(Common to Communication Systems)

Instruction Hours/week : 3(L) **Credits : 3**

Sessional Marks : 40 **Semester-end Examination : 60**

Course Objectives:

1. To apprise students with basic knowledge of IoT that paves a platform to understand physical and logical design of IOT
2. To teach a student how to analyse requirements of various communication models and protocols for cost-effective design of IoT

applications on different IoT platforms.
3. To introduce the technologies behind Internet of Things (IoT).
4. To explain the students how to code for an IoT application using Arduino/Raspberry Pi open platform.

Syllabus Contents:

UNIT I
THE INTERNET OF THINGS TODAY, TIME FOR CONVERGENCE
M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structurefor IoT, The international driven global valuechain and global information monopolies. M2M to IoT-An Architectural Overview– Building anarchitecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT II
COMPONENTS IN INTERNET OF THINGS
Functional Blocks of an IoT Ecosystem – Sensors, Actuators, and Smart Objects – Control Units - Communication modules (Bluetooth, Zigbee,Wi-Fi, GPS, GSM Modules)

UNIT III
PROTOCOLS AND TECHNOLOGIES BEHIND IOT
IOT Protocols - IPv6, 6LoWPAN, MQTT, CoAP - RFID, Wireless Sensor Networks, BigData Analytics, Cloud Computing, Embedded Systems.

UNIT IV
OPEN PLATFORMS AND PROGRAMMING
IOT deployment for Raspberry Pi /Arduino platform-Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud.

UNIT V
IOT APPLICATIONS
Business models for the internet of things, Smart city, Smart mobility and transport, Industrial IoT, Smart health, Environment monitoring and surveillance – Home Automation – Smart Agriculture

COURSE OUTCOMES:
Upon completion of the course, students will be able to
1. Explain the concept of IoT.
2. Understand the communication models and various protocols for IoT.
3. Design portable IoT using Arduino/Raspberry Pi/open platform.

4. Apply data analytics and use cloud offerings related to IoT.
5. Analyze applications of IoT in real time scenario.

TEXT BOOKS:

1. Dr. Ovidiu Vermesan, Dr. Peter Friess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers, Aalborg, 2013
2. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, CISCO Press, 2017
3. Samuel Greengard, The Internet of Things, The MIT Press, 2015

REFERENCES:

1. Perry Lea, “Internet of things for architects”, Packt, 2018
2. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things – Key applications and Protocols”, Wiley, 2012
3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning, IOT Kindle Edition.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011.
5. ArshdeepBahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
6. https://www.arduino.cc/https://www.ibm.com/smarterplanet/us/en/?ca=v_smarterplanet.

SP23C:Program Elective-III
3. Digital Design and Verification

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

At the end of this course, students will be able to

1. Familiarity of Front end design and verification techniques and create reusable test environments.
2. Verify increasingly complex designs more efficiently and effectively.
3. Use EDA tools like Cadence, Mentor Graphics.

Syllabus Contents:

Unit 1

Revision of basic Digital systems: Combinational Circuits, Sequential Circuits, Logic families, Synchronous FSM and asynchronous design,

Metastability, Clock distribution and issues, basic building blocks like PWM module, pre-fetch unit, programmable counter, FIFO, Booth's multiplier, ALU, Barrel shifter etc.

Unit 2

Verilog/VHDL Comparisons and Guidelines, Verilog: HDL fundamentals, simulation, and test-bench design, Examples of Verilog codes for combinational and sequential logic, Verilog AMS

Unit 3

System Verilog and Verification: Verification guidelines, Data types, procedural statements and routines, connecting the test bench and design, Assertions, Basic OOP concepts, Randomization, Introduction to basic scripting language: Perl, Tcl/Tk

Unit 4

Current challenges in physical design: Roots of challenges, Delays: Wire load models Generic PD flow, Challenges in PD flow at different steps, SI Challenge - Noise & Crosstalk, IR Drop, Process effects: Process Antenna Effect &Electromigration

Unit 5

Programmable Logic Devices: Introduction, Evolution: PROM, PLA, PAL, Architecture of PAL's,

Applications, Programming PLD's, FPGA with technology: Antifuse, SRAM, EPROM, MUX, FPGA structures, and ASIC Design Flows, Programmable Interconnections, Coarse grained reconfigurable devices

IP and Prototyping: IP in various forms: RTL Source code, Encrypted Source code, Soft IP, Netlist, Physical IP, and Use of external hard IP during prototyping, Case studies, and Speed issues. Testing of logic circuits: Fault models, BIST, JTAG interface

References:

1. Douglas Smith, “HDL Chip Design: A Practical Guide for Designing, Synthesizing & Simulating ASICs & FPGAs Using VHDL or Verilog”, Doone publications, 1998.
2. Samir Palnitkar, “Verilog HDL: A guide to Digital Design and Synthesis”, Prentice Hall, 2nd Edition, 2003.
3. Doug Amos, Austin Lesea, Rene Richter, “FPGA based Prototyping Methodology Manual”, Synopsys Press, 2011.
4. Christophe Bobda, “Introduction to Reconfigurable Computing, Architectures, Algorithms and Applications”, Springer, 2007.
5. Janick Bergeron, “Writing Testbenches: Functional Verification of HDL Models”, Second Edition, Springer, 2003.

SP23C:Program Elective-III
4. Audio Processing

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:
At the end of this course, students will be able to
1. Understand different characteristics of Speech.
2. Identify and analyze different speech analysis system.
3. Write algorithms for Recognition of speech.

Syllabus Contents:

Unit 1
Principle Characteristics of Speech: Linguistic information, Speech and Hearing, Speech production mechanism, Acoustic characteristic of speech Statistical Characteristics of speech. Speech production models, Linear Separable equivalent circuit model, Vocal Tract and Vocal Cord Model.

Unit 2
Speech Analysis and Synthesis Systems: Digitization, Sampling, Quantization and coding, Spectral Analysis, Spectral structure of speech, Autocorrelation and Short Time Fourier transform, Window function, Sound Spectrogram, Mel frequency Cepstral Coefficients, Filter bank and Zero Crossing Analysis, Analysis –by-Synthesis, Pitch Extraction.

Unit 3
Linear Predictive Coding Analysis: Principle of LPC analysis, Maximum likelihood spectral estimation, Source parameter estimation from residual signals, LPC Encoder and Decoder, PARCOR analysis and Synthesis, Line Spectral Pairs, LSP analysis and Synthesis.

Unit 4
Speech Coding: Reversible coding, Irreversible coding and Information rate distortion theory,
coding in time domain: PCM, ADPCM, Adaptive Predictive coding, coding in Frequency domain: Sub band coding, Adaptive transform coding, Vector Quantization, Code Excited Linear Predictive Coding (CELP).

Unit 5
Speech Recognition: Principles of speech recognition, Speech period detection, Spectral distance measure, Structure of word recognition system, Dynamic Time Warping (DTW), Theory and implementation of Hidden

Markov Model (HMM).
Speaker recognition: Human and Computer speaker recognition Principles Text dependent and Text Independent speaker recognition systems. Applications of speech Processing.

References:

1. SadaokiFurui, "Digital Speech Processing, Synthesis and Recognition" 2nd Edition, Taylor & Francis, 2000.
2. Rabiner and Schafer, "Digital Processing of Speech Signals", Pearson Education, 1979.

SP24C:Program Elective-IV
1. Random Processes and Queuing Models
(Common to Communication Systems)

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Prerequisites: Probability Theory and Stochastic Processes

Preamble: This course is designed to provide necessary basic concepts in random processes which are widely applied in random signals, linear systems in communication engineering and IT fields. The objective of this course is to familiarize the understanding of stochastic processes and queuing models. The syllabus also covers the concepts of Markovian and advanced queueing models which are essential to design and analyze communication networks.

Course Learning Objectives: The objectives of this course is to enable the student to

1. Characterize stochastic processes with an emphasis on stationary random processes.
2. Use the properties of random processes with LTI systems in real world situations.
3. Understand Markov chains and their transient behavior.
4. Differentiate between different models of queuing theory and their performance measures.
5. Understand network of queues with Poisson external arrivals, exponential service requirements and independent routing.

Course Outcomes: At the end of the course, the students will be able to

1. Analyze the various classifications of Random Processes and characterize. phenomena which evolve with respect to time in a probabilistic manner.
2. Apply the ideas of Random Processes to the LTI Systems for Spectral analysis.
3. Understand Markov Chains and regenerative processes used in modeling a

wide variety of systems.
4. Understand the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.
5. Analyze the performance of the queuing networks.

UNIT I

REVIEW OF RANDOM PROCESSES: Classification of General Random Processes, Binomial Processes, Poisson Processes, Ergodic Process, Gaussian Random Processes, Stationary and Wide Sense Stationary Random Processes, Random walks and gambler's ruin, Processes with independent increments and martingales, Brownian motion, Counting processes and the Poisson process, Stationarity, Joint properties of random processes.

UNIT II

RANDOM PROCESSES IN LINEAR SYSTEMS AND SPECTRAL ANALYSIS: Basic definitions, Spectral Density Function, transfer functions and power spectral densities, Discrete-time processes in linear systems, Low Pass and Band Pass Processes, Baseband random processes, Narrowband random processes.

UNIT III

MARKOV PROCESSES: Markov Chains, Probability Distribution of a Markov Chain, Transition Probability Matrices of a Markov Chain, Classification of States and Chains, Chapman-Kolmogorov Theorem, Stationary Distribution for a Markov Chains, Classification of States of a Markov Chain, Birth and Death Processes, Renewal Process, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poison Process.

UNIT IV

QUEUING THEORY: Basic Characteristics of Queueing Models, Introduction to Markovian queueing models, Steady state distribution, Little's Theorem, Cost equations, steady state probabilities, Queuing Models: **(M/M/1) : (∞/FIFO)** Single server with infinite system capacity, **(M/M/1) : (k/FIFO)** Single Server with Finite Capacity, **(M/M/s) : (∞/FIFO)** Multiple Server with Infinite Capacity, **(M/M/s) : (k/FIFO)** Multiple Server with Finite Capacity, models balance equations, Erlang's B and C formulae, M/G/1 Queuing system characteristics, Queues with finite waiting rooms – Queues with impatient customers: Balking and reneging.

Unit V

QUEUEING NETWORKS: Network of queues basic concepts, Tandem Queues, Channels in Series or Jackson Networks, Queues in series with multiple channels at each phase, Closed Jackson Networks, Approximating

Closed Networks, Open Networks with General Customer Routes, Symmetric Queues.

Text Books:

1. Sheldon M. Ross, Introduction to Probability Models, 10th Edition, Elsevier, 2010.
2. T Veera Rajan , Probability, Statistics and Random Process, 3rd Edition, Tata Mc Graw Hill, 2008.
3. R. D. Yates and D. J. Goodman, "Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers", 3rd Edition International Student Version, Wiley, 2014.

Reference Books:

1. J.F. Shortle, J.M. Thompson, D. Gross and C.M. Harris, Fundamentals of Queueing Theory, 5th Edition, Wiley, 2018.
2. J. Medhi, Stochastic Models in Queueing Theory, 2nd Edition, Academic Press, 2003.
3. U.N. Bhat, An Introduction to Queueing Theory, Springer, 2015.

SP24C:Program Elective-IV
2. Multispectral Signal Analysis

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

At the end of this course, students will be able to

1. Select appropriate hyperspectral data for a particular application.
2. Understand basic concepts of data acquisition and image processing tasks required for multi and hyperspectral data analysis
3. Learn techniques for classification and analysis of multi and hyperspectral data.

Syllabus Contents:

Unit 1

Hyperspectral Sensors and Applications: Introduction, Multi-spectral Scanning Systems (MSS), Hyperspectral Systems, Airborne sensors, Spaceborne sensors, Ground Spectroscopy, Software for Hyperspectral Processing, Applications, Atmosphere and Hydrosphere, Vegetation, Soils and Geology, Environmental Hazards and Anthropogenic Activity

Unit 2

Overview of Image Processing: Introduction, Image File Formats, Image Distortion and Rectification, Radiometric Distortion, Geometric Distortion

and Rectification, Image Registration, Image Enhancement, Point Operations, Geometric Operation, Image Classification, Supervised Classification, Unsupervised Classification, Crisp Classification Algorithms, Fuzzy Classification Algorithms, Classification Accuracy Assessment, Image Change Detection, Image Fusion, Automatic Target Recognition

Unit 3

Mutual Information: A Similarity Measure for Intensity Based Image Registration: Introduction, Mutual Information Similarity Measure, Joint Histogram Estimation Methods, Two-Step Joint Histogram Estimation, One-Step Joint Histogram Estimation, Interpolation Induced Artifacts, Generalized Partial Volume Estimation of Joint Histograms, Optimization Issues in the Maximization of MI

Unit 4

Independent Component Analysis: Introduction, Concept of ICA, ICA Algorithms, Preprocessing using PCA, Information Minimization Solution for ICA, ICA Solution through Non-Gaussianity Maximization, Application of ICA to Hyperspectral Imagery, Feature Extraction Based Model, Linear Mixture Model Based Model, An ICA algorithm for Hyperspectral Image Processing, Applications using ICA.

Unit 5

Support Vector Machines : Introduction, Statistical Learning Theory, Empirical Risk Minimization, Structural Risk Minimization, Design of Support Vector Machines, Linearly Separable Case, Linearly Non-Separable Case, Non-Linear Support Vector Machines, SVMs for Multiclass Classification, One Against the Rest Classification, Pair wise Classification, Classification based on Decision Directed Acyclic Graph and Decision Tree Structure, Multiclass Objective Function, optimization Methods , Applications using SVM.

Markov Random Field Models: Introduction, MRF and Gibbs Distribution, Random Field and Neighborhood ,Cliques, Potential and Gibbs Distributions, MRF Modeling in Remote Sensing Applications, Optimization Algorithms, Simulated Annealing, Metropolis Algorithm, Iterated Conditional Modes Algorithm

References:

1. 1.Pramod K. Varshney, Manoj K. Arora, “Advanced Image Processing Techniques for Remotely Sensed Hyperspectral Data”, Springer, 2013.
2. 2.S. Svanberg, “Multi-spectral Imaging– from Astronomy to Microscopy– from Radio waves to Gamma rays”, Springer Verlag, 2009

SP24C:Program Elective-IV
3. Biomedical Signal Processing

Teaching Scheme
Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

At the end of this course, students will be able to

1. Understand different types of biomedical signal.
2. Identify and analyze different biomedical signals
3. Find applications related to biomedical signal processing

Syllabus Contents:

Unit 1

Acquisition, Generation of Bio-signals,Origin of bio-signals, Types of bio-signals,Study of diagnostically significant bio-signal parameters

Unit 2

Electrodes for bio-physiological sensing and conditioning, Electrode-electrolyte interface, polarization, electrode skin interface and motion artefact, biomaterial used for electrode, Types of electrodes (body surface, internal, array of electrodes,microelectrodes), Practical aspects of using electrodes, Acquisition of bio-signals (signal conditioning) and Signal conversion (ADC's DAC's) Processing, Digital filtering

Unit 3

Biomedical signal processing by Fourier analysis, Biomedical signal processing by wavelet (time-frequency) analysis, Analysis (Computation of signal parameters that are diagnostically significant),Classification of signals and noise, Spectral analysis of deterministic, stationary random signals and non-stationary signals.

Unit 4

Coherent treatment of various biomedical signal processing methods and applications.

Principal component analysis, Correlation and regression, Analysis of chaotic signals Application areas of Bio–Signals analysis Multiresolution analysis(MRA) and wavelets, Principal component analysis(PCA), Independent component analysis(ICA)

Unit 5

Pattern classification–supervised and unsupervised classification, Neural networks, Support vector Machines, Hidden Markov models. Examples of

biomedical signal classification examples.

References:

1. W. J. Tompkins, "Biomedical Digital Signal Processing", Prentice Hall, 1993.
2. Eugene N Bruce, "Biomedical Signal Processing and Signal Modeling", John Wiley & Son's publication, 2001.
3. Myer Kutz, "Biomedical Engineering and Design Handbook, Volume I", McGraw Hill, 2009.
4. D C Reddy, "Biomedical Signal Processing", McGraw Hill, 2005.
5. Katarzyn J. Blinowska, JaroslawZygierewicz, "Practical Biomedical Signal Analysis Using MATLAB", 1st Edition, CRC Press, 2011.

SP24C:Program Elective-IV

4. Remote Sensing

(Common to Communication Systems)

Instruction Hours/week : 3(L) **Credits : 3**

Sessional Marks : 40 **Semester-end Examination :60**

Course Outcomes:

At the end of this course, students shall be able to

1. Understand basic concepts, principles and applications of remote sensing, particularly the geometric and radiometric principles
2. Provide examples of applications of principles to a variety of topics in remote sensing, particularly related to data collection, radiation, resolution, and sampling.

Syllabus Contents:

Unit 1

Physics Of Remote Sensing: Electro Magnetic Spectrum, Physics of Remote Sensing-Effects of Atmosphere-Scattering–Different types–Absorption-Atmospheric window-Energy interaction with surface features –Spectral reflectance of vegetation, soil and water atmospheric influence on spectral response patterns-multi concept in Remote sensing.

Data Acquisition: Types of Platforms–different types of aircrafts-Manned and Unmanned space crafts–sun synchronous and geo synchronous satellites –Types and characteristics of different platforms –LANDSAT, SPOT, IRS, INSAT, IKONOS, QUICKBIRDetc.

Unit 2

Photographic products, B/W,color, color IR film and their characteristics – resolving power of lens and film - Optomechanical electro optical sensors – across track and along track scanners-multispectral scanners and thermal scanners–geometric characteristics of scanner imagery - calibration of

thermal scanners.

Unit 3

Scattering System: Microwave scatterometry, types of RADAR –SLAR – resolution –range and azimuth –real aperture and synthetic aperture RADAR. Characteristics of Microwave images topographic effect-different types of Remote Sensing platforms –airborne and space borne sensors - ERS, JERS, RADARSAT, RISAT -Scatterometer, Altimeter-LiDAR remote sensing, principles, applications.

Unit 4

Thermal And Hyper Spectral Remote Sensing: Sensors characteristics-principle of spectroscopy-imaging spectroscopy–field conditions, compound spectral curve, Spectral library, radiative models, processing procedures, derivative spectrometry, thermal remote sensing –thermal sensors, principles, thermal data processing, applications.

Unit 5

Data Analysis: Resolution–Spatial, Spectral, Radiometric and temporal resolution-signal to noise ratio-data products and their characteristics-visual and digital interpretation–Basic principles of data processing – Radiometric correction–Image enhancement–Image classification–Principles of LiDAR, Aerial Laser Terrain Mapping.

References:

1. Lillesand.T.M. and Kiefer.R.W,"Remote Sensing and Image interpretation", 6thEdition, John Wiley & Sons, 2000.
2. John R. Jensen, "Introductory Digital Image Processing: A Remote Sensing Perspective", 2nd Edition, Prentice Hall,1995.
3. Richards, John A., Jia, Xiuping, "Remote Sensing Digital Image Analysis", 5th Edition, Springer-Verlag Berlin Heidelberg, 2013.
4. Paul Curran P.J. Principles of Remote Sensing, 1st Edition, Longman Publishing Group, 1984.
5. Charles Elachi, Jakob J. van Zyl, "Introduction to The Physicsand Techniques of Remote Sensing", 2nd Edition, Wiley Serie, 2006.
6. Sabins, F.F.Jr, "Remote Sensing Principles and Image Interpretation", 3rd Edition,W.H.Freeman& Co, 1978

SP25C: Pattern Recognition & Machine Learning Lab

Teaching Scheme

Instruction Hours/week :3(P) **Credits : 1.5**

Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

At the end of this course, students will be able to

1. Perform image and video enhancement
2. Perform image and video segmentation
3. Detect an object in an image/video

List of Assignments:

1. Implement maximum likelihood algorithm
2. Implement Bayes classifier
3. Implement linear regression
4. Design a classifier using perceptron rule
5. Design a classifier using feedforward back-propagation and delta rule algorithms
6. Implement deep learning algorithm
7. Implement linear discriminant algorithm
8. Design a two class classifier using SVM
9. Design a multiclass classifier using SVM
10. Perform unsupervised learning

SP26C: Detection and Estimation Theory Lab

Teaching Scheme

Instruction Hours/week :3(L) **Credits : 1.5**

Sessional Marks : 40 **Semester-end Examination : 60**

Course Outcomes:

Syllabus Contents:

At the end of this course, students will be able to

1. Simulate signals and noise
2. Detect signals in the presence of noise
3. Compare various estimation techniques

List of Assignments:

1. Simulate signal and noise models models.
2. Simulate spatially separated target Signal in the presence of Additive Correlated White Noise
3. Simulate spatially separated target Signal in the presence of Additive Uncorrelated White Noise
4. Simulate spatially separated target Signal in the presence of Additive Correlated Colored Noise
5. Detect Constant amplitude Signal in AWGN

6. Detect Time varying Known Signals in AWGN
7. Detect Unknown Signals in AWGN
8. Compare performance comparison of the Estimation techniques - MLE, MMSE, Bayes Estimator, MAP Estimator, Expectation Maximization (EM) algorithm
9. Performance comparison of conventional Energy Detectors and Coherent Matched Filter Techniques

CM27C:Cyber Security

Course Type:	**Value Added**	**Semester:**	**II Sem**	**Credits :**	**3**
Course Code:	**CM27C**	**Theory :**	**2 Hrs/Week**	**Practical :**	**2Hrs/ Week**
		Assessment:	**Lab reports and written exams**	**Internal Continuous Assessment:**	**100 M**

Course Overview / Description: Cyber security is perhaps the most important topic in today environment. Demand for cyber security professionals has exploded, in the private and public sectors alike. Student can learn how to defend information systems from cyber attacks, how to recover compromised systems, how to architect secure systems and so much more. This course is focuses on the models, tools, and techniques for enforcement of security with some emphasis on the use of cryptography. Students will learn security from multiple perspectives.

Course Learning Objectives:

1. To prepare students with the technical knowledge and skills needed to protect and defend computer systems and networks from cyber security attacks.
2. To develop graduates that can plan, implement, and monitor cyber security mechanisms to help ensure the protection of information technology assets.
3. To develop graduates that can identify, analyze, and remediate computer security breaches.

Course Outcomes: After completing this course student will be:

1. Be able to understand the basic terminologies related to cyber security and current cyber security threat landscape. They will also develop understanding about the Cyber warfare and necessity to strengthen the cyber security of end user machine, critical IT and national critical infrastructure.
2. Have complete understanding of the cyber attacks that target computers, mobiles and persons. They will also develop understanding about the type and nature of cyber crimes and as to how report these crimes through the prescribed legal and Government channels.

3. Be able to understand the legal framework that exist in India for cyber crimes and penalties and punishments for such crimes, It will also expose students to limitations of existing IT Act, 2000 legal framework that is followed in other countries and legal and ethical aspects related to new technologies.
4. Understand the aspects related to personal data privacy and security. They will also get insight into the Data Protection Bill, 2019 and data privacy and security issues related to Social media platforms.
5. Understand the main components of cyber security plan. They will also get insights into risk-based assessment, requirement of security controls and need for cyber security audit and compliance.

Unit- I Overview of Cyber security

Cyber security increasing threat landscape, Cyber security terminologies- Cyberspace, attack, attack vector, attack surface, threat, risk, vulnerability, exploit, exploitation, hacker., Non-state actors, Cyber terrorism, Protection of end user machine, Critical IT and National Critical Infrastructure, Cyber warfare, Case Studies.

Unit-II Cyber Crimes

Cyber crimes targeting Computer systems and Mobiles- data diddling attacks, spyware, logic bombs, DoS, DDoS, APTs, virus, Trojans, ransomware, data breach., Online scams and frauds- email scams, Phishing, Vishing, Smishing, Online job fraud, Online sextortion, Debit/ credit card fraud, Online payment fraud, Cyber bullying, website defacement, Cyber squatting, Pharming, Cyber espionage, Cryptojacking, Darknet- illegal trades, drug trafficking, human trafficking., Social Media Scams & Frauds- impersonation, identity theft, job scams, misinformation, fake news cyber crime against persons - cyber grooming, child pornography, cyber stalking., Social Engineering attacks, Cyber Police stations, Crime reporting procedure, Case studies.

Unit-III Cyber Law

Cyber crime and legal landscape around the world, IT Act, 2000 and its amendments, Limitations of IT Act, 2000,Cyber crime and punishments, Cyber Laws and Legal and ethical aspects related to new technologies- AI/ML, IoT, Blockchain, Darknet and Social media, Cyber Laws of other countries, Case Studies.

Unit-IV Data Privacy and Data Security

Defining data, meta-data, big data, non-personal data. Data protection, Data privacy and data security, Personal Data Protection Bill and its compliance, Data protection principles, Big data security issues and challenges, Data protection regulations of other countries- General Data Protection Regulations(GDPR), 2016 Personal Information Protection and Electronic Documents Act (PIPEDA), Social media- data privacy and security issues.

Unit-V Cyber security Management, Compliance and Governance:

Cyber security Plan- cyber security policy, cyber crises management plan, Business continuity, Risk assessment, Types of security controls and their goals, Cyber security audit and compliance, National cyber security policy and strategy.

Practical Work

The practical list has been suggested for the applicable modules; however, the faculty may expand the list as per the syllabus content duly taking into consideration the emerging nature

of cyber threats and incumbent protective measures to guard against such threats.

Practical list of Experiments:

1. Platforms for reporting cyber crimes.
2. Checklist for reporting cyber crimes online.
3. Setting privacy settings on social media platforms.
4. Do's and Don'ts for posting content on Social media platforms.
5. Registering complaints on a Social media platform.
6. Prepare password policy for computer and mobile device.
7. List out security controls for computer and implement technical security controls in the personal computer.
8. List out security controls for mobile phone and implement technical security controls in the personal mobile phone.
9. Log into computer system as an administrator and check the security policies in the system.

Text Books/ References:

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd.
2. Information Warfare and Security by Dorothy F. Denning, Addison Wesley.
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform.
4. Data Privacy Principles and Practice by Natraj Venkataramanan and Ashwin Shriram, CRC Press.
5. Information Security Governance, Guidance for Information Security Managers by W. KragBrothy, 1st Edition, Wiley Publication.
6. Auditing IT Infrastructures for Compliance By Martin Weiss, Michael G. Solomon, 2nd Edition, Jones Bartlett Learning.

SP28M: Mini Project with Seminar

Instruction Hours/week : 4(P) **Credits : 2**
Sessional Marks :100 **Semester-end Examination :-**

Course Outcomes:

At the end of this course, students will be able to

1. Understand of contemporary / emerging technology for various processes and systems.
2. Share knowledge effectively in oral and written form and formulate documents.

Syllabus Contents:

The students are required to search / gather the material / information on a specific a topic comprehend it and present / discuss in the class.

Semester III & IV
SP33D& SP41D (Dissertation) Dissertation Work Phase – I, Phase – II and Viva-Voce

Instruction Hours/week : 24+20(P) **Credits : 12+16**
Sessional Marks : 40+40 **Semester-end Examination :60+60**

Course Outcomes:

At the end of this course, students will be able to

1. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
2. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
3. Ability to present the findings of their technical solution in a written report.
4. Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Implementation and Verification
- Report and presentation

The dissertation stage II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

- Experimental verification / Proof of concept.
- Design, fabrication, testing of Communication System.
- The viva-voce examination will be based on the above report and

work.

Guidelines for Dissertation Phase – I and II at M. Tech. (Electronics):

- As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.
- The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.
- After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.
- Student is expected to detail out specifications, methodology, resources required, critical issues involve*d in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.
- Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.
- Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.
- During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.
- Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, a record of continuous progress.
- Phase – II evaluation: Guide along with appointed external examiner shall assess the
- progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may

recommend for extension or repeating the work.

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SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Postgraduate Programme
M.Tech Scheme of Instruction for Choice Based Credit System
(With effect from 2023-24 admitted batch)
Total credits (2 year course): 81

SCHEME: 2023-2024

SEMESTER I

Course Code	Course Title	L	T	P	Total	Credits	Sectional	End Semester	Total
COPC01	Mathematical Foundation of Computer Science	3	1	0	4	4	40	60	100
COPC02	AdvancedData Structures	3	1	0	4	4	40	60	100
COPC03	Advanced Operating Systems	3	1	0	4	4	40	60	100
COPE 1	Programme Elective-I	3			3	3	40	60	100
COPE11	**Machine Learning**								
COPE12	Data Preparation and Analysis								
COPE 2	Programme Elective-II	3			3	3	40	60	100
COPE21	**Distributed Databases**								
COPE22	Digital Forensics								
COCP 01	Core-I Lab:			3	3	1.5	40	60	100
COEP 01	Elective-I Lab			3	3	1.5	40	60	100
PGPC 01	Research Methodology and IPR	3	0	0	3	3	40	60	100
Total		18	3	6	27	24	320	480	800

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SEMESTER II

Course Code	Course Title	L	T	P	Total	Credits	Seasonal	End Semester	Total
COPC 04	Advance Algorithms	3	1	0	4	4	40	60	100
COPC 05	Compilers for HPC	3	1	0	4	4	40	60	100
COPE 3	Programme Elective-III	3	0	0	3	3	40	60	100
COPE31	**Big Data Analytics**								
COPE32	Recommender System								
COPE 4	Programme Elective-IV	3	0	0	3	3	40	60	100
COPE41	Computer Vision								
COPE42	Introduction to Intelligent Systems								
COCP02	Core-II Lab			3	3	1.5	40	60	100
COEP02	Elective-II Lab			3	3	1.5	40	60	100
PGPC02	Cyber Security	0	0	4	2	2	100	-	100
COMP 01	Mini Project with seminar	1		4	5	4	100	-	100
		15	2	10	27	23	440	360	800

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SEMESTER III

Course Code	Course Title	L	T	P	Credits	Sessional	End Semester	Total
COP1	Internship/Mini Project (Min 4 Weeks)	0			3	100		100
PGOE 11	MOOCs	0	0	0	3	100		100
PGOE111	Block chain Technology							
PGOE112	IoT							
PGOE113	Mobile Netwoks							
PGOE114	Network Security							
PGOE115	Any other in Current Technology							
COPD01	Dissertation-Phase-I			24	12	40	60	100
Total		0	0	24	18	240	60	300

- Courses selected under Moocs should not be same as Core and Electives

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SEMESTER IV

		L	T	P	Credits	Sessional	End Semester	Total
COPD 02	Dissertation-Phase-II			20	16	40	60	100
	Total			20	16	100		100

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SEMESTER I

PROGRAMME CORE

CourseCode	COPC 01
CourseName	MathematicalFoundationofComputerScience
Credits	3
Pre-Requisites	DiscreteMathematics

TotalNumberofLectures:48

COURSEOBJECTIVE
• To understand the mathematical fundamentals that is prerequisites for avariety of courseslike Data mining, Network protocols, analysis ofWeb traffic, Computer security, Softwareengineering,Computerarchitecture,operatingsystems,distributedsystems,Bioinformatics, Machinelearning.
• Todeveloptheunderstandingofthemathematicaland logicalbasistomanymodern techniques in information technology like machine learning, programming language design,and concurrency.
• Tostudyvarioussamplingandclassificationproblems.

LECTUREWITHBREAKUP	**NO. OF LECTURES**
Unit1 Probabilitymass,density,andcumulativedistributionfunctions,Parametricfamiliesof distributions,Expectedvalue,variance,conditionalexpectation,Applicationsoftheuni variateandmultivariateCentralLimitTheorem, Probabilisticinequalities,Markovchains	10
Unit2 Randomsamples,samplingdistributionsofestimators,MethodsofMomentsandMaximumLikelihood,	9
Unit3 Statistical inference, Introduction to multivariate statistical models: regression andclassificationproblems,principalcomponentsanalysis,Theproblemofoverfitting modelassessment.	8
Unit4 GraphTheory:Isomorphism,Planargraphs,graphcolouring,hamiltoncircuitsandeulercycles. Permutations and Combinations with and without repetition.Specializedtechniquestosolvecombinatorialenumerationproblems	11
Unit5 Computerscienceandengineeringapplications	10

Datamining,Networkprotocols,analysisofWebtraffic,Computersecurity, Softwareengineering,Computerarchitecture,operatingsystems,distributedsystems,Bioinformatics,Machinelearning.	
COURSEOUTCOMES	
Aftercompletion ofcourse,studentswould beableto:	
• Tounderstandthebasicnotionsofdiscreteand continuousprobability.	
• Tounderstandthemethodsofstatisticalinference,and therolethatsamplingdistributionsplayinthosemethods.	
• To be able to perform correct and meaningful statistical analyses of simple to moderatecomplexity.	

References

1. JohnVince,FoundationMathematicsforComputerScience,Springer.
2. K.Trivedi.ProbabilityandStatisticswithReliability,Queuing,andComputerScienceApplications.Wiley.
3. M.MitzenmacherandE.Upfal.ProbabilityandComputing:RandomizedAlgorithmsandProbabilistic Analysis.
4. AlanTucker, AppliedCombinatorics,Wiley

CourseCode	COPC 02
CourseName	AdvancedDataStructures
Credits	3
Pre-Requisites	UGlevelcourseinDataStructures

TotalNumberofLectures:48

COURSEOBJECTIVE
• The student should be able to choose appropriate data structures, understand theADT/libraries,anduseittodesign algorithms foraspecificproblem.
• Studentsshould beabletounderstandthenecessarymathematicalabstraction tosolveproblems.
• Tofamiliarizestudentswithadvancedparadigmsanddatastructureusedtosolvealgorithmicprobl ems.
• Student should beabletocomeupwithanalysisofefficiencyand proofsofcorrectness.

LECTUREWITHBREAKUP	**NO. OF LECTURES**
Unit1 **Dictionaries:**Definition,DictionaryAbstractDataType,ImplementationofDictionaries . **Hashing:**ReviewofHashing,HashFunction,CollisionResolutionTechniquesin Hashing,SeparateChaining,OpenAddressing,LinearProbing,QuadraticProbing,Doubl eHashing,Rehashing,ExtendibleHashing.	9
Unit2 **SkipLists:**Need forRandomizingDataStructuresand Algorithms,Searchand UpdateOperationsonSkipLists,ProbabilisticAnalysisofSkipLists,DeterministicSkip Lists	8
Unit3 **Trees:**BinarySearchTrees,AVLTrees,RedBlackTrees,2-3Trees,B-Trees,SplayTrees	9
Unit4	12
TextProcessing: StingOperations,Brute-ForcePatternMatching,TheBoyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, CompressedTries,SuffixTries,TheHuffmanCodingAlgorithm,TheLongestCommon SubsequenceProblem (LCS),ApplyingDynamicProgrammingtotheLCSProblem.	
Unit5 **ComputationalGeometry:**OneDimensionalRangeSearching,TwoDimensionalRange Searching,ConstructingaPrioritySearchTree,SearchingaPrioritySearch Tree,PriorityRangeTrees,Quadtrees,k-DTrees.	10

COURSEOUTCOMES
Aftercompletion ofcourse,studentswould beableto:
• Understandtheimplementationofsymboltable usinghashingtechniques.
• Developandanalyzealgorithmsforred-blacktrees, B-treesandSplaytrees.
• Developalgorithmsfortextprocessingapplications.
• Identifysuitabledatastructuresanddevelopalgorithmsforcomputationalgeometrypro blems.

References:

1. MarkAllenWeiss,DataStructuresand AlgorithmAnalysisinC++,2ndEdition,Pearson,2004.
2. M TGoodrich,RobertoTamassia,AlgorithmDesign,John Wiley,2002.

CourseCode	COPC 03
CourseName	Advanced OperatingSystem
Credits	3
Pre-Requisites	DataStructure,Algorithms,ComputerArchitectureandOrganization

TotalNumberofLectures:48

COURSEOBJECTIVE
• Theobjectiveofthecourseistoprovideintroductiontooperatingsystemdesignandconceptofprocess, processlifecycleandschedulingapproaches.

LECTUREWITHBREAKUP	**NO.OF LECTURES**
Unit1: Computersystem andoperatingsystem overview,Operatingsystem functionsanddesign issues,Designapproaches,Typesofadvanced operatingsystems.	10
Unit2: Processabstraction,Processmanagement,systemcalls,Threads,Symmetricmultiprocessingandmicro-kernels.	8
Unit3: Scheduling: Uniprocessor, Multiprocessor and Real time systems, concurrency, classical problems, mechanisms for synchronization:semaphores,monitors,Processdeadlockanddeadlock handlingstrategies.	10
Unit4: Memory management, Virtual memory concept, Virtual machines, I/O management,Fileanddiskmanagement,Operatingsystemsecurity.	9
Unit5: Distributed Operating system:Architecture, Design issues, Distributed mutualexclusion,Distributeddeadlockdetection,sharedmemory,Distributedscheduling.Multiprocessoroperatingsystems:architecture,operatingsystemdesignissues, threads, processsynchronization,processscheduling,memory management,reliabilityand faulttolerance.	11

COURSEOUTCOMES
Aftercompletion ofcourse,studentswouldbe:
• Understandingadvancedconceptsinoperatingsystems.
• LearningprinciplesofDistributedandmultiprocessoroperatingsystems

References:

1. Advancedconceptinoperatingsystem:M.Singhal,N.G.Shivratri
2. Operatingsysteminternalanddesignprinciples: WilliamStallings

PROGRAMME ELECTIVE-I TotalNumberofLectures:48

CourseCode	COPE 11
CourseName	Machinelearning
Credits	3
Pre-Requisites	
COURSEOBJECTIVE	
• Tolearntheconceptofhowtolearnpatternsandconceptsfromdata withoutbeingexplicitlyprogrammed invarious IOTnodes.	
• To design and analyse various machine learning algorithms and techniques with a modernoutlookfocusing onrecentadvances.	
• Exploresupervisedandunsupervisedlearningparadigmsofmachinelearning.	
• ToexploreDeep learningtechniqueand variousfeatureextractionstrategies.	
LECTUREWITHBREAKUP	**NO. OF LECTURES**
Unit1: SupervisedLearning(Regression/Classification) • Basicmethods:Distance-basedmethods,Nearest-Neighbours,DecisionTrees,NaiveBayes	10
• Linear models: Linear Regression, Logistic Regression, Generalized LinearModels • Support VectorMachines,Nonlinearityand KernelMethods • BeyondBinaryClassification:Multi-class/StructuredOutputs,Ranking	
Unit2: UnsupervisedLearning • Clustering:K-means/KernelK-means • DimensionalityReduction:PCAand kernelPCA • MatrixFactorizationandMatrixCompletion • GenerativeModels(mixturemodelsandlatentfactormodels)	9
Unit3 EvaluatingMachineLearningalgorithmsandModelSelection,IntroductiontoStatistical LearningTheory,EnsembleMethods(Boosting,Bagging,Random Forests)	9
Unit4 SparseModelingandEstimation,ModelingSequence/Time-SeriesData,DeepLearningandFeatureRepresentationLearning	9
Unit5 ScalableMachineLearning(OnlineandDistributedLearning) Aselectionfromsomeotheradvancedtopics,e.g.,Semi-supervisedLearning, ActiveLearning,ReinforcementLearning,InferenceinGraphicalModels,Introduction toBayesianLearningandInference	9
COURSEOUTCOMES	
Aftercompletion ofcourse,studentswouldbeableto:	
• Extract features that can be used for a particular machine learning approach in various IOTapplications.	
• To compare and contrast pros and cons of various machine learning techniques and to get aninsight ofwhentoapplyaparticularmachinelearning approach.	
• Tomathematicallyanalysevariousmachinelearningapproachesand paradigms.	

References:1 KevinMurphy,MachineLearning:AProbabilisticPerspective,MITPress,2012

2 TrevorHastie,RobertTibshirani,JeromeFriedman,TheElementsofStatisticalLearning,Springer2009(freelyavailableonline)

3 ChristopherBishop,PatternRecognitionandMachineLearning,Springer,2007.

CourseCode	COPE12
CourseName	DataPreparationandAnalysis
Credits	3
Pre-Requisites	

TotalNumberofLectures:48

COURSEOBJECTIVE
• Topreparethedataforanalysisanddevelopmeaningful DataVisualizations

LECTUREWITHBREAKUP	**NO.OFL ECTURES**
Unit1: **DataGatheringandPreparation:** Dataformats,parsingandtransformation, Scalabilityandreal-timeissues	9
Unit2: **Data Cleaning:** Consistencychecking,Heterogeneousandmissingdata,DataTransformationandsegmentation	11
Unit3: **ExploratoryAnalysis:** Descriptiveandcomparativestatistics,Clusteringandassociation,Hypothesisgeneration	13
Unit4: **Visualization:** Designingvisualizations,Timeseries,Geolocateddata,Correlationsandconnections, Hierarchiesandnetworks,interactivity	10
Unit5: **Current trends**	5

COURSEOUTCOMES
Aftercompletion ofcourse,studentswouldbe:
• Abletoextractthedatafor performingtheAnalysis.

References:

1.MakingsenseofData:A practical Guide toExploratoryDataAnalysisandDataMining,byGlenn J.Myatt

PROGRAMME ELECTIVE-II

CourseCode	COPE 21
CourseName	DistributedDatabase
Credits	3
Pre-Requisites	

TotalNumberofLectures:48

COURSEOBJECTIVE
• Theobjectiveofcourseistoprovideinsighttodistributeddatabase,normalizationtechniquesandintegrityrules.Italsoincludesparalleldatabase systemsalongwithobjectorientedmodels.

LECTUREWITHBREAKUP	**NO. OF LECTURES**
Unit1: Introduction: Distributed Data processing, Distributed database system (DDBMS),PromisesofDDBMSs,ComplicatingfactorsandProblemareasinDDBMSs,OverviewOfRelationalDBMSRelationalDatabaseconcepts,Normalization, Integrityrules,RelationalDataLanguages,RelationalDBMS.	11
Unit2: Distributed DBMS Architecture: DBMS Standardization, Architectural models forDistributed DBMS, Distributed DBMS Architecture. Distributed Database Design:AlternativedesignStrategies,Distributiondesignissues,Fragmentation,Allocation.SemanticDataControl:ViewManagement,Datasecurity,Semantic	10
IntegrityControl.	
Unit3: OverviewofQueryProcessing:Queryprocessingproblem,ObjectivesofQueryProcessing, Complexity of Relational Algebra operations, characterization of Queryprocessors,Layers ofQueryProcessing. Introduction to Transaction Management: Definition of Transaction, Properties oftransaction, types of transaction. Distributed Concurrency Control: Serializabilitytheory,Taxonomyofconcurrencycontrolmechanisms,lockingbasesconcurrency controlalgorithms.	9
Unit4: Parallel Database Systems: Database servers, Parallel architecture, Parallel DBMStechniques,Parallelexecutionproblems,Parallelexecutionforhierarchicalarchitecture.	10
Unit5: Distributed Object Database Management systems: Fundamental Object conceptsandObjectmodels,Objectdistributiondesign.Architecturalissues,Objectmanagement,Distributedobjectstorage,Objectqueryprocessing.Transactionmanagement.DatabaseInteroperability:DatabaseIntegration,Queryprocessing.	8

COURSEOUTCOMES
Aftercompletionofcourse,studentswouldbe:
• Abetounderstandrelationaldatabasemanagementsystems,normalizationtomakeefficient retrievalfromdatabaseandquery.

References:

1.PrinciplesofDistributedDatabaseSystems,SecondEdition,M.TamerOzsuPatrickValduriez

2.DistributedDatabasesprinciplesandsystems,StefanoCeri,GiuseppePelagatti,TataMcGrawHill.

CourseCode	COPE 22
CourseName	DigitalForensics
Credits	3
Pre-Requisites	CybercrimeandInformationWarfare, ComputerNetworks

TotalNumberofLectures:48

COURSEOBJECTIVE
• Providesanin-depthstudyofthe rapidlychangingandfascinating fieldofcomputerforensics.
• Combines both the technical expertise and the knowledge required to investigate, detectandpreventdigitalcrimes.
• Knowledge on digital forensics legislations, digital crime, forensics processes andprocedures,dataacquisitionandvalidation,e-discoverytools
• E-evidence collection and preservation, investigating operating systems and file systems,networkforensics,artofsteganographyandmobiledeviceforensics

LECTUREWITHBREAKUP	**NO.OFL ECTURES**
Unit1: **DigitalForensicsScience:**Forensicsscience,computerforensics,anddigitalforensics. **ComputerCrime:**Criminalisticsasitrelatestotheinvestigativeprocess,analysisofcyber-criminalisticsarea,holisticapproachtocyber-forensics	9
Unit2: **Cyber Crime Scene Analysis:** Discuss the various court orders etc., methods tosearchandseizureelectronicevidence,retrievedandun-retrievedcommunications,Discusstheimportanceofunderstandingwhatcourt documentswould berequired foracriminalinvestigation.	10
Unit3: **Evidence Management&Presentation:** Create and manage shared foldersusing operating system, importance of the forensic mindset, define the workloadof law enforcement, Explain what the normal case would look like, Define whoshouldbenotifiedofacrime,partsofgatheringevidence,Defineandapply probablecause.	9
Unit4: **ComputerForensics:**Prepareacase,Begininvestigation,Understandcomputerforensicsworkstationsandsoftware,Conductaninvestigation,Complete acase,Critiquea case, **Network Forensics:** open-source security tools for network forensic analysis,requirementsforpreservationofnetworkdata.	10
Unit5: **MobileForensics:**mobileforensicstechniques,mobileforensicstools. **LegalAspectsofDigitalForensics:**ITAct2000,amendmentofITAct 2008.	10

COURSEOUTCOMES
Aftercompletion ofcourse, studentswould beableto:
• Understandrelevantlegislationandcodesofethics
• Computer forensicsanddigitaldetectiveandvariousprocesses, policiesandprocedures
• E-discovery,guidelinesandstandards,E-evidence,toolsandenvironment.
• Emailandwebforensicsandnetworkforensics

References:1 JohnSammons,TheBasicsofDigitalForensics,Elsevier

2 JohnVacca,ComputerForensics:ComputerCrimeSceneInvestigation,LaxmiPublications

1. gn,JohnWilley,2002.

CourseCode	PGPC 01
CourseName	**ResearchMethodologyandIPR**
Credits	3

ResearchMethodologyandIPR

TeachingScheme

Lectures:1hrs/week

nation, it is needless to emphasis the need of information about Intellectual Property Righttobe promotedamongstudentsingeneral&engineeringinparticular.

- Understand that IPR protection provides an incentive to inventors for further research workand investment in R & D, which leads to creation of new and better products, and in turnbringsabout,economic growthandsocialbenefits.
-

SyllabusContents:

Unit 1: Meaning of research problem, Sources of research problem, Criteria Characteristics ofa good research problem, Errors in selecting a research problem, Scope and objectives ofresearchproblem.

Approachesofinvestigationofsolutionsforresearchproblem,datacollection,analysis,interpretation, Necessaryinstrumentations

Unit2: Effective

literaturestudiesapproaches,analysisPlagiarism,Researchet

hics,

Unit 3: Effectivetechnicalwriting, howtowritereport,Paper

Developing a Research Proposal,Formatof research proposal,a presentation and assessmentbyareviewcommittee

Unit 4: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process ofPatentingandDevelopment:technologicalresearch,innovation,patenting,development.Internati onal Scenario: International cooperation on Intellectual Property. Procedure for grantsofpatents,PatentingunderPCT.

Unit 5: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patentinformationanddatabases.GeographicalIndications.

Unit 6: New Developments in IPR: Administration of Patent System. New developments inIPR;IPRofBiologicalSystems,ComputerSoftwareetc.TraditionalknowledgeCaseStudies,IPRandIITs.

References:

- StuartMelvilleandWayneGoddard,"Researchmethodology:anintroductionforscience&engineeringstudents'"
- WayneGoddardandStuartMelville,"ResearchMethodology:AnIntroduction"
- RanjitKumar,2ndEdition,"ResearchMethodology:AStepbyStepGuideforbeginners"
- Halbert, "ResistingIntellectualProperty",Taylor &FrancisLtd,2007.
- Mayall,"IndustrialDesign",McGrawHill,1992.
- Niebel,"Product Design",McGrawHill,1974.
- Asimov,"IntroductiontoDesign", PrenticeHall, 1962.
- RobertP.Merges,PeterS.Menell,MarkA.Lemley,"IntellectualPropertyinNewTechnological Age",2016.
- T.Ramappa,"IntellectualPropertyRightsUnder WTO",S.Chand, 2008

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI
DEPARTMENT OF COMPUTER SCINCE ENGINEERING
Postgraduate Programme
M.Tech Scheme of Instruction for Choice Based Credit System
(With effect from 2023-24 admitted batch)

SEMESTER II

PROGRAMME CORE

CourseCode	COPC 04
CourseName	AdvancedAlgorithms
Credits	3
Pre-Requisites	UGlevelcoursein AlgorithmDesign and Analysis

TotalNumberofLectures:48

COURSEOBJECTIVE
• Introducestudentstotheadvancedmethodsofdesigningandanalyzingalgorithms.
• Thestudent should beabletochooseappropriatealgorithmsanduseit foraspecificproblem.
• Tofamiliarizestudentswithbasicparadigmsanddatastructuresused tosolveadvancedalgorithmicproblems.
• Studentsshouldbeabletounderstanddifferentclassesofproblemsconcerningtheircomp utationdifficulties.
• Tointroducethestudents torecent developments in theareaofalgorithmicdesign.

LECTUREWITHBREAKUP	**NO. OF LECTURES**
Unit1 **Sorting:**Review ofvarioussortingalgorithms,topologicalsorting **Graph:** DefinitionsandElementaryAlgorithms:ShortestpathbyBFS,shortestpathinedge-weightedcase (Dijkasra's),depth-firstsearchandcomputationofstronglyconnectedcomponents,emphasisoncorrectness proofofthealgorithm andtime/spaceanalysis,exampleofamortizedanalysis.	9
Unit2 **Matroids:** Introductiontogreedyparadigm,algorithmtocomputeamaximumweight maximalindependentset.ApplicationtoMST. **GraphMatching:**Algorithmtocomputemaximummatching.Characterizationofmaximummatchingbyaugmentingpaths,Edmond'sBlossomalgorithmto computeaugmentingpath.	10

Unit3 **Flow-Networks:**Maxflow-mincuttheorem,Ford-FulkersonMethodtocomputemaximumflow,Edmond-Karpmaximum-flowalgorithm. **MatrixComputations:**Strassen'salgorithmandintroductiontodivideandconquerparadigm,inverseofatriangularmatrix,relationbetweenthetime complexitiesofbasicmatrixoperations,LUP-decomposition.	9
Unit4 **Shortest Path in Graphs:** Floyd-Warshall algorithm and introduction to dynamicprogrammingparadigm.Moreexamples ofdynamicprogramming. **Modulo Representation of integers/polynomials:** Chinese Remainder Theorem,Conversion between base-representation and modulo-representation. Extension topolynomials.Application:Interpolationproblem. **DiscreteFourierTransform(DFT):**Incomplexfield,DFTinmoduloring.Fast FourierTransformalgorithm.Schonhage-StrassenIntegerMultiplicationalgorithm	10
Unit5 **LinearProgramming:**GeometryofthefeasibilityregionandSimplexalgorithm **NP-completeness:**Examples,proofofNP-hardnessandNP-completeness. **Oneormoreofthefollowingtopicsbasedon timeandinterest** Approximationalgorithms,RandomizedAlgorithms,InteriorPointMethod,Advanced NumberTheoreticAlgorithm	10

COURSEPOUTCOMES
Aftercompletion ofcourse,studentswould beableto:
• Analyzethecomplexity/performanceofdifferentalgorithms.
• Determinetheappropriatedatastructureforsolvingaparticularset ofproblems.
• Categorizethedifferentproblemsinvariousclassesaccordingtotheircomplexity.
• Studentsshouldhaveaninsightofrecentactivitiesinthefieldoftheadvanceddatastructure.

References:

1. "Introduction toAlgorithms"byCormen,Leiserson,Rivest,Stein.
2. "TheDesign andAnalysisofComputerAlgorithms"byAho,Hopcroft,Ullman.
3. "AlgorithmDesign"byKleinbergandTardos.

CourseCode	COPE 05
CourseName	Compilerfor HPC
Credits	3
Pre-Requisites	DataStructure,CompilerDesign,TheoryofComputation

TotalNumberofLectures:48

COURSEOBJECTIVE
• Theobjectiveofthiscourseistointroducestructureofcompilersandhighperformancecompilerdesign forstudents.Conceptsofcachecoherenceandparallelloopsincompilersare included.

LECTUREWITHBREAKUP	**NO.OFL ECTURES**
Unit1: **HighPerformanceSystems,**StructureofaCompiler,ProgrammingLanguageFeatures,LanguagesforHighPerformance.	9
Unit2: **Data Dependence:** Data Dependence in Loops, Data Dependence inConditionals, Data Dependence in Parallel Loops, Program Dependence Graph.**ScalarAnalysiswithFactoredUse-DefChains:**ConstructingFactoredUse-DefChains,FUDChainsforArrays,InductionVariablesUsingFUDChains,Constant PropagationwithFUDChains,DataDependenceforScalars.Data DependenceAnalysisforArrays.	10
Unit3: Array Region Analysis,PointerAnalysis,I/O Dependence,Procedure Calls,Inter-proceduralAnalysis. **LoopRestructuring:**SimpleTransformations,LoopFusion,LoopFission,LoopReversal,LoopInterchanging,LoopSkewing,LinearLoopTransformations, Strip-Mining, Loop Tiling, Other Loop Transformations, andInter-proceduralTransformations. **OptimizingforLocality:**SingleReferencetoEachArray,MultipleReferences, GeneralTiling, FissionandFusionfor Locality.	10
Unit4: **Concurrency Analysis:** Concurrency from Sequential Loops, Concurrency fromParallelLoops,NestedLoops,RoundoffError,ExceptionsandDebuggers. **VectorAnalysis:**VectorCode,VectorCodefromSequentialLoops,VectorCodefrom ForallLoops,NestedLoops, RoundoffError,Exceptions, and Debuggers,Multi-vectorComputers.	10
Unit5: **Message-PassingMachines:**SIMDMachines,MIMDMachines,DataLayout,ParallelCodefor ArrayAssignment,RemoteDataAccess,AutomaticData Layout,MultipleArrayAssignments,OtherTopics.	10
ScalableShared-MemoryMachines: GlobalCacheCoherence,LocalCache Coherence,LatencyTolerantMachines.	

COURSEOUTCOMES
Aftercompletion ofcourse,studentswouldbe:

• Familiarwiththestructureofcompiler. • Parallelloops, datadependencyandexceptionhandlinganddebuggingincompiler.

References:1.MichaelWolfe,High-PerformanceCompilersforParallelComputing,Pearson

PROGRAMME ELECTIVE- III

CourseCode	COPE31
CourseName	BigDataAnalytics
Credits	3
Pre-Requisites	DataStructure,ComputerArchitectureandOrganization

TotalNumberofLectures:48

COURSEOBJECTIVE
• Understandbigdataforbusinessintelligence.Learnbusinesscasestudiesforbigdataanalytics.Understandnosqlbigdatamanagement.Performmap-reduceanalyticsusingHadoopandrelated tools

LECTUREWITHBREAKUP	**NO. OFLECTURES**
Unit1: Whatisbigdata, whybigdata,convergenceofkeytrends, unstructureddata,industry examples of big data, web analytics, big data and marketing, fraud and bigdata, risk and big data, credit risk management, big data and algorithmic trading,big data and healthcare, big data in medicine, advertising and big data, big datatechnologies,introductiontoHadoop,opensourcetechnologies,cloudandbigdata, mobilebusinessintelligence,Crowdsourcinganalytics,interandtransfirewallanalytics .	8
Unit2: IntroductiontoNoSQL,aggregatedatamodels,aggregates,key-valueanddocumentdatamodels,relationships,graphdatabases,schemalessdatabases, materialized views, distribution models, sharding, master-slave replication, peer-peerreplication,shardingandreplication,consistency,relaxingconsistency,version stamps, map-reduce, partitioning and combining, composing map-reducecalculations.	8
Unit3: Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadooppipes,designofHadoopdistributedfilesystem(HDFS),HDFSconcepts,Javainterface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro,file-based datastructures	9
Unit4: MapReduce workflows, unit tests with MRUnit, test data and local tests, anatomy ofMapReduce job run, classic Map-reduce, YARN, failures in classic Map-reduce andYARN, job scheduling, shuffle and sort, task execution, MapReduce types, inputformats,outputformats	10
Unit5:	13
Hbase,datamodelandimplementations,Hbaseclients,Hbaseexamples,praxis.Cassandra, Cassandra data model, Cassandra examples, Cassandra clients,Hadoop integration. Pig,Grunt,pigdatamodel,PigLatin,developingandtestingPigLatinscripts. Hive,datatypes and fileformats,HiveQLdatadefinition,HiveQLdatamanipulation,HiveQL queries.	

COURSEOUTCOMES
Aftercompletionofcourse,studentswouldbe:
• Describebig dataand usecases fromselected business domains • ExplainNoSQLbigdatamanagement • Install,configure,andrunHadoopandHDFS • Performmap-reduceanalyticsusingHadoop • UseHadoop relatedtoolssuchasHBase,Cassandra,Pig,andHiveforbigdataanalytics

References:

1. MichaelMinelli,MichelleChambers,andAmbigaDhiraj,"BigData, BigAnalytics:Emerging
2. BusinessIntelligenceandAnalyticTrendsforToday'sBusinesses",Wiley,2013.
3. P.J.SadalageandM.Fowler,"NoSQL Distilled:A BriefGuidetotheEmergingWorld of
4. PolyglotPersistence",Addison-WesleyProfessional,2012.
5. TomWhite,"Hadoop:TheDefinitiveGuide",ThirdEdition,O'Reilley,2012.
6. EricSammer,"HadoopOperations",O'Reilley,2012.
7. E.Capriolo,D. Wampler,and J.Rutherglen,"ProgrammingHive",O'Reilley,2012.
8. LarsGeorge,"HBase:TheDefinitiveGuide",O'Reilley,2011.
9. EbenHewitt,"Cassandra:TheDefinitiveGuide",O'Reilley,2010.
10. AlanGates,"ProgrammingPig",O'Reilley,2011.

CourseCode	COPE32
CourseName	RecommenderSystem
Credits **Prerequisites**	3

TotalNumberofLectures:48

COURSEOBJECTIVE
• Tolearntechniquesformakingrecommendations,includingnon-personalized,content-based,and collaborativefiltering • To automate a variety of choice-making strategies with the goal of providing affordable, personal,and high-qualityrecommendations

LECTUREWITHBREAKUP	**NO. OFLECTURES**
Unit1: **Introduction:** Overview of Information Retrieval, Retrieval Models, Search andFiltering Techniques: Relevance Feedback, User Profiles, Recommender systemfunctions,Matrixoperations,covariancematrices,Understandingratings, Applicationsofrecommendationsystems,Issueswithrecommendersystem.	9
Unit2: **Content-basedFiltering:**Highlevelarchitectureofcontent-basedsystems,Advantages and drawbacks of content based filtering, Item profiles, Discoveringfeaturesofdocuments,pre-processingandfeatureextraction,Obtainingitem features from tags, Methods for learning user profiles, Similarity based retrieval,Classification algorithms.	8
Unit3: **CollaborativeFiltering:**User-basedrecommendation,Item-basedrecommendation,Modelbasedapproaches,Matrixfactorization,Attacksoncollaborativerecommendersystems.	9
Unit4: **Hybrid approaches:** Opportunities for hybridization, Monolithic hybridizationdesign:Featurecombination, Featureaugmentation,Parallelizedhybridizationdesign:Weighted,Switching,Mixed, Pipelinedhybridizationdesign:Cascade Meta-level,Limitationsofhybridizationstrategies	8
Unit5: **EvaluatingRecommenderSystem:**Introduction,Generalpropertiesofevaluation research, Evaluation designs: Accuracy, Coverage, confidence, novelty,diversity,scalability,serendipity,Evaluationonhistoricaldatasets,Offlineevaluations. **Types of Recommender Systems:** Recommender systems in personalized websearch,knowledge-basedrecommendersystem,Socialtaggingrecommendersystems,Trust-centricrecommendations,Group recommendersystems.	14

COURSEOUTCOMES
Aftercompletionofcourse, studentswould beableto:

- Designrecommendationsystemforaparticular applicationdomain.
- Evaluaterecommendersystemsonthebasisofmetricssuchasaccuracy,rankaccuracy,diversity,productcoverage,andserendipity

References:

1. JannachD.,ZankerM.andFelFeringA.,RecommenderSystems:AnIntroduction,CambridgeUniversityPress (2011),1sted.
2. CharuC.Aggarwal,RecommenderSystems:TheTextbook,Springer(2016),1sted.
3. RicciF.,RokachL.,ShapiraD.,KantorB.P.,RecommenderSystemsHandbook,Springer(2011),1sted.
4. ManouselisN.,DrachslerH.,VerbertK.,DuvalE.,RecommenderSystemsForLearning,Springer(2013),1sted.

PROGRAMME ELECTIVE-IV

CourseCode	COPE41
CourseName	ComputerVision
Credits	3
Pre-Requisites	Linearalgebra,vectorcalculus,DatastructuresandProgramming.

TotalNumberofLectures:48

COURSEOBJECTIVE
• Befamiliarwithboththetheoreticalandpracticalaspectsofcomputing withimages.
• Havedescribedthefoundationofimageformation,measurement,andanalysis.
• Understandthegeometricrelationshipsbetween2Dimagesandthe3Dworld.
• Graspthepprinciplesofstate-of-the-artdeep neuralnetworks.

LECTUREWITHBREAKUP	**NO.OFL ECTURES**
Unit1: Overview,computerimagingsystems,lenses,Imageformationandsensing,Imageanalysis,pre-processingandBinaryimageanalysis	10
Unit2: Edgedetection,Edgedetectionperformance,Houghtransform,cornerdetection	10
Unit3: Segmentation,Morphologicalfiltering,Fouriertransform	9
Unit4: Featureextraction,shape,histogram,color,spectral,texture,usingCVIPtools,Featureanalysis,featurevectors,distance/similaritymeasures,datapre-processing	10
Unit5: PatternAnalysis: Clustering:K-Means,K-Medoids,MixtureofGaussians Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised Classifiers:Bayes,KNN,ANNmodels;DimensionalityReduction:PCA,LDA,ICA,andNon-parametricmethods.	9

COURSEOUTCOMES
Aftercompletion ofcourse, studentswould beableto:
• Developedthepracticalskillsnecessarytobuildcomputervisionapplications.
• Tohavegainedexposuretoobjectandscenerecognitionandcategorizationfromimages.

References:

1. ComputerVision:AlgorithmsandApplicationsbyRichardSzeliski.
2. DeepLearning,byGoodfellow,Bengio,andCourville.
3. DictionaryofComputerVisionandImageProcessing,byFisheretal.

CourseCode	COPE42
CourseName	IntroductiontoIntelligentSystems
Credits	3
Pre-Requisites	DataStructuresand DataManagement orDataStructures

TotalNumberofLectures:48

COURSEOBJECTIVE	
• Theaimofthecourseistointroducetothefieldof ArtificialIntelligence(AI)withemphasisonitsusetosolverealworldproblemsforwhichsolutionsaredifficulttoexpressusingthetraditionalalgorithmicapproach.Itexplorestheessentialtheorybehindmethodologiesfordevelopingsystemsthatdemonstrateintelligentbehaviourincludingdealingwithuncertainty, learningfromexperienceandfollowingproblemsolvingstrategiesfoundinnature.	
LECTUREWITHBREAKUP	**NO.OF LECTURES**
Unit1: BiologicalfoundationstointelligentsystemsI:Artificialneuralnetworks,Back-propagationnetworks, Radialbasisfunctionnetworks, andrecurrentnetworks.	9
Unit2: BiologicalfoundationstointelligentsystemsII:Fuzzylogic,knowledgeRepresentation and inference mechanism, genetic algorithm, and fuzzy neuralnetworks.	8
Unit3: Search Methods Basic concepts of graph and tree search. Three simple searchmethods:breadth-firstsearch,depth-firstsearch,iterativedeepeningsearch.Heuristicsearchmethods:best-firstsearch,admissibleevaluationfunctions,hill-climbing search.Optimisationandsearchsuchasstochasticannealing and geneticalgorithm.	10
Unit4: KnowledgerepresentationandlogicalinferenceIssuesinknowledgerepresentation. Structured representation, such as frames, and scripts, semanticnetworksandconceptualgraphs.Formallogicandlogicalinference.Knowledge-basedsystemsstructures,itsbasiccomponents.IdeasofBlackboard architectures.	9
Unit5: ReasoningunderuncertaintyandLearningTechniquesonuncertaintyreasoningsuchasBayesianreasoning,CertaintyfactorsandDempster-ShaferTheoryof Evidentialreasoning,Astudyofdifferentlearningandevolutionaryalgorithms,suchasstatisticallearningandinductionlearning.	7

COURSEOUTCOMES
Aftercompletion ofcourse,studentswouldbe:
• Able to Demonstrate knowledge of the fundamental principles of intelligent systems andwould be able to analyse and compare the relative merits of a variety of AI problem solvingtechniques.

References:

1. LugerG.F.andStubblefieldW.A.(2008).ArtificialIntelligence:StructuresandstrategiesforComplexProblemSolving.AddisonWesley,6thedition.
2. RussellS.andNorvigP.(2009).ArtificialIntelligence:AModernApproach.Prentice-Hall,3rdedition.

CourseCode	PGPC 02
CourseName	Cyber Security
Credits	2
Pre-Requisites	Information Communication Technology

TotalNumberofLectures:48

COURSEOBJECTIVE

(a) LearnthefoundationsofCybersecurityandthreatlandscape.

(b) Toequipstudentswiththetechnicalknowledgeandskillsneededtoprotectanddefendagainstcyberthreats.

(c) Todevelopskillsinstudentsthatcanhelpthemplan,implement,andmonitorcybersecuritymechanismstoensuretheprotectionofinformationtechnologyassets.

(d) Toexposestudentstogovernance,regulatory,legal,economic,environmental,socialandethicalcontextsofcybersecurity.

(e) Toexposestudentstoresponsibleuseofonlinesocialmedianetworks.

(f))
Tosystematicallyeducatethenecessitytounderstandtheimpactofcybercrimesandthreatswithsolutionsinaglobalandsocietalcontext.

LECTUREWITHBREAKUP	**NO.OF LECTURES**
Unit1: Cyber security increasing threat landscape,Cyber security terminologies-Cyberspace,attack, attack vector, attack surface, threat,risk, vulnerability, exploit, exploitation,hacker., Non-state actors, Cyber terrorism,Protection of end user machine, CriticalIT and National Critical Infrastructure,Cyberwarfare,CaseStudies.	10
Unit2: Cyber crimes targeting Computer systemsandMobiles-datadiddlingattacks,spyware, logic bombs, DoS, DDoS, APTs,virus, Trojans, ransomware, data breach.,Online scams and frauds- email scams,Phishing,Vishing,Smishing,Onlinejobfraud,Onlinesextortion,Debit/credit card fraud, Online payment fraud,Cyberbullying,websitedefacement,Cyber-squatting,Pharming,Cyberespionage,Cryptojacking,Darknet-illegaltrades,drug trafficking, human trafficking., SocialMedia Scams & Frauds-impersonation,identitytheft,jobscams,misinformation,fake newscyber crime against persons -cyber grooming, child pornography, cyberstalking.,SocialEngineeringattacks,CyberPolicestations,Crimereporting procedure,Casestudies.	10
Unit 3: Cybercrimeandlegallandscapearound the world, IT Act,2000 and itsamendments.LimitationsofITAct,2000.Cybercrimeandpunishments,Cyber Laws and Legal and ethical aspectsrelated to new technologies- AI/ML, IoT,Blockchain,	10

Darknet and Social media,CyberLawsofothercountries,CaseStudies.	
Unit4: Defining data, meta-data, big data, non-personaldata.Dataprotection,Dataprivacy and data security, Personal DataProtection Bill and its compliance, Dataprotection principles, Big data securityissuesandchallenges,Dataprotectionregulations of other countries- GeneralData Protection Regulations(GDPR),2016PersonalInformationProtectionandElectronicDocumentsAct(PIPEDA).,Social media- data privacy and securityissues.	8
Unit5: Cyber security Plan- cyber security policy,cyber crises management plan., Businesscontinuity,Riskassessment,Typesofsecurity controls and their goals, Cybersecurity audit and compliance, Nationalcybersecuritypolicyandstrategy.	10

COURSEOUTCOMES

Oncompletionofthecoursethestudentshould beable to

(a) Understandthecybersecuritythreatlandscape.

(b) Developadeeperunderstandingandfamiliaritywithvarioustypesof cyberattacks,cybercrimes,vulnerabilitiesandremediesthereto.

(c) Analyseandevaluateexistinglegalframeworkandlawsoncybersecurity.

(d) Analyse and evaluate the digital payment systemsecurity and remedial measuresagainstdigitalpaymentfrauds.

(g) Analyseandevaluatetheimportanceofpersonaldataitsprivacyandsecurity.

(h))
Analyseandevaluatethesecurityaspectsofsocialmediaplatformsandethical aspectsassociatedwithuseofsocialmedia.

(i) Analyseandevaluatethecybersecurityrisks.

(j) BasedontheRiskassessment,plansuitablesecuritycontrols,auditandcompliance.

(k) Evaluateandcommunicatethehumanroleinsecuritysystemswithanemphasiso nethics,socialengineeringvulnerabilitiesandtraining.

(l) Increaseawarenessaboutcyber-attackvectorsandsafetyagainstcyber-frauds.

(m) Takemeasuresforself-cyber-protectionaswellassocietalcyber-protection.

References:

1. CyberSecurityUnderstandingCyberCrimes,ComputerForensicsandLegalPerspectivesbySumitBela pureandNinaGodbole,WileyIndiaPvt.Ltd.
2. Information WarfareandSecuritybyDorothyF.Denning,Addison Wesley.
3. SecurityintheDigitalAge:SocialMediaSecurityThreatsandVulnerabilitiesbyHenryA.Oliver,CreateS paceIndependentPublishingPlatform.
4. DataPrivacyPrinciplesandPracticebyNatrajVenkataramananandAshwinShriram,CRCPress.

5. InformationSecurityGovernance,GuidanceforInformationSecurityManagersby W.KragBrothy,1stEdition,WileyPublication



SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING:
TIRUPATI -517502
(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING
(Choice Based Credit System)

R23

POST GRADUATION PROGRAM

MASTER OF TECHNOLOGY
in
INDUSTRIAL ENGINEERING (IE)
&
PRODUCTION ENGINEERING (PE)

Scheme of Instructions and Evaluation
(With effect from the Academic Year 2023-24)



SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING:
TIRUPATI -517502
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DEPARTMENT OF MECHANICAL ENGINEERING
(Choice Based Credit System)

R23

POST GRADUATION PROGRAM

MASTER OF TECHNOLOGY
in
INDUSTRIAL ENGINEERING

Scheme of Instructions and Evaluation
(With effect from the Academic Year 2023-24)

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502
DEPARTMENT OF MECHANICAL ENGINEERING-SCHEME OF INSTRUCTION- (CBCS) EFFECTIVE FROM THE ACADEMIC YEAR:2023-2024

M.TECH (PG) SPECIALIZATION: INDUSTRIAL ENGINEERING

I-SEMESTER

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	IE11C	Operations Planning and Control	3	1	0	4	4	40	60	100
PCC	IE12C	Work System Design	3	1	0	4	4	40	60	100
PCC	IE13C	Facilities Planning	3	1	0	4	4	40	60	100
PEC	IE14C	Programme Elective- I	3	0	0	3	3	40	60	100
PEC	IE15C	Programme Elective- II	3	0	0	3	3	40	60	100
PCC	IE16L	Industrial Engineering Lab-I	0	0	3	3	1.5	40	60	100
PCC	IE17L	Simulation Lab – I	0	0	3	3	1.5	40	60	100
MC	IE18C	Research Methodology and IPR	3	0	0	3	3	40	60	100
	Total		**18**	**3**	**6**	**27**	**24**	**320**	**480**	**800**

List of Programme Elective					
Course Title	**I**	**Applied Probability and Statistics**	**Financial Management & Control**	**Human Resource Management**	**Expert Systems in Manufacturing**
	II	**Design for Manufacturing**	**Marketing Management**	**System Dynamics**	**Enterprise Resource Planning**

II-SEMESTER

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	IE21C	Advanced Operation Research	3	1	0	4	4	40	60	100
PCC	IE22C	Quality Control and Reliability Engineering	3	1	0	4	4	40	60	100
PEC	IE23C	Programme Elective Course – III	3	0	0	3	3	40	60	100
PEC	IE24C	Programme Elective Course – IV	3	0	0	3	3	40	60	100
PCC	IE25L	Industrial Engineering Lab-II	0	0	3	3	1.5	40	60	100
PCC	IE26L	Simulation Lab – II	0	0	3	3	1.5	40	60	100
MC	IE27C	Value Added course	3	0	0	3	3	100	-	100
PCC	IE28P	Mini Project with Seminar	1	0	2	3	2	100	-	100
	Total		**16**	**2**	**8**	**26**	**22**	**440**	**360**	**800**

List of Programme Elective					
Course Title	**III**	**Supply Chain Management**	**System Simulation**	**Project Management**	**Intelligent Manufacturing Systems**
	IV	**Productivity Engineering & Management**	**Logistics Engineering & Management**	**Service Engineering & Management**	**Energy Management**

Value Added course				
Course Title	**I**	Leadership Qualities for Engineers	Stress Management	Universal Human Values

III-SEMESTER

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
OEC	CSP32C	Open Elective Course (MOOCs)	0	0	0	0	3	100	-	100
PCC	CSP33I	Industrial/ Research Internship (Min of 4 Weeks)	0	0	0	0	3	100	-	100
PCC	CSP34J	**Dissertation Work Phase-I**	0	0	24	24	12	40	60	100
	Total		**0**	**0**	**20**	**20**	**18**	**240**	**60**	**300**

IV-SEMESTER

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	CSP41J	**Dissertation WorkPhase-II and Viva-Voce**	0	0	20	20	10 + 06 = 16	40	60	100
	Total		**0**	**0**	**20**	**20**	**16**	**40**	**60**	**100**

IE11C OPERATIONS PLANNING AND CONTROL
M. Tech I- SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

Unit -I

OPC is a system approach—types of production and OPC functions. Forecasting: Forecasting Methods — Qualitative Methods — Quantitative methods— moving average and exponential smoothing methods for different data patterns. Forecast errors, Tracking signal.

Unit -II

Mass Production Management Principles of flow lines, Assembly line balancing, approach to line balancing — RPW, COMSOAL, Integer, and Dynamic programming formulations. Introduction to transfer lines.Production Planning Linear programming formulations for static demand cases, Product Mix Decisions. Chance- constrained programming models.

Unit -III

Aggregate Production Planning Production planning under dynamic conditions strategies, costs involved Heuristic methods, linear production, and inventory programs. Aggregate production planning — HMMS model, search decision, parametric production planning, management coefficient models. Disaggregation — hierarchical planning, mathematical programming formulations. Master Production Schedule.

Unit -IV

Operations Scheduling Flow shop sequencing and job scheduling. Periodic review models. Continuous review models, lot size models with dynamic demand, and inventory models of spare parts.

Unit -V

Materials Requirement Planning (MRP) Introduction. Inventory in a manufacturing environment. Principles of MRP, MRP processing logic. MRP systems, and MRP-II,Jut-In-Time manufacturing: set-up reduction, stable MPS, and Kanban control.

COURSE OUTCOMES:

From this course, students will be able to

1. Describe Forecasting principles and techniques for short-range and long-range planning
2. Analyse Production requirements for each product and plan the shop floor activities
3. Elaborate Work station loading and scheduling of paths to avoid bottlenecks for smooth production
4. Design Solution for product mix decision using OR techniques.
5. Analyse optimal job sequences to achieve the minimum makespan with maximum production

REFERENCES

1. Montgomery, Operations Research in Production Planning, Scheduling and Inventory Control — Prentice Hall, N.J
2. Buffa, E.S., Operations Management — John Wiley & Sons.
3. Elsyod and Boucher Analysis of Production Systems, Prentice Hall, N.J,ISE Series
4. Burbridge, Production Planning — Heinemann Publishers, 1971.

IE12C WORK SYSTEM DESIGN
M. Tech I- SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

UNIT-I

Method study: Purpose of work-study-Objectives, applications, Method study definition & basic procedure selection of job, Various recording techniques like outline process charts, flow charts, Man machine charts, Two handed process charts, sting diagram, flow diagram, Multiple activity chart, Simo, Cycle-graphs and chrono-cycle graphs, Critical examination, development and maintenance of improved methods.

UNIT-II

Micro motion studies: Use of fundamental hand motions- principles of motion economy and work place layout, Process planning and design of jigs and fixtures. Applications of method study in office and other diverse functional areas for development and implementation of work systems.

UNIT-III

Ergonomics-Introduction to ergonomics and human engineering, physical basis of mans Perception of his environment. Anthropometry and work design, studies on human psycho sensorial processes for design of work systems.

UNIT-IV

Work Measurement-Work measurement objectives and techniques, time study and rating systems, allowances, standard and allowed time, production norms, production study, activity sampling development of synthetic and standard data, application of work study in non — traditional areas like hospitals, public utilities, etc.

UNIT-V

Principles of predetermined motion time systems (PMTS). The MTM system, its history and development, basic motions and their control characteristics, simultaneous and combined motions, limiting motions, learning curve concepts, application of PMTS & MTM.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Apply the work study procedures and analyse the methods using various recording techniques.
2. Use principles of motion economy and apply the method study in diverse functional areas for development and implementation of work systems.
3. Understand the concept of anthropometry and work system for ergonomic design of work systems
4. Estimate the standard time for a given task using different work measurement systems.
5. Apply the concepts of learning curves, PMTS & MTM to reveal the existence of ineffective time.

REFERENCES

1. Mundel, Motion and Time Study,PHI,1973
2. Niebel, Motion and Time Study. USA Edition
3. Barnes, Motion and Time Study — Design and Measurement of Work.
4. Hank Book of industrial Engineers by H.BMaynard
5. Work study and Ergonomics - S.K. Sharma and Savita Sharma
6. Workstudy – Suresh Dalela

IE13C FACILITIES PLANNING
M. Tech I- SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

UNIT-I

Facilities Planning: Definition, Significance, Objectives and process of facilities planning — strategic facilities planning; Relationship between product, process and schedule design and facilities planning. Activity relationships and space requirements planning personnel requirements.

UNIT-II

Material Handling: Definition, principles, system design and selection of equipment, unit load concepts. Basic layout types — Immer, Nadler, Muther Apple James and Ree's approaches to plant layout. Modular design concept. Production Line balancing.

UNIT-III

Computer Aided Layout: CRAFT, COFAD, PLANET, CORELAP, ALDEP. Planning for receiving and shipping, storage and ware housing, manufacturing, office planning, facility services and non — manufacturing functions.

UNIT-IV

Quantitative Approaches to facilities Planning: Deterministic models - single and multi - facility location models. Location - Allocation problems - quadratic assignment problem. Warehouse layout models. Plant location problems. Conveyor models. Storage models.

UNIT-V

Probabilistic models: Conveyor models, waiting line models simulation models and storage models Evaluation, selection, implementation and maintenance of the Facilities plan.

COURSE OUTCOMES:

1. Able to know the concept of facilities planning that aid in design of Product, Process and schedule design.
2. Able to design Material handling equipment for industrial and non-industrial purpose.
3. Able to analyse handling, receiving and shipping of goods using computer aided layout software.
4. Able to solve Problems of ware house, conveyor and allocation models using Quantitative approach.
5. Able to simulate the waiting line models, storage models and conveyor models using simulation software.

REFERENCES

1. Tompkins. J.A. and White, J.A., Facilities Planning.John Wiley& Sons
2. Francies, R.L., and Mc Ginnis White, J.A., Facility Layout and Location — Ananalytical approach, PHI Publications

IE14C APPLIED PROBABILITY AND STATISTICS
M.Tech I SEMESTER
INDUSTRIAL ENGINEERING
Common to Industrial Engineering & Production Engineering
(Programme Elective- I)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction to probability: Probability, sample space — axioms of probability, Random variables — Discrete and Continuous — Expectations — Moment Generating functions. Conditional probability — Bayer's theorem — Independent Events.

UNIT-II

Discrete distributions: Binomial, Hyper geometric, Gama, Students t, Chi-square, Weibell distributions. Bivariate random variables and their distributions (with specific reference to bivariate normal distributions only). Conditional distributions — Covariance, Correlation coefficient — Regression of the mean.

UNIT-III

Functions of random variables: Probability distribution of functions of random variables their joint probability distribution.

Sampling: Sampling Distribution — Law of Large Numbers — Central Limit theorem.

UNIT-IV

Estimation: Point Estimation, Interval Estimation and Confidence Intervals. (Maximum Likelihood Estimation), Bayesians Estimation.

Testing of Hypothesis: Simple hypothesis and the Neyman — Pearson lemma — Composite hypothesis — goodness of fit tests.

UNIT-V

Analysis of variance: One way classification — Randomized, complete block designs

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand the basic concept of probability.
2. Explain random variables for discrete and continuous probability estimation.
3. Define sampling theory, apply it to predict the event, and analyze the statistical distributions.
4. Analyse different Estimations and Testing of hypothesis
5. Apply the concepts of analysis of variance for the Correlation between the observed and experimental values.

REFERENCES

1. Ian F. Blake, An introduction to Applied Probability — John Wiley & Sons
2. Milton, J.S., Arnold, Jee C., Probability and Statistics in the Engineering andComputing Sciences — Mc Grawhill, 2003.

IE14C FINANCIAL MANAGEMENT AND CONTROL
M.Tech I SEMESTER
INDUSTRIAL ENGINEERING
(Programme Elective- I)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Goals and functions of Finance; Concepts in Valuation, Time Value of Money. Principles of Capital budgeting generating of cash flows. Evaluation of investment proposals — Capital rationing and mathematical programming of Capital Budgeting.

UNIT-II

Cost of capital for specific sources of financing and weighted average cost of capital. Evaluation of Risky investments — Generation of information needed to evaluate risky investments when cash flows are independent, sequential decisions and decision trees. Abandonment problems evaluation of projects under firm risk concepts.

UNIT-III

Working capital management — factor, principles short term Vs. long term financing, liquidity of assets and evaluation of alternative ways of financing on the liquidity of firms. Management of Cash and marketable securities management of cash lock box and concentration banking cash management, models of Bumol, Miller and Off, Management of accounts receivable credit collection policies, Evaluating credit applicant, inventory control and financial manager.

UNIT-IV

Cost accounting — Elements of cost, types of methods of costing. Overhead charges and allocation, standard costing and budgetary control/marginal costing. Cost variances — methods of calculating variances. Material, Labour, Expenses and indirect expenses preparation of cost sheets and their usages.

UNIT-V

Tools of financial analysis — financial ratio analysis, Funds flow analysis and financial forecasting, analysis of operating and financial leverage.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Analyse the time value of money, and evaluate the investment proposals and use of different capital budgeting methods.
2. Interpret financial data for the purpose of constructing risk assessment and evaluation of projects under firm risk.
3. Take both long-term and short-term financing decisions and understand the management of Cash and marketable securities management.
4. Understand the several methods of costing, preparation of cost sheets and their usages methods.
5. Apply the tools of financial analysis methods to measure the operating efficiency of business.

REFERENCES

1. Vanhorne, James. C. Financial Management and Policy — Pearson Education.
2. Pandey, I. M., Financial Management
3. Humpton, Financial Decision Making (Concepts, problems and cases) —PHI.
4. Humpton, Hand book of financial decisions —PHI.

IE14C HUMANRESOURCEMANAGEMENT

M.Tech I SEMESTER

INDUSTRIAL ENGINEERING

(Programme Elective- I)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT

UNIT-I

Introduction: Definition of personnel management, concept of labour, organisation and function of the personnel department, personnel policies.

Organisational objectives, functions, relationships, organisational structure of formal and organisations, job design.

UNIT-II

Man power planning: Man power forecasting, mobility and promotion problems, job analysis and job description.

Selection: Developing sources, methods of recruitment, alternative selection policies, application blanks and qualification card, interviews, psychological testing.

UNIT-III

Training: The nature of training, objectives in training, types of training, requirements of effective trainingconventionaltrainingtechniques,grouptraining,organisationdevelopment,evaluatingtraining effectiveness.

Performanceappraisal: Traditional performance appraisal systems, appraisal programs.

UNIT-IV

Wage and Salary Administration: Factors affecting compensation policy – equity and compensation -comparable value, job evaluation, job evaluating systems- simple ranking- job grading-point systems factor comparison system ,effects of job evaluation on human relations, Expectancy theory and compensation, variable compensation, supplementary compensations.

UNIT-

Human Factor Management: Human factors in management behavioural models, motivation, Maslow's hierarchy of needs theory-hygiene approach to motivation, expectancy theory, reinforcement theory McClelland's needs theory, motivational techniques.

Leadership: Definition, trait approaches to leadership, leadership behaviour and styles, situational approach to leadership.

Communication and Counselling: Nature and importance of communications, channels and structure, communication process, Management by objectives, counselling.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand concepts of personnel management and organisational structure of formal and organisations identify the importance of human resources.
2. Understand different tools used in planning of human resource needs and select suitable personnel.
3. Understand the effective training techniques and performance appraisal systems for organisational development
4. Establish and maintain an equitable wage and salary system using Wage and salary administration concepts.
5. Understand the concepts of Human factors in management behavioural models, leadership behaviour and importance of communications

REFERENCES

1. Scott, Clothier, Springel, Personnel Management, McGraw-Hill
2. Strauss and Sayles Personnel, The Human Problems of Management, Prentice Hall.
3. Edwon,B. Fillipo, Personnel Management
4. Koontz, O.Donnel, Weihreich, Essentials of Management, McGraw-Hill.
5. Kapoor, N.D., Introduction to Commercial & Industrial Law, Sultan Chand &Sons.

IE14C EXPERTSYSTEMSIN MANUFACTURING
M. Tech I SEMESTER
Common to Industrial Engineering & Production Engineering

(Programme Elective- I)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Artificial Intelligence & Expert Systems, (Knowledge based systems); Definition — Justification — Structure Knowledge acquisition; Knowledge base, Inference engine, User interface, Explanatory module, Forward and backward chaining

UNIT-II

Knowledge representation and inferencing. Building expert systems Suitability of task, architecture, hardware, software, personnel- Expert system building tools language, shells.

UNIT-III

Commercial software for manufacturing applications in CAD, CAPP, MRP, CAM, MRP II, Adaptive control of devices, Robotics, Process control, Fault diagnosis, Failure analysis etc.;

UNIT-IV

Linking expert systems to other software such as DBMS, MIS, MDB, Process control and office- automation.

UNIT-V

Case studies of typical applications in process planning, tool selection, cutting toolselection, part classification, inventory control, facilities planning, etc.

Course Outcomes:

At the end of the course student will be able to

1. Understand the Knowledge based systems in solving real-time problems.
2. Develop the expert systems
3. Apply expert system software for manufacturing applications
4. Link the expert systems to other software.
5. Solve the problems in the field of machining, inventory control, process planning with the help of expertsystems.

REFERENCES

1. Adodji.B, BAd1I.N Expert System Applications in Engineering & Manufacturing — John Wiley & Sons (l995)
2. Peter Jackson Introduction to Expert Systems. MartinMerryExpertSystem—85

IE15C DESIGNFORMANUFACTURING
M. Tech I SEMESTER
Common to Industrial Engineering & Production Engineering

(Programme Elective- II)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction: Design philosophy-steps in design process-general design rules for manufacturability-basic principles of designing for economical production- creativity in design.

Machining processes: Overview of various machining processes-general design rules for machining- dimensional tolerance and surface roughness-Design for machining- ease – redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT-II

Metal casting: Appraisal of various casting processes, selection of casting process- general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

UNIT-III

Metal joining: Appraisal of various welding processes, factors in design of welding – general design guidelines- pre and post treatment of welds-effects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging–closed die forging design — parting lines of dies — drop forging die design — general design recommendations.

UNIT-IV

Extrusion & Sheet metal work: Design guide lines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.

UNIT-V

Plastics: Viscous elastic and creep behaviour in plastics-design guidelines for plastic components-design considerations for injection moulding – design guidelines for machining and joining of plastics.

COURSEOUTCOMES:

1. Design components for machining
2. Simulate the casting design and choose the best casting process for a specific product.
3. Evaluate the effect of thermal stresses in weld joints
4. Design components for sheet metal work by understanding in depth the sheet metal processes and their formation mechanisms
5. Design plastic components form machining and joining and selecting a proper processes for different joining cases

REFERENCES:

1. Design for manufacture,Johncobert,AdissonWesley.1995
2. Design for Manufacture by Boothroyd,
3. Design for manufacture, James Bralla
4. ASMHandbookVol.20

IE15C MARKETINGMANAGEMENT
M.Tech I SEMESTER
INDUSTRIAL ENGINEERING
(Programme Elective- II)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction: Marketing System, role of scientific marketing analysis. Marketing models, their uses and limitations.

UNIT-II

Product Decisions: How to introduce new product**-** the generation of product idea, product research, developing utility measures for product research. Product evaluation (Break**-** even analysis). Product development (application of PERT/CPM).

Purchasing Decisions: Purchasing under fluctuating prices purchasing with quantity discounts. Pricing

UNIT-III

Decisions: Objectives in setting market price and the policies adopted in setting market price for a certain product. Strategic pricing analysis (Decision trees in pricing analysis).

UNIT-IV

Advertising Decisions: Sales response to advertising, joint optimization of price advertising and quality, Game theory models in advertising. Media advertising allocation model.

UNIT-V

Promotional Decisions: Spatial allocation of selling expenses, sales men recruitment and selection, application of dynamic programming to promotional effort, Branch-switching analysis.

Distribution Decisions: Distribution Systems, Ware housing problems.

COURSEOUTCOMES:

1. State the role and functions of marketing within a range of organizations.
2. Describe key marketing concepts, theories and techniques for analysing a variety of marketing situations.
3. Use written formats to communicate marketing outcomes.
4. Apply the introduced conceptual frame works, theory and techniques to various marketing contexts.
5. Synthesise ideas into a marketing plan.

REFERENCES:

1. Phillips Kotler, Marketing Management Analysis, Planning & Control.
2. Phillips Kotler, Marketing Management—A Model Building Approach.
3. King, Analytical Methods in Marketing.
4. Station, Fundamentals of Marketing.
5. Montgomery, Management Science applied to Marketing.

IE15C SYSTEMDYNAMICS
M.Tech I SEMESTER
INDUSTRIAL ENGINEERING
(Programme Elective- II)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Mental models for traditional management their strengths and weaknesses; Synthesizing concept of traditional management, feedback control, and computer simulation.

UNIT-II

Physical and information flows Causality and its interpretation- Causal loop diagrams and flow diagrams- Decisions and Policies- Level and rate configurations- Principles of modelling- Behavioural characteristics of low order systems.

UNIT-III

Smoothing of information- Exponential delays- Response characteristics of smoothing and delay functions. Simulation of system dynamics models

UNIT-IV

Some applications of system dynamics methodology to policy design problems in industrial economic social, environmental, and technological systems, etc.

UNIT-V

Comparison of system dynamics with popular social science modelling paradigms such as operations research economics and cross- impact theory.

COURSEOUTCOMES:

1. Understand mental models for traditional management and synthesizing concept of traditional management.
2. Able to develop Causal loop diagrams and flow diagrams
3. Analyse the Response characteristics of smoothing and delay functions
4. Apply the system dynamics methodology to policy design problems
5. Able to compare the system dynamics popular social science modelling paradigms.

REFERENCES:

1. Coyle, RG. Management System Dynamics.
2. Forrester, J.W., Industrial Dynamics.
3. Forrester, J.W., Principles of System.
4. Goodman, M.R, Study Notes on System Dynamics.
5. Richardson, G.P. and Pugh, A. L., Introduction to System Dynamics Modelling with DYNAMO.
6. Roberts, E.B., Managerial Applications of System Dynamics.
7. Roberts, N. etal., Introduction to Computer Simulation—The System Dynamics Approach.
8. Mohapatra, P.K.J.,P. Mandal, and Bora, M.C., Lecture Notes on System Dynamics.
9. System Dynamics An International Journal of Policy Modelling, System Dynamics Society of India.
10. System Dynamics Review, System Dynamics Society, M.I.T.

IE15C ENTERPRISE RESOURCE PLANNING
M.Tech I SEMESTER
Common to Industrial Engineering & Production Engineering
(Programme Elective- II)
Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction to ERP: Enterprise – An Overview, Integrated Management Information, Business Modelling, Integrated Data Model

UNIT-II

ERP and Related Technologies Business Processing Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management (SCM), Customer Relationship Management (CRM), MIS - Management Information System, DSS - Decision Support System, EIS - Executive Information System.

UNIT-III

ERP Manufacturing Prospective: MRP - Material Requirement Planning, BOM - Bill of Material, MRP - Manufacturing Resource Planning, DRP - Distributed Requirement Planning, PDM - Product Data Management

UNIT-IV

ERP Modules Finance, Plant Maintenance, Quality Management, Materials Management

UNIT-V

Benefits of ERP Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Design-making Capability

COURSE OUTCOMES:
At the end of the course student will be able

1. To understand the basic concept of enterprise resource planning (ERP).
2. To analyse the related technologies of business processing reengineering.
3. To apply the concept of MRP 1, MRP 2, BOM, DRP and PDM.
4. To develop the ERP models.
5. To understand the ERP reduction of timings and benefits.

REFERENCE:

1. Enterprise Resource Planning - Alexis Leon, Tata McGraw Hill.
2. Enterprise Resource Planning – Diversified by Alexis Leon, TMH.
3. Enterprise Resource Planning - Ravi Shankar & S. Jaiswal ,Galgoti

IE16L INDUSTRIAL LAB – I
M.TECH I SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 0-0-3-1.5

COURSE CONTENT:

LISTOF EXPERIMENTS:

1. Draw two handed process charts for Bolt, Washer & Nut assembly.
2. Performance rating
3. Standard time calculation.
4. Development of OC curves.
5. Pin board study.
6. Inventory control system.
7. Productivity measurement
8. Ergonomic design
9. Random number generation

COURSE OUTCOMES:

1. To develop two handed process charts for Bolt, Washer & Nut assembly.
2. To evaluate performance rating and standard time.
3. To develop OC curves for a sampling study.
4. To understand and analyse the inventory control systems, and random number generation
5. To understand the concept of productivity measurement and ergonomic design.

IE17L SIMULATION LAB – I
M.TECH I SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 0-0-3-3

COURSE CONTENT:

LISTOF EXPERIMENTS:

1. Simplex Method
2. Two Phase Method
3. Big M-Method.
4. Transportation Model
5. Queuing Model
6. Sequencing model
7. Assignment model
8. P-system, Q-system Inventory Models
9. PERT
10. Make or buy decision

COURSE OUTCOMES:

At the end of the course student will be able to

1. To apply the simplex, big M, two-phase methods.
2. To simulate the transportation model, queuing model, sequencing model.
3. To solve P-system, Q-system optimization problems.
4. To apply the PERT for a project duration estimation
5. To solve make or buy decision problems.

IE18C RESEARCH METHODOLOGY AND IPR
M.Tech I SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

UNIT-II

Effective literature studies approaches, analysis, Plagiarism, Research ethics.

UNIT-III

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT-IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT. Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT-V

New Developments in IPR: Administration of Patent System. New developments in IPR, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Understand research problem formulation.
2. Analyse research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

REFERENCES:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & Engineering students"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008.

IE21C ADVANCED OPERATION RESEARCH
M.Tech I SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

UNIT-I

Non - linear Programming: Classical Optimisation techniques and Kuhn Tucker theory — One dimensional minimization — Unconstrained and Constrained minimisation methods – Quadratic programming.

UNIT-II

Stochastic programming — Geometric programming problem and applications.

UNIT-III

Dynamic Programming: Characteristics of dynamic programming problems — single and multi — stage models — Practical applications to inventory and Cargo loading problems.

UNIT-IV

Multi — criteria Optimization: Introduction to multi criteria optimization — Methods of solution. Goal programming and applications.

UNIT-V

Meta Hemistich — genetic Algorithms, Simulated Annealing, Tabu search, Ant Colony Optimization algorithms.

COURSE OUTCOMES:

At the end of the course student will be able

1. To solve classical optimization problems
2. To apply stochastic programming and geometric programming concepts for solving of problems.
3. To solve constrained and Unconstrained and cargo loading problems by dynamic programming.
4. To apply multi criteria and goal programming for different applications.
5. To understand and apply heuristic algorithms for solving of problems.

REFERENCES:

1. Taha, Hamdy. A., Operations Research an Introduction. PHI Edition, 6th Edition.
2. Rao, S.S., Optimisation theory and practice — PHI.
3. Hiller & Liberaman, Operations Research — Tata McGrawhill,7t Edition,2002.

IE22CQUALITY CONTROL AND RELIABILITY
M.TECH I SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

UNIT-1

Basic Concepts: Definitions of quality, Quality of design, Quality of conformance, and Quality of performance, Dimensions of quality, Quality characteristics, Quality control, Statistical quality control and cost of quality.

Fundamentals of Probability and Statistics: Events, Sample space, Probability rules, Dependent and Independent events, Statistical tools in quality control, Concept of variation, Graphical tools for data representation and analysis, Discrete and continuous probability distributions and their applications in quality control, numerical problems

UNIT-2

Control charts for Variables: Variation, Causes of variation, Objectives of control charts, Choice of variable, Subgroup size and sub grouping, frequency of sampling, control limits. Process capability analysis, Relationship of a process in control to specification limits, Variable charts - X bar chart, R chart, σ chart, revision of control limits and RPI, Introduction to custom chart and moving range charts, numerical problems.

UNIT-3

Control charts for Attributes: Control charts for fraction nonconforming (p chart, np chart) and nonconformities (c chart and u chart) with variable and constant sample size, Choice between variables and attributes control charts, revision of control limits, numerical problems.

Failure Data Analysis : Introduction, Failure Data, Quantitative measures, MTTF, MTBF, Bathtub Curve, Mean Life, Life Testing, numerical problems, Introduction to Failure Mode and Effect Analysis.

UNIT-4

Acceptance Sampling: Fundamentals of acceptance sampling, Sampling methods, OC Curves and their characteristics, AQL, IQL, LTPD, AOQ/AOQL. Types of acceptance sampling-Single, Double, Multiple, and Sequential sampling plans, Average Total Inspection, comparison amongst sampling plans, numerical problems

UNIT-5

System Reliability: Definition, Series, parallel and mixed configuration, Block diagram concept, r-out-of-n structure solving problems using mathematical models. Difficulty in achieving reliability, Methods for improving reliability during design, Different techniques available to improve reliability, Reliability-Cost trade off, Prediction and Analysis, numerical problems.

Maintainability and Availability: Introduction, Techniques available to improve maintainability and availability, trade-off among reliability, maintainability and availability, Simple problems

COURSE OUTCOMES:

At the end of the course student will be able to

1. To understand basic concepts of quality control.
2. To apply the control charts of variables (X bar ,P bar charts) for different applications.
3. To apply the control charts of attributes (C bar ,N bar charts) and **conduct Failure Analysis**
4. To apply acceptance sampling plans for quality control.
5. Understand the concepts of reliability management, and **Maintainability and Availability:**

REFERENCES:

1. Fergenbaum, V. Armand, Total Quality Control — Tata MeGrawhill(40th Edition)
2. Besterfield H. Dale., Quality Control — A practical approach — Pearson Education Asia (2nd Edition).
3. Grant, E. L., Statistical Quality Control — Tata Mc Grawhill (6th Edition)
4. Montgomary — Statistical Quality Control — John Wiley & Sons
5. Srinath, L.S., Concepts in Reliability Engineering — Prentice Hall India.

IE23C SUPPLY CHAIN MANAGEMENT
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I
Development of SCM concepts and Definitions – key decision areas – strategic. Supply Chain Management and Key components, External Drivers of Change. Dimensions of Logistics – The Macro perspective and the macro dimension – Logistic system analysis.

UNIT-II
Sourcing strategy: Manufacturing management – make or buy decision – capacity management – Materials Management – choice of sources – procurement planning.

UNIT-III
Distribution strategy: Choice of Market – network design – warehouse designed operation and distribution planning – transportation – packaging.

UNIT-IV
Inventory Strategy: Demand forecasting – inventory planning – planning of stocking facilities – warehouse location allocation. Warehouse design and operations – inventory norms.

UNIT-V
Channels of Distribution – Customer Service Strategy: Identification of Service needs, cost of services – revenue Management.

COURSE OUTCOMES:
At the end of the course student will be able to learn the

1. To understand the concept of SCM and Logistic system analysis.
2. To apply the concepts of manufacturing management and materials management.
3. To develop distribution strategies for market choices warehouses.
4. To develop inventory strategies
5. To understand the channels of distribution.

REFERENCES:

1. Supply Chain Management Strategy, Planning and operation — Sunil Chopra and Peter Meindl.
2. Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies by David Simchi-Levi, Philip Kaminsky and Edith Simchi-Levi
3. Supply Chain Management: Strategy, Planning, and Operation by Sunil Chopra and Peter Meindl 4. Supply Chain Logistics Management by Donald Bowersox, David Closs and M. Bixby Cooper
4. The Handbook of Logistics and Distribution Management: Understanding the Supply Chain by Alan Rushton, Phil Croucher and Peter Baker

IE23C SYSTEM SIMULATION
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I
Modelling: Discrete- event and process representations, High- level and low- level languages.

UNIT-II
Input Modelling: fitting distributions to data, selecting distributions without data, non stationary arrival processes, multi variate input models.

UNIT-III
Output Analysis: point and interval estimation for means, probabilities and quintiles.

UNIT-IV
Experiment Design: terminating vs. steady-state simulation, determining number of reps/batches for fixed precision, initial bias mitigation, use of common random numbers and antithetic variates.

UNIT-V
Variety Generation: pseudorandom number generators, inverse cdf transformation, non stationary arrival processes, multivariate input models Using Simulation in Research: experiment within an experiment approach

COURSE OUTCOMES:
At the end of the course student will be able to
1. To understand about the modelling and types of modelling languages.
2. To develop models with multi variety inputs
3. To perform output analysis.
4. To create the experiments designs.
5. To generate random numbers for Simulation

REFERENCES:

1. J. Banks, J. S. Carson, B. L. Nelson and D. M. Nicol (2001), Discrete Event System Simulation, 3rd Ed., Pearson Education International Series.
2. A. M. Law and W. D. Kelton (2000), Simulation Modeling and Analysis, 3rd Ed., McGraw Hill International - Industrial Engg. Series.

IE23C PROJECT MANAGEMENT
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Basics of Project Management: Introduction, Need for Project Management, Project Management Knowledge Areas and Processes, The Project Life Cycle, The Project Manager (PM), Phases of Project Management Life Cycle, Project Management Processes, Impact of Delays in Project Completions, Essentials of Project Management Philosophy, Project Management Principles

UNIT-II

Project Identification and Selection: Introduction, Project Identification Process, Project Initiation, Pre-Feasibility Study, Feasibility Studies, Project Break-even point

Project Planning: Introduction, Project Planning, Need of Project Planning, Project Life Cycle, Roles, Responsibility and Team Work, Project Planning Process, Work Break down Structure (WBS)

UNIT-III

Organisational Structure and Organisational Issues: Introduction, Concept of Organisational Structure, Roles and Responsibilities of Project Leader, Relationship between Project Manager and Line Manager, Leadership Styles for Project Managers, Conflict Resolution, Team Management and Diversity Management, Change management

UNIT-IV

Project Performance Measurement and Evaluation: Introduction, Performance Measurement, Productivity, Project Performance Evaluation, Benefits and Challenges of Performance Measurement and Evaluation, Controlling the Projects

UNIT-V

Project Execution and Control: Introduction, Project Execution, Project Control Process, Purpose of Project Execution and Control

COURSE OUT COMES:

At the end of the course, students will be able to

1. Understand the project principles and project life cycles as to avoid the project delays and the design stage itself to arrive at the Break-even point
2. Analysis the project planning, the role and responsibility of the team work in the assignment of jobs
3. understand the Organization structure, responsibilities and role of leaders and team management
4. Analyse the Process of Implementation of Performance Measurements For Better Productivity And Project Process Control
5. Execute And Control Of Projects

REFERENCES:

1. Effective project management by Robert K.Wysoki

IE15C INTELLIGENT MANUFACTURING SYSTEMS
M TECH I SEMESTER
INDUSTRIAL ENGINEERING
(Programme Elective- II)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT I:
Computer integrated manufacturing systems – structure and functional areas of CIM system - AD, CAPP, CAM, CAQC, ASRS and advantages of CIM Manufacturing communication systems – MAP/TOP OSI model, data redundancy, top-down and bottom-up approach, volume of information. Intelligent manufacturing – system components, system architecture and data flow, system operation.

UNIT II:
Components of knowledge-based systems – basic components of knowledge based systems, knowledge representation, comparison of knowledge representation schemes, interference engine, knowledge acquisition Machine learning – concept of artificial intelligence, conceptual learning, and artificial neural networks -biological neuron, artificial neuron, types of neural networks, applications in manufacturing.

UNIT III:
Automated process planning – variant approach, generative approach, expert systems for process planning, feature recognition, phases of process planning knowledge Based System for Equipment Selection (KBSES) – Manufacturing system design, equipment selection problem, modelling the manufacturing equipment selection problem, problem solving approach in KBSES, structure of the KBSES.

UNIT IV:
Group technology: models and algorithms – visual method, coding method, cluster analysis method, matrix formation – similarity coefficient method, sorting-based algorithms, bond energy algorithm, cost-based method, cluster identification method, extended ci method.

UNIT V:
Knowledge-based group technology - group technology in the automated manufacturing system, structure of knowledge-based system for group technology (KBSGT) – data base, knowledge base, clustering algorithm.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Describe the performance of manufacturing systems.
2. Derive the systemic approach for designing and implementing manufacturing systems.
3. Analyze new procedures to improve productivity and existing manufacturing systems.
4. Explain and Analyze online collaboration tools to work in complex teams
5. Understand the group technology in automated manufacturing systems.

REFERENCES:

1. Andre Kusaic, "Intelligent Manufacturing Systems" , PHI, 1989.
2. Hamid R.Parsaei and Mohammad Jamshidi,"Design and Implementation of Intelligent Manufacturing Systems" , PHI, 2009.
3. Mikell P Groover, "Automation, Production Systems and Computer Integrated Manufacturing", 8th edition, PHI, 2008.
4. YagnaNarayana, "Artificial neural networks" , PHI,2009.

IE24C PRODUCTIVITYENGINEERINGMANAGEMENT
M.TECH II SEMESTER
(Programme Elective Course – III)
Common to Industrial Engineering & Production Engineering

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Basic definitions and Scope-Significance of Productivity in economic development. Productivity measurement at nation level. Benefits of higher productivity at firm level. Diversity of productivity concepts.

UNIT-II

Productivity measurement models—Partial Productivity models, the multi—factor productivity Computers for productivity measurement. Productivity Evaluation Productivity Models, Total Model. Expression for Total Productivity change, the Productivity Evaluation Tree.

UNIT-III

Productivity Planning—Long and Short Term Productivity models Causes of flow productivity in companies — various strategies for productivity improvement. The Analytical Productivity Model.

UNIT-IV

Productivity Management at Enterprise level—Productivity Improvement Techniques—Technology based, Materials based, Product based, employee based and cost based. Productivity in service industries

UNIT-V

Case Studies, R&D Productivity, Evaluation of R&D, productivity, Technology Transfer.

COURSE OUTCOMES:

At the end of the course student will be able to learn the

1 Analyse the significance of productivity measurement at national level and firm level
2 Implement the Productivity measurement models.
3 develop Productivity Planning
4 apply Productivity Improvement Techniques
5 Carryout case studies of productivity improvement for entrepreneurship development and technology transfer

REFERENCES

1. Sumanth David, J., Productivity Engineering and Management —McGraw-Hill Book(1984)
2. Scott, Sink, D., Productivity Management Planning, Measurement and evaluation, control and Improvement.

IE24C LOGISTICS ENGINEERING & MANAGEMENT
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Logistics: Nature & Concepts – Evolution – Importance – Advantage – Objectives – Components – Functions – Supply Chain Management: Nature & Concepts – Value chain – Functions & Contribution – Effectiveness – Framework – Outsourcing – 3 PLs – 4 PLs – Bull whip effect – SC Relationships – Conflict resolution – Harmonious relationship – Customer Service: Nature & Concepts – Importance – Components – Cost – Gap analysis – Strategic management – Case Study.

UNIT-II

Information: Position of Information in L&SCM – Logistical Informational Systems – Operational Logistical Informational Systems – Integrated Information Technology Solution for L&SCM – Emerging L&SCM – Demand Forecasting: Nature & Components – Impact of forecast on L&SCM – Effective forecasting – Techniques – Selection – Principles – Inventory: Concepts – Types – Functions – Elements – Inventory management – ABC analysis – ABC-VED matrix – Materials Requirement Planning – Distribution Requirement Planning – Just in Time System – Prerequisites – Case study

UNIT III

Transportation: Introduction – Position of transportation in L&SCM – Elements of transportation cost – Modes – Multimodal transport – Containerization – Selection of transportation modes – Transportation decision – Transportation network: routing & scheduling – Warehousing & Distribution Centers

UNIT IV

Protective Packaging: Introduction – Concepts – Functions – Forms – Problems – Policy – Order Processing: Introduction – Concepts – Functions – Elements – Significance – Materials Handling: Introduction – Concept – Objective- Principles – Equipments – Considerations – Purchasing & Sourcing Management: Introduction – Nature – Scope – Importance – Trends – Contemporary sourcing & supplier management – Case study.

UNIT-V

Organization: Introduction – Evolutionary trends of L&SCM – Principles – Factors.
Performance Measurement: Introduction – Dimensions – Basic tools – Impediments to improve performance – Case Study.

COURSE OUTCOMES:

At the end of the course student will be able to learn the

1. To understand the basic fundamentals of logistics nature and concepts.
2. Develop Logistical Informational Systems
3. Develop Transportation network
4. Apply the basic concept of protective packaging and material handling
5. Apply the L&SCM tools to improve performance of organisation.

REFERENCES:

1. Agrawal, D.K., "A Text book of Logistics & Supply Chain Management", MacMillan Publishers India Ltd., 2009.
2. Sunil Chopra & Peter Meindl, "Supply Chain Management, Strategy, Planning and Operation", 2 nd Edition, PHI, 2004.
3. David J. Bloomberg, Stephan Lemay & Joe B. Hanna, "Logistics", PHI, 2002.
4. Jeremy F.Shapiro, "Modeling the Supply Chain", Thomson Duxbury, 2002.
5. James B. Ayers, "Handbook of Supply Chain Management", St. Lucle Press, 2000.

IE24C SERVICE ENGINEERING & MANAGEMENT
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction Strategic service vision, service concepts and strategy, Understanding services, focus on customers, customer service management; Design and delivery of the services, Managing capacity and demand, Service quality and productivity, Globalization of services, Service Network; IT Enabled services, Design and operation of systems for e-Business

UNIT-II

Business Process Management - process analysis, reengineering, process measurement and effectiveness

UNIT-III

Management science application in services- Applications of inventory models, location analysis, queuing theory, operations scheduling, economic analysis, decision models, utility theory, simulation modelling, performance evaluation with data envelopment analysis, AHP and productivity models, evaluation of the dynamics of enablers, inhibitors and results

UNIT-IV

Management Control systems -control processes, performance measurement, variations in management control and modern control systems, management control of projects, management control of reliability; BPO and Services marketing

UNIT-V

Applications of Technology management, Benchmarking, Customer relationship management, Data mining and Knowledge management

COURSE OUTCOMES:
At the end of the course student will be able to learn the

1. To analysis the concept of strategic service vision.
2. To create the business process management and effectiveness of measurements.
3. To apply the management science application in services.
4. To remember the management control systems with their applications.
5. To understand the concept of application of technology management.

REFERENCES:

1. James A. Fitzsimmons and Mona J. Fitzsimmons (2000(T)), Service Management: Operation, Strategy and JIT, Third Edition, McGraw-Hill, Inc, NY.
2. Joseph M. Juran (1992), Quality by Design, The Free press.
3. R. Kalakota and A. B. Whiston (1999), Frontier of Electronic Commerce,AddisonWesley.
4. R. N. Anthony and V. Govindarajan (1998), Management Control Systems, Tata McGraw Hill Publishing Co. Ltd.
5. K. D. Hoffmann and J. E. G. Bateson (2002), Essentials of Services Marketing, Thomson South Western College Publishing.
6. M. J. A. Berry and G. S. Linoff (2001), Mastering Data Mining-The Art and Science of CRM, John Wiley & Sons Inc

IE24C ENERGY MANAGEMENT
M.TECH II SEMESTER
Common to Industrial Engineering & Production Engineering
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction: Principles of energy management. Managerial organization, Functional areas for i) manufacturing industry, ii) Process industry, iii) Commerce, iv) Government, Role of Energy manager in each of these organizations. Initiating, Organizing, and managing energy management programs.

UNIT-II

Energy Audit: Definition and concepts. Types of energy audits, Basic energy concepts, Resources for plant energy studies. Data gathering, Analytical techniques. Energy Conservation: Technologies for energy conservation, Design for conservation of energy materials, Energy flow networks.

UNIT-III

Alternative Energy Sources: **Solar Energy** – Types of devices for Solar Energy Collection.
Solar Energy Collection: Flat plate and concentrating collectors – Classification of concentrating collectors – Orientation and Thermal analysis – Advanced collectors.
Solar Applications: Solar heating/cooling techniques – Solar distillation and drying - Photovoltaic energy conversion.

UNIT-IV

Wind Energy: Sources and potentials – Horizontal and Vertical axis windmills – Performance characteristics.
Solar Energy Storage: Different methods – Sensible, Latent heat and Stratified storage – Solar Ponds.

UNIT-V

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of biogas, utilization for cooking.
Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.
Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

COURSE OUTCOMES:

At the end of the course student will be able to learn the

1. To remember the principles of energy management.
2. To analysis the energy audit.
3. To understand the basic concepts of Alternate energy sources.
4. To understand the basic concepts of alternate energy sources (wind , solar).
5. To understand the basic concepts of biomass , geothermal and ocean energies.

REFERENCES:

1. Energy Management Hand Book / W.C. Turner (Ed)
2. Rai G.D. : Non-conventionalEnergy Sources, Standard PublishersDistributors.
3. Solar Energy /Sukhatme
4. Energy Management Principles / CB Smith/ Pergamon Press
5. Energy Management / W.R.Murthy and G.Mc.Kay / BS Publication
6. Management / H.Koontz and CyrillDonnel / McGraw Hill.

IE25L INDUSTRIAL ENGINEERING LAB-II
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 0-0-3-1.5

COURSE CONTENT:

LIST OF EXPERIMENTS:

1. Sales forecasting.
2. Control charts for Variables.
3. Control charts for Attributes.
4. Development of Bill of Materials for MRP.
5. Draw SIMO charts for Ball Point Pen assembly.
6. Determine cycle time using MTM
7. Draw flow process charts for Activities by taking a case study.
8. Determine percentage utilization using work sampling.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Predict future demand using forecasting techniques.
2. Apply the control charts for checking allowable limits.
3. Prepare the BOM for MRP.
4. Apply the concepts of MTM, SIMO charts and work sampling.
5. Draw flow process chart and conduct work sampling study.

IE26L SIMULATION LAB – II
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 0-0-3-1.5

COURSE CONTENT:

LIST OF EXPERIMENTS:

1. PERT Model
2. Transportation Model
3. Queuing Model
4. Sequencing Problem
5. Assignment Problem.
6. DOE by Taguchi design.
7. DOE by Response surface methodology.
8. Single response Optimization.
9. Multi response Optimization.
10. Layout optimization

COURSE OUTCOMES:

At the end of the course student will be able

1.To apply the PERT for a project duration estimation.
2.To simulate the transportation model, queuing model, sequencing model.
3. To develop DOE by Taguchi and Response surface methodology.
4.To solve the single and multi-response optimization problems.
5. To solve layout optimization problems.

IE27C LEADERSHIP QUALTIES FOR ENGINEERS
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction to Leadership Roles, functions and characteristics of a leader, evolution and growth of leadership, Leadership traits and ethics, Attitude, Behavior, Personality traits and leadership, Types and Styles of leadership, Leader vs Manager, Essential qualities of an effective leader.

UNIT-II

Leadership and Management (Nature, Scope and Significance of Management, Levels of Management, Functions: Planning, Organizing, Staffing, Directing and Controlling, Skills: Conceptual, Human and Technical, Roles: Interpersonal, Informational and Decisional, difference between a leader and a manager)

UNIT-III

Types of Leaders, Leadership styles: Traditional, Transactional, Transformational, Inspirational and servant leadership and Emerging issues in leadership: Emotional Intelligence and leadership, Trust as a factor, Gender and Leadership.

UNIT-IV

Personality: Concept and Definition, Determinants of personality, Personality traits, Personality characteristics in organizations: Self-evaluation, Locus of control, Self-efficacy, Self-esteem, Self-monitoring: Positive and negative Impact.

UNIT-V

Self-Discovery (Awareness of personal values, beliefs and vision that motivates behavior, Personal SWOT, Trust: Openness, confidentiality, blind spot and unknown part of personality, Self-disclosure, seeking feedback, self-reflection, introspection and self-management.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. To understand the leadership roles.
2. To apply the concepts of Leadership and Management.
3. To understand and apply the concepts of Leadership styles.
4. Inculcate and apply personality development aspects.
5. To inculcate and create awareness.

REFERENCES:

1. Organisational Behaviour , M.Parikh and R.Gupta , Tata McGraw Hill Education Private Limited
2. Organisational Behavior, D. Nelson, J.C Quick and P. Khandelwal, Cengage Publication.

IE27C STRESS MANAGEMENT
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING
(Value Added Course)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Meaning and nature of stress: Difference between eustress and distress; Frustration, conflict and pressure; Meaning of stressors; common stressors at work place: Stressors unique to age and gender. Stress and Memory; Stress and Other Cognitive Variables; Stressful environmental conditions on performance.

UNIT-II

Behavioural aspects of Stress: Adaptive and Maladaptive Behaviour; Individual and Cultural Differences: Sources of Stress- Across the Lifespan; College and Occupational Stress.

UNIT-III

Stress and Work performance: Role of communication in managing stress and work performance: Emotional regulation and coping; Emotional intelligence and conflict management: Emotional Basis and Stress; Stress and Conflict in Relationships. Stress intervention – interpersonal, Management Standards and Management Competencies.

UNIT-IV

Strategies of Stress Management: Prevention of stress Challenging Stressful Thinking; Problem Solving; Emotional and cognitive coping styles: Strategies of Synthesis and Prevention: Resilience and Stress; Optimal functioning; Making changes last; Small changes and large rewards.

UNIT-V

Preparing for the Future: Care of the Self: Nutrition and Other Lifestyle Issues: Stress reduction practices: Time management; Exercise; Relaxation techniques; yoga; meditation.

COURSE OUTCOMES:

1. To understand the cognitive variables of stress and Learn Managing Work-Life Balance
2. Preparing for better future by reducing the stress.
3. To understand the nature and consequences of stress
4. To understand the impact of stress on work.
5. To recognize the stressors, Adaptive and Maladaptive behavior

REFERENCES:

1. Baron .L &Feist.J (2000) Health Psychology 4th edition, USA Brooks/Cole
2. Barlow, Rapee, and Perini(2014), 10 Steps to Mastering Stress: A Lifestyle Approach, USA
3. Clayton,M, (2011).Brilliant stressmanagement How to manage stress in any situation's 1st edition, Greart Britain Pearson Education
4. Cooper,C,&Palmer,S, (2000)Conquer Your Stress, London: Institute of personal development Universities Press
5. Dutta, P,K, (2010) Stress management Himalaya, Himalaya Publishing House
6. Lee, K. (2014). Reset: Make the Most of Your Stress: Your 24-7 Plan for Well-being. Universe Publishing.

IE27C UNIVERSAL HUMAN VALUES
M.TECH II SEMESTER
INDUSTRIAL ENGINEERING
(Value Added Course)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction to Value Education : Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations.

UNIT-II

Harmony in the Human Being : Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.

UNIT-III

Harmony in the Family and Society: Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

UNIT-IV

Harmony in the Nature/Existence : Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.

UNIT-V

Implications of the Holistic Understanding – a Look at Professional Ethics : Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

COURSE OUTCOMES:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.

3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

REFERENCES:

1. JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa 8. Bharat Mein Angreji Raj – PanditSunderlal.

IE28M: MINI PROJECT WITH SEMINAR

Instruction Hours/ Week: (L-T-P-C): 1-0-2-2

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Apply emerging technology in processes and systems
2. Analyse the results
3. Deduct conclusions from results
4. Prepare report/document
5. Present effectively

CONTENT:

The students are required conduct experimental work/mathematical modelling/simulation on software packages etc. And collect relevant for analysis, and deduct the conclusions from results. Finally, the student should prepare the report and give seminar on project.

Semester III & IV
PE33ED and PE41D Dissertation Work

Phase–I, Phase–II and Viva-Voce

GUIDELINES FOR DISSERATION PHASE-I AND DISSERATION PHASE-II:

1. The dissertation is a yearlong activity; to be carried out and evaluated in two phases i.e. Phase–I in sem-3andPhase–II in sem-4.

2. The dissertation may be carried out in department laboratories/ industry.

3. After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives.

4. Phase–I evaluation: A committee comprising of guides of respective specialization shall assess the progress/ performance of the student based on report, presentation and Q&A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

5. During phase – II: Student is required to continue Phase-1 as per the schedule and thesis (combined phase-1&2) should be submitted at end of sem-4. Accomplished results/contributions/innovations should be published in reputed journals/ conferences/Patents.

6. Phase – II evaluation: Guide, committee with external examiner shall assess the progress/performance of the student based on report, presentation and Q&A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work.

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Synthesize knowledge and skills previously gained and applied to anin-depth study and execution of new technical problem.
2. Select different methodologies to carry out the selected project work.
3. Deduct conclusions from results
4. Prepare report/document
5. Present effectively



SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI -517502

(AUTONOMOUS)

DEPARTMENT OF MECHANICAL ENGINEERING

(Choice Based Credit System)

R23

POST GRADUATION PROGRAM

MASTER OF TECHNOLOGY
in
PRODUCTION ENGINEERING

Scheme of Instructions and Evaluation
(With effect from the Academic Year 2023-24)

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING: TIRUPATI – 517 502
DEPARTMENT OF MECHANICAL ENGINEERING-SCHEME OF INSTRUCTION- (CBCS) EFFECTIVE FROM THE ACADEMIC YEAR: 2023-2024

M.TECH (PG) SPECIALIZATION: PRODUCTION ENGINEERING

I-SEMESTER

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	PE11C	Advanced Manufacturing Processes	3	1	0	4	4	40	60	100
PCC	PE12C	Advanced Material Technology	3	1	0	4	4	40	60	100
PCC	PE13C	Additive Manufacturing	3	1	0	4	4	40	60	100
PEC	PE14C	Programme Elective- I	3	0	0	3	3	40	60	100
PEC	PE15C	Programme Elective- II	3	0	0	3	3	40	60	100
PCC	PE16L	Production Engineering Lab – I	0	0	3	3	1.5	40	60	100
PCC	PE17L	CAD Lab	0	0	3	3	1.5	40	60	100
MAC	PE18C	Research Methodology and IPR	3	0	0	3	3	40	60	100
	Total		**18**	**3**	**6**	**27**	**24**	**320**	**480**	**800**

List of Programme Elective					
Course Title	**I**	**Applied Probability and Statistics**	**Operations Planning and Control**	**Advanced Casting Technology**	**Expert Systems in Manufacturing**
	II	**Robotics**	**Design for Manufacturing**	**Enterprise Resource Planning**	**Intelligent Manufacturing Systems**

SEMESTER - II

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	PE21C	Computer Integrated Manufacturing	3	1	0	4	4	40	60	100
PCC	PE22C	Cutting Tool Design and Precision Machine Tool Design Strategies	3	1	0	4	4	40	60	100
PEC	PE23C	Programme Elective Course – III	3	0	0	3	3	40	60	100
PEC	PE24C	Programme Elective Course – IV	3	0	0	3	3	40	60	100
PCC	PE25L	Production Engineering Lab – II	0	0	3	3	1.5	40	60	100
PCC	PE26L	CAM LAB	0	0	3	3	1.5	40	60	100
VAC	PE27C	Value Added course	2	0	2	4	3	100	-	100
PCC	PE28M	Mini Project with Seminar	1	1	0	2	2	100	-	100
	Total		**15**	**3**	**8**	**26**	**22**	**440**	**360**	**800**

List of Programme Elective					
Course Title	**III**	**Automation in Manufacturing**	**Metal Forming Technology**	**Quality Control and Reliability Engineering**	**Finite Element Methods**
	IV	**Advanced Welding Processes**	**Oil Hydraulics and Pneumatics**	**Productivity Engineering & Management**	**Energy Management**

Value Added course	I	**II**	**III**
Course Title	**Leadership Qualities For Engineers**	**Stress Management**	**Universal Human Values**

III-SEMESTER

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
OEC	PE31C	Open Elective Course (MOOCs)	0	0	0	0	3	100	-	100
PCC	PE32I	Industrial/ Research Internship (Min of 4 Weeks)	0	0	0	0	3	100	-	100
PCC	PE33D	**Dissertation Work Phase-I**	0	0	24	24	12	40	60	100
	Total		**0**	**0**	**20**	**20**	**18**	**240**	**60**	**300**

IV-SEMESTER

Category	Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits	Scheme of Evaluation		
			Lecture	Tutorial	Practical	Total		Sessional Marks	Semester End Examination Marks	Total
PCC	PE41D	**Dissertation WorkPhase-II and Viva-Voce**	0	0	20	20	10 + 06 = 16	40	60	100
	Total		**0**	**0**	**20**	**20**	**16**	**40**	**60**	**100**

PE11C ADVANCED MANUFACTURING PROCESSES
M.TECH I SEMESTER
PRODUCTION ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

UNIT - I

Abrasive jet machining: Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent developments.

Ultrasonic machining: Elements of the process, machining parameters, the effect of parameters on surface finish and metal removal rate, mechanics of metal removal process parameters, economic considerations, applications, and limitations.

UNIT - II

Electrochemical Processes: Fundamentals of electrochemical machining, metal removal rate in ECM, Tool design, Surface finish, and accuracy economics aspects of ECM.

Wire EDM Process: General Principles and applications of Wire EDM, Mechanics of metal removal, Process parameters, and selection of tool electrode and dielectric fluids, methods of surface finish, and machining accuracy.

UNIT - III

Electron Beam Machining: Generation and control of electron beam for machining, theory of electron beam machining, Principle, advantages, and limitations, comparison of thermal and non-thermal processes.

Plasma Arc Machining: Principle, machining parameters, the effect of machining parameters on surface finish and metal removal rate, applications, limitations

UNIT - IV

Laser Beam Machining: Principle, the effect of machining parameters on surface finish, applications, and limitations.

Surface Processing Operations: Plating and Related Processes, Conversion Coatings, Physical Vapor Deposition, Chemical Vapour Deposition, Organic Coatings, Porcelain Enamelling and other Ceramic coatings, Thermal and Mechanical Coating Processes.

UNIT - V

Processing of Ceramics: Applications, characteristics, Classification. Processing of particulate ceramics, Powder preparations, consolidation, drying, sintering, hot compaction, area of application, and finishing of ceramics. Processing of Composites: Composite Layers, Particulate and fiber-reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, and Polymer matrix composites.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand the Abrasive jet and ultrasonic machining process, applications, recent development, and limitations.
2. Analyze the influence of process parameters on the out responses of electrochemical and wire EDM processes.
3. Explain the Electron Beam and Plasma Arc machining with their principles, applications, and limitations.
4. Know the laser beam application for machining and understand the various surface process operations.
5. Understand and apply the various processing techniques to fabricate ceramic materials and composites for different applications.

REFERENCES:

1. Fundamentals of Modern Manufacturing- Mikell P. Groover, John Wiley & Sons Publishers
2. Modern Machining Process-P.C Pandey and H.S Shan, Tata McGraw - Hill Education (1980)
3. Manufacturing Engineering and Technology – Serope Kalpakjian & Stephen Schmid
4. Advanced Machining Processes / V.K. Jain / Allied Publications.
5. Introduction to Manufacturing Processes / John A Schey *I* Mc Graw Hill.
6. Process and Materials of Manufacturing / R. A. Lindburg / 1st edition, PHI 1990.

PE12C ADVANCED MATERIAL TECHNOLOGY
M.TECH I SEMESTER
PRODUCTION ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

UNIT-I

Introduction of advanced materials: Principle of material for engineering applications and their manufacturability. Selection of Materials: Classification of materials, properties required in engineering materials

UNIT-II

Metallic Materials: Fundamental of metallic materials; Crystal structure of metals and alloys Strengthening mechanisms -Phase diagrams- Heat treatment processes -iron-carbon equilibrium diagrams-Advanced Steels and cast irons-Transformation hardening in steels TTT diagrams. Non-Ferrous Materials and High-Temperature Materials: Structure, physical metallurgy, manufacturability, and properties of Al, Mg, and Ti alloys.

UNIT-III

Composite Materials: Definition, Classification, Types of matrices & reinforcements, characteristics & selection, Fiber composites, laminated composites, particulate composites, pre-pregs, sandwich construction. Fabrication methods of in-situ, ex-situ, and Nano composites.

UNIT-IV

Mechanics of Composites: Introduction, Evaluation of the four elastic moduli – Rule of mixture, ultimate strengths of a unidirectional lamina. Hooke's law for different types of materials, number of elastic constants, Two – dimensional relationship of compliance & stiffness matrix. Hooke's law for two-dimensional angle lamina, engineering constants – angle lamina, Invariants, Theories of failure.

UNIT-V

Smart Materials: Introduction to smart materials. Principles, mechanisms, piezoelectric, magnetostrictive, electrostrictive, magnetorheological, electrorheological materials, smart gels. Shape memory alloys and Applications.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand the Principle and Classification of engineering materials and their properties
2. Elaborate the phase diagrams of metallic materials and their properties
3. Analyze the Classification of composite materials along with their characteristics
4. Derive ultimate strengths of the unidirectional lamina and theories of failures in composites
5. Explain the Principle and mechanism of smart materials and their applications

REFERENCES:

1. Composite Materials handbook - Mein Schwartz - McGraw Hill Book Company - 1984. 2. Mechanics of composite materials - Autar K. - Kaw CRC Press New York. – 1st edition, 1997.
3. Mechanics of composite materials - Rober M. Joness - McGraw Hill Kogakusha Ltd. – 2008.
4. W.D. Callister, Jr, - Material Science & Engineering Addition-Wesly Publishing Co.
5. Light Alloys: From Traditional Alloys to Nano Crystals- I.J. Polmear, Elsevier Publication.
6. Shape Memory Alloys- Corneliu Cismasiu, Sciyo Publication.
7. Smart Materials Fabrication and Materials for Micro-Electro-Mechanical Systems: Volume 276 (MRS Proceedings)" by George C Johnson and A Peter Jardine

PE13C ADDITIVE MANUFACTURING
M.TECH I SEMESTER
PRODUCTION ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

UNIT-I

Introduction: Introduction to Prototyping, Traditional Prototyping Vs Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC and other related technologies, Classification of RP, Need for RP software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Sim plant, Velocity2, VoXim, Solid View, 3DView, etc., Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

UNIT-II

Rapid Prototyping (RP) Processes: Photo polymerization RP Processes: Stereo lithography (SL), SL resin curing process, SL scan patterns, Micro stereo lithography, Applications of Photo polymerization Processes.

Powder Bed Fusion RP Processes: Stereo lithography (SL), SL resin curing process, SL scan patterns, Micro stereo lithography, Applications of Photo polymerization Processes.
Extrusion-Based RP Processes: Fused Deposition Modelling (FDM), Principles, Plotting and path control, Applications of Extrusion-Based Processes.
Printing RP Processes: 3D printing (3DP), Research achievements in printing deposition, technical challenges in printing, Printing process modeling, Applications of Printing Processes.
Sheet Lamination RP Processes: Laminated Object Manufacturing (LOM), Ultrasonic Consolidation (UC), Gluing, Thermal bonding, LOM and UC applications.
Beam Deposition RP Processes: Laser Engineered Net Shaping (LENS), Direct Metal Deposition (DMD), Processing-structure-properties, relationships, Benefits and drawbacks

UNIT-III

Rapid tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct, and Indirect Tooling Methods, Soft and Hard Tooling methods

UNIT-IV

Reverse engineering: Reverse Engineering (RE) Methodologies and Techniques, Selection of RE systems, RE software, RE hardware, RE in product development

UNIT-V

Errors in RP processes and applications: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc., Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand the prototyping, TP vs. RP, RP classification, RP needs and solid view 3D view, and preparation of CAD models.
2. Describe Rapid Prototyping (RP) Processes with their principles, applications, Processing-structure-properties, relationships, Benefits, and drawbacks.
3. Select the rapid tooling methods with Soft and Hard Tooling methods
4. Understand the Reverse Engineering (RE) Methodologies and Techniques.
5. Analyze errors in RP processes and analyze applications of RP in the medical field.

REFERENCES:

1. Chua Chee Kai., Leong Kah Fai., Chu Sing Lim, Rapid Prototyping: Principles and Applications in Manufacturing, World Scientific, 2010.
2. Ian Gibson., David W Rosen., Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Springer, 2010.
3. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.
4. D. T. Pham, S. S. Dimov, Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling, Springer, 2011

PE14C APPLIED PROBABILITY AND STATISTICS
M.TECH I SEMESTER
COMMON TO INDUSTRIAL ENGINEERING & PRODUCTION ENGINEERING
(Programme Elective- I)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction to Probability: Probability, sample space — axioms of probability, Random variables — Discrete and Continuous — Expectations — Moment Generating functions. Conditional probability — Bayer's theorem — Independent Events.

UNIT-II

Discrete Distributions: Binomial, Hyper geometric, Gama, Students t,Chisquare, Weibell distributions. Bivariate random variables and their distributions (with specific reference to bivariate normal distributions only). Conditional distributions — Covariance, Correlation coefficient — Regression of the mean.

UNIT-III

Functions of Random Variables: Probability distribution of functions of random variables their joint probability distribution.

Sampling: Sampling Distribution — Law of Large Numbers — Central Limit theorem.

UNIT-IV

Estimation: Point Estimation, Interval Estimation, and Confidence Intervals. (Maximum Likelihood Estimation), Bayesians Estimation.

Testing of Hypothesis: Simple hypothesis and the Neyman — Pearson lemma — Composite hypothesis — goodness of fit tests.

UNIT-V

Analysis of Variance: One way classification — Randomized, complete block designs.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand the basic concept of probability.
2. Explain random variables for discrete and continuous probability estimation.
3. Define sampling theory, apply it to predict the event, and analyze the statistical distributions.
4. Analyse different Estimations and Testing of hypothesis
5. Apply the concepts of analysis of variance for the Correlation between the observed and experimental values.

REFERENCES

1. Ian F. Blake, An introduction to Applied Probability — John Wiley & Sons(1979)
2. Milton, J.S., Arnold, Jee C., Probability and Statistics in the Engineering and Computing Sciences — Mc Grawhill, 2003.

PE14C OPERATIONS PLANNING AND CONTROL
M.TECH I SEMESTER
COMMON TO INDUSTRIAL ENGINEERING & PRODUCTION ENGINEERING
(Programme Elective- I)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I
OPC is a system approach—types of production and OPC functions.
Forecasting: Forecasting Methods — Qualitative Methods — Quantitative methods— moving average and exponential smoothing methods for different data patterns. Forecast errors, Tracking signal.

UNIT-II
Mass Production Management Principles of flow lines, Assembly line balancing; approach to line balancing — RPW, COMSOAL, Integer, and Dynamic programming formulations. Introduction to transfer lines.

Production Planning Linear programming formulations for static demand cases, Product Mix Decisions. Chance- constrained programming models.

UNIT-III
Aggregate Production Planning Production planning under dynamic conditions strategies, costs involved, Heuristic methods, linear production, and inventory programs. Aggregate production planning — HMMS model, search decision, parametric production planning, management coefficient models. Disaggregation- hierarchical planning, mathematical programming formulations. Master Production Schedule.

UNIT-IV
Operations Scheduling Flow shop sequencing and job scheduling. Periodic review models. Continuous review models, lot size models with dynamic demand, and inventory models of spare parts.

UNIT-V
Materials Requirement Planning (MRP): Introduction. Inventory in a manufacturing environment. Principles of MRP, MRP processing logic. MRP systems, and MRP — II, Jut-In-Time manufacturing: set-up reduction, stable MPS, and Kanban control.

COURSE OUTCOMES:

From this course, students will be able to

1. Describe Forecasting principles and techniques for short-range and long-range planning
2. Analyze Production requirements for each product and plan the shop floor activities
3. Elaborate Work station loading and scheduling of paths to avoid bottlenecks for smooth production
4. Design Solution for product mix decision using OR techniques.
5. Analyse Optimal job sequences to achieve the minimum makespan with maximum production

REFERENCES

1. Montgomery, Operations Research in Production Planning, Scheduling and Inventory Control — Prentice Hall, N.J
2. Buffa, E.S., Operations Management — John Wiley & Sons.
3. Elsyod and Boucher Analysis of Production Systems, Prentice Hall, N.J,ISE Series
4. Burbridge, Production Planning — Heinemann Publishers, 1971.

PE14C ADVANCED CASTING TECHNOLOGY
M TECH I SEMESTER
PRODUCTION ENGINEERING
(Programme Elective- I)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Moulding Materials Sand — Silica, Zircon, Chromite, Olivine sands; Binders —Bentonite, cement, sodium silicate, Ethyl silicate, plaster of Paris, carbohydrates, setting oils, synthetic resins; Additives — Coal dust, wood flour, silica flour; Mould and core coatings; Moulds auxiliary materials; Parting agents, core paste, exothermic, insulating sleeve materials; Sand testing and controls.

UNIT-II

Furnaces Design features of Arc and Induction furnaces, heat treatment furnaces including salt bath furnaces and induction heating

UNIT-III

Principles of Casting Design Basic concepts of Engg. Analysis of metal fabrication with particular reference to casting processes. Factors influencing the production of engg., castings to customers' specifications, attempt making. Chvorinov's rule, design of running and feeding systems; factors affecting the engineering design of castings. Functional design, freezing range alloys in metallic and non—metallic moulds, grain refinement, modification, various types of defects in non—ferrous alloys, influence of form and environment.

UNIT-IV

Non-ferrous foundry metallurgy Properties of liquid metals, their significance in foundry practice, oxidation, solution of gases in metals, fluidity, hot tear, shrinkage and solidification Mechanisms of pure metals, Eutectic and long range freezing alloys — some advances in die casting including Acurad process — some features of steel foundry practice, specification of moulding material, Foundry practice of non-ferrous metals and alloys.

UNIT-V

Foundry Mechanization and management General principles and objectives, Plant layout Mechanization foundries, selection of equipment, operation and flow process charts.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Identify materials for moulding, additives, coating, and the methods of sand controls.
2. Analyze different furnaces for metal melting and design a suitable furnace depending on materials.
3. Explain the concepts related to the casting processes and the factors influencing the design process for metals and alloys.
4. Describe the properties of liquid metals and their compositions and attain the various alloys depending upon the temperature, Iron-carbon diagram.
5. Understand the principles of mechanization of foundries with their layouts and purchase of suitable plant layouts.

REFERENCES

1. Rosenthal et al., Principles of Metal Casting — Tata Mc Grawhill Publishers.
2. Ruddle Riser and Gating design
3. Murphy Non — ferrous Foundry Metallurgy
4. Tompkins and White Facilities planning — John Wiley & Sons.
5. Flinn Metal Casting — Prentice Hall India.
6. P. L. Jam Principles of Metal Casting — Tata McGraw-Hill
7. O. P. Khanna Foundry Technology — Khanna Publishers.

PE14C EXPERTSYSTEMSIN MANUFACTURING

M. Tech I SEMESTER

Common to Industrial Engineering & Production Engineering

(Programme Elective- I)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Artificial Intelligence & Expert Systems, (Knowledge based systems); Definition — Justification — Structure Knowledge acquisition; Knowledge base, Inference engine, User interface, Explanatory module, Forward and backward chaining

UNIT-II

Knowledge representation and inferencing. Building expert systems Suitability of task, architecture, hardware, software, personnel- Expert system building tools language, shells.

UNIT-III

Commercial software for manufacturing applications in CAD, CAPP, MRP, CAM, MRP II, Adaptive control of devices, Robotics, Process control, Fault diagnosis, Failure analysis etc.;

UNIT-IV

Linking expert systems to other software such as DBMS, MIS, MDB, Process control and office- automation.

UNIT-V

Case studies of typical applications in process planning, tool selection, cutting tool selection, part classification, inventory control, facilities planning, etc.

COURSEOUTCOMES:

At the end of the course student will be able to

1. Understand the Knowledge based systems involving real-time problems.
2. Develop the expert systems
3. apply expert system software for manufacturing applications
4. Link the expert systems to other software.
5. Solve the problems in the field of machining, inventory control, process planning with the help of expert systems.

REFERENCES

1. Adodji.B,BAd1I.NExpertSystemApplicationsinEngineering&Manufacturing —JohnWiley&Sons(l995)
2. Peter JacksonIntroductiontoExpertSystems.MartinMerryExpertSystem—85

PE15C ROBOTICS
M TECH I SEMESTER
PRODUCTION ENGINEERING
(Programme Elective- II)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Fundamentals of robotics – Automation and robotics, Robot Anatomy, Four common robot configurations – SCARA robot – kinematic joints – prismatic, revolute, twisting and revolving Robot wrist motions – YPR motions– Robot work volumes – Robot characteristics – Spatial resolution, Accuracy, Repeatability.

UNIT-II

Control Systems and components – Basic control systems components and models – Mathematical models, transfer function – Block diagrams, Characteristic equations – Controllers – Proportional control, Integral control, Proportional and Derivative (PD) control, Proportional and Integral (PI) control and PID Control. Stability and speed of response of a robot arm.

UNIT-III

Drive systems and sensors –Servo-controlled and non-servo-controlled robots. Powering of the robot arm – Hydraulic, Pneumatic, and Electric drives – Robot joint control design. Types of sensors – Contact and non–contact type sensors – Position sensors – velocity sensors – force sensors – torque sensors – Tactile sensors – proximity and range sensors – Vision sensors.

UNIT-IV

Trajectory planning of a robot arm – cubic polynomials – Trajectory planning and robot controller. Robot end–effectors – grippers and tools – Mechanical grippers – types of gripper mechanisms – gripper force analysis – vacuum grippers – magnetic grippers – Remote Centre Compliance (RCC) device.

UNIT-V

Robot arm kinematics – Homogeneous transformation matrix – DH matrix – Forward and Inverse kinematics of 2R and 3R robot manipulators, Robot Programming methods – Offline and online programming – Manual programming, Lead through programming, robot programming languages—industrial applications of robots.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand the fundamentals of robotics and its anatomy.
2. Analyze Robot Configuration and its controls.
3. Describe the Principles of robot programming and handle with a typical robot, control systems & sensors.
4. Analyze the Construction and working of robot components.
5. Design automatic manufacturing cells with robotic controls, robot kinematics, and programming.

REFERENCES

1. John J. Craig, Introduction to Robotics Mechanics and Control, Second Edition, Addison Wesly Longman Inc. International Student edition, 1999
2. Mark W. Sponge & Vidya Sagar M., "Robot Dynamics and Control," Wiley; 1st Edition (1989)
3. Tsuneo Yohikwa, Foundations of Robotics Analysis and Control, Prentice Hall of India Pvt. Ltd., 2001
4. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel and Nicholas G. Odrey, "Industrial Robotics Technology, Programming and Applications," Mc Graw Hill Book Company, 1986
5. R.K. Mittal and I.J. Nagrath, "Robotics and Control," McGraw Hill Education (India) Private Ltd., 2014.
6. Gonzalez KSFURC and Lee C.S.G., "Robotics-Control, Sensing, Vision, and Intelligence" Mcgraw-Hill Book Company (July 1987).
7. Deb S.K, Deb,s "Robotics Technology and Flexible Automation", Tata McGraw-Hill Education Private Limited, 2009.
8. Ganesh S. Hegde, A textbook on Industrial Robotics, Laxmi Publications (P) Ltd., 2007.

PE15C DESIGN FOR MANUFACTURING
M TECH I SEMESTER
COMMON TO INDUSTRIAL ENGINEERING & PRODUCTION ENGINEERING
(Programme Elective- II)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction: Design philosophy-steps in design process-general design rules for manufacturability-basic principles of designing for economical production-creativity in design.

Machining Processes: Overview of various machining processes-general design rules for machining- dimensional tolerance and surface roughness-Design for machining – ease – redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT-II

Metal Casting: Appraisal of various casting processes, selection of casting process, -general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

UNIT-III

Metal Joining: Appraisal of various welding processes, factors in the design of weldments – general design guidelines-pre and post-treatment of welds-effects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations.

UNIT-IV

Extrusion & Sheet Metal Work: Design guidelines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.

UNIT-V

Plastics: Visco elastic and creep behaviour in plastics-design guidelines for plastic components-design considerations for injection moulding – design guidelines for machining and joining of plastics.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Perceive the principles and steps for designing products for economical production.
2. Simulate the casting design and choose the best casting process for a specific product.
3. Evaluate the effect of thermal stresses in weld joints and accessibility of welding processes.
4. Design components for sheet metal work by understanding the design guidelines and principles of sheet metal processes.
5. Design plastic parts for machining, joining, and selecting a proper method for different joining cases.

REFERENCES:

1. Design for manufacture, John cobert, Adisson Wesley. 1995
2. Design for Manufacture by Boothroyd,
3. Design for manufacture, James Bralla
4. ASM Handbook Vol.20

IE15C ENTERPRISE RESOURCE PLANNING
M.Tech I SEMESTER
Common to Industrial Engineering & Production Engineering
(Programme Elective- II)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction to ERP: Enterprise – An Overview, Integrated Management Information, Business Modeling, Integrated Data Model

UNIT-II

ERP and Related Technologies Business Processing Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management (SCM), Customer Relationship Management (CRM), MIS - Management Information System, DSS - Decision Support System, EIS - Executive Information System.

UNIT-III

ERP Manufacturing Prospective: MRP - Material Requirement Planning, BOM - Bill Of Material, MRP - Manufacturing Resource Planning, DRP - Distributed Requirement Planning, PDM - Product Data Management

UNIT-IV

ERP Modules Finance, Plant Maintenance, Quality Management, Materials Management

UNIT-V

Benefits of ERP Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Design-making Capability

COURSE OUTCOMES:

At the end of the course student will be able

1. To understand the basic concept of enterprise resource planning (ERP).
2. To analyse the related technologies of business processing reengineering.
3. To apply the concept of MRP 1, MRP 2, BOM, DRP and PDM.
4. To develop the ERP models.
5. To understand the ERP reduction of timings and benefits.

REFERENCE BOOKS:

1. Enterprise Resource Planning - Alexis Leon, Tata McGraw Hill.
2. Enterprise Resource Planning – Diversified by Alexis Leon, TMH.
3. Enterprise Resource Planning - Ravi Shankar & S. Jaiswal ,Galgotia

PE15C INTELLIGENT MANUFACTURING SYSTEMS
M TECH I SEMESTER
PRODUCTION ENGINEERING
(Programme Elective- II)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT I:
Computer integrated manufacturing systems – structure and functional areas of CIM system - AD, CAPP, CAM, CAQC, ASRS and advantages of CIM Manufacturing communication systems – MAP/TOP OSI model, data redundancy, top-down and bottom-up approach, volume of information. Intelligent manufacturing – system components, system architecture and data flow, system operation.

UNIT II:
Components of knowledge-based systems – basic components of knowledge based systems, knowledge representation, comparison of knowledge representation schemes, interference engine, knowledge acquisition Machine learning – concept of artificial intelligence, conceptual learning, and artificial neural networks -biological neuron, artificial neuron, types of neural networks, applications in manufacturing.

UNIT III:
Automated process planning – variant approach, generative approach, expert systems for process planning, feature recognition, phases of process planning knowledge Based System for Equipment Selection (KBSES) – Manufacturing system design, equipment selection problem, modelling the manufacturing equipment selection problem, problem solving approach in KBSES, structure of the KBSES.

UNIT IV:
Group technology: models and algorithms – visual method, coding method, cluster analysis method, matrix formation – similarity coefficient method, sorting-based algorithms, bond energy algorithm, cost-based method, cluster identification method, extended ci method.

UNIT V:
Knowledge-based group technology - group technology in the automated manufacturing system, structure of knowledge-based system for group technology (KBSGT) – data base, knowledge base, clustering algorithm.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Describe the performance of manufacturing systems.
2. Derive the systemic approach for designing and implementing manufacturing systems.
3. Analyse new procedures to improve productivity and existing manufacturing systems.
4. Explain and Analyse online collaboration tools to work in complex teams
5. Understand the group technology in automated manufacturing systems.

REFERENCES:

1. Andre Kusaic, "Intelligent Manufacturing Systems", PHI, 1989.
2. Hamid R.Parsaei and Mohammad Jamshidi, "Design and Implementation of Intelligent Manufacturing Systems", PHI, 2009.
3. Mikell P Groover, "Automation, Production Systems and Computer Integrated Manufacturing", 8th edition, PHI, 2008.
4. Yagna Narayana, "Artificial neural networks", PHI, 2009.

PE16L PRODUCTION ENGINEERING LAB –I
M TECH I SEMESTER

PRODUCTION ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 0-0-3-3

COURSE CONTENT:

LIST OF EXPERIMENTS:

1. Inspection of drill JIG.
2. Simulation of CNC programming, using XL turning m/c
3. Simulation of CNC programming, using milling m/c
4. Screw thread measurement using profile projector
5. Straightness testing by using the Wedge method.
6. Study of Measuring Instruments
7. Sine bar
8. Sand analysis

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Perform Drill jig inspection.
2. Write CNC programming for turning and milling
3. Understand the working of measuring instruments
4. Perform profile and straightness measurements.
5. Utilize the sine bar and sand analysis for the casting process.

PE17L CAD LAB

M TECH I SEMESTER

Instruction Hours/ Week: (L-T-P-C): 0-0-3-3

COURSE CONTENT:

1) Modeling and analysis of machine parts using modeling and simulation packages.
2) Minimum of four exercises in structural and thermal analysis is to be carried out.
3) A case study has to be done by the each student.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand the commands of CAD and CAE software's.
2. Able to analyse the structural problems and their solutions using CAE.
3. Able to analyse the thermal problems and their solutions using CAE..
4. Able to analyse manufacturing problems and simulation using the CAE software.
5. Able to apply CAD tools for design and manufacturing applications.

PE18C RESEARCH METHODOLOGY AND IPR
M.TECH I SEMESTER
PRODUCTION ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

UNIT-II

Effective literature studies approaches, analysis, Plagiarism, Research ethics.

UNIT-III

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT-IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT. Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT-V

New Developments in IPR: Administration of Patent System. New developments in IPR, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

REFERENCES*:*

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & Engineering students"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008.

PE21C COMPUTER INTEGRATED MANUFACTURING
M.TECH II SEMESTER
PRODUCTION ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

UNIT-I

Introduction: Scope of computer-integrated manufacturing, Product cycle, and Production automation.

Group Technology: Role of group technology in CAD/CAM integration, Methods for developing part families, Classification and coding, Examples of coding systems, Facility design using group technology, Benefits of GT.

UNIT-II

Computer Aided Process Planning: Role of Process Planning, Approaches to process planning- Manual, Variant, Generative approach; Examples of Process planning systems - CAPP, DCLASS, CMPP; Criteria for selecting a CAPP system, Benefits of CAPP.

UNIT-III

Integrative Manufacturing Planning and Control: Role of integrative manufacturing in CAD/CAM integration, Overview of production control - Forecasting, Master production schedule, Rough – Cut Capacity planning, MRP, Capacity Planning, Order release, Shop-floor control, Quality assurance, Manufacturing Planning, and control systems; Cellular manufacturing, JIT manufacturing.

UNIT-IV

Computer-Aided Quality Control: Terminology in quality control, Contact inspection methods, Non-contact inspection methods, Computer aided testing, and Integration of CAQC with CAD/CAM.

UNIT-V

Computer Integrated Manufacturing Systems: Types of manufacturing systems, Machine tools and related equipment, Material handling systems, Computer control systems, CIMS Benefits.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Define the scope of integrated manufacturing in production.
2. Different Approaches of the planning process in CAPP and their benefits
3. Design a manufacturing cell and cellular manufacturing system
4. Understand the Importance of inspection methods in CAQC
5. Explain types of manufacturing systems and material handling in CIM

REFERENCES*:*

1. Computer Integrated Design and Manufacturing by David D. Bedworth, Mark R. Henderson, Philip M. Wolfe.
2. CAD / CAM by Groover & Zimmers (PHI)
3. Automation, Production Systems, and Computer Integrated Manufacturing- by M.P.Groover (PHI)
4. "Computer Integrated Manufacturing System," Yorem Koren, McGraw-Hill, 1983.
5. "Computer Integrated Manufacturing," Ranky, Paul G., Prentice Hall International, 1986.

PE22C CUTTING TOOL DESIGN AND PRECISION MACHINE TOOL DESIGN STRATEGIES
M.TECH II SEMESTER
PRODUCTION ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 3-1-0-4

COURSE CONTENT:

UNIT-I

Cutting tool geometry – Tool terminology – Tool signature/nomenclature of single point cutting tool – Tool geometry in ASA, ORS, and NRS systems – Functional angles – true rake and inclination angle – Deformation of metals during cutting – Basic mechanics of metal cutting process – Mechanism of chip formation – Orthogonal cutting and Oblique cutting – Thin zone model and thick zone model – Types of chip – Chip curl – Chip breakers.

UNIT-II

Thin zone model – Merchant analysis – Kinematics of chip –Calculation of metal cutting strain – Measurement of Cutting forces – Dynamometry – Merchant theory and Lee and Shaffer theory – Friction in metal cutting – Effect of friction. Cutting tool materials – Coating of cutting tools – chemical vapor deposition and physical vapor deposition methods.

UNIT-III

Thermal aspects of machining and cutting temperatures and Acoustic Emission (AE) in metal cutting. Cutting fluids – Basic forms of wear in metal cutting – Adhesive, Abrasive and solid–state diffusion. Tool wear and Tool failure – crater wear and flank wear – wear land – Tool life equation – Variables affecting tool life—the economics of machining.

UNIT-IV

Fundamentals of drilling and grinding – Power of drilling – Theory of grinding – Cutting tool design – Types – single point and multi–point cutting tools – Design of a single point turning tool – strength and rigidity criteria – Design of multi–point cutting tools – Profile milling cutters, Drills, Broach and design of Form tools.

UNIT-V

Developments in cutting tool materials for high-speed machining, Introduction to micromachining, Differences between macro cutting and micro cutting, characteristics of micro cutting – size effect, minimum chip thickness, the specific power consumption, etc.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Describe cutting tool geometry and mechanism of chip formation.
2. Understand and explain merchant theory, Lee and Shaffer's theory
3. Understand the practical aspects of tool wear and tool life and their influence on economics
4. Analyze different types of tools and their applications
5. Describe macro and micro cutting and their characteristics.

REFERENCES:

1. N. Lopenz de Lacalle et al. Machine tools for high-performance machining, Springer, 2009.
2. Cyril Donaldson, Tool Design, Tata McGraw Hill Edition
3. ASTME Handbook Tool Design, PHI.
4. Tool Design Pollock, Reston D Taraporevala Sons,1983
5. Tool Design Nagpal, Khanna Publishers — 1991
6. G.Kuppuswamy, Principles of Metal Cutting, Orient Longmans, Hyderabad, India
7. B.L Juneja G.S.Sekhon — Fundamentals of Metal Cutting and MK tools, New Age India Pvt. Ltd. Publishers.

PE23C AUTOMATION IN MANUFACTURING
M.TECH II SEMESTER
PRODUCTION ENGINEERING
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction: Types and strategies of automation, pneumatic and hydraulic components, circuits, automation in machine tools, mechanical feeding and tool changing, and machine tool control.

UNIT-II

Automated Flow Lines: Methods of part transport, transfer mechanism, buffer storage, control function, design, and fabrication considerations.
Analysis of automated flow lines - General terminology and analysis of transfer lines without and with buffer storage, partial automation, and implementation of automated flow lines.

UNIT-III

Assembly System And Line Balancing: Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

Automated Material Handling And Storage Systems: Types of equipment, functions, analysis, and design of material handling systems, conveyor systems, automated guided vehicle systems. Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT-IV

Adaptive Control Systems: Introduction, adaptive control with optimization, adaptive control with constraints, application of adaptive control in machining operations. Consideration of various parameters such as cutting force, temperatures, vibration and acoustic emission in the adaptive controls systems.

UNIT-V

Automated Inspection: Fundamentals, types of inspection methods and equipment, Co-ordinate Measuring Machines, Machine Vision.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand the various types of automation systems.
2. Solve the line balancing problems in the various flow line systems with and without the use of buffer storage
3. Analyze the different automated material handling, storage and retrieval systems, and automated inspection systems.
4. Utilization of Adaptive Control principles and implementing the same online inspection and control
5. Understand the fundamentals of automation inspection methods.

REFERENCES:

1. Automation, Production Systems, and Computer Integrated Manufacturing/ M.P. Groover./ Prentice Hall
2. Computer Control of Manufacturing Systems / Yoram Coren/Tata McGraw-Hill edition
3. CAD / CAM/ CIM /P. Radhakrishnan, S.Subrahmanyam, V.Raju/New Age International Publishers
4. Automation / W. Buekinsham, 3rd Edition/PHI Publications

PE23C METAL FORMING TECHNOLOGY
PRODUCTION ENGINEERING
M.TECH SEMESTER II
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I
Characteristics of presses types of crank drives, eccentric, knuckle joint, rocker arm, non—geared and geared fly wheel type number of suspensions, use of counterbalances, etc. Types of friction screw presses — 3 wheels, 4 — wheel Vincent, percussion, Belta drive, electric and hydraulic screw drives.

UNIT-II
Input-output balance diagrams of these drives. Characteristics and stroke rating of these machines. Horizontal forge machine, press frame design, guides.

UNIT-III
Fundamental theories of plasticity and mechanics of plastic deformation equations, methods for solution of problems in metal formation processes.

UNIT-IV
Fluid power in metal forming and related machine tools. Introduction of symbols, pumps, accumulators, and valves. Classification of hydraulic presses extrusion, forging, and deep drawing presses — design features — choice of fluid in hydraulic presses.

UNIT-V
Column design in hydraulic presses. Comprehensive design analysis of a deep drawing press and extrusion press. Hammers for hammer forgings. Classification based on action, stands, controls, and power medium. Theoretical principles involved in estimating the efficiency of a hammer, number of strokes, and power variation during — a play hammer.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand Metal forming fundamentals and applications.
2. Analyze Metal forming mechanics.
3. Understand plastic deformation takes place in Metal forming
4. Application of Fluid hydraulics in Metal forming
5. Design analysis of presses and Explain hammer forging and its efficiency

REFERENCES

1. Row., Metal Forming Technology
2. Crane, Press Working of Metals, John Weliy & Sons, 1957

PE23CQUALITY CONTROL AND RELIABILITY
M.TECH I SEMESTER
PRODUCTION ENGINEERING
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Basic Concepts: Definitions of quality, Quality of design, Quality of conformance, and Quality of performance, Dimensions of quality, Quality characteristics, Quality control, Statistical quality control and cost of quality.

Fundamentals of Probability and Statistics: Events, Sample space, Probability rules, Dependent and Independent events, Statistical tools in quality control, Concept of variation, Graphical tools for data representation and analysis, Discrete and continuous probability distributions and their applications in quality control, numerical problems

UNIT-II

Control charts for Variables: Variation, Causes of variation, Objectives of control charts, Choice of variable, Subgroup size and sub grouping, frequency of sampling, control limits. Process capability analysis, Relationship of a process in control to specification limits, Variable charts - X bar chart, R chart, σ chart, revision of control limits and RPI, Introduction to custom chart and moving range charts, numerical problems.

UNIT-III

Control charts for Attributes: Control charts for fraction nonconforming (p chart, np chart) and nonconformities (c chart and u chart) with variable and constant sample size, Choice between variables and attributes control charts, revision of control limits, numerical problems.

Failure Data Analysis : Introduction, Failure Data, Quantitative measures, MTTF, MTBF, Bathtub Curve, Mean Life, Life Testing, numerical problems, Introduction to Failure Mode and Effect Analysis.

UNIT-IV

Acceptance Sampling: Fundamentals of acceptance sampling, Sampling methods, OC Curves and their characteristics, AQL, IQL, LTPD, AOQ/AOQL.

Types of acceptance sampling-Single, Double, Multiple, and Sequential sampling plans, Average Total Inspection, comparison amongst sampling plans, numerical problems.

UNIT-V

System Reliability: Definition, Series, parallel and mixed configuration, Block diagram concept, r-out-of-n structure solving problems using mathematical models. Difficulty in achieving reliability, Methods for improving reliability during design, Different techniques available to improve reliability, Reliability-Cost trade off, Prediction and Analysis, numerical problems.

Maintainability and Availability: Introduction, Techniques available to improve maintainability and availability, trade-off among reliability, maintainability and availability, Simple problems

COURSE OUTCOMES:

At the end of the course student will be able to

1. To understand basic concepts of quality control.
2. To apply the control charts of variables (X bar ,P bar charts) for different applications.
3. To apply the control charts of attributes (C bar ,N bar charts) and **conduct Failure Analysis**
4. To apply acceptance sampling plans for quality control.
5. Understand the concepts of reliability management, and **Maintainability and Availability:**

REFERENCES:

1. Fergenbaum,V. Armand, Total Quality Control — Tata MeGrawhill(40th Edition)
2. Besterfield H. Dale., Quality Control — A practical approach — Pearson Education Asia (2nd Edition).
3. Grant, E. L., Statistical Quality Control — Tata Mc Grawhill (6th Edition)
4. Montgomary — Statistical Quality Control — John Wiley & Sons
5. Srinath, L.S., Concepts in Reliability Engineering — Prentice Hall India.

PE23C FINITE ELEMENT METHOD
M.TECH II SEMESTER
PRODUCTION ENGINEERING
(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Overview of FEM: Basic concepts – Historical background – General applicability of methods – one-dimensional heat transfer, fluid flow, solid bar under axial load – Engineering applications of finite element method– general procedure in FEM – comparison of FEM and other solutions methods.

UNIT-II

Approximate methods of Analysis: Methods of Weighted residuals – point collocation – Collection of sub-regions – least squares -Galerkin method, - Rayleigh`s method, Rayleigh-Ritz method, Ritz method, FDM

Discretization of Domain: Introduction to the discretization of Domain – Basic element shapes – Discretization process –Types of elements and sizes – Finite representation of bodies – Node Numbering scheme –Automatic mesh generation methods.

UNIT-III

Interpolation Methods: Introduction to interpolation polynomials – Polynomial forms of interpolation functions –Simplex, complex and multiplex elements – interpolation polynomial in terms of nodal degrees of freedom – Selection of order of interpolation polynomial – Convergence requirements – linear interpolation polynomials in terms of global co-ordinates - interpolation polynomials in terms of local co-ordinates.

UNIT-IV

Higher Order and Iso Parametric Elements: Higher order one-dimensional elements – Higher order elements in terms of natural co-ordinates - Higher order elements in terms of interpolation polynomials, One-Dimensional elements, and two-dimensional elements using classical interpolation polynomials – comparative studies of elements – Iso parametric elements - shape function in co-ordinate transformation –continuity and compatibility – Numerical integration

UNIT-V

Applications in Solid Mechanics: Introduction - Plane stress – Plain strain rectangular element – Iso parametric formulation –Axis- metric stress analysis

Applications in Heat Transfer: Introduction – One-dimensional heat conduction: quadratic element – One-dimensional heat conduction with convection

Applications in Fluid Mechanics: Introduction – Governing equation for incompressible flow: Rotational and Irrotational.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Understand the General procedure of FEM and its applications
2. Elaborate on different analysis methods of FEM
3. Describe polynomial forms of interpolation
4. Evaluate high-order one-dimensional elements and iso parametric elements
5. Analyze the various applications of FEM in engineering.

REFERENCES:

1. Finite element method in Engineering – SS. Rao, Edition 4, Elsevier Publications, 2004
2. Fundamentals of Finite Element Analysis, David V. Hutton., Mc Graw Hill Publications, 2004
3. An Introduction to Finite Element Method, Reddy J.N., Mc Graw Hill Publications
4. Introduction to Finite Elements in Engineering: Chnandrupatla T.R.& Belegundu A.D, Pearson education publishers, 4th edition. 2009
5. Finite Element Procedures, Klaus-Jurgen Bathe, Prentice Hall Professional, Revised Edition.1995.

PE24C ADVANCED WELDING PROCESSES
M.TECH II SEMESTER
PRODUCTION ENGINEERING
(Programme Elective Course – IV)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I
General survey and Classification of welding processes. Conventional gas welding and cutting. Manual metal arc welding. Electrode coverings and their functions. Continuous processes based on the above.

UNIT-II
Submerged arc welding — types of fluxes and their compounding Wire and strip electrodes. Gas-shielded welding TIG and MIG and MAG/ CO_2 processes. Consideration of shielding gases, electrode polarity, current setting, metal transfer, and arc length control. Plasma welding and cutting processes. Equipment maintenance, application of the above.

UNIT-III
Electrical power sources for welding; General characteristics of transformer, transformer—rectifier, and motor generator sets. Use of pulsed currents. Pressure welding processes Solid phase bonding, friction welding, and ultrasonic welding.

UNIT-IV
Explosive welding, Diffusion bonding, and adhesive bonding. Resistance welding Spot, Seam and projection welding, Flash and upset butt welding.

UNIT-V
Brazing and soldering: Electron Beam, Laser, and Infrared Welding. Principles, Operational details, process controls, and application of the above processes.

COURSE OUTCOMES:
At the end of the course, students will be able to

1. Understand the different weldability testings for different metals.
2. Describe the different types of welding and its applications.
3. Explain the electric power sources for welding and pressure welding processes.
4. Understand the different types of bondings and their advantages.
5. Distinguish between brazing and soldering and their applications.

REFERENCES

1. The Science and Practice of Welding by Davies, A.C., Cambridge Low Price Edition
2. Welding Processes by Houldcroft, P. T., PHI Publications
3. Welding Technology by Konigsberger, F. Mc Graw Hill Publications
4. Welding and Welding Technology by Little, Richard L, TATA Mc Graw Hill Publications.
5. Welding Engineering by Rossi, Boniface E, PHI, Publications
6. Advanced Welding Systems. Vol.1; Vol.2 and 3 by Jean Cornu, USA Edition.

PE24C OIL HYDRAULICS AND PNEUMATICS
M.TECH II SEMESTER
PRODUCTION ENGINEERING
(Programme Elective Course – IV)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I
Introduction
Functional requirements of power transmission, different types of power transmission systems and their combinations; Fundamentals of oil hydraulics and pneumatics, Control functions of oil hydraulic systems; Comparison between Mechanical, Oil Hydraulic, Pneumatic, and Electrical power transmission systems; Advantages, disadvantages, and Applications of Oil Hydraulic and Pneumatic power transmissions.

UNIT-II
System Components
Hydraulic & Pneumatic Symbols as per ISO/ANSI, Properties and selection of hydraulic fluids, Filtration, Hydraulic Reservoirs, Accumulators, Intensifiers or Pressure Boosters, Seals, and Packing.

UNIT-III
Oil Hydraulic Pumps and Actuators
Construction, the working Principle and operation of rotary & reciprocating pumps like Gear, Vane, Generated-Rotor, Screw, Axial Piston, Radial Piston, Pump characteristics, Specifications and selection of pumps; Linear actuators like Ram type, Telescopic, and Single acting/double acting, types of their constructions, types of mountings, cylinder materials, cushioning of hydraulic cylinders, Rotary actuators, specifications, sizing and selection of pumps and actuators.

UNIT-IV
Control Valves
Construction, working Principle, and operation of Direction control valves, Flow control valves, and Pressure control valves, including Check, Pressure relief, Compound Pilot operated Pressure Relief, Safety, Sequence, Pressure Reducing, Unloading, and Counterbalance valves—different types of center positions of DCVs, Methods of actuation of DCVs.
Hydraulic and Pneumatic Controllers used in Feedback Control systems
Construction, working Principle, and operation of Proportional and Servo control valves, including Servo-type DCV-like nozzle valves, flapper-type valves, mechanical servo valves, single and double stage servo valves; Applications of servomotor systems in feedback control systems.

UNIT-V

Hydraulic Circuits

Reciprocation, quick return, sequencing, flow control circuits, synchronizing circuits, accumulator circuits, industrial circuits like press circuits, machine tool circuits, forklift, earth mover circuits- design and selection of components.

Pneumatic circuits

Compressed air production and distribution, pneumatic control components, examples of application including electro-pneumatic and hydro-pneumatic controls.

COURSE OUTCOME:

At the end of the course, students will be able to

1. Analyze the functional requirements of a power transmission system for a given application.
2. Understand the system components of Hydraulic and pneumatic symbols.
3. Design an appropriate hydraulic or pneumatic circuit, and develop a circuit diagram.
4. Describe the control valves and Hydraulic and pneumatic controller and their applications.
5. Design the hydraulic and pneumatic circuit and its selection.

REFERENCES:

1. Industrial Hydraulics by John Pippenger and Tyler Hicks, McGraw Hill.
2. Oil Hydraulic Systems, Principle and Maintenance by S R Majumdar, McGraw-Hill.
3. Fluid Power with Applications by Anthony Esposito, Pearson.
4. Fluid Power: Generation, Transmission and Control, Jagadeesha T., Thammaiah Gowda, Wiley.
5. The Analysis & Design of Pneumatic Systems by B. W. Anderson, John Wiley.
6. Control of Fluid Power Analysis and Design by Mc Clay Donaldson, Ellis Horwood Ltd.
7. Hydraulic and Pneumatic Controls: Understanding made Easy, K.Shanmuga Sundaram, S.Chand & Co Book publishers, New Delhi, 2006 (Reprint 2009)

PE24C PRODUCTIVITYENGINEERINGMANAGEMENT
M.TECH II SEMESTER
Common to Industrial Engineering & Production Engineering

(Programme Elective Course – III)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Basic definitions and Scope - Significance of Productivity in economic development. Productivity measurement at nation level. Benefits of higher productivity at firm level. Diversity of productivity concepts.

UNIT-II

Productivity measurement models—Partial Productivity models, the multi—factor productivity Computers for productivity measurement. Productivity Evaluation Productivity Models, Total Model, Objectives Matrix. Expression for Total Productivity change, the Productivity Evaluation Tree.

UNIT-III

Productivity Planning- Long and Short Term Productivity models—Causes of low productivity in companies — various strategies for productivity improvement. The Analytical Productivity Model.

UNIT-IV

Productivity Management at Enterprise level—Productivity Improvement Techniques—Technology based, Materials based, Product based, employee based and cost based. Productivity in service industries

UNIT-V

Case Studies, R&D Productivity, Evaluation of R&D, productivity, Technology Transfer.

COURSEOUTCOMES:

At the end of the course student twill be able to

1. Analyze the significance of productivity measurement at national level and firm level
2. Implement the Productivity measurement models.
3. Develop Productivity Planning
4. Apply Productivity Improvement Techniques
5. Carryout case studies of productivity improvement for entrepreneur ship development and technology transfer.

REFERENCES

1. Sumanth David, J., Productivity Engineering and Management — McGrawhill Book(1984)
2. Scott, Sink, D., Productivity Management Planning, Measurement and evaluation, control and Improvement.

PE24C ENERGY MANAGEMENT

M.TECH SEMESTER II

Common to Industrial Engineering & Production Engineering

(Programme Elective Course – IV)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction: Principles of energy management. Managerial organization, Functional areas fori) manufacturing industry, ii) Process industry, iii) Commerce, iv) Government, Role of Energy manager in each of these organizations. Initiating, Organizing, and managing energy management programs

UNIT-II

Energy Audit: Definition and concepts. Types of energy audits, Basic energy concepts, and Resources for plant energy studies. Data gathering, Analytical techniques. Energy Conservation: Technologies for energy conservation, design for conservation of energy materials, and Energy flow networks. Critical assessment of energy usage. Formulation of objectives and constraints, Synthesis of alternative options, and technical analysis of options. Process integration.

UNIT-III

Economic Analysis: Scope, Characterization of an investment project. Types of depreciation, Time value of money. Budget considerations, Risk analysis.

UNIT-IV

Alternative Energy Sources:

Solar Energy – Types of devices for Solar Energy Collection – Thermal Storage System – Control Systems-

Wind Energy – Availability – Wind Devices – Wind Characteristics – Performance of Turbines and Systems.

UNIT-V

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation, and economic aspects.

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Describe the principles and functional area of energy management.
2. Learning the basics of energy auditing with applications in different sectors.
3. Evaluate risk analysis and decision estimations in budget.
4. Identify opportunities for increasing the rational use of alternative energies.
5. Analyze the biomass system, conversion, and utilization.

REFERENCES:

1. Energy Management Hand Book / W.C. Turner (Ed)
2. Renewable Energy Sources fTwideil & Weir
3. Solar Energy /Sukhatme
4. Energy Management Principles / CB Smith/ Pergamon Press
5. Energy Management / W.R.Murthy and G.Mc.Kay / BS Publication
6. Management / H.Koontz and Cyrill Donnel / McGraw Hill
7. Rai G.D. : Non-conventional Energy Sources, Standard Publishers Distributors

PE25L PRODUCTION ENGINEERING LAB –II
M.TECH II SEMESTER
PRODUCTION ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 0-0-3-1.5

COURSE CONTENT:

LIST OF EXPERIMENTS:

1. Measurement of cutting forces using lathe tool dynamometer.
2. Measuring cutting forces using a drill dynamometer
3. To determine the major & minor flank angle of a particular screw by using the tool makers microscope.
4. To arrange the dividing head for differential indexing, to divide a circular part into a number of parts, using differential indexing.
5. Surface roughness measurement by using Talysurf
6. Measurement of cutting forces in milling
7. Spur gear measurement
8. Welding
9. To write a manual part program for the profile turning cycle to the given dimensions for a typical part.
10. To write the manual part program for the drilling operation

COURSE OUTCOMES:

At the end of the course student will be able to

1. Measure cutting forces using a dynamometer for the lathe, drilling, and milling machines, and arrange differential indexing.
2. The major and minor flank angles of the screw by using a toolmakers microscope
3. The surface roughness using Talysurf and Spur gear measurement
4. Perform welding and analysis
5. Part programming for the given typical part and manual part programming for the drilling operation

PE26L CAM LAB

M.TECH II SEMESTER

PRODUCTION ENGINEERING

Instruction Hours/ Week: (L-T-P-C): 0-0-3-1.5

COURSE CONTENT:

LIST OF EXPERIMENTS:

1. Preparation of process planning.
2. CNC programming using G & M codes for the given work piece & also shows the simulation using CNC lathe software.
3. Simulation & execution of a part program for a given component using CNC milling.
4. Fabrication of a component using CNC Lathe.
5. Fabrication of a component using CNC machining center.

Note: Conduct at least 8 Exercises in the above topics.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Define the preparation o process planning.
2. Write a Program for a CNC lathe using G&M codes
3. Analyze the simulation of the CNC lathe process and execute a part program.
4. Write a Program for CNC milling using G&M codes
5. Analyze the simulation of CNC milling and execute a part program for a given component.

PE27C LEADERSHIP QUALTIES FOR ENGINEERS

M.Tech II Semester

Common to Industrial Engineering & Production Engineering

(Value Added Course)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction to Leadership Roles, functions and characteristics of a leader, evolution and growth of leadership, Leadership traits and ethics, Attitude, Behavior, Personality traits and leadership, Types and Styles of leadership, Leader vs Manager, Essential qualities of an effective leader.

UNIT-II

Leadership and Management (Nature, Scope and Significance of Management, Levels of Management, Functions: Planning, Organizing, Staffing, Directing and Controlling, Skills: Conceptual, Human and Technical, Roles: Interpersonal, Informational and Decisional, difference between a leader and a manager)

UNIT-III

Types of Leaders, Leadership styles: Traditional, Transactional, Transformational, Inspirational and servant leadership and Emerging issues in leadership: Emotional Intelligence and leadership, Trust as a factor, Gender and Leadership.

UNIT-IV

Personality: Concept and Definition, Determinants of personality, Personality traits, Personality characteristics in organizations: Self-evaluation, Locus of control, Self-efficacy, Self-esteem, Self-monitoring: Positive and negative Impact.

UNIT-V

Self-Discovery (Awareness of personal values, beliefs and vision that motivates behavior, Personal SWOT, Trust: Openness, confidentiality, blind spot and unknown part of personality, Self-disclosure, seeking feedback, self-reflection, introspection and self-management.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. To understand the leadership roles.
2. To apply the concepts of Leadership and Management.
3. To understand and apply the concepts of Leadership styles.
4. Inculcate and apply personality development aspects.
5. To inculcate and create awareness.

REFERENCES:

1. Organizational Behaviour, M.Parikh and R.Gupta , Tata McGraw Hill Education Private Limited

2. Organizational Behavior, D. Nelson, J.C Quick and P. Khandelwal, Cengage Publication.

PE27C STRESS MANAGEMENT

M.Tech II Semester

Common to Industrial Engineering & Production Engineering

(Value Added Course)

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Meaning and nature of stress: Difference between eustress and distress; Frustration, conflict and pressure; Meaning of stressors; common stressors at work place: Stressors unique to age and gender. Stress and Memory; Stress and Other Cognitive Variables; Stressful environmental conditions on performance.

UNIT-II

Behavioural aspects of Stress: Adaptive and Maladaptive Behaviour; Individual and Cultural Differences: Sources of Stress- Across the Lifespan; College and Occupational Stress.

UNIT-III

Stress and Work performance: Role of communication in managing stress and work performance: Emotional regulation and coping; Emotional intelligence and conflict management: Emotional Basis and Stress; Stress and Conflict in Relationships. Stress intervention – interpersonal, Management Standards and Management Competencies.

UNIT-IV

Strategies of Stress Management: Prevention of stress Challenging Stressful Thinking; Problem Solving; Emotional and cognitive coping styles: Strategies of Synthesis and Prevention: Resilience and Stress; Optimal functioning; Making changes last; Small changes and large rewards.

UNIT-V

Preparing for the Future: Care of the Self: Nutrition and Other Lifestyle Issues: Stress reduction practices: Time management; Exercise; Relaxation techniques; yoga; meditation.

COURSE OUTCOMES:

At the end of the course, students will be able to

1. To understand the cognitive variables of stress and Learn Managing Work-Life Balance
2. Preparing for better future by reducing the stress.
3. To understand the nature and consequences of stress
4. To understand the impact of stress on work.
5. To recognize the stressors, Adaptive and Maladaptive behavior

REFERENCES:

1. Baron .L & Feist.J (2000) Health Psychology 4th edition, USA Brooks/Cole
2. Barlow, Rapee, and Perini(2014), 10 Steps to Mastering Stress: A Lifestyle Approach, USA
3. Clayton,M, (2011).Brilliant stressmanagement How to manage stress in any situation's 1st edition, Greart Britain Pearson Education
4. Cooper,C,& Palmer,S, (2000)Conquer Your Stress, London: Institute of personal development Universities Press
5. Dutta, P,K, (2010) Stress management Himalaya, Himalaya Publishing House
6. Lee, K. (2014). Reset: Make the Most of Your Stress: Your 24-7 Plan for Well-being. Universe Publishing.

PE27C UNIVERSAL HUMAN VALUES

M.Tech II Semester

Common to Industrial Engineering & Production Engineering

Instruction Hours/ Week: (L-T-P-C): 3-0-0-3

COURSE CONTENT:

UNIT-I

Introduction to Value Education : Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations.

UNIT-II

Harmony in the Human Being : Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.

UNIT-III

Harmony in the Family and Society: Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

UNIT-IV

Harmony in the Nature/Existence : Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.

UNIT-V

Implications of the Holistic Understanding – a Look at Professional Ethics : Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

COURSE OUTCOMES:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS.'
2. To ensure sustained happiness and prosperity which are the core aspirations of all human beings
3. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence.
4. To develop a holistic perspective of Universal Human Values and movement towards value-based living in a natural way.
5. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

REFERENCES:

1. Jeevan Vidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal.

IE28M MINI PROJECT WITH SEMINAR

Instruction Hours/ Week: (L-T-P-C): 1-0-2-2

COURSE CONTENT:

The students are required conduct experimental work/mathematical modelling/simulation on software packages etc. And collect relevant for analysis, and deduct the conclusions from results. Finally, the student should prepare the report and give seminar on project.

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Apply emerging technology in processes and systems
2. Analyze the results
3. Deduct conclusions from results
4. Prepare report/document
5. Present effectively.

Semester III & IV
PE33ED and PE41D Dissertation Work

Phase–I, Phase–II and Viva-Voce

GUIDELINES FOR DISSERATION PHASE-I AND DISSERATION PHASE-II:

1. The dissertation is a yearlong activity; to be carried out and evaluated in two phases i.e. Phase–I in sem-3andPhase–II in sem-4.

2. The dissertation may be carried out in department laboratories/ industry.

3. After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives.

4. Phase–I evaluation: A committee comprising of guides o respective specialization shall assess the progress/ performance of the student based on report, presentation and Q&A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

5. During phase – II, student is required to continue Phase-1 as per the schedule and thesis (combined phase-1&2) should be submitted at end of sem-4. Accomplished results/contributions/innovations should be published in reputed journals/ conferences/Patents.

6. Phase – II evaluation: Guide, committee with external examiner shall assess the progress/performance of the student based on report, presentation and Q&A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work.

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Synthesize knowledge and skills previously gained and applied to anin-depth study and execution of new technical problem.
2. Select different methodologies to carry out the selected project work.
3. Deduct conclusions from results
4. Prepare report/document
5. Present effectively

S.V.U. COLLEGE OF ENGINEERING :: TIRUPATI

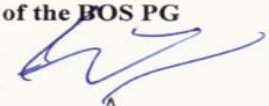
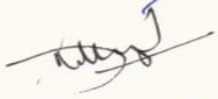
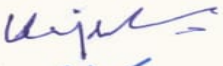
DEPARTMENT OF MECHANICAL ENGINEERING

SVUCE/MED/Minutes/2023 Dt. 02.06.2023

A meeting of the Joint Boards of Studies (PG) of all PG programmes in all the disciplines of Engineering is conducted at 10-30 A.M. on 02-06-2023 (Friday) in Room No. 200 online/offline mode to consider and discuss M.Tech. R-23 regulations, scheme and syllabus of all PG programmes for the Academic Year 2023-2024.

BOARD OF STUDIES (PG) MEETING RESOLUTION

Members of the BOS PG

1. Prof. P. Venkataramaiah : 
   Chairman
2. Prof V. Diwakar Reddy : 
   Head &, Ex-Officio Member
3. Sri K. Rajesh Babu : 
4. Dr. K. Dharma Reddy : 
5. Dr. Hema Pothur : 
6. Prof. G. Prasanthi : Attended Online
   Dept. of Mechanical Engineering
   JNTU, Anantapur
7. Dr. N. Venkaiah :
   Dept. of Mechanical Engineering
   Indian Institute of Technology,
   Tirupati

MINUTES

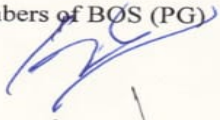
After the meeting of Joint Boards of Studies (PG), the Board of studies of Mechanical engineering meeting is conducted from 1-30 PM on 02-06-2023 (Friday) in committee hall of mechanical engineering.

It is resolved to consider M. Tech. R-23 regulations, scheme and syllabus of two PG programmes:

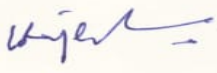
1) Industrial engineering

2) Production engineering for the Academic Year 2023-2024.

The members of BOS (PG)

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2.6.1 -The Institution has started learning outcomes (generic and programme specific) /graduated attributes which are integrated into the assessment process and widely publicized though the website and other documents.

(A) PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design / development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

(B) PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1	Empowering the students for continuous learning and deliver efficient solutions for emerging challenges in the computation domain.
PSO2	Ability to design, develop and implement problems of current research areas.